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IN his article describing railway funded indebtedness, Professor Ripley illustrates his points by citing numerous specific instances. This adds interest to the discussion of general principles, but it is fair to point out that the instances selected are *notable* instances, and frequently exceptions to the rule. In the hundreds of millions of bonds sold each year by the railway companies, all classes of securities are represented, because, of course, of the varying problems that have to be met by the financial officers of the different companies, and in the great majority of cases the financing is carried through very successfully. Professor Ripley takes pains to point out that when he cites a particular case it is not necessarily a typical case, but is often an extreme case illustrative of what a certain kind of financing may lead to. Nevertheless, it is well to call especial attention to this when we publish the first of Professor Ripley's articles in this week's issue of the *Railway Age Gazette.* One thing further may be mentioned: Professor Ripley condemns certain forms of financing or finds them less desirable than certain other forms. This may be good theory, but in practice the thing that should be done is the thing that can be done. A railway's board of directors are given a specific problem which they *must* solve. They may solve this skillfully by the issue of a certain kind of securities, or clumsily by the issue of a certain other kind of securities, but the success or non-success of their efforts should be judged from practical, not theoretical, standpoints.

THE reduction from a 4 to a 3½ per cent. rate of interest by a good many savings banks, notably in New York City, without doubt is directly related in a measure to railway bond investment. The financial strength of a savings bank depends mainly on three classes of securities: railway bonds, municipal and state bonds, and notes secured by realty mortgages. The last may be described as constants and reckoned at neither above nor below face value so long as they are sound, as they usually are. But the other two are variants depending on market values, and the actual surplus of a savings bank rests on those values and whether they go up or down. At the present time, in the case of the savings banks, we are witnessing an anomalous situation. Municipal, railway and state bonds are selling low, that is to say, giving a high investment return. The state of Connecticut, for a recent example, has just marketed $4,000,000 non-taxable 4 per cent.'s at a little above par, while a few years ago her 3½ per cent.'s commanded about the same price. As regards *present* investment, therefore, the Eastern savings banks can secure a higher return than in past years, and to that extent are better able to maintain the old 4 per cent. interest rate. But it is far from making good the bond shrinkage of the recent years, that impairs a surplus based on market values. When we look back on the causes of that shrinkage there can hardly be a doubt that it is to be ascribed originally to the lowered market value of the "good" railway bond, and that, in time, to adverse state and federal action. The good railway bond fell and has brought down with it the municipal and state bonds which, along with railway bonds, the banks hold as security for their deposits. The assault on railway credit has hit public credit too; and not only that but, still proceeding, has hit the savings bank depositor, reducing his dividend one-eighth, or 12.66 per cent. It is not the so-called capitalist alone whom a misguided governmental policy affects; the wage earner when he takes his deposit book to be written up has occasion now to learn that he is a capitalist also—and, in an indirect way, a railway capitalist.

SOME three months ago (September 1, 1911) we gave returns of the Interstate Commerce Commission showing, since 1901, the sustaining power of railway passenger traffic and its relative increase as compared with freight traffic. Since then an interesting table has been compiled for forty-two important railways, by T. A. Polley, tax commissioner of the Chicago, St. Paul, Minneapolis & Omaha, which brings many of the returns down to the current year. Taking his returns for a five-year period ending in 1910, the average annual increase for freight business was 4.63 per cent., as compared with 5.15 per cent. for passengers. In a general way, and with one or two decided exceptions, his later table, which in most cases includes the figures for 1911, indicates a tendency of lines of high intensive freight business to increase that form of traffic, while lines of high passenger intensity do not show a corresponding passenger increase. It seems, therefore, as though the proverb of "making the meat one feeds on" reverses itself in the transfer from freight to passengers. This seems somewhat anomalous when it is remembered that passenger density in a great degree depends on city and suburban traffic, and that the American city grows fast

while the rural districts grow slowly. On the other hand, it is to be recalled that two forces—the automobile and the long distance telephone—which have a tendency to reduce passenger traffic, have worked most actively among urban populations, and even the competition of electric railways, especially to suburban points, has not been quite exhausted. Again, there is probably on low passenger density lines an effort to make good in that direction. At any rate, it is from such lines that the sustaining power of passenger business, taking the railway companies as a whole, appears to have been derived, contrary to the natural inference. On some lines like the Seaboard Air Line, the St. Louis & San Francisco, the Soo and the Great Northern, which are at the foot of the list in absolute passenger density, the percentage increase is highest.

THE comments of the Interstate Commerce Commission in its annual report on the decisions of the Commerce Court in the various cases that have been appealed to it from the commission cannot be regarded otherwise than as a direct attack on the court's intelligence and fairness. The commission contends vigorously that several of the court's decisions are not good law. Its principal complaint, however, seems to be that both the Commerce Court and the Supreme Court have been reviewing its findings of fact. Of course, if, as the commission implies, the Commerce Court does not know the law and should not be allowed to review the commission's findings in fact, the Commerce Court has little excuse for its existence. However, that the commission attacks also the decisions of the Supreme Court in certain cases seems to indicate that its grievance is not merely against the Commerce Court, but grows out of its idea that it (the commission) has a very comprehensive authority, indeed. Its position seems to be that when an appeal is taken from one of its orders affecting rates the courts have no right to set it aside unless it be shown to be confiscatory. On this theory it might make a rate of $15 from Chicago to Omaha and one of 15 cents on the same commodity from Chicago to San Francisco, and nobody would have any right to interfere except Congress, unless it were not shown that the result was to confiscate the railways concerned. But such an adjustment would be unreasonable, and the law as made by Congress requires railway rates to be *reasonable* and merely empowers the commission to fix *reasonable* maximum rates. If the commission chooses to disregard the expressed will of Congress that the rates it fixes shall be reasonable, have those injured no recourse except to appeal for further legislation by Congress to change the rates fixed by the commission? If the commission is to be a law unto itself why require the rates it fixes to be reasonable? That Congress meant *all* the orders of the commission to be subject to review by the courts is implied by the language of the law itself and is a matter of historic record; and the courts in reviewing them are merely carrying out the will of Congress. That most of the decisions of the court have reversed the commission is just what might be expected; for the railways only appeal from the comparatively small minority of the commission's decisions against them which they are pretty sure they can get reversed. It is a matter of record that, for similar reasons, the commission was continually reversed by the courts before the Commerce Court was established; and for similar reasons it would continue to be if that court were abolished. No doubt the Commerce Court could present some pretty pertinent facts and cogent reasoning in its defense, if it were not contrary to custom and good form for courts to do such things. That the commission knew it was attacking a body that could not talk back does not put its assault in a more favorable light.

ONE of the best evidences of the arrival of the mechanical stoker for locomotive work and its acceptance as an accomplished fact, is to be found in an improvement of one of the stokers on the market, as described in another column. The old idea that the stoker must be prepared for the coal and be so constructed as to handle everything from dust to large lump, in all classes of services and on all kinds of locomotives, has been abandoned. In its stead has come the acceptance of the condition that the coal should be prepared for the stoker. This is a simple thing in itself, but really means more than it seems. It means that we have abandoned the old requirements that we are accustomed to put on every new device that is presented for acceptance, which require that it shall do far more than we ever dreamed of doing in the old way, and shall do it so smoothly and with such a total absence of trouble that cost of maintenance shall be nil, and the veriest fool cannot harm it. Instead, we recognize it as a machine with its own physical limitations, and as a thoroughly efficient and economical one within these limitations. Instead of saying: "If it can't handle run of mine coal, it will never do." We say: "If the stoker is to do good work, the coal must be fitted for it." And so the stoker manufacturers are to be congratulated on the breaking down of this really formidable barrier to their progress and the recognition of the necessity for crushing coal before it is put on the tenders of locomotives equipped with mechanical stokers. This done, the introduction will be more rapid and the crusher at the coaling station and the stoker on the locomotive will form a combination that will be taken as much as a matter of course as a dryer for the sand, and the box that holds it on top of the boiler. It has been a very long and hard struggle to gain this point, and as it is a crucial one, one on which the success of the mechanical stoker really depends, and one that has been urged upon deaf ears for a long time and seemingly to no avail, the fact that it has been accepted by one progressive road cannot be too strongly emphasized.

THE "RULE OF REASON" AND THE RAILWAYS.

IN the light of the recent Supreme Court decisions in the Standard Oil and the Tobacco cases, an interesting question arises as to the position which the railways now occupy and how far they are now legally permitted to go in the direction of co-operative action. President Taft has expressed clearly his opinion of these decisions, and his view of the law as it stands today. Because of his training and experience upon judicial questions, his attitude carries more weight than does the opinion usually of our chief executive. Upon questions that relate to combinations and restraint of trade, his views have the prestige that comes from the fact that he delivered the Circuit Court of Appeals opinion in the Addyston Pipe & Steel Company case, which was upheld in every respect by a unanimous decision of the court of last resort. President Taft, in his message to Congress, declares that these recent decisions are epoch-making and that they serve to advise the business world authoritatively as to the scope and the operation of the Sherman Anti-trust act.

Now, what advice do they give to the railway managements? The Trans-Missouri Freight Association case, which dissolved that organization as being a combination in restraint of trade and in violation of the Anti-trust act, was decided in March, 1897 This organization had been created according to its expressed intent "for the purpose of mutual protection by establishing and maintaining reasonable rates, rules and regulations on all freight traffic." The majority of the court, disregarding the mass of authoritative and undisputed fact showing the disastrous results of unrestrained competition of paralleling lines, held that the act covered all restraints, whether reasonable or unreasonable. Said the Court: "It may be that the policy evidenced by the passage of the Act itself will, if carried out, result in disaster to the roads, and in a failure to secure the advantages sought from such legislation. *Whether that will be the result or not we do not know and cannot predict.* These considerations are, however, not for us." This opinion was rendered by Justice Peckham and concurred in by only four other justices. The opinion in the

Joint Traffic case a year later was rendered by the same justice on the same grounds, with the same four justices concurring. Of these four, Justice Brewer, five years later in the Northern Securities case, rendered a separate opinion for the express purpose of announcing his change of attitude. He said, "Instead of holding that the Anti-trust Act included all contracts, reasonable or unreasonable, the ruling (in the Trans-Missouri and Joint Traffic cases) should have been that the contracts there presented were unreasonable restraints of interstate trade, and *as such within the scope of the act.*"

Moreover, in the able dissenting opinion in the Trans-Missouri case delivered by Justice White, the present Chief Justice, and concurred in by Justices Field, Gray and Shiras, in which it is pointed out that the contract between the railway companies substantially embodies only an agreement to obtain uniform classification, avoid rate cutting, and arbitrary and sudden changes in rates, occurs this significant sentence: *"The opinion of the court rests upon the hypothesis that the provisions of the contract are reasonable,"* and again, *"It is conceded that the contract does not unreasonably restrain trade."* In other words, the traffic associations were condemned not because they were in unreasonable restraint of trade (for the opinion of the Court assumed their reasonableness), but because the act of Congress forbade all restraints.

We now come to the Standard Oil and Tobacco decisions in which the opinions of the Court, unanimous except for a disagreement upon one point by Justice Harlan, were delivered by Chief Justice White, who was the leader in dissent in the Traffic cases. With seven concurring justices, he declares that the Anti-trust Act indubitably requires a standard, and that it was intended by the act that the standard of reason should be applied, a position which is strikingly confirmed by former Senator Edmunds in his article in the *North American Review* for December.

If, then, a practically unanimous Court has declared in so emphatic a way that only unreasonable restraints are illegal, a position which the majority of the Court have unquestionably maintained since the Northern Securities decision in 1903, where does this situation leave the railways in respect to the right to form traffic associations? No better answer can be given than to quote a sentence from the opinion of the Chief Justice in the Tobacco case:

"The necessity for not departing in this case from the standard of the rule of reason which is universal in its application is so plainly required in order to give effect to the remedial purposes which the act under consideration contemplates, and to prevent that act from destroying all liberty of contract and all substantial right to trade, and *thus causing the act to be at war with itself by annihilating the fundamental right of freedom to trade, which on the very face of the act it was enacted to preserve,* is illustrated by the record before us."

The railway traffic association, while it restrained competition, never in the remotest degree restrained trade unreasonably. It conferred enormous benefits upon business by promoting stability and guarding against arbitrary fluctuations in rates. It never suggested monopoly in any sense except to the anti-railroad crusader. It preserved that "fundamental right of freedom to trade" which the Sherman Anti-trust act was "enacted to preserve."

It is well known that after the Trans-Missouri and Joint Traffic Association decisions the various traffic associations were reorganized, but in such a way as was intended to conform, at least technically, with the decisions. No one has ever been certain, however, whether as reorganized they are legal and the fear of prosecution has prevented the railways from making them as effective, beneficial and public means of co-operation regarding traffic matters as it is desirable they should be. Have not the recent decisions under the anti-trust law cleared away all doubt of their legality and all obstructions to their restoration to a basis where they will be as effective organizations as they ought to be?

A POSSIBLE NEW COMPETITOR IN THE SOUTH.

THE large railway systems of the Southeast have been built up in good part by a system of buying and connecting up short lines, but big southern railway companies are not now, to any great extent, adding to their mileage by buying short lines. One can sit down with a railway map of the southern states and plan out quite a number of railway systems that could be made by connecting up short lines now in operation; and on paper these combinations often look attractive. Apparently, however, most of the important southern railway companies have come to the conclusion that in practice this is not profitable.

The Norfolk Southern is the new company that took over the Norfolk & Southern after the receivership and foreclosure sale under plan of reorganization, which sale took place in 1910. This company has begun a policy of expansion that might, if carried very far, be an attempt at building up a new railway system by connecting existing short lines. The Norfolk Southern itself is a sound, compact, small property that operates about 608 miles, of which the main line and the two important branches are shown in the accompanying sketch map. Its operating revenues in 1911 totaled $2,960,000, and after the payment of expenses, taxes and fixed charges, the company had a surplus of $610,000, from which it paid $240,000 dividends.

There is no competing railway between the main north and south line from Norfolk to Beaufort and the coast. A large part of the company's business is carrying lumber, and it owns all



The Norfolk Southern and Its Three New Lines.

of the securities of the John L. Roper Lumber Company. The railway competes only to a limited extent with the Southern Railway and the Seaboard Air Line, and the company has a tidy and, probably, profitable property which may well be expected to develop a considerably larger business than it is now doing. The development of the country through which the road runs is rapid, and, as the timber is cut off, the land, which is unusually fertile, can be put under cultivation and made to produce profitable crops at a minimum cost.

It was recently announced that the Norfolk Southern had bought control of the Aberdeen & Ashboro, the Durham & Charlotte and the Raleigh & Southport. There was also recently incorporated, as mentioned in our construction news columns, the Raleigh, Charlotte & Southern, and it is understood that Norfolk Southern interests are behind and intend to help finance this Raleigh, Charlotte & Southern.

Details of the proposed route of the R. C. & S. have not probably been fully worked out even by those interested, but in the main their plans indicate an intention of having a line controlled by the Norfolk Southern running from Raleigh at least as far southwest as Charlotte, of which line the detached east and west line, shown in our sketch map marked D. & C., would form the middle section. Such a line would parallel the Seaboard Air Line from Raleigh to a point south of the terminus of the D. & C., as shown on the map, and would compete with the Southern Railway and the Seaboard Air Line for business from Charlotte.

If the Norfolk Southern stopped at Charlotte, the competition on the 150-mile extension from Raleigh might well not be keen enough to make its operation unprofitable. If the Norfolk Southern, however, extended much further into Southern Railway territory, it might be within the bounds of possibility that competition would become unprofitably keen. It is not intended to assume here that the Norfolk Southern has any more ambitious plans than the extension to Charlotte, but it is quite interesting to speculate on what the results of such an extension might possibly be. In the South, more than in any other part of the country, a situation may exist in which short, independent roads not connected with each other but connecting with lines of the larger systems may well be operated at a fair profit, and yet if they were to be connected up with each other, formed into a system and brought into competition with the big roads to which they had heretofore been feeders, one might well find that they could no longer handle their business on a profitable basis.

The Norfolk Southern itself handles as we have said a large tonnage of lumber—more than half of the total tonnage last year was furnished by lumber and lumber products—but its ton mile rate is quite high. This is one of the factors that permits it to operate at a low ratio. This low operating ratio is essential.

The Southeast is developing more rapidly in many ways than any other section of the country. The country is covered with a network of railways, most of which, with the exception of a few great main lines, are cheaply built and capable of carrying only comparatively light traffic for which, to handle on a profit basis, they must charge a high ton-mile rate. Notwithstanding, however, the large proportionate mileage of branch lines and light railways, the country has by no means as yet grown up to its railway facilities. On the Southern Railway it is probable that traffic could be increased five or six times on hundreds and hundreds of miles of branch lines without increasing the facilities of these lines with the exception of rolling stock. This is even more true of a considerable number of independent short lines. These short lines now make more or less of a living because they are local enterprises, but were they brought together and made part of a large system, competing with the older lines and no longer local businesses but foreign corporations with a capital C, they might well find it impossible to earn even their fixed charges.

NEW BOOKS.

The Mechanical World Pocket Diary and Year Book for 1912. Emmott & Co., Manchester, England. Cloth, 4 in. x 6 in., 263 pages. Price, 12 cents.

The twenty-fifth annual edition of this publication appears promptly, and with some improvement over previous issues. The section on steam turbines has been rewritten and extended considerably, with new illustrations. There are new sections dealing with roller bearings, helical springs and milling cutters, and a number of new tables. The book is more fully illustrated than formerly, and the whole work has been subject to a thorough revision.

Technology and Industrial Efficiency. Published by the McGraw-Hill Book Company, New York. 6 in. x 9¼ in. 486 pages. Bound in cloth. Price, $3.00.

This volume contains the proceedings of the Congress of Technology, held in Boston, Mass., last April at the Massachusetts Institute of Technology. Some seventy papers are included which form a valuable and up-to-date record of the present state of industrial science, including the presentation of some of its problems and probable solutions. The six sections into which the congress was divided are represented by papers on: Scientific Investigation and Control of Industrial Processes, Technological Education and its Relation to Industrial Development, Administration and Management, Recent Industrial Development, Public Health and Sanitation, and Architecture. These divisions are logical and comprehensive.

Letters to the Editor.

A YARDMASTER'S VIEWS ON EFFICIENCY.

Pittsburgh, Pa., November 29, 1911.

To the Editor of the Railway Age Gazette:

Mr. Ballantine's paper entitled "Locomotive Efficiency and Condition Reports" which appeared in your paper October 27 strikes me as retrogressive. It did seem a short time ago that the railways had gone statistically mad, but the present tendency is to railroad more in the present and less in the past.

If the government regulating experts and scientific management experts would give real railway men of the type of Atterbury, Kruttschmitt and Hine a chance they might yet save the valuable properties which our too zealous critics seem bent on destroying. Let us grant that old business methods were not all they should have been, and publicity and agitation were necessary. Would it not be well to cease the agitation for awhile? The men as well as the customs of the old days are gone. Give the new men a chance. Prosecutions for real wrong and persecutions as a hobby are quite different.

Brandies and Emerson, with their irresponsible $1,000,000-a-day talks, do not attempt to show where the waste is, or how it can be corrected. This $1,000,000 a day seems an enormous sum, but is it? Figures are only comparative, and does $1,000,000 a day waste represent more than 10 per cent. of the gross income? Is it possible to operate any corporation or even household with less than 10 per cent. waste? In fact, would it not be painful to be keyed up to 100 per cent. efficiency in all our actions? The gross earnings of all the railways in the United States for the last fiscal year were $2,787,266,136. Ten per cent. of this is $278,726,614, or $763,635 a day. Ninety per cent. efficiency means, then, $763,835 a day waste. Odd figures do not make an attractive headline, so the more attractive figure of $1,000,000 a day waste was given. Analysis really shows this statement to be an estimate. Ninety per cent. is considered a good average in anything. If the statement had been that the railways were wasting 20 per cent. of the gross earnings, and that at least 10 per cent. of this should be saved, it might not have made such an attractive headline, but it would have been more logical.

Before we abandon this efficiency-statistical craze it would be interesting to have figures showing the cost of productive and non-productive labor on the railways. It would not be surprising to find the latter near the 50 per cent. mark. What is the answer? Too much so-called efficiency.

After all, what do these lawyers and engineer enthusiasts know about railway operation. We admit that the educated man who enters the railway service and makes an honest study of the intricate railway problems should make a better railway man than the one lacking education. We do not admit, however, that the man who has taken a railway course in some school can tell us anything about railway operation.

The Pennsylvania and Harriman Lines have railway schools (apprentice courses) that have been turning out real efficiency men for years.

Shop supervision is more simple than operating supervision. The railway people know this, however, and are trying to get effective supervision closer to the actual operation. The unit system now in operation on the Harriman Lines is a practical step in this direction.

This lack of on-the-ground supervision represents phenomenal traffic growth instead of inefficient management. The organization which a few years ago gave us on-the-ground supervision has grown with the traffic, until the superintendent of today has almost as much traffic and as many men to look after as the general manager of a few years ago. What is needed, and what is coming, is reorganization below the position of superintendent, which will give this on-the-ground supervision.

To get back to Mr. Ballantine's paper. The railways have discovered that efficiency and statistics can be overworked, and they are trying to get away from the unpractical. While the politicians and efficiency men think they have discovered something new, and are calling for all kinds of statistics, the railways have learned that what is needed is fewer post-mortems and more action. Dwell less on what was done yesterday and get on the job today, and there will be less concern about the net earnings showing up on the wrong side of the ledger. Conductors, roundhouse foremen and yardmasters already make too many reports that are at best only good estimates. When an emergency arises we find the reports did not give the picture as had been intended. We then fall back on the expert explainer. He discovers some new factor that has thrown our machinery out of gear. The evil is not corrected, but the excuse lets us out temporarily.

We have a board of uniform cost, but we find uniformity of cost is more apt to run to the maximum than to the minimum.

We have a store department, which apportions supplies to all departments. One department has been fortunate, not using all its supplies, but to provide for a rainy day the full allotment for the next period is drawn. It might be necessary to bury some bridge stone, or rails, or perhaps resort to the scrap pile, so the inspector will not catch us with a surplus, but the labor necessary to do this also being alloted, the expense will not show up against us.

The serious nature, however, of the allotment evil is for the chap who has had to use his allotment. For example, each roundhouse is allotted a certain number of engine parts. The roundhouse manages by patch jobs, etc., to keep the engines going, but some foreman less fortunate than the others will have the same part on several engines to give way entirely, and his whole allotment is gone in a few days. He makes requisition for an additional supply. After much correspondence and grilling by a chief clerk, or a storekeeper who has been a chief clerk, his mechanical knowledge being nil, the much needed parts are furnished. In the meantime, each engine that comes to the house for running repairs is robbed of the needed part in order to keep the engine in service, the job being done and undone a half dozen times before the supply arrives. When it is impossible to resort to the robbing system you have the gratifying spectacle of a $15,000 piece of machinery lying idle for a week, awaiting a $2 part.

These are some of the "efficiency" methods that our practical railway men are trying to get away from, but to go off half-cocked and try something that might be worse would be poor policy. The railway officials saw these leaks long before the efficiency people knew they existed. Mr. Kruttschnitt's paper in the *Railway Age Gazette* of May 5, 1911, shows the good work of the past. It might be known that a leak existed, but a watertight bung might not be easy to find. We will always find the railway official on solid ground several years in advance of the self-styled efficiency man.

Bigger men closer to the actual operation and fewer statistics would seem more along the line of real efficiency.

Regulation is here to stay and this is really as it ought to be. It should be, however, by one commission in no way governed by politics, and not by 48 commissions all more or less influenced by politics.

In conclusion, why do not the efficiency men try to solve the question of the real inefficiency men, union labor? This is a purely social question and more properly comes within their province. Why delude ourselves longer under the guise of policy or political expediency, with the argument that combinations of labor are necessary? Justice to the working man is necessary if we wish to get efficient service, but the present position of union labor is selfish and untenable, their one idea being to get the maximum wage and give the minimum service. What will be the government's position in the struggle which cannot be much longer avoided? Are the railways to be arbitrated out of existence? The past decisions of the arbitration courts have been to give the men all they asked for. If the other decisions are to be similar we might as well prepare for government ownership.

YARDMASTER.

THE SUPPLY DEPARTMENT—D. A. D.'S ARRAIGNMENT OF THE DEPARTMENT "INDIAN."

OTTAWA, Ont., November 29, 1911.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In the issue of the *Railway Age Gazette* of November 17 I find a short letter of my own on this subject,* and note that the editor has kindly stated that he will allow me a little more space in which to further consider the matter of supplies, and the supply department.

I have no quarrel with any one who claims that the supply department has not reached perfection. In fact, I have small use for those who think it, or their particular part of it, has reached that desirable point. From that class we can only look for that self-complacence that is death to advancement and improvement. But surely it is rather late in the day to intimate that there is no place in the railway world for the supply department organization. D. A. D. cites two roads that have no such organization; and they were doing very well, thank you, when last heard from. As I don't know anything about these roads, I will only take his word for their happy state, and let it go at that. The only road I have known of late years without a supply department never got more than two jumps ahead of the sheriff in its life, and finally its foot slipped. When rounded up, and started on again it had a supply department, of a kind, added to it. *Verbum sat sapienti.*

Now, I am not saying that the lack of a supply department organization put this particular road "into clear," but the fact that there was no supply organization indicated that there was a lack of organization generally. Had the men in charge organized their supply department, such an act on their part would have indicated a good work finished and done. For we all know that this is the last piece of work in the organization line undertaken. Its absence was only the outward and visible sign of an inward and real lack of cohesiveness; result, it fell to pieces.

In looking back over the history of our railways we find that they have been built up bit by bit, and piece by piece, as the need of the parts were felt, with, until very recently, small regard to the thing as a whole. How imperfect the whole is has been pointed out by better men than I; but we of the supply department have at least as good a right as others to feel that our small brick was not added to the pile until the need of us was felt. If we do not yet fit in well is the fault more with our brick than with the others? I am not so sure but what the fault lies more in the foundation than the superstructure, for who can honestly say that the place of the supply brick is not in the foundation itself, rather than stuck on to some corner in an attempt to bolster up a none too steady structure?

The trouble with the question of supply is that we hate it. We hated it when as a boy we filled that old woodbox behind the stove. We hated it later when the "kiddies" wanted new boots, that wore out so quickly; and we continued to hate it when we were general manager of a railway, and the same old question held us down, and made our annual reports look so cheap. But as it is the beginning, the middle, and the end of all things, we cannot get away from it; so we must face it, as we would any other enemy, and subdue it lest it devour us. It cannot be eliminated; to tame it, and keep it in reasonable bounds, is all we may hope to do; and for that purpose we have the supply department organizations on our railways. That they are imperfect we allow, but the knowledge that not one other department *is* perfect enables us to keep on with some small hope for the future.

I have no desire to point out defects in other departments;

*This was the letter entitled "D. A. D. and the Supply Department," and signed "Storekeeper."

the live ones know them for themselves, and it is a waste of breath to talk to the dead ones. If we of the supply department do not know most of ours, it is not because we have not been told of them; we have, by all and sundry. But so long as we are only accused of trying to save our company money we feel that we cannot be so far wrong. A wise statesman once said that when he went to steal apples he always looked for the tree with the greatest number of sticks lying around it; on it was sure to be the best apples. If we can only manage to twist that into a simile for our own case, we would be happy, but can we?

In the beginning, man, each of him, hunted for himself alone, later for himself and mate. In the early days of the railway it was much the same; and the first attempt at organization was the appointment of the purchasing agent, or the setting apart of one to buy for all. There are men living today who can remember that they thought this move settled the question for all time. But to their surprise it settled nothing beyond the fact that they knew little, or nothing, about the matter. It did not decrease the outlay as a whole, nor did it show more clearly than before what it was costing to order, receive, and distribute the material. On attempting to learn this, the business was found so mixed up with the regular work of the different departments, that it could not be separated, nor could the cost be even guessed at, while the only interest the departments felt in the matter was to get all they wanted, and a little more, to be safe. For this reason each department had its own little surplus, which in the aggregate made a big one, and yet there was no surplus for general use. So the next logical idea was that, if it was good business to have one man devote his time to buying for the whole, why not have one or more men receiving, caring for, and distributing for the whole? And here is where the storekeeper, and storehouse, entered on the scene.

In what way was this move designed to be of general benefit? There were many reasons why it should be. In the first place, it removed a large amount of work from the department offices that did not fit in well with the work the department office was designed to perform, and left those offices in much better shape for carrying on their legitimate functions. It took the work out of the hands of men to whom it was a secondary matter, and placed in the hands of men to whom it was the first, and if properly done, only matter. It brought supplies to a central point, and placed the surplus at the disposal of all. The man, or men, to whom the handling of supplies was now the chief aim, would naturally become proficient in the work, and proficiency has generally meant economy.

Now, as to the cost. For here we have a new department, and we know what *it* costs. But is the cost more, or less, than under the old plan? Who is there that can answer this question and show the figures to prove his statement? I refer here to the cost of handling, receiving, caring for, and distributing. Owing to the manner in which the work had been mixed up with the department work, we cannot well get these figures, but the work was there to be done, and it was done, and as we have never yet succeeded in getting something for nothing, nor any great amount of work done at that price, it is only fair to assume that it was paid for. But we don't know how much was paid for it, and we like to know what a thing costs. As done by the storekeeper we do know, and would it not be also fair to assume that in doing it, and it alone, he does it at least as cheaply as it was done by many others, who had other, and from their point of view more important, duties to perform? I think it would be fair to assume this without further evidence. But now and then we can get a small amount of what we might call corroborative evidence. For instance, when a department other than the supply department, owing to local conditions, and the wish of some official, assumes the care of certain material and supplies, reporting same to the supply department, we find one of two conditions: Either the supplies are not properly looked after and reported, or the work is well done, but more money is spent in doing it in proportion to bulk and value than when it is done by the supply department people. And the money so expended does not appear in the right place, for it is not shown as expense in connection with supplies. Now, before setting the above down as a prevarication, take a look around and see what you can find for yourself.

I am not sure that I grasp D. A. D.'s full meaning when he says the development of the store department has been one sided. If I may take it that he means it is, as yet, incomplete, I would be glad to agree with him. It is. For one thing, it has not as yet secured such complete control of material and supplies as it should have, and there is constant effort on the part of minor officials, and some who are not so minor, to further weaken that control. Will our critics say that the reason for this is that we have shown ourselves incompetent? Well, now, would a general manager consider himself, and the results he can show, fairly judged if his authority were restricted, or his control of the property incomplete? I think not.

The question, "Have you given due weight to concealed items of expense in arriving at the point of handling company's material?" is very much to the point. But I am not sure that the full force of this question is levelled at the supply department men. The man who asks that question knows that many of the concealed items are not concealed by him; he is not called on to show them up, and oh! my brethren, how many of you have seen a railway man digging up "concealed item" of expense for the fun of showing them to the "old man" and hearing his opinion of your department? Alas, the supply man is only human, and if it be permitted that others take a few "items" and bury them, as they do, can we expect him to rob a grave just to make a smell around himself?

But why are there concealed items at all? That brings us back to our starting point: our dislike of the whole question; right back to that old woodbox that we were always filling, and that would not stay full. Do you remember how we would slip the tough old "chunk" off to one side in the hope that some one else would tackle it, or how we would cross the bottom sticks so it would take less wood to make a showing at the top. And how our little tricks were always seen through? Well, "men are but children of an older growth," and in some way or other we are still filling our woodbox, not loving it yet, and playing our poor little tricks. Then along comes D. A. D. and kindly, but firmly, with a twinkle in his eye, tells us to "saw wood." All right, D. A. D., there are no hard feelings, but we hope you can spare a day soon, to help with some of those hard chunks that are too much for our, as yet, weak arms. You swing a good axe, and little you care where the chips fall.

In spite of all the stones thrown at us, we doubt if there are many railway officials who would be willing to see the supply department eliminated. Why, what would then become of that old stock excuse for delay to work "waiting on the stores." Like a good lie, it has become "our ever present help in time of trouble" to so many of us. I say us, because I have sat in the seat of the scornful myself, when the question of supplies, with me, began and ended with my own small wants, and little I cared for the quantity or cost, so long as I could show my piece of work complete, in a manner to pass inspection. And am I not as other men knowing one thing at a time, and that imperfectly?

The supply department was created for a purpose, when the need of it, for that purpose, was felt. It is imperfect, as all work of man is imperfect, but before being judged either for praise or condemnation it must have a fair trial, and it cannot be tried fairly until it has full scope in its own field. The mechanic who is allowed to begin a work that a man of less training will finish—should he be held responsible for the finished article? And we ask for an extended jurisdiction, and more complete control. The writer to whom reference has been made points out clearly and sharply the manner in which the chief executive

officer will so often give purely perfunctory attention to requisitions, even at times refusing to sign them at all, but passing them on to the supply department, with a hint to supply what they can't hold back, or words to that effect. Now, I sympathize with that chief executive officer from the bottom of my heart. How is it possible for him to *know* that each of these hundreds, nay, thousands, of items are actually required, and in the quantities shown? He cannot. But do you say he has there the signature of his heads of departments to show? That all is well; but if he is a wise old bird he has learned long ago that in this matter of supplies the signature of his chief of department is only too often there simply because *his* foreman, or clerk, has signed it ahead of him. And what is the chief executive doing when he acts thus more than applying to this half-understood matter the principles of the most modern political science, and leaving it open to the referendum, and recall, after it has passed the test of the purchasing agent's analysis, and bid for prices? There is a reason for such action on the part of the executive. He has his supply department; why should he not make use of it to the utmost?

On the other hand, let me cite a case. A manager who was most painstaking in viewing each item on requisition reduced the number of hand lanterns and monkey wrenches, then signed the sheet so amended, with a feeling of duty done. But he had, in looking for small things, overlooked an item for a piece of machinery that a foreman had a notion he wanted, and that cost more than all the other items put together. The requisition was signed; there was not the sympathy between the executive and the purchasing agent that there should be; so the machinery was bought without further reference. The manager nearly had a fit when he had to approve the invoice, and to help soothe his feelings he found he had created an extremely awkward situation on his road, because there was want of hand lanterns and monkey wrenches. Oh, no; this was not on *your* road, but I know the road, and men. And there are others.

The executive is appointed to operate the railway, and the many departments are created, each to do a part, and assist in the whole, and while they must all work together we hear little complaints from one against the other. Indeed, some of them are so far apart, and come in contact so little, that it would be strange, indeed, if they should not find anything to disagree about. But far or near, great or small, they all come in contact with the supply department, and they come with complaints. We cannot say to them, come with a good will or come not at all, for they must come. We *would* not exist if they were not here, they could not exist if we, or something to take our place, were absent for long. Are they justified in their complaints? At times, perhaps, yes. But is not a man prone to forget quickly the one thousand times his wants have been met, and remember long the one time he has had to wait? One charge they have not yet made against us, and that is that we are too liberal with the goods intrusted to our care. Responsibility has made us conservative. But while the departments charge us with following a niggardly policy, the executives are firm in the belief that we delight in handing out everything we have, and coming back, like the daughter of the horse leech, with cries of "more," "more."

We have good authority for the statement that man cannot serve two masters, but we must keep trying to do so, anyway, and if we do not succeed in fully satisfying both we can at least plead that we are attempting the impossible, and leave it to fair and understanding minds to say to what extent we have failed. We have many problems ahead of us; the railways are in themselves a great problem. Their history is a history of great things done, and many costly mistakes made. D. A. D.'s criticisms and questions are mostly pertinent and to the point. But we have long known that a person of inferior mental capacity may often puzzle a sage, so it would be strange indeed if the old gentleman would not have the boys guessing at times. He does not hit the supply department any harder than he does some others, and honest criticism should do us good, rather than harm. We are called the "spending department." Know then all men by these presents, that it is our ambition to be, and some day be known as, the "saving department." We can take no part in selling that "intangible commodity, transportation," that you other departments deal in, but we do help in making it for you to sell. We give the best that is in us to our part in serving each and everyone of you, and helping you to make money. Do you, then, give our part some thought, and help us to *save?* The end is the sum. Devote a little time to the thought of what you can get along without, rather than to figuring on how much you can get. Collect your tag ends of unused material and send them to the supply men. If you can't use them to advantage, someone else may be able to do so, and if they can't, the supply man just loves to turn them into cash. That is about the only chance he has to bring money in.

The alleged fallacy that the user of material cannot be trusted with its custody was not introduced by the store people; far from it. The store people were introduced because many good men had, after years' of experience, come to the conclusion that it was not a fallacy.

The editor says, in defense of D. A. D. against "Orphan," that D. A. D. knows all about storekeeping. Well, perhaps he does, but, if my salary would allow of it, I would like to make a small bet, that he was never a railway storekeeper for very long. It's a very subduing occupation, and who can read "D. A. D.'s" exuberant effusions, and dream that *he* has ever been subdued? He skips like a roe upon the mountain, clearing obstacles with a bound, regardless of what may be beyond, in a manner that excites our admiration and envy. But, alas, we have in our time placed our profane feet, hastily, where even the angels walk carefully, or not at all, and the resultent slip has taken the "skip" out of us.

The user of material is the man who does the work. Have we ever seen the time when we considered it unnecessary to watch and supervise that work? Could we expect to get satisfactory results if we did not do so? Then, if it is necessary to check him in the thing by which he must stand or fall, the thing that is of first and vital interest to him, surely it is necessary to check him in a matter that is of secondary interest. Let me illustrate: A member of the B. & B. department sends to his chief a requisition for a carload of B grade 2 in. planking. His chief, with many calls on his attention, signs the requisition, and it goes through until it reaches the supply men, or, say, the storekeeper. He, being familiar with material and prices, as well as having a general knowledge of the work going on, wonders why a carload of best quality plank is required in the district from which the requisition came, and he returns the requisition to the maker of it, asking just what the plank is to be used for, and learns that it is required for repairs to coal bins. Result, a saving of $200 on the carload, and the work does not suffer. This is one fact taken at random from many at hand.

The truth is that the man who actually fills the requisition is, if he knows his business, the best critic of the same. I venture to say that there is not a railway storekeeper in America but has many such items in his records. But he has no authority in the matter, and must handle them with diplomacy, and make the effort again and again, even when turned down with contumely by those who are more jealous of their fancied prerogative than they are of their company's interest.

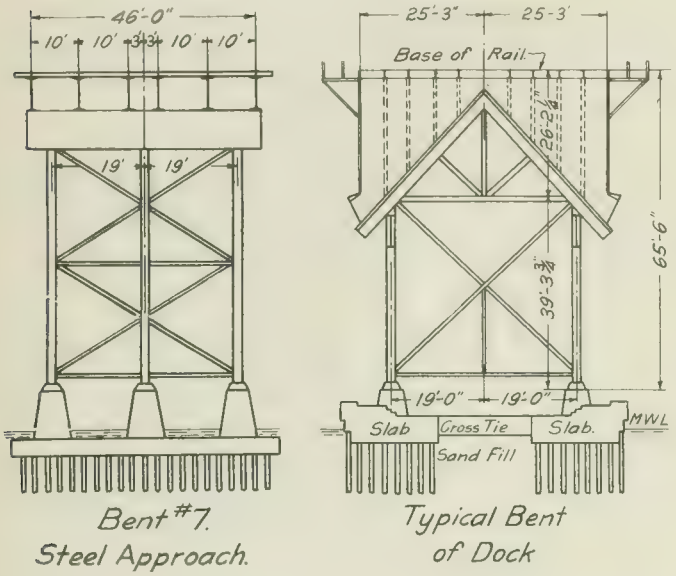
The supply man is judged by the departments on his ability to meet promptly all of their real, and fancied, wants; what a good time we could all have here if there was no hereafter. He is judged by the executive on the smallness of his stock on hand, and the amount of his bills payable; how easy to prepare for the hereafter if we did not have to live in the present.

E. J. MCVEIGH,
Storekeeper, Grand Trunk.

NEW ORE DOCK AT TWO HARBORS, MINN.

The Duluth & Iron Range has recently completed a new ore loading dock at Two Harbors, Minn., which replaces a wooden structure known as dock No. 1. The new dock makes use of steel instead of timber framing, reinforced concrete for bin walls and foundations, has an improved type of door for controlling the flow of ore and provision for raising and lowering the spouts by electric power. In addition to the increased capacity, these features of design embody the principal improvements made in ore dock construction in recent years.

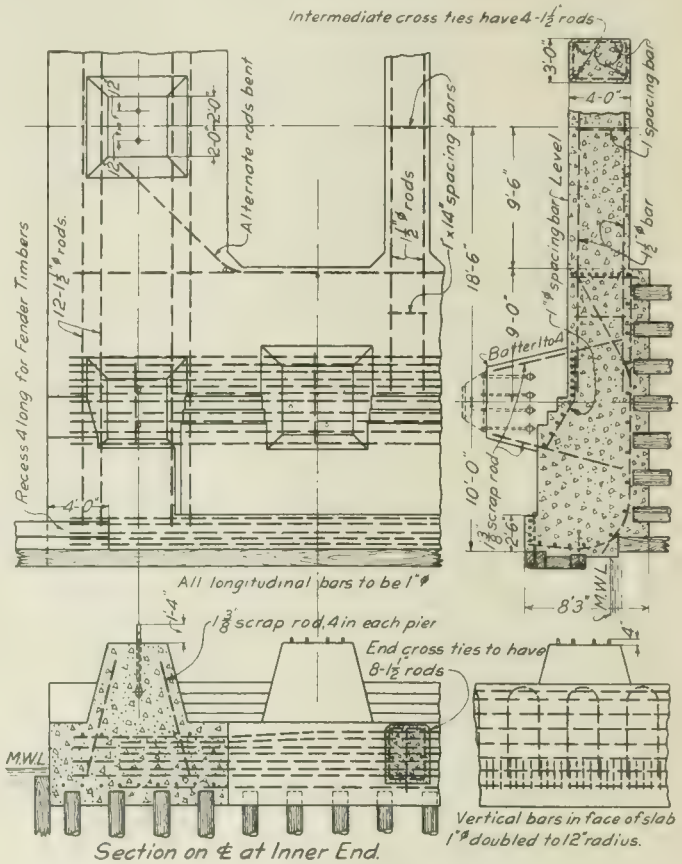
The new dock is on the same site as the one it replaced, its center line being 18 in. from that of the old and parallel to it. A timber trestle approach 225 ft. long and a steel approach 317 ft. long lead up to the dock proper. The inner end of the timber approach is on a 9 deg. 30 min. curve, and both the timber and steel approaches are on a 0.304 per cent. grade rising towards



Framing of Steel Bents in Approach and Dock Proper.

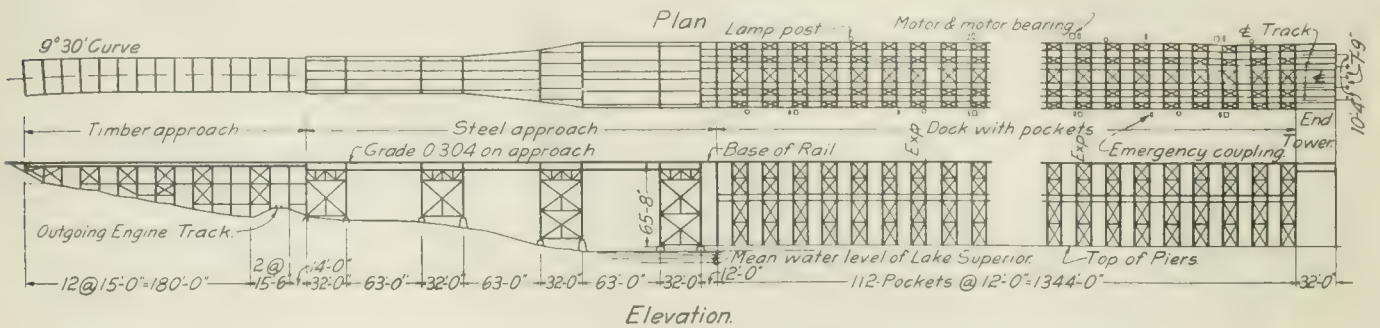
the dock. The dock itself has 112 ore pockets on each side, each pocket being 12 ft. long, making a total length of 1,344 ft., in addition to which there is at the outer end a tower 32 ft. long on which engines at the head of ore trains can be run so as not to interfere with the filling of the outer pocket. This length of dock provides for the simultaneous loading of four of the largest boats used in the ore traffic. The dock is 51 ft. 8 in. wide, exclusive of machinery platforms, and 74 ft. high above mean water level, or 65 ft. 6 in. above top of masonry.

The timber approach consists of 14 framed bents spaced 15 ft. center to center, with the exception of the last three bents, the spacing of which is made irregular to allow the outgoing engine track to pass under the structure. The timber approach carries a double track laid on 8 in. x 16 in. stringers. The steel approach consists of four towers made up of three-column bents carrying 32 ft. tower girders and 63 ft. intermediate girders. The cross section of bent No. 7, shown in one of the accompanying drawings, illustrates the framing of these steel bents, and the accompanying elevation of the dock and approaches illustrates the transverse bracing used in the towers. The bents are supported on concrete pedestals carried on piles, the pedestals being spread to form a concrete cap over the head of the piles. The double track diverges to four tracks over the third tower of the steel approach. The section carrying the double track has four girders, the section carrying four tracks has six girders and the section over the third tower, where the change is made, has five girders.



Details of Reinforced Concrete Foundation Slab and Cross Ties.

The foundation of the dock proper consists of longitudinal concrete slabs under the two rows of pedestals tied together by transverse concrete cross ties at intervals of 24 ft. The piling in the foundation of the old dock was utilized as far as possible to support the new concrete foundation, piles being driven where necessary to complete the cribs under the new structure. The continuous concrete slabs are supported on pile cribs consisting of rows of seven piles spaced 2 ft. 6 in. apart in the row and 3 ft. between rows. Each tie wall between these slabs is carried on a



Plan and Elevation of New Dock and Approaches; Duluth & Iron Range.

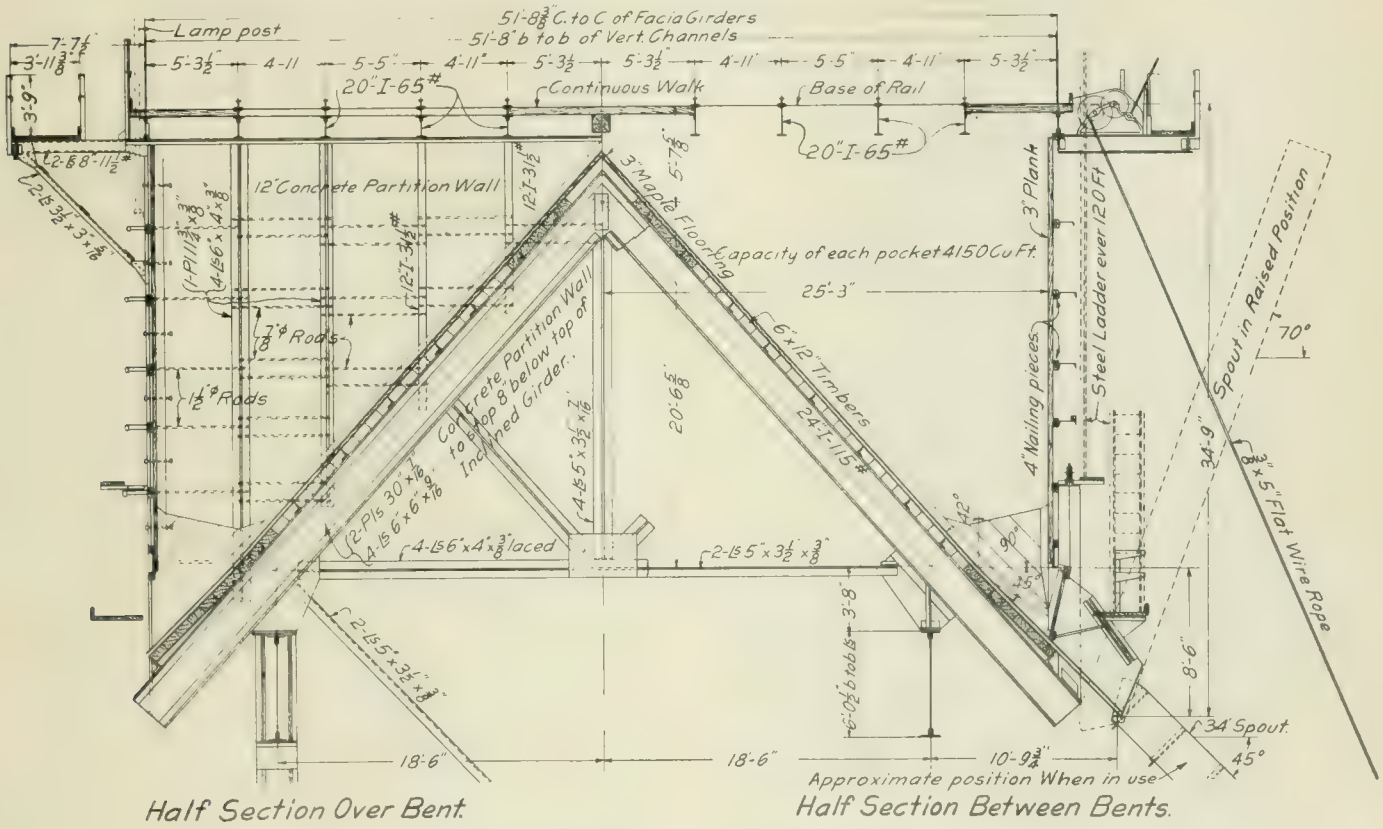
single row of piling driven on 2 ft. 6 in. centers. The entire foundation under the dock is enclosed by a wall of wooden sheet piling, and the space between cribs is filled with sand or gravel. The piles extend 1 ft. 6 in. into the concrete slabs.

The details of the concrete slab are shown in a drawing reproduced herewith. The slab is 4 ft. thick reinforced in both the upper and lower reinforcing planes by 1½-in. round bars tied together by 1-in. spacing bars. This depth of slab is increased over the pile cribs on either side to enclose the tops of the piles and to provide a fender for boats lying alongside. The face of the slab is reinforced by 1-in. round bars doubled to a 12-in. radius and spaced 24 in. center to center. The center line of pedestals supporting the steel bents under the dock is 10 ft. inside the face of the concrete slab. These pedestals are 4 ft. 9 in. square on top and are battered one to four. They are reinforced by 1⅜-in. scrap rods set parallel to the surface of the concrete near each corner and extending down into the concrete slab. The concrete cross ties connecting the continuous slabs are 3 ft. wide and 4 ft. thick. The six ties at the inner end are reinforced by eight 1½-in. rods tied with 1-in. spacing bars, and the remainder of the ties are reinforced by four rods placed near the corners of the section.

The framework of the dock is structural steel, the bents being spaced 12 ft. apart and consisting of built-up H sections carrying 72-in. longitudinal girders which directly support the weight of the bins. Each H section column consists of one 18-in. 60-lb. I beam, two plates 24 in. x ⅞ in. and four angles 4 in. x 4 in. x 13/16 in. The columns are 28 ft. 1¼ in. high and rest on cast iron bases 1 ft. 6 in. high. The two columns in each bent are spaced 37 ft. center to center, as shown in the cross sections. The transverse bracing in the bent consists of built-up angle sections. The flooring of the bin is carried directly on the A-frames of the bents and on two 24-in. 115-lb. I beams, spaced 2 ft. 7¼ in. each side of the center line of the pocket. Longitudinal purlin angles 3½ in. x 3½ in. x ⅜ in. riveted to the bents and to these I beams support 6 in. x 12 in. filler planks on which is laid a 3-in. hard maple floor. The pitch of this floor is 48 deg. with the horizontal, which is 3 deg. steeper than has been commonly used. It is expected that this change will considerably facilitate the emptying of the bins. The partitions between the bins, which are placed directly over the supporting bents, are of reinforced concrete 12 in. thick, in which are embedded vertical structural steel members which carry the load on the dock tracks down to the supporting bents. Each pocket has a capacity of 4,150 cu. ft., or 290½ tons on the basis of 140 lbs. per cubic foot of ore. The outside face of the bins is made up of 3-in. planks secured to 4-in. nailing pieces placed inside longitudinal channel members which are tied to the vertical members in the partition walls by 1½ in. round rods. Machinery platforms and galleries for operators are provided on the dock on built-up cantilever structures. Each rail of the double track on the dock is laid directly on a 20-in. 65-lb. I beam stringer, and the spacing between the rails is left entirely open. The tracks are spaced 10 ft. 4 in. center to center.

The structural steel in the dock conforms to American Railway Engineering Association specifications for unit stresses and American Bridge Company specifications for workmanship. In making the design impact was added only for track stringers and vertical posts supporting these stringers. The live load on the track was calculated by the loading diagram illustrated in the sketch shown herewith.

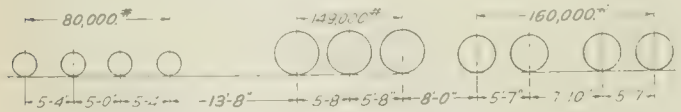
The slope of the bin floor which, as mentioned above, is 48 deg. from the horizontal changes at a point 8 ft. 6 in. above the lower edge of the chutes to 45 deg. It has been customary in dock design to provide small chutes 2½ to 3 ft. wide allowing two, and sometimes three, openings from each pocket. By the use of an improved door design this dock was equipped with a single opening for each pocket 5 ft. wide, and 3 ft. high. The details of the chute and door are shown in one of the accompanying drawings. An ore pocket door has ordinarily been hinged at the upper end and it has been very difficult to shut it in the face



General View of Dock Construction.

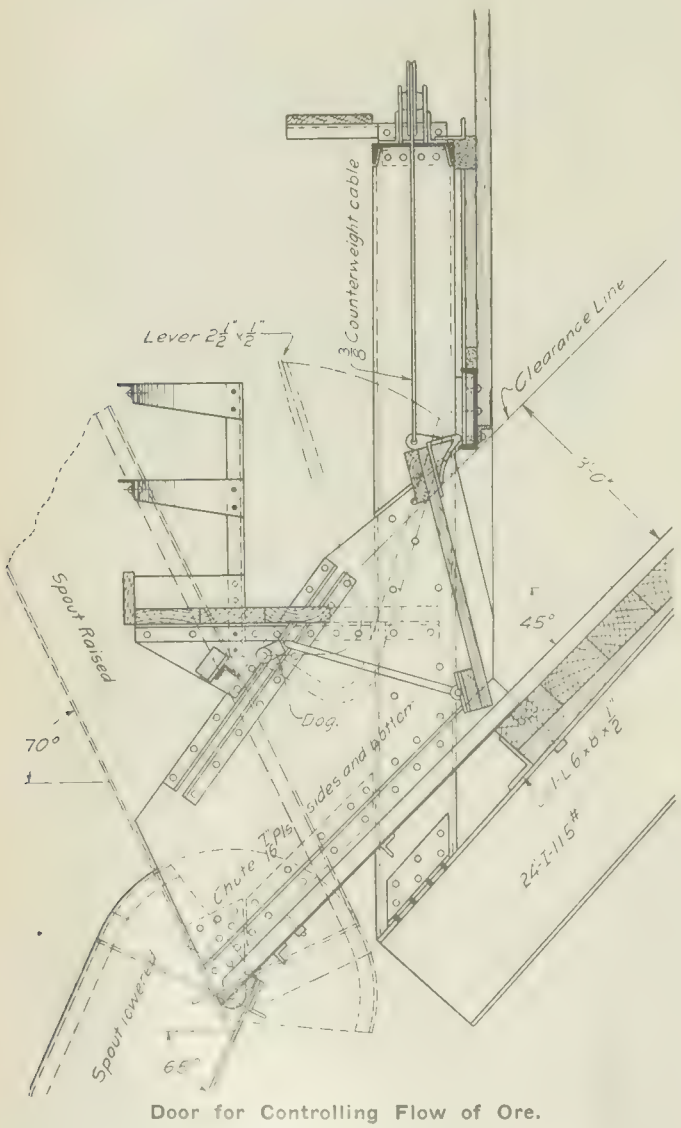
Showing trestle, chutes, machinery platforms, steel galleries, also positions of ore pocket doors and spout.

of a stream of ore. In the design illustrated the door is counterweighted. Its upper supporting point travels in a vertical groove and its lower edge is connected by a link to a rod moving in an inclined groove. The door is held closed by a dog, which prevents the movement of the rod in this inclined slot. When it is desired to open the door a lever connected with this dog and extending up to the operating platform is thrown over, removing



Loading Diagram Used in Design of D. & I. R. Dock.

the dog from the path of the rod and allowing the rod to travel downward in the slot. The counterweight at the same time pulls the door upward removing it entirely from the spout opening. To close the door it is lowered by means of the counterweight until the lever operating the holding dog can be thrown into the closed position. The arc described by the lower edge of the door has been so calculated that when the door is being



Door for Controlling Flow of Ore.

pushed into the ore stream the resultant pressure is practically normal to the floor of the pocket so that the minimum resistance to closing the door is encountered. The spout is of steel 34 ft. long, 2 ft. 6 in. high and 5 ft. wide. When in use it rests at an angle of about 45 deg., although it is possible to lower it until the slope is about 65 deg. from the horizontal. The spout is supported by a flat wire rope ⅜ in. by 5 in. attached at a point about 7 ft. from the end of the spout. The upper end of this rope is wound around a drum connected to an electric hoist located on the machinery platform at the top of the dock. These hoists are operated in groups from a line shaft, 10 drums being connected to each motor, which requires a total of 11 motors on each side of the dock. The hoisting drums and line shaft are connected by friction clutches controlled by operating levers on the machinery platforms. The motors are designed to lift one spout at a time and no counterweights are provided. The spouts are prevented from dropping suddenly by pawls so arranged that the spouts must be hoisted slightly before they are released.

This dock was built under the direction of W. A. Clark, chief engineer of the Duluth & Iron Range. The American Bridge Company had the contract for fabricating and erecting the steel and the hoists were designed and built by the Whiting Foundry Equipment Company.

A LIVING RATE FOR THE RAILWAYS.*

BY MORRELL W. GAINES.

Under private ownership the railways of the United States, built and operated for profit, have grown far beyond the measure of the growth in other countries, where, for the most part, railways have been the care of the government. Our mileage per capita is five times that of Europe and ten times that of the world at large. Stocks and bonds outstanding per mile of line are a little over half the average amount per mile on the foreign railways, and the freight traffic per mile is three times as great. Rates per ton-mile are lowest in the United States, less than half of the average charged in other lands. Private enterprise, dominated by ambition, has fostered the growth of railways in this country not only in length and carrying capacity but in the direction of cheapness and efficiency.

Even before the assumption of control over rates by the Interstate Commerce Commission and by the several state commissions, the growth of our railways had become slower and of altered character. Fifteen years ago the progressive lowering of rates that characterized the preceding sixty-five years of our railway experience reached, at length, the point where it limited both form and rapidity of growth. High rates, where railways are operated for profit, mean rapid construction, new competition and, in due sequence, reduction of the rates. Until the depression of 1893-1896 rates in this country, although they had been steadily reduced, were still high enough, in view of the growth of traffic and the cheapening of construction costs, to make it profitable to build. The characteristic of the whole railway era had been swift expansion.

Then the time of low, limiting rates arrived. Railway growth, while not absolutely pausing in mileage, turned from the goal of new revenues so that of operating economies. Capital sought decreased costs, which were certain, instead of increased haul, which was now of dubious profit. Growth turned visibly from light traffic extensions and competing routes to improvements on heavy traffic lines. In due sequence the absence of new competition has made itself felt and the rates have become more steady. For these fifteen years they have been stationary.

The record of the extension of lines (with the rates for which they were extended) reads as follows by decades:

Year	Miles of Line.	Increase.	Per Cent.	Rate per Ton-Mile.	Rate per Pass.-Mile.
1832	229	229		.....	.....
1840	2,302	[illegible]	905	.....	.....
1849	7,365	5,063	220	.....	.....
1859	28,789	21,424	291	.....	.....
1869	46,844	[illegible]	63	.....	.....
1879	86,556	39,712	85	*1.29c	†2.422c
1889	161,276	74,720	86	0.922	2.165
1899	194,336	33,060	20	0.724	1.978
1909	236,869	42,533	22	0.763	1.928

*1880. †1883.

Railways are generally built for their prospective earnings. The influence of rates on construction is seen in the percentage

*From an article in the *Yale Review* for October, 1911, and reprinted from it by permission.

of increase more clearly than in the actual miles of new line. At the beginning this was a poor country and the cost of railway building, with hand labor and high prices for rails, was great. A mile then involved more effort than five miles now. Viewed in this light, the period ending with the Civil War was one of swift expansion. For the next thirty years construction was still at a rapid advance, averaging 8 per cent. per annum of the existing mileage. For the last twenty years the expansion has been only 2 per cent. a year, or less than the growth of population. The great prosperity of the past ten years has not materially stimulated building, although there is abundant room for new lines. Low rates have limited the growth of railways.

Nearly all the construction done since the days of high rates passed has been under three heads: (a) Branches of existing lines which could obtain a long haul over their connecting rails; (b) important through routes (usually in connection with existing roads); (c) development lines to coal or lumber holdings, or other sources of heavy tonnage. Only in those sections of the country where rates are still high, as in the Far West and the South, is any considerable amount of new mileage of any class still undertaken.

Instead of building extensions the railways have turned, in the last fifteen years, to making improvements. The following table shows how their facilities have grown and the effect on the traffic capacity:

Year.	2d, 3d, and 4th Track and Sidings Owned-Miles.	Freight Cars in Operation.	Ton-Miles Freight Carried.	Ton-Miles per Mile of Line.
1894	54,825	1,205,169	80,335,104,702	457,252
1899	63,070	1,295,510	123,667,257,153	659,565
1904	84,830	1,692,194	174,522,089,577	829,476
1909	106,949	2,073,606	218,802,986,929	953,986
	Per Cent. Increase Fifteen Years			
	95%	72%	172%	109%

This table reverses the story of the table showing extension of lines. Instead of slowing down, as in the case of new construction, the railways have built more rapidly. They have added nearly as much to facilities in the last fifteen years as they had accumulated by 1894 during all their previous existence. Nor does the table tell the full story. The average capacity of freight cars was 28 tons in 1902, the first year reported. In 1909 it was 35 tons. No doubt the average in 1894 was below 25 tons, and the increase since that date in total load-capacity, if not in cars, has been well over 100 per cent. And besides these items of tracks and cars, the reducing of grades, straightening curves, strengthening bridges, ballasting and putting down heavy rail, not shown in the table, have used up a sum of money running into hundreds of millions of dollars. As a consequence of their vast outlay for improvements, the railways are able to carry twice as much freight per mile of line as in 1894, or two and three-fourths times as much altogether.

The railways were not only forced from extensive development by low rates. They were forced into intensive development; because they had to cheapen their haul. The increased density of traffic that is a necessary consequence of accommodating a rapidly growing country to a slowly growing mileage finally resulted, as every one knows, in an unwonted prosperity for the existing lines. Railways are pre-eminently subject to the law of increasing return. They have accordingly, while not immoderate in their distribution, paid of late years a much larger aggregate of dividends than in the days of high rates. Out of their distress they brought a measure of abundance. The passing, thus clearly marked, from the era of competitive building and high rates into an era of non-competitive rebuilding and low rates, has worked to the great advantage of established lines and settled communities and to the disadvantage of new roads and unsettled or thinly populated regions.

During the last five years, and particularly since the amendment to the Interstate Commerce Act that went into effect a year ago, a new and powerful influence has been brought to bear upon the current of railway growth. It is too early to measure closely the effect of the downward control over rates and the upward control over expenses imposed by public authority. It is by no means too early to review the situation and point out its tendencies.

In so doing, to be fair, the immediate and most evident results of the decisions of the Interstate Commerce Commission in the Trunk Line,* and Western, rates cases, handed down last February, must be entirely disregarded. It is true that orders for equipment have practically ceased; that the rail orders are halting; that entrenchment is the watchword with maintenance as well as with improvements; that extensions are in abeyance, and that there is no money to be had for new lines. But these are temporary effects, the result of shock, and will pass. In the end the purposes and practices of the Interstate Commerce Commission will be clearly understood and fully reckoned with.

Railway growth is a matter of interest on money invested. The capital requirements for the next five years, according to the rate of development of the recent past, will be $500,000,000 a year. The incentive to growth which will cause this sum to be forthcoming lies wholly in increased net earnings. Contrary to the popular conception, the railways are not, and have not been even in these last few years of prosperity, operating on a basis of wide profits. Their margins have been narrow. If the new regulation exerts an appreciable effect on rates or on expenses it will have a great deal of effect on growth.

The following table, based on operations and not on capitalization, shows what returns the railways get out of the business they actually do. It is compiled from the Interstate Commerce Commission reports, omitting duplications:

Year ending June 30.	Gross Earnings.	Net Earnings after Taxes.	% Net to Gross.	Other Income.	% to Gross.
*1889	$964,816,129	$292,519,034	30	$25,794,090	3
*1894	1,073,361,797	305,391,315	28	20,855,071	2
1899	1,313,610,118	409,708,295	31	26,044,996	2
1904	1,975,174,091	574,128,143	29	49,380,970	2.5
1909	2,418,677,538	728,298,805	30	73,586,827	3

*1889 and 1894 approximated.

Year ending June 30.	Interest, etc.	% to Gross.	Dividends.	% to Gross.	Surplus after Dividends.	% to Gross.
1889	$227,330,541	24	$71,704,045	7	$19,278,538	2
1894	281,814,744	26	79,772,895	7.5	†35,341,253	3
1899	248,760,382	19	94,273,796	7	92,719,113	7
1904	296,063,447	15	183,754,236	9	143,691,430	7
1909	388,273,154	16	236,620,890	10	176,991,588	7

† Deficit.

The average operating profits of the railways have been 30 cents out of each dollar received for transportation. Out of this 30 cents they paid 25 cents fifteen to twenty years ago for interest on borrowed money, and within the last few years have paid 15 cents. In dividends they paid 7 cents in the earlier years, trenching on accrued surplus to do so, and have now increased the distribution to 10 cents. Since the crisis of the nineties a balance of 7 cents, out of the dollar charged the shipper and out of "other income," has been put back into the property or applied to deficits and general corporate needs.

Any cut in rates would operate to reduce the margin available for improvements. A cut amounting to 5 cents on the dollar would impair dividends on all roads of lesser strength and threaten the dividends of the rest. A 10 cent reduction would directly injure many bonds and indirectly weaken the security of all bonds to an extent that would send quotations down and make new financing impossible. There is, therefore, no appreciable margin for reduction of rates without prejudice both to the properties themselves, to their owners and to their creditors.

Some hold the opinion that bonds and stocks are so watered that the payment of the current interest and dividends is an injustice, and that rates should be reduced in spite of the injury to security holders. The equity and policy of this position may be doubted, but it would be idle to make direct answer. No appraisement has been made of railway property as a whole. The value, on any reasonable basis, is probably measurably near the total of stocks and bonds outstanding; but this value cannot be proved in the absence of an appraisal. However, even those who hold this opinion concede that rates should yield a fair return on the actual railway investment. The circuit court in Minnesota has recently affirmed the right of railways to a 7 per

cent. return on values approximating, for the roads of that section, the actual issues of securities. As a hypothesis, a 6 per cent. return may be asumed to be both moderate and ample, and the following table can be constructed to show the theoretical capitalization upon which the railways are actually receiving 6 per cent.:

Year ending June 30.	Miles of Line.	Miles of Track.	Effective Capitalization.	Per Mile of Line.	Per Mile of Track.
1889	153,385	186,627	$4,983,909,767	$32,493	$26,708
1894	175,691	229,796	6,026,460,650	34,301	26,225
1899	189,295	252,364	5,717,236,300	30,203	22,655
1904	212,243	297,073	7,996,961,383	37,678	26,919
1909	235,402	342,351	10,414,900,733	44,243	30,422
			Average.....	$35,784	$26,586

The "effective capitalization" is the sum of the interest and dividends actually paid out divided by 6 per cent. It has no relation to the par value of railway securities outstanding. Watered stocks which pay no dividends can obviously have no bearing on rates, while stocks that pay 12 per cent. should, with equal obviousness, be conceded a weight of double their par value.

The effective capitalization, or figure upon which a 6 per cent. return is received out of rates paid, is really very low, just as it stands, when measured per mile of line and per mile of track. It includes, however, several items which, in proper fairness to the railways, might well be segregated from the capitalization of the lines as such. In 1909 the outside investments of the railway companies, not connected with rail transportation, produced a clear income of $73,586,827. Capitalized at 6 per cent. these investments represent $1,226,447,117 out of the $10,414,900,733 total. In 1909 also the railways, in consequence of the rapid increase in their quota of equipment, owned 57,212 locomotives, 45,584 passenger-train cars and 2,172,696 freight and company cars. Prices for the heavy purchases of recent years have been higher, so that it is conservative to postulate an average cost of $12,000 per locomotive, $4,000 per passenger car, and $800 per freight car: at which prices the value of the equipment becomes $2,607,036,800. The sum of these two items is $3,833,483,917, which, being deducted from the $10,414,900,733 total, leaves $6,581,416,816 as the capitalization of the railway lines proper. This figure amounts to only $27,958 per mile of line, and $19,224 per mile of track for 1909, the best year of railway history for which detailed statistics are obtainable. For any previous year the figures would be still smaller. This net effective capitalization is sufficiently low to show clearly that the railways are not distributing 6 per cent. on an inflated valuation. It is undoubtedly far below the costs of construction for the railways of the country as a whole. It is below the general valuation obtained in the partial investigations made by state railway commissions, whether based on original cost, reproduction cost, depreciated cost, or cost including intangible assets such as traffic and location.

In a sense there can be no average cost of building railways. Some lines have been laid down across flat prairie at $10,000 to $12,000 a mile. Others, like the Virginian, with heavy rails, ballast, steel bridges, tunnels, great cuts and fills, and excavations of rock, have cost over $100,000 a mile in cash. Aside from mere construction costs, the terminal real estate alone, in which each city calls for its own heavy investment, would eat up probably half, at present prices, of the $6,581,480,816 net capitalization. Ties and rails and right of way do not make a railway. The general cost, which has never been completely measured, is almost certainly above $40,000 a mile.

The popular impression that railways are imposing exorbitant capital charges on their traffic arises from the fact that some conspicuous railways pay large dividends, and that the total of stocks and bonds issued on the railway properties, according to the Interstate Commerce Commission report, is $59,259 per mile of line. The point is lost sight of that the overcapitalizations of the dark ages of railway financing, 25 to 40 years ago, handed down to us in one form or another, have been as a general rule punished by inability to earn dividends. In 1909, 36 per cent. of stock and 10.5 per cent. of bonds paid nothing, although that was (with the possible exception of 1907) the most prosperous year the railways had ever had. The net capitalization, excluding idle stocks and bonds is small, and the average of the dividends and interest paid is low.

Still, though dividends and interest be moderate, the objection is heard that the railways are piling up large surpluses out of earnings beyond what they distribute to their owners, and that this in effect constitutes an unreasonable burden on rates. To this objection the Interstate Commerce Commission, both in the eastern and the western rate cases, has unfortunately lent the weight of its authority.

In any sober consideraion of the matter it is much to the credit of our railway managements that they have, to a conservative extent, foregone dividends in favor of improvements to their lines. The process does not add to the burden carried by the rates. In England stockholders take, as by right, the entire surplus earnings. So in that country capital account is necessarily added to, year by year, for improvements here provided out of surplus. In twenty years' time the interest on the added capital under the English plan amounts to just as much as the annual appropriations of the American plan, and in the long run it comes to impose a direct burden on the traffic. As a matter of experience the capitalization of the English roads, now $274,954 per mile, has grown to unwieldy proportions, and the lessening of operating costs through improvements that would allow lower freight rates, lags far behind the American standard. Our practice should not be condemned. It is thoroughly sound finance and lightens, rather than increases, the weight of the tariffs.

Upon complete examination, therefore, of the earnings of railways it is plain that rates are low enough and contain no undue charges whatever on account of capital invested. Those who use the railways could hardly ask a reduction in the price for the services rendered. From the standpoint of growth, which is that of public interest, the rates are too low.

No case has yet been before the Interstate Commerce Commission relating to the general reduction of rates. That body has, thus far, merely picked out individual rates here and there and decided cases involving one form or another of discrimination. The only cases involving the general rate level were those decided against the railways last February on their application to increase their charges.

These cases were disappointly barren of facts, but rich in indications of policy bearing on the future of railway rates. The position both of the railways and of the Commission was futile, and the final result was that of a case not proven. In effect the argument of the railways was that they should have higher rates because they were oppressed by their expenses and needed the money. They were unwilling, or unable, to establish fixed critria of a reasonable return from transportation and rested on the assumption that their old rates, prior to late increases in wages, were fair and should now, therefore, be raised to match the cost of operation.

The reply of the commission was that the former rates, while carrying a certain sanction from long usage, afforded no absolute standard of reasonableness. Figures—inaccurate and misleading because of the inclusion of duplicated dividends and duplicated capital, and because of the accrual in surplus both of premiums on stocks and bonds and of amounts that would, under the system of accounting devised two years ago by the Interstate Commission itself, now be written off for obsolescence—were adduced to show the great prosperity of the railways. To the plea of the railways that they were in need, the commission replied in effect that they had had plenty of money the year before; and so were not entitled to higher rates this year. But, said the commission, if you ever come to dire want (referring beyond doubt to a time when the whole country should be in the throes of distress), come to us and we will raise your rates. The railways were looking ahead to a period of lean traffic and high expenses. The commission was looking back to full traffic

and lower expenses. In fact it had so little appreciation of the actual situation as to prophesy that net earnings for 1911, now fallen off from 10 to 15 per cent. in the trunk line territory particularly in view, would be substantially as high as they were in 1910. It proved impossible to persuade the commission to take any but an academic view of the actual facts.

As to principles, both sides were in error in thinking stress a proper excuse, or a period of depression a fit time, for the raising of rates. There could be no grosser favoritism than to levy on distressed industries a forced contribution for the benefit of distressed railways. It is altogether against fair play. The commission takes but an empty view of its own powers in dreaming that it can, by fiat, accomplish the salvation of the railways in an hour of crisis. What is necessary is that rates shall be set so firmly on a basis of prosperity for the railways in time of prosperity that they can meet adversity out of their own accumulated strength. Otherwise rates are radically insufficient. This, in other words, is the opinion of Judge Sanborn in the Minnesota rate decision, handed down last April.

As to results, the railways were not ruined, or permanently damaged, by the refusal of the commission to grant the increases. The average annual increment to net earnings for the nine prosperous years ending with 1907 was $50,000,000. The total of the rate increases asked for, East and West, would also have produced about $50,000,000. Thus the roads were, in effect, petitioning to be set forward a year or two in the recovery from the present dull times. At the worst the decision deprived them of no more than two years' growth.

After a time they may get part of the relief asked for, not along the lines of the specious argument of Mr. Brandeis, who accused them of wastefulness, but from the natural fall of costs and, perhaps, of wages. More they may look for from the ultimate return of traffic to its ordinary increment of volume. In the meantime their earnings are unsatisfactory and their growth is at a standstill, except for bare necessities. Rates are too low for the conditions and too low for sound and healthy progress.

As to the future of rates, these cases were an inconclusive episode. For an increase, the burden of proof is, by the express terms of the Interstate Commerce Act, placed on the carriers. It is always difficult to obtain an increase in charges from a supervisory body, constituted at once judge and public advocate, and it may be imagined that few increases will be granted under the new law. As to decreases, on the other hand, the burden of proof is, implicitly, upon the commission. Such decisions will be reviewed by the courts, which will hardly sanction a general return on railway investment below the existing scanty reward. The tendency of rates under regulation will no doubt be downward, but it will also be, and more strongly, towards crystallization.

In two respects, otherwise than by direct influence on rates, the principles enunciated by the Interstate Commerce Commission have an adverse bearing on the growth of railways. The commission does not recognize the costs of abandonment and reconstruction, or of non-income producing improvements, as capital outlay, but as charges to be defrayed out of income. At the same time it frowns upon the undue burdening of present rates with the cost of improvements designed to benefit the future. Thus, if the reasoning be carried into effect in subsequent accounting regulations, such improvements must come out of the pockets of the stockholders, being payable neither out of capital nor out of surplus. Naturally the improvements would cease to be made. The intensive growth, the characteristic forward policy of the present era, must then come to a full stop except in those infrequent instances where it constitutes a clear addition to the existing plant, without replacements.

With respect to extensions, the commission states in explicit terms that the pioneering must be done at the risk of stockholders and not at the risk of shippers on the existing lines. That is to say, not only must each branch stand by itself (an object naturally in view in its construction) but the rates on the existing lines can carry no margin of surplus applicable to its deficits. As is well known, extensions are ordinarily unprofitable for the first three or four years. The customary method of building railways, the only safe way, and the one followed in the development of all our railway systems, is to make the old lines carry the new, and to throw forward the advance from time to time only as the established traffic can carry the new capital cost. New construction will generally cease if the commission contrives, as it may, to put into effect its views on extensions.

The order given against the general advance in rates has now been supplemented by the decision in the Spokane and Intermountain cases, handed down in July, as well as by a number of minor decisions leaning towards reduction of rates. The principle of the Spokane case was different from that involved in the question of rate advances. The issue was discrimination, the familiar discrimination in favor of competitive points that is incorporated not only in the present rate system but in the currents of traffic, in the construction of lines and in the established commerce of cities. Although there may be justification for modifying the inter-mountain rates on the ground that discrimination here is excessive, the Interstate Commerce Commission has gone further in principle, and by a rigid interpretation of the amended long-and-short-haul clause, has declared abruptly for an upsetting of most important and delicate rate fabrics elsewhere. The decision will cause the transcontinental lines an estimated loss of $6,000,000 in net earnings if it is sustained by the courts; and other roads must face, it is to be feared, similar, if smaller, encroachments on earning power.

Ultra-radical decisions are perhaps not to be expected from the Interstate Commerce Commission, biased although it appears to be and jealous of its own powers. It is a broader minded body than most of the state railway and public service commissions whose place and whose functions it must increasingly assume. Its decisions will themselves be regulated and moderated by the courts. Nevertheless, of a certainty, retardation of growth is implied in any such general supervision and regulation of rates by governmental authority as is now entrusted to the commission. Hope of profit has built our railways and keeps them on the battle line of progress. But wherever there is an attempt to secure the public interest by direct compulsion (which is the essence of regulation) profit, beyond a mediocre compensation for the use of money, or the grudging allowance of reward to exceptional efficiency, stands in the by and large for an unreasonable exaction.

There are many ways in which railways can cease to grow. "Economizing" in maintenance, now going on, is one of them. They can make the old cars, old rails and existing grades and facilities do. They can lay off men. They can cut down the passenger service, usually an expense in proportion to its direct return. They can cease to anticipate heavy traffic by buying a surplus of freight cars, and so force the shipper to wait his turn when the press of business comes. They can hold back the building of branches, making the farmer haul his produce a longer distance or leave his new land untilled. Where they must still expand they can buy a cheaper grade of equipment, build inferior lines, scant their facilities and second tracking. In short, they can cease to cope with the advance in the communities they serve. They do not desire this. In fact, they regard it as a calamity that they are forced, temporarily and in a measure only, into this path. The mere enumeration of items indicates sufficiently well the state of inertia into which regulation tends to press the railways.

If wisely guided, the Interstate Commerce Commission has a field of usefulness in preventing discrimination in rates. In the regulation of the general rate level, moderate though it may attempt to be and little subversive of the existing order, its influence cannot help but be injurious. The living rate for the railway is one low enough to make the traffic grow, and high enough to make the railway grow. It regulates itself and has produced in this country an unexampled development both of railways and of traffic. The reasonable rate for the Interstate Commerce Commission or for any governmental commission is

based on evidence of existing costs, existing traffic and existing investment. It is not a living but a dead rate unless imagination or speculation in the future enters into it. If the rate be artificial it will not produce growth. A mould can only set the form.

The regulatory system may confer, in the end, the boon of stability and heavy traffic upon the companies at which it is directed, with steady profits on capital already invested; but it will surely visit with blight the companies yet unincorporated and the growth of railways yet to be made.

JOHN C. STUBBS.

On January 1 John C. Stubbs retired as director of traffic of the Harriman system of railways. For several years it had been known to his more intimate friends that Mr. Stubbs intended to relinquish active service on reaching the age of 65, from a settled conviction that a man of that age holding a responsible position should sever his connection with active affairs as a duty both to himself and to the institution he represents. Several months ago this purpose became publicly known and a few weeks ago, at the time of the general readjustment of the Harriman lines plan of reorganization, the date was fixed as January 1, although Mr. Stubbs' sixty-fifth birthday does not occur until May 31.



John C. Stubbs.

With his entrance into private life, Mr. Stubbs has taken up his residence in his boyhood home town of Ashland, Ohio, although he still retains his connection in an advisory capacity with the railway system he has served for over 40 years. That Mr. Stubbs does not, however, feel entirely ready as yet to give up all railway work is indicated by the recent announcement that he has been engaged to examine and report upon the condition and requirements of the property of the Wabash Railroad, now in the hands of receivers.

On Thursday, December 28, Mr. Stubbs was tendered a farewell banquet in the crystal room of the Blackstone Hotel in Chicago, by many of the principal officers of the western railways, including presidents, vice-presidents and legal and traffic officers. "Thirty," the telegraphic code for "that's all," was engraved on the menus in commemoration of his retirement.

Mr. Stubbs has spent practically all of his business life in the traffic department of the railways now comprising the Harriman system. In October, 1870, when in the second year of his railway service, he became chief clerk in the general freight office of the Central Pacific at Sacramento, Cal. For the past ten years, as director of traffic of the Harriman System, he has held an office unique in the railway world, with jurisdiction over the traffic department of 18,000 miles of road.

By virtue not only of this powerful position, but also of his own personality and remarkable ability, Mr. Stubbs has for many years held a commanding position in the transportation world and has perhaps exerted a more potent influence on the traffic destinies of the western half of the United States than any other one man. He was very largely responsible for the development of many important industries of the Pacific coast through his policy of making rates to foster a business that otherwise would be unable to compete in distant markets. For example, he is fond of telling the circumstances surrounding the first important eastbound shipments of raisins from California. A Sacramento farmer who wanted to make the shipment came to him to find what the rates would be. The tariffs had named $3 per 100 lbs. The farmer thought the shipment would stand $1.75. "Then, that is the rate," said Mr. Stubbs, and the general office confirmed it.

Mr. Stubbs was born May 31, 1847, at Ashland, Ohio. After a common school education his first railway experience was gained during his connection with the army in the Civil War, when he was assigned to transportation service and employed in checking government freight. In March, 1869, he entered the service of the Pittsburgh, Cincinnati & St. Louis as clerk in the general freight office at Columbus, Ohio. In October, 1870, he transferred his allegiance to western railroading as chief clerk in the general freight office of the newly-opened Central Pacific at Sacramento, and on December 1, 1871, he was promoted to the office of assistant general freight agent. From July 28, 1873, to March 5, 1882, he was general freight agent, and from May, 1882, to October 1, 1884, he was freight traffic manager of the same road. On October 1, 1884, he was appointed general traffic manager of the same road and leased lines. On February 27, 1885, after the Southern Pacific had taken over the Central Pacific he was made general traffic manager of that company, and in December, 1889, he was elected third vice-president of the Southern Pacific. After E. H. Harriman had merged the Southern Pacific and the Union Pacific systems, he selected Mr. Stubbs and Julius Kruttschnitt as the keystones of his great operating organization, with Mr. Kruttschnitt as director of maintenance and operation and Mr. Stubbs as director of traffic at Chicago. Mr. Stubbs held this position from July 9, 1901, until the date of his retirement. He was succeeded by Lewis J. Spence, who, for some time, had been his chief assistant at Chicago.

On October 5 a line in China was completed, which is not very long but quite important, and extends from Canton to the British town Kow-loon, on the main land opposite Hong Kong, where a large part of the commerce of China is transacted. It is 106 miles long, extending along the coast, about 19 miles being in English territory, this part having been built by an English company. The work was begun nearly four years ago. It has to compete with steamers for the through traffic. There is one express train, with but one stop between Canton and Kowloon, which makes the 106 miles in five hours.

INDIRECT LIGHTING FOR PASSENGER EQUIPMENT.

Indirect lighting, which has been used extensively in hotels and other public places because of the even light and soft tones, has recently had two applications to railway passenger equipment. The dining cars on the Santa Fe Train de Luxe, which were illustrated in the *Railway Age Gazette* of December 15, 1911, page 1207, were lighted in this way; also the dining and observation rooms in the private car for B. F. Yoakum, chairman of the board of directors of the Frisco lines, which has just been completed. Although the Santa Fe cars were the first ones to be actually placed in service with this system of lighting, the possibility of using it was first considered in connection with Mr. Yoakum's car, which, however, was a little slower in building than the Santa Fe cars.



Arrangement of Indirect Lighting Fixture in B. F. Yoakum's Private Car.

The lighting fixture in the dining room is placed in the center of the room and is supported by four cast bronze chains. The bronze or metal portion is finished in verde antique, and the bowl is made of leaded glass, which is of sufficient density to give a soft color when lighted by the lamps inside of the bowl. No useful light for illuminating the room passes through the bowl. Underneath the twelve 25-watt tungsten lamps is placed a metal reflector, which redirects the downward rays of light to the ceiling of the room, allowing just enough light to pass the reflector to light the colors in the glass bowl. The ceiling of the dining room is finished in a dull ivory white, while the side walls are finished in mahogany; the carpets are green.

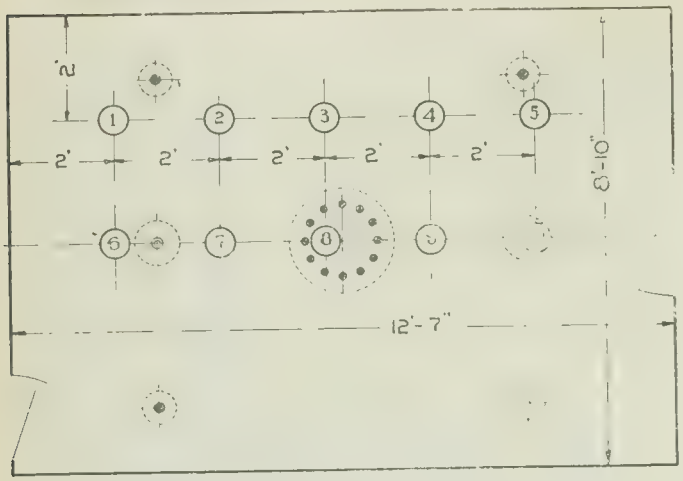
The center lighting fixture in the observation room is similar to the one in the dining room, except that the glass bowl is leaded with a combination of frosted, white granite and amber glass; the latter is used sparingly—just a spot here and there for design and to relieve the monotony of the frosted and granite glass. The ceiling of the room is finished in a cream white and the side walls are of mahogany.

Two small electric lamps, of the direct lighting type, are located under the lower deck in both the dining and observation rooms. Both the center fixtures are large, compared with those usually found in cars. The effect when lighted and also in the daylight is pleasing; this is due to the severe interior treatment of the rooms. The mahogany finish is very plain, with simple molding and plain panels. The large lighting fixtures are, therefore, the only decorative spots in the rooms and these lend themselves to the carrying out of the color scheme as well as to the finish.

That the illumination from these central fixtures is exceedingly good in both the rooms may be seen from a study of the readings at various points, which were obtained with a Sharp Miller illuminometer. The readings were taken 3 ft. above the floor, and their value may be more readily understood by reference to the table showing the requirements in foot candles, for various services, as compiled by Barrows. The location of the points at which the readings were made is shown on the accompanying diagrams. The direct electric lights were not in use when these readings were taken.

Lighting Requirements in Foot Candles for Various Services as Compiled by Barrows.

Assembly rooms, corridors, public spaces	5	to	15
Auditoriums, theaters	1	to	3
General illumination of residences	1	to	2
Reading: Good clear print	1	to	1.5
Reading: Newspaper print	2	to	2.5
Reading: Postal service	3	to	4
Churches	3	to	4
Library: General illumination	1	to	
Library: Reading tables	3	to	4
Ball rooms	2	to	3
Desk lighting	2	to	5
General illumination of stores	3	to	5
Bookkeeping and clerical work	3	to	5
Clothing stores	4	to	7
Display of dark goods	5	to	10
Drafting, engraving	5	to	10
Street lighting by gas	0.05	to	0.25
Street lighting by electricity	0.05	to	0.60
Light from full moon	0.025	to	0.03

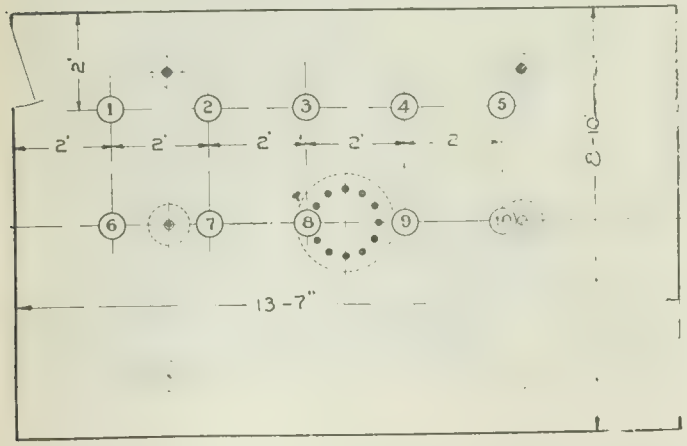


Plan of Observation Room Showing Where Illumination Readings Were Taken.

Illumination in Dining Room, Using Twelve 15-Watt Tungsten Lamps.

Station.	Foot Candles.	Station.	Foot Candles.
1	1.60	6	1.82
2	2.07	7	2.50
3	2.40	8	2.40
4	2.20	9	2.50
5	1.68	10	1.88

Average, 2.06 foot candles.



Plan of Dining Room Showing Where Illumination Readings Were Taken.

Illumination in Dining Room, Using Twelve 25-Watt Tungsten Lamps.

Station.	Foot Candles.	Station.	Foot Candles.
1	1.81	6	2.10
2	2.30	7	2.95
3	2.68	8	3.00
4	2.70	9	3.40
5	1.88	10	3.60

Average, 2.48 foot candles.

Illumination in Observation Room, Using Twelve 15-Watt Tungsten Lamps.

Station.	Foot Candles.	Station.	Foot Candles.
1	2.26	6	2.43
2	3.20	7	4.20
3	3.60	8	6.40
4	3.40	9	4.67
5	1.96	10	2.70

Average, 3.28 foot candles.

Indirect lighting will probably be used extensively on private cars, dining cars and possibly parlor cars. The effect of the light is most pleasing, but a considerably larger amount of power is required than for ordinary lighting. The fixtures in Mr. Yoakum's car were supplied by the Safety Car Heating & Lighting Company. Pintsch gas is used as an auxiliary. The car was built at the St. Charles, Mo., plant of the American Car & Foundry Company.

ANNUAL REPORT OF THE INTERSTATE COMMERCE COMMISSION.

The principal part of the 25th annual report of the Interstate Commerce Commission, sent to Congress, December 20, was abstracted in the *Railway Age Gazette,* December 22, page 1282. In addition to the subjects there dealt with, the report has chapters on the work of the statistical division, on railway accidents, on safety appliances and other matters connected with the physical operations of railways and on a number of minor matters. The chapter relating to decisions of the commission and of the courts contains a list of 62 indictments which have been returned in the federal courts during the past year, and another list of 42 prosecutions which have been concluded during the year. The four cases which have been decided by the Supreme Court of the United States during the year are the following: Against the Delaware, Lackawanna & Western, sustaining the order of the commission forbidding the combining of shipments to make carloads; the Galveston Terminal case, forbidding discrimination by giving exclusive privileges on a wharf; the Willamette Valley case, dealing with shipments of lumber from Oregon to San Francisco, in which the commission ordered a reduction in the rates, although it was admitted that the former lower rates, which were ordered restored, had been unreasonably low; and the Elevation case, dealing with the grain elevators at Council Bluffs, which was noticed in the *Railway Age Gazette* of December 22, page 1294. The principal cases which have come before the commerce court are described at some length.

The Division of Carriers' Accounts during the past year has made extended investigations in the offices of the larger trunk lines and of the 13 large express companies; and the accounts of industrial railways have been investigated. Switching and terminal railways are now being investigated. The commission believes this work to be highly useful.

There is a chapter on shippers' claims, setting forth, in some detail, how some railways do injustice by slow and unbusinesslike methods and also how unlawful advantages are given to shippers by the allowance of claims unjustly large.

During the fiscal year ending June 30, 1910, the railways of the country paid out in settlement of claims for loss of or damage to freight the sum of $21,941,232. For the year before that the sum was $25,000,000, and the year before that $27,500,000. The 1910 sum mentioned amounted to 1.1 per cent. of the total freight revenues. Thus, while the percentage appears to be diminishing, the commission thinks there ought to be a further reduction. It is hoped that in co-operation with the Freight Claim Association an improvement can be effected. Discussing undercharges and other loose practices, the commission suggests that Congress make it compulsory for the carrier to collect full charges, say within 90 days, and, if not collected within that time, it shall be deemed guilty of giving a rebate to the shipper. It appears that cases have arisen where the shipper was called upon more than two years after the delivery of goods to pay an amount in addition to that paid at the time of delivery.

The compilation of the annual reports of the railway companies for the year ending June 30, 1910, is now in the hands of the printer. A preliminary report for the year ending 12 months

later (June 30, 1911) for companies having gross annual revenues of $10,000,000 will soon be issued. This report gives many classes of items which have not been heretofore shown in any of the commission's publications. The number of companies included in this abstract is 62 and they operate 171,745 miles of road.

A table is given classifying the mileage covered by the operations of the 13 principal express companies—whether rail, boat or stage; another table giving the income of the express companies as a whole; and a third giving the revenues and expenses of the Pullman Company from July 1, 1911, to October 31. This department has secured annual reports from electrical interurban railways for four years, and the number of companies reporting is increasing year by year; but as this information is not complete it has been deemed inadvisable to include it in the annual published report. The Division of Statistics has also secured information from pipe-line companies. The commission says that the decision, last October, of the Commerce Court, holding that the commission could not demand from a steamboat company statistics of traffic not subject to the interstate commerce law, will make it impossible to compile useful information from such steamboat companies and will necessitate additional legislation if the commission is to continue the work of developing operating statistics. It expects, however, that the railways will not take advantage of the present situation to interrupt a promising line of statistical work. The railways have made reports to the commission for over twenty years, covering both interstate and intrastate traffic, and they will not take advantage of this court decision allowing them to cut out the intrastate statistics.

The report contains a short chapter on railway accidents, giving the statistics to the end of the last fiscal year, June 30, 1911. These figures were given in the *Railway Age Gazette,* November 10, page 957, in connection with the last accident bulletin. Reference is made to the investigations which have been made of train accidents, but the reports of these accidents are not printed, and nothing is said as to whether they will be. The investigations have generally been conducted by the inspectors of safety appliances "by reason of their special training and peculiar fitness for the work." It is declared that "the construction of cars and locomotives is tending toward an ever-increasing standard of dimensions without a proportionate betterment of track conditions." Statistics are given of derailments during the past ten years which were caused by defects of roadway. The commission recommends legislation looking to the establishment of uniform train rules throughout the country and repeats certain recommendations made by Mr. Belnap in one of his reports of an accident investigation.

Under the head of safety appliances the report says that many of the railways have inefficient inspectors. A review is given of the courts' decisions relating to the safety appliance laws. The commission is gratified to find that the railways are equipping existing cars and engines in accordance with the order of March 13 last, fixing standards of ladders, running boards, brakes, etc., in accordance with the law of April 14, 1910. One company had 4,000 cars equipped within three months from the date on which the law went into effect. During the year suits have been begun to prosecute railways for 23 violations of the locomotive ashpan law, and penalties amounting to $1,600 have already been collected. The hours-of-service law having been sustained by the Supreme Court of the United States, 153 roads formerly refusing to make reports have signified their readiness to comply with the law. There is a gratifying decrease in the service of men beyond the hours named in the law, but the railways present unreasonable excuses for delays, such as hot boxes, poor coal and couplers pulled out. Sixty-three prosecutions have been begun under this law, and penalties amounting to $7,526 have been collected. Judge Trieber, in a suit against the Kansas City Southern, has rendered a decision which, if sustained, will do away with these unreasonable excuses. Judge Willard has held that it is not excusable to detain an engineman or fireman after sixteen hours "to watch the engine"; but, on the other hand, he holds that where a crew remained at a station and neglected to call the telegrapher from his house the company is excusable. As these and other decisions bring out conflicting views, the commission again suggests that Congress make the law more definite and clear.

Referring to the work of the Block Signal and Train Control Board, which has now been in existence four and a half years, the commission says:

"The Board renews the recommendation contained in all of its preceding reports for the compulsory use of the block system on all passenger railways. It concludes that automatic train stops, if properly installed and maintained, will materially contribute to the safety of railway travel. It further concludes that in many situations the use of automatic train stops is urgently demanded. The board is convinced that the principles of design and application of automatic train stops are such that the railways, if required to use them, would find little difficulty in securing appliances of this kind which would meet their operating conditions. The board believes that the railways have been decidedly lax in developing devices of this character. As a consequence of this laxity there has been so little actual experience with such devices on steam surface railroads that the board expresses doubt whether at this time a legislative requirement for the use of automatic stops would be wise. It believes, however, that such action should be taken if due diligence is not exercised by the railways in developing this highly important means of safeguarding railway travel.

"The time has come when something more than mere investigation is necessary, and there should exist some central authority with power adequately to deal with the question of safety upon railways in all its phases. Existing safety legislation does not produce results at all commensurate with their cost. Many matters that have a vitally important bearing upon safety in railway operation are entirely neglected because no adequate means exist for dealing with them. Any future legislation on this subject, to be effective, should deal as comprehensively with the whole subject of the physical operation of railways as existing legislation now deals with the subjects of railway rates and accounts.

"The opinion is expressed that the time has come in this country to inaugurate a system of control over the physical operation of interstate railways similar in character to that now administered through the British Board of Trade. This opinion is not unanimous, however, as one of the board members, Mr. Adams, believes that the establishment of such a governmental agency would be an experiment in an untried field, and holds that action along this line should be deferred until after experts appointed by the government, with power only to investigate and report, have had an opportunity to study the general subject of railway operation."

Following this summary of the views of the board, the commission renews its recommendation of legislation for the compulsory use of the block system, but beyond this makes no recommendations. The views of the board, however, are "entitled to careful consideration." Believing that a temporary board with the limited means available cannot profitably continue the investigations on which it has been engaged, the commission does not ask for an appropriation to continue it beyond the present fiscal year.

The commission on October 3 adopted regulations for the transportation of dangerous articles. These regulations have just been issued (*Railway Age Gazette,* December 29, page 1347). The inspection of locomotive boilers under the law of last February has been begun, and 47 district inspectors have been appointed and assigned to their districts. In the three months following July 1 last, 6 persons were killed and 32 injured by boiler accidents; whereas in the three months immediately preceding that date 12 persons were killed and 260 injured.

Mention is made of the investigation of the derailment on the

Lehigh Valley at Manchester, N. Y., August 25 (the report of which has not yet been issued), and the attention of Congress is called to the need of investigating the causes of rail breakages; but the commission does not desire to make the investigation; there are, doubtless, it says, other bureaus under other departments of the government that are competent to do such work with competent men. The commission thinks that possibly it is desirable to require from the railways comprehensive reports of wheel failures; and that the manufacture of wheels as well as of rails ought to be investigated. The commission repeats the recommendation made to Congress on February 22 last, in response to a resolution of the Senate, that the use of steel cars in passenger trains be made compulsory after a suitable interval, say ten years.

The commission summarizes its recommendations as follows:

1. That section 6 of the act be amended to require telephone, telegraph and cable companies to publish, file and post tariffs, and to empower the commission to reject and refuse to file any schedule tendered for filing which has the effect of exceeding the number of supplements or the volume of supplemental matter permitted under the commission's tariff regulations.

2. To make the Elkins act applicable to telephone, telegraph and cable companies.

3. That the stimulus of requirement be applied to the long-delayed progress toward the adoption of a uniform classification.

4. To provide additional safeguards in railway transportation for employees and the public: (*a*) By standardization of operating rules of all interstate carriers; (*b*) by requiring the adoption of steel cars, postal, baggage and passenger; (*c*) by amending the hours-of-service law, making clear the proviso in section 3 of the act; (*d*) by legislation requiring the use of the block signal system.

5. That the commission be relieved of the jurisdiction of the physical operation of street railways in the District of Columbia.

6. To provide for the regulation and control of capitalization and suitable provisions for the valuation of railway property.

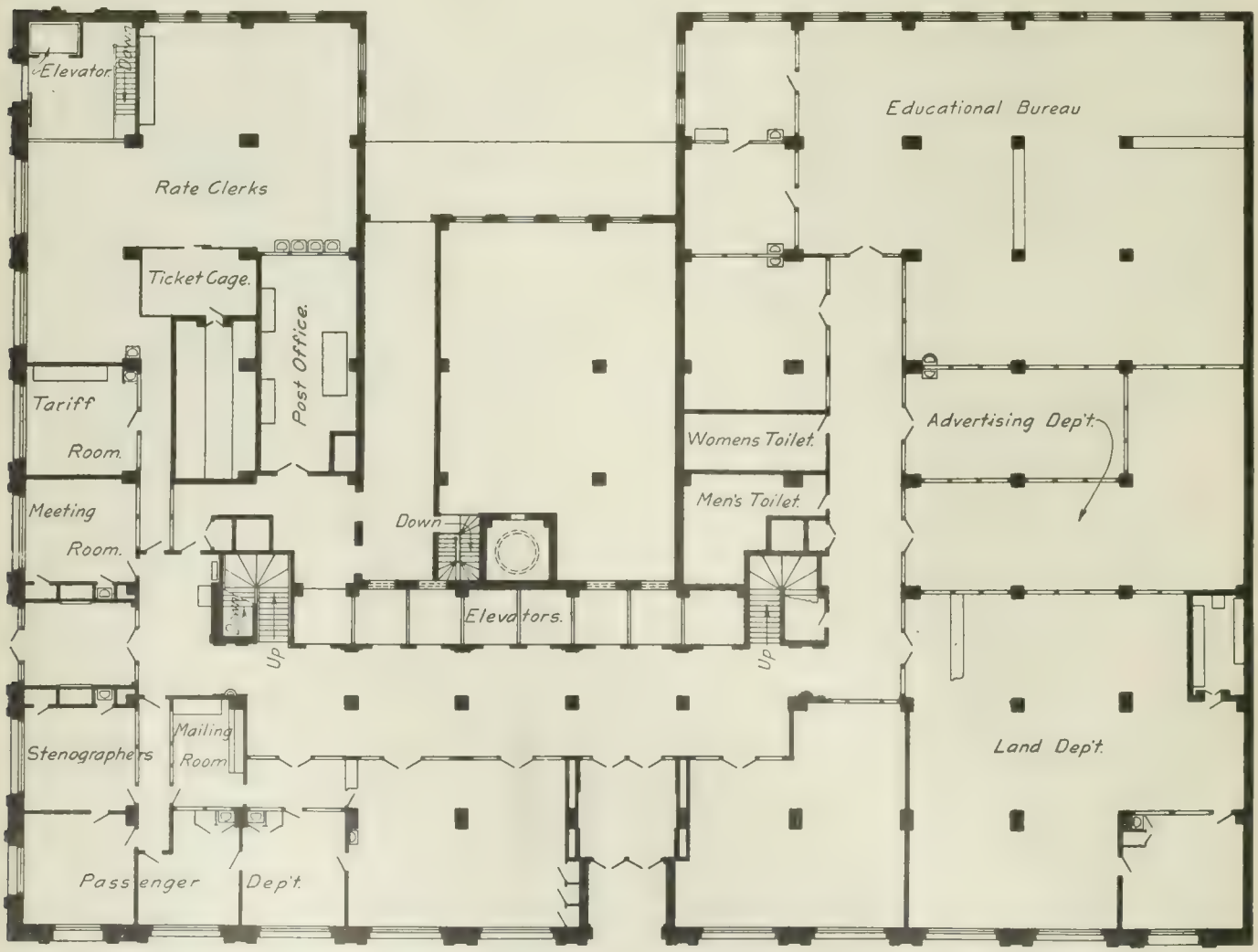
7. The construction of an adequate and suitable office building for the use of the commission.

NEW GENERAL OFFICE BUILDING OF THE UNION PACIFIC AT OMAHA.

The new general office building of the Union Pacific, located at Fifteenth and Dodge streets, Omaha, is completed except for some interior finishing and other minor details which are expected to be finished by January 15. The general officers with their entire office forces have already moved in and the building has been occupied since October 25.

This building consists of twelve stories and basement, having a frontage of 199 feet on Dodge street and 146 feet on Fifteenth street, with a court 50 by 90 feet. It is of the latest type of construction, and is provided with every modern convenience.

The building is of modern fireproof skeleton steel and tile construction, with Maine granite for the base, the first three stories being in Bedford cut stone, and the upper stories gray pressed brick with terra cotta trimming. All floors are of six-inch reinforced concrete, which when tested with loads of 250 lbs. per square foot showed deflections of less than 7-32 in. The foundation is of concrete, 3,100 cubic yards of



First Floor Plan; Union Pacific Office Building.

which were used in its construction, and is supported on piling.

This building contains an average of 21,000 sq. ft. of floor space per floor, of which 17,000 sq. ft. will be used for office space and 4,000 sq. ft. for hallways, elevator, stair space, etc. The building is lighted by over 1,000 windows. The accompanying plan of the first floor shows the general arrangement. There was used in construction of the headquarters, exclusive of the foundation, 500 bbls. of cement, 27,000 tons of structural steel, 1,600,000 common brick and 800,000 face brick.

The lower halls are of Colorado polished white marble; the upper halls have tile floors, and all casings, counters and wardrobes are finished in mission oak.

The building is heated with a modern steam heating plant,



New Union Pacific General Office Building.

three 250-horsepower boilers with patent automatic stokers being used for this purpose.

A modern ventilating system has been installed with power fans operated in the basement of the building, and an improved refrigeration system will be used for cooling all drinking water used.

No expense has been spared by the management to provide pleasant and comfortable offices for its employees, and to give them every modern convenience. The building is equipped with a vacuum cleaning plant. A pneumatic tube system for the transmission of papers, letters and telegrams from one department to another has also been installed, and a package of papers up to two and one-half inches in diameter and ten inches long can be transmitted by way of a central station at the rate of about 90 ft. per second. This is the Universal pneumatic system, and operates entirely by vacuum.

On March 31, 1911, 2,761 miles of railway were open for traffic in New Zealand, as against 2,717 miles the previous year. The net earnings per average mile on lines open in 1911 were $2,114, as compared with $1,944 the previous year. The net earnings per train mile for the past year were 70 cents, as compared with 66 cents the previous year. In addition to $486,000 to be expended during the next four years on grade-reduction work alone on government railways, other contemplated large expenditures are covered in the loan bill which has passed the New Zealand parliament providing authority for raising $2,430,000 for railway construction and $1,458,000 for additional rolling stock.

RAILWAY BONDS AND NOTES.

BY WILLIAM Z. RIPLEY,
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The most striking feature of all funded indebtedness, as contrasted with capital stock, its high degree of localization. A railway company's share capital represents the equity—that is to say, the surplus value over and above its debts—of all its property as a unit. There is no differentiation of real estate from wharves or bridges, rolling stock or marine equipment. The capital stock comprehends the whole within its range. Bonds, on the other hand, are evidences of borrowing upon the security of *particular possessions*. Any specified stretch of mileage, any bridge, ferry or machine shop, even franchises or traffic agreements may be separately mortgaged. And such property, thus covered by a loan, remains the sole security for the payment of interest or discharge of principal at maturity. This is a feature of great importance to investors, seldom appreciated until bankruptcy throws it into strong relief. Such multiplicity of distinct loans, each secured by a separate piece of property, tends to become more and more accentuated with the age of the road, especially in the case of companies with a checkered and precarious past. The funded indebtedness of the Reading company affords a good illustration of such financial complexity carried to its extreme limits. Not alone the financing of its coal properties in addition to its railway lines; but repeated bankruptcy and reorganization over a long period, have contributed to this result. The best illustrations of the financial intricacy of such railway bonded indebtedness is afforded by the excellent series of maps in White & Kemble's Atlas of Railway Mortgages. Map 19 in this volume, for example, shows that on the main line of the Philadelphia & Reading Railroad between Philadelphia and Mount Carbon there are no fewer than ten distinct bond issues. These are secured in every conceivable way. They cover different stretches of road, ranging from 54 to 116 miles in length. Some are convertible; some are consolidated; some are improvement bonds. Some are confined to the main line, others spread out over the many branches of the road. They overlap and interlock in the most complicated fashion. They vary in rates of interest, in term, in provisions as to trusteeship and foreclosure. Detailed examination of such a map demonstrates more clearly than in any other way this leading financial principle, that mortgage indebtedness of a railway is a matter not of corporate unity, but of particularity to the last depree.

The American practice of financing by means of mortgages of specific property has had important results, especially with rapidly growing systems. For even in normal cases, the path of localized borrowing once entered upon, must be pursued to the end. Thus a mortgage upon a hundred mile operating division or upon a given bridge immediately stands in the way of any general lien upon the property of the company as a whole. These local liens, by taking precedence over any subsequent ones, render their security less sound. Such prior liens must first be extinguished, or else, for that property thus already embarrassed, the succeeding loan becomes a "second mortgage." And yet such practice is inevitable in any expanding system. Any general mortgage upon the entire property immediately becomes a partial or localized one after new construction or consolidation with other properties has taken place. Simple financing is possible only in these rare instances where all increments of capital for extension or improvement are obtained from new stock issues or from surplus income, reserved from dividends for the purpose. In all other instances, companies are hampered in contracting fresh loans. Previous borrowings may be far less than the value of the property, yet specific first mortgage security for any but particular bits of possession may be hard to find. The cost of such piecemeal finance is surely greatly enhanced as a result.

As an extreme instance of the highly specialized character of a bond issue, an experiment upon the St. Louis & San Fran-

cisco Railroad in 1904 may be cited. This company had acquired a large part of the capital stock of the Chicago & Eastern Illinois in order to obtain an entrance into Chicago. Funds for this purpose were borrowed upon the stock deposited as collateral, with an agreement to pay 10 per cent. dividends upon it, until finally redeemed at $250 in 1942. Meantime the "Frisco" was sadly in need of funds to meet costs of improvement and extension. No tangible property remained unmortgaged. The expedient was therefore adopted of making a traffic contract between two subsidiary roads, the St. Louis, Memphis & South Eastern, and the Chicago & Eastern Illinois, on terms peculiarly favorable to the former road, and then to base a mortgage upon this profitable contract. In other words, by this arrangement one controlled road was given an advantage over another; and the profits from this agreement to the former were promised as interest upon a $16,000,000 bond issue by this company. Fixed charges of nearly a million dollars were thus created, which of course had to be raised at the expense of the other party to the contract, the Chicago & Eastern Illinois. Such charges became a prior lien upon earnings ahead of the guaranteed dividends upon the capital stock. The legality of this arrangement was called in question in court proceedings. Aside from its legality, however, the case is significant as illustrating the possibilities of highly specialized borrowing in case of need.

A mode of simplifying an already very complex scheme of borrowing has been to put forth new consolidating, unifying or general bonds. These are supposed to represent the aggregate equity over and above all previous borrowing. Such an issue would necessarily provide funds for retiring all prior liens as they fall due. Theoretically this plan would in time substitute one "blanket" loan for a multiplicity of localized ones. And where they are issued by a system, which, by reason of consolidation of separate properties, has greatly enhanced revenue power, they would seem to be warranted. But unfortunately in practice many old bondholders may decline to exchange their prior liens; so that the net result is merely the addition of another "junior" security to the long list.

All authorities upon railway finance have emphasized the fallacy of the view that a mortgage is really secured by any specific piece of property. In ordinary real estate or commercial practice this is indeed true. But the theory is entirely inapplicable to a railway. Few of its separate possessions are in and of themselves of a worth equal to the face of the loans based upon them. It seldom happens even that the entire property can be sold for enough to satisfy the face of its outstanding obligations. The separate units to a far higher degree have no value except as part of a going concern. No matter how much a bridge or a terminal may have cost, its value depends upon use. And railways are peculiarly economic units from an operating point of view. The right of way is not even fit for farming land when trains cease to run. Rails become scrap iron. Rolling stock and movables alone can be auctioned off piecemeal fashion. The real lien of a railway mortgage, therefore, is not upon property as such, but upon earning power. And earning power is dependent upon such efficient operation as can alone take place when each separate possession can be treated as an integral part of the whole. The inherent weakness in the prevailing theory is revealed whenever the test of bankruptcy is applied.

The main purpose served by the right of foreclosure in funded indebtedness is that it may compel a financial reorganization of the company. This is an operation of the utmost delicacy in view of the conflicting interests involved; and the number of these is often very great. In the Union Pacific reorganization of 1895, there were no less than fifteen separate official committees, each representing many separate issues of securities. The Atchison in 1889 had to readjust the interests of 41 distinct groups of bondholders. Only a few of the senior issues could be satisfied by an outright foreclosure sale. All the rest would have their equities extinguished by such drastic procedure. Their safety lay in continued operation of the property as a whole, with such postponement or proportional reductions of their claims as could be agreed upon among themselves. The former of these two courses is the one usually adopted. New securities, with interest returns, not fixed as before but contingent upon earnings as they appear in future, are commonly exchanged for the old ones on which default has occurred. And it is an odd circumstance, shown by long experience, that the company, having failed because of its overload of capitalization, usually emerges from its reorganization with a larger volume of securities than ever. This is due to the fact that dissenting bondholders can be tempted to acquiesce in the new plan, only through offers of larger par values than before, as an offset for the postponement of their claims on current earnings. As Daggett, the prime authority upon reorganization, aptly observes: "There is a magic in the par value stamped upon a certificate which affords a certain consolation to those from whom sacrifices in interest are demanded. An unimpaired (usually increased) principal, moreover, constitutes a real advantage when the date of maturity arrives."

There are many other practical details as to the issue of bonds which may be merely mentioned in passing. It goes without saying that the price at which such securities may be sold depends upon two factors: first, the amount issued in relation to the property upon which it is based; and secondly, the interest promised in relation to the prevailing market rate. The best test of normality is that the bonds shall be salable at par at the going interest rate. If a higher rate than this is necessary to hold them at their face value, it is an evidence of weakness. And, of course, the issue of bonds at a discount is an expensive and wasteful proceeding, even at best. For all such securities at maturity must be paid off at par, and any larger principal sum to be paid at that time than was realized at the date of issue is a positive loss. Sometimes this may be offset by a saving in the current rate of interest paid. Issuance at a discount may at times be necessary in order to strengthen the appeal to investors, who commonly prefer to buy at what seems to offer somewhat of a bargain. But by and large there can be no doubt that the soundest financing is characterized by such adjustment of principal and interest as shall enable emission at somewhere near par value. It should also be understood that the value of a bond depends in a measure upon the length of its life. This follows directly from the fact that the premium or discount at its issue has to be pro-rated over the ensuing period of years. The preference of investors for long term bonds, which offer some opportunity of a rise in price because of the expected fall in the general rate of interest, is another factor to be reckoned with. It commonly leads to somewhat higher quotations relatively to their interest rate, for long-term securities. Such details, however, appertain to private finance rather than to the public aspects of the question. They are fully described in the standard hand books on the subject.

The actual differentiation of funded indebtedness of American railways into various classes of securities is shown by the following table from the official Statistics of Railways for 1909:

Mortgage bonds	$6,942,000,000
Collateral trust bonds	1,147,000,000
Income bonds	284,000,000
Debentures, notes, etc.	803,000,000
Miscellaneous	316,000,000
Equipment trust bonds	308,000,000
Total	$9,801,000,000

It may next be in order to describe the essential features of some of these types of indebtedness.

The income or preference bond is a form of security devised largely in connection with the widespread reorganizations of 1893-7. Disappointed bondholders were induced to accept them in exchange for their old securities, the companies meantime being relieved from the burden of fixed charges by the promise to pay interest only on condition that it was earned. It seeks to combine the lien of a mortgage with the contingency of interest payment if earned. It differs thus from preferred stock, in the

addition of a prior claim upon assets in case of bankruptcy. Attaining a considerable volume ten years ago, the amount of such issues has not greatly increased in recent years. As has been observed, the income bond "is an attempt to combine two contradictory commercial principles. . . . Security for both interest and principal is the essence of the creditor's position, while contingency depending upon success is the essence of the stockholder's position." The two interests are incompatible and conflicting. Experience has proved this to be the case. Stockholders, controlling management, have it in their power to devote all surplus earnings to maintenance and improvement, rather than to pay interest upon the bonds. The property is thus built up until both stock and bonds may be able to participate in earnings alike. Meantime, however, the income bondholders have been deprived of revenue. Nor can they ever recoup these losses of interest, as might happen in the case of cumulative preferred stock. Interest lost for one year is gone forever. The notable suits of the Central of Georgia income bondholders under the Harriman régime, settled in 1910, clearly demonstrate the nature of the difficulty inherent in this class of security. One party wished to upbuild the property by devoting large sums to maintenance, even concealing revenue from its subsidiary company, the Ocean Steamship Company, and otherwise juggling its accounts. The bondholders demanded proper consideration of their rights and eventually secured it.* If, on the other hand, as in the Reading reorganization, this contingency is guarded against, the trust agreements may be so rigid as to embarrass the management in securing further loans needed for development. Nor has the conferring of voting power upon income bondholders solved the problem satisfactorily. As a matter of fact, such securities are scarcely distinguishable from preferred stock; and recent financing has tended frankly to recognize that situation.

The close similarity between income bonds and preferred stock is exemplified by a recent contest between shareholders on the St. Joseph & Grand Island.† The Union Pacific practically controls this small company, through ownership mainly of its common stock. It is in position to make good use of its property as a short line between important points. Net earnings of the road have in the past been substantial, sufficient, in fact, to pay the full dividend upon the first preferred shares. And during eight years of control by the Union Pacific, approximately four million dollars of such earnings have apparently been put back into the property in the form of improvements. Inasmuch as the preferred stock is non-cumulative as to dividends, this entire diversion of earnings into betterments entails an irreparable loss to the holders of this class of stock. On the other hand it immediately inures to the benefit of the Union Pacific, by hastening the time when the common stock, by reason of enhanced earning power may be placed upon a dividend basis. Meantime, it is alleged, the Union Pacific is quietly picking up the preferred shares at low prices conditioned by the cessation of dividends. Whatever the actual merits of the case, the issue raised as to the differentiation between income and capital, or improvement, account is precisely analagous to that raised by the Central of Georgia income bondholders, referred to in a preceding paragraph.

A special variety of bond, more common in England than in the United States, is known as a debenture. This is practically a bond without a specific mortgage lien, and hence without foreclosure power. In other words, it is merely a promise to pay, depending for security upon the general credit of the road. In one respect the debenture resembles an income bond, in that interest is contingent upon earning power. Being thus, in form at least, somewhat less secure than an ordinary mortgage bond, some other attractive feature, such as convertibility into stock, or a higher rate of interest, is necessary in order to insure its successful flotation. On the part of the company, the advantage is clear, inasmuch as debentures may be issued irrespective of the amount or nature of the prior liens already outstanding. Some strong companies like the New York Central & Hudson River and New York, New Haven & Hartford, have largely relied upon debentures in recent years. But in the case of weaker companies, like the Wabash, large issues of such securities have been at once a source of disappointment to investors, and an embarrassment to the future financing of the road itself.‡

Short time borrowing by railways may be for several purposes, quite different in character and significance. Notes may be issued merely in order to anticipate assured income, as cities or towns frequently do, in order to cover current expenses until receipts from taxes suffice. Such financing is purely normal and requires no comment. Or notes may be emitted under financial stress by companies struggling on the verge of bankruptcy. In this case the episode is abnormal, and usually merely postpones the evil day of reckoning. A third cause of short-time borrowing has within recent years assumed such proportions as to demand careful examination. Such borrowing for short periods of time threatens to disturb the general money market as well as the supply of long term bonds. It is commonly associated with periods of financial disturbance, arising naturally of course in a tight money market when ordinary bonds are unsalable at any fair price. Every crisis since 1878, with the exception of the distinctively railway panic of 1884 has witnessed this phenomenon. But it has steadily assumed larger and larger proportions; and seems to be less critically regarded than heretofore. This is probably due to the fact that it is now resorted to by the strongest and most conservative railways; whereas it was formerly only a device for staving off impending bankruptcy of railways of the weaker sort.

As a device for merely postponing trouble, note issues are in bad repute. The Jay Cooke flotation of Northern Pacific notes just prior to financial collapse in 1872 was almost identically repeated twenty years later on the eve of the panic of 1893. The floating debts of important railways ran up by $124,000,000 at this time. The most prominent examples were the Union Pacific collateral trust notes of 1891-4, and those of the Northern Pacific and the Atchison. In all three cases, the notes falling due in a panic period precipitated bankruptcy. But the subsequent resort to note issues at the two periods of financial distress of 1903 and 1907 have been due to entirely different causes. They represent forced borrowing, of course, for it is inconceivable that any company should pay high rates of interest for short loans, if regular bonds could be sold. But the significant feature is that they now represent true development work, rather than impending bankruptcy. Note financing has assumed a positive rather than a merely negative character. Nor is the amount of such borrowing inconsiderable. It has been estimated that in 1903-4 not less than $200,000,000 of short time notes were issued; while within the first five months of 1907, the aggregate loans of this kind were $285,000,000. During the latter period regular bonds amounting to less than $200,000,000 were sold by railways. In other words the half year's financing was predominantly of this temporary sort. The average rate of interest has also risen. In 1903-4 it averaged about 4.5 to 5 per cent. Three years later it was between 5 and 6 per cent.

The particular causes of these later note issues were the imperative need of improved facilities for handling the enormous growth of traffic; and also to some degree the exhaustion of the regular supply of loanable capital for financing stock market operations incident to the spread of consolidation. The freight blockade of 1899 was mainly due to insufficiency of equipment to handle the business offered. The trouble in 1903 was inadequacy of terminals. Many large companies, notably the Pennsylvania, had in consequence committed themselves to large projects of terminal development. These commonly proved more costly than was anticipated; and moreover the panic of 1903 interrupted

*Described in detail in Quarterly Journal of Economics, XXV, 1911, p. 396 *et seq.*

†The U. S. Investor for January 21, 1911, p. 115, reprints the statement of the aggrieved preferred shareholders.

‡Succeeding articles will treat of collateral trust and convertible bonds.

them midway in construction. The work could not be interrupted without loss upon all the investment already made. It was imperative to go on at all cost. Bonds could not be floated. Notes were a last resource. It must be added, however, that other causes were also contributory. While the Pennsylvania was making extensive terminal improvements in 1903 at New York, it was also, with the Lake Shore road, engaged in buying up the stock of the Philadelphia & Reading in order to steady both the trunk line and hard coal situations. This latter factor was less in evidence in 1906.

As for the outcome of these stupendous note issues, it is unfortunate perhaps that in the main it was successful. In other words, the notes were mainly paid off by means of the proceeds of regular bond issues, after the lapse of from one to three years. The issues of 1907 in fact were in some cases actually bought up by the companies themselves in advance of maturity. Surplus funds drawing only 2 per cent. interest., could profitably be devoted to this purpose. The leading exception was the Erie, which was barely saved from default and another bankruptcy by the intervention of Mr. Harriman, when its notes fell due in 1908. The fact, however, that in most cases these notes happened to fall due at times when the needs of the companies could be permanently cared for, does not detract from the possible danger lurking in their use. If they chance to mature at an inconvenient time, the situation may easily become desperate, and the cost of such hand-to-mouth finance is always bound to be excessive.

From a wider point of view the seriousness of this tendency to resort to short term financing is that it withdraws from trade the floating supply of capital. This in turn leads to drafts upon the available long-time investment funds of the community for the daily needs of business. In other words extensive note issues discourage, if they do not preclude, ordinary borrowing by means of long-time bonds. The appeal is usually to the large sources of ready capital. Until the reform of the New York life insurance companies, they invested heavily in such notes. They are commonly in large denominations for the convenience of such lenders. The notes used more commonly to be secured by deposit of collateral, ordinarily free holdings of stocks or bonds of subsidiary companies. But many in recent years are issued upon the mere credit of the company, being otherwise unsecured. Many are thus rendered semi-speculative in character. This naturally leads to wide fluctuations in value. It is sometimes difficult to separate such liabilities from the ordinary funded debt. They should always of course be regarded as current liabilities, of the nature of floating debt. But in 1910, leading companies like the Erie and the Baltimore & Ohio, failed to so designate them. This is a most deceptive practice. On the whole, viewing the developments of the last decade, one is almost tempted to hope that a sharp lesson or two may serve to remind railway financiers of the risks incident to the growth of this short-note habit.

ANOTHER VIEW OF THE SUPPLY DEPARTMENT PROBLEM.

The comments on the supply department of "D. A. D." in one of his "Letters of an Old Railway Official to His Son, a General Manager," recently published in the *Railway Age Gazette*, continues to call forth discussion from the supply department. The following letter from "K. I. D.", who in real life is the general storekeeper of a large railway, has been received under the title, "A Heretofore Unpublished Letter from a General Manager to His Father, a Retired Railway Official."

On Line, August 3, 1911.

My dear D. A. D.:

Your letter of July 22 from Salt Lake City was received in due time, but I have not had a good opportunity to reply to same on account of being so very busy. I have also deferred answering as I hesitated to say to my fond old *pater* just what I wanted to say, and thought possibly by putting it off I might decide not to write it, but I still feel the same, and must get it out of my system.

Now you know, D. A. D., that I have the greatest respect for you and your opinions, and I owe everything to you. I certainly miss seeing you, and I read all your letters from all over the country with great interest, and I derive much benefit from them, though sometimes I differ in opinion from you, and do not follow your advice. (By the way, D. A. D., now that you've retired and are well fixed, why don't you settle down and give mother a little more benefit of your society? If you don't you soon must be a *tired* "retired railway official.")

But I can't bring myself to agree with you on the stores department proposition. You have been out of the active service now for some time, and I believe have not kept fully posted as to the progressiveness of this branch of the service. You know, D. A. D., that it has been pretty hard for some of the old fellows to give up the old practices, and a few of them never will until they're "born again." I say all this with due respect to you, and I hope you won't get miffed at what I say, and take a trip to the coast to settle your nerves.

It's a poor father who does not make his son show up an improvement over him, and each successive generation should be better. That this is so is the highest encomium on our ancestors. Grandfather always wore boots. You discarded them after a hard struggle, and the only ones I ever wore were the red top ones I wore when a boy. Now, you know, D. A. D., you can run faster in light shoes than you can in boots. The railways are metaphorically shedding their boots, and newer methods are in vogue and younger men are at the helm. Why, at my age (and I mention this only as an example in point, and not egotistically) you were still general foreman at the Glendale shops. You didn't have an electrically driven machine in the shop, never heard of a superheater, and if a Mallet engine had run into the shop (which would have been impossible on the 40-lb. rail, and on account the size of the roundhouse), you would have been scared to death.

But these things all came, and with each one of them there were calamity howlers, and it was hard to give up the boots.

The same way with operating practices. After you became superintendent of the old road, which you know was only two hundred miles long, you made the purchases of material. When the road was absorbed by, and made a grand division of, the trunk line, you were made general superintendent, but were relieved of the buying, and this was done by the purchasing agent. I remember well your howls at this innovation, and I note even yet, in your letter, you say "the purchasing for a large railway *may* warrant a purchasing agent," implying that you are still unconverted on this point. But is there any big road without a purchasing agent?

And now the stores department looms up as a bugaboo. It is young yet, but it is not a helpless infant. It has gotten out of long clothes and is making great headway, and in my opinion is bound to be the prime factor in the proper handling of the supply question on all railways. This has already been demonstrated on many systems, and is being worked out satisfactorily on the majority of the lines. But right here I want to say that the management should not inaugurate a stores department, appoint a general storekeeper, tie his hands and feet, throw him in, and tell him to swim. I am not going into the matter of organization, but I do say that the stores department should be given the proper recognition by the management, the general storekeeper vested with the necessary authority, and given pay roll allotment adequate to enable him to employ men of suitable caliber to successfully operate his department.

The storekeepers *are* making good showings for their companies, and it is not done by reducing their stocks to a working basis so low as to be unsafe and uneconomical.

fact, however, that the criterion of the ability of a storekeeper is the percentage of his issues of material to his stock on hand, provided always that he carries sufficient stock to meet promptly all reasonable demands upon him for supplies.

I cannot imagine a case of a superintendent having to beg a storekeeper for any material. Regardless of the system in operation, the superintendent and storekeeper should work together for the railway, and with us I know they do. If in any case they do not, it is not the fault of the system, but an evidence that the storekeeper or the superintendent or both should be removed.

The storekeeper can be an invaluable aid to the superintendent or higher official in keeping check of the materials both before and after issue, and he is in a better position to do this than the superintendent is. A bona-fide order is necessary now to get material from the storehouse, and the storekeeper is supposed to account properly for all material used. This was not exactly the case at Glendale, when the general foreman had the stock. Don't you remember, D. A. D., when you persuaded the superintendent of motive power to let you rebuild the 627? You gave an estimated cost of $7,000, and when completed our charges ran up to $8,700. Don't you remember when you told Wilson, the so-called storekeeper (who, by the way, got $45 a month), to shave the charges to the 627 down to $6,930.78, and charge the difference to repairs of freight cars, as that account would stand it? Don't you remember when they had the big political celebration in Glendale, and you loaned the committee two hundred lanterns, and gave them a barrel of carbon oil? We got back part of the lanterns and no oil, and the shortage you had charged to "O. T. & W. for locomotives." (I hesitate to mention the mahogany sideboard which mother still has.) I could enumerate lots more, but you know them. This would be harder to work under the stores department system, and that's one reason why some of the old fellows kick.

You refer to two prominent roads which do not have the stores department system and two others which do have it. Before I inaugurated the system on our lines, I personally visited all of these roads and made careful investigation, and I want to say it was principally due to my investigation of these particular lines that I started our department, and I have not had cause to regret it. When the hard times struck us all a few years ago, one of the roads without a stores department, which you mention, had such a heavy stock on hand that it practically made no purchases for about a year. During the period of depression and low-priced material it was using up its high-priced stock accumulated during the fat years. The other road, with a stores department operated on a good basis, continued to purchase material monthly as needed, *at low figures*. This is a eulogy on the stystem.

But I am drawing this out too long, I fear, and will close after relating a coincidence, or you might say "two." Aunt Mary has been visiting us for the past week, and you know some of her ideas are as strenuous as yours, although along different lines. Whenever she is with us on Sunday, I always brush up and go to church with her, just like it was my regular habit. I went twice last Sunday. Now, don't laugh yet. In the morning the minister's text was Deut. xxxii, 15, "But Jeshurun waxed fat, and kicked." He took as his theme the fellow who couldn't stand prosperity, and incidentally took a few knocks at the fellow who had everything his own way, and then kicked when finally he was compelled to give something up. On the way home, Aunt Mary said, "I wish your father could have heard that sermon."

In the evening the minister had a composite text from Zech. iv. 10, "For who hath despised the day of small things," and Ps. cxviii, 22, "The stone which the builders refused has become the head stone of the corner." When he concluded I couldn't help thinking, with apologies to the old nursery rhyme,

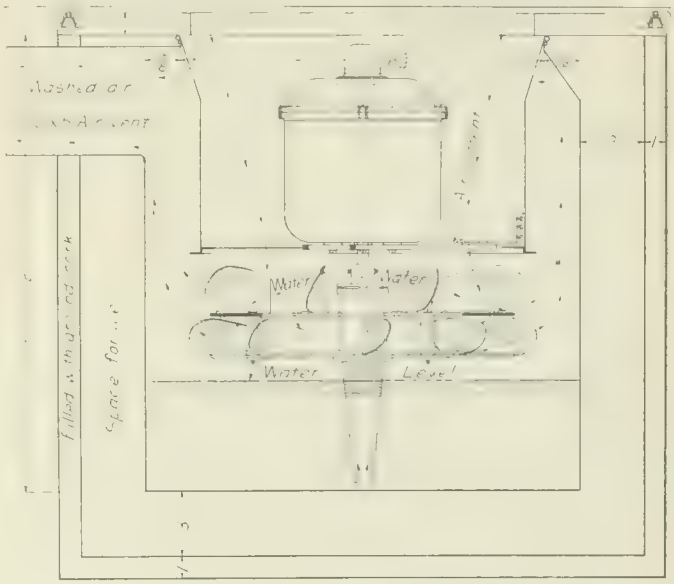
> Hush, little Storekeeper, don't you cry,
> You'll be *somebody* by and by;

and mentally I joined with the pastor when he said "Let us pray."

Now, take this all kindly, my dear old D. A. D., and believe me to be your affectionate son. K. I. D.

AIR WASHER AND COOLER, SANTA FE TRAIN DE LUXE.

In the description of the Santa Fe "Train de Luxe" in the *Railway Age Gazette* of December 15, reference was made to a recently invented air-cooling and air-washing device, which is intended to be used when the trains are passing through the hot, desert portion of the line. This device was made by the Duntley



Air Washer and Cooler for Passenger Equipment.

Manufacturing Company, Chicago, and a section of the apparatus is here illustrated. It consists of an inner case or tank surrounded by a 3-in. ice space, which in turn is insulated by an outer case, leaving a space 1 in. wide, which is filled with granu-



Application of Air Washer and Cooler to Baggage End of Buffet Car.

lated cork. A Burke electric motor is suspended in the sheet iron drum with the fan below. It is specially wound so as to operate on a 30-volt, direct current and consumes 242 watts when running at full speed at 1,200 revolutions per minute. The fan is 16 in. in diameter and consists of a horizontal ring 2⅜ in. wide and a solid disc below, on both of which are riveted curved vanes.

Below the fan and fastened to the motor shaft is a conical tube which projects into the water; its rapid revolution causes the water to rise in the tube, and it passes out through a narrow slot in a fine spray near the top of the fan. Outside air is admitted through the central portion surrounding the motor and passes to the fan, where it is cooled, moistened and washed by the cold water spray, and then passes out through ducts in the lower deck of the car. It is admitted to the body of the car through ornamental registers, about 8 in. in diameter, placed in the headlining of this deck. The air washer is located in a small closet at the end of the dining and sleeping cars, and its general appearance, as fitted in the baggage end of the buffet car, is shown in the photograph. When operating at full speed each air washer supplies about 90,000 cu. ft. of air per hour to each car, which insures ample ventilation. It should add greatly to the comfort of passengers passing through a hot, dusty region, as the air supplied to the cars will be free from dust, cinders and other impurities, and will be cooled through the medium of the water spray aided by the ice jacket.

STREET MECHANICAL STOKER.

A description of the Street mechanical stoker was published in the *Railway Age Gazette* of May 26, 1911, page 1197. Since that time an improvement has been effected in the design and construction of the conveyor used for moving the coal from the tender to the elevator hopper beneath the frame of the locomotive. The natural construction of such a conveyor is to use the screw type, but so long as the stoker was expected to feed everything from run-of-mine to slack, such a machine was inapplicable to the work. Something not apt to jam was needed. But if prepared—that is, crushed—coal is used, then the screw conveyor can be employed.

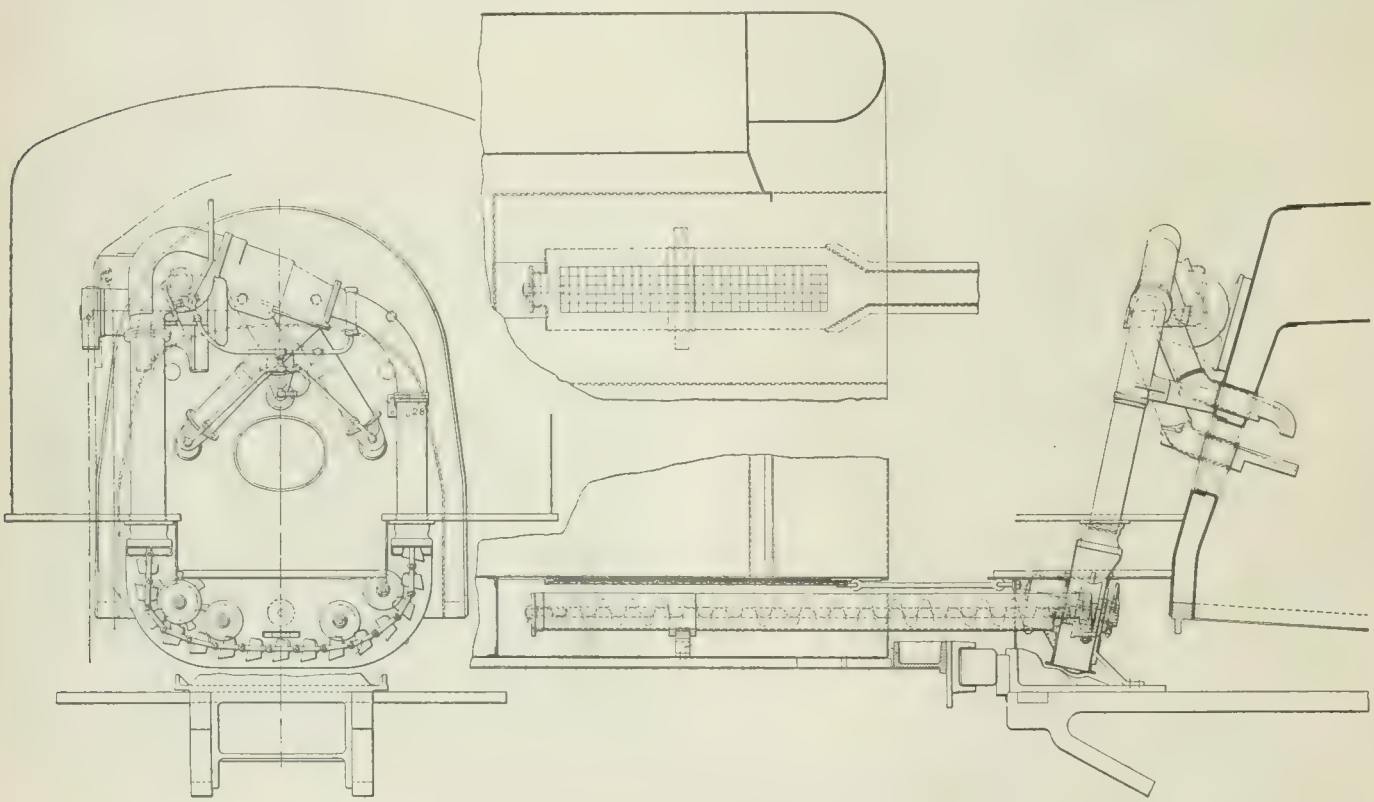
Mr. Street has always insisted that the coal used in his stoker be crushed before delivery to the distributing nozzles, and, to that end, put a crusher on the tender, not that he approved of it, but because railway officials were not educated to the point of preparing coal for stoker use. With the crusher, the fireman has to rake down all the coal to the stoker jaws, from which it drops into a chute delivering into the deep hopper below the conveyor. This crusher is driven by an engine of its own located on the tender and taking steam from the locomotive. This arrangement was made to meet requirements and will be abandoned as soon as officials are educated to the point of recognizing the advantages of using one crusher at the coaling station instead of one on each of the locomotives.

In the previous article the four-fold screen in the elevator pipe was described, which, by turning, can throw any one of four grades of crushed coal down at the back head. It was not illustrated at the time and is, therefore, shown here.

With crushed coal furnished to the tender, a screw conveyor is used to carry it to the elevator hopper. Its general arrangement is shown in the accompanying engravings. The second engine, that was located on the tender, has been dispensed with, and the screw conveyor is driven by a sprocket wheel mounted in the lower hopper, and in turn driven by the elevator chain.

The screw runs back from the hopper beneath the floor of the tender, as shown in the illustration. It lies in a heavy sheet iron trough, which is pivoted on a strong pin to the hopper. The back end of the trough rests on a wrought iron support bolted to the floor of the tank. A double toggle joint is provided for driving the screw, and this together with the pivot connection for the trough makes ample provision for passing around curves and over uneven track.

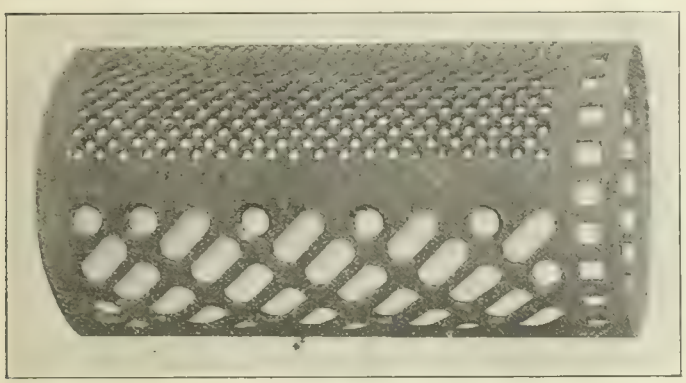
A screen having 2-in. square meshes and made of ¼-in. wire is placed directly above the screw conveyor and in the floor of the tank. This screen is covered with sliding plates, which plates are arranged so an opening 10 in. by 12 in. is the maximum which can be obtained, and this opening is always in front of the coal, and therefore at a point where it can be seen by the fireman.



General Arrangement of Screw Conveyor Type Street Locomotive Stoker.

The screen has a sliding support in the tank and is provided with an agitator which keeps it in constant motion while the locomotive is running, and prevents the coal from bridging and clogging over it. When taking coal these plates are placed in a position which covers the entire screw, and prevents any coal from being fed to it until such time as the fireman is ready for this to be done. He then moves the front plate ahead, uncovering the opening beneath it, and allowing the coal to flow down upon and through the screen until the slope will deliver no more. The second plate is then drawn out against the first, thus moving the opening to the rear. The other plates are afterwards moved in succession to meet the demands of the fire until the last plate has been drawn out and the tender has been emptied.

With the stoker and crusher combination as described in the former article, the lower hopper was very deep so as to obtain a sufficient steepness of slope for the chute to cause the coal to flow under all circumstances. With the screw conveyor the lower hopper is located between the floor of the cab and the deck casting. A section of the cab floor is made removable, and by lifting it access is obtained to all parts of the lower hopper. This hopper is provided with movable slides to facilitate cleaning it out, and is also fitted with a steam jet for blowing in steam to thaw it out in case of freezing. When the screw conveyor is



Discharge Pipe Screen.

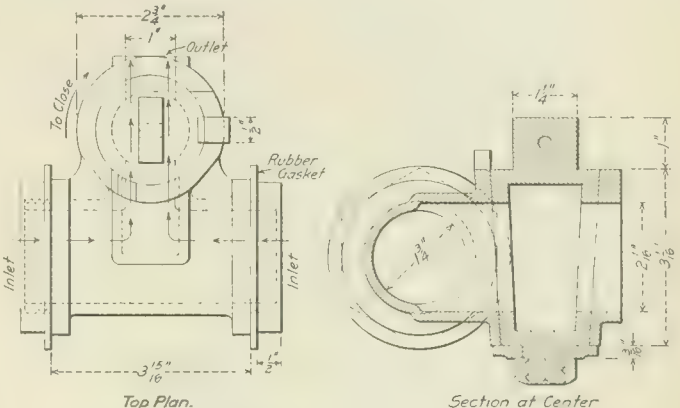
used it is possible to construct the tank of such a form that all of the coal can be taken from the tank and fed into the firebox without being handled by the fireman. Under the most unfavorable construction of the tank the only handling of the coal required on the part of the fireman is that of scraping it out of the sides of the tank on top of the screen when the coal supply is low or nearly exhausted. The agitator prevents bridging, and the only attention the screw must receive from the fireman is that of occasionally drawing out one of the plates which cover the screen, bringing the opening further back. With this type of stoker the amount of coal fed to the firebox is governed by the speed of the screw conveyor, which is regulated from the fireman's seat.

The elevator engine and elevator run at a constant speed, and a gear changing box is provided, by means of which three different speeds can be given to the screw conveyor. The operating handle for this gear changing box is located at one side of the fireman's seat, to enable him to change the speed of the screw, and therefore the amount of coal fed to the firebox without leaving his seat. The gear changing box is mounted directly on the shaft of the driving sprocket, and motion is transmitted from the box to the screw through the medium of a link chain and a pair of sprocket wheels. The balance of the stoker remains as it is used in connection with the crusher, and as described in the previous article.

The chamber of deputies of Bolivia has passed a bill authorizing the government to ask for tenders for the construction of a railway from Quiaca, Argentina, to Tarija, Bolivia, a distance of about 104 miles. There will be a guarantee of 5 per cent.

TANK VALVE FOR REFRIGERATOR CARS.

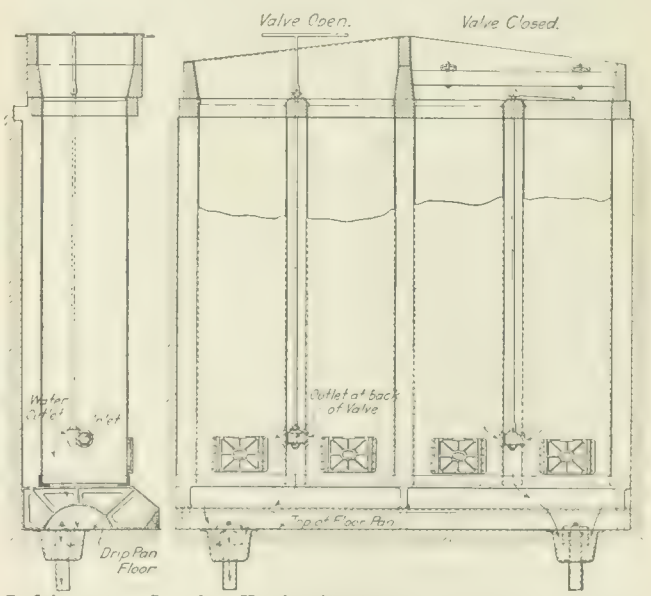
The M. C. B. committee on brine drippings from refrigerator cars recommended, at the 1910 convention, that all salt water from melting ice should be retained in the ice tanks and drained only at icing stations, because the sprinkling of the salt water over the road was a serious cause of the corrosion of steel road structures and rails; also that the mechanism for operating the draining valves should be simple and positive. Many of the packing companies have equipped large numbers of refrigerator



Drain Valve for Ice Tanks.

cars with drain valves, in accordance with these recommendations, which are opened only at ice stations. The illustrations show the general arrangement and detail of a drain valve as designed and patented by the Haskell & Barker Car Company, Michigan City, Ind.

The brine tanks are arranged in pairs, and the valve with a flange connection made tight with rubber gaskets is placed between each pair. The connecting piece is 1¾ in. inside diameter, and the plug valve body is cast solid with it, providing a clear opening 2 1/16 in. in diameter. The entire fixture is made of brass; the plug is ground in to fit and is operated by a rod extending to the handle at the top of the car. The overflow



Refrigerator Car Ice Tanks Equipped With Draining Valves.

brine passes down to the floor drip pan, and is delivered to track through the usual traps. Morris & Company have used these valves in their refrigerator cars for a year, and report them to be uniformly successful. They have had no trouble with them freezing, and they stop the dripping of brine on the track. All the brine is carried in the tanks and is emptied only at icing stations. The overflow pipe in the tank is placed so high that even when all the ice is melted the opening is still above the water level.

General News Section.

The Missouri Pacific has ordered a reduction in force and working time in the shops at Sedalia, Mo.

Telephone train despatching circuits are being installed on the Chicago Great Western, between Kansas City, Mo., and Des Moines, Ia.

Suit has been started in the federal court at Salt Lake City against the Oregon Short Line for five violations of the hours-of-service law.

The Baltimore & Ohio Southwestern was fined $300 in two cases in the federal court at Cincinnati on December 28 for unduly detaining live stock in cars in violation of law.

The Atchison, Topeka & Santa Fe has abolished the use of flags as markers for the rear ends of passenger trains, and the lamps (unlighted) will serve as markers during the day.

By agreement between R. T. Railey, general attorney of the Missouri Pacific, and Attorney-General Major of Missouri, the cases against the Missouri Pacific and the Missouri, Kansas & Texas, involving the validity of the state law requiring railways to pay employees twice a month, have been advanced on the docket of the Missouri supreme court for hearing at the January term.

A statement compiled at the War Department in Washington shows that from sales of scrap iron and other unused material which was left on the Isthmus of Panama by the Frenchmen who did work on the canal fifteen years ago, the government has already realized the sum of $2,112,000. Over 29,000 tons of metals from these abandoned plants have been shipped to the United States, and there is much work yet to be done. Some of the abandoned machinery has been put in order and is being used.

The Illinois Central has offered a reward of $1,000 for the arrest and conviction of the persons responsible for attempts to wreck four suburban passenger trains in the vicinity of Grand Crossing and Parkside, Chicago, on the night of December 26. Three of the trains were derailed, but no one was injured. Suspicion has rested on men involved in the recent strike of shop employees of the company, but no clew has yet been developed. An investigation showed that the switches had been tampered with. Fourteen sticks of dynamite were also found under the approaches of the railway bridge across the Mississippi river, used by the Illinois Central and other lines, at Thebes, Ill.

The railroad commissioners of Nevada, H. F. Bartine, J. F. Shaughnessy and W. H. Simmons, have addressed to the senators and representatives of congress from that state, a petition for the abolition of the commerce court and for the enactment of a law to carry all disputed decisions of the Interstate Commerce Commission direct to the supreme court of the United States. The honorable commissioners have printed their petition in a pamphlet of 8 pages, and they evince no disposition to mince words. The commerce court is nothing more nor less than a second commission. Important cases are sure to be appealed. If the court holds invalid an order of the commission, in the great majority of cases "it is morally certain that the court will be wrong and the commission right." The Interstate Commerce Commission is experienced and competent and it is absurd in all cases and a rank injustice in many to require its action to run the gauntlet of two courts. The inferior courts are slow and much injustice is done by delays. The procedure in many cases is "both strange and objectionable in the highest degree." Many courts "refer cases to irresponsible but ambitious masters in chancery." The master sets up his opinion against that of the railway commission, federal or state, and the court then adopts the presumption that the master is right, both in his findings of fact and conclusions of law. This is productive of untold evil. The petition goes on to cite cases illustrating this and other points.

The Uruguay Great Eastern Railway has been authorized to open to public service its completed extension from La Sierra to Maldonado, and the government has approved the plans of the Central Uruguayan Railway Company for its new station at San Jose. The company will commence the construction of this station at once.

Rules for B. & O. Claim Agents.

General Claim Agent Egan, of the Baltimore & Ohio, has formulated a code of business ethics, and has forwarded a copy of it to each claim agent. Following are extracts:

"Be polite and kind to the poor. . . .

"Do not be deceitful. Tell the truth and take your medicine; it is better for your conscience, the company and your fellow men.

"Be honest. Because a claimant is poor, do not take advantage of him nor his condition.

"Be frank in all things. If a claimant asks your advice, give it openly and freely. If your advice is not taken, your duty has been done.

"Be courteous. Do not endeavor to create the impression that you own the road.

"Be ever patient. If a claimant vilifies you and says all manner of things against you, treat him with all the politeness and kindness you possess, and ere the day has passed he will bemoan the fact that he made an ass of himself."

Illinois Central Pensions.

Figures compiled by the pension department of the Illinois Central show that during the period of 10 years—July 1, 1901, to June 30, 1911—534 employees were pensioned, exclusive of a number of men to whom special allowances were granted in lieu of pensions on account of their not being technically eligible to a pension under the rules. The names of 364 men were on the pension roll on June 30, and the pension roll as of that date was at the rate of $95,429 per year. During the 10 years' operation the company paid out $511,664 in pensions, not including special allowances.

An examination of the pension records show many interesting features. An agent at a comparatively small station, 53 years continuously in the service in the same capacity, receives a pension of $47.57 a month for the rest of his life. A tinsmith, 53 years continuously in the service, receives $40.32. A laborer, 52 years continuously in the service and whose wages were always necessarily below the wages of men of skilled trades, receives a pension of $32.08. An engineman is receiving a pension of $80.13 a month; another engineman has been paid $5,932.80 during the 10 years he has been carried on the pension roll. The figures do not include the Yazoo & Mississippi Valley.

Bureau of Safety Organized on Chicago Great Western.

H. J. Slifer, general manager of the Chicago Great Western, has issued a circular announcing the establishment of a bureau of safety along lines similar to the safety committees on the Chicago & North Western, Frisco and other roads, for the purpose of studying methods of minimizing the risk of accidents to employees and the public. An executive safety committee has been appointed consisting of: Hiram J. Slifer, general manager; J. G. Neuffer, superintendent of motive power; L. C. Fritch, chief engineer; G. O. Perkins, superintendent of telegraph; Dr. G. N. Wassom, company surgeon; J. H. Ambruster, chairman educational committee, which will have full jurisdiction over the operations of the bureau. Division safety committees will be appointed on each operating division to be composed of the division superintendent, engineer maintenance of way, master mechanic, trainmaster and chief despatcher. The chairman of each division committee will render a monthly report to the executive committee. Similar committees will be appointed by the executive committee for general office headquarters at Chicago. Transportation safety committees will be appointed by division safety committees and will consist of five members each, representing enginemen and trainmen. Mechanical safety com-

mittees will be appointed by division safety committees and will consist of five members each, representing roundhouse men, coaling station men, cinder pit employees.

Locomotives on the Erie with Two Whistles.

The Erie Railroad has equipped about 100 of its locomotives, running in suburban passenger service at the New York end of the road, with 2-in. single-bell chime whistles, in addition to the ordinary whistle, and has instructed the enginemen to use this smaller and less noisy whistle on all occasions except where the louder one is required as a measure of safety. All of the engines in the New York suburban service, about 175, will soon be equipped. The whistle valve is controlled by a flexible wire which extends from the front to the back of the cab, within easy reach of the engineman and in close proximity to the pull which actuates the larger whistle and which is of a different form. Some of these smaller whistles have been in use for several months, and officers of the road find them satisfactory in every respect.

As a local report well says, those suburban residents who have been disturbed and annoyed by the "wild shriek" of the 5 a. m. train may now be expected to become fast friends of the Erie. This is a good way of making friends, or at least of making things tend in that direction.

Government Control of Interstate Mercantile Affairs.

Charles Nagel, Secretary of Commerce and Labor, in his annual report recommends direct supervision by the federal government of all mercantile and manufacturing enterprises whose business is subject, or legally can be made subject, to the United States government. He says:

"A certain degree of combination of capital is admittedly essential to the carrying on of our great business enterprises. To control properly such necessary combinations we must have some administrative federal office or commission which shall make this work its business. We must have a permanent authority which shall by steady and continuous supervision and publicity safeguard the public interests and at the same time allow full scope for necessary and proper business efficiency and development.

"The decisions of the Supreme Court in the Standard Oil and American Tobacco Company cases have brought forcibly to the public attention a fact repeatedly presented in the reports of this department—the imperative need for the positive administrative regulation of great industrial corporations.

"The recent decisions, and the reorganizations which followed, have made it clear that another imperative step remains to be taken, and that this is the establishment, by appropriate legislation, of a broad system of supervision and publicity for all those industrial and commercial organizations engaged in interstate and international business.

"Whether this shall be done by means of federal incorporation or by a federal office or commission exercising powers of regulation and supervision may be a secondary question. The first consideration appears to be the establishment of permanent administrative publicity, regulation and supervision. The time is peculiarly ripe for such action. Public opinion and the views of many corporation managers are as one."

Railway Storekeepers' Association.

The ninth annual meeting of the Railway Storekeepers' Association will be held at Buffalo, N. Y., May 20-22. The standing committees are as follows:

Committee on Recommended Practices—One year, H. C. Pearce (Sou. Pac.), H. C. Stevens (Nat. Rys. of Mex.), T. W. Flanagan (M. St. P. & S. S. M.); two years, C. C. Dibble (L. S. & M. S.), E. J. McVeigh (Grand Trunk), J. W. Foyle (M. K. & T.); three years, J. H. Waterman (C. B. & Q.), George Holmes (Mich. Cent.), W. L. Cooper (M. & O.).

Committee on Piece Work—D. C. Curtis (C. B. & Q.), J. W. Gerber (Sou. Ry.), B. W. Griffith (L. S. & M. S.).

Committee on Scrap Classification—D. Kavanagh (R. I. Lines), E. J. Roth (C. B. & Q.), C. C. Dibble (L. S. & M. S.), H. A. Anderson (Penna.), W. F. Girten, Scranton, Pa.

Committee on Accounting—D. A. Williams (B. & O.), E. L. Fries (Harriman Lines), F. R. Brown (C. B. & Q.), W. H. Grassman (N. Y. C. & H. R.), E. E. McCracken (B. & L. E.).

Committee on Uniform Grading and Inspection of Lumber—J. H. Waterman (C. B. & Q.), J. R. Mulroy (St. L. & S. F.), W. F. Jones (N. Y. C. & H. R.), N. M Rice (A. T. & S. F.).

Committee on Standard Grain Door—D. Kavanagh (R. I. Lines), E. J. Roth (C. B. & Q.), W. A. Summerhays (Ill. Cent.).

Committee on Membership—N. M. Rice (A. T. & S. F.), E. E. McCracken (B. & L. E.), J. H. Callaghan (Can. Pac.), H. S. Burr (Erie).

Committee on Stationery—H. E. Rouse (C. G. W.), N. A. Waldron (St. L. S. W.), E. E. Herold (B. & O.).

Committee on Standardization of Tinware—J. R. Mulroy (St. L. & S. F.), H. C. Pearce (Sou. Pac.), J. H. Waterman (C. B. & Q.), F. D. Reed (C. R. I. & P.), H. A. Anderson (Penna.), W. F. Jones (N. Y. C. & H. R.).

American Supply and Machinery Manufacturers' Association.

The next joint convention of the American Supply and Machinery Manufacturers' Association, the National Supply and Machinery Dealers' Association and the Southern Supply and Machinery Dealers' Association will be held at the Monticello hotel, Norfolk, Va., May 13-15, 1912. F. D. Mitchell is secretary and may be addressed at 309 Broadway, New York.

American Society of Mechanical Engineers.

The American Society of Mechanical Engineers will hold a meeting of members resident in New York on January 9, to consider the work of the society.

American Association of Demurrage Officers.

The annual meeting of the American Association of Demurrage Officers will be held at San Francisco, Cal., May 10-11, 1912.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.; annual, May 7-10, Richmond, Va.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Boston, Mass.

AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York; next convention, Seattle, Wash.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Chicago.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September; annual, March 17, Chicago.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York.

AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOC.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOC.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—M. H. Bray, N. Y., N. H. & H., New Haven, Conn.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conrad, 75 Church St., New York.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.

Engineers Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

Iowa Railway Club.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

Master Car and Locomotive Painters' Assoc. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass. Convention, 2d week in September.

National Railway Appliances Assoc.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railway Club.—C. L. Kennedy, C., M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Business Association.—Frank W. Noxon, 2 Rector St., New York.

Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio. Convention, May 20-22, Buffalo, N. Y.

Railway Supply Manufacturers' Assoc.—J. D. Conway, 2135 Oliver Bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

Railway Tel. & Tel. Appliance Assoc.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling; September, 1912, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Dertoit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; August, 1912.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month except July and August, Chicago.

Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md.; annual, January 16-18, Chicago.

Traffic News.

The Southern Demurrage and Storage Bureau, with headquarters at New Orleans, La., was dissolved on January 1.

The Chesapeake & Ohio and the Toledo, St. Louis & Western have arranged to take freight through between Cincinnati and St. Louis, the junction being at Marion, Ind. The train schedules provide for second morning delivery of freight at both cities.

The Missouri, Kansas & Texas has granted the Oklahoma City jobbers and manufacturers storage and transit rate privileges on car load shipments from factories to points in Oklahoma on farm implements, gasolene engines and harvesting and threshing machinery.

A special meeting of the Central Passenger Association was held in Chicago, December 27, for the purpose of considering a plan of abolishing as far as possible all special certificate plan and convention rates below 2 cents a mile, with the exception of Niagara Falls excursions and similar rates which have become established. Further consideration will be given to the plan at a meeting on January 10.

The Atlantic Express Company is the name of a corporation which has been formed to conduct an express and baggage transfer business in Boston and other New England cities, and also in New York. The name of William Loeb, Jr., collector of the port of New York, is given as one of the directors of the company; and F. B. White of Boston, is general manager. The new company will buy the Hoyt-Tarbox Express Company, of Boston.

During the week preceding Christmas, the Chicago & North Western "entertained" at its new passenger terminal at Chicago 318,000 people; that is to say, that number passed through its doors; the number of pieces of baggage handled was 24,190, and 12,370 persons were served in the lunch and dining room. This is an increase in passengers and baggage of 20 per cent. over the corresponding week of 1910 at the old Wells street terminal.

At a meeting of a joint committee representing eight business men's organizations of Cincinnati, held on December 27, a resolution was passed attacking the present rates of the Cincinnati Southern for the transportation of certain manufactured articles from southern points to Cincinnati as being unfair and discriminatory. A copy of the resolutions was mailed to each of the trustees of the Cincinnati Southern, demanding a readjustment of the rates.

Exporters in New York City report that to many destinations they are now obliged to pay for ocean transportation fully double the rates demanded last summer; this in consequence not only of a general heavy movement of freight from America to Europe, but also because of heavy movements in other parts of the world. Freight from Europe to America has not increased so largely, but the steamships have announced that the rates will be increased in the near future.

T. O. Plunkett, the head of the cotton culture department of the Southern Railway, now has thirteen men traveling among the cotton planters of Alabama, Mississippi and other states traversed by the Southern Railway and its affiliated lines, instructing and assisting the farmers in combating the cotton boll weevil. The Southern Railway proposes not only to do what it can in exterminating the weevil, but also to give suitable information to the farmers in those regions where it has not yet been found, with a view to preventing its spread.

L. L. Fellows, commercial agent of the Lake Erie & Western at Indianapolis, was elected president of the Indianapolis Transportation Club at the annual business meeting of the club. Other officers were elected as follows: First vice-president, H. C. Shepard, division freight agent, Pennsylvania Lines; second vice-president, S. S. Shambaugh, assistant treasurer Kokomo Wire & Steel Company; third vice-president, E. C. Merritt, traffic manager Indianapolis Abattoir Company; secretary-treasurer, L. E. Stone, agent Central States Despatch.

Frank Foster, commissioner appointed by the supreme court of Kansas in the mandamus action brought by the attorney-general

of Kansas against eight railways entering Kansas City, Kan., and six elevator companies, has filed a report holding that the grain inspection law passed by the Kansas legislature is constitutional; that all grain consigned to and stored in public warehouses at that point is subject to inspection, and that the inspection fees prescribed by the law will not yield a revenue in excess of the necessary expenses of maintaining the department; but that grain entering the terminals and not consigned or stored in the elevators is not subject to inspection.

A revised Western Freight Classification, No. 51, was issued on January 1 to become effective February 15. This latest issue of the classification contains 437 pages as compared with 264 in the last issue, the additional pages having been necessitated mainly by the adoption of the recommendations of the Uniform Classification Committee, published prior to September 1, including reports 1 and 2. The classification has been elaborated in many ways and its rules are made more specific; for example, the old term "not otherwise specified" now reads "not otherwise indexed by name." This is also the first issue of the classification embodying the requirement of the Interstate Commerce Commission that all advances or reductions be indicated.

The Baltimore & Ohio will run an agricultural educational train over its lines in Maryland on five days next week, the lectures being given by professors and teachers from the Maryland Agricultural College, under the direction of Dr. Richard S. Hill, state director of farmers' institutes.

The Pennsylvania Railroad will next week start its fourth annual farmers' educational train in New Jersey, leaving Camden Monday morning and visiting 30 towns. A new feature of the train will be an exhibit car in which the work of the state experiment station at New Brunswick will be shown in the shape of fruit packed for shipment, corn, alfalfa, methods of managing poultry and shipping eggs, and a display of charts. Secretary Dye of the State Board of Agriculture will have with him on the train 15 lecturers and other assistants.

The much regulated Texas railways have recently discovered that even justices of the peace may regulate freight rates in that state, to the extent of overruling rates fixed by the Texas railway commission. In the case of Young vs. Houston & Texas Central the plaintiff secured from a justice of the peace at Hempstead a judgment of $14 on the complaint that the defendant's rate on a shipment of melons was exorbitant, in spite of the fact that the rate was one promulgated by the state commission. A temporary injunction was secured in the district court, but later dissolved. An appeal was taken to the court of civil appeals at Galveston, which declined to overrule the justice of the peace. Then the supreme court refused to allow a writ of error on the ground that the justices of the peace have authority to pass on cases involving less than $20.

The Pennsylvania's Agricultural Instruction.

To answer the question, What profit? an officer of the Pennsylvania Railroad has compiled the following information concerning the work of the lecturers which the company has carried over the road during the past three years in its "agricultural specials"; and the results are found to be more definite, and are manifested in a greater number of places, than any one had expected. The pamphlets issued by the company, and its other missionary work, are also found to have been popular and useful.

The members of the Chester Valley Farmers Co-Operative Association declare that that organization is a result of the railway's agricultural work. One of the first undertakings of the association was cow testing, for which a trained man from Pennsylvania State College was secured. There are 450 cows in the herds owned by members of the association.

At Price, Md., there has been organized a "Progressive Farmers' Club." The charter members numbered 35, and they have started a creamery. The object of the club is to study farming industries, improve farm land, and instruct farmers in the placing of their crops on the markets in better shape.

Reports from various points in Pennsylvania show that as a result of the educational work which is being done by the road many apple and peach orchards have been established. There were received at one station an increase of 1,000 fruit trees in one year over the previous year. Reports from another station show that in 1911 there was an increase of 50 per cent. in carload apple shipments. At another station the receipt of nursery stock has doubled in the last year, while from another the report states that five times as much nursery stock has been received this year as in any previous year.

A general report from one section of Pennsylvania states that "a large number of old orchards have been renovated, new ones have been planted, and on every hand there is evidence of renewed interest and activity in all lines of farm work upon a more intelligent and scientific basis."

The number of fruit trees in one county in Maryland increased 140,000 in the last few years.

The Fruit Tree Special, operated by the Pennsylvania was in charge of Professor H. A. Surface. There can be no doubt that it actually reached those interested for it was the practice, when this train arrived at a scheduled stop, to take the spraying apparatus, pruning hooks, pots for mixing spraying solutions, and all other paraphernalia at once to an orchard in the vicinity. There the lecturers put on their working clothes and after selecting a good specimen of a tree, pruned and sprayed it themselves in the presence of the owner of the orchard and other farmers. This was done after the spraying solution had been mixed and prepared on the ground by the lecturers.

Indicative of the extent to which the "Soil Fertility" lectures have been effective are the following reports regarding the use of lime and commercial fertilizers:

During the past season 25 carloads of lime have been received at a station where no lime was ever received before. Two stations report an increase of 50 per cent. in receipts of lime. One station reports an increase of 201 carloads of lime in the first eight months of 1911 over the same period of 1910.

Where farmers burn their own lime, all reports show an increase in the receipt of coal used in burning the lime stone. Several lime-burning companies were unable to fill orders this year, whereas in previous years their kilns were shut down part of the time. At one station during the present season 33 persons attended the lectures, each of whom represented a different farm in the vicinity.

As a result of the operation of the educational trains over the Pope's Creek Branch of the Philadelphia, Baltimore & Washington in central Maryland, two dairy farms have been established.

One farmer of central Maryland crossed the Chesapeake bay to the eastern shore in order to attend the lectures given on the train. This same farmer drove 20 miles one morning to the first stopping place of the Special, and remained with it all day in order to hear all of the lectures several times.

Throughout the country districts of Pennsylvania the principles of agriculture form a part of the course of study in the schools. Beginning this year a special coach was added to the trains and at each stopping place the high school class and teacher were given a lecture on home and market gardening. In the final examinations of the year this subject will be given consideration. The Pennsylvania State College authorities state that the enrollment in the school of agriculture has greatly increased in the last few years, and they have no doubt that the educational trains have contributed to the increase.

The company's literature on farming subjects is in active demand among responsible farmers. As many as twenty-five requests for the books have been received at Broad street station alone in one day's mail. The following statement shows the number of the various pamphlets distributed:

Orchard Primer	25,000
Potato Culture	35,000
Seed Grain Suggestions	40,000
Use of Lime on Land	10,000
Essentials of Soil Fertility	20,000
Alfalfa	25,000
Farming Possibilities of Delaware-Maryland Virginia Peninsula	3,000
Increase of Crop per Acre—Use of Dynamite on the Farm	26,500
Good Roads at Low Cost	35,500

One division freight agent reports:

"A merchant of Lancaster County, who is an intelligent and observing man, has voluntarily stated to one of our agents

that a marked awakening among the farmers in that vicinity has been so noticeable of late that he felt impelled to inquire among the farmers individually as to the cause of their activity and the noticeable changes in their methods for the better; and in every instance it was traced directly to the information they had gained from the pamphlets issued by the Pennsylvania Railroad Company.

"The apparently stolid indifference with which these pamphlets were at first received by many of these people was only temporary. For instance, the pamphlet on the use of dynamite on the farm when first distributed, was the subject of much levity and adverse criticism, but those who scoffed have remained to pray, and everywhere stones, stumps and other obstacles, which have long obstructed and marred the farm are being rapidly eliminated by the intelligent use of dynamite, while sub-soiling is being largely resorted to by the same means."

Good Roads.—Township supervisors located on the Pennsylvania east of Pittsburgh and Erie are using the split-log drag. They all report good results. The railway company built log drags and placed them at several stations for the use of the farmers and others. At no point has the drag been left unused, and requests for more drags are being received. One township supervisor stated recently that in his estimation "no township can be fully equipped for road making without a log drag." This same supervisor was one of the hardest to convert to the use of the drag.

Following a visit of the good roads train, a farmer who heard the lectures made and began to use a log drag on a short stretch of road from his farm to the state road. He was stopped in this work by the township authorities, but he persisted in his efforts, using the drag after dark. After a few nights' work, the effects of his labor were seen and he was then allowed to use the drag. Since that he has had numerous requests for the loan of his drag, and others have been built.

A number of farmers living in the neighborhood of one of the points at which the good roads train stopped built drags and used them on the roads in front of their farms. In this way an excellent road was built for a distance of nine miles into one of the principal towns of the county. During the tour of the good roads train more than 75,000 people heard the lectures and viewed the exhibits.

INTERSTATE COMMERCE COMMISSION.

An investigation by the Interstate Commerce Commission of the subject of allowances paid by railways to industrial railways serving steel plants, is to be opened at a hearing in Chicago on January 27 before Commissioner Harlan.

The "Greater Des Moines" committee of Des Moines, Ia., has petitioned the Interstate Commerce Commission for a reduction in class rates between Des Moines and points in Colorado, Utah and Wyoming, alleging discrimination as compared with the rates between Chicago and those points.

The Brunswick-Balke-Collender Company has petitioned the Interstate Commerce Commission to cancel the rule of the Western Classification Committee, under which an extra rate is applied to articles too large to be loaded through the side door of a 36-foot car, or too long to be loaded through the end window.

The Louisiana railway commission has filed a complaint with the Interstate Commerce Commission asking a suspension of tariffs advancing the freight rates on potatoes from points in Louisiana to points in Texas from a range between 31½ and 40 cents to a range between 44 and 49 cents, effective February 12. The state commission alleges that the rates will work an unjust discrimination against Louisiana potato growers on account of lower rates from Texas points to Louisiana.

Discrimination Against Sioux City.

Traffic Bureau of the Sioux City Commercial Club v. Chicago & North Western et al. Opinion by Commissioner McChord:

Class rates from Sioux City, Iowa, to southwestern Minnesota found unreasonable to the extent that they exceed the rates from St. Paul and Minneapolis to equidistant points in the same territory. (22 I. C. C., 110.)

Complaints Dismissed.

J. P. Wadell Show Case & Cabinet Co. v. Michigan Central et al. Opinion by the commission:

Complainant's shipments were properly rated as "in crates" under western classification. (22 I. C. C., 106.)

Gamble-Robinson Commission Co. et al. v. St. Louis, Iron Mountain & Southern. Opinion by the commission:

Rates on watermelons from southeastern Missouri to Minneapolis, Minn., and St. Paul are not found unreasonable. (22 I. C. C., 138.)

Bewsher Co. v. Union Pacific. Opinion by the commission:

A rule requiring those doing business with the Union Pacific to sign a voucher on receipt of money, showing their relationship to the corporation or firm for which they take the money, is not found to be unreasonable. (22 I. C. C., 146.)

Georgetown Railway & Light Co. v. Norfolk & Western et al. Opinion by the commission:

Differences in transportation conditions justify a different rate on Pocahontas coal from West Virginia to Georgetown, S. C., from the rate on the same coal to Charleston, S. C. (22 I. C. C., 144.)

Carload Rate Established.

Red Path-Vawter Chautauqua System v. Atchison, Topeka & Santa Fe et al. Opinion by the commission:

At present the complainant is charged L. C. L. rate on its tents, poles, camp chairs, etc., for Chautauqua entertainments. The commission holds that Chautauqua outfits should be given a C. L. rate with a minimum weight of 20,000 lbs. (22 I. C. C., 135.)

Live Stock Rates Reduced.

In re alleged unreasonable rates and practices in the transportation of live stock, packinghouse products, and fresh meats from various Southwestern points to packing houses, and from thence to various destinations. Opinion by Commissioner Prouty:

The defendants' present rates upon live stock from points in New Mexico, Texas, and Oklahoma to Fort Worth, Tex., Oklahoma City, Okla., and Wichita, Kans., are unreasonable and are hereby reduced. The defendants' present rates on fresh meats and packing-house products from Fort Worth, Oklahoma City, and Wichita to various points are unreasonable and are reduced.

As the record contains nothing which indicates clearly the points to which the rates on tankage are desired, nor the nature of the complaint against the rates now in effect, no opinion on that point is at this time expressed. For reasons expressed in the report, no opinion is given on the rates on hides involved in this case. The defendants' present rate on salt from the Kansas field to Oklahoma City is unreasonable to the extent that it exceeds the rate prescribed in this report. (22 I. C. C., 161.)

Reparation Awarded.

Sunderland Brothers Co. v. Missouri Pacific et al. Opinion by the commission:

Carload rates on brick from the Kansas gas belt to points in Iowa found unreasonable to the extent that they exceed rates from the same points to Mississippi river territory. (22 I. C. C., 141.)

Under the present ruling of the commission, if, of two competing through carriers, one has a combination of intermediate rates less than the through rate, such carrier may reduce the through rate, and if such carrier happens to be the short line, the competing carrier or carriers may reduce their through rates without an application to the commission; but if such carrier does not happen to be the short line, the other roads have to make a special application to the commission to reduce their rates. The commission believes that railways now competing under equal rates should be allowed to continue their competition until special cases can be passed on by the commission, and therefore has ordered that where the through rate has been reduced, roads maintaining through rates via other routes between the same points may meet the reduction, although discrimination

against intermediate points is thereby increased. When the commission, however, specifically passes on any application for permission to charge less for the long haul, the order will automatically cancel the permission now granted in general.

The commission has extended from January 1 to May 1, 1912, the date at which its orders ruling that the tariffs which show a higher rate to intermediate points simply because the intermediate points are not either consuming or producing points, shall be corrected so as to show the same rate to intermediate points. The extension of time was granted because of the amount of labor involved in correcting the tariffs.

Rate on Lemons Again Reduced to $1.

Arlington Heights Fruit Exchange et al. v. Southern Pacific et al. Opinion by Commissioner Prouty:

The defendants in 1904 made a blanket rate of $1 per hundred pounds for lemons from southern California to all territory east of the Rocky Mountains, and advanced this rate in November, 1909, to $1.15. The commission in 19 I. C. C., 148, while holding that a rate of $1.15 on oranges was liberal, reduced the rate on lemons to $1. The Commerce Court granted an injunction against the enforcement of this order of the commission on the ground that the commission was attempting to protect California lemon growers against Sicilian competition, regardless of the reasonableness of the rate itself. The Commerce Court, in its opinion, pointed out that the commission had apparently attempted to overcome tariff insufficiencies by lowering the transcontinental freight rate. The commission did not attempt to do this. Had the commission understood that the Commerce Court would attempt to look into the mind of the commission for the purpose of ascertaining the reasons on which its order was based, that the mere statement of the claims of the parties was to be taken as evidence of the assent of the commission to those claims, and that the number of lines used in stating the issue was to indicate the weight attached by us to that particular consideration, we should have been more careful in the phrasing of our opinion. In the main, the transportation conditions for oranges and lemons from southern California to eastern markets are the same, and it is pointed out that for the better part of eight years the defendants had, of their own free will, maintained a rate on lemons at first 25 cents and later 15 cents lower than the rate on oranges. The fact that a much larger per cent. of oranges move under refrigeration than of lemons would justify a somewhat lower rate on lemons than on oranges. If the lemon rate is to be measured by the orange rate, then the commission thinks the orange rate should be reduced in determining a fair relationship, not that the lemon rate should be advanced. The commission is of the opinion that the rate of $1.15 on lemons is unjust and unreasonable, and should not exceed $1. This decision is not based on any consideration that the American producer should be protected against foreign competition. The commission points out that since lemons can move simply under ventilation, and that about 5,500 cars have collapsible bunkers, into which bunkers fruit moving under ventilation can be loaded, the car loading on lemons is potentially larger than on oranges, and railways should be allowed to require the shipper to load the collapsible bunker cars to their capacity.

One ground of attack of the former order of the commission was that it was without authority to establish a blanket rate extending from the Rocky mountains and covering the whole East. The question presented to the commission was not what would be a reasonable rate if the commission were for the first time establishing such rates, but, rather, is $1.15 or $1, or some other figure, reasonable as a blanket rate. The commission did not wish to fight this contention, and in the supplemental hearings the commission asked both the defendant and the complainant whether they wished a blanket rate established or graded rates, and both joined in asking a blanket rate. The question of damages is reserved for a further hearing.

Commissioner Lane concurring:

We are called on in this case to pass on the reasonableness of a rate on lemons that is the same from Los Angeles to Denver as from Los Angeles to Boston. Manifestly, if there is any direct relation between the cost of service and the rate charged, such method of making rates is in conflict with the law. These great blankets, however, are made as a matter of policy. They are instituted by the carriers for their own benefit to develop the industry and to extend and simplify the marketing of fruit. This case, when broadly reported, involves a question of the highest national importance. The whole continent for a zone of 2,000 miles is made to serve the Pacific coast terminal cities at uniform rates, while the states between the mountains are not given such advantage. At the same time, the lumber of the far Northwest is not so treated, nor the wool or hides of the interior. Primarily it is a matter of national concern and not of railway policy as to what system of rate making shall obtain, so long as the carriers receive a raesonable return on the value of their property. The railway, by its rates, may make each portion of the country largely independent of the remainder, or it may make of the nation one economic and industrial unit, each portion thereof doing best, that which nature has fitted it to do best. This is fundamentally the difference in philosophy which underlies the two methods of making rates which have been given consideration in this case. There is no doubt in my mind but that the commission could not itself prescribe this blanket rate which the commission approves, because neither the carriers nor the shippers wish it destroyed. Commissioner Meyer concurs with Commissioner Lane.

Commissioner Clark concurring in part:

It seems to me clear that it would be greatly to the advantage of citrus fruit growers and shippers if the blanket rate were broken up. I am unable to discover any substantial transportation difference between the movement of oranges and of lemons except that the lemons stand transportation better than the oranges do. The enforcement of a minimum weight on cars carrying lemons under ventilation higher than that on lemons moving under refrigeration is agreed to. (22 I. C. C., 149.)

STATE COMMISSIONS.

The Massachusetts Commission has authorized the Boston Elevated Railway Company to act as a common carrier of baggage and freight in the city of Boston. The order contemplates the doing of an express business only.

The Railroad Commission of Louisiana, in answer to a complaint of the Shreveport Chamber of Commerce, has said that while it recognizes the necessity for the correction of erroneous demurrage assessments at this time, there has been no practical way suggested or any remedy shown to the commission that will improve present demurrage rules.

The Railroad Commission of Louisiana, in a case where complaint was made against the condition of the roadbed and track of the New Orleans Great Northern between St. Tammay station and Pearl river, employed an expert to make an examination, and from his report the commission comes to the conclusion that the roadbed and track complained of is in an unsafe condition. "While trains may be run over this road at a very slow speed with utmost caution without greatly endangering the lives of passengers, its condition is such that adequate and suitable freight and passenger service cannot be rendered to the public." The commission, therefore, orders the track to be put in such condition by April 1, 1912, as will render it safe for trains going 25 miles an hour.

COURT NEWS.

In a local court at Wabash, Ind., a trainmaster of the Cleveland, Cincinnati, Chicago & St. Louis has been fined $5 for refusing to issue a "letter of service" to an employee who resigned. The last legislature of Indiana passed a law making the giving of such letters compulsory. The case will be appealed.

In the case of Oliver Huff, a brakeman of the New York, New Haven & Hartford, who sued the road for damages on account of injuries sustained in a collision, basing his suit on the federal laws as they now stand (with the fellow-servant provision abolished), and in which the plaintiff secured a verdict for $22,500, the court has acted favorably on the motion of the defense, asking for a new trial; but mainly because the verdict is regarded as excessive. If Huff will accept $10,000, the motion for a new trial will be denied.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF OCTOBER, 1911.

Name of road.	Mileage operated at end of period.	Operating revenues: Freight.	Passenger.	Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Atlantic & West Point	92	$63,222	$41,096	$115,009	$12,287	$21,428	$5,194	$32,575	$5,180	$76,664	$38,345	$245	$5,189	$33,401	$3,224
Atlantic & St. Lawrence	166	93,647	23,483	128,319	46,843	22,789	3,681	48,883	3,015	124,211	4,108	.....	6,659	—2,551	15,831
Atlantic City	166	69,066	58,093	136,679	34,204	19,853	3,313	71,372	1,961	130,703	5,976	—4,956	7,000	—5,980	—7,073
Belt. Ry. Co. of Chicago	21	.....	.....	240,843	14,100	26,719	644	84,844	6,600	132,907	107,936	.....	5,500	102,436	11,332
Butte, Anaconda & Pacific	46	77,809	7,987	91,357	14,760	18,201	625	41,953	3,909	79,448	11,909	.....	2,000	9,909	—11,905
Canadian Pacific Lines in Maine	233	61,821	17,184	84,749	26,345	13,814	5,149	33,133	3,591	82,032	2,717	.....	7,000	—4,283	—4,607
Central of Georgia	1,915	954,478	341,594	1,440,537	137,815	232,533	30,172	423,404	35,684	859,608	580,929	5,763	47,400	539,292	105,510
Chesapeake & Ohio Lines	2,241	2,305,311	484,633	2,999,738	430,813	572,376	49,153	856,117	60,099	1,968,558	941,180	—427	93,100	847,653	—32,839
Cincinnati, Hamilton & Dayton	1,014	674,387	153,552	921,092	90,797	143,788	21,004	359,351	17,820	632,760	288,332	.....	41,294	247,038	16,052
Detroit, Grand Haven & Milwaukee	190	199,657	51,197	299,163	30,053	27,182	6,379	98,072	4,621	166,307	42,856	—88	2,880	39,888	—4,606
Georgia Southern & Florida	395	116,383	74,107	218,091	20,491	37,964	7,044	77,618	10,116	153,233	64,858	.....	9,407	55,451	7,989
Grand Trunk Western	347	349,225	183,466	568,047	76,923	74,251	17,954	230,446	13,159	412,733	155,314	—1,438	31,635	122,241	13,823
Illinois Central	4,755	2,891,463	1,157,665	4,601,215	817,206	936,058	117,603	1,872,889	120,260	3,864,016	737,199	—9,510	230,929	496,760	—986,403
International & Great Northern	1,159	869,631	211,723	1,137,954	93,373	115,443	16,756	369,873	31,530	626,975	510,979	—463	33,000	477,516	147,118
Kansas City, Mexico & Orient	809	134,425	32,378	175,878	41,013	32,286	8,563	74,932	10,462	167,256	8,622	.....	6,750	1,872	—28,063
Louisiana Ry & Navigation	350	155,043	23,658	194,595	19,573	16,989	5,658	65,558	5,878	113,656	80,939	.....	4,600	76,339	41,293
Minneapolis & St. Louis	1,027	283,972	103,423	422,919	47,668	49,885	10,658	172,364	12,858	293,433	129,486	38	20,570	108,954	—57,858
Missouri, Kansas & Texas	1,743	1,162,699	401,631	1,652,426	209,788	203,769	34,418	467,994	40,897	956,806	695,620	—547	58,500	636,573	—61,301
Missouri Pacific	3,915	1,757,716	473,393	2,437,599	519,185	509,907	55,795	1,010,709	71,563	2,167,159	270,440	— 6,313	82,600	181,527	—52,041
Nevada Northern	165	103,766	10,614	117,277	12,542	14,133	429	24,568	3,005	54,677	62,600	.....	4,743	57,857	—5,617
New Orleans, Texas & Mexico	264	107,790	18,132	133,719	24,364	15,183	3,235	55,358	6,375	104,515	29,204	.....	1,552	27,652	4,123
Northwestern Pacific	416	152,859	149,572	325,309	49,857	42,608	2,806	111,226	9,160	215,657	109,652	.....	12,885	96,797	12,192
Philadelphia & Reading	1,014	3,255,976	610,047	4,042,274	322,286	685,135	45,312	1,230,898	68,922	2,352,553	1,689,721	26,178	90,282	1,625,617	229,662
Port Reading	21	109,568	.....	110,587	6,126	2	33	24,948	105	31,214	79,373	3,518	3,800	79,091	—5,197
St. Louis, Iron Mountain & Southern	3,314	2,124,131	524,540	2,830,765	498,893	458,898	47,468	843,865	68,402	1,917,526	913,239	—10,078	81,765	821,396	132,165
St. Louis Southwestern	796	568,738	117,585	720,191	67,788	109,186	27,540	165,906	26,761	397,181	323,010	—1,239	19,564	302,207	27,905
San Antonio & Aransas Pass	727	330,080	104,728	459,828	72,373	39,969	5,663	150,546	9,837	278,388	181,440	.....	11,000	170,440	—21,883
Seaboard Air Line	3,053	1,407,576	411,302	2,024,276	275,068	278,855	61,148	706,347	64,165	1,385,583	638,693	—2,863	75,000	560,830	—44,615
Southern Pacific Co.	6,184	5,258,765	2,568,620	8,374,152	753,157	784,944	172,246	2,295,083	193,238	4,198,668	4,175,484	61,099	301,144	3,935,439	185,572
Spokane, Portland & Seattle	550	301,194	147,748	471,590	48,257	33,170	5,677	104,302	10,409	201,815	269,775	—73	42,200	227,502	37,036
Toledo, Peoria & Western	247	61,468	42,705	114,866	15,497	26,087	2,236	41,299	3,351	88,470	26,396	.....	4,800	21,596	135
Ulster & Delaware	128	65,710	20,837	90,610	16,492	7,739	1,013	37,257	2,433	64,934	25,676	86	3,300	22,462	—5,472
Wabash	2,514	1,830,592	662,170	2,691,293	318,815	414,947	82,242	999,599	70,834	1,886,437	804,856	—1,792	63,419	739,645	—185,071
Western Maryland	543	519,146	86,754	631,075	80,271	83,162	8,534	217,926	12,561	402,454	228,621	—75	21,000	207,546	—14,695
Western Pacific	934	414,888	101,962	530,234	117,271	49,799	27,270	198,814	22,734	415,888	114,346	—2,129	14,350	97,867	.....
Western Ry. of Alabama	133	81,449	45,371	138,015	16,171	20,929	5,399	32,493	5,976	80,968	57,047	—118	4,612	52,317	9,408
Yazoo & Mississippi Valley	1,371	499,537	227,229	784,921	164,444	91,863	16,039	323,142	25,378	620,866	164,055	—1,089	38,000	124,966	—150,132
FOUR MONTHS OF FISCAL YEAR, 1912.															
Atlanta & West Point	92	$223,775	$170,028	$430,586	$50,236	$79,023	$20,001	$121,934	$20,489	$291,683	$138,903	$680	$20,756	$118,827	$20,370
Atlantic City	166	282,167	692,078	1,022,317	93,962	51,999	13,958	420,742	6,578	587,239	435,078	—16,859	28,000	390,219	28,124
Atlantic & St. Lawrence	166	286,872	127,951	460,817	173,473	85,703	16,280	187,169	11,708	474,333	—13,516	.....	26,635	—40,151	—4,216
Belt Ry. Co. of Chicago	21	.....	.....	905,176	60,380	103,350	2,623	311,502	24,433	502,298	402,878	.....	22,000	380,878	7,920
Butte, Anaconda & Pacific	46	298,252	46,520	369,406	43,416	70,341	2,833	157,479	10,944	285,013	84,393	.....	8,000	76,393	—36,611
Canadian Pacific Lines in Maine	233	186,350	77,416	287,400	102,285	51,842	20,244	121,798	13,385	309,564	—22,164	.....	28,000	—50,164	—37,834
Central of Georgia	1,915	2,960,025	1,380,803	4,750,807	557,405	894,828	135,128	1,488,189	143,395	3,218,945	1,531,862	26,651	189,600	1,368,913	166,972
Chesapeake & Ohio Lines	2,241[1]	9,000,740	2,133,155	11,596,817	1,536,734	2,144,872	207,319	3,314,953	246,458	7,450,336	4,146,481	16,924	372,400	3,791,005	—27,567
Cincinnati, Hamilton & Dayton	1,014[2]	2,642,617	676,650	3,717,737	388,457	572,104	79,412	1,447,971	73,941	2,561,885	1,155,852	.....	158,146	997,706	198,125
Detroit, Grand Haven & Milwaukee	190	461,723	270,357	834,675	102,641	103,674	27,768	352,973	17,455	604,511	230,164	—261	11,520	218,383	86,561
Georgia Southern & Florida	395	410,563	289,597	805,511	83,353	153,393	26,707	307,536	37,007	607,996	197,515	.....	37,628	159,887	2,741
Grand Trunk Western	347	1,334,185	850,389	2,333,321	316,333	332,217	76,984	873,055	53,151	1,651,740	681,581	—1,865	126,540	553,176	185,675
Illinois Central	4,755[3]	13,001,597	4,892,381	20,381,820	3,273,315	4,252,164	478,570	7,340,929	514,180	15,859,158	4,522,662	—33,084	923,449	3,566,129	—1,309,258
International & Great Northern	1,159[14]	2,461,792	828,123	3,486,779	381,364	430,637	76,665	1,266,523	123,362	2,278,551	1,208,228	—1,233	106,000	1,100,995	169,413
Kansas City, Mexico & Orient	809[4]	437,228	132,121	602,611	157,285	133,429	34,530	274,824	33,243	633,311	—30,700	.....	27,000	57,700	—69,613
Louisiana Ry. & Navigation	350	506,998	97,793	653,705	83,140	62,953	23,406	228,545	25,098	423,142	230,563	.....	18,400	212,163	114,229
Minneapolis & St. Louis	1,027	1,010,345	465,892	1,622,302	183,057	203,742	42,174	662,185	48,402	1,139,560	482,742	—28	79,046	403,668	—198,961
Missouri, Kansas & Texas	1,743[5]	3,984,224	1 589,124	5,936,797	1,017,114	860,812	136,071	1,753,969	164,625	3,932,591	1,994,206	—2,951	234,126	1,757,129	79,485
Missouri Pacific	3,915[6]	6,464,702	1,816,731	9,102,338	1,842,823	1,989,710	249,909	3,802,732	289,907	8,175,081	927,257	—11,804	330,400	585,053	—878,748
Nevada Northern	165	422,164	44,327	478,342	52,217	57,914	1,709	97,113	13,451	222,404	255,938	.....	18,668	237,270	—11,951
New Orleans, Texas & Mexico	264	320,802	77,205	425,898	89,473	54,068	16,572	188,348	26,583	375,044	50,854	.....	4,655	46,199	8,900
Northwestern Pacific	416[7]	580,971	784,387	1,455,903	201,999	164,340	14,092	452,851	36,645	869,927	585,976	.....	51,279	534,697	35,285
Philadelphia & Reading	1,014[8]	1,157,885	2,545,761	14,801,531	1,513,069	2,803,632	172,128	4,641,427	269,410	9,399,666	5,401,865	93,442	361,806	5,135,501	31,796
Port Reading	21	355,322	.....	362,748	33,683	886	126	109,740	543	144,978	217,770	543	15,200	203,113	—39,265
St. Louis, Iron Mountain & Southern	3,314[9]	7,297,382	2,137,314	10,115,928	1,873,995	1,753,691	211,212	3,165,854	276,773	7,281,525	2,834,403	—19,335	327,060	2,488,008	323,322
St. Louis Southwestern	796[10]	1,890,493	479,681	2,488,737	212,547	441,703	106,368	595,245	92,884	1,448,747	1,039,990	—3,394	78,256	958,340	15,325
San Antonio & Aransas Pass	727	1,212,740	462,010	1,761,316	272,536	187,391	21,916	556,053	38,551	1,076,447	684,869	.....	44,000	640,868	—8,016
Seaboard Air Line	3,053[11]	4,775,464	1,655,326	7,175,587	1,052,808	1,080,700	221,230	2,495,141	221,335	5,071,214	2,104,373	—3,546	297,000	1,803,827	56,947
Southern Pacific Co.	6,184[12]	18,731,636	11,134,407	32,023,956	3,710,446	3,333,656	707,436	8,577,173	807,882	17,136,593	14,887,363	102,581	1,204,576	13,785,368	—661,679
Spokane, Portland & Seattle	550[13]	989,370	688,599	1,774,478	184,292	149,262	29,425	430,820	42,003	835,802	938,676	8,807	168,800	778,683	—100,774
Toledo, Peoria & Western	247	246,315	171,333	445,849	70,325	94,961	9,143	159,796	13,499	347,724	98,125	.....	19,200	78,925	—16,286
Ulster & Delaware	128	245,282	214,490	480,595	64,953	40,630	7,063	171,051	9,826	293,523	187,072	110	13,200	173,982	—8,982
Wabash	2,514	6,803,802	2,827,405	10,421,951	1,329,287	1,687,705	334,658	3,790,939	301,421	7,444,010	2,977,941	—424	278,386	2,699,131	—546,009
Western Maryland	543	2,008,378	409,663	2,524,679	351,933	295,199	45,364	828,285	48,910	1,569,691	954,988	791	84,000	871,779	—126,002
Western Pacific	934	1,507,692	431,383	1,990,089	358,693	169,029	111,737	727,357	85,577	1,452,393	537,696	—11,560	57,400	468,736	.....
Western Ry. of Alabama	133	264,338	167,494	467,473	73,829	84,946	20,596	122,210	24,979	326,560	140,913	— 769	18,449	121,695	19,653
Yazoo & Mississippi Valley	1,371	1,964,253	919,290	3,107,081	677,701	445,772	64,970	1,144,152	103,298	2,435,893	671,188	—2,609	152,000	516,579	73,463

Mileage operated on October 31, 1910—[1] 2,224; [2] 1,031; [3] 4,352; [4] 740; [5] 1,736; [6] 3,919; [7] 376; [8] 1,022; [9] 3,316; [10] 768; [11] 3,027; [12] 6,193; [13] 432.

[14] The figures shown herein are for the International & Great Northern Railroad, T. J. Freeman, Receiver, from July 1 to September 15, and the figures for the International & Great Northern Railway from September 16 to October 31. — Indicates Deficits, Losses and Decreases.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

James E. Baldwin has been appointed assistant auditor of the New York, Chicago & St. Louis, with office at Cleveland, Ohio.

W. S. McCaull, claims attorney of the Quincy, Omaha & Kansas City, with office at Kansas City, Mo., has resigned to engage in the private practice of law.

Byron Clark, attorney for the Chicago, Burlington & Quincy at Lincoln, Neb., has been appointed general solicitor of the lines west of the Missouri river, with office at Omaha, Neb., succeeding James E. Kelby, resigned to engage in private practice.

T. E. Clarke, general superintendent of the Delaware, Lackawanna & Western, at Scranton, Pa., has been appointed assistant to the president, with office at Scranton, and with such duties to perform as shall be assigned to him from time to time by the president.

A. E. Miller, assistant to the general attorney of the Duluth, South Shore & Atlantic and the Mineral Range Railroad at Marquette, Mich., has been appointed general attorney, with office at Marquette, succeeding A. B. Eldredge, elected president and general counsel.

L. Emery Katzenbach, whose appointment as secretary and assistant treasurer of the Great Northern, with office at St. Paul, Minn., has been announced in these columns, was born February 23, 1880, at New York City and graduated from Princeton University in the class of 1901. He began railway work on June 15, 1901, in the accounting department of the New York Central & Hudson River and remained with that company and New York Central Lines until April, 1906, when he entered the service of the Colorado & Southern in the office of the secretary and treasurer at New York, and was appointed assistant treasurer in 1907. He remained in the service of that company until it came under the control of the Chicago, Burlington & Quincy, in June, 1909, when he was elected assistant secretary and assistant treasurer of the Colorado & Southern and affiliated companies in charge of the New York office. He has held these positions since that time, and in addition was elected assistant secretary of the Chicago, Burlington & Quincy on November 17, 1910.

Operating Officers.

H. W. Joslyn has been appointed assistant superintendent on the Idaho division of the Oregon Short Line, with headquarters at Glenns Ferry, Idaho.

W. J. Houlihan has been appointed trainmaster of the Great Northern, with office at Great Falls, Mont., succeeding C. C. Reynolds, assigned to other duties.

G. W. Clark, assistant superintendent of the Central New England at Hartford, Conn., has been appointed superintendent, succeeding to the duties of O. M. Laing, general superintendent, deceased.

R. W. Edwards, superintendent of the Kansas City terminals of the Kansas City Southern, has been appointed superintendent of all terminals of the Pittsburgh & Lake Erie, with headquarters at Youngstown, Ohio.

C. O. Dambach, trainmaster and superintendent of telegraph of the Wabash Pittsburg Terminal and the West Side Belt at Pittsburgh, Pa., has been appointed superintendent of these companies, and the office of trainmaster has been abolished.

J. W. Higgins, assistant general manager of the Missouri Pacific, and the St. Louis, Iron Mountain & Southern, at St. Louis, Mo., who has been acting general manager since September, has been appointed general manager, succeeding A. W. Sullivan, resigned.

M. J. Sullivan, formerly superintendent of the Northern division of the Kansas City Southern at Pittsburg, Kan., has been appointed superintendent of terminals, with office at Kansas City, Mo., succeeding R. W. Edwards, resigned to accept service with another company.

F. G. Archer has been appointed general yardmaster of the Baltimore & New York and the Staten Island Rapid Transit, with jurisdiction over all yard work at Cranford Junction, Arlington and St. George, including docking of floats at St. George, Staten Island, N. Y.

E. M. Rine, asssitant general superintendent of the Delaware, Lackawanna & Western, at Scranton, Pa., has been appointed general superintendent, in charge of the transportation department and his former position has been abolished, succeeding T. E. Clarke, promoted. See Executive, Financial and Legal Officers.

W. B. Wood, formerly superintendent of the Akron division at Akron, Ohio, of the Pennsylvania Lines West, has been appointed superintendent of the Cleveland and Pittsburgh division, succeeding T. B. Hamilton, promoted. Nettleton Neff, superintendent of the Richmond division, at Richmond, Ind., succeeds Mr. Wood. J. C. McCullough, superintendent of the Marietta division, at Cambridge, Ohio, has been appointed superintendent of the Richmond division, and H. K. Brady, trainmaster of the eastern division, has been promoted to superintendent of the Marietta division.

W. S. Kirby, superintendent of the Chicago, Burlington & Quincy at Aurora, Ill., has been appointed special inspector on the staff of the general manager, with office at Chicago. Robert Rice, superintendent at St. Joseph, Mo., succeeds Mr. Kirby, and B. B. Greer, superintendent of the Hannibal division at Hannibal, Mo., succeeds Mr. Rice. W. C. Welch, superintendent at Brookfield, Mo., succeeds Mr. Greer. W. A. Chittenden, assistant superintendent at Aurora, Ill., succeeds Mr. Welch. F. Cone, assistant superintendent at Ottumwa, Iowa, succeeds Mr. Chittenden. N. C. Allen, trainmaster of the Ottumwa division at Burlington, Iowa, has been transferred to Ottumwa, and T. C. Dougherty succeeds Mr. Allen.

Thomas B. Hamilton, who has been appointed general superintendent of the Central system of the Pennsylvania Lines West of Pittsburgh, with office at Toledo, Ohio, as has been announced in these columns, was born August 7, 1865, at Columbus Ohio. He graduated from Princeton University in 1888, and began railway work in November of the same year as rodman on the Jefferson, Madison & Indianapolis, now part of the Pittsburgh, Cincinnati, Chicago & St. Louis. On January 27, 1890, he became connected with the engineering corps of the Pittsburgh division of the latter road, and six years later was made assistant engineer on the same division. He was engineer of maintenance of way from May, 1897, to June, 1901, having been consecutively on the Toledo division of the Pennsylvania Company, on the Cincinnati district of the P. C. C. & St. L. and on the Cleveland & Pittsburgh division of the Pennsylvania Company. He was then appointed superintendent of the Erie & Ashtabula division, and on December 21, 1903, was made superintendent of the Cleveland & Pittsburgh division, which position he was holding at the time of his recent promotion to general superintendent.



T. B. Hamilton.

J. W. Small, whose appointment as superintendent of motive power of the Southern Pacific line in Texas, with office at Houston, Tex., has been announced in these columns, has been given the title of assistant general manager of the Galveston, Harrisburg & San Antonio, the Houston & Texas Central, the

Houston, East & West Texas, the Houston & Shreveport and the Texas & New Orleans, and the title of superintendent of motive power will be retained by him to such extent only as may be necessary for compliance with laws and existing contracts. (See item under Engineering and Rolling Stock Officers.) George McCormick has been appointed assistant superintendent of the Galveston, Harrisburg & San Antonio, with office at El Paso, Tex., succeeding D. W. Fitzgerald, granted leave of absence on account of illness.

Traffic Officers.

O. H. Taylor has been appointed passenger traffic manager of the Eastern Steamship Corporation, with office at New York City.

W. C. Saunders has been appointed assistant general passenger agent of the Norfolk & Western, with headquarters at Roanoke, Va.

Albert Thompson, manager of the advertising bureau of the Chicago & Alton, with office at Chicago, has resigned to engage in other business.

F. A. Brown has been appointed traveling passenger agent of the Chicago, St. Paul, Minneapolis & Omaha, with headquarters at Kansas City, Mo.

James S. Patterson, chief clerk to the general freight agent of the Chesapeake & Ohio, has been appointed also commerce agent with office at Richmond, Va.

H. M. Runyon has been appointed general eastern freight agent of the Seaboard Air Line, with office at New York City, succeeding C. L. Smith, resigned.

C. F. Schmidt, chief clerk to the general freight and passenger agent of the Louisiana & Arkansas, at Texarkana, Ark., has been appointed general agent, with office at Texarkana.

W. R. Sheldon, general agent of the Minneapolis, St. Paul & Sault Ste. Marie at Helena, Mont., has been appointed division freight and passenger agent, with office at Calgary, Alberta, Canada.

W. W. Trimble, traveling freight agent of the Missouri Pacific, at Memphis, Tenn., has been appointed a contracting freight agent. W. D. Arens, chief clerk, succeeds Mr. Trimble, and E. P. Costello succeeds Mr. Arens.

William D. Corfield has been appointed division freight agent of the Philadelphia & Reading, the Perkiomen Railroad and the Stony Creek Railroad, with office at Philadelphia, Pa., succeeding J. J. Bergen, deceased.

George R. Chesbrough has been appointed eastern passenger agent of the Missouri, Kansas & Texas, with office in New York. Herbert Comins, traveling freight agent in New York, has been appointed traveling passenger agent at the same place.

J. E. Williams, assistant general freight agent of the Pere Marquette at Detroit, Mich., has been appointed a member of the Committee on Uniform Classification, succeeding Robert N. Collyer, resigned to become chairman of the Official Classification Committee.

O. F. Scudder has been appointed assistant real estate and industrial commissioner of the Chicago, Burlington & Quincy for the lines east of the Missouri river, with office at Chicago. R. W. Foster, assistant general agent at Portland, Ore., has been appointed commercial agent, with office at Portland.

E. M. Elliott has been appointed agent of the Star Union Line of the Pennsylvania Lines West and the Pennsylvania Railroad, with headquarters at Indianapolis, Ind., succeeding H. H. Gray, promoted. Wallace M. Crozier has been appointed freight solicitor in connection with the office of the export agent at Chicago.

E. H. Bryant, traveling freight agent of the Baltimore & Ohio at Kansas City, Mo., has been transferred to Minneapolis, Minn. C. K. Minor, soliciting freight agent at Kansas City, succeeds Mr. Bryant, and W. S. Fuhrman succeeds Mr. Minor. N. D. Harding has been appointed commercial agent at Davenport, Iowa.

George L. Alley, general baggage agent of the Oregon Short Line at Salt Lake City, Utah, has been appointed general baggage agent of the Union Pacific, with office at Omaha, Neb., succeeding Andrew Traynor, retired under the pension rules of the company on January 1, after a service of more than 43 years with the road.

The following officers of the Chicago, Milwaukee & Puget Sound, the Tacoma Eastern and the Gallatin Valley have had their jurisdiction extended over the Big Blackfoot Railway: R. M. Calkins, traffic manager; F. D. Burroughs, general freight agent; G. W. Hibbard, general passenger agent, and J. M. Allen, freight claim agent, all at Seattle, Wash.; W. D. Carrick, general baggage agent at Milwaukee, Wis., and A. J. Hillman, division freight and passenger agent at Butte, Mont.

J. M. Harris, traveling passenger agent of the Pennsylvania Lines at Atlanta, Ga., has been appointed district passenger agent of the lines west of Pittsburgh, with office at Toledo, Ohio, succeeding G. L. A. Thomson, transferred to Chicago. P. J. Wickham, traveling passenger agent at Spokane, Wash., has been appointed traveling passenger agent, with headquarters at Seattle, Wash., succeeding C. L. Harbaugh, transferred, and W. F. Chase, passenger agent at Milwaukee, Wis., succeeds Mr. Wickham. J. M. Neafus succeeds Mr. Chase.

Incidental to the merger of the Minneapolis & St. Louis and the Iowa Central, a number of changes in the personnel of the traffic department have been made, effective January 1: W. L. Ross, vice-president in charge of traffic; R. J. McKay, general passenger agent; B. C. Stevenson, assistant freight traffic manager; J. W. Graham, assistant general freight agent in charge of tariffs, and H. G. Thompson, commercial agent, all at Chicago; E. C. Coffey, assistant general freight agent at Peoria, Ill.; A. K. Handy, general Eastern freight agent at New York; R. M. Baumgardner, New England freight agent at Boston, Mass.; and C. F. Vigor, general agent in the freight department at Buffalo; all of whom have been in charge of the Chicago & Alton, the Toledo, St. Louis & Western, the Minneapolis & St. Louis and the Iowa Central, have had their jurisdiction withdrawn from the two latter roads. S. G. Lutz, traffic manager, and A. B. Cutts, assistant traffic manager, both at Minneapolis, Minn., have had their jurisdiction extended to include matters formerly in charge of the vice-president in charge of traffic, the general passenger agent and the assistant freight manager at Chicago. H. T. Boyd, commercial agent of the Minneapolis & St. Louis at Des Moines, Iowa, has been appointed general agent in the freight department at Peoria, and J. T. Redmond, contracting freight agent at Peoria, has been appointed commercial agent at that place. C. A. Werlich has been appointed chief of the tariff bureau, with office at Minneapolis, succeeding to the duties of Mr. Graham, and E. H. Spence has been appointed general Eastern agent, with office at New York, succeeding Mr. Handy. E. L. Dalton has been appointed commercial agent at Chicago, and J. R. Shannon has been appointed traveling freight agent at the same place. W. M. Hardin, commercial agent at Kansas City, Mo., has been appointed commercial agent at Minneapolis, succeeding H. C. Yutzy, and J. A. Lucey, traveling freight agent at Minneapolis, succeeds Mr. Hardin. H. C. Yutzy succeeds Mr. Lucey. J. B. Helwig has been appointed a contracting freight agent, with headquarters at Cincinnati, Ohio, and L. C. Rains has been appointed grain and flour agent, with office at Minneapolis. G. C. Houk, traveling freight agent at Fort Dodge, Iowa, has been appointed commercial agent, with office at Des Moines, succeeding H. T. Boyd, promoted, and E. C. Davis succeeds Mr. Houk.

Engineering and Rolling Stock Officers.

H. R. Gibson has been appointed division engineer maintenance of way of the Baltimore & Ohio, with office at Flora, Ill., succeeding T. H. Brown, resigned.

Bayard Wright has been appointed engineer maintenance of way of the Newburgh & South Shore, with office at Newburgh, Ohio, succeeding A. H. Stewart, resigned.

Frank A. Howard, assistant engineer of bridges and buildings of the Erie Railroad at New York, has been appointed engineer of bridges and buildings, with office at New York.

R. J. Turnbull, assistant superintendent of machinery of the Missouri Pacific at St. Louis, Mo., has been appointed acting

superintendent of machinery, with office at St. Louis, succeeding J. W. Small, resigned to accept service with another company.

C. E. Knickerbocker having resigned as chief engineer of the New York, Ontario & Western, as has already been announced in these columns, J. H. Nuelle, principal assistant engineer at Middletown, N. Y., has been appointed engineer of maintenance of way.

F. K. Murphy, supervisor of air brakes of the Cleveland, Cincinnati, Chicago & St. Louis, has been appointed master mechanic, with office at Brightwood, Ind., succeeding F. M. Lawler, retired on a pension, after a service of 41 years with the road. J. A. Gibson, master mechanic of the Peoria & Eastern division at Urbana, Ill., has resigned.

George Woods, roadmaster of the Chicago, Rock Island & Pacific at El Dorado, Ark., has been appointed roadmaster at El Reno, Okla. H. Berend, roadmaster at Sibley, Iowa, has been transferred to the Missouri division, with office at Washington, Iowa, and F. E. Allen, general foreman of shops at Valley Junction, Iowa, succeeds Mr. Berend.

J. W. Small, whose appointment as superintendent of motive power of the Southern Pacific Lines in Texas, with office at Houston, Tex., has been announced in these columns, has been appointed also superintendent of motive power of the Louisiana Western, and of Morgan's Louisiana & Texas Railroad & Steamship Company. (See item under Operating Officers.)

G. T. Hartman, assistant superintendent of the Copper Range, at Houghton, Mich., will have jurisdiction over the mechanical and supply departments, and the present heads of these departments will report to him. Mr. Hartman is to continue to report to the general superintendent, and will devote his entire time to the above departments, relinquishing his present duties in train and station matters, etc.

P. F. Smith, Jr., master mechanic of the Pennsylvania Lines West at Columbus, Ohio, has been appointed superintendent of motive power of the new grand division to be known as the Central system. This is composed of the Cleveland, Akron & Columbus Railway, with its two divisions, the Akron and the Zanesville, heretofore operated by its own separate organization; and the Toledo, Columbus & Ohio River with its two divisions, the Toledo and the Marietta, formerly in the Northwest system. G. B. Fravel, master mechanic at Dennison, Ohio, succeeds Mr. Smith, and J. J. Walsh, master mechanic of the Logansport (Ind.) shops, succeeds Mr. Fravel. H. H. Hilberry, master mechanic at Toledo, Ohio, has been transferred to Mahoningtown, Pa.; and J. W. Hopkins, general foreman at Richmond, Ind., has been appointed master mechanic at Toledo, Ohio.

Purchasing Officers.

C. H. Kenzel, assistant purchasing agent of the Elgin, Joliet & Eastern at Chicago, has been promoted to purchasing agent, and his former position has been abolished.

W. C. Blake has been appointed division storekeeper of the J. & O. district of the Mobile & Ohio, with office at Jackson, Tenn., succeeding E. T. Bracken, transferred.

John H. Guess, assistant general purchasing agent of the Grand Trunk at Montreal, Que., has been appointed general purchasing agent, succeeding A. Butze, retired under the provisions of the pension fund, and R. Johnson succeeds Mr. Guess, both with offices at Montreal.

OBITUARY.

L. L. Korn, traveling freight agent of the Atchison, Topeka & Santa Fe, with headquarters at Cincinnati, Ohio, died at that place on December 28.

Alonzo C. Goodrich, formerly manager of the Centerville division of the Chicago, Burlington & Quincy, with office at Keokuk, Iowa, died at his home in Chicago on January 1. Mr. Goodrich was born September 30, 1852, at Pittsfield, Rutland county, Vermont, and began railway work in April, 1872, as a rodman on the engineering corps of the Chicago & North Western. From December, 1886, to July, 1904, he was general manager of the Keokuk & Western and manager of the Centerville division of the Burlington, which absorbed the Keokuk & Western.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

THE CHICAGO, ROCK ISLAND & PACIFIC is figuring on 45 Mikado locomotives.

THE NEW YORK, NEW HAVEN & HARTFORD has ordered three electric locomotives from the Westinghouse Electric & Manufacturing Company.

THE SYDNEY & LOUISBURG has ordered 1 consolidation locomotive from the Montreal Locomotive Works. The dimensions of the cylinders will be 21 in. x 26 in., the diameter of the driving wheels will be 50 in., and the total weight in working order will be 177,000 lbs.

THE PAULISTA RAILWAY, Brazil, has ordered 4 ten-wheel locomotives from the American Locomotive Company. The dimensions of the cylinders will be 17 in. x 20 in., the diameter of the driving wheels will be 48 in., and the total weight in working order will be 96,000 lbs.

CAR BUILDING.

THE DELAWARE, LACKAWANNA & WESTERN has ordered 200 refrigerator cars from the Standard Steel Car Company.

THE CHICAGO, ROCK ISLAND & PACIFIC has ordered 15 caboose cars from the Mt. Vernon Car Manufacturing Company and is said to have ordered 2,500 box cars and 500 furniture cars from the Pullman Company. The latter two orders have not been confirmed.

IRON AND STEEL.

THE LEHIGH VALLEY is figuring on 2 dining cars.

THE CANADIAN PACIFIC has ordered 42,000 tons of rails from the Inland Steel Company.

THE MINNESOTA, DAKOTA & WESTERN has ordered 2,000 tons of rails from the Illinois Steel Company.

THE NATIONAL RAILWAYS OF MEXICO have ordered 4,500 tons of rails from the Maryland Steel Company.

THE BUFFALO, ROCHESTER & PITTSBURGH has ordered 1,300 tons of bridge material from the American.

THE SOUTHERN RAILWAY has ordered 21,000 tons of rails from the Tennessee Coal, Iron & Railroad Company.

THE MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE has ordered 18,000 tons of rails from the Illinois Steel Company.

THE TRANSCONTINENTAL will receive tenders until January 10 for 14,468 tons of 80-lb. rails, and the necessary rail fastenings.

THE BALTIMORE & OHIO has ordered 500 tons of bridge steel from the McClintic-Marshall Construction Company for use in Chicago.

GENERAL CONDITIONS IN STEEL.—The holiday period has been a busy one for the steel mills. Increasing rush orders have forced the manufacturers to keep their mills operating at about 80 per cent. of their capacity even on January 1. This period is usually devoted to overhauling the plants, but that was not the case this year. The rolling mills have enough orders on their books to insure capacity operations for about four months, and a large volume of orders is still pending. The forces will be increased immediately, and it is expected that operations will average between 80 and 85 per cent. of capacity for the month. No immediate increase in prices is anticipated.

The Usambara Railway Company's line near the northern border of German East Africa, whose ocean terminus is Tanga, about 100 miles south of the Uganda Railway terminus, and 125 miles north of Dar-es-Salaam. It has lately been extended to Moschi, just south of the famous mountain Kilimanjaro.

Supply Trade News.

Dwight P. Robinson and John W. Hallowell have been made members of the firm of Stone & Webster, Boston, Mass.

The Standard Steel Works Company, Philadelphia, Pa., has opened a branch office in the First National Bank building, Denver, Col.

The Railway & Mill Equipment Company, New Orleans, La., has been established to sell railway supplies. Seely Dunn and J. Otho Elmer are officers.

F. H. Jones, assistant resident manager of the General Railway Signal Company, Rochester, N. Y., with office at Chicago, has been made resident manager at San Francisco, Cal., C. O. Poor, general superintendent of the Rochester works of the company, succeeds Mr. Jones at Chicago.

The Simplex Railway Appliance Company, Hammond, Ind., has been incorporated in Delaware with $1,000,000 capital stock, to make interurban, street and steam railway cars, trucks, wheels, etc. Harry H. Philips is president, and Paul A. Neuffer, secretary.

The United Car Company, with offices in the Commercial National Bank building, Chicago, which has recently been organized with C. H. Thomas, F. A. Hecht and E. R. Davis as directors, has purchased the entire plant and equipment of the American Car & Equipment Company, Chicago Heights, Ill., including a large erecting shop, blacksmith shop, offices, etc. It will build and rebuild cars and handle railway supplies in general, making a specialty of steel underframes and tank cars. Mr. Thomas is president of the company; Mr. Hecht, vice-president; and N. B. Hall, secretary.

F. C. Lavarack, signal engineer at New York for the Federal Signal Company, Albany, N. Y., has resigned to become general sales manager of the Signal Accessories Company, with offices recently established at 140 Nassau street, New York. The Signal Accessories Company has been incorporated to manufacture signal materials, and in addition to handle the sales of the United Electric Apparatus Company, Boston, Mass.; the W. F. Bossert Manufacturing Company, Utica, N. Y.; the American Conduit Company, East Chicago, Ind.; and various other companies. Mr. Lavarack has spent his entire business life in the railway signal field, having been with the Standard Signal Company; the Pneumatic Signal Company; the New York Central & Hudson River; the School of Railway Signaling; and later with the Federal Signal Company.

On December 28, 1911, Judge Christian C. Kohlsaat, of the United States Circuit Court, decided the case of the Railroad Supply Company, Chicago, against the Hart Steel Company, Elyria, Ohio, and Guilford S. Wood, Chicago, pending in the United States Circuit Court for the northern district of Illinois, and dismissed the bill for want of equity, holding that, while the three Wolhaupter patents, upon which the suit was instituted, were valid under the state of the art shown by the record, the claims must be limited to the devices described in the specifications, and that when so construed the device sold by the defendants did not infringe. An appeal was at once prayed and allowed to the United States Circuit Court of Appeals for the seventh circuit, and will be heard at the April session of that court in Chicago. The companion suit against the Elyria Iron & Steel Company, Elyria, will be heard before Judge Day in the federal court at Cleveland in January, 1912.

TRADE PUBLICATIONS.

Refrigeration and Ventilation.—Burton W. Mudge & Company, Chicago, have published an illustrated booklet on the Garland system of ventilation, heating and refrigeration applied to refrigerator cars.

Chains.—The Morse Chain Company, Ithaca, N. Y., has published bulletin No. 11 on the Morse Silent chain. This chain is described in detail and illustrated by photographs and diagrams. An interesting comparison between rope drive and chain drive is included. On the last page of the bulletin data is given to be used in the design of the Morse Silent chain drive.

Railway Construction.

New Incorporations, Surveys, Etc.

Camino, Placerville & Lake Tahoe.—Incorporated in California with $100,000 capital, and headquarters at San Francisco. The plans call for building from Camino, Cal., to Placerville, 6 miles, and later to Lake Tahoe, about 50 miles. The incorporators include B. C. Dabaher, C. F. Wood and B. Sair, all of San Francisco.

Canadian Northern.—The improvements to be carried out at Montreal, according to local reports include a tunnel to be about three miles long, under the mountain, to the heart of the city of Montreal. A large station is to be built at the end of the tunnel on the corner of St. Monique and Dorchester streets to Lagauchetiere street. There is also to be a large hotel built, and all the lines are to be electrified from Back river to the city. An overhead line is to be constructed from Lagauchetiere street station to the river front, connecting with the harbor commissioner's line, and a spur is to be built from Moreau street station to the harbor lines in the east, providing a continuous line from the tunnel's mouth to Moreau street. New freight sheds are to be put up near the corner of William and Nazareth streets. It is understood that the tunnel will be ready for operation in about two years, and that the entire cost of the improvements will be $25,000,000. The work is to be started early in the spring. T. Turnbull, assistant chief engineer, Winnipeg, Man.

Central Pacific.—See Southern Pacific.

Clarksburg Northern.—This company is said to be at work on a line from New Martinsville, W. Va., south to Middlebourne. The line is eventually to be extended either to Salem or Clarksburg, or to both of these places. T. M. Jackson, president, Clarksburg.

Delaware & Hudson.—The general revision of grades between Nineveh, N. Y., and Oneonta, 37 miles, has been completed. The work included raising or lowering 10 miles of track and cost $250,000.

Duluth & Northern Minnesota.—An officer writes that this company has projected an extension from mile post 68, through Minnesota to the Minnesota Canadian boundary. John Millen, president and general manager, Duluth, Minn.

Illinois Central.—Two additional tracks have been laid by the Illinois Central between Homewood, Ill., and Matteson, five miles. The extension of suburban service to Matteson will be undertaken next spring. Double track improvements have been completed from Hawthorne, Ill., to Parkway on the Freeport division, and the New Orleans double tracking when finished will cover 50 miles.

Kansas City, Mexico & Orient.—An officer is quoted as saying that work will be finished on the branch from San Angelo, Tex., to Del Rio within the next twelve months, and it is understood that the money recently secured is to be used to pay for this work and to build from Wichita, Kan., either to Emporia, or to Osage City. W. W. Colpitts, chief engineer, Kansas City, Mo.

Kirkland-Redmond Railway, Light & Power Company.—Incorporated in the state of Washington, with $200,000 capital and headquarters at Seattle. The plans call for building an electric line from Kirkland, Wash., to Redmond, about 6 miles, and to other points in King county. E. A. Eaton, B. F. Gordon and W. D. Gillis are incorporators.

Mexican Roads.—The government department of communications has received bids for building a line, it is said, from Balsas, the present terminus of the Cuernavaca division of the National Railways of Mexico, to the port of Zehuatanejo on the Pacific coast in the state of Guerrero. A branch line will also be constructed to Uruapan in the state of Michoacan, where it will make another connection with the National Railways of Mexico. The lines will be constructed by the government, and on completion will be taken over and operated as part of the National Railways of Mexico. The proposed work involves the construction of about 350 miles of track. The bids have not been made public.

The Mexican government has granted to a syndicate of Seattle, Wash., a concession to build 300 miles of railway which will connect Acapulco with the City of Mexico. The syndicate has under construction 120 miles, and the line to the capital will be an extension of the road now being built. Moritz Thompson is back of the project. The grant calls for completion of the work in six years.

MISSOURI, ARKANSAS & GULF.—This company was incorporated in April, 1911, with $2,000,000 capital, to build from Rollo, Mo., south to Bakersfield, 125 miles; grading is said to be under way from Rollo to Willow Springs; surveys have not been made south of Willow Springs. G. Lay, president, St. Clair; W. E. Finke, secretary. W. B. Payne, engineer, Rolla. (August 18, p. 356.)

NATIONAL RAILWAYS OF MEXICO.—See Mexican Roads.

NEW YORK, WESTCHESTER & BOSTON.—An officer writes that work is now under way on 1.3 miles, between New York City and Mount Vernon, on 1.6 miles, between Mount Vernon and New Rochelle, and on 3.4 miles, between Mount Vernon and White Plains. The contractors are the O'Brien Construction Company and Henry Steers, Inc., both of New York City; Lathrop & Shea, Mount Vernon, and Merritt & Gilbert, New Rochelle. The projected work includes 9.7 miles between New Rochelle and Port Chester, and 6.4 miles from New York to Throgg's Neck. The company during the past year completed 12 miles of the four-track line between New York City and Mount Vernon, and between that place and New Rochelle and White Plains. J. L. Crider, chief engineer, New York. (June 23, page 1674.)

OREGON EASTERN.—See Southern Pacific.

PANHANDLE PECOS & GULF OF TEXAS.—M. J. Healey, president of this company, is said to have entered into a contract with residents of Pecos, Texas, to build from Pecos, via Knowles, N. Mex., to Dawson Fields, Colo., about 350 miles. The first section to Knowles is to be finished in about eighteen months. The plans call for putting up shops, roundhouses, and a general office building in Pecos. Financial arrangements are said to have been made, and it is understood that grading work will be started soon.

SAN ANTONIO, ROCKPORT & MEXICAN.—According to press reports, this company will build from San Antonio, Tex., south via Crowther, to a point on the Rio Grande near Mission, with a branch from Crowther southeast to Rockport and Harbor Island, about 370 miles, at the latter place large docks are to be built. It is understood that the plans call for building an extension from San Antonio west to San Angelo, and lines in Mexico. Financial arrangements are said to have been made, and it is expected that the work will be started soon. R. Russell, president; A. L. Matlock, vice-president; J. H. Haile, treasurer, and V. L. Knight, secretary, with headquarters at San Antonio.

SAN JOSE & ALMADEN (Electric).—This company, which was recently incorporated, has started work on a line from San Jose, Cal., to Hacienda, about 11 miles. C. A. Nones, president.

ST. LOUIS, ARKANSAS & PACIFIC.—This is the new name of the Harrison mineral Belt which has increased its capital from $80,000 to $2,080,000. The main line is to be built from Harrison, Ark., southwest to Fallsville in Newton County, with a branch from Jasper northeast to Pontiac, Mo., in all about 100 miles. J. H. Kuder, secretary, Harrison.

ST. LOUIS, BROWNSVILLE & MEXICO.—An officer writes that contracts have been let and work is now under way on a branch from Bloomington, Tex., to Victoria, 14 miles. All material has been bought, and it is expected that the line will be in operation about March 1. F. G. Jonah, chief engineer, St. Louis, Mo.

SAVANNAH SOUTHERN.—An officer writes that this company is making surveys for an extension from Spurs, Ga., to Clyde, 6 miles. G. T. Tuten, secretary and treasurer, Letford, Ga.

SOUTHERN PACIFIC.—The Oregon Eastern, which is building the Southern Pacific's line from Natron, Ore., south to Klamath Falls, 142.6 miles, has increased its capital from $1,000,000 to $6,000,000, and plans have been made to build branch lines to various points in Oregon. It is understood that the line from Natron, in Lane county, east to Ontario in Malheur county on the Oregon Short Line is to be built, the latter company is reported to have recently let a contract for an extension from Vale, Ore., west to Dog mountain, 135 miles. A branch is projected from a point on the Klamath Falls line, at or near that place to connect with the Central Pacific, and another branch is contemplated from the Ontario-Natron line south to Lakeview, which is eventually to be extended south to a point near the east shore of Goose lake, at the Oregon-California state line.

RAILWAY STRUCTURES.

ALLENTOWN, PA.—The Lehigh Valley Transit Company will build a large bridge at Allentown. The work is to be carried out by the Allentown & South Allentown Bridge Company, and it is understood that the structure will be built of concrete, and is to have a total length of about 2,000 ft., with 1,800 ft. between abuttments.

BARSTOW, CAL.—The Atchison, Topeka & Santa Fe Coast Line has given a contract to C. A. Fellows at about $65,000, it is said, for putting up a reinforced concrete 25-stall roundhouse at Barstow. (August 11, p. 305.)

CENTRALIA, WASH.—The contract recently let for building the new union station at Centralia for the Northern Pacific, the Great Northern and the Oregon-Washington Railway & Navigation Company has been given to the Rounds-Hurson Company, Seattle. It is understood that the contract price is about $50,000. (December 22, p. 1301.)

CINCINNATI, O.—The city council has passed an ordinance granting a franchise to the Cincinnati Depot & Terminal Company for a union passenger terminal for all the steam and electric railways entering the city, and requiring its completion within five years. The plans include a large terminal office building, a new four-track entrance to the city, reducing the mileage and grades and an elevated approach. There is to be a meeting of railway officers on January 9 to consider plans for a building.

DENVER, COLO.—The six railways entering the city of Denver have decided to build a new union passenger terminal to cost about $6,000,000 subject to approval by the various boards of directors of some details of plans.

LAREDO, TEX.—Work has been started on a new joint passenger station for the International & Great Northern and the Texas-Mexican.

LATHAM, ORE.—The Southern Pacific is planning to put up a new passenger station, it is said, at Latham.

MASON CITY, IA.—The Chicago, Rock Island & Pacific and the Chicago & Great Western will jointly build a union passenger station at Mason City. The estimated cost of the station is $500,000.

MILNEBURG, LA.—The Railroad Commission of Louisiana has ordered the Pontchartrain Railroad, which is a subsidiary of the Louisiana & Nashville, to build a combined passenger and freight station at Milneburg within ninety days.

MONTREAL, QUE.—See Canadian Northern under Railway Construction.

RICHMOND, CAL.—The Atchison, Topeka & Santa Fe Coast Lines is having plans made for a reinforced concrete passenger station.

The chief feature of the railway policy in New Zealand is to connect up some isolated railway lines which extend only short distances inland from various small seacoast towns. When such detached lines are connected with the main lines, it will be possible for almost every town of importance to be reached by railway from the main centers of population and heavy through traffic with districts now reached only by coasting boats will be provided. It is also intended by construction already planned or under way to shorten the mileage and time for transportation between some leading towns. For instance, New Plymouth, about midway on the west coast, and Napier, about midway on the east coast, which now have good connection with Wellington and the southern part of the North island, will also be connected with the main trunk railway line between Wellington and Auckland at points much more northerly, giving access to Auckland without the present inconvenient roundabout routes.

Railway Financial News.

Atchison, Topeka & Santa Fe.—See Southern Pacific.

Boston & Maine.—This company sold to William & Read & Co., New York, $1,200,000 Fitchburg Railroad 4 per cent. currency bonds of 1912-1932 at 102.89. The bonds are being offered to the public by the bankers at 104. Of the proceeds of the sale, $100.000 was used for refunding purposes and the remainder for additions and betterments made to the Fitchburg under its lease to the B. & M.

Buffalo, Rochester & Pittsburgh.—This company has sold to Procter & Borden, New York, $1,000,000 equipment trust certificates, series G, 1909-1929. The total authorized series G bonds amounts to $3,000,000, and, including the bonds now sold, there are outstanding $1,754,000, less $44,000 retired through the sinking fund.

Central New England.—This company has asked the New York Public Service Commission, Second District, for its approval of a supplemental mortgage to secure $25,000,000 bonds, the bonds secured by the mortgage to be used to refund bonds of the Dutchess County Railway.

Chicago & North Western.—Stockholders of the Des Plains Valley Railway, a subsidiary of the North Western, has voted to authorize a mortgage securing $2,500,000 bonds.

Cleveland & Pittsburgh.—The New York Stock Exchange has listed $1,073,950 special betterment stock. The stock was issued to pay for additions and betterments.

Cleveland, Cincinnati, Chicago & St. Louis.—The New York Stock Exchange has listed $1,106,000 general mortgage 4 per cent. bonds, due 1993. Of these bonds, $106,000 were issued for refunding purposes and $1,000,000 for additions and betterments.

Des Plains Valley Railway.—See Chicago & North Western.

Detroit, Toledo & Ironton.—The much postponed sale of this property has been again postponed from January 9 to April 9.

Fitchburg Railroad.—See Boston & Maine.

Florida Railway.—A suit was recently filed by the Knickerbocker Trust Company, New York, against the Florida Railway for an accounting and compensation as trustee of the railway company's bonds. The railway company has now filed a counter claim for $2,000,000 damages said to have been incurred through the unlawful refusal of the trust company to deliver bonds which it had certified to purchasers in Paris. It is claimed that as a result of this refusal the company has been without funds since August to continue extension work and that materials on hand are now worthless.

Grand Trunk Pacific.—Moleson Macpherson has been elected a director of the Grand Trunk Pacific.

Kansas City, Mexico & Orient.—It is said that arrangements have been made for the sale of an additional block of $4,000,000 bonds.

Maine Central.—That part of the St. Johnsbury & Lake Champlain running from the Connecticut river in Vermont to the village of St. Johnsbury, including the Victor branch, has been leased to the Maine Central, and will be operated as part of its line.

New York Central & Hudson River.—The New York Public Service Commission has authorized the New York Central & Hudson River to buy all or any part of the outstanding $10,000,000 stock of the New York & Harlem, the price to be not higher than $175 for a $50 share.

The commission has given its permission to the issue of $35,000,000 4 per cent. debentures at not less than 90, or $30,000,000 notes at not less than 98½. The railway company's requests for authority were described in these columns last week.

New York & Harlem.—See New York Central & Hudson River.

Old Colony Railroad.—There was sold at public auction on January 3 $500,000 capital stock, making the total capital stock now outstanding $21,664,000.

Pennsylvania Company.—The Toledo, Columbus & Ohio, all of whose stock is owned by the Pennsylvania Company, has declared an initial 6 per cent. annual dividend on its $8,000,000 stock.

Reading & Columbia.—See Reading Company.

Reading Company.—Stockholders of the Reading & Columbia, a subsidiary of the Reading Company, have been asked to authorize $850,000 new first mortgage 4 per cent. bonds of 1912-1962, to be guaranteed by the Reading Company, and the proceeds to be used to refund $650,000 first mortgage 4 per cent. bonds, due March 1, 1912, and $200,000 of the $350,000 second mortgage 5 per cent. bonds, due September 1, 1912. The remaining $150,000 second mortgage 5 per cent. bonds will be converted into debenture bonds.

Seaboard Company.—Stockholders of the Seaboard Company, which owns 83 per cent. of the Seaboard Air Line Railway stocks and $6,785,000 of the railway adjustment bonds, voted unanimously to dissolve the company by retiring the first preferred stock for cash at par, exchanging for the second preferred stock 1⅓ shares of the railway company preferred stock, for each share outstanding, and for the common stock slightly over par in common stock of the railway. The adjustment mortgage bonds were recently sold by the holding company to provide for this dissolution.

Southern Pacific.—This company has, it is understood, bought from the Atchison the Sonora Railway and the New Mexico & Arizona and the Atchison has bought from the Southern Pacific the line between Mojave and the Needles in California.

The Atchison has organized the California, Arizona & Santa Fe with a capitalization of $50,000,000 to consolidate the Mojave-Needles line with the Arizona-California line from Bengal, Ariz., to Wickenburg, on the Santa Fee, Prescott & Phoenix, a distance of about 195 miles.

Atchison directors and officers have resigned from the New Mexico & Arizona and Sonora Railway, Limited, and Southern Pacific directors and officers have been elected. The New Mexico & Arizona line runs from Benson, Ariz., on the Southern Pacific, south to Nogales on the Arizona-Mexico border, a distance of about 80 miles. The Sonora line runs from Nogales on the south through Mexico to Guaymas on the Gulf of California, and is 263 miles long. The line from Mojave to Needles in California is 243 miles long and has always formed part of the Atchison's through line. Since 1885 it has been leased to the Atchison at an annual rental of $163,850. This rental has been offset by payment of the same amount annually by Southern Pacific for use of the Sonora line.

St. Johnsbury & Lake Champlain.—See Maine Central.

Toledo, Columbus & Ohio.—See Pennsylvania Company.

Western Maryland.—This company has authorized an issue of $10,000,000 secured 5 per cent. notes of 1912-1915, of which $8,000,000 have been sold. The notes are secured by all of the capital stock of the Georgia's Creek & Cumberland and of the Connellsville & State Line Railway, which companies own the 85-mile line running from Cumberland, Md., to a connection with the Pittsburgh & Lake Erie at Connellsville, Pa. This line is not covered by any mortgage. The proceeds of the notes are to be used for additions and betterments.

The Russian railways examination committee has received a report on the investigations carried out on the Siberian railway. It reports that the total cost of equipping the railway after finishing its partial reconstruction will make about $110,000 per mile. Taking into account the facilities for receiving and discharging traffic and the difficulties in working, the estimate is considered moderate. The operation of the Siberian railway is carried out very satisfactorily on the whole, and improvements are to be wished for only in respect to the organization of the work in constructing the second line, the quality of the rails, the control of supplies of material and the calculations as to working capital, the organization of the commercial sections and the infirmary department.

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IF the number and size of the reservations of space made by supply manufacturers for the annual railway appliance exhibition to be held in Chicago in connection with the convention of the American Railway Engineering Association in March may be regarded as any criterion of their views of the business outlook, they are anticipating that 1912 will be a far more prosperous year than was 1911. The list of those who will have exhibits, published elsewhere, shows that not only is the extent of the entire exhibition to be increased, but that many who have been prominently represented in previous years have taken still larger spaces this year. Although 16,000 sq. ft. of extra exhibit space have been made available by renting the First Regiment Armory in addition to the Coliseum, nearly all of it has, at this early date, been reserved. The steady growth of the exhibition since the organization of the Railway Appliances Association, and the beginning of the use of the Coliseum instead of the parlors of the hotel where the engineering conventions were held, is but one illustration of its increase in importance. Another illustration of this is afforded by the fact that concerns dealing in appliances used in the mechanical, as well as in the maintenance of way and construction department, are enrolling themselves among the exhibitors. The exhibition is now attended not only by engineers incidentally to their attendance on the convention, but by them and by numerous other railway men from all over the country because of its independent educational worth.

THERE is an old story of a president of a 10-mile railway, who, on being refused exchange transportation over the Pennsylvania because of the difference between the mileage of the two roads, replied: "My road may not be as long as yours but it is just as wide." A great deal of free transportation is being issued every year by the railways of the United States for the issuance of which many persons can see no more convincing reason than the one given by this president. In another column is published a letter from a yardmaster regarding what he calls "the abuse of the pass privilege." "Yardmaster" suggests that free transportation be abolished and that a nominal, or at least a reduced, rate be charged railway employees when traveling for their own pleasure or on their own business. Some railway officers have gone so far as to suggest the entire elimination of exchange transportation for even railway business travel. A few years ago such a proposal would have seemed radical, but now that federal and state laws have greatly reduced the pass giving and receiving custom the idea of still further restricting it may be viewed in a different light. The practice on the part of railway officers of giving passes to friends, politicians and shippers was—and, where it still obtains, is yet—open to abuses not inherent in the custom of the A. B. C. railway standing a part of the expenses of an officer or employee of the X. Y. Z. railway, traveling on company business, or even taking his wife and family on a vacation trip. But it is a question worth considering whether the railways would not put themselves in a sounder position before the public, as well as establish more business-like relations among themselves, if they stopped the practice of exchanging annual or term passes, confining the use of such transportation to their own officers and employees when on their own lines and issuing trip passes to those of other lines, and then only under special circumstances. Interchangeable mileage tickets could be used for employees required to travel constantly over different roads. The existing practice in most instances has been reduced to a matter of routine which precludes the idea of the extension of a courtesy, and, while between many roads the exchange of transportation probably is approximately equal, there are many cases where this is far from true; and in all cases the practically unrestricted issuance and exchange of transportation doubtless involves much needless expense. A frank expression of views on this subject by railway men might lead to good results.

THERE are some special reasons that make the state of Massachusetts an interesting field for railway study. It has a dense population very largely grouped in cities. Its railway capitalization has been conservative and its railway corporations under close supervision by a railway commission. The nature of its population has given it an exceptionally large passenger business in ratio to freight; and in freight business it has been a great consumer of raw material while shipping away factory products much less in volume than incoming freight but of a much higher freight classification. It is superlatively a factory state. Such features call attention to the returns of the state railway commission for the last fiscal year, which report has just appeared. As compared with 1910 the general railway business shows a handsome increase, passengers carried rising from

160,769,201 to 162,940,242, freight tonnage from 55,786,434 to 56,557,644 and gross revenue from $120,140,993 to $123,959,490. But this increase in gross of $3,818,497 was much more than offset by an increase in expenses of $7,458,386, increased expense thus almost doubling increased gain in gross earnings, higher wages undoubtedly being the greater element. When the depression in Massachusetts textile industries is considered (26 mills in Fall River alone reduced dividends in 1911) the gain in gross earnings, however, seems remarkable. Not so cheering is a deficit of $4,444,762 over dividends as compared with a surplus of $1,165,737 in 1910, even though we allow for the heavy net losses of the Boston & Maine system. That such a net showing should be made in an old and populous commonwealth where railway conditions are supposed to be stable is a little startling. It is qualified by the fact that the conditions are probably temporary and that Boston & Maine rehabilitation and efficiencies will ere long modify the returns. Passenger revenue rose from $52,995,871 in 1910 to $55,602,106, while freight business increased only from $64,070,157 to $65,038,750, illustrating the general condition of the higher sustaining power of passenger traffic compared with freight—though a rise of average passenger fare from 1.65 to 1.72 cents a mile, while the freight rate per ton mile fell from 1.18 to 1.17 cents, partly accounts for the difference. Evidently the Massachusetts companies were able to lift decidedly local passenger rates in avoidance of any interstate rulings. In connection with the subject of supervision of railways in the state may be noted the urgency of Governor Foss in his message that the railway commission be merged in a "general utilities" body having supervision of electric and gas lighting, telegraphs and telephones also. It is a phase of commission development all over the country to which we have alluded heretofore. But in the case of the Masachusetts railway commission, already overloaded with duties connected with both the steam and street railways, the plan has exceptional infirmities.

THE CIVIC PERIL OF THE RAILWAYS.

THE most conspicuous fact on a broad scale in the life story of our American railways has been their segregation into a comparatively few large groups—in other words, their drift to consolidation. It has come through the action of several forces: Branch lines have passed to main lines by natural absorbtion, resting either on normal value as feeders or on fear of rival control. Rival lines have coalesced under the law of abated competition. Connecting lines have been joined on the principle of more efficient management or to secure important and remoter terminals; and, finally, considerable systems already consolidated have combined with others on what is really the basic motive of consolidation, namely, control of railway territory. With the railway groups grown so big, and with the interstate relation constantly deepening, contacts with federal authority were probably inevitable; and the step was but a short one to new contacts with state authority, too. Probably the most philosophical and certainly the most charitable view of the long series of antagonisms between the civic authorities and the railways is that which thus attributes them to fundamental conditions. That the antagonism has been stimulated by popular outcry and the play of political and partisan motive the same kindly philosophy will perhaps treat as an unfortunate but logical incident in which the railway corporations themselves have had their share of the blame. But the result of it all has been the creation of certain tendencies of a broad and general character which, in the look ahead, are worth their attention.

One of these tendencies bears as much on civic authority as on the railways—indeed, even more. Side by side has grown interstate as well as intrastate regulation of the railway. Federal regulation and state regulation, the inner and the outer regulation, have both been intensified. They are now, theoretically at least, held apart by a constitutional division. But in character as well as directions they are approaching each other and their limitations growing less definite. Just where, for example, as a practical question, is the line to be drawn when an intrastate railway corporation controls by a holding company or otherwise a railway in another state owning its separate charter? The attorney general of the United States brought suit against the New Haven for holding Boston & Maine shares. But he withdrew it when the state of Massachusetts ratified the holding, although there was not the slightest change in the economic and physical situation—indeed, the "restraint of trade," if it existed at all, was increased by the state's enactment. On the other hand, if he had not withdrawn the suit he might have been in collision with the state. This case—and other instances are the Minnesota rate case and the Supreme Court safety appliance decisions—illustrates the way in which federal regulation is moving toward state regulation, and *vice versa*, a tendency on which the Hadley commission laid considerable stress. If the result be a general collision, as it already has been in some instances, the difficulties of either judicial or constitutional adjustment are obvious. Meanwhile, the misfortune of the railway in sustaining the impact of both movements is also obvious. It is between the state and federal millstones that often grind exceeding small in more senses than one.

A second tendency, of an external and compulsory nature, is outlined in what may be termed the federal policy of paternalism. That paternalism in the railway case has apparently been extended to the shipper rather than the railway carrier, in whose case federal paternalism has at its best been that of the scriptural parent who spares not the rod. Such paternalism has its present evil of undue severity. But it has other evils that inhere in the thing itself. Unjust paternalism cannot last forever. The railways approximate one-third of the corporate wealth of the country, and form about one-sixth of its total wealth. They are interweaved closely with almost every element of national prosperity. Their material magnitudes and the direct and indirect interests that they involve must inevitably force a reaction toward justice in the federal policy. But it may still be a justice based upon a paternal regimen—a dependent relation upon a fickle parent that now yields up no powers, but rather seeks larger powers. Nor can the federal parent be exactly described as possessed of acute perceptions in the solution of the problems of railway management. The evident danger of such paternalism is its narrowing of the gap between regulation and ownership—a federal tendency toward taking the final step and a railway tendency to accept it as a choice of evils. How grave that alternative evil would be in a civic as well as an economic sense hardly needs demonstration. But it is an evil toward which excessive regulation, whose other name is paternalism, points the way.

Through both these tendencies which we have described, whether they pertain to state or federal powers, there has run a bad principle. Stated briefly, it has been—and is—the confounding of an economic question with a civic one. Railway regulation has been approached overmuch from its civic side, using those terms here broadly, so as to include such elements as public feeling, politics, and immediate or ultimate vote-getting. The economic, the commercial, the investment side of railway regulation, while not ignored, has been thrust to a secondary place. The railway corporation, for example, has been treated as though it were a body made up merely of a group of directors with a president and secretary, instead of a great body of stockholders with interests at bottom exactly analogous to those of the shopkeeper or the private factory owner. The railway differs from them in form, is *quasi* public, owns charter privilege and obtains certain powers of eminent domain, and, on those grounds, opens itself to regulation. But the fundamental interests are private and personal, possessed of vested and material rights of an elementary quality and rooted in the old common law. The question of the future is how far that principle is to be recognized and one-sided paternalism of federal and state authority contract its powers and be modified into the economic equities. On that idea—with the aid of the courts as interpreters of organic law—rests the hope that certain dangerous tendencies now affecting the railways may be checked.

GIVE THE COMMISSION POWER TO STOP UNFAIR DISCRIMINATIONS.

STATEMENTS by the Interstate Commerce Commission in that part of its annual report in which it discusses the action of the Commerce Court in restraining it from enforcing its order in the Transcontinental Rate cases make clear that it does not believe it has authority in any circumstances to fix an absolute or a minimum rate. It says (page 38):

"The Commerce Court intimates that the mistake of the commission is in having attempted to fix a relation of rates instead of establishing reasonable rates; but, as we have already pointed out, there is no way in which the discrimination found to exist in these tariffs can be prevented except by fixing a differential, since we have no power to establish an absolute rate or fix a minimum charge below which the carrier is not free to go."

It does not follow from the commission's reasoning that the law authorizes it to adjust rates as it sought to do in these cases. But it does seem probable that its view, that in no case can it fix an absolute or a minimum rate, is a correct interpretation of its power. Except in the fourth section, the only authority the act to regulate commerce gives it over rates which it has found unreasonable is that of fixing the "reasonable maximum" rates thereafter to be charged. Therefore, the commission cannot prevent any discrimination that the railways may be disposed to persist in effecting unless possibly it be one to which the fourth section applies; for if the commission shall find that one of two rates is relatively too high and order it reduced, the railway may reduce the other rate in proportion, and thereby perpetuate the discrimination.

The fourth section, however, provides, in substance, that the carriers must get the permission of the commission to charge a lower rate for a longer than for a shorter haul, and that the commission may prescribe the extent to which the one rate may be made lower than the other. It has, therefore, been argued by some that where the long and short haul question is involved the commission may fix a specific minimum rate for the longer haul. As the quotation made from its annual report shows, the commission rejects this view. If the question were presented directly to the courts it seems probable they would hold that any authority which is not clearly conferred is not given at all; and certainly the power to fix absolute or minimum rates is nowhere expressly conferred. Therefore, the conclusion seems justifiable that the commission has not authority, even under the fourth section, to fix minimum or absolute rates, and, consequently, has not adequate power to prevent unfair discrimination in rates in any case whatever.

At another place in its annual report (page 34) the commission says:

"The commission might determine a rate below which the traffic would be unremunerative to the carrier and might refuse relief in case the carrier fell below this rate, but such an order would not reach the difficulty, since the point of discrimination might be passed long before the unremunerative rate was reached."

This is said merely in reference to the fixing of rates to the Pacific coast, but it applies with equal force to the entire matter of regulation of discriminatory rates under the law as it now stands. The rates on packing house products from Kansas City and Omaha to Chicago should, on every sound principle of rate-making, be the same. The railways might make a lower charge from Kansas City than from Omaha, which, however, might not be unremunerative. This would be an unfair discrimination against Omaha; but, under existing law, the commission could not remedy it, because, as it cannot fix a minimum rate, the roads could reduce the rate from Kansas City as fast as the commission could reduce that from Omaha. Similarly, the carriers can make a rate of, say, 2.85 mills per ton per mile on copper from Omaha to New York and charge rates which are very much higher in proportion on other commodities. This would be an unjust discimination against the shippers of all other commodities. But is the discrimination to be remedied by reducing all the other rates in the railways' tariffs? Obviously, the only fair way to correct it would be to raise the rate on copper and fix a minimum below which it must not go. The foregoing illustrations are not hypothetical. They describe almost exactly the present conditions. The rate on packing house products from Kansas City to Chicago is unfairly discriminatory as compared with that from Omaha. The present rate on copper from Omaha to New York of 2.85 mills per ton per mile is unfairly discriminatory as compared with the rates on practically all other commodities. Yet the commission cannot fairly correct these discriminations because they grow out of rates that are unfairly low, and for it to make all other rates in proportion would simply be to make all rates unfairly low.

The *Railway Age Gazette* long has contended that the commission should be given power to raise rates and prevent their reduction similar to that which it now has to reduce them and prevent advances, on the ground that only when it possesses this authority will it be able to correct and prevent all unfair discriminations. The commission's statements in its annual report support this position. Legislation of the nature indicated is especially needed to protect the small shippers and small communities that are put at a disadvantage by the incessant and often successful efforts of the larger shippers and the larger communities to get undue concessions from the carriers.

STEAM RAILWAYS AND STREET RAILWAYS.

THE street railways of the country in 1910 reached a magnitude of interests which, measured by outstanding securities, was $4,682,217,000. The figures are considerably higher now and may by the same test be reckoned, even allowing for profuse stock watering in the earlier stages, at about one quarter of the steam railway capitalization of the country in stock and debt. The growth and size of the "tractions" are impressive facts in themselves. But they become more interesting as elements in that general field of transportation where they acquire relations more or less close with the steam railway. There have been some recent changes in those relations which make the subject worth an up-to-date study.

In their earlier times the tractions as investments, except of the most speculative kind, were open to a suspicion which affected both stock and bonds, and which they have not yet outlived; and the calamitous "high finance" of the New York City tractions has persistently shadowed them at the financial center of the country. The "bond and bonus" plan so pervasive in their early financing, and to a degree still existant, has prejudiced their credit elsewhere. But many of them, especially during the last year or two, have begun to live down the old notoriety and become standardized. More and more our eastern states have begun to open the best traction bonds to savings bank and trust investment, and increasingly, as the returns of the savings banks prove, has the "institutional" demand taken them up. The result has been a somewhat acute competition of bonds of this type with the better class of steam railway bonds. The average good traction security has not yet reached the investment level of the good steam railway security. But it has been approaching it, and its higher yield in times when increased income has so much shaped personal investment has intensified the rivalry. One may go farther and say that in the general field of conservative buying the good traction bond has been one of the major forces to reduce bond prices. And when one notes, along with the fall of consols and of the higher class of railway securities in England, the estimate of the London *Economist* that durin 1911 some $100,000,000 of English capital has sought investment in this country, the American traction bond rivalry may even be vested with a foreign influence.

But, on the other hand, turning to the field of physical relations, the steam railway has in recent years made good. At first the competition of the traction was severe. As a parallel it affected not only long distances but short distances, and cut down steam passenger traffic to the lowest terms. Such conditions still prevail in limited regions in the West and South. But generally, in the older and more populous communities, with the initial rivalries lived down, the traction has become a feeder —or, more strictly speaking, its character as a lateral and feeder has come to dominate its nature as a parallel. This is especially true of the East, where profitable new traction teritory was long ago mostly exhausted. A minor factor is the tendency of

the suburban traction to bring the suburb into closer connection with the urban steam railway station.

Rarely an interstate line, the traction has in a great majority of cases escaped the federal interference which has visited the steam road, and, as a state and localized corporation, has probably been less subject to regulation by state commissions also. But it has had its own hardships. With a large constituency of passengers who use it at least twice a day, it has encountered in very intense form the criticism which the commuter loads on the steam road. It—the traction—is the target of sharp complaints of the overcrowded car, defective equipment and irregularities of service. The demand for transfer privilege is loud and incessant. Then, in the matter of fares, there is that vexing limitation of the nickel and the obstacles to adjusting it to zone systems; and retrenchment, when called for by financial needs of the traction company, is almost sure to meet stronger opposition than on the steam road.

Compared with present conditions, and in the light of recent progress, the future of the steam-traction relation is also an attractive study. Will the analogy of the New Haven and the New York Central continue, and the tractions gradually be absorbed by steam systems, themselves operated much more extensively by electricity than at present? Or, will the tractions, in the main, be segregated, as now? The best guess, if we look far enough ahead, probably favors the former alternative; but, if state policy and legislation allow it, it will be preceded by an interval of consolidation of the tractions into large systems, repeating thus the history of steam lines.

THE RAIL SITUATION.

IN its issue of December 15 the *Railway Age Gazette* published an editorial entitled "What Are the Railways Going to do About Rails?" which has been the subject of much discussion. Persons connected with both the steel companies and railways have complained because, as they have said, the statements in it implied that they have been doing nothing in recent years to improve the quality of rails and that there has been no improvement. The *Railway Age Gazette* did not say or imply that no efforts have been made to improve rails or that no improvements have been made. What it said was that the efforts made and the improvements effected have not been as great as conditions demand. It has also been asserted that our utterances conveyed the impression that the danger of accidents due to rail breakages is very great. The largest number of people killed in any year of the ten ending with June 30, 1911, as a result of derailments from rail breakages was 24, this being in the year ending June 30, 1910. The number thus killed in 1911 was twelve, which is less than the average trespassers killed on the railways of the United States every day in the year. The total persons killed as a result of derailments caused by broken rails in the ten years 1902-1911, inclusive, was 106. The total number killed meantime while trespassing on railway property was over 51,000. It is said the regulating authorities may take steps to reduce the accidents due to broken rails. If the public authorities would for awhile use their energy to reduce fatal accidents due to trespassing, for which the public and faulty drafting and enforcement of the laws are to blame, instead of to reduce the relatively very small number for which the railway managements are to blame, the results gained would be greater and more beneficial.

However, it is a fact that the number of derailments caused by broken rails is greater, according to the statistics of the Interstate Commerce Commission, than that due to any other defect of railway roadway; and the deaths thus caused in the past six months probably have exceeded those in any previous year. Some of the criticisms of our comments on this subject have shown a surprising lack of information regarding it. The following table giving the numbers of derailments caused during the past ten years by the various defects of roadway is based upon the statistics of the Interstate Commerce Commission. Doubtless in the report there are included under this head some breakages caused by defective equipment and not due to inherent shortcomings of the rails; but to what extent this is the case nobody knows.

It will be seen that the number of accidents due to almost all the different kinds of defects of roadway were greater in 1907 than in any other year of the last ten. This, doubtless, was due to the heavy increase in traffic in that year and the difficulties under which the railways handled it. If comparison be made merely between the figures for 1911 and 1907 the conclusion will be reached that there has been an improvement all along the line. However, even proceeding this way, the showing regarding rail breakages will not be found relatively encouraging. The number of derailments due to broken rails was greater in 1911 than in any other year for the last ten except 1907. On the other hand, the number due to spread rails was less in 1911 than in 1910, 1908 or 1907, the number due to soft track less than in any year since 1905, and the number due to irregular track less than in any year since 1907 except 1909.

Often no enlightening conclusion can be reached by comparing the results of one year with those of another. It is better to compare period with period. Let us, therefore, compare the five-year period 1902-1906, inclusive, and the five-year period 1907-1911, inclusive. The number of derailments due to broken rails increased from 825 in the first-named period to 1,234 in the second period, or 49½ per cent. Meantime, the number of derailments due to the spreading of rails increased only 39.4 per cent.; to soft track, 26.7 per cent.; to irregular track, 38 per cent.; to miscellaneous causes, 29.7 per cent.; and to all causes other than broken rails, 36 per cent. The percentages of increase in derailments due to bad tires and sun kinks were much greater, but the absolute numbers of derailments due to these causes are quite small compared with those due to other causes, and, therefore, do not materially affect the total results.

During the years mentioned there was a substantial increase in the railway mileage of the country. There was also a large increase in the traffic handled, the increase in passengers hauled one mile being 28 per cent., and in tons hauled one mile 30.4 per cent. There was not a proportionate increase in the number of trains run one mile to handle the traffic, but, on the other hand, there was an increase in the weight of cars and locomotives and in the average train load, and therefore, in the pounding and stresses to which the track was subjected. Therefore, other things being equal, some increase in rail breakages was naturally to be expected. It will be seen, however, that the increase of derailments due to rail breakages was substantially greater in proportion than in those due to other causes, and also was markedly greater in proportion than the increase in the traffic handled. If any conclusion at all can fairly be drawn from the foregoing figures it is that, from the stand-

	Derailments Due to Defects of Roadway.								Totals due to defects of roadway other than broken rails.
	Broken rails.	Spread rail.	Soft track.	Bad ties.	Sun kinks.	Irregular track.	Miscellaneous.	Totals.	
1902	78	60	50	8	9	85	257	547	469
1903	150	106	101	14	4	131	315	821	671
1904	176	115	95	25	13	151	291	866	690
1905	201	168	99	19	15	154	351	1,007	806
1906	220	168	180	25	13	232	449	1,287	1,067
1907	308	206	182	45	18	272	497	1,528	1,220
1908	238	200	151	42	28	211	545	1,415	1,177
1909	196	130	114	36	14	175	315	980	784
1910	243	171	110	31	28	202	336	1,121	878
1911	249	153	108	41	30	179	465	1,225	976
Totals	2,059	1,477	1,190	286	172	1,792	3,821	10,797	8,738
Five years ended June 30, 1906	825	617	526	91	54	753	1,663	4,528	3,703
Five years ended June 30, 1911	1,234	860	665	195	118	1,039	2,158	6,269	5,033
Increase p. c. latter period	49.5	39.4	26.7	114.3	118.5	38.0	29.7	38.4	36.0

point of public safety, the improvement in rails has been substantially less than the improvement of the condition of the roadway in general. It may be said that the number of derailments due to broken rails is not a true index of the number of rails that break, because there are many more breakages than there are resulting derailments. But if we may fairly assume that the care the railways took properly to inspect and maintain their track was as great in the last as in the preceding five-year period, it must follow that they detected and took out of the track during the second period as many broken rails in proportion which did not cause accidents as they did in the earlier period, and that the number of breakages causing derailments is, therefore, a true index of the total number of breakages. As a matter of fact, probably more care was taken to look for and remove broken rails during the later and during the earlier period.

One criticism that the *Railway Age Gazette* passed on the railways in the editorial heretofore referred to was that they do not give publicity to data which show the facts about rail breakages and the reasons for them. We also suggested that they could get better rails by concentrating their orders on the mills that make good rails. We have compiled all the data regarding rail breakages during the year ending October 31, 1910, which the railways have furnished to the American Railway Engineering Association, and a summary is presented in the following tables:

RAIL BREAKAGES PER 10,000 TONS IN TRACK REPORTED.

Mill.	100 lb.	90 lb.	85 lb.	80 lb.	75 lb.	Average.	Tonnage.
Bessemer.							
I	31.2	37.3	45.0	8.0	10.5	29.5	2,628,040
II	28.1	119.4	42.2	51.0	22.7	50.6	2,466,843
III	18.6	39.9	10.6	11.9	20.6	18.6	1,159,903
IV	20.9	63.6	20.8	13.1	11.1	22.9	652,539
V	52.8	44.1	40.2	20.8	73.9	42.4	1,110,692
VI	....	....	15.6	40.4	10.8	20.1	583,374
VII	17.4	17.4	12.0	12.3	34.0	15.3	192,472
Open Hearth.							
I	5.0	11.3	8.2	....	1.7	9.7	347,665
II	7.8	....	2.2	....	....	4.5	39,660
IV	10.6	....	....	....	....	10.6	18,881
V	....	0.5	....	....	....	0.5	43,733
VI	....	8.5	....	....	1.0	7.5	151,078
VII	5.1	....	3.7	....	....	4.4	78,988
VIII	24.9	54.2	13.1	....	....	39.5	222,427
IX	....	11.7	13.8	19.1	14.3	16.3	614,969

The facts will be made clearer to many person if the figures regarding Bessemer rails be presented on the basis of the number of rails reported in track in the year ending October 31, 1910, for each breakage. The following table reduces to this basis the above statistics regarding Bessémer rails:

NUMBER OF RAILS IN TRACK FOR EACH BREAKAGE.

Mill.	100 lb.	90 lb.	85 lb.	80 lb.	75 lb.	Total number rails.	Total number breakages.	Total rails for one breakage.
I	653.5	606.8	532.0	3,484.5	2,834.3	6,597,523	7,759	850.3
II	724.5	189.5	567.7	549.1	1,310.3	6,074,725	12,492	486.3
III	1,093.5	567.0	2,248.9	2,346.1	1,448.6	2,740,971	2,161	1,268.4
IV	972.0	355.4	1,149.5	2,129.6	2,685.0	1,477,778	1,494	989.1
V	385.4	513.2	594.5	1,344.2	403.6	2,671,095	4,712	566.9
VI	....	....	1,537.9	692.7	2,776.2	1,464,190	1,174	1,247.2
VII	1,173.3	1,043.9	1,993.6	2,276.0	878.0	477,521	294	1,624.2
Totals						21,503,803	30,086	714.4

We have used numbers instead of the names of the mills in these tables, because, as was said in our former discussion of this subject, the railways have not furnished anything like complete information regarding the rail situation, and to publish the names of the mills while giving only incomplete information regarding their output in track might do injustice to some of them. The incomplete data given indicates that the railways have been by no means concentrating their orders on the mills that make good rails. It will be seen that on the average there was only one breakage reported for each 850.3 of the rails of Mill I in track, this mill being credited with the largest tonnage; while there was one breakage for each 486.3 of the rails of Mill II in track, this mill being credited with the second largest tonnage reported on. Mill III had only one breakage for each 1,268.4 rails charged up against it, and yet the tonnage reported for it was less than half as great as the tonnage reported for either Mill I or Mill II. There is no apparent relationship between the quality of the rails being made by the different mills and the sizes of the orders that they have received. It seems improbable that the mills give their traffic to the railways regardless of their rates or service. If they did, the traffic managers of the steel companies would soon be looking for new jobs.

A glance at these figures is enough to show that they tell a very different story from those for the Harriman Lines given by Mr. Isaacs in the letter we published December 29. Mr. Isaacs said: "The number of rails breaking during the first year of service (on the Harriman Lines) which is their critical period under traffic, has fallen in that time (three years) from about one rail in 370 to one in 3,670, with an increase in tonnage, and but for an unfortunate manufacturing error, which was very soon discovered, it would have approximated one rail in 7,000." The foregoing statistics showing only, on the average, 714.4 rails in track for each breakage, indicate that the experience of the Harriman Lines is not typical, but exceptional.

The figures indicate that the greatest numbers of breakages in proportion take place in the larger sections, which seems to demonstrate that the buying of heavier rails is not yet proving a remedy for this trouble. The showing made by the higher priced open hearth rails is much better in proportion than that made by the Bessemer rails, but probably only very general conclusions can be drawn from the data given, because of its incompleteness. For example, it includes no facts throwing light on the conditions of operation under which the rails were used. Mr. Isaacs, in the letter already mentioned, described the method employed by the Harriman Lines in reporting rail failures. If all of the railways of the United States would use a similar method in securing reports of broken rails and transmitting them to the American Railway Engineering Association, and would let that association make them public, information would be available which would really show what results the railways are getting from rails and why they are getting them.

The editorial previously printed in this paper on the rail question has been widely quoted in the press, and has been interpreted as implying that there is "collusion" between the railmakers and the railway managers which results in the railways buying poor rails. The fact is that committees of the American Railway Association and the American Railway Engineering Association have been negotiating for several years with representatives of the steel companies to get improved rails. It has been a hard fight, but they have made some progress. The attitude of the steel manufacturers is much more conciliatory and they are showing a stronger disposition to co-operate now than in past years. But when one considers the fact that, to a very large extent, the same men are dominant financially in the steel and iron manufacturing industry and in the railway business one feels less gratification at the progress that has been made than disappointment that it has not been greater. If the big financiers who are largely interested in both the steel business and the railways should say to the United States Steel Corporation and the other steel companies that they must make the railways good rails at reasonable prices the roads probably would get better rails than they now are getting, and at reasonable prices. And the testimony of E. H. Gary before the Stanley committee is a recognition on behalf of the big men in the United States Steel Corporation, at least, that it is just as much their duty to seek to make good rails at reasonable prices for the railways as it is the duty of the railway managers to seek to get good rails at such prices. Judge Gary said that large industrial concerns such as the Steel Corporation should be subjected to administrative regulation somewhat similar to that applied to the railways. This involves recognition by him and by those whom he represents that the Steel Corporation is essentially as much a concern engaged in rendering a public service as are the railways. Now, the law and their duty to the public require the railways to give safe transportation at reasonable rates; and, to a considerable extent, on the kind of rails they get, and the prices at which they get them, depend the safety of the transportation that they can give and the rates that they must charge for it. The Steel Corporation cannot better justify its existence than by furnishing the railways better and safer rails at lower prices than they could hope for under competitive conditions; and if there is any evidence that it has been, or is, doing so, the best use to which it could be put would be to make it public.

Letters to the Editor.

A SUGGESTION FROM A MECHANICAL MAN.

December 28, 1911.

To the Editor of the Railway Age Gazette:

Your editorial and the resultant comments on the subject of "present giving" by seller to buyer are most timely and most encouraging to the right thinking. One of your correspondents regrets that the discussion was not started a longer time before Christmas, that greater good might have resulted.

This reminds me that now would be a good time to make a suggestion about the giving of some gifts that takes place at Atlantic City each year. Some wise action has already been taken by the supply men regarding souvenirs that have outward and visible form. It is the inward and invisible ones that I wish to speak about—the kind that are given between 6 p. m. and 6 a. m. Can't these be cut out, also? I have heard that certain supply firms have men for this particular kind of entertainment, but I don't believe it. Do you?

While we are cutting out gifts at Christmas and souvenirs at the conventions, let's also cut out this other kind.

MECHANICAL MAN.

ABUSE OF THE PASS PRIVILEGE.

Pittsburgh, Pa., Dec. 29, 1911.

To the Editor of the Railway Age Gazette:

One of the greatest evils on the railways today is the abuse of the pass privilege. In many business concerns employees are given goods at cost, but never free. There was a time when free transportation to railway employees was indirectly considered part of their salary, but this claim can no longer be advanced, as railway employees are paid as well as, if not better than, employees in other service.

A low rate, not necessarily cost, would cure the abuse. This rate should be so low that no employee would hesitate for a moment, on account of expense, to make any pleasure or business trip, but high enough to stop the "joy riding." For example, the commutation rate for employees should be about ¼ cent a mile within a radius of 20 miles, any one traveling more than 20 miles to and from work is either not getting his proper rest or is not giving his duties the proper attention. The through rate for employees should be about ½ cent a mile. This would make the round trip rate between New York and Chicago about $10. Between Pittsburgh and New York and return, and between Buffalo and Chicago and return, it would be about $5. From New York to San Francisco and return the rate would be $30. The round trip over any division would cost between $1 and $2. This would be a very small percentage of the total cost of any business or pleasure trip.

Mileage books would be the best form of transportation, the present pass regulation to govern.

The two important points are: First, there should be a ticket for every mile traveled, either for business or for pleasure. Second, travel by those officers and employees whose railway duties require traveling should be free from expense. Free mileage books should be furnished, the official's travel being governed by his own judgment and duties, and the employees's free travel being governed by his superior.

For its educational advantages, travel by all employees should be encouraged, and intelligent handling of this transportation question is important.

YARDMASTER.

A bill has been introduced into the congress of Bolivia providing for the sum of $6,000,000 to be set aside for the construction of the La Paz-Puerto Pando railway. The bill further provides that this amount shall be used exclusively for building that line, which shall not be transferable to any other railway.

EFFECT OF COLD WEATHER ON TONNAGE RATING.*

BY EDWARD C. SCHMIDT,

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Any method of tonnage rating should recognize the three important variables which modify train resistance,† namely, speed, average weight of the cars, and air temperature. The influence of the third variable, air temperature, may be as great as that of either speed or car weight, and it is proper that it should have received as general consideration in establishing winter ratings as it has. The railway engineering department of the University of Illinois has been experimenting along these lines for the past two years, and although the tests are still far from being completed, the work has gone far enough to develop some rather interesting results. The influence of cold weather in increasing total train resistance is greater than its influence on the tractive effort of the locomotive.

At the speeds at which freight trains pass ruling grades the net resistance is composed almost entirely of the resistance developed at the wheel rim and the resistance developed in the car journals. The former is called rolling resistance and the latter journal resistance. Whether the rolling friction is greater or smaller in cold weather need not concern us here, for it is altogether likely that at the speeds prevailing at ruling grades

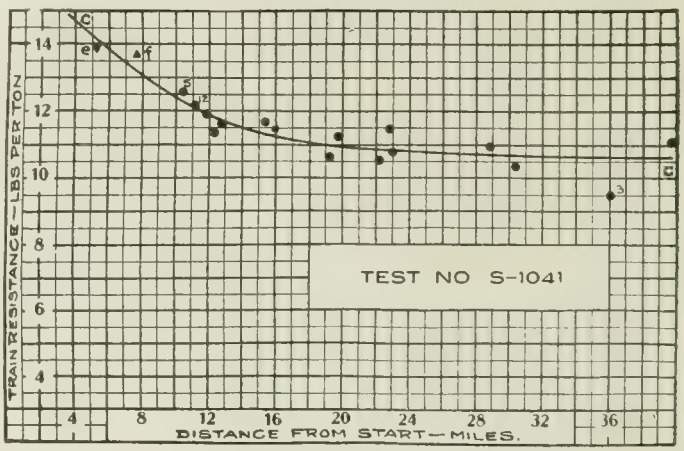


Fig. 1—Curve of Train Resistance at a Speed of 15 M. P. H. for Temperatures Between 30 and 42 Deg. F.

this rolling resistance is much less than the journal friction. In the journals of a car which has been standing for some time, the oil film will be broken through and the journal and brass will probably be in direct contact. As the car starts and the journal turns, oil is brought up from the waste below and the film of oil begins to establish itself. Until this oil film is established over the whole journal the friction is high and gives rise to the great starting resistances which prevail at this time. Low air temperature not only makes the oil more viscous but lengthens the period during which the film is being established. The temperature of the bearing will increase until the rate of heat production within the bearing equals the rate at which the heat is dissipated from the box and other parts, such as the axle. To maintain a certain rate of dissipation of heat the journal temperature may be lower in cold weather than in warm weather. Therefore the minimum resistance attained in cold weather is greater than in warm weather.

Two years ago tests were made in summer weather to determine the influence of car weight on resistance and the results were published in Bulletin 43 of the Engineering Experiment Station of the University of Illinois. The first test in cold weather was made on October 31, 1908, and the air temperature

*Abstract from a paper presented before the Central Railway Club, January 11. Copyrighted by the Central Railway Club, 1911. Reprinted by permission.

†Throughout the paper, train resistance means the force needed to keep the train moving at uniform speed on straight, level track and in still air. This force is expressed in pounds per ton of train weight.

varied from 30 deg. F. at the beginning to 42 deg. F. at the end of the test. As at first plotted, there seemed to be no definite relation between resistance and speed for this test, the resistance values, for speeds in the neighborhood of 15 m. p. h., varying from 8.9 to 12.6 lbs. per ton, and similar variations occurred at other speeds. If cold weather causes these variations, it does so through its influence on journal temperature. It was conceived, therefore, that the variations were due to differences in journal temperature, and that these differences were, in their turn, due to the fact that most of these values were taken while the journals were warming up.

If the journal temperature was varying, it must have been increasing as the train moved further and further from the starting point, and it was concluded that if, for each point on the road at which resistance had been determined, its value were plotted with respect to the distance of that point from the beginning of the run, such a plot would reveal a regular variation of resistance with the distance due to the influence of the distance upon journal temperature.

All resistance readings taken between 14 and 16 m. p. h. were plotted as in Fig. 1, in which vertical distances denote resistance, and horizontal distances represent miles run from the starting point. The points which have the highest resistance values are found near the beginning of the run, whereas those having the

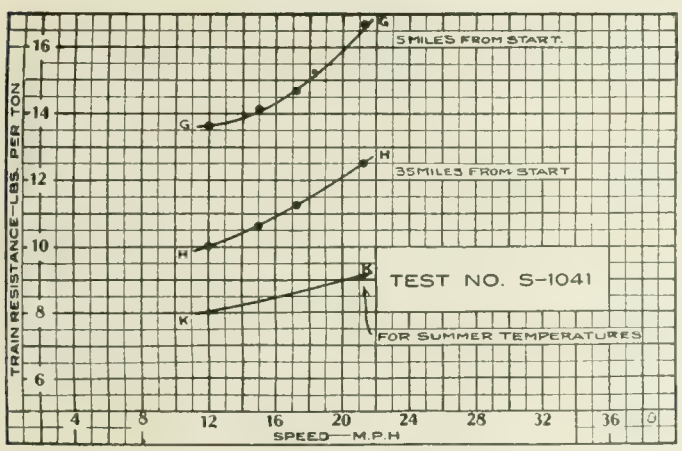


Fig. 2—Showing Resistance in Cold Weather and Summer Weather.

lowest resistance values fall at the end of the run, and in general the points so arrange themselves that their resistance values constantly decrease as the distance increases. Bearing in mind the facts that all values apply to the same train and to approximately the same speed, it is apparent that neither variations in car weights nor variations in speed can account for the regular decrease in resistance shown. This decrease must therefore be due to the only remaining variable which exerts any important influence upon resistance, namely, journal temperature. It is therefore assumed that the regular decrease in resistance as the train progresses is due to the fact that the journal temperatures are constantly increasing and that oil viscosity and journal resistance are therefore diminishing. This assumption underlies the further discussion of this and of the following figures. The test conditions* made it difficult to directly measure the temperature of the journals in the train and the results are therefore presented in terms of distance run by the test train. The journal temperatures are intimately related to this distance unless the test is run under widely varying speeds.

The curve *CC* drawn in Fig. 1 represents approximately the rate at which resistance changes with distance run, and it applies to a speed of about 15 m. p. h. It is apparent from this curve that the resistance at the beginning of the run is about 14 lbs. per ton at this speed and that it constantly decreases until the train has progressed about 35 miles, at which point the resistance reaches its minimum value of about 10.5 lbs. per ton and the journal temperature reaches its maximum. Trains of like character when run at similar speeds in warm weather reach their minimum resistance within the first 8 or 10 miles of their run, and their minimum resistance is less than that attained in the train whose performance is exhibited in Fig. 1.

From further analyses of the results it was found that for speeds of 21.3, 17.3, 15 and 12 m. p. h., the minimum resistance is reached at about 35 miles from the beginning of the run.

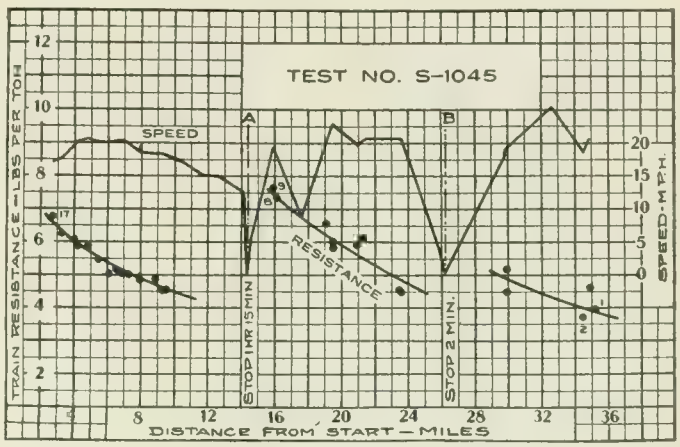


Fig. 3—Resistance Curves Showing the Influence of Stops in Cold Weather.

From curves for speeds of 21.3, 17.25, 15 and 12 m. p. h., plotted in the same manner as in Fig. 1, the curves in Fig. 2 were drawn. The corresponding values of resistance and speeds at 35 m. p. h. constitute the co-ordinates of the four points shown on the curve *H*, of Fig. 2, and serve to define this curve. The curve *G*, for 5 m. p. h., is found in the same way. The vertical distances represent resistance and horizontal distances represent speed, the curves *G*, and *H* represent, therefore, the variations of resistance with speed for test 1041, and present train resistance curves in their usual form. This test was made when the air temperature

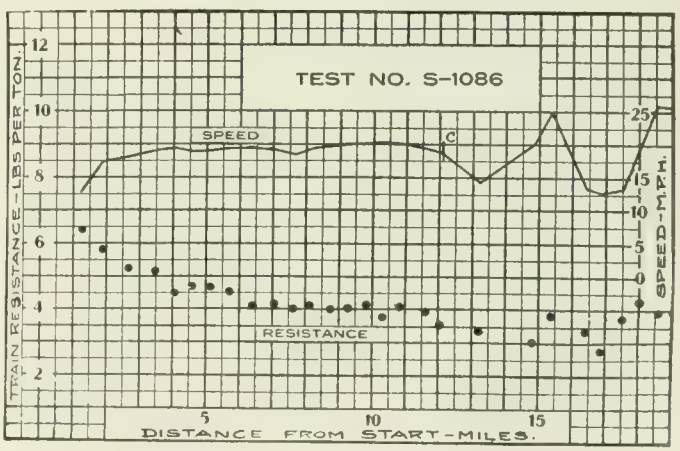


Fig. 4—Resistance Curve of Train of Heavily Loaded Cars.

varied from 30 deg. F. to 42 deg. F., and when the wind was light. The train was composed of cars weighing, on the average, 17.2 tons.

In order to compare the resistance shown by curves *G* and *H* with the resistance prevailing in warm weather, the curve *K* is drawn. This curve shows the approximate resistance in summer weather of a train composed of cars weighing 17.2 tons. The curve *K* is therefore comparable with either *G* or *H*. Curve *H* represents resistances which are approximately 25 to 30 per cent. greater than those represented by curve *K* and we

*The trains tested were freight trains of the Illinois Central, accepted as they came in the regular service. It has not proved feasible, thus far, to directly measure the temperature of any of the journals of the cars composing these trains.

may conclude that for the train of test 1041 even the minimum resistance attained after the train had run 35 miles is about 25 per cent. greater than the resistance of a similar train in warm weather. Whether the change from summer temperatures to a temperature of 30 deg. F. will always result in an increase of 25 per cent. in the resistance does not appear, and the data in hand do not as yet warrant generalizations of this sort. Attention is called to the fact that the term resistance as here used means resistance on level track, and consequently a difference of 25 per cent. in resistance does not necessarily require a difference of 25 per cent. in tonnage rating. This statement is developed beyond.

Fig. 3 is similar to Fig. 1, and it leads to similar conclusions. It applies to test 1045 during which the air temperature varied from 22 deg. to 26 deg., and for which the train was composed of cars averaging 49.2 tons in weight. In Fig. 3 the speed during the run is indicated by the line in the upper part of the diagram. It will be noticed that the train was brought up to a speed of about 20 m. p. h. within the first 3 miles of the run and that the speed was thereafter maintained at approximately 20 miles, except in the immediate neighborhood of the two stops which are indicated at *A* and *B*. The speed for all but four of the points for which resistance is calculated lies between 18 and 21 m. p. h., and the speeds for these four points lie close to this range. Since the speed is so nearly uniform for all these points, its influence in modifying resistance is practically eliminated, and such changes in resistance as are indicated on the diagram are chiefly due to changes in journal temperature. At point *A* about 14 miles from the start, the train was stopped for one hour and 15 minutes, the air temperature at that time being 23 deg. F. Again at *B*, 12 miles farther along, a stop of two minutes' duration was made. It is interesting to note the effect of these stops upon the resistance. The resistance in the beginning is in the neighborhood of 7 lbs. per ton. It steadily decreases as the train progresses, until at the point *A*, where the train was first detained, it had fallen to about 4 or 4½ lbs. Upon leaving *A* the train's speed was immediately raised to its general value of 20 m. p. h., and the resistance is found to have risen again to about the same value which it had at the original starting point. From there on, the resistance again decreases steadily until the point *B* is reached, after which there is a slight increase in resistance due, probably, not so much to the 2-minute stop as to the cooling of the journals during the considerably longer period in which the speed at this point was low, while the train was approaching and leaving *B*. The diagram serves well to show how important the effect of such a stop as that at *A* may be. If the ruling grade in this case had occurred just beyond *A*, it is entirely likely that the increased train resistance would have stalled the train at that point. There is no evidence in this diagram that the minimum resistance of this train at this speed is reached during the test. Indeed, if the resistance curves there drawn are accepted as correct, it seems clear that the stops have delayed the establishment of this minimum resistance beyond the test limits. Comparison with resistance in warm weather is therefore unwarranted.

During test 1084 the air temperature varied from 1 deg. F. below zero at the beginning to 5 deg. F. above zero at the end of the test. These temperatures are lower than any others prevailing during the tests here discussed. The speed during this test was increased from 8 m. p. h. near the start to 20 m. p. h., at which it was maintained uniform. The resistance values derived for the first 10 miles of the run are not numerous enough to offer much information. The resistance at 10 miles from the start was 20 lbs. per ton, and decreased at 24 miles from the start to about 16 lbs. per ton, and probably would have continued to decrease had the test been continued beyond this point. The normal resistance in summer weather for a train of this car weight (16.5 tons) is 9.5 lbs. per ton. The train of this test has, therefore, a resistance 68 per cent. in excess of the normal, even after running 24 miles. Part of this excess is doubtless due to the fact that a rather strong wind prevailed during the test; most of it, however, is probably due to low temperature.

Fig. 4 applies to test 1086, during which there were very light winds and the air temperature varied between 28 and 30 deg. F. The test train was composed of cars whose weights averaged 59.5 tons. The points shown were taken between the speed limits of 12.5 and 26 m. p. h. The resistance value for each point lying within these limits is plotted with respect to the distance of this point from the start. The upper line represents the speed, which was quite uniform and near 20 m. p. h. for the first 12 miles of the run. Beyond this point the speed varied considerably. As in the tests previously discussed, the resistance decreases with great regularity during the first 12 miles, until at *C* the journals have apparently attained their maximum temperature for a speed of 20 m. p. h., and the resistance has reached its minimum value for this speed. Beyond *C*, therefore, the influence of journal temperature upon resistance largely disappears and the resistance thereafter responds, in its variation, quite definitely to changes in speed.

One other fact developed by Fig. 4 merits consideration. It has been noted that in this case the maximum journal temperature was attained after running only 12 miles. This is a shorter run than was necessary to thoroughly warm up the journals in the other trains here discussed. These trains differ from the train of test 1086 in having lower car weights and the explanation probably lies in this fact. It seems likely that the greater load on the journals in test 1086, and the consequent greater heat production within the bearings has caused their temperature of equilibrium to be attained sooner in this test.

EFFECT OF GRADE ON TONNAGE REDUCTION.

It was stated above that an increase in net train resistance, of say 30 per cent., due to low temperature, does not necessarily require a like reduction in train tonnage. This is due to the facts that net train resistance, which here denotes merely the resistance on level track, is not the only resistance which absorbs the tractive effort, and that the other resistances are unaffected by temperature.

The process of rating locomotives consists essentially in specifying a train whose gross resistance shall equal the available tractive effort. Since ratings are made to meet the conditions which exist at the ruling grades, this gross resistance must always consist of net resistance, as above defined, and of grade resistance.* Of these two elements, the grade resistance is almost always the greater. Obviously neither air temperature nor any other external condition can affect the grade resistance, which is modified only by difference in grade. Since the larger element of gross resistance remains unaffected, the reductions in rating in cold weather need not be as great as the variations which cold weather causes in the smaller element of gross resistance, that is, in the net train resistance. Neither are these tonnage reductions the same for different grades. An example may serve to make this clearer.

Assume that it be required to find the summer and winter ratings for a certain class of locomotives on two divisions of a road, which we here designate as division *A* and division *B*. The ruling grade on *A* is one-half per cent. and that on *B* is 1 per cent. The resistance due to grade alone is 20 lbs. per ton of train weight for each per cent. of grade, and the grade resistance on division *A* is therefore 10 lbs. per ton, while on division *B* it is 20 lbs. per ton. Now assume also that the net train resistance for the desired speed is 4.5 lbs. per ton in summer and that in winter it is 33⅓ per cent. greater, namely 6.0 lbs. per ton. We assume further that in summer the available tractive effort on grade *A* for the class of engines under consideration is 32,000 lbs., and on grade *B* 30,500 lbs. If the effect of cold weather upon the engine itself be assumed such as to

*Acceleration and curve resistance may also be components of this gross resistance. They are, however, ignored here, since their consideration is not necessary to the argument, although their presence may modify its conclusion.

cause a reduction of 5 per cent. in tractive effort, we find the available tractive effort in winter to be 30,400 lbs. on division *A* and 28,970 lbs. on division *B*. We have now available enough information to calculate the tonnage ratings. On division *A*, for example, the gross resistance in summer is 10 + 4.5 = 14.5 lbs. per ton, the tractive effort is 32,000 lbs., and the tonnage is consequently 32,000 ÷ 14.5 = 2,207 tons. The winter tonnage on division *A* is 30,400 ÷ (10 + 6.0) = 1,900 tons. The proper winter tonnage on division *A* is found therefore to be (2,207 — 1,900) ÷ 2,207 = 14 per cent. less than the summer tonnage. Similarly for division *B* the tonnage reduction for winter weather is found to be 10 per cent. The results of these calculations are summarized in the following table:

	Division A.	Division B.
Ruling grade—per cent.	1½	1
Tractive effort in summer.....lbs.	32,000	30,500
Tractive effort in winter.....lbs.	30,400	28,970
Grade resistance.....lbs. per ton.	10	20
Net resistance in summer.....lbs. per ton.	4.5	4.5
Net resistance in winter.....lbs. per ton.	6.0	6.0
Gross resistance in summer.....lbs. per ton.	14.5	24.5
Gross resistance in winter.....lbs. per ton.	16.0	26.0
Tonnage in summer.....tons	2,207	1,245
Tonnage in winter.....tons	1,900	1,115
Tonnage reduction.....per cent.	14	10

It is apparent from these calculations that an increase in net resistance of 33⅓ per cent. necessitates a reduction in rating on division *A* of only 14 per cent., and on division *B* this reduction need be only 10 per cent. Not only are the tonnage reductions in both cases considerably less than the difference in net resistance, but the reductions are different on the different grades. The greater grade requires the smaller tonnage reduction. If the ruling grades on a particular road do not differ greatly on the different divisions, it would be an unnecessary refinement of practice to discriminate between divisions in establishing tonnage reductions for winter weather. If, on the other hand, a road runs in both level and mountainous country, it is not only logical but economical to make such distinctions.

There are a few roads operating almost exclusively in mountain territory which find it unnecessary to make reductions in rating for low temperatures. The ruling grades on these roads are, of course, heavy. The foregoing example illustrates how the effect of heavy grades may disguise and almost nullify great variations in net resistance, and it offers therefore, some justification for the practice which ignores distinctions between summer and winter ratings in such territory.

CURRENT PRACTICE.

A considerable amount of information has been collected from the railways of the country concerning their tonnage rating practice. This information is presented in the accompanying table. It is believed that the table fairly represents, in most cases, the practice of the various roads as stated by their own officers. It has, however, been found difficult to force into the form and limits of the table all the information available, and in a few cases the tabular statement scarcely represents all the facts. It is hardly possible to indicate in the table the degree of authority given on these roads to trainmasters and despatchers, under which they may vary from the usual practice.

The roads are arranged in the table in the order of the air temperature limits which determine the normal rating. This arrangement was adopted because it makes easier the direct comparison of figures appearing in the later columns. At the same time, it brings together roads which operate in a very different territory and under very different weather conditions, and these facts should be borne in mind in making comparisons. Examination of the table makes it evident at once that there is great diversity of practice. Not only are different tonnage reductions made for similar temperatures, but the range in temperature which is considered to warrant tonnage reduction varies from a few degrees to 30 or 40 deg. Most of the differences in practice are not surprising when it is considered that the roads included, represent practically the entire United States and Canada and represent, therefore, the greatest variety in weather conditions. Most of the differences in practice disclosed by the table are quite sufficiently explained by the differences in the weather conditions prevailing in the territory served.

TONNAGE RATING — SUMMARY OF CURRENT PRACTICE.

Road.	Minimum temperature for normal rating. Degs. F.	Tonnage Reductions for Various Temperature Conditions.								Additional reductions for unusual conditions.
		Temperature range.	Reductions per cent.	Temperature range	Reductions per cent.	Temperature range.	Reductions per cent.	Temperature range.	Reductions per cent.	
Chicago Great Western	*45	45-25	8	25-0	16	0 & below	25			†8 per cent.
Chicago & Eastern Illinois	45	45-32	10	32-15	20	15-0	30	0-10	35	
Chesapeake & Ohio	45	For each 10 deg. change in temperature make 5 per cent. reduction.								Special orders.
Boston & Albany	40	A reduction of from 50 to 150 tons is made from summer rating for winter rating.								Special orders.
New York Cent. & H. R.	50	More or less discretionary. For a drop of 20 deg. reduce about 10 per cent.								Special orders.
Central R. R. of New Jersey	40	40-20	10	20-0	20					Special orders.
Pittsburg & Lake Erie	40	40-20	210 ts	20-10	420 ts	Zero	640-860 ts			Special orders.
Baltimore & Ohio	35	From 35 degs. to zero and below make reductions of from zero to 30 per cent.								Special orders.
Erie	33	33-23	5	23-13	10	13-3	15	Below 3	20	Special orders.
Del., Lack. & Western	32	Make 10 per cent. reduction for temperatures below 32 deg. and 15 per cent. reduction for extreme conditions.								
Wabash	32	Governed by Special Orders.								Special orders.
Norfolk & Western	30	At 30	50-100 ts	30-20	100-150 ts	20-10	200-250 ts	10-0	300-350 ts	Special orders.
Chi., Bur. & Quincy	*30	*30-0	10-15	*Below zero	15-20	†30—0	15-20	‡Below zero	20-30	†‡10-15 per cent.
Chi., Mil. & St. Paul	30	30-20	5	20-10	10	10 to —10	20	—10 to—20	30	Special orders.
Chi., St. P., Minn. & Omaha	30	30-10	10	10 to —10	15	—10 & lower	25			Special orders.
Great Northern	25	‡25-5	10	5 to —10	20	—10 & lower	25			Special orders.
Chicago & North Western	20-25	Below 25	10-25							Special orders.
Duluth & Iron Range	25	25-0	10	Zero to —10	20	Below —10	25			Special orders.
Lehigh Valley	25	About 5 per cent. Reduction for each 10 deg. drop in temperature.								
Boston & Maine	15	15-0	7-15	1 to —15	12-18	—16 to—30	17—22			‡7-15 per cent.
Central Vermont	Zero	From zero to 35 degs. below reduce 150 tons for each 8 deg. drop in temperature.								Special orders.
Grand Trunk Pacific	Zero	0 to —5	5	5 to —10	10	—10 to —15	15	—15 & lower	20	Special orders.
Intercolonial of Canada	Zero	Make reduction of 100 tons for temperature below zero.								Special orders.
Chi., R. I. & Pac.	Zero	Make 20 per cent. reduction for temperature below zero with no wind and 25 to 30 per cent. with heavy winds.								‡10 per cent.
Denver & Rio Grande	Zero	0 to —10	10	—10 to —30	20					Special orders.
Colorado & Southern	Zero	0 to —25	10 to 25							Special orders.
Big Four	Governed by special orders.									Special orders.
N. Y., New Haven & Hartford	Matter left to division officers.									
Grand Trunk	Matter left to division officers.									
Pere Marquette	Bad storms and very cold weather, 20 to 30 per cent. reduction.									
A. T. & S. F. Coast Lines	No reductions except on Albuquerque Div., where reduction of 100 tons is made in winter.									Special orders.
A. T. & S. F. Eastern Lines	Governed by special orders.									Special orders.
St. Louis & San Francisco	Matter left to sub-division officers.									
Northern Pacific W. of Paradise, Mont.	Matter left to division officers.									
Southern Pacific	No reduction.									Special orders.
Kansas City Southern	No reduction.									Special orders.
El Paso & Southwestern	No reduction.									
Seaboard Air Line	No reduction.									Special orders.
Atlantic Coast Line	No reduction.									
Virginian	No reduction.									
Oregon Short Line	No reduction.									

*Light or no wind. †Heavy wind. ‡Bad rail.

COLLATERAL TRUST BONDS.

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Collateral trust bonds, so called, constitute by far the most important type of funded indebtedness, next to the ordinary simple mortgage. Approximately one-ninth of the total borrowings of the railways of the United States in 1908 assumed this form. This is the more notable, as this huge volume of more than a billion dollars, is in large measure the creation of the decade since 1900. It is indubitable that without this expedient, few if any of the great railway consolidations could have taken place. Certainly the holding company as a means of effecting combination could never have been employed.

A collateral trust bond differs from the ordinary bond in that it is a mortgage secured, not by any real property or franchise, but by the deposit with a designated trustee of stocks or bonds of other companies. Its lien upon actual property therefore is not immediate but indirect, through the medium of such other securities as are thus deposited as collateral. The collateral trust bond, moreover, depends for its interest upon such revenues as may accrue from these stock or bond holdings, together with such additional guarantee as the issuing company may find it expedient to give. A concrete illustration will make the practice clear. In 1902, 306,000 shares of the Louisville & Nashville out of a total of 600,000 shares, as a result of an untoward speculative raid, was turned over to a much smaller company, the Atlantic Coast Line Railroad. This latter road, thus assuming control by ownership of a majority of the stock, paid for the purchase by an issue of $35,000,000 of its own collateral trust bonds, together with certain other considerations in cash and securities. These Atlantic Coast Line bonds bore 4 per cent. interest and constituted a mortgage upon the Louisville & Nashville shares. These shares were in fact deposited with a trustee for that purpose. It is evident that the Atlantic Coast Line independently could never have issued bonds to this large amount, it being nearly three times the entire capital stock ($12,600,000) of the company. But the bonds, calling for an interest charge of $1,400,000 annually, were to be supported by the dividends of $1,530,000 upon the purchased stock. It was anticipated of course that the enhanced earning power of the conjoined companies would still further guarantee the success of the issue. At the outset this plan, including the additional consideration given, netted a heavy loss to the issuing company; but in the course of a few years, increased dividends upon the deposited stock brought about a large direct profit, aside from the operating advantages.

The first use of the collateral trust bond dates from the early history of the Union Pacific. In 1873 Congress, in order to protect its heavy loans to the company, prohibited by law any further increase of the bonded indebtedness of the road subject to its lien. This greatly embarrassed all projects for expansion through construction of either branch lines or extensions. To finance these by means of small independent companies was out of the question. Small companies could not successfully sell bonds, nor would it be wise to lose control of them; consequently the Union Pacific advanced funds for construction, taking the stocks and bonds of the new companies in payment. Its treasury was then reimbursed by the issuance of the 6 per cent. collateral trust bonds of 1879, secured by the deposit of these securities. Thus the needed extensions were built without violating the letter of the federal prohibition.

The foregoing illustration indicates the earliest, and for a long time, the most important reason for the resort to collateral trust bonds. Indeed in a country divided into so many independent states, it is difficult to see how much of our construction could have been effected otherwise. Most charters issued by states authorize construction only within certain strictly defined territory. Subsequent extensions can be legally made only by means of new charters or amendment of the old one. The latter expedient may require modification of original liberal charter rights. It is safer to organize new and independent corporations. Moreover, of course, construction beyond state boundaries must of itself entail the formation of a separate company with a charter of its own. None of these new and subsidiary companies can be successfully financed by themselves. It is more profitable that the necessary funds should be procured by the parent road. Its bonds or stocks will sell to far better advantage in distant markets. The undoubted advantages in this plan have led to its adoption by most of the large companies, notably the Union Pacific, Atchison, Burlington, and Rock Island roads in the West; and the Louisville & Nashville and Illinois Central in the South.

In recent years, particularly since the resumption of general prosperity in 1897, the collateral trust bond has been largely utilized as a means for financing the consolidation of railways. To the holding company as a mode of combination, it is in fact indispensable. The New York Central & Hudson River after 1898 acquired control of the Michigan Central and Lake Shore by the exchange of its own collateral trust bonds for the stocks of these roads deposited as collateral. Among many similar operations within the last decade, one of the most notable was the joint purchase of the Burlington road in 1901, by the Great Northern and Northern Pacific companies. In this case the bonds became a joint obligation of both companies, being secured by the deposit of their Burlington stock as collateral. The variations of procedure are many. Control of another road may first be acquired by purchase for cash, with subsequent reimbursement through mortgaging the securities purchased. This was a common mode prior to 1900; but was obviously open only to strong companies with ample cash resources. Another mode would be the direct exchange of the new collateral trust bonds for the desired stocks or bonds to be acquired. This method has been largely utilized in building up the Rock Island system. Or a third method may be adopted; namely, first to procure the necessary funds by sale of the collateral trust bonds, and then with the proceeds engage in the necessary business.*

The collateral trust bond, as used in acquisition of securities of other companies, is precisely analogous to "margin" operations by individuals upon the stock exchanges. Its advantages and dangers to individuals and corporations are precisely alike. There is no difference whatever in principle. Payment in full in cash for purchases of securities, ties up a large amount of capital indefinitely. Both principal and interest are lost, being offset only by the income derived from the stocks or bonds acquired. But if such operations can be based not upon cash but credit, an indefinite expansion of the scale of operations becomes possible. The property acquired, as Mitchell observes, pays its own purchase price. It is a great economizer of funds. Thus E. H. Harriman in 1896 obtained control of $10,000,000 par value of Illinois Central stock with an outlay of less than $1,500,000 of Union Pacific cash. The stock paying 5 per cent. dividends was bought by an issue of bonds bearing only 4 per cent. In other words bonds could be sold on sufficiently good terms to pay even the necessary premiums on the stock, and entail little if any burden upon the parent company.

As a means of railway consolidation, the collateral trust bond has certain well defined merits. The most notable is its elasticity. Whereas actual mergers and even long term leases are practically indissoluble; a control by means of stock ownership, financed through an issue of collateral trust bonds, may be readily enough terminated by selling the stock and retiring the bonds with the proceeds. Thus, when in 1909, the Rock Island system found the St. Louis & San Francisco road too heavy a financial burden, the connection was severed by simply retiring the collateral trust bonds through the sale of "Frisco" stock. This stock was the only tie between the two roads. Sometimes, however, with additional complications in the nature of guaranteed

*These plans are fully discussed by T. W. Mitchell in *Quarterly Journal of Economics*, May, 1906, pp. 445-467.

dividends, leases, and preferred shares, as in the Union Pacific tangle about 1908, this remedy is extremely difficult to apply. The much discussed segregation of assets of the Union Pacific by means of a holding company was impossible at that time for these reasons. On the other hand the collateral trust bond may readily become a source of danger where it imposes a heavy burden of fixed charges upon a company. Most of the early issues of this sort down to 1901 were based upon the deposit of bonds of subsidiary companies. The New York Central-Lake Shore collateral trust bonds in 1898 and the Burlington joint 4's three years later started the fashion of issuing such securities not upon bonds as collateral, but upon deposited stocks. This change was undoubtedly due to a shift of the main purpose for which such bonds were put forth. Instead of being used for the extension of existing lines into new territory they were used for purposes of consolidation. Fixed charges were thus created for the parent roads, which were supported not by assured, but only by contingent, income—income contingent, that is to say, upon its being earned by the companies whose stocks were deposited.

The most serious danger lurking in the collateral trust bond, however, is its invitation to corporate speculation and overextension of credit. The ease with which a strong company may engage in stock market operations on a large scale by such means is most clearly demonstrated by the experience of the Union Pacific road between 1901 and the death of Mr. Harriman in 1909.* The cost of its investment in Northern Pacific stock, subsequently converted into Northern Securities Company's stock was about $76,900,000. This had been financed by means of collateral trust bonds for the most part based upon operations of the Southern Pacific road, also within its control. The profit in hand and on paper when these operations were closed out amounted to about $82,900,000 or 113 per cent. These profits it will be noted, as described more in detail elsewhere, were promptly reinvested in stocks of other roads all over the country. But the new purchases were made at the high prices prevailing before the panic of 1907; and, although largely increasing its revenue, could not have been closed out without losses quite commensurate with the previous gains. But in the latter case it may be urged that the stocks acquired were *bona fide* investments, paid for in full from cash in hand. On the other hand, the large sums due the Union Pacific by the Oregon Short Line which was the cat's paw in these speculative plunges, as appeared in 1910, shows how burdensome was the diversion of funds from their legitimate uses for operating development into the channels of outside investment.

The stock market operations of the trunk lines in their acquisition of the hard and soft coal lines in 1900-06 affords yet further illustration of the amazing development of credit which is possible with the use of collateral trust bonds. The following table shows the amount of these purchases and the paper profits at prices prevalent in August, 1905:

	Amount Purchased.	*Profit.
The Pennsylvania group:		
Baltimore & Ohio com	$30,293,300	$13,500,000
Baltimore & Ohio pfd	21,480,000	4,200,000
Chesapeake & Ohio	16,000,000	6,400,000
Central of N. J.	14,500,000	8,400,000
Norfolk & Western	32,000,000	16,500,000
Reading com	13,952,000	6,000,000
Reading 1st pfd	6,065,000	300,000
Reading 2d pfd	14,265,000	3,800,000
The Vanderbilt group:		
Lake Shore	50,000,000	50,000,000
Reading com	13,952,000	6,000,000
Reading 1st pfd	6,065,000	300,000
Reading 3d pfd	14,265,000	3,800,000
Big Four	11,224,000	4,400,000
Lehigh Valley	3,200,000	2,500,000
Michigan Central	20,000,000	10,000,000
Chesapeake & Ohio	16,000,000	6,400,000
Miscellaneous:		
Ontario & Western	30,000,000	3,000,000
Soo Line, com	7,066,000	9,500,000
Soo Line pfd	3,533,000	5,000,000

*Estimated.

These of course are paper profits entirely. Any attempt to liquidate their holdings on any large scale would of course have led to rapidly crumbling quotations. Yet when in 1906 some of these holdings were sold out, the actual profits were large. The Lake Shore was credited with having made an average profit of $30 on about 100,000 shares of Reading stock. On the Chesapeake & Ohio the Pennsylvania Railroad cleared possibly $4,500,000. Its Baltimore & Ohio investment, sold to the Union Pacific in 1906, undoubtedly yielded large gains. These profits undoubtedly went into the great projects for improvement about New York. But suppose that instead of profit, there had been heavy losses, as in fact there were on paper in the case of many purchases made prior to the break of 1907. When the Reading was practically taken out of the market in 1903, its common stock sold for nearly $70 per share (par value $50). Within a year the price fell to $37. Similarly the Union Pacific reinvestments in 1906 of proceeds of its Northern Pacific operations within the next two years registered a loss on paper of many million dollars. Nor can there be question that, as in the case of the New York Central, many of these companies would have been better off, had they devoted these huge sums, tied up in stock market operations, to the prosecution of their legitimate function of transportation. The New York Central certainly, had it had the undivided support of the Lake Shore would not have been compelled to pile up still higher the burden of its capitalization in order to complete its terminal improvements at New York. Not all of these operations were financed by the use of collateral trust bonds. But even if not, capital had to be raised somehow to pay for these purchases. And hardly ever, when the securities have been resold, have the proceeds been used to reduce the capitalization to its former level. The entire development of these years represents a most dangerous tendency. And for its first suggestion as to ways and means, the collateral trust bond must be held largely accountable. Merely because the outcome of these purchases, by means of borrowed money, chanced to have a favorable issue, due to a rapidly rising level of prices, does not in the least detract from the force of the criticism.

Certain other uses of the collateral trust bond may be mentioned. It is commonly employed for the funding of troublesome floating debts. These are usually, however, issued for a short term and are rather of the nature of notes based upon specific collateral. Of far greater general importance is their use in making effective appeal to certain classes of investors. Many conservative people who would never dream of purchasing railway stocks, will trustingly invest in a collateral trust bond whose sole security is the deposit of such stocks. This matter came prominently to the fore in connection with the New York Life Insurance Investigation of 1905. As a result of this examination, the insurance companies were prohibited from investing in stocks of railway or other corporations. The laws of foreign countries also restrict the investments of insurance companies in much the same way. Yet the reserves of these companies may, and undoubtedly do contain, large amounts of collateral trust bonds, based upon stocks as collateral. The mere substitution of a bond for a stock by this means evidently largely widens the market for railway securities.

*Succinctly set forth in *Quarterly Journal of Economics*, August, 1907, pp. 569-612.

The *Diario Official* of September 29, 1911, gives the official contract that has been submitted for the consideration of the government of Salvador, covering the construction of a railway from San Salvador to the port of La Libertad, on the Pacific coast. According to the plans this new railway will connect with the line which is already built and is now in operation as far as the city of Santa Tecla. The new line is to be of the same gage, 3 ft., as the existing line. The terms of the contract require that the work must be concluded within a period of two years of the acceptance of the plans by the government, and a subsidy of $11,000 per mile is granted.

STEEL OBSERVATION CAR FOR THE PANAMA LIMITED OF THE ILLINOIS CENTRAL.

The Panama Limited train of the Illinois Central, running between Chicago and New Orleans, has a daylight trip through both the north and the southland. A steel observation car with a new feature called a sun parlor, specially designed for this service, has been recently added to it. The car was built by the Pullman Company, and has the semi-elliptical roof so generally used by the Harriman Lines. The rear platform, which is usually open on observation cars, is here enclosed, enabling the passengers to view the winter landscape of the north through the protecting glass, while, in the semi-tropical climate of the south, the large sash may be dropped in the side walls of the car, giving the full effect of an open platform. The window sill is hinged so as to cover up the opening; the vertical and horizontal sections of this drop sash and its guides and cover are here illustrated.

There is the usual large parlor with 25 chairs and a wide seat at the end with grill work above. Beyond this is a double writing table and bookcase. In the front end of the car is the smoking room with 20 seats, a toilet and a small buffet. The smoking room is enclosed and has a side door from the aisle. The car is 74 ft. long and weighs 133,100 lbs. without storage batteries; the latter increase the weight about 3,000 lbs., making the total weight in working order, 136,100 lbs.

The lighting is by axle light and storage battery; for emergency purposes the cars are fitted with twelve of the Pullman Company's candle lamps. The generator is of the Gould new type B, belted, 40 volts, 3 k. w. The main lamp regulator is situated underneath, while the generator regulator and lamp multiplier are located in the switchboard locker. The battery boxes are of O. H. steel, Pullman Company's standard design, containing 24 cells. The Edison batteries are divided in two portions, and are placed on opposite sides of the car to equalize the weight on the springs.

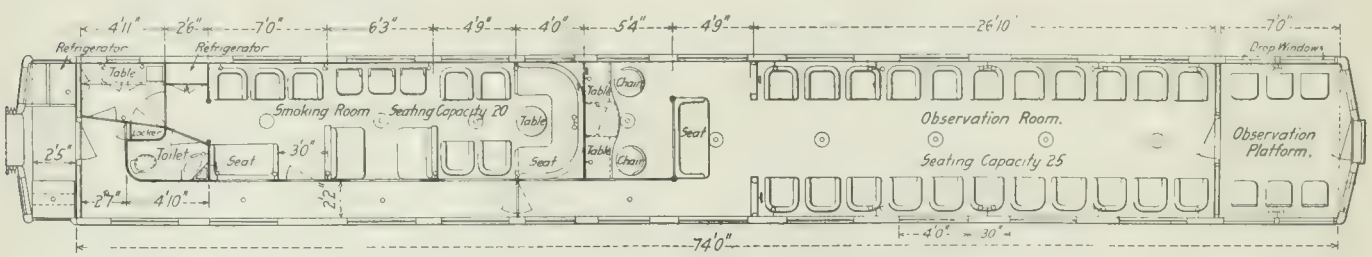


Looking Toward the Rear End of the Observation Car.



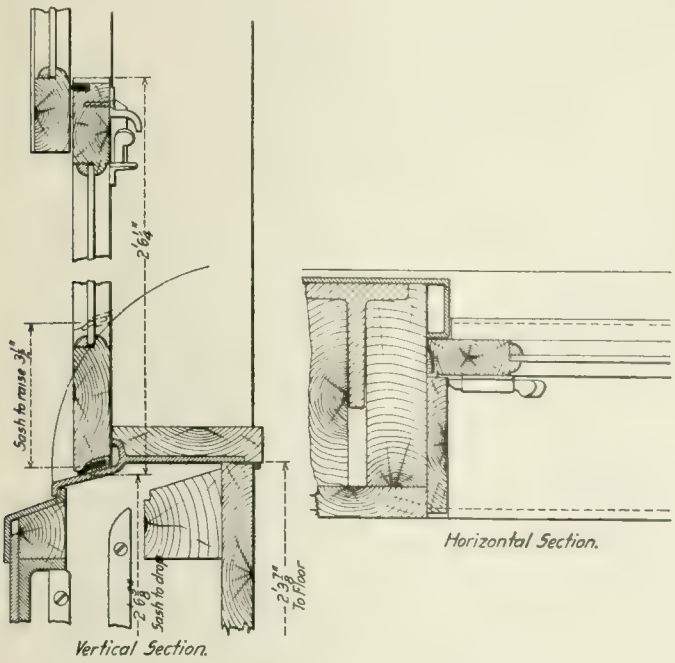
Smoking Room of Observation Car.

The heating is by the vapor system, with the smoking room and sun parlor independent. Each of these two rooms may be cut out from the heating system as desired. The train line consists of 2 in. pipes well covered with magnesia; all inside heating pipes are concealed by brass grills. The ventilation is obtained by ten Garland type C registers. The interior of the sun parlor and body of the car are finished in Cuban mahogany with English oak in the smoking room and quarter sawed oak in the buffet. The cars are fitted with 40 mahogany side frame chairs



Plan of the Observation Car Used on the Panama Limited Train of the Illinois Central.

upholstered in tapestry and Spanish leather. The shades are silk, faced with pantasote, while in the sun parlor they are of



Details of Drop Sash in Observation Car.

monk's cloth. Among the special features provided on these cars is a telephone, U. S. mail box, and electric flat iron and ironing board.

WHY STEAMBOAT TRAFFIC DECLINED BEFORE THE RAILWAY.

BY PAUL W. BROWN.

The completion of the Northern Pacific and the decline of the steamboat trade on the upper Missouri decided the last great campaign in the contest between the American railway and the American river steamer as means of transportation. What has come to pass since that day has been but the realization of a foregone conclusion. The trade on the lower Mississippi yielded to the inevitable much earlier; its "peak" was touched just at the end of the '50's; it never recovered the disorganization of the Civil War. The decade ending with 1880 saw a heavy traffic on the upper Mississippi; the lumber trade was brisk, and the rush to the Red river wheat country caused the upstream boats to draw deep. The Missouri, with its 2,084 miles of navigable channel leading to the very gates of the Rocky mountains, was the last stronghold of river transportation.

Though more than a score of years have passed since the issue was definitely decided, with momentous consequences in the realms of social development, economic progress, finance and even government, no adequate explanation of the victory of the railway over the river carrier has yet appeared. The course of events has been deemed too simple to require extended explanation. Champions of inland waterway navigation and writers on railway development, in polar antagonism on many points, have tacitly agreed that the reason for the decline of river traffic lay on the surface of the event.

When they have proceeded to state that reason, however, they have been far from saying the same thing. There are two standardized explanations of the passing of the steamboat trade, and each is made, with scarce the change of a phrase, many times a year.

The steamboat man and the waterway enthusiast—who, by the way, are not necessarily the same person—assert that it was the total depravity of railway managers which killed the steamboat trade. This is alleged as a sole and sufficient explanation. Steamboat traffic is of necessity limited to certain routes. Railways, we are told, were for years content to do business at a loss on those routes, and recoup themselves by overcharging in districts where there was no waterway competition, in order to strangle the steamboat trade. They gave rebates, issued passes, cut rates, bought up water terminals. They purchased boats, and either laid them up to rot, or made rates so high that no business fell to them. Their work was insidious. When the steamboat owners finally awoke to their danger, the railways were everywhere; their capitalization had reached a figure which made them preponderant in the world of finance; shippers were unable to take the large view, and saw only the free passes and immediate rate concessions held out to them, blind to the coming time when the railway should, like Poe's Red Death on the morning after the feast, "hold illimitable dominion over all." This is the steamboat view.

The railway men, on the other hand, declares that the passing of the steamboat was but the inevitable progress of an outworn instrument of transportation to the evolutional scrap heap. The steamboat season was limited; the railway runs twelve months every year. The steamboat schedule is broken by high water, low water, floating ice, storm; the railway is well-nigh as independent of weather as of season. An upstream freight carrier nets five miles an hour; a slow freight train nets 15. Steamboats are confined to certain routes, nearly always circuitous; railways may follow air lines in level country, and surmount mountain ranges in that which is rough. Steamboats are restricted to waterside terminals in delivering freight; railway terminals may be as wide as the confines of the community served.

Each of these explanations wins its victory too easily; both are characterized by what John J. Ingalls called "the fatal gift of facility." Waterway explainer and railway explainer have shirked the laborious task of finding out why the steamboat passed away before the railway advance; each has told how the change ought to have occurred.

Now, history manufactured by "the rule of reason" is the least trustworthy commodity known to the commerce of ideas. Actual situations are always more complex than our thoughts about them. Leaving altogether at one side the question why the steamboat ought to have yielded to the railway, why, in fact, did it yield?

The moment we begin to scrutinize the two standardized explanations, we are afflicted with certain doubts. The steamboat man's explanation may apply to the final phases of the struggle, but it seems wholly insufficient to account for the railway's initial victories. When the railway first appeared upon the scene, it was the interloper, the untried ad unproven instrumentality, while the steamboat held the field. Throughout the river valleys of the West, the steamboat interests controlled transportation, and were inextricably interlocked with banking and manufacturing interests. As for total depravity, manifesting itself in rate-cutting and kindred practices, by what Machiavellian stroke did the infant railways possess themselves of all the effective resources of human rascality, and leave the steamboat owners to go to hopeless ruin with clean hands and pure hearts? No explanation of this miracle has ever been tendered, nor am I aware of anything in the history of morals which might help one to understand it.

When we turn to the railway explanation we feel the same dissatisfaction. It is true that the river carrier does not operate throughout the whole year; but the same disability has not prevented the lake carrier from building up a traffic which is one of the wonders of modern transportation. The railway may, within certain broad limits, go where it pleases and deliver goods where they are desired; but the infant railway competed for business in a world organized for steamboat traffic, with waterside warehouses and factories. Steamboats are much slower than fast freight trains; but in the years of the railway's initial victories over the steamboat our modern

high-pressure system of distribution had not been organized, and was not even dreamed of. Shoes were made by hand; packinghouse products were unknown outside of a few large centers; harness, wagons, buggies were made in small shops in every village; bananas and oranges were unfamiliar delicacies to the average American. We cannot account for the early triumphs of the railway by invoking its supply of needs which had not then been created.

When we consider the main contention of the railway view —that the steamboat was brushed aside before a more economical means of transportation—we are confronted by the incontestable fact that it has not been brushed aside. Small as is the volume of steamboat traffic, it still continues, and not simply with districts not readily accessible by rail, like the projecting tongue of land between the Mississippi and Illinois. The steamboat survives in highly competitive territory. St. Louis and Alton are connected by railways and by a fast interurban trolley line; yet packet boats, carrying both freight and passengers, carry on a trade which flourishes in the teeth of this double competition. The Lee line runs steamers between Memphis and St. Louis, Memphis and Vicksburg, and Memphis and Cincinnati, in competition with great railway systems operating through a country whose climate and topography are especially favorable for economical railway operation. The single instance of this company, with its record of continuous operation for more than a generation between chief commercial centers of the central west, is proof conclusive that the explanation of the passing of the steamboat must be sought in something more convincing than an easy generalization about "an outworn instrument of transportation."

The full explanation is not all to be found in any one place. The portions of it which I have gathered have been encountered in many places: in conversations with old merchants in little waterside towns, and with old pilots on hills overlooking long reaches of empty river; in stray remarks dropped in pilot-houses, as a laden packet went swinging down the long curve under the high bank of a great bend on a summer night; from dusty files or newspapers of the '50's; out of observation of the actual operation of steamboats on many waters at the present day. The main factors of the decline of the steamboat trade in the face of the railway advance were:

Instability of rates.

Uncertainty and irregularity of service other than those occasioned by the shortness and variable length of the river season and the ordinary hazards of navigation.

The short life of the individual steamboat.

The nuisance of marine insurance.

The lack of effective line organization.

The habit of extravagance engendered by an era in which the westward advance of population was out of all proportion to the capacity of existing means of transportation.

The first two points—instability of rates and irregularity of service other than that inseparable from the conditions of steamboat operation—are so intimately related that they may most conveniently be considered together.

In the golden days of steamboating there was not a stable rate in all the vast region lying between Fort Benton, Mont., and Pittsburgh, Pa. Each steamboat was an independent traffic unit; the captain was his own freight and passenger association, classification committee, and general passenger and freight agent. In New Orleans in the greatest year river trade ever saw—the season ending August 31, 1860—the average cargo of the 4,030 steamboats tieing up at the levee was 540 tons; at St. Louis, 18 years before, the average cargo of the 2,412 arrivals was 193 tons. It is not too much to say that there were as many "adjustments" of rates as there were arrivals, for while occasionally two or three boats might load side by side at identical rates, more often the captain of a steamboat that was loading found it either necessary to "shade" his figures to complete a cargo, or possibly to raise them as the available stowage space grew smaller, in view of an empty river and a full wharf.

A single instance will mirror the situation. Missouri City, on the north bank of the Missouri river, 28 miles below Kansas City, was once an important shipping point for a wide hinterland. "When boats were plenty at the season of high water," said an old shipping merchant, "the St. Louis rate would go down to 25 cents; when the low water season came on and boats were scarce, it sometimes reached $2.50. Passenger rates varied from $10 to $25 for the same reason."

An incident of those days rounds out the picture. "I remember," said the Old Timer, "once Jim Lane sold some tobacco to the government. The water was low, and Jim was mighty anxious to get it started towards Fort Leavenworth. Well, the *Annie Jacobs,* Captain Bill Massie, come along, loaded so's she was drawin' all the water they was in the river, but pretty well down by the head, so if she got her nose over a bar, the rest'd be pretty sure to follow. 'Take my tobacco?' says Jim. 'Not on yer life,' says Bill Massie. Jim begged and begged, but 'twa'n't no use. Finally he says: 'Cap,' says he, 'if you'll jest put that tobacco aboard, and start her up river, I'll pay ye the full rate, and give ye the best suit o' clothes that a $100 bill 'll buy in St. Louis,' so Bill he took the tobacco." It is needless to remind the reader either that the Elkins law slumbered in the bosom of the unrevealed future at this time, or that that interesting statute has never been construed to apply to steamboats.

Late in November, 1852, just at the end of the season, the *Excelsior* arrived in St. Paul from St. Louis with 300 tons of freight for which she had received "one dollar a hundred any distance."

Coupled with fluctuations in rates which mounted to 1,000 per cent. of the minimum there was great irregularity of service, owing to the fact that the individual steamboat did not, for the most part, develop a trade and stick to it, but went where the returns were greatest. The western "steamboat country" extended from St. Paul to the gulf, and from the heart of the Southern Appalachians and the headwaters of the Allegheny to the foothills of the Rockies in Montana. Times might be dull on the Tennessee and good on the Ouachita; the Minnesota river trade might boom just at the time when crops had failed on the Osage and the Gasconade. What happened then? A steamboat which had made regular trips to certain landings for two or three seasons might enter another trade simply by hiring a new pilot, or instructing the old one, if his license covered the new territory, to turn the boat's head in that direction. The freight at the old landings would wait in vain; it might rot, or find some other conveyance. Nothing bound the vagrant steamer to her old trade, as the sound of her deep breathing grew fainter in the distance, and the white water from her paddles blended indistinguishably with the turbid river. This tendency of the steamboat, without warning to the shipper, to deprive him of his accustomed means of transportation just at the season of his greatest need—the time of crop failure, or of slow transit, because of low water—was one of the prime uncertainties of business "when the steamboat was king." Trade can adjust itself to a limited shipping season; the hazards of high and low water follow, usually, a certain cycle, and may be in a general way foreseen. But the steamboat that departed for more crowded landings just at the time when an established trade most needed regular service introduced into business a hazard of the first order.

What was the effect of these fluctuations in rates and uncertainties of service on the competition of rail transit with the river trade?

While there are, of course, factors making for variability in rail rates, they are few and feeble compared with those which influenced river rates in the olden days. The river is an open highway; any man who could command $20,000 could build and pay for a small sternwheel boat and become a factor in rate making; the railway is an artificial traffic way and requires a

heavy initial investment before equipment is purchased and operations begin. The costs of river transportation as carried on in the '50's were only interest on cost of equipment, depreciation of equipment, wharfage charges, fuel and boat supplies, and wages of crew. To run a railway requires a large and permanent organization—engineers, section men, bridge men, station agents, despatchers and signal men, yard and roundhouse crews, a traffic staff, etc.—in addition to the crews operating the trains. All this fixed expense tended inevitably toward stability of rates. Then, too, the climatic factor, while affecting the railways to some extent, is negligible in rate making. Times of high water may cause an occasional washout on a railway, but that is all; while the season of low water does not exist for railway operation. A railway knows delay on account of storms, but it is but an incident of the day's work. In the steamboat trade, on the other hand, low water greatly increases operating expense, while high water makes certain landings inaccessible, and opens up some areas of traffic which are closed at ordinary stages. All these are real and vital factors in the making of rates.

Still another thing must be taken into consideration: the size of the unit of equipment. A railway train is elastic, and is an aggregation of traffic units containing, in the early days, about eight or ten tons each. The steamboat with which they competed had a fixed capacity averaging as much as two 20-car railway trains. Full or empty, the downstream expense was practically the same, and the upstream cost nearly so. After a boat had secured cargo enough to meet her fixed and operating expenses, all that came to her in addition, at any rate greater than the expense of setting it on and off, was so much clear gain. If the freight trains of that day had had a fixed length of 20 cars, railway rates would have had an additional element of instability.

But in the matter of service, the great advantage of the railway over the steamboat was that the grade was not portable and the rails spiked down. The railway stayed when the steamboat went —not because the railway man was wiser than the steamboat man, not because he would not have been glad to move his road, when times were dull at home, to lead into the Red River Valley, or to the mines of Montana, but simply because it couldn't get away. Before long, the railway man began to see his opportunity in the steamboat man's desertion of his territory. *The railway intrenched itself as an instrument of transportation in the lean years, when the steamboat had departed for other valleys, where the hills were green afar off.*

Now it is an axiom of the transportation business that any rate is better than an uncertain rate. When this is re-enforced by the further axiom that a certain means of transportation has an infinite advantage over an uncertain one, it will be understood why the shipper "signed up" with the station agent after the steamboat had left his goods, literally high and dry, in his hour of need, and paid a somewhat higher rate for a definite service. The shipper was willing to wait for the *Prairie Belle* when the river was low, and to lay in a stock in the fall to "run him through" till spring; but when the captain of the *Belle* left the Illinois river to go to the Yellowstone without sending him word, and he let the *Evening Star* go by because he was saving his apples for the other boat, thus losing a dollar a barrel in the St. Louis market, he vowed vengeance, and went in quest of the railway station agent.

The life of the wooden steamboat is short. The *Western Boatman* for 1848 presented an estimate of the total number of steamboat "fatalities" up to that time, with an analysis of causes. The conclusion was that the average age of boats "worn out or abandoned" was five years, and that of those "sunk, burnt or otherwise lost" was "four years, or nearly four." In the 10 years between 1840 and 1850 there were 270 boats lost in western waters. Forty boats lost their lives by snags in 1840, according to Gould's "History of River Navigation," and 29 in the year following. George B. Merrick, the historian of steamboating on the upper Mississippi, has compiled records, as far as possible, of every boat which ever ran regularly above the Upper (Rock Island) Rapids. Their average life was five years. The most prosperous year on the Lower River, 1860, saw 290 boats destroyed or damaged; 120 of these were totally destroyed.

It is interesting to compare these figures with the number of steamboat arrivals at New Orleans, the great entrepot of the valley. These totaled 4,030. The casualty list, of course, includes all Western waters, but it is suggestive that if the boats reaching New Orleans averaged but ten trips each in the season—which is 12 months long on the Lower River—the fleet numbered but 403; and that the number of casualties in the Valley resulting in total loss was about one-third as great as the whole New Orleans fleet.

The average life of the boats worn out in service seems very short. We shall return to that point later. It should be remembered here that average means average. There were boats which remained in service for 20 years, like the *Itasca*, built in 1857, and burnd at La Crosse in 1878; but there were others, which never completed the first trip.

Now, the short life of the steamboat had a very definite influence in its contest with the railway, entirely apart from the question of hazard. A railway is, physically, a resistant thing, and a dull season perhaps has as great a tendency to lengthen the life of rails and equipment as to shorten it. But the causes which operated to produce a dull year in the steamboat trade—crop failure and consequent paralysis of business—brought about also a stage of water that greatly increased the hazards of operating wooden boats. Then, too, it must be remembered that the prosperous boat owner who became a trifle lazy and stopped building boats, though he might continue to operate all he had, would, in the course of a very few years, go out of the business automatically. A railway, short of bankrupt sale, remains, for better or for worse, in the hands of its owners; a fleet of wooden steamboats, no matter how well operated, if not re-enforced by frequent additions, literally disappears from sight in the course of a few years and "leaves not a wrack behind."

The nuisance of marine insurance was a factor in the decline of the steamboat trade which may be summarily disposed of. For some inscrutable reason, steamboat men have never learned to deal with the insurance brokers themselves, and issue an insured bill of lading. After the shipper has obtained a satisfactory rate, he must visit the broker himself, and get his insurance. Nor is the insurance full; it covers only damage in transit; goods at the landing are at the shippers risk. Even though freight rate and insurance rate added together leave a comfortable margin below the rail rate, there are the human factors of worry and trouble, and the commercial factor of time lost over negotiations.

Before we begin to consider the effect on the steamboat trade of absence of adequate line organization, I wish to revert to the important fact that the victory over the steamboat was won, not by the railway of the present day, but by the railway as it was in the Mississippi valley between 1860 and 1880. When the steamboat man of the present day talks of the change that has come over his calling, he accounts for it by experiences of the past 25 years, the darkening twilight period since the setting of the steamboat sun. When the railway man of the present day pauses to account for railway supremacy, he unconsciously thinks in terms of the modern railway. Now, let us recognize, once for all, that the railway that won a victory over the steamboat knew nothing of continuous brakes on freight trains; that its freight cars carried from 16,000 to 28,000 lbs. each, instead of from 60,000 to 110,000; that 38 tons was, in the Mississippi valley, a heavy locomotive; that rails were largely of iron, perhaps 40 lbs. in weight on the average; that block signals, gravity terminals, automatic couplers, steel underframing and draft rig were as far from the vision of the railway man as were concrete bridges and culverts, 100-lb. rails, ½ per cent. grades through rough country, compound engines and superheated steam. The steamboat of fifty years ago was every bit as good as the steamboat of the present day; the record time between New Orleans and St. Louis was probably made by the *J. M. White* in 1844 (the

Robert E. Lee, in 1870, finished in less time than the *White*; but the river had materially shortened itself by cut-offs in the interval). The railway has gone on; the steamboat has stood still.

Is is very easy to draw the wrong inference from this fact. The hasty generalizer will jump to the conclusion that if the steamboat retired before railways so imperfect it is evidence of its utter worthlessness in the modern transportation world. Let me once more remind him of the boats now in operation in highly competitive territory, and advance, tentatively, the view that the conclusion to be drawn is rather that factors other than the straight economic test of two rival instruments of transportation are to be invoked in the explanation.

This is especially to be remembered when we take up the absence of adequate line organization, and its effect on the steamboat's fate.

The great magnitude of American commercial corporations, that most significant fact of our modern commercial life, with its marked effects on social organization and even on national character, is the direct result of necessities laid upon American railway managers by the continental sweep of American territory. The first big American corporation was the railway corporation and it became big because of the breadth of its necessary field of operation. In England, there is no town or village situated more than 90 miles from a seaport. In France, the greatest distance from the seaboard is little more than twice as much. In the United States, the goods which, at Buffalo, reach the eastern limit of lake navigation after a joruney of 1,000 miles are still 400 miles from the seaboard. In 1843, the traveler could go by rail from Buffalo to Albany, but he was carried on the rails of 16 different companies. The business was largely through business. It traversed a territory under one government, with one language, one law and one tradition. That these 16 companies, each but a link in one haul, should coalesce and become one was inevitable. It was but response to the compulsion of inexorable physical necessity.

All over the United States the same process was going on. The world had never seen such corporations. Mankind had never extended so far the bounds of a single commercial management. But the continent was inexorable. It was the continent that compelled the American railway manager to stretch his conceptions to its imperial extent, to think in terms of its vastness, to run one railway from the sea to the Lakes, and from the central river to the western sea. The early railway managers made mistakes. They tried to apply to corporations gigantic beyond precedent means of control inadequate to such vast creations. Some of them were devoured by their own Frankensteins. But the length of the railway was dictated by necessity. The road had to run to the land's end.

The steamboat man saw this, and tried to meet combination with combination. He failed. The reason is clear. He was not coerced by necessity. Between St. Louis and New Orleans one captain and crew, with a $40,000 boat, was as complete an instrument of transportation as the Illinois Central Railroad—of far less capacity, but equally sufficient unto itself.

The human factor is tremendously important here. The steamboat, in 1860, had been the chief means of transportation in the West for 40 years. It was then as old as the railway was in 1894, forty years after the first line touched the Mississippi. The best human material had gone into the business. Now, the steamboat man was an individualist, pure and simple. The captain made his own schedule, selected his own route, accepted or rejected freight consignments as his judgment dictated. He often owned his own boat; how often one must pore over old steamboat lists to realize. If he worked for other owners, they trusted him in everything, so long as the returns of the trade were satisfactory. He penetrated new countries. He braved hostile Indians. At each end of the season, in the North, his boat played a game with death as he dared the ice, for there were rich rewards for the last boat into St. Paul, and the first to leave St. Louis or Dunleigh (East Dubuque) in the spring.

One thing this admirable and capable individual did not understand—how to work in harness. This is the first lesson the railway teaches, for obvious reasons. It is, in the end, the great lesson of civilization's riper stages. The steamboat captain lived and died a pioneer. And when the transportation business reached the stage where organization on a large scale was a determining factor, the railway found itself with a personnel trained to pull together and move at the word of command, while the steamboat trade was manned by a splendid set of individual chieftains, undisciplinable, unorganizable, each ready to go down to the bottom of the river, if necessary, with his own particular pennant nailed to his own particular jackstaff.

The Rock Island tapped the Mississippi in 1854. Within two years thereafter railway reached the river crossings at Galena, Alton, Burlington, Quincy and Cairo, and the railway became a factor in the steamboat world. The first joint-stock company for the operation of steamboats in western waters was the "Cincinnati and Louisville Mail Line," organized in 1818. The first regularly organized company in the Upper Mississippi was formed in 1842. It was not until just after the Civil War that this form of organization was tried out on the Missouri. Many of the so-called "lines" were simply operating pools. Each captain owned his own boat, and could retire with his share of the profits or losses at any time. The instability of such an organization at just those times when organization was most vital to the life of the trade needs no comment.

A few brief biographies of lines, real and so-called, will reveal the actual course of events better than general statements. In 1858, the "Railroad Line," having traffic arrangements with the Illinois Central at Cairo, and the Ohio and Mississippi at St. Louis, was formed by the owners of 10 of the finest steamers in western waters to run between St. Louis and New Orleans. "While this was not a joint stock company, the boats were run in joint interest, and with a regularity heretofore unknown in this trade and at uniform prices for the business they did." The traffic man will read much between the lines of this naive comment of Captain Gould, vessel master and historian of steamboating. Soon the new line, which included the *Pennsylvania* and the *Alex. Scott*, was high in favor with shippers and passengers. "A position in the 'Railroad Line,' or a 'day in the line,' as it was called, was coveted by all who had a boat suitable for the trade, and commanded a large premium when offered for sale, and as high as $1,500 was paid in some instances." This line was broken up by the Civil War.

Just after the war, in the prostration following the destruction of southern trade and the disuse of army transports, a large joint stock company, the "Atlantic and Mississippi Steamship Company," was formed by steamboat owners, who took stock according to the appraised value of the boats they put into the line. The capital was $2,000,000. The line had through billing arrangements with railways and ocean-going lines. This venture was killed by the individualism of the steamboat man, both without the line and within it. The owners who were left out of the new organization combined at once and disorganized the rate situation by competition. The effects of this spirit within the line are eloquently summed up by Captain Gould. "Many of the steamboats were in commission, manned by crews with little [pecuniary] interest beyond their salaries, each crew striving to excel the other in the excellence and luxury of their tables and the speed of their boats, with no one to control or check their extravagance."

A lurid light is cast upon the central organization of a corporation the aggregate of whose property was "fabulous" to the chronicler. "The widespreading limits of the company's business rendered it impossible for the executive officers (only two of which were receiving salaries) to do more than give general supervision, leaving the detail and the result to the judgment and the caprice of those in charge of the boats." Discipline in the general sense there was none, and discipline on the individual boat appears to have gone by the board, for a series of disasters swept away half the fleet in six months. The line lasted less than

two years. We read that "the directors were liberal, high-toned business men, and stood manfully by the company throughout all its embarrassments."

It is worth while to remark again that these were the best boats, officered by the best boatmen in the valley. This single history is conclusive as to the fitness of the pioneer steamboatman to "work in harness."

All other forces making for the decline of the steamboat trade were intensified in destructive quality by the general social situation in the 40 years intervening between 1850 and 1890. This was a time when a tremendous population movement overflowed utterly inadequate channels of transportation. All the steamboatman's other disabilities might have been overcome had he been in any true sense a sane business man. He was the spoiled darling of fortune. The whole course of social development was such as to beget in him habits of extravagance, and to make him trust that the morrow would care for the things of itself. The steamboat, during the years between the building of the first railroad to the Mississippi and the completion of the Northern Pacific, which killed the trade between St. Louis and the Upper Missouri, was not, like the railways of the present day, the medium of the interchanges of a settled population. It was the vehicle of the advance of an eager population into a virgin land. The '40's and '50's saw the rush to Wisconsin and Minnesota; the period following the war witnessed the conquest of the Red river wheat country by immigrants by the Missouri, and the Red river of the north. Then came the discovery of El Dorados on the headwaters of the Missouri, beyond the end of its 2,084-mile steamboat journey from St. Louis.

"Many a time during the Minnesota rush," said an old pilot to me, "the captain has watched the people coming on the boat at Dunleith or Rock Island until she had all she'd sleep on the cabin floor and the boiler deck, besides two in every bunk and steerage passengers all over the freight on the main deck. When he guessed she had all she'd take, he and I would take the sounding pole and walk down the landing-stage, crowding back the people who were pouring on in a steady stream. Then we'd cast off and straighten up, with the levee as crowded, to the eye, as when we come in."

It was the demand for transportation thus created—and the incident given above could be paralleled many times in every "trade" of that day—that was at the root of all the steamboat's disabilities. It was responsible for the fantastic variations in rates; it was responsible for the desertion of established routes by captains, lured by the great rewards of pioneering. The short life of the steamboat would have lengthened, as improvements strengthened its weak places, substituted steel for wood, and differentiated passenger and freight carriers, just as has happened in Europe; but what was the use? When a good boat would pay for herself in one season and could reasonably be expected to last five, why worry over steel hulls and cargo-box barges? Suppose the shipper did find himself incommoded by the necessity of bargaining with the insurance broker; who cared, when there was more freight as it was than the boat could load? Suppose the line went to pieces; the captain of the *Nancy Belle* held a license covering the Missouri, and passengers were plenty at St. Louis with $300 each to pay for transportation to Fort Benton. Pilots were paid regularly $500 a month; crack men received much more. One pilot, paid by the trip, who had an especially good knowledge of the eccentricities of the Missouri, made $120 a day between Kansas City and Omaha. Captain "Bill" Massie "cleaned up" more than $30,000 in a single season on the Missouri at the wheel.

When the west and north became populated this transportation fever went down. It left the steamboatman with an empty pocketbook—for his prodigality had equaled his earning power—expensive tastes and invincible prejudices in favor of the business methods of a boom period.

The foregoing were, in my opinion, the chief causes of the decline of the river trade in the west. The causes usually alleged by critics of the railways certainly operated and go far to explain how the rail lines, grown strong and conscious of their strength, took away the remnant of the kingdom of the steamboat. But this is not the real problem; that is set for us by the earlier years, when the railway was crude and its service imperfect, when accidents were many and schedules represented only the substance of things hoped for, while the steamboat was the accepted means of transportation in a traffic world organized by and for water carriage. The victory of the railway was not a matter either of swiftness of transit or ton-mile costs. The question of the relative economy of the two instruments of transportation in the Mississippi Valley has yet to be tried out in a practical way.

MIKADO SUPERHEATER LOCOMOTIVES FOR THE MISSOURI PACIFIC.

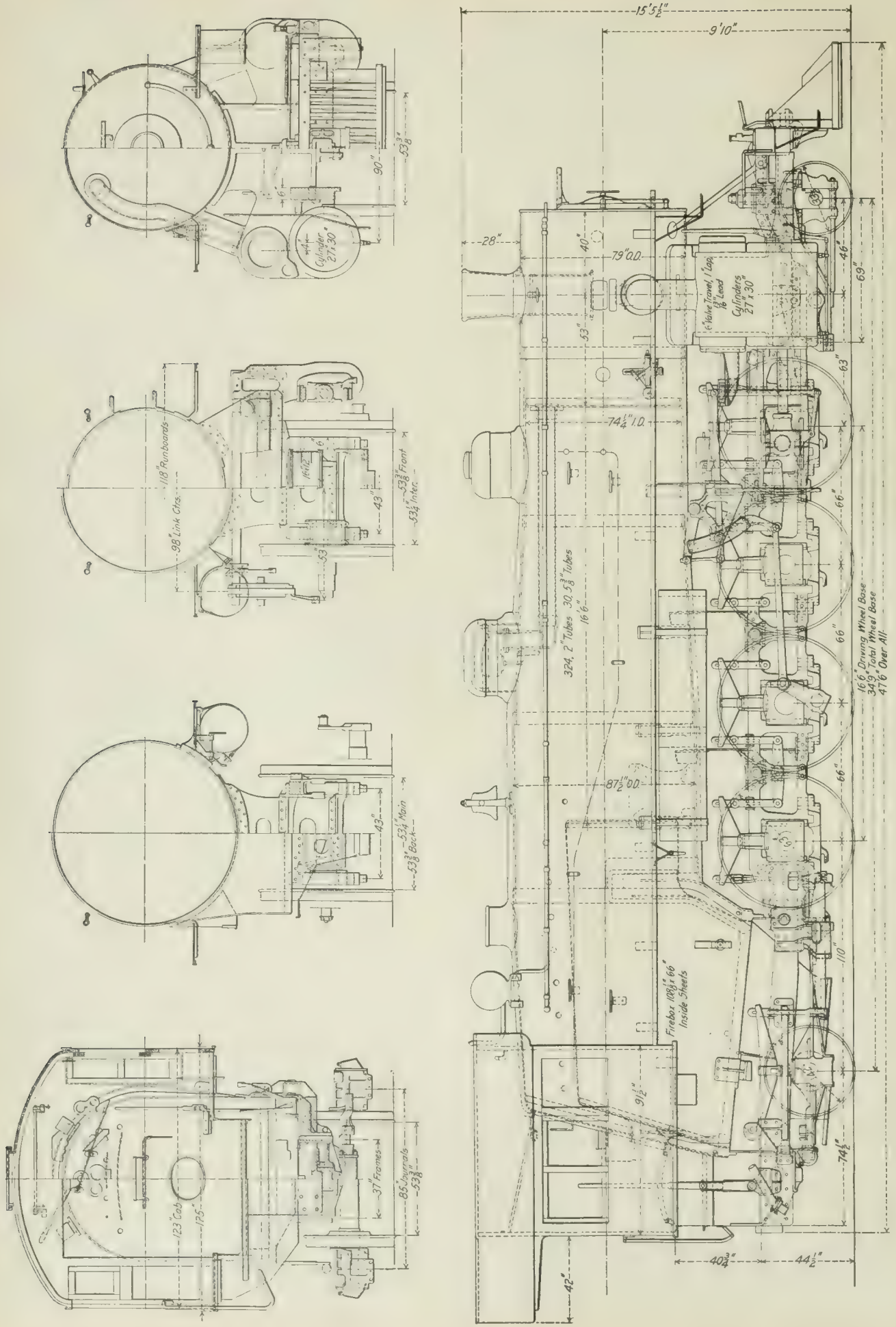
The Mikado type locomotive has become quite popular during the past year, the total number ordered being about 22 per cent. of all the locomotive orders placed. The American Locomotive Company, New York, has recently completed 50 locomotives of this type for the Missouri Pacific. These engines weigh 275,000 lbs. in working order, and are equipped with the Locomotive Superheater Company's type *A* superheater. The tractive effort is rated at 50,000 lbs., which with a weight of 209,000 lbs. on drivers, gives a factor of adhesion of 5.5.

The engines were built to replace the 103-ton consolidations, which have a tractive effort of 39,200 lbs., and are expected to haul about 28 per cent. more tonnage. They will be operated on the divisions between St. Louis, Mo., and Hoxie, Ark., and Kansas City, Kan., and Pueblo, Col. From St. Louis to Hoxie there are some heavy grades, especially between Des Arc, Mo., and Piedmont, where Gads Hill has a 1.6 per cent. grade on one side and a 1.4 per cent. grade on the other. Between Annapolis and Arcadia there is another severe maximum grade of 1.95 per cent. From Kansas City to Pueblo there is a general up grade, but the maximums do not exceed 1.5 per cent.

The boilers are of the conical connection type, the first ring being 74¼ in. inside diameter with a ¾-in. plate. The second course tapers to 85¾ in. outside diameter with a ⅞-in. plate. The dome is placed in this ring and is 10 ft. back of the front tube sheet. It is built up of 1¼-in. collar with a ½-in. shell, whose seam is welded, and a 1¼-in. dome ring. The firebox has a combustion chamber 34 in. deep, which limits the length of the tubes to 16 ft. 6 in. The grate is 66 in. wide and 108½ in. long, providing a grate area of 49.5 sq. ft. The total equivalent heating surface, which consists of the total heating surface plus 1½ times the superheating surface, is 3,795 sq. ft. The boiler pressure is 170 lbs.

The cylinders are 27 in. x 30 in., and are located on 90 in. centers, which brings them 23½ in. outside of the centers of the frames. The piston valves are 4 in. outside of the center lines of the cylinders and are connected to the steam headers by a pipe running directly through the side of the smokebox, which eliminates the passage through the cylinder saddle, making a comparatively simple cylinder casting. The valves are operated by the Walschaert valve gear and have a travel of 6 in. with a steam lap of 1 in. The exhaust ports are set line and line, and the valves are set with a lead of 3/16 in. The cylinders are provided with extended piston rods, which are supported by sliding crosshead bearings on guides in the extension casings. The frames are 6 in. wide, and are of the usual design for this type of locomotive.

These engines are similar to the Mikado locomotives built for the Illinois Central by the Baldwin Locomotive Works, and described in the *Railway Age Gazette*, September 29, page 585, in that they have the same size cylinders and drivers, and both use the same type of superheater. Their tractive efforts, total weights, weight on drivers and boiler pressures are very nearly alike, but the boilers are radically different, which makes a



Elevation and Sections of Mikado Locomotive for the Missouri Pacific.

marked difference in their ratios. The Illinois Central engines have boilers about 6 in. larger in nominal diameter than the Missouri Pacific, but do not have combustion chambers, which allows them to use tubes 4 ft. longer. Their total equivalent heating surface is also larger by 54 per cent. The accompanying table gives a good comparison of these two engines:

	Ill. Cent.	Mo. Pac.
Tractive effort	51,700 lbs.	50,000 lbs.
Total weight	283,850 lbs.	275,000 lbs.
Weight on drivers	218,000 lbs.	209,000 lbs.
Length of tubes	20 ft. 6 in.	16 ft. 6 in.
Boiler pressure	175 lbs.	170 lbs.
Boiler, nominal diameter	82 in.	75¾ in.
Firebox heating surface	235 sq. ft.	254 sq. ft.
Total heating surface	4,068 sq. ft.	2,868 sq. ft.
Superheating surface	1,093 sq. ft.	558 sq. ft.
Total equivalent heating surface	5,708 sq. ft.	3,705 sq. ft.
Grate area	70 sq. ft.	49.5 sq. ft.
Tractive effort × diameter of drivers ÷ total equivalent heating surface	570	850
Total equivalent heating surface ÷ grate area	81.8	74.8
Weight of drivers ÷ total equivalent heating surface	38.2	56.5
Total weight ÷ total equivalent heating surface	49.6	74.1
Total equivalent heating surface ÷ volume of cylinders	288	186.8

It will be seen that the tractive effort multiplied by the diameter of drivers, divided by the total equivalent heating surface, or the boiler capacity factor, is considerably larger in the Missouri Pacific locomotives than for those of the Illinois Central which would indicate that the former locomotives must run at a lower speed in order to meet the demands of their cylinders. The smaller grate area in the case of the Missouri Pacific engines would seem to indicate either that they would use a considerably better grade of fuel than used on the Illinois Central, or that the rate of combustion would be much higher.

The ratio of total weight to the total equivalent heating surface is about one-half again as much as that of the Illinois Central engines. Although the combustion chamber may tend to discount these differences, it is a question as to whether it will overbalance the whole difference. Following is a table of the principal ratios and dimensions of the Missouri Pacific locomotives:

General Data.

Type	2-8-2
Service	Freight
Fuel	Soft coal
Tractive effort	50,000 lbs.
Weight in working order	275,000 lbs.
Weight on drivers	209,500 lbs.
Weight of engine and tender in working order	431,100 lbs.
Wheel base, driving	16 ft. 6 in.
Wheel base, front truck	9 ft. 1 in.
Wheel base, total	34 ft. 9 in.
Wheel base, engine and tender	67 ft.

Ratios.

Total weight ÷ tractive effort	5.5
Weight on drivers ÷ tractive effort	4.19
Tractive effort × diam. drivers ÷ heating surface	1,100.
*Tractive effort × diam. drivers ÷ equivalent heating surface	850.
Total heating surface ÷ grate area	57.9
*Total equivalent heating surface ÷ grate area	74.8
Firebox heating surface ÷ total heating surface, per cent.	8.85
*Firebox heating surface ÷ total equivalent heating surface, per cent.	6.85
Weight on drivers ÷ total heating surface	73.1
*Weight on drivers ÷ total equivalent heating surface	56.5

Ratios.

Total weight ÷ total heating surface	95.9
*Total weight ÷ total equivalent heating surface	74.1
Volume of both cylinders, cu. ft.	19.86
Total heating surface ÷ vol. cylinders	144.5
*Total equivalent heating surface ÷ vol. cylinders	186.8
Grate area ÷ vol. cylinders	2.5

Cylinders.

Kind	Simple
Diameter	27 in.
Stroke	30 in.

Valves.

Kind	Piston
Travel	6 in.
Steam lap	1 in.
Lead	3/16 in.

Wheels.

Driving, diameter over tire	63 in.
Driving, thickness of tire	3½ in.
Driving journals, main, diam.	11 in. x 12 in.
Driving journals, others, diam.	10 in. x 12 in.
Engine truck, diameter	33½ in.
Engine truck journals	6½ in. x 12 in.
Trailing truck, diameter	42 in.
Trailing truck journals	8 in. x 14 in.

Boiler.

Style	Conical connection
Working pressure	170 lbs.
Outside diameter of first ring	75¾ in.
Firebox, width and length	66 in. x 108⅛ in.
Firebox plates, thickness	⅜ in.
Firebox water space	4½ in.
Tubes, number and diameter	224—2 in.; 30—5⅜ in.
Tubes, length	16 ft. 6 in.
Heating surface, tubes	2,614 sq. ft.
Heating surface, firebox	254 sq. ft.
Heating surface, total	2,868 sq. ft.
Heating surface, superheating	558 sq. ft.
*Heating surface, total equivalent	3,705 sq. ft.
Grate area	49.5 sq. ft.
Center of boiler above rail	9 ft. 10 in.
Top of smokestack above rail	15 ft. 5½ in.

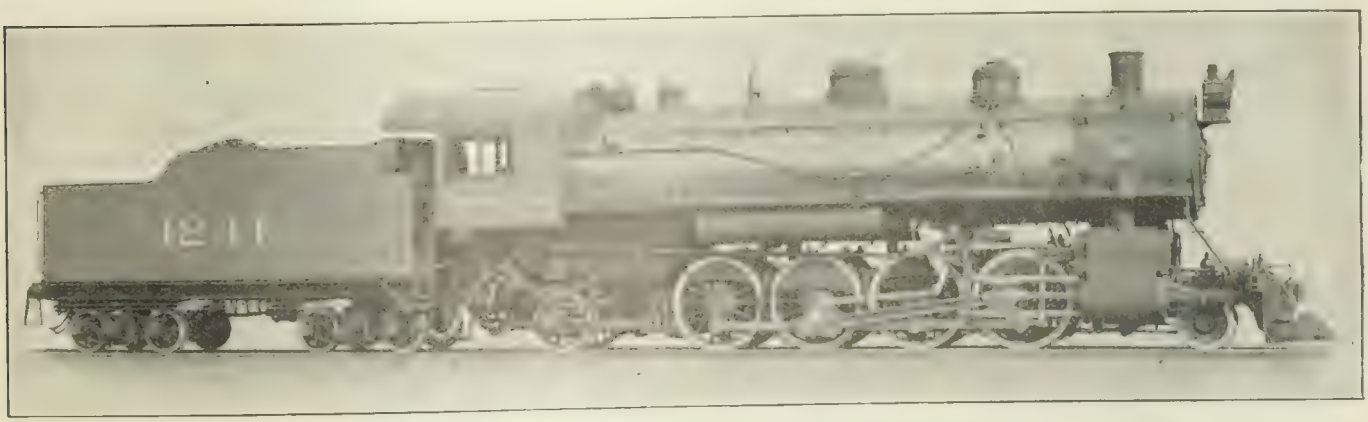
Tender.

Tank, style	Hopper
Frame	Cast steel
Wheels, diameter	33 in.
Journals	5½ in. x 10 in.
Water capacity	8,000 gal.
Coal capacity	14 tons

*Total equivalent heating surface equals total heating surface (2,868 sq. ft.) plus 1½ times superheating surface.

ANNUAL REPORT OF NEW JERSEY COMMISSION.

The Board of Public Utility Commissioners of New Jersey, Robert Williams, Thomas J. Hillery and W. M. Daniels, have issued their annual report—a comprehensive and business-like document. This is the first important report made, the report of a year ago having been made before the reorganized commission had been in office long enough to begin important activities. The railway commission, which was succeeded by the present board, was established only five years ago. The present board has broad powers; it may fix just and reasonable rates; may suspend increases in rates; and, in general, has authority over railways, telephones and lighting companies, like the New York commissions. The three important problems now before the board are the rates for intrastate commutation passengers, the price of gas and the charges for the use of telephones. Season ticket passengers going to Hoboken and Jersey City have to buy tick-



Mikado Superheater Locomotive for the Missouri Pacific.

ets to New York (including ferryboat fare) and pay the New York rate. The question of requiring a reduction was before the commission for some months, and an order was finally issued requiring season tickets to be sold to Hoboken and Jersey City. The railways complied with this order, but named rates the same as those to New York, and the question of the authority of the commission is now before the supreme court of the state. The commission has forbidden numerous proposed increases in passenger rates.

Cases of discrimination by street railways have been before the board, and a number of decisions have been rendered. The charges for gas and for electric service are briefly discussed. An elaborate investigation is now being made of telephone rates. The board has fixed a code of standards and regulations for the gas companies. The commission proposes to require the telephone companies to file their tariffs and also to conform to a system of uniform accounts, such as the Interstate Commerce Commission has prescribed for railways. Many telephone companies do such a small business, however, that they cannot reasonably be required to keep elaborate accounts. The street railway companies now keep their accounts in such a way as to conform to the system prescribed by the Interstate Commerce Commission, and they will henceforth be required to file reports.

Much of the time of the chief inspector and of the counsel of the board has been taken up in the examination of franchises, the law now requiring that every franchise for a public utility shall be approved by the board. The board also is charged with the duty of approving issues of stock, bonds, etc., and the report calls attention to the fact that under a law passed in 1906 bonds may be issued for 25 per cent. more than the value received; and it is suggested that this law ought to be repealed and the board given exclusive authority to settle all questions connected with the approval of issues of securities.

The board has made no changes in the requirements as to railway accidents, but now requires reports of accidents from street railways. Accident reports have not been required from other public utilities, because the board has had to keep a great variety of records, taking up its time and facilities; but inspectors of the board report anything dangerous that they may see. Officers of public utilities cheerfully co-operate with the board in abolishing dangerous conditions. The report mentions the investigation which the board made on the derailment at Martin's Creek, and says that the Interstate Commerce Commission concurred in the report of the New Jersey board on that accident.

Systematic inspections of railways are made, the same as was done by the old commission; and also of street railways and other properties, so far as practicable. The Interstate Commerce Commission is to send to the New Jersey commission duplicates of the reports which it receives concerning the inspection of locomotive boilers. The board is required by a law of May, 1911, to formulate regulations for the safe transportation of explosives, but thus far it has delayed action because changes are going on; in the meantime, the requirements of the Interstate Commerce Commission afford reasonable protection.

Complying with an order of the legislature the board will soon make a report on the proposition for a full crew law.

The board has given careful attention to the grade crossing problem. During the year it has secured protection, or has had the protection improved, at 49 grade crossings. It has refused to permit certain new highways to cross tracks, and in other cases has approved new grade crossings. The board discusses the problem of grade crossing elimination in a conservative tone, while yet expressing full appreciation of its gravity, as related to the safety of the public. To indicate in some degree the great cost which would be involved in separating the grades at crossings in New Jersey, attention is called to the experience of Massachusetts, where in 20 years the sum of $34,372,048 has been expended; 21 millions by railways, nearly 9 millions by the state, and about 4½ millions by the cities and towns. The board suggests to the legislature that any law on this subject should provide for an equitable division of the cost between the railways, the state and the municipalities. Continuing, the report says:

"So far as the elimination of a grade crossing lessens damage costs, and the cost of protecting the crossings, it redounds directly to the financial benefit of the railway. So far as it permits greater speed and facility of operation it also helps railway earnings. But the carriers must make a capital outlay on this elimination work; and so far as the annual charges on the outlay are not met by the economies and facilities provided by track elevation, the roads are bound to obtain the residue of the increased annual charge from rates and fares. If the public owned and operated the roads, track elevation would necessarily be a public charge in its entirety. While it is argued that private ownership and operation for gain transfers the responsibility from the public to the carrier, the interests of both are so closely related that in the final analysis, no matter what provision is made for its immediate assumption, a part of the charge must be borne by the public.

"If a law is passed which provides that grade crossings shall be eliminated without cost to the municipalities, it is not unreasonable to assume that, no public burden being apparent, an agitation will start for the elimination of grade crossings wherever they exist, for all grade crossings are objectionable and possess some element of danger.

"But to remove all these crossings must be necessarily the work of years; disappointment would ensue to those who had been led to look for immediate results, and doubt would arise as to the efficacy of the law, no matter how earnest and intelligent the efforts made for its application.

"If, on the other hand, the law provides that a part of the cost, which may be small, in proportion to that paid by the railway, shall be borne directly by the municipality, sharing the benefit, local movements for the abolition of grade crossings would be accompanied by a sense of direct financial responsibility, which would tend to concentrate public attention on efforts for the elimination of crossings where the danger and annoyance are greatest.

"It would seem that this concentration of attention would lead to more practical results than could be reasonably looked for if the efforts for crossing elimination are based upon the general public impression that all grade crossings in the state are to be eliminated without cost to any municipality in which such crossings exist. Any law providing for a division of the cost of eliminating grade crossings should be so framed that the municipalities would be protected against any extravagant or disproportionate expenditure of public funds for this purpose."

The board recommends the amendment of the public utilities laws as follows: Where a company sells bonds for less than their face value it shall be required to amortize the discount, the board to decide at what rate. The board should have power to order connections not only between railways and street railways but between telephones lines. New public utilities should be granted an indeterminate franchise. All the property and the intangible rights (except franchise valuations) should be defined in advance and a fair return allowed on the value thus fixed; the property to be purchasable at a fair price, if ever taken over by the city or state. The intent of this recommendation appears to be that a public utility shall retain its franchise so long as it conforms to the law.

The report ends with a chapter describing the organization of the commission. It is divided into two divisions, the railway division and the utilities division. Each has a chief and three assistant inspectors. An accountant of the board examines applications for approval of issues of stock and bonds. No strict line is drawn between the two administrative divisions; and inspectors from one are frequently assigned to work in the other. Most of the inspectors have their headquarters at the branch office of the commission in Newark. The board has insufficient room in the State House at Trenton.

IMPROVED METHOD OF TREATING TIES AND TIMBERS.

BY W. F. GOLTRA.

The science of timber preservation is one of the liveliest subjects before railway men today. Many problems in the art of treating wood with antiseptics have yet to be solved, and there is much room for improvement. Undoubtedly much improvement over methods commonly employed in this country, is possible in the securing of a speedier and more efficient method of seasoning, a better preparation for impregnating ties and timbers, as well as greater economy in handling of material. Despite the diversity of practice it is possible to find among the experienced and practical operators, both in this country and abroad, a measure of agreement as to both methods and results, and from these to outline the essentials of a correct method.

A new and original method of treating ties and timbers with preservatives is here submitted for the consideration of those interested in timber preservation. Several distinct steps are taken in carrying out this method or process, consisting of steaming of ties upon delivery at plant; stacking of ties in the yard for open air seasoning; machining of ties preparatory to impregnation; completion of drying and warming ties in ovens, and impregnation with antiseptic liquid.

A suitable plant for making this process effective is illustrated in the accompanying drawings.

STEAMING TIES.

Upon arrival of the ties or timber at the treating plant, they are transferred by hand from standard gage cars to narrow gage tram cars, which are placed alongside. The tram cars are then run into the steaming cylinder. The ties or timbers are subjected to live steam for a period varying from 30 minutes to four hours, depending upon their character and condition, at a pressure of about 15 lbs. per sq. in. In most cases possibly 15 to 20 lbs. should be the maximum, for reasons set forth later. It should not, however, be inferred from the above that it is necessary to separate ties or timbers into groups for steaming beyond the natural separation at the shipping point.

In order that this step in the process may be clearly apprehended, both as to its own importance and its preparatory value for what is to follow, it will be observed that steaming the wood as above indicated has the effect,

1. Of breaking the cell walls and producing narrow microscopical slits, through which the juices and saps in the cells and intercellular spaces are liberated.

2. Steaming effects a great reduction of the time subsequently required for seasoning the wood, whether it be in a dry kiln with heated air, or by natural air seasoning. This greatly reduces the stock necessary to maintain on hand and thus reduces about three-quarters of the capital that might otherwise be tied up, when the ties or timbers are not steamed. It further effects a material economy in the cost of installation of a treating plant, by proportionately diminishing the storage yard space and length of tracks needed to handle the ties. Fire insurance and taxes are also correspondingly reduced.

3. Steaming dissolves and withdraws the juices and saps contained in the wood and prevents decay when subsequently dried. When green ties, and lumber generally, are piled for air drying without preliminary steaming, the saps and juices ferment and decompose rapidly. Decay attacks the delicate cells and less compact portions of the timber, and then the firmer portions until, in a few months, the timber becomes spongy or doaty in the interior and its strength is impaired. In this condition it absorbs undue quantities of preservatives, when afterwards treated.

4. Steaming softens the outer surfaces and opens the pores of such timbers as may have had a preliminary air seasoning and which may have become "case-hardened," thus permitting rapid evaporation of the moisture contained in the interior of the timber and thereby preventing much of the checking and splitting, which is so common in crossties and timbers generally, while undergoing air seasoning.

5. The chief point in securing good treatment is to withdraw the juices, saps and acids from the timber. Hence steaming is an essential part in the process of treatment of wood, not only as to the effect on the timber, extracting the juices and toughening the fiber of the wood, but in a general way to prepare it to absorb the chemical preservative, whatever it may be.

6. Experiments under varying conditions indicate that large timbers, such as railway ties, piling, etc., may be steamed at 20 lbs. pressure for as much as four hours without material depreciation of strength.

The duration of the steaming is determined by the color of the condensation from the cylinders. At first the condensed water runs off fairly clear and colorless, but later on it gets much darker and discolored and has a particular woody smell from the extracts dissolved. Steaming is continued until this stage is passed and the condensed water again runs clear and colorless, showing that the sap has been dissolved and withdrawn to the fullest extent possible.

The moisture in timber amounts to from 16 to 65 per cent. It is unequally distributed in green timber, being greatest in the sapwood. The per cent. of moisture present in different kinds of wood is approximately as shown in the accompanying table:

	Sapwood or outer part.	Heartwood or interior.
Pine, cedar, spruce, firs	45-65	16-25
Cypress, extremely variable	50-65	18-60
Oak, beech, ash, maple, elm, hickory, chestnut, walnut and sycamore	40-50	30-40

The lighter kinds of woods have the most water in the sapwood, thus sycamore has more than hickory.

It is manifest that the greater part of this moisture must be removed in order to put the timber in condition to receive treatment with antiseptics. While it is true that by long continued exposure to open air, timber can be sufficiently dried to meet common requirements, it is being seriously questioned if such methods do not require too much time and space to meet modern conditions.

When steaming sawed ties, or lumber, the pieces should be piled on cross sticks, about 1 in. apart horizontally, so that the steam will have access to all surfaces. The steam pressure should be only a few pounds at the beginning and gradually increased to not exceeding 20 lbs. at the end of the operation, so as not to heat the timber too suddenly, which might cause checking and splitting, an effect which frequently occurs when hot oil is introduced in the retort on cold ties.

Experience has demonstrated that it is not feasible to impregnate timbers with antiseptics immediately following the steaming, because the cells are filled with vapor and condensed steam, which resist the entrance of the chemical. A fair penetration can be obtained with zinc chloride, but scarcely any at all with creosote oil. It is very essential that the ties and timbers be dried after the steaming.

STACKING OF TIES IN YARD FOR AIR SEASONING.

Having taken the initial step in the seasoning process by steaming, the next in order is to evaporate the condensed steam or moisture from the ties or timbers. This is accomplished by stacking in a yard for air seasoning.

The loaded tram cars are drawn out of the steaming cylinders by a small locomotive or any other suitable means and placed on a transfer table. The table is moved to one of the parallel yard tracks and the tram-cars are drawn to the place where the ties are to be stacked. The tracks in the yard are laid with three rails so that a standard gage locomotive crane can stand on one track and unload narrow gage tram cars standing on another.

The use of a locomotive crane and transfer table also materially reduces the cost of building a plant, as the arrangement of the yard, thereby made possible, affords a better utilization of the space for stacking ties, lessens the space required and correspondingly lessens the lengths of tracks; and also obviates the expense of constructing a high-loading platform, as the treated ties are transferred directly from tram cars to standard

gage gondola cars, from the yard level, for shipment to destination. The space required for a plant having the capacity for treating upwards of one million ties annually is about 20 acres, and the length of the tracks in the yard is approximately four miles.

Ties which have been given a preliminary steaming dry rapidly, and the average time required to evaporate the moisture to put them in condition for treatment is about three months, depending upon the character of the wood and climatic conditions. Ordinarily it requires from nine to twelve months in the open air for ties to season sufficiently for treatment.

MACHINING TIES.

When the ties have sufficiently seasoned and are ready for treatment, they are taken from stacks, passed through an adzing and boring machine and loaded directly on tram cars to be transported to the ovens for the completion of the drying, and thence to the impregnating cylinder for treatment with preservatives.

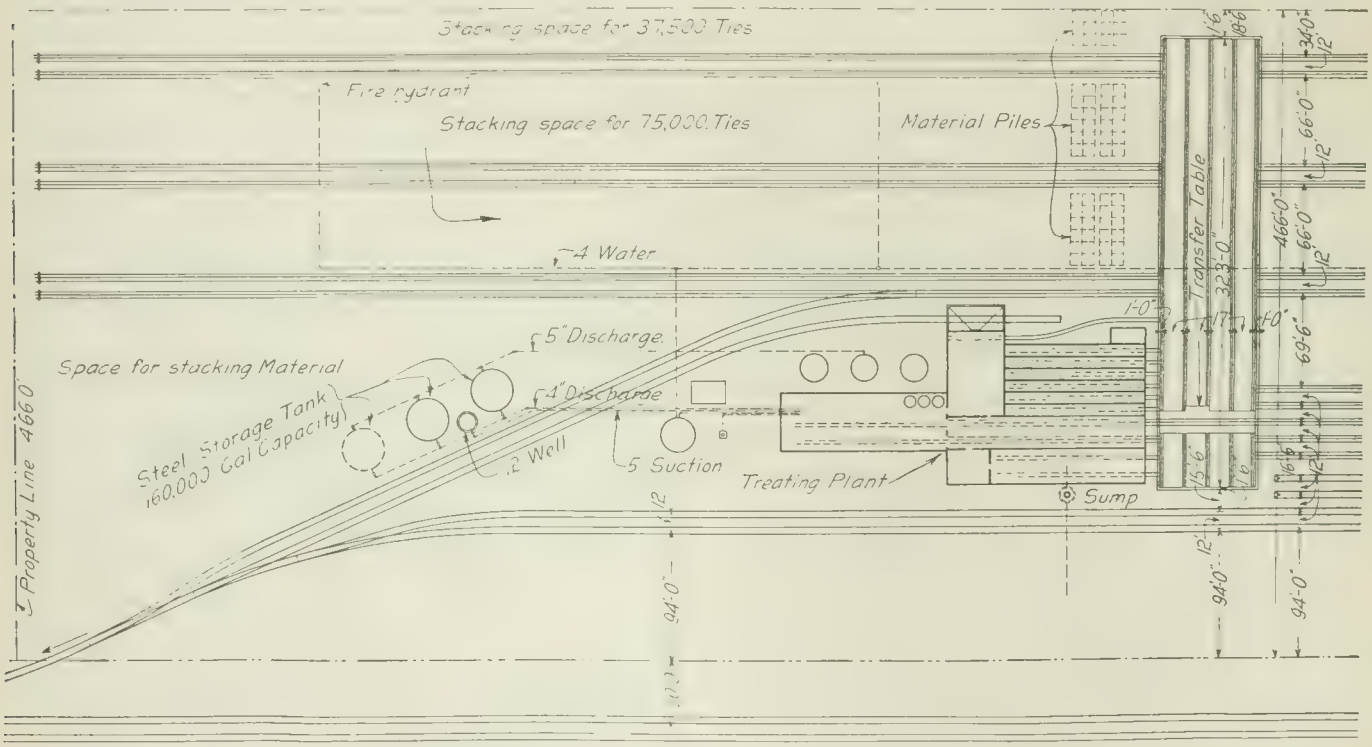
The adzing and boring machine is preferably mounted in a standard gage box car, which is moved about the yard and placed opposite the stacks of ties. A skid is placed between the stacks and the car on one side, and another skid is placed between the machine car and tram cars on the other side. In loading ties on tram cars care should be exercised to pile them loosely, both vertically and horizontally, to permit the heated air in the ovens, as well as the preservative fluid in the retorts, to come in contact with all surfaces. If the ties are sawed the parting strips should be about 1 in. thick to keep the surface apart.

There are two causes of tie deterioration, decay and mechanical wear, and there is no economy in increasing the resistance to one without also increasing the resistance to the other. Of these two destructive agencies decay is much the greater, but it is so interwoven with mechanical wear that the two should be considered together. It has been almost the universal practice on English, French and several European railways, to machine their ties before attaching the rails or rail chairs to them. The consensus of opinion in Europe is to the effect that such preparation, by machining, is of marked economy. Years of observations and tests on both treated and untreated ties, have proved that longer life is obtained by the machining operation. The machining of ties obviates the necessity of adzing them before laying in the track, thereby effecting a saving in the time and labor of the section men.

In fastening a rail to a tie, either a cut spike must be driven, or a screw spike must be turned into the tie structure. If a screw spike be used in any form now on the market, it is necessary to first bore a hole for it to enter. If a cut spike be used it is possible to drive it in most of our American tie woods without previously boring a hole. The holding power of a heavy spike is greater when it follows a small hole than when driven directly into the wood structure, also the boring of ties to be treated is essential because the holes become mediums through which chemicals reach the interior of the ties and it penetrates radially from each hole, thus promoting impregnation. In consequence, the spike never opens the grain of the wood beyond the penetration depth.

COMPLETION OF DRYING AND WARMING OF THE TIES IN OVENS.

After the ties have been machined and loaded directly upon tram cars, they are transported to the drying ovens.



Proposed Arrangement of Timber Treating Plant and Tracks.

The moisture content in timber has a very appreciable effect upon the way in which it lends itself to treatment, and any method that will make same moisture condition uniform is bound to result in a much more uniform penetration and dissemination of the antiseptic. Slow air seasoning is not found sufficient to insure a good preparation of the ties and timbers for treatment, and the drying should therefore be completed in the ovens. In France some of the treating plants are equipped with drying ovens and the seasoning of ties is completed just prior to the treatment with antiseptic.

Different woods absorb heat with different degrees of rapidity, depending principally upon the conductivity of their fibers. It has been demonstrated that an average of 24 hours is sufficient time to thoroughly heat timbers, such as railway ties, and during this time the moisture content will be reduced 3 to 4 per cent. The object in placing the timber in the ovens is not only to complete the air drying, but also to permit a perfect regularity of operations at the plant at all seasons of the year and

in all kinds of weather. The timber thus dried comes to the impregnating retort in a hot condition and the high temperature of the impregnating fluid, when introduced into the retort, is maintained when it comes in contact with the wood, consequently the penetration is deeper and more perfect. During the winter season, especially in the northern latitudes, it is frequently necessary to close down the works on account of ties being covered with ice and snow. When such ties are placed in the retort for treatment the warm impregnating fluid is congealed and, in consequence, the penetration is very slight. Again, ties exposed to the weather immediately prior to treatment are often drenched by heavy rains and absorb considerable water. This offsets, in a great measure, the air seasoning and makes it difficult to obtain good results from such seasoning alone.

The rapidity with which the drying can be carried on, after the material has received a preliminary steaming, or air seasoning, depends upon several factors, such as species of wood, its softness and porosity, proportion of heartwood and sapwood, intended use, and the manner in which it is presented to the air in the ovens. No positive rule can, therefore, be given as to the duration of the drying period and the temperature for the various kinds of woods, under all conditions, but experience soon teaches the operator how rapidly the ties or lumber can be dried in the ovens, without injuring, by splitting, checking, warping or honeycombing.

The drying oven, as a structure, is preferably built of cement and masonry and corresponds in length and size to the length of the impregnating retorts. The air is heated by means of heating coils, placed under or in the bottom of the ovens, and the circulation of the air is effected by means of a blower or fan. Fresh air enters at the ends of the ovens, passes through the heating coils, thence in the oven chambers, through the loads on the trams, to the opposite end of the ovens, and downward into the moist air duct, from which it passes into the moist air gallery and is drawn out by means of the blower. Each oven is adapted to be operated independently of the other, so that when one or more ovens are being charged, the others are not affected.

IMPREGNATING WITH ANTISEPTIC CHEMICALS.

After the timbers have remained in the ovens a sufficient length of time to thoroughly dry and warm them, the trams are drawn out on to the transfer table and immediately run into the impregnating cylinders for chemical treatment. Each cylinder holds 12 trams, each of which carries between 45 and 50 ties, or approximatetly 560 ties per charge.

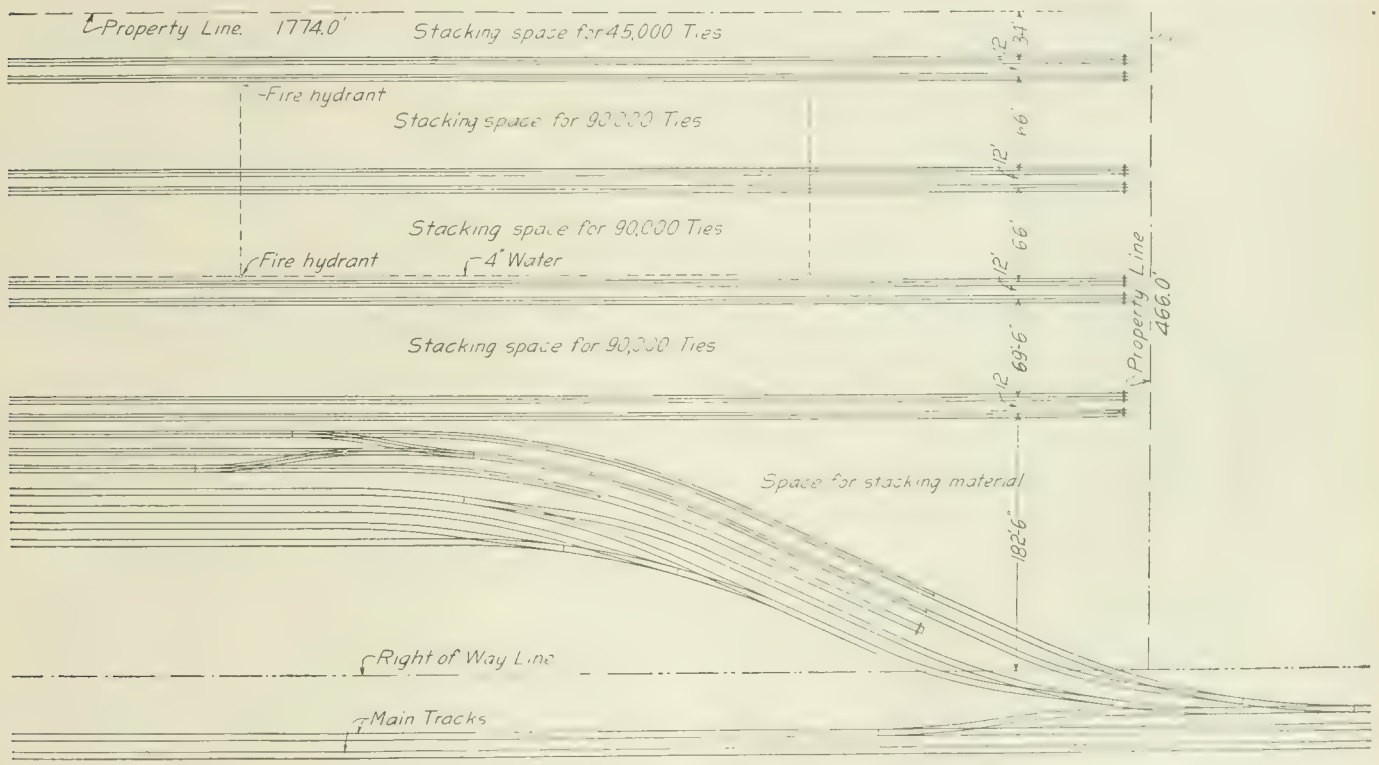
The duration of one complete operation in the impregnating cylinder is as follows:

Charging the cylinder with ties	15 minutes
Producing vacuum to 14 in.	45 "
Filling cylinder with chemical	15 "
Continuation of filling with pressure pump	90 "
Returning surplus chemical to working tank	15 "
Producing vacuum to hasten drying of ties	30 "
Blowing back last remnant of chemical to working tank	15 "
Opening door and discharging cylinder	15 "

Total, 240 minutes, or four hours.

In their order the first step is to produce a vacuum up to 14 in. of mercury and which should be attained within 30 to 45 minutes. The vacuum having been on for sufficient time it is held while the chemical is allowed to flow in, until the impregnating cylinder is completely filled, it being understood that the chemical, whether it be creosote, chloride of zinc, or a mixture of the two, has been previously heated by means of coils in the respective tanks to a temperature of 75 degs. F. When the air pressure in the impregnating retort reaches the atmospheric pressure, as shown by the vacuum gage, an air valve with an overflow pipe attached is opened to let the air escape from the retort, while filling. As soon as the fluid begins to flow in a full stream through the overflow pipe, the air valve is closed, and the force or pressure pump is put into action and kept working until a pressure of say 100 lbs. per sq. in. is obtained. The more the chemical penetrates the wood, the more the force pump has to be kept at work to maintain this necessary pressure, and the impregnation is considered complete when the manometer shows, for at least 20 minutes, that without further pumping the pressure has remained stationary at 100 lbs., thus showing that the chemical is no longer penetrating into the wood.

The duration of this phase of the operation varies from one to two hours, depending upon many factors, such as species of wood, its physical structure, proportion of heartwood and sapwood, degree of seasoning, size, shape, mass and other conditions, not a single one of which is sufficiently well defined to make it possible or practicable to segregate timbers into many groups for treatment. The treatment should, in all cases, be carried to "re-



Proposed Arrangement of Timber Treating Plant and Tracks.

fusal," which obviates the necessity for sorting ties or timbers into numerous groups.

When the timber has absorbed all of the chemical it can receive, the pressure pump is stopped and the solution valve opened. At the same time the air compressor pump which is connected with the dome on top of the impregnating cylinder, is put into action, pumping air into the cylinder and forcing the excess chemical back to the working tank from which it was originally drawn, through the solution pipes. The solution valves are then closed and a vacuum is immediately created in the cylinder by means of a vacuum pump. This vacuum, which need not exceed 14 in., is held about 30 minutes, or sufficient time to allow the ties to drip.

When ties or timbers attain a sufficient degree of dryness so that they can be handled comfortably, the vacuum is released and the dripping returned to the working tank. The tram loads are then drawn out and placed on a track in the yard, where they are transferred to standard gage gondola cars, by a locomotive crane, for shipment to destination.

YARD ARRANGEMENT.

A special feature of the plant, as shown in the drawings accompanying this article, is the entire absence of switches for running trams from one part of the yard to the other, and shifting of devices from track to track. Frequently the room or space, where a plant of this kind must be located, is limited and precludes the possibility of building a plant of the ordinary kind, with switches. Here a yard has been planned in which all of the tracks are parallel and relatively near to each other, and which are crossed by a transfer table, adapted to move back and forth and serve all tracks abutting thereon. The space required for a plant of this kind is about one-third less than required for the ordinary type. The length of the tracks is proportionately reduced. The plant is more compact and considerable saving in time and labor can be effected on that account. The maintenance and depreciation of tracks is materially reduced, and finally the entire cost of the plant entirely equipped is actually less than that of the plant of the ordinary type, of equal capacity.

APPROXIMATE COST OF PLANT.

The cost of the plant as described, completely equipped, exclusive of land, would be approximately as follows:

FOR PLANT.

Four miles of track and grading	$20,000
Six drying ovens with heating and ventilating apparatus and iron work, complete	16,000
Two steaming cylinders, saddles, piping, etc., installed	8,000
Two impregnating retorts, saddles, pipe connections, heating coils, etc., installed	12,000
Three 150 h. p. boilers set, complete	4,200
Iron, steel and wooden tanks, complete	10,400
Transfer table, electric motor, etc., installed complete	5,500
Brick buildings, including machine shop	18,000
Sewers	1,500
Pumps, air compressors, vacuum, pressure, general service, etc.	4,600
Piping, solution pipes, steam pipes, air pipes, valves, etc., installed complete in retort building	5,800
Fire hydrants and piping complete	2,500
Electric plant and generator, wiring, etc., complete	3,000
Scales, creosote and zinc chloride wells, driven wells, and miscellaneous items	4,000
	$115,500

FOR EQUIPMENT.

One 12-ton locomotive crane	$4,500
One switch engine, 10 in. x 16 in. cylinders	3,000
200 tram buggies	9,000
Adzing and boring machine, mounted on 40 ft. steel underframe car, exhaust fan, air compressor, complete	10,000
	$26,500

RECAPITULATION.

For plant	$115,500
For equipment	26,500
Total	$142,000

In addition to the above, it is necessary to carry a stock of creosote oil and zinc chloride, which would perhaps amount to $30,000 on the average the year round. The above plant can easily treat 1,500,000 ties annually, with reasonable allowance for breakdowns and interruptions, provided it is operated night and day. In the event the capacity was increased 1,000.000 or more, it would probably be necessary to add two units of five ovens each to the plant, which would cost approximately $25,000. It will be observed that such a plant requires only about 20 acres of land and the tracks amount to only four miles. Furthermore, there is no need of a loading platform, as the ties are transferred from tram cars to gondola cars with a crane, from the ground level. This saves approximately $3,000 in the installation of a plant.

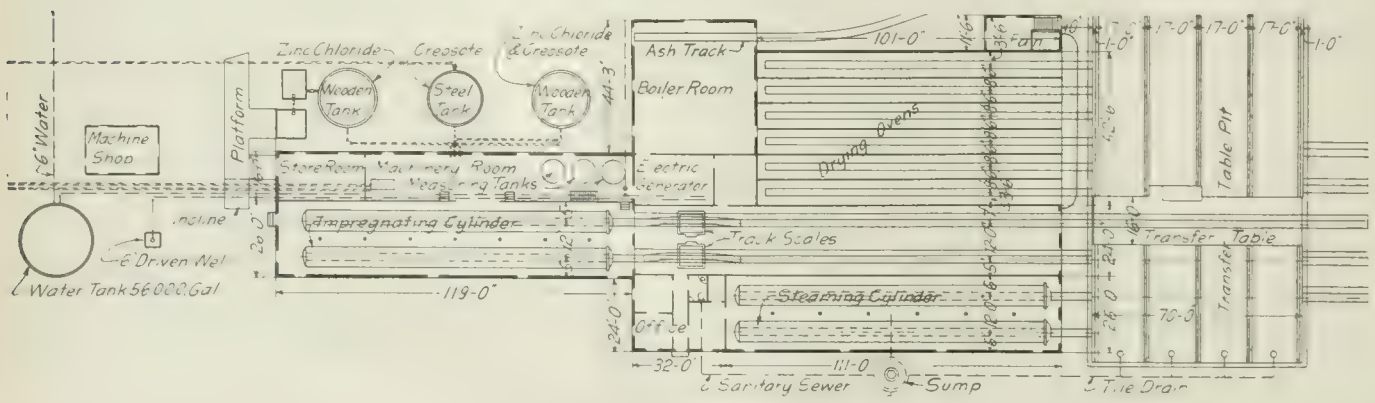
FOREIGN RAILWAY NOTES.

The president of Venezuela has approved the contract made by the department of public works with the representative of the Bolivar Railway Company on November 16, 1910, permitting the latter to import, free of duty, materials and tools absolutely necessary for the conservation and operation of the section of this railway between Tucacas and Aroa, to the extent of $193,000.

The president of Peru has approved the law passed by the Peruvian congress relating to the construction of railway branches from Trujillo to the mining camps at Salpo and Quiruvilca. This line is of especial importance, as it will open up for rapid development a large area of rich coal deposits. The branch line of the Oroyo-Tarma Railroad to Puerto Wertheman has also been approved.

The electrification of the railways of New Zealand in certain sections is now under contemplation by the government, especially where there are long tunnels, such as the one between Christchurch and Lyttelton, now the longest in the dominion, 1¼ miles long, and at the Otira tunnel and at the Rimutaka incline, between Wellington and Napier in the North island, where there is a grade averaging 1 ft. in every 3 ft., requiring two or three engines for hauling trains up the incline.

Except several very short railway lines owned by mining companies, all New Zealand railways are owned by the government, hence there is no competition such as applies to American railway systems, and there is not the incentive to rapidly branch out into new territory to get business as there is among railways in the United States, which have been obliged to show enterprise in order to get ahead of rivals. In New Zealand no competition would be permitted with existing government lines, which must, however, face considerable competition with coastwise boats.



Arrangement of Treating Plant.

General News Section.

The Boston & Maine is introducing motor cars for the use of track repairers.

The Prime Minister of Manitoba announces that a public service commission will be established in that province to supervise and regulate railways, gas works, electric lighting, telegraphs, etc.

The fast mail train of the Lake Shore & Michigan Southern on January 2 was run from Cleveland to Toledo, 108 miles, in 105 minutes, making up 40 minutes. The train consisted of 12 cars and was drawn by two engines.

The New York, New Haven & Hartford announces that henceforth free individual paper drinking cups will be provided on its trains for passengers. The use of a common cup for passengers is now forbidden by law in both Massachusetts and Connecticut.

The usual annual offer of the United States Steel Corporation to its employees of the privilege of subscribing to its shares on a deferred payment plan, enables the employees this year to buy preferred stock at $110 a share and common stock at $65 a share.

The mail car of the Southern Pacific Oregon express was robbed on January sixth of its registered mail while the train was running between Red Bluff and Redding, Cal. The two robbers bound and gagged the three mail clerks; and they escaped at the next station.

The Chicago & Eastern Illinois has advanced the wages of enginemen, firemen, conductors and brakemen, effective January 1, to the level of the scales paid on the Frisco lines west of the Mississippi river, this in accordance with an agreement reached last year by which the advance was to be made in two instalments. The present advance constitutes the second instalment.

The Pennsylvania Railroad finds that the capacity of its freight yards in 1897 aggregated accommodations for 103,789 cars; and in 1911 192,104 cars (lines east of Pittsburgh and Erie), an increase of 88,315 cars, or 85 per cent. The new yards at Northumberland afford track room for 5,944 cars. Facilities at Altoona have been more than trebled since the installation of the Hollidaysburg yard. These two are now required to do the work formerly done by the one at Altoona. Their combined capacity is nearly 16,000 cars.

A resolution has been introduced in congress by Representative Ayres, of New York, calling upon the Interstate Commerce Commission to investigate the repair shops of the railways belonging to the Trunk line association. It is declared that the differences in the cost of various things made by railways in their shops vary so greatly as between the shops of different roads that an investigation is needed. Railways are reporting higher costs for repairing cars and engines, yet the workmen in the shops do not see any benefit from the increase.

The New York, New Haven & Hartford has announced that the road from Stamford to Cedar Hill, a mile beyond New Haven, 41 miles, four-track all the way, is to be electrified and the work completed within two years. Operations will begin early next spring. With this extension the New Haven passenger trains will be drawn by electric locomotives 74 miles (New York to New Haven), and the new plans probably provide for the use of electric propulsion for both passenger and freight. The main line has a heavy freight traffic from New Rochelle to Cedar Hill, 58 miles.

The California legislature, at a special session, acting under the provisions of the recent amendments to the state constitution, has made changes in the Employers' Liability Law, both houses having passed Senate bills 11, 12 and 22. There will be an industrial accident board with authority in connection with all industries in the state; and employers failing to meet the requirements of the board are liable to penalties. Farmers, horticulturists, dairymen and a few other classes, are exempted. An appropriation has been made for the collection of data concerning accidents, with a view to formulating a basis for insurance and indemnity laws.

It is impossible to tell at the present time what the loss will be to the Harriman Lines from the burning of the Equitable building, 120 Broadway, New York, on January 9.. Many of the records are contained in vaults on the third and fourth floors, including the stock transfer records, comptroller's books and accounts, corporate records and the treasurer's and secretary's accounts. It is probable that the records of W. V. S. Thorne, director of purchases, have been destroyed. The great bulk of the securities of the treasurer are kept in another building. The most serious damage will probably be the loss of the stock transfer records. The operating, traffic and legal departments had already been moved to the new office, 165 Broadway.

Thomas A. Edison, the inventor, held a short conference with officers of the Illinois Central on Saturday, January 6, and in an interview later convinced the Chicago newspapers that he had solved the problem of operating the Chicago railway terminals by electricity. W. L. Park, vice-president and general manager; M. K. Barnum, general superintendent of motive power, and C. F. Parker, purchasing agent, conferred with Mr. Edison and arrangements were made for an experimental test of three passenger motor cars to be equipped with storage batteries at the Edison shop. Mr. Edison asserted that the batteries can be charged in 40 minutes for a run of 200 miles. The Chicago Great Western has recently arranged for a test on a branch line of a similar car which has already been tried on the Long Island.

New Mileage Built and Cars Ordered by Electric Railways During 1911.

The total number of new miles of track laid by electric lines in the United States and Canada during 1911 was 1,191 miles, as compared with a total of 1,397 miles built in 1910. California heads the list of states with 120 miles, and North Carolina and Illinois each built 104 miles. The new cars of all kinds ordered by the electric railways totals 4,015 cars, which is a decrease of 1,466 from the number ordered in 1910. Of the total, 2,884 were city passenger cars, 626 interurban passenger cars, and 505 freight and miscellaneous cars.—*Electric Railway Journal.*

Governor Wilson Demands a Full Crew Law.

"We have done much toward securing justice and safety for the workingmen of the state in our factory laws, our tenement-house legislation, and our Employers' Liability act, but we have not done enough. Our workmen very justly demand further legislation with regard to the inspection and regulation of factories and work shops, and I recommend legislation of this kind to your very careful and earnest consideration. I recommend, moreover, the passage at an early date of an act requiring the railways operating within this state to provide their trains with adequate crews. Our sister state of Pennsylvania has adopted legislation of this kind, and the railways whose lines cross from Pennsylvania into New Jersey actually carry full crews to the border of this state, and then send their trains on through New Jersey with diminished crews, to the jeopardy, as I believe, of life and property; requiring more of the small crew than it can safely and thoroughly do."—Annual message of the governor of New Jersey.

U. S. Unfilled Tonnage.

The monthly statement of the United States Steel Corporation shows unfilled orders on December 31 amounted to 5,084,761 tons, as compared with 4,141,955 tons on November 30; 3,694,328 tons on October 31, and 2,674,757 tons on December 31, 1910. Unfilled tonnage at the end of the year was the highest since March, 1910, at the end of which month this item amounted to 5,402,514 tons. At the end of 1906 unfilled tonnage stood at 8,489,718 tons,

the largest ever recorded by the company. The United States Steel Corporation has a capacity of about 43,000 tons a day, so that orders now on hand would be sufficient to keep the various plants running full for a four months' period if no more orders were booked. Operations, however, are at 85 per cent. capacity, which is equal to about 37,000 tons a day, or more than 11,000,000 tons a year.

Business of Soft Coal Roads in 1911.

Authorities differ as to the volume of bituminous coal produced during 1911, but from the forecasts available at this time, in the light of the usual increase in tonnage produced during November and December, it would seem a conservative prediction that the production will be little, if any, in excess of that for the year 1910.

Coal trade during the first half of this year was undoubtedly much depressed on account of the slackened business of industrials; this is especially true regarding the steel manufactures. Despite the restricted output of bituminous coal, with a few exceptions, the principal carriers of that commodity show increased gross revenues for the ten months' period ended October 31, 1911. The Baltimore & Ohio and the Western Maryland are the principal soft coal carriers to suffer reduction in revenues. Norfolk & Western, the Chesapeake & Ohio and the Virginian Railway, by reason of their location in the midst of rapidly developing soft coal fields in the Virginias and Kentucky, have naturally shared in the advance of bituminous production in that locality.

The latest reports available in connection with the soft coal traffic show that ten leading roads of the East carried 113,381,803 tons during the ten months ended October 31, compared with 112,294,031 tons in the same period of same year, a gain of 1,087,772 tons, or 0.97 per cent. Shipments to the five Atlantic coal ports during the period above mentioned show an advance from 21,508,798 tons last year to 22,316,286 tons this year, an increase of 807,488 tons, or 3.76 per cent. Among these ports Norfolk showed the largest gain in tonnage of bituminous coal, indicating some advance in the coal tonnage of Norfolk & Western eastbound.—*Wall Street Journal.*

Burlington Organizes Department of Safety.

Darius Miller, president of the Chicago, Burlington & Quincy, has addressed a circular letter to each of the 45,000 employees of this road, announcing the organization of a department of safety similar in its general plan to the safety committees formed on the Chicago & North Western, the St. Louis & San Francisco, the Baltimore & Ohio, the Chicago Great Western and the Delaware, Lackawanna & Western.

The department will be in charge of E. M. Switzer, who will have the title of superintendent of safety, and will be assisted by a central or advisory committee, with headquarters at Chicago. On each operating division there will be a sub-committee, with separate sub-committees for some of the more important shops and other places where large numbers of men are employed. These sub-committees will be composed largely of employees from the different classes of service, supplemented and assisted by certain of the division officers. The sub-committees will meet monthly, and will be expected to report and discuss all matters that have come under their observation involving the safety of employees or others, and to endeavor to enlist the co-operation and interest of all employees in the promotion of safety.

The central or advisory committee will consist of the following: E. P. Bracken, assistant general manager; J. A. Connell, attorney Iowa lines; J. A. Denney, medical director and assistant superintendent relief and employment departments; W. L. Breckenridge, engineer maintenance of way; J. W. Cyr, superintendent motive power lines east of Missouri river; T. Roope, superintendent motive power lines west; L. B. Allen, general superintendent Nebraska district; A. W. Newton, general inspector permanent way and structures.

In his circular to employees Mr. Miller says in part:

"It is very plain to those who have the duty of investigating injuries to persons that a great many of them are entirely unnecessary, and would not have occurred if proper precautions had been taken. The object in sending this personal letter to you is to solicit your interest in the matter of preventing personal injuries of every character, and to secure your earnest co-operation with the local committee which will be formed in your territory. I hope you will inform yourself regarding your committee and support its work. This you can do in large measure by avoiding all unnecessary risks in your own work and using all possible care to avoid injuries to yourself or your co-employees. The company will continue its efforts to reduce and remove, as far as possible, the elements of danger that may surround your work, and you can assist it by reporting to your superior officer conditions of ways or structures that appear to threaten injury, dangerous methods of work that can be improved, or careless employees whose conduct is likely to produce injury to themselves or others.

"If every employee on the Burlington will respond to this request for co-operation and assistance, we believe that by the exercise of greater care on the part of employees, and the provision of better safeguards on the part of the company, a very large decrease in the number of injuries can be accomplished, and much pain, unhappiness and loss of time on the part of employees and others can be avoided."

Chicago Great Western Station Agents' Association.

The Chicago Great Western Station Agents' Association was recently organized for the purpose of bringing station agents and station employees into closer relationship with each other and with heads of departments. The plan adopted by the educational committee in organizing this association contemplated a local organization on each division, each local organization to be part of a general association comprising the whole system. These local associations have been organized and successful meetings have been held on several divisions. These have been attended not only by the agents and station employees of the divisions represented, but by officers. Following the business meeting, enginemen, trainmen and other employees were invited to join in a good fellowship gathering. A meeting of the northern division was held at St. Paul on November 25.

It is now proposed to hold a general get-together meeting, or, in fact, two meetings, one to complete the organization of the Station Agents' Association, and another to be in the nature of a good fellowship meeting in the evening. These meetings will be held at Oelwein, Iowa, on January 27, and will be attended by representatives from all divisions. Enginemen, trainmen, yardmen and office men are invited to the evening meeting. Later a similar organization may be formed for the shop men, roundhouse men, track and bridge men. Some officers, including General Manager H. J. Slifer, will be in attendance, but it is announced that the meeting is to be entirely in the hands of the employees, who will be expected to do most, if not all, of the talking. The employees are asked to come prepared to take up any subject which they think will be of interest to their fellow workers; but there are four suggested by the company as especially profitable for discussion as follows:

1. How can I increase the revenue of the company?
2. How can I improve the freight or passenger service of the company?
3. How can I effect economies for the company?
4. How can I advance the welfare of the company?

In the circular addressed to employees by General Manager Slifer to announce the meeting, he said:

"I consider myself an employee with the rest of you, and I expect to be on hand as an employee—not as an official—and as I said before, I want to see as many of my fellow employees there as possible, and I want as many of you who feel so inclined to prepare short papers on one or more of the topics mentioned above, or on any other topic that you may see fit to bring up for discussion. You may not have the gift of making extemporaneous speeches, but you can put your thoughts on paper and read them. If you do not want to do this or if you will not be able to attend the meeting, prepare your paper anyway and send it to the secretary, H. Ernest, who will read it for you. To make it even easier for you I will agree to have your paper read even if it is not signed, provided of course there is nothing objectionable in it. We want your thoughts and suggestions and do not want to be deprived of them on account of a little modesty on your part. Simply send in your ideas and they will be read at the meeting, although I would much prefer to have the author present to read them in person."

Railway Appliances Association.

The Railway Appliances Association will hold its fourth annual exhibit of appliances used in the construction, maintenance and operation of railways at the Coliseum, Chicago, March 18 to 23, inclusive, at the time of the annual convention of the American Railway Engineering Association. The exhibit will occupy not only the entire main floor, annex and balcony of the Coliseum, as in previous years, but also the First Regiment Armory, Michigan avenue and Sixteenth street, containing 16,000 sq. ft. of net floor space for exhibit purposes, which, with the Coliseum, will give a total of 54,000 sq. ft. of exhibit space. In spite of the additional amount of space available this year, practically all, or over 50,000 sq. ft., has already been reserved by the different exhibitors.

Many of those who have exhibited in former years have reserved larger spaces for the display of their exhibits this year than before, and there are many new exhibitors in the list, including several manufacturers of appliances pertaining more to the mechanical than to the construction or maintenance department. On Tuesday of the week devoted to the exhibits, the American Railway Engineering Association will adjourn its session at 4 p. m. for the purpose of giving the railway men an opportunity to devote the remainder of the afternoon and evening to the inspection of the exhibits.

Applications for space should be made to Bruce V. Crandall, secretary, 537 South Dearborn street, Chicago.

Following is a list of exhibitors who have secured space:

Adams & Westlake Co., Chicago.
Ajax Forge Co., Chicago.
Alexander Crossing Co., Clinton, Ill.
American Casting Co., Birmingham, Ala.
American Concrete Pile and Pipe Co., Chicago.
American Guard Rail Fastener Co., Philadelphia, Pa.
American Hoist & Derrick Co., Chicago.
American Iron & Steel Manufacturing Co., Lebanon, Pa.
American Railway Signal Co., Cleveland, Ohio.
American Rolling Mill Co., Middletown, Ohio.
American Steel & Wire Co., Chicago.
American Valve and Meter Co., Cincinnati, Ohio.
American Vulcanized Fibre Co., Wilmington, Del.
American Well Works, Aurora, Ill.
Armspear Manufacturing Co., New York.
Asphalt Ready Roofing Co., New York.
Barrett Manufacturing Co., New York.
Bausch & Lomb Optical Co., Rochester, N. Y.
Beaver Dam Malleable Iron Co., Beaver Dam, Wis.
Blaw Collapsible Steel Centering Co., Pittsburgh, Pa.
Blocki-Brennan Refining Co., Chicago.
Boss Nut Co., Chicago.
Bossert Manufacturing Co., W. F., Utica, N. Y.
Bowser & Co., S. F., Fort Wayne, Ind.
Bryant Zinc Co., Chicago.
Buda Co., Harvey, Ill.
Buyers Index Co., Chicago.
Canton Culvert Co., Canton, Ohio.
Carey Co., Philip, Cincinnati, Ohio.
Carnegie Steel Co., Pittsburgh, Pa.
Carpenter & Co., George B., Chicago.
Chicago Bridge & Iron Works, Chicago.
Chicago Pneumatic Tool Co., Chicago.
Chicago Steel Tape Co., Chicago.
Cleveland Frog and Crossing Co., Cleveland, Ohio.
Clyde Iron Works, Chicago.
Columbia Nut & Bolt Co., Inc., Bridgeport, Conn.
Concrete Form and Engine Co., Detroit, Mich.
Conley Frog and Switch Co., Memphis, Tenn.
Cook's Standard Tool Co., Kalamazoo, Mich.
Crane Co., Chicago.
D. & A. Post Mold Co., Three Rivers, Mich.
Des Moines Bridge & Iron Works, Des Moines, Iowa.
Detroit Graphite Co., Chicago.
Dickinson, Inc., Paul, Chicago.
Dietzgen Co., Eugene, New York.
Dilworth, Porter & Co., Ltd., Pittsburgh, Pa.
Dixon Crucible Co., Joseph, Jersey City, N. J.
Drouve Co., G., Bridgeport, Conn.
Eastern Granite Roofing Co., New York.
Economy Spearable Switch Point Co., Inc., Louisville, Ky.
Edison, Inc., Thomas A., Orange, N. J.
Electric Railway Journal, New York.
Electric Storage Battery Co., Philadelphia, Pa.
Fairbanks, Morse & Co., Chicago.
Federal Cement Tile Co., Chicago.
Federal Signal Co., Albany, N. Y.
Foster, Frank M., Columbus, Ohio.
Franklin Manufacturing Co. of Pennsylvania, Franklin, Pa.
Fruit Growers' Refrigerating & Power Co., Anna, Ill.
General Electric Co., Schenectady, N. Y.
General Railway Signal Co., Rochester, N. Y.
Greenlee Bros. & Co., Rockford, Ill.
Grip Nut Co., Chicago.
Hall Signal Co., New York, N. Y.
Handlan-Buck Manufacturing Co., Chicago.
Hart Steel Co., Elyria, Ohio.
Hatfield Rail Joint Manufacturing Co., New York.
Hayes Track Appliance Co., Richmond, Ind.
Hobart-Allfree Co., Chicago.
Hubbard & Co., Pittsburgh, Pa.
Indianapolis Switch & Frog Co., Springfield, Ohio.
Ingalls-Shepard Forging Co., Chicago.
Inland Steel Co., Chicago.
Interlocking Nut & Bolt Co., Pittsburgh, Pa.
International Automatic Signal Co., Chicago.
International Steel Tie Co., Cleveland, Ohio.
Johns-Manville Co., H. W., New York.
Jordan Co., O. F., Chicago.
Joyce-Cridland Co., Dayton, Ohio.
Kalamazoo Railway Supply Co., Kalamazoo, Mich.
Kerite Insulated Wire & Cable Co., New York.
Kernchen Co., Chicago.
Lackawanna Steel Co., Buffalo, N. Y.
Lebanon Engineering Co., Lebanon, Pa..
Lidgerwood Manufacturing Co., Chicago.
Lorain Steel Co., Chicago.
Lufkin Rule Co., Saginaw, Mich.
Lupton's Sons Co., David, Philadelphia, Pa.
Lutz-Lockwood Manufacturing Co., Aldene, Union Co., N. J.
Massey Co., C. F., Chicago.
Matthews & Rothermel, Chicago.
Milburn Co., Alexander, Baltimore, Md.
Moore & Sons Corp., Samuel L., Elizabeth, N. J.
Morden Frog & Crossing Works, Chicago.
Mudge & Co., Burton W., Chicago.
Nachod Signal Co., Philadelphia, Pa.
National Carbon Co., Cleveland, Ohio.
National Lock Washer Co., Newark, N. J.
National Malleable Castings Co., Chicago.
National Roofing Co., Tonawanda, N. Y.
National Surface Guard Co., Chicago.
Nichols & Bro., George P., Chicago.
Northwestern Manufacturing Co., Milwaukee, Wis.
Okonite Co., New York.
Spencer Otis Co., Chicago.
P. & M. Co., Chicago.
Patterson Co., W. W., Pittsburgh, Pa.
Pease Co., C. F., Chicago.
Pennsylvania Steel Co., Chicago.
Pittsburgh Steel Co., Pittsburgh, Pa.
Pocket List of Railway Officials, New York.
Potter-Winslow Co., Chicago.
Q. & C. Co., New York.
Rail Joint Co., New York.
Railroad Supply Co., Chicago.
Railway Age Gazette, New York.
Railway & Supplymen's Mutual Catalogue Co., Chicago.
Railway List Co., Chicago.
Railway Review, Chicago.
Ramapo Iron Works, Hillburn, Rockland Co., N. Y.
Roberts & Schaefer Co., Chicago.
Sandwich Electric Co., Sandwich, Ill.
Scherzer Rolling Lift Bridge Co., Chicago.
Sellers Manufacturing Co., Chicago.
Signal Engineer, Chicago.
Snow Construction Co., T. W., Chicago.
Standard Asphalt & Rubber Co., Chicago.
Standard Underground Cable Co., Pittsburgh, Pa.
Stark Rolling Mill Co., Canton, Ohio.
Strait Scale Co., Chicago.
Strauss Bascule Bridge Co., Chicago.
Templeton, Kenly & Co., Ltd., Chicago.
Trussed Concrete Steel Co., Detroit, Mich.
Union Switch & Signal Co., Swissvale, Pa.
U. S. Wind Engine & Pump Co., Batavia, Ill.
Universal Concrete Tie Co., New Orleans, La.
Universal Metallic Tie Co., Salt Lake City, Utah.
Verona Tool Works, Chicago.
Weber Chimney Co., Chicago.
Weir & Craig Manufacturing Co., Chicago.
Weir Frog Co., Cincinnati, Ohio.
Whall & Co., C. H., Boston, Mass.
Wharton, Jr., & Co., Incorporated, William, Philadelphia, Pa.
Wilson Railway Gate Co., Birmingham, Mich.
Winans Improved Patent Rail Joint Co., Portland, Ore.
Winslow Co., Horace L., Chicago.

Transportation Club of New York.

An annual exposition of travel and traffic, under the auspices of the Transportation Club of New York, will be held at the Grand Central Palace, New York, April 25-May 4, by the International Exposition Company of New York, under an arrangement entered into between the club and that company. This exposition will be patterned somewhat after similar expositions held successfully in London, England, and Berlin, Germany. The exhibits will be made by transportation companies and by health and other resorts, hunting camp sections and all allied interests. A Show Committee of five members of the club has been appointed to look after the details in co-operation with the International company. One of the principal functions of this committee will be the organization of an historical exhibit embracing all the interesting relics that can be found relating to the development of transportation from its inception. D. W. Pardee is secretary of the Transportation Club of New York.

American Society of Engineering Contractors.

The third annual meeting of the American Society of Engineering Contractors was held in New York, January 9. In the morning members of the society inspected the work being done by the New York Central & Hudson River, in connection with its new terminal, at the invitation of W. L. Morse, terminal engineer of the New York Central & Hudson River. A business meeting was held in the afternoon. In the evenig J. R. Wemlinger gave a talk on Methods and Costs of Driving and Pulling Steel Sheet

Piling. Major C. E. Gillette, Philadelphia, Pa., was elected president; H. J. Cole, New York, first vice-president, and J. Marshall, Regina, Canada, second vice-president.

American Electric Railway Association.

The annual conference of the executive heads of the member companies of the American Electric Railway Association will be held in New York, January 26. Only matters of pressing interest will be considered and a report of recommendation and instructions will be made to the executive committee. The regular mid-year meeting of the executive committee will also be held in New York, January 25. A banquet, of which the date has not yet been announced, will be given to the members of the executive committee and the visiting officials by the American Electric Railway Manufacturers' Association.

Cleveland Engineering Society.

At the regular meeting of the Cleveland Engineering Society, held in Cleveland, Ohio, January 9, an illustrated paper on Railway Signaling was presented by C. E. Denney, signal engineer of the Lake Shore & Michigan Southern. F. W. Ballard is secretary.

Western Society of Engineers.

W. C. Armstrong, bridge engineer of the Chicago & North Western, has been elected president of the Western Society of Engineers; A. Bennett, first vice-president; G. T. Seeley, second vice-president; E. C. Shankland, third vice-president, and A. Reichman, treasurer.

Railway Club of Pittsburgh.

At the meeting of the Railway Club of Pittsburgh, to be held in Pittsburgh, Pa., January 26, an illustrated paper on Oxy-acetylene Welding and Cutting will be presented by J. A. Warfel.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.; annual, May 7-10, Richmond, Va.

American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass.; annual, May 10-11, San Francisco, Cal.

American Association of General Passenger and Ticket Agents.—W. C. Hope, New York; next convention, Seattle, Wash.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Chicago.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September; annual, March 17, Chicago.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York.

American Electric Railway Manufacturers' Assoc.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

American Railway Association.—W. F. Allen, 75 Church St., New York.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

American Railway Master Mechanics' Assoc.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

American Railway Tool Foremen's Association.—M. H. Bray, N. Y., N. H. & H., New Haven, Conn.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Car Accounting Officers.—G. P. Conrad, 75 Church St., New York.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.

Engineers Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July, 23-26, Chicago.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

Iowa Railway Club.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

Master Car and Locomotive Painters' Assoc. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass. Convention, 2d week in September.

National Railway Appliances Assoc.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railway Club.—C. L. Kennedy, C., M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Business Association.—Frank W. Noxon, 2 Rector St., New York.

Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio. Convention, May 20-22, Buffalo, N. Y.

Railway Supply Manufacturers' Assoc.—J. D. Conway, 2135 Oliver Bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

Railway Tel. & Tel. Appliance Assoc.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling; September, 1912, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Dertoit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; August, 1912.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month except July and August, Chicago.

Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md.; annual, January 16-18, Chicago.

Traffic News.

The Nevada-California-Oregon Railway is now running trains regularly on its extension northward from its former terminus to Lakeview, Ore., 37 miles.

Press despatches from Boston report a serious congestion of freight on the steamship docks because of a strike of longshoremen, which began last week.

The fifth annual dinner of the Chicago Transportation Association was held on January 9 at the Auditorium Hotel, Chicago. William Hodgdon, freight traffic manager of the Pennsylvania Lines, was one of the speakers.

At New York on Friday last, five pence a bushel was paid for carrying 16,000 bushels of corn to London; said to be the highest rate for such service since 1891. It was an emergency shipment to fill a delayed contract.

The Chicago & Alton has restored its former fast freight schedules from Chicago to Kansas City, and St. Joseph, giving a second morning delivery. Last winter the Alton and other lines lengthened schedules to give a third morning delivery.

The Western Classification Committee has issued its docket for the semi-annual classification meeting to be held at Galveston on January 16. The docket includes a list of 404 subjects, among which are several that were disposed of at the Milwaukee meeting last summer, but in which the decisions have been opposed by shippers.

The Florida East Coast Railway is to be opened to Key West January 22, and the president of the United States, on behalf of the city of Key West, has invited foreign nations to be present at a celebration which will be held on that day. Many of the foreign ministers in Washington will go, or send representatives.

The transportation bureau of Wichita, Kan., has passed resolutions calling on Kansas senators and representatives in Congress to support legislation for the abolition of the commerce court. Endorsement is also given to the proposals to amend the act to regulate commerce so as to give the Interstate Commerce Commission the right to prescribe minimum as well as maximum rates, and to give it jurisdiction over coastwise steamship traffic and rates.

The Grand Trunk has withdrawn its offer of a commission of $3 on immigrant passengers, which was sent to the steamship lines a few weeks ago; and it is understood that the other railways taking passengers west from New York have agreed to admit the Grand Trunk as a partner in their immigrant office at Ellis Island, New York harbor. It is expected that a tariff will be issued showing emigrant rates over the Grand Trunk from New York to points in western Canada.

At a meeting of the Western Passenger Association on January 4, it was decided to make two cents a mile the minimum rate for conventions and special excursions. Homeseekers' rates are to be made on the same basis as last year. Action on summer tourist rates was postponed until next month. An effort is being made to bring about an increase of $2.50. The association also reaffirmed the rule previously adopted by it providing for an excess baggage charge on trunks over 45 in. long, equal to that for 10 lbs. for each inch of excess.

It is reported in Washington that negotiations between the American government and representatives of Canada, looking to a joint international commission to regulate railway rates between the United States and Canada, as the Interstate Commerce Commission regulates them in this country, have been given up, the British government apparently having decided that such a joint body would help promote reciprocity in trade, whereas the last election in Canada condemned the idea of reciprocity. Former Chairman Knapp, of the Interstate Commerce Commission, and the chairman of the Canadian commission, held a number of conferences on this subject last year.

All of the independent steel and iron companies in Alabama and Tennessee have decided to apply to the Interstate Commerce Commission for reductions in freight rates. They claim that the railways of the South, particularly the Louisville & Nashville and the Southern Railway, are maintaining high rates so that the United States Steel Corporation may continue to command the markets of the North and West to the detriment of the companies in the South. The principal point at issue is the freight on iron from the Birmingham and Tennessee districts to Ohio river points. In 1906 and the early part of 1907, the railways advanced freight rates on iron to Ohio river points $1 a ton. At first, when iron was selling at $15 a ton, the railways advanced the freight rate 50 cents a ton, and then, when the price of iron advanced to $20 a ton, the railways, according to these steel men, imposed a further charge of 50 cents. No objection was made to these advances at the time, the iron and steel companies doing a profitable business and having no objection to the railway sharing in that prosperity.

The activities of the Southern Railway in promoting agriculture in all its branches throughout the states traversed by the company's lines, have been frequently noticed in these columns. Speaking of the success of this work, an officer of the road tells us that on the occasion of one of the educational excursions in southern Virginia some time ago, an agent of the land and industrial department of the road took the names and addresses of a large number of farmers attending the lectures; and on sending out a circular letter, a year later, he received replies from 48 of these men, almost everyone of whom told of specific benefits which he had derived from listening to the lectures. There is no doubt that much improvement is accomplished which cannot be measured. The United States agricultural department at Washington reports increases in the average yields per acre of all crops reported on in each of the states traversed by the Southern Railway Lines, and the officers of the railway feel justified in believing that their agricultural instruction trains are to be credited with some of this improvement.

The Long Island Railroad Company has issued a circular showing that 9,046 buildings were erected on Long Island (exclusive of Long Island City and old Brooklyn) during 1911. Of this number 7,429 were dwellings, 820 stores, 44 factories and 753 miscellaneous. The total shows an increase of 529 over the previous year, and compared with the number of structures put up in 1905—when the road first started to make compilations of building operations—it indicates a gain of over 50 per cent. For the benefit of prospective homeseekers and others, the circular contains a map showing where the residential sections are located, where factories can be built, where the best summer resorts are found, where farms are under cultivation, and where golfers, fishermen and huntsmen may find these pleasures. On September 8 last, the Long Island completed its first year's operation of trains to and from New York City through the Pennsylvania Railroad's East river tunnels. During that period the Long Island took about six million passengers to or from the Pennsylvania station in Manhattan, in 87,000 trains. During the year previous to the opening of the tunnels there were 137,937 commutation tickets sold on Long Island, while during the first year of the operation of the tunnel route, there were 151,931 tickets sold—an increase of 19,994. The Long Island road has spent enormous sums of money and is still making large expenditures for new cars, new stations and the elimination of grade crossings. Work is now under way on the North Side division, which involves the construction of a new line between Woodside and Winfield, and the electrification of the line to Port Washington and Whitestone Landing, together with the abolition of many grade crossings.

INTERSTATE COMMERCE COMMISSION.

The commission has suspended until May 11 the proposed advances (amounting to about 10 per cent.) on bituminous coal made by the railways in western Trunk Line Association territory.

Commissioner Prouty has been elected chairman of the commission, to succeed Chairman Clements. This is in accordance with a rule adopted last year that the term of office of the chairmanship should be limited to one year and be filled from year to year by different members in the order of seniority in service.

The iron and steel manufacturers of the Youngstown district of Ohio have filed a complaint with the Interstate Commerce Commission attacking the rate of 56 cents a ton on iron ore from Ashtabula harbor, the rate of $1.35 a ton on coke from the Connellsville district, and the 70-cent rate on coal from the Pittsburgh district.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF NOVEMBER, 1911.

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Alabama & Vicksburg	142	$114,529	$38,527	$163,406	$21,293	$33,006	$3,871	$53,684	$5,066	$116,920	$46,486	—$346	$5,726	$40,414	$875
Alabama Great Southern	309	500,102	89,967	424,618	48,346	95,817	10,701	127,724	10,373	292,961	131,657	—462	15,048	116,147	21,910
Ann Arbor	291	130,059	43,397	185,165	20,828	17,755	4,189	64,094	7,662	114,528	70,637	—307	13,986	56,344	—209
Arizona Eastern	366	114,308	35,285	159,538	25,043	14,883	2,044	42,176	5,882	90,028	69,510	159	14,000	55,669	13,165
Atchison, Topeka & Santa Fe	7,613	5,597,335	1,879,533	8,054,811	1,114,668	1,115,169	177,119	2,270,227	157,009	4,834,192	3,220,619	.....	328,308	2,892,311	—63,319
Atlantic Coast Line	4,533	2,010,241	636,956	2,855,684	344,509	405,776	42,118	956,385	70,646	1,819,434	1,036,250	.....	107,000	928,250	—19,623
Baltimore & Ohio—System	4,433	6,000,319	1,110,655	7,583,335	964,955	1,361,639	168,753	2,735,350	165,264	5,355,961	2,227,374	- 64,443	248,805	1,914,126	333,518
Baltimore & Ohio Chicago Terminal	77	.....	1,916	143,954	25,020	21,671	751	61,864	3,645	112,951	30,103	841	18,206	12,738	17,010
Bangor & Aroostook	627	211,872	53,676	278,220	46,519	33,274	5,401	85,322	10,268	180,784	97,436	.....	9,250	88,186	7,197
Bessemer & Lake Erie	203	54,092	23,084	574,424	77,665	118,031	6,405	169,401	7,819	379,321	195,103	.....	7,000	188,103	23,676
Boston & Maine	2,224	2,397,182	1,188,370	3,861,080	553,468	497,576	28,578	1,720,911	73,794	2,874,327	987,753	15,560	178,586	824,727	—29,563
Buffalo, Rochester & Pittsburgh	572	655,480	77,455	753,104	75,319	152,682	9,358	261,564	16,504	515,427	237,677	—75	17,000	220,602	—46,036
Butte, Anaconda & Pacific	46	75,138	5,909	86,878	13,094	19,325	635	41,736	2,451	77,231	9,647	.....	2,850	6,797	—2,495
Carolina, Clinchfield & Ohio	238	172,005	10,582	186,162	11,131	21,254	5,803	37,145	7,396	82,729	103,433	.....	8,000	95,433	30,828
Carolina, Clinchfield & Ohio of S. C.	17	11,015	1,541	13,880	811	78	928	2,950	540	5,287	7,593	.....	500	7,093	2,675
Central of Georgia	1,915	833,621	299,681	1,251,803	154,842	197,920	36,575	415,588	49,078	854,003	397,800	4,118	43,080	358,838	—32,406
Central of New Jersey	671	1,765,915	417,801	2,311,100	269,159	312,417	27,005	678,415	43,786	1,330,782	980,408	—16,830	95,238	865,340	36,505
Central New England	276	276,671	94,215	394,973	41,222	20,745	1,460	82,504	2,616	148,547	166,426	—155	9,000	157,271	45,110
Charleston & Western Carolina	340	126,310	31,482	167,841	32,615	24,555	3,155	65,261	3,936	129,522	38,319	.....	5,000	33,319	—25,899
Chesapeake & Ohio Lines	2,241	3,138,688	467,767	3,651,817	353,098	516,385	52,065	825,663	64,471	1,811,682	840,135	- 3,313	68,083	768,739	—85,222
Chicago & Alton	1,025	860,835	295,794	1,245,791	187,672	264,835	42,135	478,427	35,054	1,007,123	237,668	—3,632	36,500	197,536	11,548
Chicago & Eastern Illinois	1,175	1,054,480	241,068	1,371,321	149,694	262,872	31,361	510,637	41,051	995,615	375,706	- 4,756	38,500	332,450	—21,330
Chicago & Erie	369	361,116	55,230	459,337	55,577	75,244	19,047	219,729	11,471	381,068	78,269	.....	16,450	61,819	11,751
Chicago & Northwestern	7,764	4,044,525	1,516,099	6,246,301	733,741	810,178	128,725	2,622,779	118,368	4,412,791	1,833,510	—4,983	275,000	1,553,527	—302,041
Chicago, Burlington & Quincy	9,054	5,225,755	1,645,749	7,563,299	720,615	1,270,279	124,659	2,500,973	168,752	4,803,278	2,760,021	—14,682	264,412	2,480,927	—187,388
Chicago Great Western	1,496	765,985	230,432	1,079,289	129,358	153,828	45,377	451,616	36,628	816,807	262,482	—190	33,037	229,255	—21,504
Chicago, Indiana & Southern	359	283,793	91,871	393,481	45,642	71,768	6,764	122,482	8,155	254,811	58,670	36	13,900	44,806	—41,750
Chicago, Indianapolis & Louisville	616	338,745	126,222	515,733	75,306	74,345	16,055	199,730	14,673	380,009	135,724	.....	23,414	112,310	12,584
Chicago, Milwaukee & Puget Sound	2,058	1,155,212	205,362	1,406,043	76,229	162,069	49,157	545,838	18,075	851,368	554,675	14,205	79,334	489,546	—207,727
Chicago, Milwaukee & St. Paul	7,511	3,804,002	1,043,376	5,402,186	617,730	783,047	103,665	2,282,694	85,346	3,872,482	1,529,704	—12,868	239,948	1,276,888	152,456
Chicago, Peoria & St. Louis	255	110,430	26,174	144,309	17,019	26,456	7,296	66,459	6,340	123,550	20,759	.....	4,300	16,459	7,222
Chicago, Rock Island & Gulf	476	208,603	51,678	277,289	24,904	22,424	10,767	92,037	8,207	157,839	119,450	—189	1,400	117,861	—42,410
Chicago, Rock Island & Pacific	7,551	3,576,134	1,435,861	5,352,991	759,405	692,008	155,874	2,137,365	137,916	3,882,568	1,470,423	—20,551	232,480	1,217,392	—487,930
Chicago, St. Paul, Minneapolis & Omaha	1,743	918,659	375,392	1,392,113	112,051	150,469	25,305	578,077	29,530	895,422	496,691	—468	68,530	427,693	—111,499
Chicago, Terre Haute & Southeastern	351	149,430	15,503	168,926	24,598	22,972	2,646	51,405	7,455	109,076	59,850	—198	8,700	50,952	.....
Cincinnati, New Orleans & Texas Pacific	337	613,831	136,574	790,316	89,100	178,938	20,555	227,475	18,532	534,600	255,716	- 2,396	21,800	231,520	—10,653
Cincinnati, Hamilton & Dayton	1,014	620,646	117,610	837,504	89,562	131,358	17,976	356,190	20,258	615,344	222,160	.....	40,692	181,468	5,275
Cincinnati Northern	245	89,469	14,688	109,443	19,624	16,170	2,537	47,068	2,902	88,301	21,143	.....	5,700	15,443	—10,869
Cleveland, Akron & Cincinnati	344	245,491	62,287	326,967	39,859	58,435	4,027	110,566	5,111	217,998	108,969	.....	19,900	89,069	12,366
Cleveland, Cincinnati, Chic. & St. Louis	2,010	1,135,046	572,181	2,53[illegible],303	287,122	454,992	69,839	1,030,100	55,540	1,897,593	634,710	—2,521	100,000	532,189	63,939
Colorado Midland	337	163,711	16,379	193,625	21,165	34,070	7,200	78,366	5,445	146,246	47,379	—294	8,000	39,085	15,020
Colorado & Southern	1,106	625,549	94,221	767,335	66,599	143,712	11,976	244,901	23,462	490,650	276,685	—1,017	24,700	250,968	—50,837
Cumberland Valley	162	184,149	54,882	250,930	37,432	34,090	5,074	80,344	6,825	163,765	87,165	559	5,141	82,583	2,654
Delaware & Hudson Co. & R. R. Dept.	851	1,539,113	184,371	1,780,455	141,632	267,301	16,398	621,843	49,043	1,096,117	684,338	—2,419	50,000	631,919	—114,302
Delaware, Lackawanna & Western	930	2,446,093	604,612	3,248,928	320,671	519,539	63,510	963,236	67,564	1,934,520	1,314,408	44,730	178,500	1,180,638	—44,789
Denver, Northwestern & Pacific	214	77,266	11,535	93,152	14,645	13,944	1,924	41,137	3,888	75,538	17,614	.....	3,000	14,614	— 20,248
Detroit & Mackinac	353	63,704	25,940	96,303	17,362	18,455	2,115	30,203	3,287	71,322	24,981	— 36	8,522	16,423	— 7,069
Detroit, Toledo & Ironton	441	129,748	12,087	153,380	29,218	18,602	2,767	72,606	5,038	128,231	25,149	- 18	6,000	19,131	18,308
Duluth & Iron Range	190	348,349	23,059	378,884	126,058	54,093	710	115,630	12,623	309,114	69,770	—4,135	14,187	51,448	—104,012
Duluth, Missabe & Northern	328	371,649	35,604	416,052	109,389	51,998	1,526	128,324	14,385	305,622	110,430	—584	16,794	93,052	—64,186
Duluth, Shore Shore & Atlantic	622	149,097	81,816	244,590	33,848	26,751	10,634	100,118	6,521	177,872	66,718	57	18,000	48,775	—13,730
El Paso & Southwestern Co.	991	554,309	79,568	665,410	78,878	80,457	11,596	182,326	23,229	376,486	288,924	—1,141	31,076	256,707	—2,609
Elgin, Joliet & Eastern	841	792,159	6	839,749	86,649	161,736	4,283	254,943	14,213	521,824	317,925	.....	16,725	301,200	60,044
Erie	1,995	3,183,864	692,568	4,182,004	422,189	677,539	89,886	1,433,909	91,013	2,714,536	1,467,488	7,063	163,026	1,311,525	15,303
Florida East Coast	583	167,003	88,082	294,493	61,436	40,533	4,827	100,806	8,631	216,233	78,260	.....	15,500	62,760	—3,718
Fort Worth & Denver City	434	359,806	112,119	492,911	40,642	65,623	6,218	158,724	14,039	285,246	207,665	—531	12,000	195,134	—32,756
Galveston, Harrisburg & San Antonio	1,338	648,589	245,416	943,576	111,708	200,056	35,756	369,527	27,178	744,225	199,351	—4,673	30,442	164,236	—173,279
Grand Rapids & Indiana	587	244,494	129,816	397,197	42,888	82,641	11,637	177,024	14,740	328,930	68,257	—50	22,965	45,242	—9,572
Great Northern	7,344	4,661,180	1,177,620	6,224,730	448,111	611,056	95,466	1,610,659	99,795	2,865,087	3,259,643	—25	238,823	3,120,795	704,713
Gulf & Ship Island	307	125,429	33,710	175,808	19,503	31,263	3,543	50,583	8,420	113,312	62,496	.....	4,452	58,044	—4,283
Gulf, Colorado & Santa Fe	1,093	969,169	254,078	1,265,960	197,001	165,027	30,622	455,323	33,633	881,606	414,354	.....	35,761	378,593	—29,549
Hocking Valley	352	562,543	67,144	664,775	69,902	103,510	8,304	202,312	16,128	400,156	264,619	.....	43,644	220,975	25,122
Houston, East & West Texas	190	83,931	28,338	118,538	25,024	12,960	1,784	40,922	4,276	84,966	33,572	.....	4,416	29,156	—9,072
Houston & Texas Central	789	357,863	154,881	547,612	72,797	107,138	19,037	229,260	21,708	449,740	97,672	—1,137	24,974	71,561	—89,898
Illinois Central	4,755	3,077,992	1,017,633	4,897,322	709,254	1,342,142	111,062	2,021,132	134,434	4,318,024	579,298	- 19,156	230,798	329,344	—1,119,651
Iowa Central	558	238,779	87,910	288,728	43,384	48,203	8,108	133,514	8,797	242,006	46,722	.....	9,685	37,037	—36,660
Kansas City Southern	827	641,073	127,576	861,944	87,317	122,147	26,516	283,385	31,538	550,903	310,341	.....	34,612	275,729	—52,299
Lake Erie & Western	886	353,130	61,654	444,903	80,857	79,615	10,911	177,762	10,196	359,341	85,562	.....	19,886	65,676	15,377
Lake Shore & Michigan Southern	1,775	2,626,261	797,723	3,933,994	384,104	507,371	81,776	1,369,438	71,134	2,413,723	1,520,271	— 7,837	170,000	1,342,434	470,316
Lehigh & Hudson River	96	141,883	3,687	146,659	16,642	20,499	1,322	47,026	3,506	88,995	57,664	.....	3,500	54,164	117
Lehigh Valley	1,431	2,850,979	358,226	3,320,232	356,956	518,227	80,499	1,097,351	67,021	2,120,054	1,200,178	—3,667	124,600	1,071,911	—47,816
Long Island	398	303,833	446,457	780,819	121,822	114,880	12,529	404,401	21,237	674,869	105,950	40,029	53,553	92,426	8,956
Louisiana & Arkansas	255	110,063	19,734	134,248	16,615	19,387	2,447	35,566	4,862	78,877	55,371	.....	3,650	51,721	5,014

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF NOVEMBER, 1911—(CONTINUED).

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.					
Louisiana Ry. & Navigation	350	$145,356	$23,806	$180,775	$18,969	$12,758	$6,040	$70,182	$6,745	$114,694	$66,081	.....	$4,900	$61,181	$28,006
Louisville & Nashville	4,704	3,623,082	931,103	4,853,988	723,584	799,197	96,442	1,561,167	85,340	3,265,730	1,588,258	—$10,087	148,950	1,429,221	—39,050
Louisville, Henderson & St. Louis	199	69,042	31,117	106,290	22,457	13,178	4,022	37,898	2,890	80,445	25,845	373	3,000	23,218	1,251
Maine Central	1,179	613,203	233,929	898,734	154,273	112,798	7,113	322,655	37,205	634,044	264,690	—2,768	44,244	217,678	27,010
Michigan Central	1,804	1,737,995	589,180	2,586,718	242,052	302,612	61,273	1,032,649	41,881	1,680,467	906,251	5,624	130,000	781,875	244,100
Midland Valley	373	97,576	40,186	145,551	27,609	21,659	2,653	44,282	6,965	103,168	42,383	191	5,483	37,089	—8,142
Minneapolis & St. Louis	1,027	262,032	86,122	378,878	40,428	49,330	11,125	180,601	12,808	294,292	84,586	—155	20,334	64,097	—35,324
Missouri, Kansas & Texas	1,743	973,930	342,577	1,399,255	175,603	194,885	38,469	486,624	41,054	936,635	462,620	—4,676	48,500	409,444	—230,940
Missouri, Kansas & Texas of Texas	1,345	773,838	365,767	1,193,825	208,233	106,011	25,892	583,638	36,666	960,440	233,385	1,045	50,000	184,430	—200,036
Mobile & Ohio	1,114	855,059	112,710	1,033,841	116,698	191,280	30,378	358,234	32,606	729,196	304,655	—771	24,595	279,279	—31,201
Monongahela	64	100,734	2,220	104,508	10,474	6,696	536	22,390	2,036	42,132	62,376	.....	4,000	58,376	15,282
Nashville, Chattanooga & St. Louis	1,255	745,647	220,981	1,041,475	158,600	195,080	40,613	382,669	25,735	802,697	238,778	—1,384	23,816	213,578	—32,605
New Orleans & North Eastern	195	263,346	51,707	337,140	35,318	62,532	8,759	125,772	11,608	243,989	93,151	163	8,250	85,064	—4,745
New Orleans Great Northern	282	99,004	26,499	137,019	22,161	19,242	3,008	45,902	7,688	98,001	39,018	—94	2,000	36,924	—410
New Orleans, Mobile & Chicago	404	137,021	26,809	173,853	22,425	18,296	3,070	49,598	8,772	102,161	71,692	—11	4,807	66,874	—13
New York Central & Hudson River	3,591	5,526,335	2,334,184	8,791,727	1,140,415	1,469,594	137,842	3,351,709	217,035	6,316,595	2,475,132	55,008	637,853	1,892,287	—4,873
New York, Chicago & St. Louis	561	810,310	135,518	982,949	99,714	98,297	40,867	375,318	15,355	629,551	353,398	—1,919	44,000	307,479	88,922
New York, New Haven & Hartford	2,041	2,748,205	2,141,224	5,364,635	570,697	630,535	35,744	2,083,316	149,758	3,470,050	1,894,585	133,175	310,000	1,717,760	—29,112
New York, Ontario & Western	565	585,350	82,204	692,772	99,423	123,719	9,246	281,162	16,226	529,776	162,996	—7,566	17,917	137,513	—36,932
New York, Philadelphia & Norfolk	112	221,534	35,817	277,887	30,161	52,714	4,123	108,909	11,998	207,905	69,982	.....	7,500	62,482	—6,964
New York, Susquehanna & Western	152	172,454	46,792	248,808	21,660	19,099	2,030	96,947	4,511	144,247	104,561	7,250	17,874	93,937	—3,426
Norfolk & Western	2,084	2,821,092	371,793	3,258,598	351,716	636,602	48,421	966,145	65,880	2,065,764	1,192,834	- 2,773	115,000	1,075,061	148,684
Norfolk Southern	607	190,097	62,378	273,181	30,531	30,459	5,329	86,406	14,254	166,979	105,202	—460	7,500	97,242	11,187
Northern Central	472	607,854	179,646	1,155,017	13,571	255,377	15,076	569,405	22,781	876,210	278,807	454	40,337	238,924	147,965
Northern Pacific	6,008	4,250,996	1,241,412	5,856,636	485,436	561,177	101,418	1,858,117	75,068	3,081,216	2,775,420	25,645	292,822	2,508,243	30,506
Oregon Short Line	1,684	1,141,361	386,239	1,906,685	171,008	184,983	21,921	477,318	35,411	890,641	1,016,044	—1,190	130,000	884,854	—65,443
Oregon Washington R. R. & Nav. Co.	1,917	840,110	406,306	1,354,477	146,843	158,043	39,132	490,797	44,769	879,584	474,893	—1,205	165,000	308,688	.....
Pecos & Northern Texas	296	148,348	27,314	166,266	26,890	27,800	2,229	53,339	5,321	115,579	50,687	.....	6,353	44,334	11,056
Pennsylvania Co.	1,435	3,386,481	614,676	4,307,484	589,484	830,385	73,099	1,540,450	82,107	3,115,525	1,281,959	—4,888	173,181	1,103,890	—17,543
Pennsylvania R. R.	3,958	10,181,061	2,707,230	13,824,261	1,207,837	2,797,827	193,929	5,090,084	324,342	9,614,019	4,210,242	—146,376	605,931	3,457,935	- 405,760
Penna. & Eastern	381	176,015	56,743	250,416	36,656	38,142	4,967	104,170	6,782	190,717	59,699	.....	10,500	49,199	2,831
Penn. Marquette	1,331	1,114,688	300,697	1,507,863	190,969	230,793	35,018	680,128	30,814	1,167,722	360,141	—2,965	56,298	300,878	46,598
Peoria & Pekin Union & Western	73	762,552	651,607	1,500,341	207,029	287,314	25,670	660,073	34,534	1,214,620	375,721	.....	50,698	325,023	—54,522
Pittsburgh & Lake Erie	316	1,194,657	115,810	1,352,093	143,945	260,076	9,036	323,038	22,629	758,724	593,569	—645	30,530	562,394	—86,130
Pittsburgh, Cincinnati, Chicago & St. Louis	1,467	2,367,049	576,285	3,328,364	434,655	625,664	65,614	1,204,634	63,768	2,394,335	934,019	—863	123,027	810,129	51,075
Pittsburgh, Shawmut & Northern	140	113,347	7,961	133,748	12,978	24,357	1,127	34,054	3,896	76,412	45,836	.....	1,565	44,271	13,625
Pittsburg, Shawmut & Pittsburg	53	55,488	20,857	102,227	20,432	27,521	2,783	72,172	5,729	128,637	63,590	.....	1,094	62,496	—5,432
Rutland	468	166,104	92,783	293,485	30,729	35,880	8,092	116,907	6,533	198,141	95,344	.....	10,969	84,375	11,675
St. Louis & San Francisco	1,574	779,677	311,170	1,179,589	32,309	17,564	5,010	66,774	5,375	127,032	- 7,243	- 31	5,711	—12,985	—15,964
St. Louis & South Western	4,581	2,567,107	876,680	3,699,184	503,287	456,479	82,518	1,241,165	103,843	2,386,292	312,862	.....	161,738	1,151,124	170,980
St. Louis, Brownsville & Mexico	890	317,641	87,518	490,757	42,551	13,302	3,373	65,847	8,006	133,079	57,678	.....	4,500	53,178	24,313
St. Louis Merchants' Bridge Terminal	9	.....	443	148,286	19,730	11,123	414	85,838	5,837	122,942	25,344	.....	6,150	19,194	—8,687
St. Louis, San Francisco & Texas	343	100,831	29,019	137,999	20,410	15,098	3,127	53,960	4,847	97,442	40,557	.....	610	39,947	23,266
St. Louis Southwestern	796	886,058	114,934	752,548	75,516	109,476	32,615	175,018	22,967	415,582	336,956	- 2,021	19,564	315,371	—20,615
St. Louis Southwestern of Texas	703	349,503	91,157	463,053	59,704	84,965	12,955	160,487	18,921	337,032	131,021	—111	10,000	120,910	74,137
San Antonio & Aransas Pass	777	455,804	105,719	607,684	63,801	46,661	5,718	145,574	9,926	271,680	136,004	.....	11,000	125,004	38,705
San Pedro, Los Angeles & Salt Lake	1,113	466,211	191,950	708,452	111,111	190,719	31,586	291,613	18,792	643,821	64,831	- 7,388	24,926	32,517	—137,940
Santa Fe, Prescott & Phoenix	1	100,168	44,385	153,443	21,623	12,191	2,998	41,326	5,670	83,808	68,635	.....	3,500	65,135	2,145
Southern	7,1	3,7 ,442	1,75,131	5,4 ,464	670,671	824,614	137,637	1,881,814	165,699	3,680,365	1,746,099	—3,284	196,724	1,546,091	—159,776
Southern Pacific Co.	1,9	1,9	3 ,167	1,1 ,359	24,125	10,213	2,010	42,682	4,200	83,230	43,129	.....	4,992	38,137	—7,564
Southern Railway in Mississippi	3	1	13,760	129,503	10,819	24,807	1,962	42,858	4,190	84,636	44,867	.....	3,535	41,332	171
Spokane, Portland & Seattle	3	5,1 ,1	,516,938	8,184,500	963,889	1,043,754	152,386	2,356,725	179,514	4,655,968	3,528,532	58,083	339,288	3,247,327	—238,452
Sunset	3		14,411	76,104	4,094	3,225	30	27,987	260	36,396	39,708	.....	3,390	36,318	- 313
Syracuse, Binghamton & New York			8,3	94,482	10,146	6,537	2,703	34,825	2,9	56,503	37,979	.....	6,220	31,759	5,371
Tennessee Central	3	1	4	1 ,465	1 ,171	1,077	16,254	5,863	49,785	7,488	102,467	22,704	.....	4,212	18,492	—13,739
Terminal R. R. Ass'n of St. Louis					,486,419	27,613	23,276	592	9,206	6,535	155,222	84,197	9,566	29,400	64,363	- 14,625
Texas & New Orleans	3	1	1	1 ,171	350,853	59,680	107,456	8,535	140,737	11,138	3,7 ,536	23,317	- 483	12,248	10,586	—35,121
Toledo & Ohio Central	4	1	1	1	454,076	60,122	52,284	6,841	150,874	8,137	30 ,58	145,818	926	26,795	118,097	—58,248
Toledo, Peoria & Western	1	1	1	1 ,710	103,815	17,364	22,627	2,524	41,647	3,266	87,428	15,887	.....	4,800	11,087	—1,366
Toledo, St. Louis & Western	2	1	1	1 ,141	1 ,1	47,580	68,531	7,630	128,689	10,110	2 ,540	82,658	.....	14,500	68,158	—30,588
Trinity & Brazos Valley	1	1	1	1	1	41,415	30,098	9,407	131,612	13,708	225,240	74,886	.....	5,835	69,051	1,599
Union Pacific	8,1	3,1	8	4,7 ,342	355,736	564,218	105,673	1,249,902	109,440	2,384,969	1,890,573	—6,610	175,150	1,708,813	—761,606
Union R. R. of Baltimore	2	111,3	1	1	14,862	.....	1,001	4,844	2,313	33,090	110,574	.....	5,922	104,652	—8,691
Union R. R. of Pennsylvania	31	1	1	1	1 ,272	74,331	106	124,261	3,171	2 ,141	96,984	3,550	10,000	90,534	32,624
Vandalia	1	57,3	19,1	1	100,48	171,892	23,842	346,150	18,083	660,15	196,481	.....	28,301	168,180	—90,745
Vicksburg, Shreveport & Pacific	1	1	4	4	1	20,964	20,341	3,304	41,279	4,539	96,427	49,214	113	6,300	43,027	—2,984
Virginia & Southwestern	3	1 ,1	1	1	1	18,5	31,813	1,842	42,264	5,8	99,736	45,891	.....	4,710	41,181	6,073
Virginian	4	3 ,5	1	4	1	78,65	5,189	120,187	7,724	260	142,999	5,273	13,000	135,272	776
Washington Southern	1	1	1	1	1	11,449	10,175	1,160	34,903	2,854	60,532	30,130	.....	3,245	26,885	3,803
West Jersey & Seashore	3	1	1	3	1	83,7	95,515	9,445	212,713	10,228	411,528	25,522	—3,309	23,473	—52,304	—67,746
Wheeling & Lake Erie	4	5	4	6	1	66,50	112,324	7,054	214,712	15,844	416,884	219,824	3,157	29,900	193,081	57,739
Yazoo & Mississippi Valley	1,1	7	2	1,0	1	135,997	16,164	382,594	29,740	750,348	330,943	—1,117	38,000	291,826	—240,872

Discrimination by Elevation in Transit Rules.

William H. Suffern Grain Co. v. Illinois Central et al. Opinion by Commissioner Prouty.

A rule which provides that grain may be unloaded into elevators at Cairo, Ill., and reshipped at the balance of the through rate, the railway company paying the elevator company three-fourths of a cent per hundred pounds, but which does not provide for any elevation allowance to grain dealers at Decatur, Ill., discriminates against Decatur, and the discrimination is ordered discontinued. (22 I. C. C., 178.)

STATE COMMISSIONS.

The Washington railway commission has issued a general distance tariff reducing distributive freight rates to and from Seattle, Tacoma, Spokane, Everett, Bellingham, Aberdeen, Hoquiam, Chehalis, Centralia, Wenatchee, Pasco, Kenewick, North Yaquima and Walla Walla, effective May 1, by amounts ranging from 10 to 31 per cent.

The Louisiana Railway Commission, after an investigation of express rates within the state extending over the past year, has issued an order requiring many reductions in the present rates. The commission prescribes a maximum distance scale of merchandise rates, and also orders several changes in the rules governing express shipments, effective March 1.

The Board of Public Utility Commissioners of New Jersey has ordered all roads operating in that state to provide facilities for the use of drinking water by passengers on trains, and the order says that the arrangement made in some other states by railway companies, by which passengers can obtain individual paper cups without cost by applying to conductors, brakemen or porters, recommends itself to the board.

The Illinois railway commission at a meeting on January 3 denied a petition of the Mine Rescue State Commission of Illinois, asking the elimination of the $25 minimum tariff rate for the movement of mine rescue cars within the state. Representatives of the railways present opposed the elimination of the minimum as establishing a precedent which might be applied to other kinds of cars, but stated that the roads should be allowed to treat each case individually and to handle the mine rescue cars free if emergency required. The commission at this meeting established a rating of double first class on aeroplanes in the Illinois classification on the petition of the Illinois freight committee.

The Mississippi Commission on January 3 ordered the discontinuance of its freight classification, which has been in force for many years, and the adoption by the railways, for intrastate shipments, the same classification as that now used by them on interstate business, namely, Southern classification No. 38. One of the three commissioners voted against the resolution, and it is said that on January 15 the present commission goes out of office and that this change in classification may then be rescinded. The effect of the change on some commodities will be to raise the rates, while on others there will be a reduction; and, of course, every shipper whose goods have to pay a higher rate will clamor for the reversal of this action.

The Indiana Commission announces that on February 8 a conference and inquiry will be held on the subject of rails; and railway managers, engineers and other officers interested in rails, including purchasing agents, are notified to be present. Rail manufacturers may appear if they wish to do so. The commission hopes that the railways and the railmakers will act together harmoniously to secure the best rails. The preamble to the notice says that the commission is advised that the rails now being put in use are inferior to the "lighter grades" heretofore used, meaning, presumably, smaller sections. It is understood that the commission will seek the aid and counsel of the American Railway Engineering Association.

On complaint against the discontinuance of the use of the Pennsylvania station at Jersey City by the New York, Susquehanna & Western, the Board of Public Utility Commissioners of New Jersey made an investigation and came to the conclusion that while considerable inconvenience to the public would be caused by the abandonment of this station by the N. Y. S. & W., the board could not compel the Pennsylvania Railroad to permit the N. Y. S. & W. to continue to use and occupy its Jersey City station, and the board could not force the New York, Susquehanna & Western to employ condemnation proceedings to establish a permanent foothold in the Pennsylvania passenger terminal. The board disapproves of the action of the New York, Susquehanna & Western but has no jurisdiction in the matter.

Annual Report.

The New York State Public Service Commission, First district (New York City), has made its fifth annual report. During the year 1911 the commission has awarded subway contracts to the amount of $29,000,000, which, with the contracts awarded in previous years and not yet completed, make nearly $50,000,000 worth of work now going on. The commission has made substantial progress on the execution of the city transit programme as agreed upon with the Board of Estimate of the city. It recommends a law providing that reorganized companies shall be required to get approval of new securities, as is now the case with solvent companies; also that the courts be prohibited from reviewing the commission's orders by certiorari. It is recommended that a bill be passed providing a method of exempting self-sustaining rapid transit bonds issued after January 1, 1910.

An appropriation of $1,000,000 for the elimination of grade crossings is asked for. Applications for approval of issues of stocks and bonds during the past year, in cases other than reorganization, have aggregated $79,914,177. There are now 97 operating and lessor transportation corporations subject to the jurisdiction of the commission, with an aggregate capitalization of $1,124,342,471.

The per capita expenditure of the public of New York City for 1910 is estimated at $16.35 for transportation, $6.68 for gas and $5.32 for electricity, a total of $28.35, and the expenses of the commission in supervising such public utilities were $377,000, a per capita expense of eight cents.

A chapter is devoted to service facilities, the principal improvements effected during the year being pointed out.

COURT NEWS.

The Missouri supreme court has sustained the validity of a law of that state requiring railway companies to maintain passenger service on Sunday on branch lines of a certain minimum length.

The government has filed in the United States supreme court at Washington an appeal from the lower court in the case of the Interstate Commerce Commission, the Federal Sugar Refining Company and others against the Baltimore & Ohio and the Central of New Jersey. This is a suit concerning alleged discriminatory allowances by the railways for lighterage at eastern termini on westbound shipments of sugar.

The opinion of the Supreme Court delivered by Justice McKenna says that under federal law before a common carrier can accept freight for transportation it must publish its rates and regulations. Congress having exercised its power to regulate interstate commerce in this way, the state was precluded from legislating on the same subject. It was manifestly a conflict of power between the federal and the state authorities, and in that case the state should give way. The case was reversed and remanded.

The Supreme Court of the United States, this week handed down a decision invalidating the law of the state of North Carolina which requires common carriers to accept for transportation freight offered at any regular station of the carrier and to transport it. The decision was in the case of the Southern Railway against Reid. The statute provides a penalty for each day that the carrier holds the goods after receiving them and before forwarding them. The Supreme Court of North Carolina had held it to be constitutional.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

David Z. Cowden has been appointed tax attorney of the Southern Pacific, with office at San Francisco, Cal., succeeding Jere T. Burke, deceased.

H. E. Bissell has been appointed right-of-way and claims agent of the Grand Trunk Pacific, with office at Winnipeg, Man., succeeding George H. Pope.

Lucius Laudie has been appointed auditor of the Salt Lake & Mercur, with office at Salt Lake City, Utah, succeeding P. E. Long, resigned to go into other business.

S. B. Haupt, general manager of the Susquehanna, Bloomsburg & Berwick at Watsontown, Pa., has been elected also president, succeeding J. H. Cochran, deceased.

H. M. Watkins, auditor of freight accounts of the Oregon-Washington Railroad & Navigation Company at Portland, Ore., has been appointed assistant auditor of the Union Pacific, with office at Omaha, Neb.

N. M. Leach, traffic manager of the Texas & Pacific, with office at New Orleans, La., has been appointed also assistant to the president of the International & Great Northern. During the period of the receivership of the latter road Mr. Leach was its traffic manager.

L. Delano, assistant to general superintendent of transportation of the Atlantic Coast Line at Wilmington, N. C., has been appointed assistant to the president, with office at Wilmington, succeeding W. R. Sullivan, whose resignation has already been announced in these columns.

E. T. Jeffery, president of the Denver & Rio Grande, has been elected chairman of the board, with office at New York, succeeding George J. Gould. Benjamin F. Bush, president of the Missouri Pacific, has been elected also president of the Denver & Rio Grande, with office at St. Louis, Mo., succeeding Mr. Jeffery. A photograph of Mr. Bush, and a sketch of his career were published in the *Railway Age Gazette* of April 21, 1911, page 944.

The real estate and tax departments of the Missouri Pacific-Iron Mountain system having been consolidated, J. M. Seibert, general agent in the passenger department at St. Louis, has been appointed real estate and tax agent, with office at St. Louis, and E. S. Cronk, land agent at St. Louis, has been appointed assistant real estate and tax agent.

S. S. Butler, whose appointment as assistant to the vice-president in charge of traffic of the St. Louis & San Francisco Lines in Texas and Louisiana, with office at Houston, Tex., has been announced in these columns, was born August 25, 1875, at Murfreesboro, Tenn. He received a high school education in his native town, and began railway work November 1, 1890, with the Texas & Pacific at Dallas, Tex., remaining with that company for ten years. On November 1, 1900, he went with the St. Louis & San Francisco at Dallas as a soliciting agent, and was then consecutively traveling freight agent, commercial agent and general agent, having been appointed to the latter office, with headquarters at Ft. Smith, Ark., on April 1, 1907. He was appointed general Eastern agent, with office at New York, on October 1, 1909, from which position he was promoted as above, effective January 1.

Operating Officers.

William Osborne has been appointed superintendent of the Atlantic Northern & Southern, with office at Atlantic, Iowa.

W. M. Cowhig has been appointed superintendent of transportation of the Southern Railway, with office at Washington, D. C.

S. L. Racey, chief despatcher of the Green River division of the Denver & Rio Grande at Helper, Utah, has been appointed chief despatcher of the Salt Lake division, with office at Salt Lake City, succeeding H. H. Hoover, resigned to accept service with another company. W. A. Nash succeeds Mr. Racey.

M. D. Rice, roadmaster of the Nevada-California-Oregon Railway, has been appointed assistant superintendent, with headquarters at Lakeview, Ore.

Alexander MacDonald Parker, whose appointment as superintendent of the Allegheny division of the Pennsylvania Railroad, has been announced in these columns, was born on June 25, 1870, at Carlisle, Cumberland county, Pa., and was educated at Dickinson College. He entered the service of the Pennsylvania Railroad in 1888 as a rodman, in which capacity and subsequent higher ones he was engaged for several years on survey work. In 1891 he was transferred to the assistant engineer's office on the Philadelphia division, and was later transferred to the principal assistant engineer's office at Altoona. In 1892 he was appointed assistant supervisor of the Philadelphia division at Lancaster, and four years later was transferred in the same capacity to the Philadelphia yard. He was appointed supervisor at Tyrone in 1897, and subsequently served in the same capacity on the Frederick, the Schuylkill and the New York divisions, becoming assistant to the principal assistant engineer in 1903. He was made principal assistant engineer in 1905, and upon the organization of the Hudson division at New York in 1909, Mr. Parker was appointed superintendent, which position he held until his recent appointment as superintendent of the Allegheny division, with office at Oil City, Pa.



A. M. Parker.

Charles S. Krick, whose appointment as superintendent of the Manhattan division of the Pennsylvania Railroad has been announced in these columns, was born on March 16, 1866, at Reading, Pa. He was educated at the public schools and at Carroll Institute, Reading, and graduated from La Fayette College in June, 1887. The following month he entered the service of the Pennsylvania Railroad as rodman on the Schuylkill division, and was later transferred to the Altoona office. From December 14, 1890, to May, 1895, he was assistant supervisor, first at Tyrone, then at Middletown, and later at Philadelphia, and was then appointed supervisor of the Schuylkill division. He was later transferred to the Middle division and then to the Pittsburgh division. In January, 1903, he was made assistant engineer of the Eastern & Susquehanna division, and later was transferred to the Philadelphia Terminal division. Mr. Krick was appointed principal assistant engineer of the Philadelphia, Baltimore & Washington in January, 1906, and in April of the following year he was made superintendent of the New York Terminal division. On January 1, 1912, when the Hudson division and the New York Terminal divisions were combined to form the Manhattan division, he was appointed superintendent of that division.



C. S. Krick.

E. M. Switzer has been appointed superintendent of safety of the Chicago, Burlington & Quincy, with office at Chicago. (See item in General News Section.)

Oliver T. Boyd, general passenger agent of the Hudson & Manhattan, has been appointed assistant general manager, with office at New York City.

H. H. Hoover, chief despatcher of the Denver & Rio Grande at Salt Lake City, Utah, has been appointed chief despatcher of the Southern Pacific, with office at Ogden, Utah.

F. G. Bement, formerly trainmaster of the Grand Trunk at Durand, Mich., has been appointed inspector of transportation of the Pere Marquette, with office at Detroit, Mich.

G. H. Hammond has been appointed superintendent of terminals of the Minneapolis, St. Paul & Sault Ste. Marie at Duluth, Minn., and Superior, Wis., with headquarters at the latter place.

The Southern Railway announces that on January 15, the general direction of the operations of the departments of maintenance of way and structures, maintenance of equipment and transportation will be trasferred to and directed by the chief engineer of maintenance of way and structures, the general superintendent of motive power and equipment, and the general superintendent of transportation, respectively, and the general superintendents of each district will report to and be governed by instructions issued by them. Questions relating to operation will be reported by general superintendents to the vice-president and general manager, as heretofore. The general superintendent of motive power and equipment will control and give direction to the inspection, care and use of coal for all purposes. The superintendent of transportation will direct the distribution of coal.

Traffic Officers.

W. H. Winnfield, soliciting freight agent of the St. Louis & San Francisco at Dallas, Tex., has resigned.

J. V. Styers has been appointed assistant general freight agent of the Bessemer & Lake Erie, with office at Pittsburgh, Pa.

R. J. Ross has been appointed commercial agent of the New York Central lines and fast freight lines, with headquarters at Winnipeg, Man.

S. G. Nethercot, chief of tariff bureau of the Chicago & Northwestern, has been appointed assistant general freight agent, with office at Chicago.

B. S. Barnes has been appointed acting foreign freight agent of the Erie Railroad with office at New York City, succeeding T. J. Skidmore, resigned.

P. O. Lee has been appointed traveling freight agent of the Georgia Southern & Florida, with headquarters at Cordele, Ga., succeeding H. W. Watson, resigned.

C. R. Strickler, agent of the Delaware, Lackawanna & Western at Des Moines, Iowa, has been appointed general agent of the Lackawanna Fast Freight Line, with headquarters at Peoria, Ill.

Harry C. Hilbourne has been appointed general agent of the passenger department of the Chicago Great Western, with office at Chicago, succeeding F. P. Lasier, resigned on account of illness.

Volney E. Huff has been appointed freight solicitor of the Star Union Line of the Pennsylvania Lines West and the Pennsylvania Railroad, in connection with the Indianapolis, Ind., agency.

R. B. Rawlins has been appointed traveling freight and passenger agent of the El Paso & Southwestern system and the Morenci Southern, with office at El Paso, Tex., succeeding H. L. Haynes, Jr., resigned.

William D. Corfield has been appointed division freight agent of the Philadelphia & Reading, the Perkiomen Railroad and the Stony Creek Railroad, with office at Philadelphia, Pa., succeeding J. J. Bergen, deceased.

N. M. Leach, traffic manager of the Texas & Pacific, with office at New Orleans, La., has been appointed also general traffic manager of the Opelousas, Gulf & Northeastern. (See item under Executive, Financial and Legal Officers.)

C. R. Carlton, city ticket agent of the Pennsylvania Lines West at Dayton, Ohio, has been appointed traveling passenger agent, with headquarters at Atlanta, Ga., succeeding J. M. Harris, promoted. C. L. Tipton succeeds Mr. Carlton.

James Robertson, assistant general freight agent of the Duluth, South Shore & Atlantic and the Mineral Range Railroad at Duluth, Minn., has been appointed also assistant general passenger agent, succeeding James Maney, promoted.

T. L. Bingham has been appointed agent of the Western Transit Company and the Rutland Transit Company, steamship lines of the New York Central, with office at St. Louis, Mo., succeeding J. G. Pullinger, resigned to accept service elsewhere.

H. S. Duval, traveling freight agent of the Southern Railway at Albany, Ga., has been transferred to Valdosta, Ga. H. W. Watson succeeds Mr. Duval, with office at Albany, and W. C. Plant has been appointed freight soliciting agent, with office at Memphis, Tenn.

The following appointments have been made on the Raleigh & Charleston: E. D. Kyle, freight traffic manager; C. B. Ryan, general passenger agent; R. I. Cheatham, assistant freight traffic manager; L. E. Chalenor, general freight agent; G. S. Rains, assistant general freight agent.

T. G. Ratcliff, chief clerk to the traffic manager of the Galveston, Harrisburg & San Antonio, at Houston, Tex., has been appointed commercial agent of the Houston East & West Texas, with office at Houston, succeeding J. B. Gibson, resigned to become agent of the Frisco Refrigerator Line.

C. J. Longbotham, general agent in the freight department of the Chicago Great Western at Duluth, Minn., has been appointed general agent in the freight department, with office at St. Paul, Minn., succeeding J. N. Storr, resigned to engage in other business. R. A. Bishop, agent at Winona, Minn., succeeds Mr. Longbotham.

W. F. Mundee has been appointed commercial freight agent of the Seaboard Air Line, at Jacksonville, Fla., with office at Jacksonville. R. H. Dozier, commercial agent at Jacksonville, has been appointed contracting freight agent at Jacksonville, reporting to the commercial freight agent, and C. I. Malone has been appointed contracting freight agent, with office at Atlanta, Ga.

Edward Eden, traveling freight agent of the Canadian Pacific, the Minneapolis, St. Paul & Sault Ste. Marie, the Canadian Pacific Despatch and the Duluth, South Shore & Atlantic at Chicago, has been appointed agent of these lines, with headquarters at Omaha, Neb. His territory, comprising the state of Iowa, parts of Minnesota and South Dakota, and Omaha, Neb., remains the same.

E. B. Reynolds, soliciting agent of the Louisville & Nashville at Memphis, Tenn., has been appointed a traveling freight agent, with office at Memphis. B. H. Wallace succeeds Mr. Reynolds. H. T. Drane, soliciting agent at Selma, Ala., has been appointed traveling freight agent, with office at Macon, Ga., succeeding C. L. Whaley, resigned, and Robert C. Gucker succeeds Mr. Drane, with office at Selma.

J. E. Branch, traveling freight agent of the St. Louis & San Francisco Lines at Atlanta, Ga., has been appointed commercial agent, with office at Jacksonville, Fla., succeeding M. M. Hogan, resigned, and F. G. Roberts, soliciting freight agent at Atlanta, succeeds Mr. Branch. S. R. Carson succeeds Mr. Roberts. J. E. W. Fields, chief rate clerk at Houston, Tex., has been appointed assistant to the general Eastern agent, with office in New York.

H. F. Harden, soliciting freight agent of the Cincinnati, New Orleans & Texas Pacific at Cincinnati, Ohio, has been appointed traveling freight agent, with office at Indianapolis, Ind., succeeding L. E. Banta, transferred. W. S. Logan succeeds Mr. Harden. B. Q. Gasner has been appointed traveling freight agent, with headquarters at Cincinnati, Ohio, succeeding J. W. Piatt, transferred, and A. H. Fulkerson has been appointed traveling freight agent, with office at Jacksonville, Fla., succeeding W. E. Hurley, transferred.

G. N. Thomas, traveling freight agent of the Wabash at Pittsburgh, Pa., has been appointed general agent, with office at Pitts-

burgh, succeeding R. E. Lawrence, deceased, and D. E. Gilbert, contracting agent at Pittsburgh, succeeds Mr. Thomas. W. D. Stubbs, general agent, with offices at Seattle, Wash., and Portland, Ore., having resigned to go into other business, F. H. Wegener, traveling freight and passenger agent at Seattle, has been appointed general agent at Seattle, and C. A. Pettibone, traveling freight and passenger agent at Portland, has been appointed general agent at Portland.

The territory east of Alpha, N. J. (with exception of Newark, N. J.), on the Lehigh Valley, will hereafter be under the direct supervision of the general offices at New York. O. F. Johnson has been appointed traveling freight agent, with headquarters at New York, in charge of the territory east of Alpha, N. J. (not including Newark), and will assume such other duties as may be assigned to him by the general freight agent. A. B. Walmsley, division freight agent at Newark, has been appointed commercial agent at Newark. The jurisdiction of O. M. Barres, division freight agent at South Bethlehem, Pa., has been extended to include the Mahanoy & Hazleton division, Penn Haven Junction, Pa., to Mount Carmel, including Beaver Meadow branch, Highland branch, Ashland branch, and Quakake branch, Pottsville branch, Lizard Creek Junction, Pa., to Pottsville, and adjacent territory on connecting roads. H. E. Dengler, division freight agent at Hazleton, Pa., has been appointed commercial agent at Hazleton. W. T. Grier, coal freight agent, has been appointed general coal and freight agent, with office at New York, and S. A. Story has been appointed through freight agent, with office at Buffalo, N. Y.

Engineering and Rolling Stock Officers.

See item regarding duties of officers on Southern Railway under Operating Officers.

W. F. Hart has been appointed chief engineer of the Memphis, Dallas & Gulf, with office at Nashville, Ark., succeeding A. M. Van Auken, resigned.

John Fletcher, superintendent of telegraph of the Canadian Pacific at Vancouver, B. C., has been appointed to the new position of telegraphic superintendent of traffic.

Samuel G. Thomson, assistant engineer of motive power of the Philadelphia & Reading, has been appointed acting superintendent of motive power and rolling equipment with office at Reading, Pa., succeeding Howard D. Taylor, resigned.

C. W. Cross, superintendent of apprentices of the New York Central & Hudson River at New York, and G. W. Good, supervisor of piece work, also with office at New York, have been transferred to Chicago, where they will have jurisdiction over the New York Central Lines west of Buffalo.

T. Rumney, general mechanical superintendent of the Erie at New York, has been appointed assistant second vice-president of the Rock Island Lines in charge of the mechanical department, with office at Chicago, succeeding W. A. Nettleton, general superintendent of motive power, resigned.

William Schlafge, mechanical superintendent of the Erie Railroad at Jersey City, N. J., has been appointed general mechanical superintendent, with office at New York, succeeding T. Rumney, resigned, to go to the Chicago, Rock Island & Pacific. A. G. Trumbull, mechanical superintendent at Cleveland, Ohio, has been transferred to Jersey City; E. S. Fitzsimmons, master mechanic at Hornell, N. Y., has been promoted to mechanical superintendent at Cleveland; L. R. Laizure, master mechanic at Cleveland, has been transferred to Hornell, and J. A. Boyden, general foreman at Hornell, has been promoted to master mechanic at Cleveland.

W. N. Spangler, supervisor of signals of the Pennsylvania Railroad at New York, has been appointed inspector of signals in the office of the signal engineer at Philadelphia, Pa., and B. F. Oler, supervisor of signals at Camden, N. J., succeeds Mr. Spangler. E. K. Post, supervisor of signals at Media, Pa., succeeds Mr. Oler, and W. I. Bell, assistant supervisor of signals at Altoona, Pa., succeeds Mr. Post. P. A. Rainey, assistant supervisor of signals at Harrisburg, Pa., has been transferred to the middle division at Altoona, succeeding Mr. Bell, and E. G. Bauman, foreman at the Jersey City terminal on the New York division, succeeds Mr. Rainey. L. E. Carpenter, supervisor of signals at Williamsport, Pa., has been appointed supervisor of signals on the Philadelphia terminal division, with office at West Philadelphia, succeeding C. E. Goings, transferred to the office of the signal engineer. J. H. Broadbent, supervisor of signals on the Allegheny division at Kittanning, Pa., succeeds Mr. Carpenter on the Williamsport and Susquehanna divisions, and B. F. Dickinson, assistant supervisor of signals at Jersey City, succeeds Mr. Broadbent. E. M. Hatton, acting assistant supervisor of signals on the Baltimore division, has been appointed assistant supervisor of signals on the New York division, succeeding Mr. Dickinson.

John Moore James, whose appointment as superintendent of motive power of the Western Pennsylvania division of the Pennsylvania Railroad has been announced in these columns, was born on September 10, 1875, at Wellsville, Ohio, and was educated in the public schools of his native town and at the Ohio State University. He entered the service of the Pennsylvania Railroad as a machinist apprentice in the Altoona shops in 1893, and was appointed assistant foreman of car inspectors at Washington, D. C., in May, 1899. The following January he was made foreman of the Anacosta shops of the Philadelphia, Baltimore & Washington, and in May of the same year he was promoted to general foreman at Washington. He was appointed general inspector of the Buffalo & Allegheny Valley division in October, 1900, and became assistant engineer of motive power of that division in January, 1902. The following December he was appointed master mechanic at the Olean, N. Y., shops, and in November, 1908, was transferred in the same capacity to the Buffalo division. He was again transferred on May 1, 1911, as master mechanic to the West Philadelphia, Pa., shops, which position he held at the time of his recent appointment as superintendent of motive power of the Western Pennsylvania division, with office at Pittsburgh, Pa.



J. M. James.

Purchasing Officers.

Adolph Butze, general purchasing agent of the Grand Trunk, with office at Montreal, Que., whose retirement on January 1, under the pension rules of the company, has already been announced in these columns, was born in October, 1845, at Quincy, Ill., and was educated in the public schools of his native town. Mr. Butze, after serving in the Civil War, entered railway service in 1868, and was for some time in the employ of the Wabash. In 1885 he went to the Missouri Pacific in the purchasing department, and two years later was made private secretary to the general manager of the Chicago, Indianapolis & Louisville. Mr. Burtze up to the time of his retirement had been in the service of the Grand Trunk for the past 16 years, having been appointed general purchasing agent of that road in 1896.

OBITUARY.

William F. Beyreiss, advertising agent of the Queen & Crescent Route, with office at Cincinnati, Ohio, died at that place on January 4.

Francis S. Jones, freight solicitor of the Pennsylvania Railroad at Jamestown, N. Y., and previous to that superintendent of the Jamestown, Chautauqua & Lake Erie, died on January 1 at Jamestown, at the age of 61 years.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Virginian Railway has ordered 9 mikado locomotives from the Baldwin Locomotive Works.

The Central Vermont has ordered three switching locomotives from the Lima Locomotive and Machine Company.

The Minneapolis, Red Lake & Manitoba has ordered 1 ten-wheel locomotive from the Baldwin Locomotive Works.

The Chicago, St. Paul, Minneapolis & Omaha has ordered 10 locomotives from the American Locomotive Company, in addition to the 5 switching locomotives mentioned in the *Railway Age Gazette* of December 22.

CAR BUILDING.

The Baltimore & Ohio is making inquiries for 36 passenger cars.

The Grand Trunk is making inquiries for 500 automobile cars and 500 refrigerator cars.

The Delaware, Lackawanna & Western has ordered 200 hopper cars from the American Car & Foundry Company.

The Chicago & North Western has ordered 550 thirty-ton 40-ft. refrigerator cars from the Haskell & Barker Car Company.

The Elgin, Joliet & Eastern has ordered 250 Williamson gondola cars and 250 hopper cars from the Pullman Company, and 250 hopper cars from the Standard Steel Car Company.

The Western Live Stock Express, Chicago, has ordered 100 double-deck stock cars, the bodies to be built by the Whipple Car Company and the steel underframes and trucks by the Bettendorf Axle Company. An option has been taken on an additional 100 double-deck stock cars.

The Pennsylvania Railroad has ordered 1,000 class H 22 coke cars from the Pressed Steel Car Company, 1,000 class H 21 coke cars and 200 class H 22 coke cars from the Cambria Steel Company; 1,000 G. R. A. gondola cars from the American Car & Foundry Company, and 800 class H 22 coke cars from the Standard Steel Car Company.

The New York Central Lines have ordered 50 coaches and 10 smoking cars from the American Car & Foundry Company, 35 combination passenger and baggage cars from the Standard Steel Car Company, 15 baggage cars from the Pressed Steel Car Company, and 25 coaches and 20 smoking cars from the Barney & Smith Car Company. The New York Central & Hudson River will receive 50 coaches, 15 baggage cars, 30 combination passenger and baggage cars, and 20 smoking cars; the Lake Shore & Michigan Southern will receive 10 smoking cars and 5 combination passenger and baggage cars; the Cleveland, Cincinnati, Chicago & St. Louis will receive 25 coaches. This company is still negotiating for 2 combination mail and baggage cars and 2 combination passenger, mail and baggage cars.

IRON AND STEEL.

The Southern Railway has ordered 3,000 tons of rails from the Maryland Steel Company.

The Chicago, Burlington & Quincy has ordered 1,200 tons of bridge material from the American Bridge Company.

The Delaware & Hudson is reported to have ordered 12,000 tons of open hearth rail from the Bethlehem Steel Company.

The Great Northern is reported to have ordered 38,000 tons of rails, divided between the United States Steel Corporation, the Lackawanna Steel Company, and the Cambria Steel Company.

General Conditions in Steel.—The operations of the steel mills have not increased since the first of the year, which had been expected from the heavy orders received in November and December. The explanation appears to be that the new orders are for immediate delivery, but will be spread over a period of several months. The principal feature of interest in the steel trade at present is the activity in fabricated structural steel for buildings and bridges, in which the railways are figuring prominently. President Farrell, of the Steel Corporation, expects the mills to operate at full capacity in the near future.

SIGNALING.

The Missouri Pacific plans to erect automatic block signals during the present year on the line from Sheffield, Mo., to Leeds, four miles; and from Independence, Mo., to Kansas City Southwestern Junction, five miles.

The Southern Railway will put up automatic block signals on the line from Denim, a point about three miles north of Greensboro, N. C., to Charlotte, N. C., a distance of about 97 miles. This entire stretch is double track, with the exception of five miles just south of Concord, N. C., which is single track. The signals will be of the three-position, upper quadrant type with the Railway Signal Association standard type A spectacle. There will be 116 signals.

The Gray-Thurber cab signal and automatic train stop, which has been in use experimentally on the Pennsylvania Lines west of Pittsburgh, was tested at a public exhibition on December 29, with satisfactory results. Messrs. Gray and Thurber have been making experimental runs since the beginning of December. The tests are made on one of the westbound tracks of the main line of the Fort Wayne, between Jack's Run and Glenfield, about 5 miles. This apparatus not only gives an audible signal in the cab of the locomotive and applies the brakes, but also shuts off steam. The electric circuits connecting the engine apparatus with the roadside apparatus, are run through the rails of the track and are controlled by means of an insulation between the locomotive and the tender, or between one pair of wheels of the locomotive and the rest of the engine.

Railway Equipment in New Zealand.

It is now the policy of the New Zealand government to make all its own rolling stock, even though it is admitted that it costs about one-third more to do so than if such equipment were imported from England or the United States. The present styles of locally made rolling stock conform to American patterns rather than British. On account of the narrow gage of New Zealand railways, 3 ft. 6 in., the locomotives and cars must be built much narrower than those intended for use on American railways, and this has led to some original local designs for economy of space. The chief mechanical engineer of the New Zealand railways, A. L. Beattie, whose position corresponds with that of superintendent of motive power on American railways, is a member of the American Railway Master Mechanics' Association, and is a strong advocate of American models for locomotives and cars. Mr. Beattie tells me that were it not the present government policy to make its own equipment, he would favor importing all the rolling stock for New Zealand railways from the United States, as American-built equipment previously bought has given much more satisfaction than that bought in England. Out of 478 locomotives now in use on the New Zealand railways, 109 were built in the United States and about 300 in England, the remainder having been built in New Zealand during the last four or five years, chiefly according to American designs modified to suit local conditions. Out of 1,166 cars used on the New Zealand railways, about 100 were American built. The only imported parts of the present locally made equipment consist of the steel tires or rims for the wheels and the larger steel castings. The chief local workshops for making this equipment are at Addington, a suburb of Christchurch. There is a large use here of machine tools and lathes, mostly from the United States, and much attention is paid to the latest American improvements, with a view to their introduction here. Westinghouse airbrakes are used, and the Pintsch system of car lighting. There are five separate Pintsch gas works manufacturing oil gas, the amount used by the government railways in 1910 being 8,270,930 cu. ft., costing about 50 cents per 100 cu. ft. The cars are now nearly all fitted with incandescent mantles. Acetylene gas is used for locomotive headlights.—*Minister of Railways for New Zealand.*

Supply Trade News.

Street mechanical stokers, designed by Clement F. Street, Schenectady, N. Y., have been specified for the nine mikado locomotives just ordered by the Virginian Railway from the Baldwin Locomotive Works.

C. E. Tripp, of the Stone & Webster Engineering Corporation, Boston, Mass., has been made chairman of the board of directors of the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., succeeding Robert Mather, deceased.

The Isthmian Canal Commission will receive bids until January 24 on cast iron car wheels, and until January 25 on automatic signal material, for the relocated line of the Panama Railroad. (Circulars 671 and 669, respectively.)

C. E. Knickerbocker, member American Society Civil Engineers and lately resigned as chief engineer of the New York, Ontario & Western, has gone to the MacDonald Construction Company, New York, in charge of railway construction.

Judge Elbert H. Garry, chairman of the United States Steel Corporation, New York, has resigned his position as chairman of the board of directors of the Allis-Chalmers Company, Milwaukee, Wis. It has just been made known that Judge Gary also resigned from the directorate of the American Steel Foundries, New York, some time ago.

The Baldwin Locomotive Works, Philadelphia, Pa., has bought 320 acres of land at Calumet, Ind., near Indiana Harbor, upon which it will immediately begin the erection of a plant with a capacity of building 10 locomotives a week. Additions will be made later which will increase the capacity to 30 locomotives a week, and will give employment to 5,000 men.

James A. Scully, work superintendent of the Whiting Foundry & Equipment Company, Harvey, Ill., and George E. Jones, superintendent of outside erection and complaint adjustment of the Whiting company, have resigned their positions and have organized Scully, Jones & Co., Chicago, to make and sell foundry equipment and supplies, machinists' supplies and railway appliances.

D. F. Lillis has been appointed Eastern sales agent of the Grip Nut Company, Chicago, with headquarters in New York. Mr. Lillis has been engaged in railway work for about 20 years, and has been chief clerk to four presidents of the Lake Shore & Michigan Southern. Later he was secretary to J. F. Deems, until recently general superintendent of motive power, rolling stock and machinery of the New York Central lines.

The Standard Railway Equipment Company, Pittsburgh, Pa., and the Monarch Pneumatic Tool Company, St. Louis, Mo., will in future keep their respective orders and business transactions separate. The Standard company will receive all orders for roof materials and carlines, and the Monarch company will receive all orders for pneumatic tools. P. H. Murphy is president of the Standard company and William Miller is president of the Monarch company.

The Scullin-Gallagher Iron & Steel Company, St. Louis, Mo., made a new record during December for low cost of production and maximum tonnage in plant No. 2. This company has recently ordered a 45-ton pouring crane from the Alliance Machine Company, Alliance, Ohio, and a turbine air compressor from the Ingersoll-Rand Company, New York, to use exhaust steam capable of throwing 4,000 cu. ft. of air per minute at 100 lbs. pressure.

J. G. White & Company, Inc., New York, have just purchased 124 miles of 12-in. steel pipe to be used in building a natural gas line in California. The pipe will weigh approximately 11,000 tons, and, with transportation, will cost approximately $600,000. Quotations were asked from British, German and French manufacturers, and the best foreign price was that of a British firm, which, exclusive of duty and freight, was approximately double that at which the contract was placed with the National Tube Company, Pittsburgh, Pa.

W. O. Jacquette has resigned as vice-president of Manning, Maxwell & Moore, Inc., New York. Mr. Jacquette has made no plans for the future, but for the present will make his headquarters at 165 Broadway, New York. Charles L. Lyle, heretofore manager for Manning, Maxwell & Moore, at St. Louis, Mo., has been made western manager for the Niles-Bement-Pond Company, New York, with office at St. Louis. Mr. Lyle was connected with the Niles-Bement-Pond Company until some nine years ago, when he left to go with Manning, Maxwell & Moore.

George W. Fowler, for many years sales manager of the Garwood Electric Company, New York, and W. J. Warder, Jr., formerly chief engineer and superintendent of Roth Brothers, Chicago, and later with the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., have resigned to enter the sales department of the Crocker-Wheeler Company, Ampere, N. J. A. K. Selden, Jr., for some years in charge of the design of motors for the Electro Dynamic Company, New York, has resigned to enter the engineering department of the Crocker-Wheeler Company.

Morris E. Ward, general sales agent of the Chicago-Cleveland Car Roofing Company, Chicago, died in Chicago on January 7 of a complication of diseases at the age of 68 years. Mr. Ward served for three years in the Civil War, and later was associated with several newspapers in various parts of the West. In 1874 he became city editor of the Denver *News,* and, later city editor of the Omaha *Republican.* For seven years he was railway editor of the old Chicago *Times,* after which he was for three years connected with the Allen Paper Car Wheel Company, and for three years with the Wickes Refrigerator Company. He had been general sales agent of the Chicago-Cleveland Car Roofing Company for 18 years.

The Bureau of Associated Geological Engineers, with main office at 131 State street, Boston, Mass., and a branch at 331 Fourth avenue, Pittsburgh, Pa., an association that has engaged in geological engineering, has recently entered the railway field, specializing in examinations of mineral properties and the possibilities of mining and quarrying developments along the lines of the various railways, reporting on the most favorable localities for obtaining water supplies, and on the geological conditions bearing upon the stability of bridge and other foundations. The managers are Myron L. Fuller and Frederick G. Clapp, both former members of the United States Geological Survey.

The Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has received an order for the complete equipment of three rotary converter sub-stations and one transformer sub-station from the Kansas City, Clay County & St. Joseph Railway Company. The transformer junction station will contain three 750 kva., 25 cycle, 6,600-33,000 v. transformers. Each rotary converter sub-station consists of six 185 kva., 25 cycle transformers, 33,000 v. primary to rotary converter secondary voltage, and two 500 kw. 25 cycle, 1,200 v. direct current rotary converters. The road runs from Kansas City, Mo., to St. Joseph, with a branch from Kansas City to Excelsior Springs, with a total mileage of 80 miles.

Richard T. Crane, president of the Crane Company, Chicago, died at his home January 8. Mr. Crane's death was sudden; his illness had not been considered serious. Mr. Crane was born in Paterson, N. J., in 1832, and worked in machine shops in Paterson, New York and Brooklyn, N. Y., until he was 23 years old, when he moved to Chicago. An uncle, Martin Ryerson, gave him a small piece of land on which he started a brass foundry. His brother, Charles S. Crane, subsequently joined him, and the machine manufacturing company of R. T. Crane & Brother was formed. This concern later grew into the Northwestern Manufacturing Company, and after that into the Crane Brothers Manufacturing Company, from which it evolved into the Crane Company.

Charles I. Young, of the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., died on January 6. Mr. Young graduated from Princeton University in 1883. He started his business career with the Edison Machine Works at New York, and later became superintendent of the Edison Illuminating Company, New York. In 1886 he went with the Westinghouse company. Due to an electric shock of 2,500 v., received in 1888, he was incapacitated for work for the three years following. In 1891 he again became associated with the Westinghouse company, and while he was physically weak and partially dependent on the

help of another, he retained all his mental faculties, and his knowledge of the electrical business from the beginning fitted him splendidly for work in the sales department as advisory engineer, first in the office at Philadelphia, Pa., later in the export department, and finally at East Pittsburgh, Pa. As instructor in the commercial training department in the sales organization he achieved remarkable success.

TRADE PUBLICATIONS.

Gage Glass Protectors.—The Ashcroft Manufacturing Company, New York, has published a small folder on the Ashcroft gage glass protectors, consisting of malleable iron frames.

Fans.—The American Blower Company, Detroit, Mich., has published "Fact Bulletin" No. 3, giving the present standing of several suits which are now being carried on between this company and other fan manufacturers.

Mechanical Stokers.—The E. R. Allen Foundry Company, Corning, N. Y., has issued a pamphlet devoted to the Elliott mechanical stoker, describing and illustrating its method of automatically taking care of coal, fire and ashes.

Atlantic Coast Line.—The passenger department of this company has published a useful little folder entitled What to Say in Spanish and How to Say It, giving brief, selected vocabularies on many of the most common subjects.

Southern Railway.—The land and industrial department of this company has published a small illustrated folder on the activities of the Southern Railway in the good roads movements along its lines. Interesting results are given.

Pennsylvania.—The freight department of this company has published a small, useful little booklet on the essentials of soil fertility, which gives a good deal of information on the proper method of preparing soil to obtain the best results.

Pneumatic Tools.—The Chicago Pneumatic Tool Company, Chicago, has issued bulletin No. 34 C, devoted to Chicago pneumatic tandem gasolene-driven compressors. This company has also issued a booklet on compressors for air and gas.

Compressors.—The Ingersoll-Rand Company, New York, has published form No. 3211 on Imperial type X, duplex, steam-driven compressors, in which detailed descriptions are given and many advantages enumerated. Diagrams and dimension tables are included.

Northern Pacific.—The passenger department of this company has published a very attractive 25-page booklet on the Bitter Route Valley in Montana, in which are described the great productivity and diversity of resources and the climatic attractions of this region. Brief accounts of several small towns are included.

Journal Boxes.—The Locomotive Equipment Company, Detroit, Mich., has published in bulletin J-1 facts about the Newcomb journal box, in which ten definite advantages are clearly and concisely given. Some interesting results of tests are included to substantiate these claims. Illustrations and diagrams are included.

Locomotive Cranes.—The Browning Engineering Company, Cleveland, Ohio, has just published an unusually attractive and useful catalog descriptive of the various types of Browning locomotive cranes and the many different uses to which the cranes and their various attachments are adapted. In addition to illustrating and describing briefly a few of the more important details of construction the book contains many excellent photographs showing locomotive cranes, clam shell buckets, electric lift magnets, wrecking cranes, railway ditchers, revolving steam shovels and pile drivers in actual use in various large plants. These photographs include illustrations of methods of using cranes for the lifting of all sorts of heavy objects, in car building yards and steel plants, in trestle building, for handling and breaking up scrap, loading and unloading cars and boats, handling timber, in building wrecking, and in various kinds of excavation work, as well as for many other purposes too numerous to mention.

Railway Construction.

New Incorporations, Surveys, Etc.

Atlantic Coast Line.—The Haines City branch of the Third district has been opened for business from Haines City, Fla., south to Crooked Lake.

Canadian Northern.—The Brandon Maryfield-Lampman section is open for business between Brandon, Man., and Ceylon, Sask., 232 miles.

The Neepawa-Beulah section is open for business between Neepawa, Man., and Beulah, 81 miles.

The Hudson Bay Junction-Le Pas sub-division is open for business between Hudson Bay Junction, Sask., and Le Pas, Kewatin, 87½ miles.

The Sturgeon River sub-division is open for business between North Battleford, Sask., and Edam, 38 miles.

Train service on the Oak Point sub-division has been extended from Oak Point, Man., to Gypsumville, 92 miles.

The Delisle-MacRorie line is now in operation between Delisle, Sask., and MacRorie, 46 miles.

The Calgary section has been extended from Kindersley, Sask., to Alsask, 44 miles.

The Thunderhill branch has been extended from Pelly, Sask., to Preeceville, 38½ miles.

An extension on the Shellbrook-Crooked Lake line has been opened for business from Shellbrook, Sask., to Blaine Lake, 36 miles, and from Shellbrook to Big River, 56½ miles.

Chicago, Milwaukee & Puget Sound.—According to press reports this company has about completed work on the line to Coeur d'Aline, Idaho, and is negotiating for the right of way with the Wallace-Spokane Company, which holds the franchise privileges over the government and state lands between Coeur d'Alene and Wallace by way of the Fourth of July canyon.

Delaware, Lackawanna & Western.—The new line between Lake Hopatcong, N. J., and Slateford Junction, Pa., 29 miles, has been opened for business.

This company will build a new line from Clarke's Summit, Pa., to Hallstead, to reduce the distance between the two points from 38 to 35 miles, and to eliminate curves and heavy grades between Scranton and Binghamton. Contracts will be let in ten sections. The work will include building a concrete bridge near Nicholson, to replace the present tunnel at that point.

Detroit & Mackinac.—Train service has been put in operation on the Rogers City branch from Calcite, Mich., north to Rogers City, 3 miles.

Erie Railroad.—This company during the past year built 42 miles of second track between Leavittsburg, Ohio, and Marion. Arrangements have been made for completing an additional 11 miles during January. W. J. Harahan, vice-president, New York. (July 14, p. 104.)

Iowa & Southwestern.—An officer writes that work has recently been finished on the line from Clarinda, Iowa, southwest via Colorado Springs to Blanchard, on the Wabash Railroad, 17½ miles. The company expects to develop a traffic in live-stock, lumber, coal, grain and merchandise. W. S. Farquhar, president; C. B. Judd, chief engineer, Clarinda.

Liberty-White.—This road has been extended from Kaigler, Miss., to Bridges, 3 miles.

Lynchburg-Danville & Carolina.—Incorporated in Virginia with $25,000 capital, and office at Amherst, Va. The plans call for building from a point on the Chesapeake & Ohio near Lynchburg, Va., south to the Virginia-North Carolina State line, near Milton, N. C., about 70 miles. T. O. Troy, president; W. P. Read, secretary, both of Amherst; A. B. Carrington, R. A. James and W. R. Fitzgerald, all of Danville; J. E. Bowman, E. Meeks and L. B. Davies, all of Amherst, are directors.

Memphis Railway Bridge & Terminal Company.—See Memphis, Tenn., under Railway Structures.

Northern Pacific.—Bids are now being asked for, it is said, to build the Point Defiance line from Tacoma, Wash., to Tenino. Work on the line had been held up for some time owing to the

delay in securing the necessary franchises. (November 10, p. 975C.)

Ohio & Kentucky.—This road has been extended from Malone, Ky., to Liberty Road, 3½ miles.

Oklahoma-North Western.—This company was incorporated last year with $100,000 capital to build from Oklahoma City, Okla., into the northwestern section of Oklahoma. It is said that financial arrangements have been made. John W. Shartell, of the Oklahoma Railway Company, Oklahoma City, is said to be back of the project.

Oregon Short Line.—On the Idaho division the following branches have been opened for business: Paris branch, from Montpelier, Idaho, to Paris, 9½ miles; North Side branch, from Rupert west to Bliss, 73 miles; Oakley branch from Burley west to Oakley, 22 miles; Caldwell branch Caldwell to Wilder, 11 miles.

Pecos Valley Southern.—This road has been extended from Balmorhea, Tex., to Toyahvale, 3½ miles.

Pembroke, Red Springs & Northern.—Incorporated in North Carolina with $75,000 capital to build from Red Springs, N. C. to Pembroke, about 12 miles. The incorporators include W. J. Johnson, J. D. McLean, J. L. McMillan and J. G. Williams, all of Red Springs.

Peninsular Railway (Electric).—Construction work is soon to be started on the extension from Palo Alto, Cal., into San Mateo county. The work includes putting up a concrete viaduct over San Francisquito creek near Palo Alto.

Portland & West Coast Railroad & Navigation Company.—Application has been made at Bay City, Ore., for a franchise. The company has already been granted permits to build through Sheridan, Willamina, Bentley, Tillamook, Dolph and Hebo. It is understood that the company will build a hydro-electric power plant. W. F. Pries, C. M. Hendrickson and J. H. Upton are incorporators. (November 3, p. 932.)

Quanah, Acme & Pacific.—An officer is quoted as saying that work will be started soon on an extension from Paducah southwest on about 50 miles. (September 22, p. 576.)

Roaring Fork.—Work has been finished on the line from Roaring Fork, Va., to Pardee, 4½ miles.

Seaboard Air Line.—On the Fifth division the Plant City branch has been extended from Bradley Junction, Fla., to Agricola, 5 miles; and the Sarasota branch has been extended from Sarasota south to Venice, 19 miles.

Seaboard Air Line.—See Norlina, N. C., under Railway Structures.

Wichita Falls & Northwestern.—Train service is now in operation on the Fifth division, between Hammon, Okla., and Leedy, 19 miles.

Winnipeg, Salina & Gulf.—Application has been made in Kansas to issue bonds. The company plans to build from Omaha, Neb., southeast to Oklahoma City, Okla., with another line from Kansas City, Mo., to Des Moines, N. Mex. H. L. Miller, president; C. C. Whitehead, secretary. The headquarters of the company are at Salina, Kan. (June 23, p. 1675.)

RAILWAY STRUCTURES.

Bells, Tex.—J. J. Maloney, of Dallas, has been awarded the contract for building a new passenger station for the Missouri, Kansas & Texas and the Texas & Pacific.

El Paso, Tex.—Work is to be started at once on a reinforced concrete freight house for the Texas Pacific, to cost about $75,000.

Hamilton, Ont.—The Toronto, Hamilton & Buffalo is planning to make improvements to include extensions to the freight sheds and yards at Hamilton.

Harrisburg, Ore.—Permission has been granted to the Oregon Electric to build a bridge over the Willamette River, near Harrisburg.

Kingsville, Tex.—The St. Louis, Brownsville & Mexico, according to reports, will enlarge its repair shops at this point and order a large amount of new machinery in addition to erecting a new passenger station.

Los Angeles, Cal.—The Pacific Electric, it is understood, will put up new shops at Dominguez, about 13 miles from Los Angeles. The estimated cost of improvements is $250,000.

Memphis, Tenn.—The Memphis Railway Bridge & Terminal Company has applied for a charter in Tennessee to build a bridge across the Mississippi river at Memphis, to be used by the Rock Island Lines. J. T. Harahan, former president of the Illinois Central, is one of the incorporators. Plans for the improvement are being prepared by the Rock Island, and will include terminal yards and freight houses, as well as large freight warehouses in the city, involving an expenditure of several million dollars in all.

Nicholson, Pa.—See Delaware, Lackawanna & Western under Railway Construction.

Norlina, N. C.—The Seaboard Air Line has bought land at Norlina, it is said, as a site for shops. It is understood that the plans include a change of line between Raleigh and Durham.

Oakland, Cal.—The Oakland & Antioch, with headquarters at San Francisco, is said to be making plans for putting up a station and terminal buildings on property recently secured at Fortieth and Opal streets, in Oakland.

Palo Alto, Cal.—See Peninsular Railway under Railway Construction.

Philadelphia, Pa.—The Philadelphia & Reading will build a new station at Falls of Schuylkill soon. The building will cost about $25,000.

Pine Bluff, Ark.—The machine and boiler shops of the St. Louis Southwestern were destroyed by fire on January 1, with a loss of about $80,000. It is expected that the shops will be rebuilt.

Port Huron, Mich.—The Pere Marquette station and office building was destroyed by fire on January 2, with a loss of about $20,000. The building may be rebuilt.

Seymour, Tex.—The Gulf Texas & Western and the Wichita Valley are preparing to build a new union station.

Toronto, Ont.—The Canadian Pacific is building a 16-story office building in Toronto, with a frontage of 75 ft. on King street and 125 ft. on Yonge street. Several floors are to be occupied by the railway for its own offices, and others are to be rented.

Villa Rica, Ga.—The Southern Railway is building a new station at Villa Rica.

Vincennes, Ind.—The Indiana railway commission has ordered the Baltimore & Ohio Southwestern, the Chicago & Eastern Illinois, the Vandalia, and the Cleveland, Cincinnati, Chicago & St. Louis to submit plans for the improvement of the union station by March 1.

Winfield, Kan.—The St. Louis & San Francisco has notified the Kansas railway commission that it will build a new passenger station at Winfield.

FOREIGN RAILWAY NOTES.

The government of Paraguay has granted a concession to Conde dos Nacimientos & Company for the construction and operation of a railway from Asuncion to Santo del Guaira.

On November 9, 1911, the minister of public works of Ecuador and Julian Fabre, manager of the Franco-Dutch Company, signed a contract in virtue of which the government of Ecuador grants to M. Fabre a concession to build and operate a railway, which leaving the port of Bolivar on the Gulf of Guayaquil is to pass through Cuenca and terminate at some navigable point on the upper Amazon. This line will undoubtedly be very important when once it is built, because in addition to its international significance it will cross four of the richest provinces of Ecuador and thus stimulate production and traffic, and give to them an outlet to the Atlantic ocean. The Franco-Dutch Company estimates the cost at about $40,000,000.

Railway Financial News.

Baltimore & Ohio.—The New York Public Service Commission has approved the proposal for the acquisition of the 215 outstanding minority shares of the Staten Island Rapid Transit by the B. & O. All the rest of the stock is now owned by the Baltimore & Ohio.

Boston & Lowell.—Stockholders have voted to increase the capital stock from $7,399,400 to $7,679,400, the additional stock to be sold to provide for additions and betterments.

Boston Railroad Holding Co.—See New York, New Haven & Hartford.

Buffalo, Rochester & Pittsburgh.—The New York Public Service Commission, Second district, has authorized this company to issue $1,229,375 4 per cent. equipment trust bonds.

Camino, Placerville & Lake Tahoe.—See Placerville & Lake Tahoe.

Chesapeake & Ohio.—The *Wall Street Journal* says that this company will probably sell to its bankers in the near future about $3,000,000 equipment trust notes.
See also Pere Marquette.

Colorado & Southern.—This company, which owns nearly all of the stock of the Colorado Springs & Cripple Creek District, has leased the road of the C. S. & C. C. D. to the Florence & Cripple Creek, which is owned by the Cripple Creek Central.

Colorado Springs & Cripple Creek District.—See Colorado & Southern.

Cripple Creek Central.—See Colorado & Southern.

Denver & Rio Grande.—In connection with the retirement of George Gould as chairman of the board of directors, and the election of B. F. Bush as president, mentioned in our "Elections and Appointments" columns, Mr. Gould issued a statement which says, among other things, that Mr. Jeffery (formerly president and now chairman of the board) will continue to have direct charge of the finances of the D. & R. G. and will, of course, exercise general supervision over the affairs of the company.

Florence & Cripple Creek.—See Colorado & Southern.

Minneapolis & St. Louis.—In a circular sent to stockholders, President Newman Erb says in part:

The Minneapolis & St. Louis was for 15 years up to January 1, 1910, able to pay dividends regularly on its preferred stock, and for about four years dividends upon its common stock. It has terminals in Minneapolis and St. Paul, which about two years ago were appraised by experts at approximately $7,300,000, or an amount exceeding 30 per cent. of the funded debt of that company. These terminals are capable, with moderate development, of meeting the requirements of the company for many years to come.

"The western terminus of the road at Le Beau, So. Dak., on the Missouri river, has no Western connection; on the south the Iowa Central at Albia connects with the Wabash Railroad, which, while interchanging traffic on friendly terms, has other connections to serve as well. Under these conditions the properties were dependent almost solely upon the development and prosperity of the immediate territory served, were highly competitive and without proper advantage of their 1,560 miles as a connecting link to territory beyond their own termini. Notwithstanding these adverse conditions, the gross earnings have been steadily increasing, exception being limited to two unusual crop failures recently.

The extension to the international Canadian boundary now contemplated will enable the company to add to its tonnage the business to and from the Canadian Northwest. A connection is contemplated with the Missouri, Kansas & Texas at or near Moberly, Mo., which will make your properties a north and south line from Canada to the Gulf, adding still more tonnage movement without any corresponding increase in the overhead or terminal charges. The extension to the Canadian border will take about 18 months to build. The connection with the M. K. & T. will be, it is intended, provided through trackage contracts. Arrangements are also under consideration for making the Peoria line, by a very modest amount of new construction and by connections at Peoria, an east and west line to Omaha. The gross earnings per mile of the properties for the past fiscal year were $5,570. With $1,000 additional revenue per mile through the extensions proposed, and with operations upon a normal ratio of cost, say, 70 per cent., we should more than meet all fixed charges and dividend requirements for the whole capitalization, the outstanding preferred stock being only $4,100 per mile and the common stock about $10,000 per mile.

"The financial provisions now being made will leave the properties free of all floating debt, with a reasonable amount of working capital. The new 'first mortgage and extension' bonds will be a first mortgage upon 229.6 miles of existing road and a general lien upon all the other properties. They will also be a first mortgage upon the extensions. When payment of dividends is resumed on the preferred stock the price at which you are permitted to subscribe for the securities will yield 7½ per cent. per annum."

New York Central & Hudson River.—See Rutland Railroad.

New York, New Haven & Hartford.—This company has sold through J. P. Morgan & Co., New York, $30,000,000 1-year 4 per cent. notes dated January 15. The notes are being offered to the public by Lee, Higginson & Co., Boston, Mass., at par. The company has maturing within the next two months $22,000,000 1-year notes and $7,290,000 other obligations.

Governor Foss, of Massachusetts, in an address to the legislature, says in part: "The Boston Railroad Holding Company is wholly indefensible, and I now demand that the constitutional power of the Commonwealth be exercised to dissolve it. If the two railways are not parallel or competing, then there is no objection to a consolidation of these properties, the principal condition being that the two lines shall be physically connected and thus provide for through passenger and freight service."

[Physical connection would mean presumably a tunnel under Boston between the North and South stations.]
See also Rutland Railroad.

New York & Harlem.—The directors have declared a dividend of 7 per cent., payable January 23. It is for the purpose of returning to the stockholders, prior to the sale of the stock to the New York Central, the amount of special franchise taxes which were held up some years ago pending a settlement with the Metropolitan Street Railway Company, lessee, of a dispute as to which corporation was responsible for the state tax. As a consequence of this dispute the New York & Harlem suspended dividends out of the rental of the street railway from October, 1908, until October, 1910. When the dividend was resumed it was at the rate of 3 per cent.

Pere Marquette.—Newman Erb and associates are said to be negotiating for the control of the Pere Marquette, and rumor says that the Chesapeake & Ohio may possibly eventually buy control of the Pere Marquette.

Placerville & Lake Tahoe.—This road was sold to the trustee of its mortgage bonds for $62,715. The Camino, Placerville & Lake Tahoe has been incorporated with $100,000 stock to take over the property.

Rutland Railroad.—The United States circuit court has denied an injunction to restrain the N. Y. C. & H. R. from transferring the remainder of the majority stock of the Rutland to the New York, New Haven & Hartford pending an action brought in the United States circuit court asking for a receiver for the Rutland. (Dec. 1, page 1150.)

San Pedro, Los Angeles & Salt Lake.—A special meeting of stockholders has been called for voting on the question of retiring the $60,000,000 authorized first mortgage bonds, of which $48,835,000 are outstanding; to make a new mortgage to secure an authorized issue of $70,000,000, and to authorize the directors to issue bonds at their discretion under this mortgage. The road is controlled jointly by the Harriman Line interests and Senator Clark.

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POSTMASTER GENERAL HITCHCOCK, in his recommendation that the federal government buy all the telegraph lines of the country and operate them in connection with the postoffices has made three mistakes. First, he neglected to secure the co-operation of the president, and so has alienated friends in a cause which cannot get along without all the friends that can be got hold of. Second, he is careless of his facts. Government telegraphs which give such marvelously low rates are not profitable; the British lines have been maintained in part by large issues of government bonds, a burden on the tax payer. It is, probably, a mistake of fact, also, to assume that we have in this country many postoffices where there ought to be a telegraph office, to accommodate people now needing it. The telephone has met this need, and met it better than the telegraph could do. Thirdly, he is behind the times. His proposition to economize by having one person tend the postoffice and the telegraph office has been forestalled by the Western Union in its consolidation of telegraph and telephone offices. The Western Union is striving to make this improvement efficiently and economically, being kept alert by a lively competitor, the Postal Telegraph Company. A government bureau, possessing a monopoly, would lack this incentive.

SUBJECT to final revisions by the electrical department of the company, which are not likely to change much the original computations, the extension of electric service over the New Haven's four tracks from Stamford to New Haven (39.75 miles) is now clearly in sight and ordered by the company's directors. Unless unlooked for financial obstacles should ensue it seems reasonably certain that the end of the present year will find electric service with complete exclusion of steam on the 73 miles between the Grand Central station and New Haven, and applied to both passenger and freight traffic. The total cost of the extension, including a considerable purchase of electric freight engines will be about $7,000,000. The electric passenger service between New York and Stamford has been operated at a considerable loss as compared with steam, but due largely to the maintenance of the "mixed" service and the use of the power in practically one direction only from the Cos Cob station. With the extension to New Haven operated the official forecast iutlines great economies over steam from unification of service, economies in the case of engines, extensive service in two directions without a new power house, large economies in switching and obvious economies in fuel. The end of the year 1913, and very likely a date earlier will see these forecasts tried out. Meanwhile it is to be recalled that the New Haven electric plan includes also the 74 miles of track of the New York, Westchester & Boston. With a mileage of about 150 miles thus under electric operation and a trackage of about 4 times those figures, the magnitude and significance of the New Haven's electric enterprise are apparent. President Mellen's prophecy of a few years ago that results would also be "revolutionary" of steam business on high traffic lines will await ulterior demonstration.

THE great advantage of increasing the capacity of locomotives without increasing the weight is becoming quite generally recognized as the limits of weight are being approached. Any such increase in capacity means greater ton-mileage with a comparatively small increase in operating expense. Advantage is being taken of the different devices which make far greater fuel and steam economy, and the weight of various parts of the locomotive is being reduced to a minimum, in order to increase the size and steaming capacity of the boiler. It is, therefore, strange, when a road has gone to considerable expense to thus improve the condition of its power, to hear a motive power officer enthusiastically exclaim: "Those new engines are great! Why, they can pull over that heavy grade on the X Y Z division with 100 tons more than our standard engines and blow-off steam all the way." The strange part is to find that "blowing-

off steam" is not intended as a figure of speech, but that it is literally true that in some instances the engineers are allowed to do it a considerable amount of the time. Although on many roads emphasis is constantly being laid on the rapid rate at which coal is wasted when this process is going on, it seems almost impossible to control it. Various suggestions have been made from time to time as to how the popping of the safety valves can be reduced to a minimum. These range from the attachment of a shrill whistle to the pop valve to placing the valve underneath the engineer's seat box. The most practical device thus far used seems to be a clock attachment, such as was described in a recent issue of the *Railway Age Gazette,* which records the actual time that the valve blows-off. while the engine is making a trip. Conditions on some roads are such that radical steps should be taken to check this evil.

ATTENTION is called in a bulletin issued by the bureau of explosives of the American Railway Association to the need for the exercise of the greatest vigilance on the part of railway men to guard against a common and dangerous practice which vitally affects the public safety. It has come to the attention of the bureau that many users of explosives, and especially miners ignorant of the English language or of the requirements of the federal laws, are in the habit of including packages of explosives in baggage checked in the usual way on passenger trains or in packages of household furniture shipped by freight. The law strictly forbids concealed shipments of explosives, or their transportation on passenger trains in any circumstances. Explosives must be packed in their regular shipping containers, which must be correctly marked and accompanied by proper shipping orders. The penalties provided for violations of the statute are severe, the maximum being a fine of $2,000, or imprisonment for 18 months, or both. In some instances it is reported that miners have taken kegs of blasting powder, and even packages of loose sticks of dynamite mixed with blasting caps, all wrapped in loose paper packages, into smoking cars. Washtubs and barrels supposed to contain only household goods have been found to contain loose powder and sticks of dynamite. Many violations of the law of this kind have been reported, and in several cases convictions have been secured. The bureau of explosives deserves credit for having already brought about a wholesome improvement in the conditions attendant upon the transportation of explosives and other dangerous articles. Such reckless handling as is described above is peculiarly difficult of detection, and the efforts of Chief Inspector B. W. Dunn and his assistants can only be made successful by the heartiest sort of co-operation on the part of the railway companies. Many roads are rendering material assistance by giving the subject wide publicity among their own employees, without whose constant watchfulness little can be accomplished.

IF the assumptions by Mr. Gardiner, in his letter printed on another page, are correct, he might well be justified in asking "who would be left to oppose government ownership?" The facts, however, fail to bear him out. Mr. Gardiner's first assumption that the largest part of railway mileage of the country was built for securing profit from building and not profit from operation is a very broad statement—probably entirely too broad. In the South it is more nearly true, probably than in any other part of the country, however. Mr. Gardiner's experience is that a railway needs 5 per cent. of its actual value to put into the property each year for improvements, and his contention is that railways built and financed as they have been in the past will not be able to put this amount into the property each year for improvements, because they will not be able to raise new capital. The obvious answer is that railways have been able to raise new capital to make very extensive permanent improvements to their property. Let us take the Southern Railway. On June 30, 1900, it was capitalized, exclusive of equipment trust certificates, but inclusive of securities of lease-hold estate at $49,306 per mile operated. At the end of June, 1910, the company was capitalized at $63,683 per mile operated, computed on the same basis. This is an increase of capitalization of 2.9 per cent. per year, on *capitalization,* as against Mr. Gardiner's estimated necessary 5 per cent. on actual cost. Moreover, the Southern Railway is largely an aggregate of lines built and financed very much on the plan suggested by Mr. Gardiner with numerous first lien mortgages and stock, consisting largely of the capitalization of hoped-for profit. Notwithstanding this, the Southern Railway has been able to spend the necessary sums from capital account for permanent improvements and to raise these sums by the sale of securities not a first direct lien on the rails. Furthermore, the Southern Railway has now facilities sufficient to handle not only any reasonable increase in traffic that may be expected, but (with the exception of equipment) even three or four times the traffic that is being carried on most of its lines at present. As to motive power, with a sharp return to prosperity, and largely increased shipments, especially through the West—the railways might quite possibly find themselves badly in need of more locomotives and possibly cars, but the car surplus and shortage report of the American Railway Association, printed this week, in our news section, hardly confirms this surmise, as far as cars are concerned. Mr. Gardiner speaks of a return to prosperity measured by an output by the steel plants of 90 per cent. of capacity. The United States Steel Corporation is now operating at about 89 per cent. of capacity, and some of the more important independent companies at 85 per cent. of capacity. Nevertheless, there is a surplus of freight cars of over 100,000. Mathematicians can prove conclusively that a baseball cannot be curved by a pitcher, but the fact remains that curves are easily pitched. It might be possible to so twist figures as to show that the railways of the United States cannot possibly raise the capital needed for improvement during the next ten years, but the same method used ten years ago would have shown the same thing, and one is inclined to trust experience rather than hypothetical figures. It is not because Mr. Gardiner's views are those of a shipper, but are those of a theorist that we question them.

NOMINATED FOR THE ANANIAS CLUB.

IN an article entitled, The Truth about Railway Accidents, published in the *Railway Age Gazette* of December 8, page 1166, numerous false statements regarding the railways of the United States, made by Charles Edward Russell, in an article entitled, Speed, published in the *Hampton-Columbian Magazine* for October, were exposed. We have secured information from the Interstate Commerce Commission completely refuting certain of the assertions made in the article referred to with ultra-positiveness. The assertions referred to appear in the following sentences:

"Various gentlemen connected with the operating, publicity and press agent departments of our national slaughter houses will make, of course, the usual perfervid protests at my statement that only three railways in the United States use the absolute block. To save them needless excitement, I may observe here that I do not get my information about this from the press bureaus, but from the office of the Interstate Commerce Commission, which is a much better source. Operating departments have now become so large and so complicated that sometimes the worthy young gentlemen employed in them do not know what is what on their own railways."

The *Railway Age Gazette* knew that the statements above quoted were untrue, and it did not believe that the Interstate Commerce Commission had given out any such misinformation as was attributed to it. We, therefore, wrote to Judson C. Clements, chairman of the commission, inquiring about the matter, and received from him under date of December 22 a letter, in which he said in part:

"In order to guard against any possible erroneous statement in answering you I wrote to Mr. Russell, asking him for the source of his information, and under date of November 15 I received an acknowledgment from him, in which it was stated:

"'I hardly have need to assure you of my desire to assist you in every way in my power; but in view of the nature of the interests antagonized by that article you will not think it either strange or improper if I ask

concerning the purpose of the inquiry and what use is intended of the information.'

"To this I replied that the purpose of my inquiry was to obtain information upon which to base a reply to a letter received from you, but I have heard nothing further from him. I now write to say that I am unable to locate any utterance emanating from the commission justifying the statement of Mr. Russell quoted by you."

Subsequently to writing the above, Mr. Clements continued his investigation with results which are set forth in the following letter written by him to the *Railway Age Gazette* on January 12:

"Again referring to the correspondence which originated with your letter of November 2, quoting from an article by Charles Edward Russell entitled 'Speed,' I have to say that effort has been made to locate the source of Mr. Russell's information.

"Mr. Russell declines to give the name of the one by whom the statement was made and I can therefore only say that it was never made by the commission, and was not made by any person by authority of the commission, or by any person who was authorized to speak for the commission.

"I may add that the information which we have relative to operation of block signal systems on our railways indicates that the statement in Mr. Russell's article, that only three railways in the United States use the absolute block, is very inaccurate and incorrect."

Mr. Clements' letter indicates with sufficient clearness the "shorter and uglier word" which in similar circumstances a former president of the United States would apply to the author of "Speed." We hereby nominate Mr. Russell for life membership in the Ananias club. We note that the *Hampton-Columbian Magazine* has been revived and that the leading article in its January issue is signed by Mr. Russell. We, therefore, also nominate the *Hampton-Columbian Magazine* for life membership in the same organization. We know of no man and no publication that so thoroughly merit a high place on its roster and the most distinguished honors of its own peculiar kind that it can bestow.

SOME QUESTIONS IN RAILWAY EQUITIES.

THE New York Central in 1898 took a step by which it in effect became a proprietor of the Lake Shore property. The Lake Shore had been paying 6 per cent. dividends on its $50,000,000 of outstanding stock. The New York Central offered the Lake Shore stockholders what was tantamount to a guaranteed dividend of 7 per cent. It offered, that is to say, in the ratio of 2 to 1 its own 3½ per cent. debenture bonds for Lake Shore stock. To the Lake Shore stockholder the plan was attractive. It increased his return by 1 per cent. It substituted the pledge of a strong dividend paying corporation for the, at least theoretical, uncertainties of the dividend of another corporation. And, as additional security, the Lake Shore stock surrendered was to be held as collateral for the guarantee. But there was another inducement to the exchange of Lake Shore stock for "New York Central-Lake Shore collateral trust" debentures not now commonly remembered. It was announced at the time that the large Vanderbilt holdings of Lake Shore had joined in the plan, thus not only practically assuring New York Central control of the Lake Shore, but placing the non-assenting stockholder in the position of a minority share owner, with attendant risks—a risk which the experiences of minority stockholders in other railways had shown to be considerable.

The plan went through with substantial success—at least from the New York Central viewpoint. Holders of about $45,000,000 of Lake Shore stock surrendered their shares in exchange for about $90,000,000 of the collateral trust bonds. Holders of about $5,000,000 of stock did not surrender it, and in the outcome have shown that they had superior wisdom or courage or both. For the Lake Shore dividend, based moreover, on earnings, has been raised to 18 per cent., when the New York Central has needed the money. The Lake Shore shareholder who entered into the scheme proposed has had to content himself with 7 per cent., while he has seen the non-assenting holder draw 18. The New York Central has, in a sense, penalized its coadjutors and rewarded the outsiders. The coadjutors have seen their own holding—measured in double the market price of their bonds—selling at about 165, while the outstanding Lake Shore stock has been quoted far up and indefinitely in the hundreds. Based on market price, the profits of the New York Central are obviously very great. Calling Lake Shore stock 400, the shares for which, in par of the bonds, $90,000,000 was paid, show a net profit for the New York Central of the same amount.

The case cited raises questions in equities and ethics. Assuming that the New York Central had fore-knowledge of the Lake Shore earning power and of its own policy of using that power for dividends, how far was it justified in driving so sharp a bargain with the old shareholders? It may be said that it was dealing with a corporation and interests technically, at least, extraneous to itself and that it was acting in the interest of its own shareholders. But, on the other hand, it may be urged that its relations with the Lake Shore as a "Vanderbilt road" were not only fiduciary, but intimate, if not controlling, and certainly such as to give it the "inside knowledge" that induced the exchange of stock for bonds. It may be contended also that the *caveat emptor* principle applies to the case, that the Lake Shore stockholders took their chances, and that they neglected due study of their property and estimate of its value and futurities. This line of reasoning is partly justified by the theory of fear inspired by the perils of minority stockholding. The question is now mainly academic, as well as the ulterior question as to how reparation could be made if a wrong has been done. The New York Central has now sent a circular to the collateral trust bondholders asking them to exchange their bonds for a new second mortgage security as a legal condition precedent to the consolidation of the two companies. A study in investment mentality will be affordedly the spirit in which the bondholders receive the proposition.

The consent of three-quarters of the bonds is legally required for the consolidation. Assuming that consent to be obtained, there is beyond another question in the railway equities. What terms can be demanded successfully by the holders of the outstanding $5,000,000 of Lake Shore stock for surrender of their shares? The rule of morals in such cases is that there should be compulsion on neither side—that on the part of the absorbing corporation there should not be a "freeze-out," nor on the part of the outstanding stockholders the "strike" for an exorbitant price. In practice, such cases usually get to the courts for an appraisal as a matter of the stockholder's constitutional right. And in the Offield case the United States Supreme Court has maintained the power of a state to determine the conditions—under appraisal—for condemnition of minority shares. The minority Lake Shore interest in this instance represents a market value of some $20,000,000 or more—enough by its magnitude alone to excite keen interest in the final adjustment of the equities.

INTELLIGENT AGITATION OF THE GRADE CROSSING PROBLEM.

EDWARD S. CORNELL, secretary of the National Highways Protective Association, speaking of recent records of fatalities at highway grade crossings, says, according to the *New York Herald*, that it is useless to make good roads, so long as the old grade crossing exists. Indeed, with the better road surface the speed of vehicles is likely to be higher, increasing the danger. Automobiles, running faster than horses have, no doubt, been caught by trains at crossings, when the slower moving horse would have escaped. Mr. Cornell has given voice to a very significant suggestion. The good-roads propaganda is becoming popular in all of the older states. New York State has appropriated millions for roads (four and a half millions in three years), while for the elimination of grade crossings, the need of which was recognized years ago, only an average of $79,149 yearly has been appropriated during the past fourteen years. No one can deny the economy of good roads for the farmer, but the farmer (in the legislature) should take care to economize with equal discretion in all directions. It is important for him to safeguard his life at railway crossings as well as to

cheapen the cost of carrying his grain to market; and the point is specially pertinent when, as sometimes happens, the tax money which he is spending on good roads is found to benefit pleasure riders in automobiles more than it eases the pull on the front draw bar of the farmer's wagon. Such heavy financial burdens as those of good roads and safe railway crossings should be made to bear as equitably as possible on all those whom the improvement benefits.

Another significant utterance on the grade crossing question is that in the report of the New Jersey Public Utilities Commission, given in our last issue, page 58, to the effect that cities and towns ought to bear a share of the burden of the necessary improvements in order to keep the sentiment of the citizens alert, intelligent and conservative. The universal tendency to shove tax burdens off upon somebody else is particularly persistent in the case of a burden so discouraging as this one, and public officers can do no better service to the people than to call attention to the cold realties of such problems. There has been a movement in New Jersey aiming to compel the abolition of all grade crossings at the expense of the railways alone, the state and the towns paying nothing. The railways, being forced to add new main tracks and to improve grades and ease curves, without waiting for the slow movements of city councils, have done millions of dollars' worth of work in this direction already, relieving the cities, only to be rewarded by having their taxes increased; but there can be no equity in forcing them to go further. Any favoring of the public in this direction must be made up in another, by deferring needed reductions of fares or freight rates. There is no way to get around the fact that the public must ultimately bear the principal share of the burden, for the railways derive their income from the public. As the New Jersey board suggests, we shall do well to consider the situation in those countries where the railways are owned and operated by the state. With public ownership the elevation of tracks is a public charge in its entirety.

Still another clear declaration is that of Governor Dix, of New York, who says:

"The increasing frequency of accidents at grade crossings, the peril and inconvenience to which the public are subjected at such crossings, the increasing traffic upon both the railways and highways, urgently demand that liberal appropriations should be made to carry on the work of eliminating such crossings. There are in this state, outside of the city of New York, upwards of 8,500 such crossings, a great proportion of which are a constant menace to the safety of the public."

"Liberal" appropriations in New York must mean a large sum. Massachusetts, with less than one-fourth as many crossings as New York, spent over $500,000 yearly for twenty-one years. This out of the state treasury. The cities and towns have spent large sums also, and the railways twice as much as state, cities and towns combined, the total expenditures since 1890 aggregating about $35,000,000. The New York legislature cannot do justice to the Governor's recommendation by making an appropriation after a perfunctory half hour's discussion; the need is for a careful study of the whole state budget, with a view to eliminating every unnecessary expenditure, thus making possible a large appropriation for crossings. With the increase of electric interurban railways, and (with the improvement of such railways) the growth in frequency and speed of electric cars, the grade-crossing problem is becoming larger instead of smaller, and legislatures, courts and people are bound to deal with the question most seriously. Hitherto there has been good ground for the assertions of Commissioner G. W. Dickinson, of Michigan, in his report to the commissioners' convention at Washington last October: "The public has been appealed to in vain. Commissions have recommended legislative action, only to have their recommendations ignored . . . The spirit of 'taking the chance' seems to have become almost habitual. . . . Some states permit the establishment of grade crossings. The public agrees that something ought to be done, but when it comes to bearing a fair share of the expense the public demurs, or loses interest." The grade-crossing problem is no summer-school campaign. It is still full of difficult questions.

A NOVEL PLAN FOR CHANGING RAILWAY CONTROL.

IN an article in *McClure's Magazine* for January, William W. Cook, one of the foremost authorities in this country on corporation law, outlines and advocates a novel plan for bringing all the railways of the United States under a single control. His sceme, he believes, would have all the advantages of both public and private ownership and management, and none of the disadvantages of either.

He proposes the organization under a federal charter of a holding company with an authorized capitalization of $25,000,000,000. On such of its stock as should be sold to the public from time to time the government would guarantee dividends of 3 per cent. This, he thinks, would make the stock marketable at par, like government bonds. He says that ten large systems now practically control the railway transportation of the country. These are the Pennsylvania Railroad, the New York, New Haven & Hartford, the New York Central & Hudson River, the Southern, the Union Pacific, the Chicago & North Western, the Chicago, Milwaukee & St. Paul, the Northern Pacific, the Great Northern and the Atchison, Topeka & Santa Fe. He estimates the market value of their stock at $2,844,484,526. By raising this sum, by the sale of its stock at par, the holding company could buy all the stock of the railways named and make itself the recipient of their dividends aggregating $151,818,393 per year. After paying 3 per cent. dividends on its outstanding capitalization, amounting to $85,334,535, the holding company would have left as its profit the difference, $66,483,858. "This large profit," Mr. Cook states, "could be applied to improvements or be consumed by a reduction in rates. In either case it would be a great saving to the people."

He proposes to capitalize the holding concern for the large sum of $25,000,000,000, because he estimates that "about $15,000,000,000 would be needed to secure all the existing railway stocks and pay for the existing railway bonds as they became due; and the remaining $10,000,000,000 would be issued from year to year to pay for future extensions and improvements." He would have the 25 original directors of the company named by Congress in its charter, their appointments being for life, and would empower them, with the approval of the president of the United States, and, perhaps, with that of the United States senate, also, to appoint their successors.

Mr. Cook thinks his plan would eliminate "Wall street domination," and the financial manipulation, unfair discrimination, etc., which he regards as great evils in railway management now, without producing the political complications and inefficient operation which he believes would result from government ownership. He assumes that under his scheme the operation of the individual railways would stay in the same hands as now, and would, therefore, continue to be efficient.

The twenty-five men who would compose the board of the holding company would be the keystone, and determine the success or failure of Mr. Cook's plan; for by voting the holding company's stock they would choose the directors of the operating companies; the directors of the operating companies would choose the executive officers of the railways; and upon the kind of executive officers who were appointed and the incentives they were given to do good work would depend how rates would be made, how economically and efficiently the properties would be run and what their earnings would be. Mr. Cook assumes the roads would continue to earn and pay their present dividends. But, of course, if they were ill managed they might not earn even 3 per cent.; in which case the government would have to raise by taxation the money to make good its dividend guarantee.

Is it probable, then, that the board of the holding company, chosen as suggested, would be so composed as to be competent to supervise honestly and wisely the operation, improvement and extension of the gigantic railway system of the United States? The first board would be elected by Congress. Most of the men who have the capacity and experience to equip them for directors are now connected with the railways either in that capacity or as executive officers. But if Congress adopted Mr. Cook's plan it would be primarily with the object of changing the influences

now governing railway management; and to accomplish this it would be apt to select men unlearned and unskilled in railway affairs. Indeed, it is not undue harshness, in view of the past history of public affairs in this country, to assume that they would be chosen for political rather than business reasons. If the first directors were chosen for such reasons so probably would their successors be. It is not likely that the directors of the holding company would select directors of the operating companies who would be essentially different from or superior to themselves. And if the directors of the operating companies were not good business men, and were not chosen because they were such, they would not be likely to select the executive officers of the railways regardless of political considerations and solely because of their experience and skill as railway men. If the executive officers were not chosen and retained or dismissed solely for business reasons the efficiency with which the railways were operated would deteriorate, which would result in poorer service or higher rates or reduced net earnings, or, perhaps, all of them.

Instead of having all the advantages and none of the disadvantages of both private ownership and government ownership, it would seem that Mr. Cook's plan would have few of the advantages and most of the disadvantages of both. There are many things to criticise in the existing method of selecting, and in the personnel of the directors of the roads of the United States. Too many of them live remote from the railways to whose boards they belong, and do not know their needs or the public sentiment along them. Too many are men of such large and varied affairs that they must perforce perform their directorial duties perfunctorily. Too many are mere dummies of large interests in Wall street. But a large proportion of the members of most boards do have the knowledge and experience needful for their duties. Furthermore, directly or indirectly, they represent and are responsible to the stockholders, or at least to the dominant stockholders; and, therefore, they have a strong incentive to cause the roads to be operated skillfully, and may be turned out if they do not. The process of eliminating incompetent directors is sometimes painfully and wastefully slow; but it usually works itself out. Similarly, under government ownership the owners of the railways could call those who were charged with the duty of operating them to an accounting; although the difficulty they would encounter in doing so would be greater than that met by the present owners, and for this and other reasons under government ownership the managers would be likely to be given less opportunity for and incentive to good management than they have now.

Who, under Mr. Cook's plan, would be able to call the board of the holding company to an accounting if it did not satisfactorily perform its duties? Not the stockholders, because they would have nothing to do with choosing or removing the directors. Not the public through Congress or any other branch of the federal government, because after the first directors were appointed the board would be self-perpetuating. Mr. Cook would rely entirely on public sentiment to hold the directors up to intelligent and energetic work. But only in the long run does public sentiment pass wise and favorable judgment on the conduct of men who are handling large affairs. Seldom are the qualities that make a great administrator and those that win popularity combined in the same person. Furthermore, public sentiment in many cases influences the acts both of public men and of business men only because of their fear that if they disregard it the result will be their retirement, or legislation that will harm their business. Under Mr. Cook's scheme the directors of the holding company, who would be quasi-public men, could not, if they chose to defy public opinion, be punished or removed except, perhaps, by some slow and uncertain process of impeachment.

On the whole, Mr. Cook's plan will not appeal to many public men, or to many business men, as one that would satisfactorily solve the railway problem. Probably its solution is to be found only in either efficient private management under wise public regulation, or public ownership.

Letters to the Editor.

GOOD SERVICE IN DESPATCHERS' OFFICES.

SPOKANE, Wash., December 5, 1911.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I have just read, in your issue of December 1, page 1140, an article credited to J. W. James, purporting to tell of "real life in the train despatcher's office" and showing up in vivid language the behavior of a supposed despatcher who was neglectful of his duty and ungentlemanly in his conduct toward the operators.

I desire to protest against the statements made in this article. I cannot believe that Mr. James correctly reflects conditions as they really exist. In all of the offices in which it has been my pleasure to labor I never yet have discovered a force of train despatchers who carried so lightly the responsibilities placed upon them. A quarter of a century ago I began as an operator and assistant despatcher on the Boston & Lowell at Boston. Since that time I have worked in the transportation departments of important railways at Lincoln, Minneapolis, Des Moines, Buffalo, Kansas City and Spokane; and I can testify that in none of these offices have I seen anything even approaching the nonsense related in the story you print.

The only redeeming feature of this document is its concluding sentence, which expresses vividly the contempt in which train despatchers are held by various other employees. The responsibility for this, I think, lies principally on those who are constantly harping on their demand that train despatchers be included as a part of the official staff. It seems to me that instead of doing good for train despatchers, this claim, maintained by some of our old friends, has worked to the detriment not only of the service, but of the individual as well. No man who has his heart properly in his work cares a rap whether he be called employee or officer. The result to be attained is to furnish satisfactory transportation to the railway's customers. In the selection of officers to direct the affairs of railways, train despatchers have no claims on the management that are superior to the ambitions and hopes of any other body of men, the chief consideration being always fitness for the position to be filled. The despatcher who sets himself with determination to satisfy his employer and to give the public good service will have no need of an organization to fight for him; chairmen of industrial committees will find themselves without an occupation.

STEPHEN H. BROWN.

GOVERNMENT OWNERSHIP INEVITABLE.

LAUREL, Miss., January 12, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I have read with interest the several letters from railway officers published recently in the *Railway Age Gazette* in relation to present conditions and future prospects of American railways, and it occurs to me that perhaps your readers may be interested in the observations of a shipper.

It seems to me that if careful thought be given to the subject, the conclusion must be reached that there is little prospect that stockholders will hereafter receive any large benefits from their railway investments.

My experience with railway operations in connection with our lumber manufacturing business, also my acquaintance with railway properties particularly in the South, convinces me that on an average, money must annually be provided to the extent of over 5 per cent. of the actual value of the road for use in permanent improvements to the property.

Some of these improvements are: extension and enlargment of terminals, new and larger stations, double tracking and elevating tracks, additional side tracks, elimination of grade crossings, heavier rails and reduction of grades, additions to equipment.

The last item usually is cared for with equipment notes, falling due annually, which are quite different from long time bonds,

and must be liquidated out of earnings, and is not included in my estimate for cost of permanent improvements.

Referring to the history of railway construction in this country, it is well understood that the largest part of railway mileage now in existence was constructed for the purpose of securing profit from building and not for profit to be derived from operating. As a result of this policy, the first bonded indebtedness placed on the roads was enough to cover the entire cost of construction and equipment. An equal amount of stock was also issued which represented the promoter's equity or profit. If the road was well located and profitable as an operating proposition, the stock rapidly advanced in value, and if highly profitable, additional bond issues were laid on the road; the total capital stock and bonds represented the value of the road based on its earning capacity, and not on the actual cost of the property.

This method of early financing operates at present to prevent issuing additional first lien securities on the roads for the purpose of securing funds to pay for the improvements mentioned above, which are necessary to maintain the railways at a proper standard of efficiency and to meet the requirements of state and national commissions. The difficulty with most roads in securing additional money, by using long time bonds, is that, as above stated, practically all the roads have already issued such obligations to such an extent that the security for further issues on the same property is not deemed adequate by investors and consequently second mortgage bonds and the usual refunding bonds sell at such a large discount, if taken at all, that the roads cannot afford to issue them. Nor is it expedient to issue capital stock to provide funds for the above mentioned purposes. Frequently the stock is quoted below par or the issue of additional stock would reduce the value of that outstanding to below par.

The experience, during many years past, is that production of commodities and railway tonnage double every ten years and it is reasonable to expect that hereafter railway traffic should increase at about the above ratio. Practically everything produced is transported by rail, and production therefore will be confined to the capacity of the railways to handle tonnage.

During the past three or four years, addition to railway equipment has just about been offset by loss from retirement of worn out cars and engines, so that as relates to equipment there has been no improvement. As to the other items mentioned in the beginning of this letter, the railways are rapidly falling behind in providing them and to such an extent that should there be a revival of general business throughout the country during the next twelve months and should there be the increase in the volume of tonnage hoped for and expected by many (say to a basis of 90 per cent. of capacity of the steel plants), there will be such congestion of traffic and delay in transportation, with consequent forced extension of bank credits, that interest rates will reach prohibitive figures, similar to what occurred during the early part of 1907.

Congestion of traffic will largely increase operating costs and reduce operating income so that the railways will be unable to make improvements from operating profits or to secure funds from the sale of securities.

Prohibited from advancing rates to pay for increasing operating costs and with no prospect of saving any profit from operations to invest in improvements and with nothing but second or third class bonds or short time notes to sell, it will be impossible for the railways to secure sufficient funds for permanent improvements to increase their capacity to the extent necessary to handle the average annual increase of tonnage. It is imperative that the facilities for railway transportation be rapidly and vastly increased, or stagnation in business will result and to such an extent that the people will suffer financial loss. Should such congestion of traffic occur and continue for any great length of time, the dissatisfaction on the part of shippers will be so great that Congress will be appealed to for relief and with the demand that the government own and operate the roads.

When increased operating costs and the cost of such improvements as are absolutely necessary to be made have absorbed all of the net earnings of the roads, leaving nothing for dividends, stockholders will be anxious to exchange their stocks and bonds for three per cent. government bonds.

Inability to secure further advances in wages will cause railway employees to favor government ownership.

Lack of adequate transportation facilities will cause shippers to favor government ownership.

Who will be left to successfully oppose the movement towards government ownership?

GEORGE S. GARDINER.
President, Eastman, Gardiner & Co.

THE STEEL PASSENGER CARS IN THE ODESSA WRECK ON THE ST. PAUL.

The rear-end collision on the Chicago, Milwaukee & St. Paul at Odessa, Minn., on December 12 was so destructive to the modern steel Pullman sleeper that considerable interest has been taken in the matter of the behavior of the cars, and we have obtained some illustrations of the wreck which show very clearly the condition of the equipment after the collision. Ten persons in the sleeper were killed and 11 injured. Passengers in the other portions of the trains were not injured. The dining car,



Fig. 1—Locomotive and Steel Sleepers—Left Side.

which was next to the sleeper, was not damaged beyond the kitchen, and that portion was not occupied.

The passenger train was made up of a Pacific type locomotive having a total weight with tender of 303,350 lbs. and one baggage car, one combination mail and express car, one coach, and one tourist sleeper. At the rear was a sleeping car built by the Pullman Company having its usual design of steel underframe, but with a ⅛ in. steel plate side and wooden inside finish. Next to this was a steel dining car of the same construction, built by



Fig. 2—Locomotive and Steel Sleepers - Right Side.

the Pullman Company. These two cars were the only ones which were seriously damaged.

The conditions of the collision were roughly as follows: The manual block system is in operation at Odessa, the system extending from Junction Switch to Appleton, a distance of 20.6 miles. Two signal operators are maintained at Odessa, but there is no operator in the tower from 1:30 a. m. to 8 a. m. For some reason the operator when he vacated his place at 1:30 a. m. left the signal at "stop." The engineer of the passenger train, the

"Columbian" flyer, when it arrived at 3:32 a. m., observed the signal and stopped at the station. The flagman apparently utterly failed in his duty to go back and signal any approaching train, or to throw the switch to the passing track.

The train despatcher believing that the passenger train had advanced near the next station east, Appleton, gave orders to the following section of the train to proceed from Junction Switch to Appleton at regular speed. This second train was, therefore, running at high speed when it approached Odessa station and at 4:25 a. m. collided with the first section, which had just begun to move forward, and had proceeded about 30 ft. The second section was composed of a Pacific type locomotive of the same weight as the one on the first section and six loaded 30-ton special refrigerator cars 46 ft. long, each weighing 69,000 lbs., empty. Four cars were loaded with silk, and two cars with fish.

The general construction of the underframe and superstructure of the sleeping car and dining car were illustrated in the *Railway Age Gazette* of February 24, 1911, page 359. The underframe was the same as that which has been used in a large number of steel sleepers built by the Pullman Company, having center sills in the form of fish belly girders, 26 in. deep at the center, attached to a steel casting which forms the double body bolster and the platform and draft sills, the rolled portion of the center sill ending where it is riveted to the inner lugs of this casting.

The action of the cars at the time of the collision appears to



Fig. 3—Steel Dining Car and Front of Steel Sleeper.

have been as follows: The heavy locomotive, running at high speed with six heavily loaded freight cars, plunged into the rear of the sleeper, which was the smoking compartment, and splitting open the car entered as far as the rear of the steam cylinders. Although the car had wooden inside finish which was badly splintered no fire occurred, and this must be attributed to the use of steam heating and electric lighting, which do not require live flame in the light or live coal in the heater as in the old style methods. The cast steel bolster and platform at this end were broken and split apart as far as the center plate. This must have tended to raise the rear of the sleeper and depress the forward end, so that the pressure of the collision tended to raise the dining car underframe above that of the sleeper, producing a telescopic effect which is roughly illustrated in the sketch, showing how the six-wheel trucks were driven together and how the dining car entered the sleeper for one-third of its length.

The two underframes in this portion of the collision sliding past each other, were not very badly damaged, and the platform casting, the steel bolster and the center sills at the front end of the sleeper were almost intact, those of the dining car being in the same condition. The roof of one-third of the sleeping car was thrown clear up on top of the dining car and the sides of the sleeper split and spread apart, as shown clearly in the illustration. The almost complete destruction of the sleeping car and the cushioning effect of its telescoping with the dining car absorbed so much of the impact of the collision that little damage was done to the remainder of the passenger train. Even the front end of the dining car retained its vestibule and buffers, and the platform, body bolsters and underframe at that end, without material injury. No one was injured in the cars in front of the dining car. Doubtless the fact that the first section was moving slowly made the collision less destructive than it would have been if the train had been standing with brakes set.

The damaged cars have been inspected by engineers interested in the design of steel passenger equipment, and various suggestions have been made as to further improvements in this class of equipment. The manifest weakness of the roof, as shown by its complete collapse in the collision with the dining car, has suggested stronger construction in that part of the car so as to make the resistance at the end plate more nearly proportional to that of the end sill. Very little, if any, criticism can be made of the strength of the center sills in these cars, as those under both dining car and sleeper are bent scarcely any and were not broken. It is evident that with this very strong construction the effect of telescoping in high speed collisions must be very disastrous, as the upper frame of the car is weak compared with the underframe; when they are in collision and telescope the weaker portion must suffer severely, and the illustrations of this wreck show the extent to which damage of this kind takes place in the strongest of modern steel equipment.

Some lessons are to be learned also in regard to the cost of repairs of steel equipment when badly damaged in this way. The sides of the sleeping car are so completely bent and warped out of shape, and the inside finish so destroyed, that there is scarcely any salvage, the steel center sills being about the only

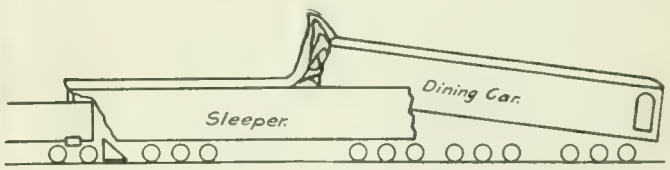


Fig. 4—Diagram Showing Position of the Rear Cars After the Odessa Wreck.

part which would not require renewal or heavy repairs. The ⅜ in. steel plates forming the sides of the car and the steel angles forming the side sills are so badly distorted that it is doubtful whether it will pay to attempt to use them for renewals.

It will be remembered that the type of construction here involved is that which utilizes the long steel plate girder under the windows as a portion of the structure for carrying the load, and the side sills are made unusually light. If another type of car having heavy side sills had been used the same amount of destruction and distortion would have occurred, and the labor required to restore the side sills to normal condition would have been even greater. It must be concluded, therefore, that in accidents of this kind none of the various types of steel passenger car construction of equal weight have any particular advantage over wooden equipment so far as resistance to impact is concerned, and there is not much difference in the cost of repairs of the heavier parts of the construction. The trucks were driven along under the cars and were not very badly damaged. They were bunched together as shown in the sketch, as is usually the case in such collisions. These two steel cars weighed about 75 tons each, and the underframe end construction was sufficiently strong to resist the impact found in ordinary passenger train accidents without serious damage or loss of life.

Passenger car design may be further developed so that some greater strength in the end construction may be obtained with the present weight of steel, but little can be gained by adding weight to the section to get additional strength, as cars so constructed as to resist the impact which resulted in the collision here illustrated would be so heavy that the railways could not afford to provide the motive power for hauling present passenger

traffic in them. Besides, the expense involved in the construction alone of such heavy cars would be very nearly prohibitive.

It will be remembered that in the wreck on the Pennsylvania Railroad near Fort Wayne, Ind., a steel car was in collision with a wooden dining car, telescoping the steel car, and the position of the cars was similar to that shown in our illustration, Fig. 3. At that time there was considerable discussion as to the relative strength of wood and steel cars, and the popular impression was that a demonstration had been made of the superiority of wooden construction. It is hardly necessary to point out that in the collision referred to, as well as in the one here described on the St. Paul, the dining car underframe entered the steel car above the sleeper underframe. In each case it was simply the collision of a strong, stiff underframe with a light superstructure, and the effect of such collisions must be the same in either case.

REPORT OF THE MASSACHUSETTS RAILROAD COMMISSION.

The railway commissioners of Massachusetts, F. J. Macleod, G. W. Bishop and Clinton White, have sent to the legislature the forty-third annual report of the commission. Two new railway corporations have been organized in the state during the year, the Hampden and the Southern New England. The length of the railways in the state, at present, is 2,111 miles. Following the usual statistics a discussion of the general field of the board's duties is given, beginning with a statement, filling two or three pages, devoted to nothing but a list of things that the board, by direction of the legislature, has had to do in connection with other boards. For example, in considering the proposition for subways in the city of Boston, the board acted conjointly with the Boston Transit Commission; on the question of a proposed tunnel between the North and South stations in Boston, the board sat with the Board of Harbor & Land Commissioners, the Boston Transit Commission, and the Metropolitan Park Commission; an examination of the property of the New York, New Haven & Hartford was made by the railway commissioners, the tax commissioner and the bank commissioner, acting together; and so on. This statement is followed by notes on a dozen other propositions referred directly by the legislature to the commission. One of the subjects dealt with in this way was that of fenders and wheelguards for street cars; and a discussion of this subject takes up 40 pages of the report, the commissioners, in person or by proxy, having visited a half dozen European cities, and a score of cities in America. The Board does not recommend any further legislation on this subject. The roadbed and tracks of the electric lines and the surfaces of highways are so far from perfect that in many situations the best fender or wheelguard will do no good, while under favorable conditions the poorest device will very often produce good results.

A brief chapter is given to the subject of electrification of steam railways in the vicinity of Boston, on which the joint board, which studied the subject, disagreed. No action has been taken by the legislature. The present report holds that within the Metropolitan district electrification "is bound to come in the near future," and calls attention to the fact that one of the principal obstacles to this is the unsatisfactory condition of the relations between the Boston & Providence and the New York, New Haven & Hartford, lessee of the B. & P., the lessee being bound to make all improvements, while such improvements eventually become the property of the lessor.

The board has approved certain new securities issued by the Boston, Cape Cod & New York Canal Company, and in connection with the construction of the Cape Cod Canal, has authorized temporarily the use of a railway grade crossing, a section of the Woods Hole branch of the New Haven road having been relocated to accommodate the canal.

CHARLES A. PROUTY.

Charles Azro Prouty, as announced in our columns last week, has been elected chairman of the Interstate Commerce Commission for the ensuing year. Mr. Prouty succeeds Judson C. Clements, in accordance with the plan announced last year, following the resignation of Martin A. Knapp to become presiding judge of the new Commerce Court, that a new chairman would be elected each year in the order of the commissioners' length of service. After Mr. Clements, Mr. Prouty is the ranking member of the commission in point of seniority. He was appointed in 1896, and has served continuously ever since, always bearing a most prominent part in the numerous activities of the commission.

It has been an open secret that he had been selected for appointment as one of the judges of the Commerce Court at the time of its organization, but that he preferred to remain "on the firing line" in the performance of the more arduous and multifarious duties of the commission.

Personally, without doubt one of the best-known and most popular of the commissioners, Mr. Prouty has been generally regarded by both railway men and the representatives of the shippers as one of the very ablest of the members of that body. A man of unusual natural parts, tireless energy, keen insight into men and matters, he has acquired a remarkably comprehensive knowledge and understanding of railway and commercial affairs, and enjoys a power of logical and forceful reasoning, which, with his universally recognized unswerving honesty have commanded the highest respect for his opinions even on the part of those who may often have disagreed with his conclusions.

The same qualities have also made him a powerful factor in bringing about a better understanding between the transportation and the shipping interests, while very strongly influencing the character of the work of the commission. He has written the opinions in many of its most important and far reaching decisions, including some that have involved the most strenuous controversies. Among the more recent of these may be mentioned particularly the opinion in the eastern general rate advance case last year, most of the long series of decisions growing out of the transcontinental rate cases, and the opinion in the Southeastern rate case. The latter two cases are now before the supreme court. He has also been one of the most active and industrious of the commissioners in traveling about the country hearing important cases. During the early years of his connection with the commission he had much to do with the criminal branch of its work, and conducted many of its investigations.

Mr. Prouty is a lawyer by profession, and one of the most distinguishing characteristics of his work has been the clear and logical reasoning, as well as the remarkable literary quality, displayed throughout his opinions. His capacity for absorbing intricate details and the analytical powers which he brings into play in separating the salient facts from the non-essentials during the progress of a hearing, coupled with his wonderful memory, have often aroused the admiration of those who have observed him in action; while his shrewd, dry humor and a certain pleasing quaintness in his rugged personality have done much to relieve the strain and expedite the proceedings of a complicated case.

Members of the Interstate Commerce Commission have been selected for appointment with a view to giving representation to the different sections of the country. Mr. Prouty in this respect represents the New England and northeastern states. He is a native of Newport, Vt., where he was born October 9, 1853, and where he now maintains his permanent residence. He was graduated from Dartmouth College in 1875, and taught school for several years before he was admitted to the bar in 1882. He practiced law at Newport from 1882 until 1896, and meanwhile was a member of the lower house of the Vermont legislature in 1888, and was reporter of the supreme court of the state from 1888 to 1896. In December of the latter year he was appointed a member of the Interstate Commerce Commission, and has since been regularly reappointed on the expiration of his term.

CONVERTIBLE RAILWAY BONDS.

BY WILLIAM Z. RIPLEY,
Professor of Economics, Harvard University.

The convertible bond, so called, has come into extraordinary favor since 1901. Such a bond, as its name implies, may under a specific contract as to time and ratio be exchanged for capital stock. Securities of this character combine the double assurance of a first lien on assets at the start, and participation in growing profits, when success of the enterprise has become certain. Such bonds were common in the highly speculative period after the Civil War. The St. Paul 7's of 1873 are a good example. The most widely known convertibles, however, were those of the Erie road. Daniel Drew and "Jim" Fisk used them to good effect in their classic contests with Commodore Vanderbilt for control of that property. They were a necessary adjunct to the reckless stock market speculation of the period. The plan was simple. Having quietly secured authorization by stockholders for a large issue of convertible bonds, Drew would create the appearance of a shortage in the supply of outstanding Erie stock. Other speculators having sold short would cover at high prices, Drew supplying them by selling shares which he did not yet possess, but which were borrowed for the purpose. And then, when Vanderbilt, who was seeking control of Erie, and all other dealers who were covering their commitments at high prices based upon a calculated shortage, had become loaded up with agreements to buy, Drew would convert his bonds into stock, flood the market, break the price and close out all his contracts for delivery at large profits. The scandals of the time so eloquently described by Charles Francis Adams in his Chapters of Erie, gave a bad repute to this class of security, which lasted for many years.

Revival of interest in convertible bonds seems commonly nowadays to be associated with periods of financial distress. They are not, however, storm signals like short-time note issues, as already described. But they are apt to be resorted to in a time when an added fillip to investment in railways seems to be needed. In the same period of 1893 several strong companies made use of them. Some of these were really expedients for selling new stock at par for improvements; although the old shares were being quoted at a discount. In other words the combined security of a bond with a fixed rate of return, and of the speculative chance of added profit upon conversion when the stock rose above par, enabled the company to secure new capital at more favorable rates than it otherwise could have done.

The next period of activity in convertible bonds was associated with the great consolidations about 1901. The most notable instance was the $100,000,000 issue of the Union Pacific in order to finance the purchase of the Southern and Northern Pacific. Other important companies like the Pennsylvania and the Baltimore & Ohio resorted to the same device in 1902. The prime motive in adding the conversion privilege at this time, seems to have been to overcome the prejudice against bonds secured, not by a direct lien upon real property but upon securities of other roads to be purchased with the proceeds. In other words many of the issues of this period of active consolidation were collateral trust bonds, elsewhere described. As such they needed some privilege, or opportunity for peculiar profit, in order to dispose of them on favorable terms.

Subsequent appearances of convertible bonds on a large scale have been principally associated with the two financial depressions of 1903 and 1907. At both times large companies like the Atchison and the New Haven have seen fit to add the conversion privilege to their new bonds, in order to make effective appeal to investors. Where weaker roads have been forced to resort to short time notes, the stronger ones have used convertible bonds. At other times as in 1905, the issues of bonds of this class by roads like the Erie, the Pennsylvania, the New Haven and the Atchison, have assumed large proportions. There can be little doubt that bonds of this sort have steadily risen in general favor in recent years.

There appear to be no less than four substantial reasons for the popularity of the conversion privilege. The most substantial one is the successful appeal which it makes to the investing public. To assured interest return, it adds a speculative chance of participating in future profits as they accrue. That was the main reason for its extended use in the early days of railway construction. And since 1900, with the active competition of industrial and mining securities with railway bonds, it has been found by experience that the addition of the right of conversion is necessary to insure a successful flotation. A second factor is found in the nature of the security behind many of these new convertible bonds. The majority of them are either debentures —that is to say, carrying no prior lien on specific assets, but rather a general obligation of the company as a going concern, or else collateral trust bonds, based upon the deposit of other securities of controlled roads. The more or less imperfect character of the security in either case, renders the conversion right necessary as an offset. In the third place, the reason which made "convertibles" simply invaluable to Daniel Drew in the '70s, is still not without significance. In several notable cases, the control of railways by particular financial interests has been menaced or lost by unexpected operations upon the stock exchange. The Louisville & Nashville in 1902 was ruthlessly torn from the Belmonts by a clever ruse incident to the issue of a large amount of new stock. The Illinois Central was likewise deprived of its long-standing independence despite a substantial concentrated minority control. And the contest for the Northern Pacific culminating on May 9, 1901, clearly demonstrated the need for ownership of a positive majority of all classes of outstanding share capital, in order to assure control. The final victory of the Morgan-Hill party over Union Pacific interests was determined by its power over retirement of the large issue of preferred stock. Yet the law does not contemplate control of competing lines by actual majority ownership with favor. A device whereby control may be practically assured, as in the Pennsylvania dominance of outlying properties, without an actual majority ownership of shares, is consequently welcome. A large issue of convertible bonds may aid in the solution of such a problem. It constitutes a reserve which may be drawn upon by the existing management in case more stock is needed in an emergency. This feature has undoubtedly in several cases led to the addition of the conversion privilege to new bond issues.

The final and most fundamental advantage of convertibility as applied to funded debt—an advantage bound to make it of continuing importance in future—is that it affords opportunity for gradually transforming fixed charges into contingent ones. Funds raised by the sale of ordinary bonds permanently saddle a heavy burden of prior liens upon earnings ahead of the capital stock. These charges must be paid whether earned or not. This was the great lesson enforced by the bankruptcies of 1894. Yet on the other hand, of course, the security is so great that capital may be obtained at low rates of return. This latter advantage would not follow an issue of new stock to finance improvements, particularly in the case of companies whose share capital stands at a premium, and whose rate of dividends is high. When the St. Paul in 1906 financed its Pacific coast extension by an issue of new 7 per cent. stock at par, it was virtually paying a higher rate for the capital needed than the new enterprise could possibly earn for some time. As a device for distributing surplus earnings of the parent company, it might be most effective. But regarded as a means of financing a new line, it was certainly expensive.

The convertible bond seems to answer the purposes of a company thus situated, more satisfactorily than either straight bonds or stocks. For it enables the new capital for the incipient and uncertain stages of the enterprise to be had on a funded-obligation basis. And thereafter, as the earning power of the extension emerges, the fixed charges become transformed into contingent ones, with the progress of conversion of bonds into stock. And this process of conversion is automatic in its action. The plan in short is that of an automatic sinking fund. As profits grow

the price of the capital stock rises, until on passing the price at which exchange may be effected, the profit in conversion leads to the freer exercise of the privilege. The ultimate outcome is a corporation freed of the incubus of a heavy funded debt, yet with net earnings demonstrably sufficient to support its capital stock. The prime instance of the successful application of such methods to a great enterprise, is the financing by the Pennsylvania Railroad of its great New York terminals in 1902 and 1905. The expedients of the New York Central in raising funds for similar purposes by means of stock and debentures seem clumsy and expensive by contrast. The great strength of the Union Pacific under the Harriman régime, viz., its low percentage of fixed charges to net earnings despite extensive borrowings for development and speculative purposes, has resulted largely from its successful use of convertible bonds as a means of raising new capital.

Certain disadvantages of convertible bonds remain to be mentioned. Common stockholders not infrequently regard them as a violation of their rights. In a sense the convertible bond holder is a share holder with a preference both as to earnings and lien on assets, whose rights are intervened between the ordinary stockholder and his property. The ordinary bond holder is not thus regarded as an intruder, his interest rate being both moderate and fixed. Strenuous protest from shareholders is not unlikely to arise, as in the case of the Atchison issue of 1905. Moreover, it sometimes happens that convertible bonds instead of being automatically eliminated by rising quotations for the stock to the conversion point, may remain outstanding as bonds for a long period and may block the way to further borrowing on favorable terms. And yet, while outstanding as bonds, they may be entitled to all the privileges of the stock. This embarrassment occurred in the Pennsylvania financing of 1909. With large amounts of unconverted bonds outstanding, further needs of the company were met by putting forth new stock, the right to subscribe to it by being confined to shareholders. This addition of new stock obviously withheld the shares from rising in price to the conversion point, and still further postponed the time at which the convertible bold holder might with profit exercise his privilege. This difficulty was met by the New Haven in a similar case of about the same date, by extending the privilege of subscription to new shares to stock and convertible bond holders alike. Unless specifically provided for by contract in advance, however, the convertible bond holder may have his privilege of exchange at a profit indefinitely postponed by such emissions of new capital stock

Still other disadvantages obtain. The convertible bond fluctuates widely in price, often following closely the movement of the stock quotations. Large profits have been made, and likewise heavy losses, by persons who in reality sought investments stable in price. Such bonds are speculatively handled on the exchanges, being often "sold short" just like stocks. Moreover the operations incident to conversion or redemption may be complicated. Ordinary investors may not understand them. Instances are not wanting, as in the case of St. Paul bonds of 1893 convertible into preferred stock, not at maturity, but within ten days after any dividend date, where many holders failed through ignorance to take advantage of their rights at the proper time. And finally in some cases, the bond convertible into stock at a ratio below par may be open to all the disadvantages of the issue of shares at a discount. Thus in 1903, and again two years later, the Erie road issued bonds to finance the purchase of the Cincinnati, Hamilton & Dayton road (afterward abrogated) and for purposes of improvement, convertible within ten years into common stock at $50 and $60 per share respectively. The low market price of the stock at the time did not indicate much hope of exercise of the privilege; but if it ever occurs it will in effect violate the general prohibition by New York state of the issue of capital stock below par. A special act of the legislature rushed through in the closing days of a preceding session had amended the law by permitting conversion of bonds to take place, "at not less than the market value." The danger of a resort to expedients for watering stock is too apparent to need further comment. In practically all other cases, the privilege of conversion is fixed at par or above, sometimes, as in the case of the Delaware & Hudson 4s, at as high a figure as 200. In conclusion, it goes almost without saying, that an increase of capital stock must always be authorized in connection with an issue of convertible bonds, sufficient in amount to cover the requisite number of new shares after the exchange of bonds for stock has been effected.

A peculiar modification of a bond, in order to give it a speculatively attractive character, occurred in the case of the Oregon Short Line Participating Bonds of 1904. These securities, to the amount of $36,500,000 were based upon a deposit by the Union Pacific interests of their holdings of Northern Securities stock. In other words, they were not ordinary but merely collateral trust bonds; and the participating clause was added in order to overcome this disability and assure their successful flotation. In addition to a guaranteed 4 per cent., these bonds were to receive annually a supplementary interest, equal to whatever dividend in excess of 4 per cent. might be declared upon the Northern Securities stock which underlay them. A peculiar complication arose in this connection. Dividends upon Northern Securities stock being held back by litigation, threatened to pour forth in mass upon its termination, while in the meantime the regular 4 per cent. had to be paid from other sources. Were the participating bonds to share in all excess dividend above 4 per cent., when all these back dividends appeared at once, the Oregon Short Line would be a heavy loser. A provision for retirement at 102½ pointed the way of escape. It enabled the company to release the underlying collateral, upon the dissolution by decree of the Supreme Court dissolving the Northern Securities Company. This was effected in 1905.

Car trust certificates or equipment trust bonds are highly specialized liens upon particular items of railway property. A company having mortgaged all of its tangible assets, and being unable to issue new capital stock, is in dire need of new cars and engines. There are practical as well as legal objections to direct loans based upon the acquired rolling stock as collateral. A round-about plan is in use, which practically amounts to borrowing the equipment, instead of the money; and paying for it gradually as surplus revenues permit. An independent syndicate is formed, which purchases the desired rolling stock, as in 1903 on the Pennsylvania system some 13,000 freight cars. Or it may be one of the great railway equipment companies enters into the agreement. The cars are then leased to the railway for a short term of years, under an agreement providing for interest and gradual payment of principal. Only upon the final payment does actual title to the property become vested in the railway. In the meantime, it would appear to have no equity in the property. The lease thus made is then assigned to a trustee, and "car trust certificates" are issued and sold to investors. The requisite interest upon these bonds of course are derived from the rentals paid to the trustee by the railway company under the terms of the agreement. This cumbersome process seems to be an outgrowth of the inelastic character of the mortgage bonds of the railway already outstanding. The deed of trust itself is a highly complicated instrument, providing for repairs, maintenance and replacement of the property, and its final delivery at maturity. Bitter experience of former years, as upon the Erie in the '70s where car trust certificates at maturity found the rolling stock completely worn out, have compelled the most elaborate safeguards against fraud. Recently the process seems to have been simplified somewhat by the abandonment of the terminology of a lease contract. Despite the complexity of such operations, the volume of equipment trust obligations has enormously expanded in recent years. While the total funded debt of American railways between 1898 and 1907 increased by about 60 per cent., equipment trust obligations increased over eight fold. The total outstanding in 1908 was $344,000,000. While not a large proportion of the total funded indebtedness, the rate of increase in recent years has been notable.

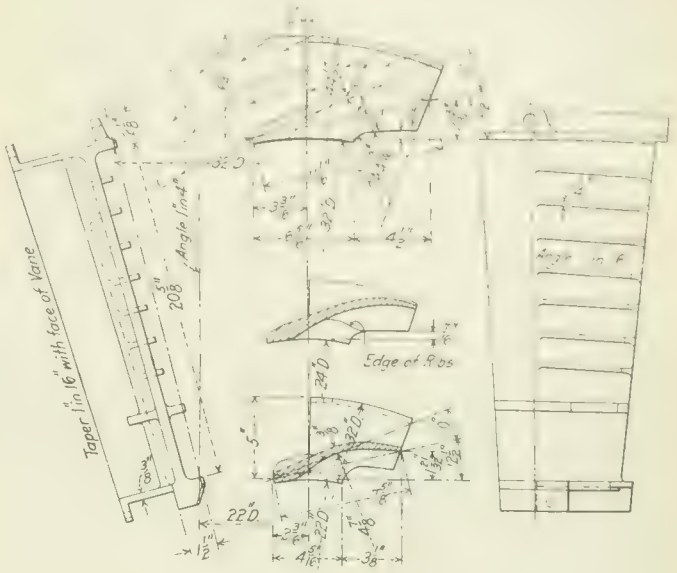
LIGNITE FUEL FOR LOCOMOTIVES.

The cost of Iowa coal for locomotives on the Chicago & Northwestern in western Nebraska and Wyoming is $5.20 per ton. The Northwestern has been gradually developing the use of lignite in the district west of Long Pine, Neb., the lignite coal fields being in the neighborhood of Lander, Wyoming. The cost of lignite in that region is about $2 per ton, and it has an analysis about as follows:

Fixed carbon	37.71
Volatile combustible	38.66
Ash	4.41
Moisture	19.22
	100.00
Sulphur	1.54

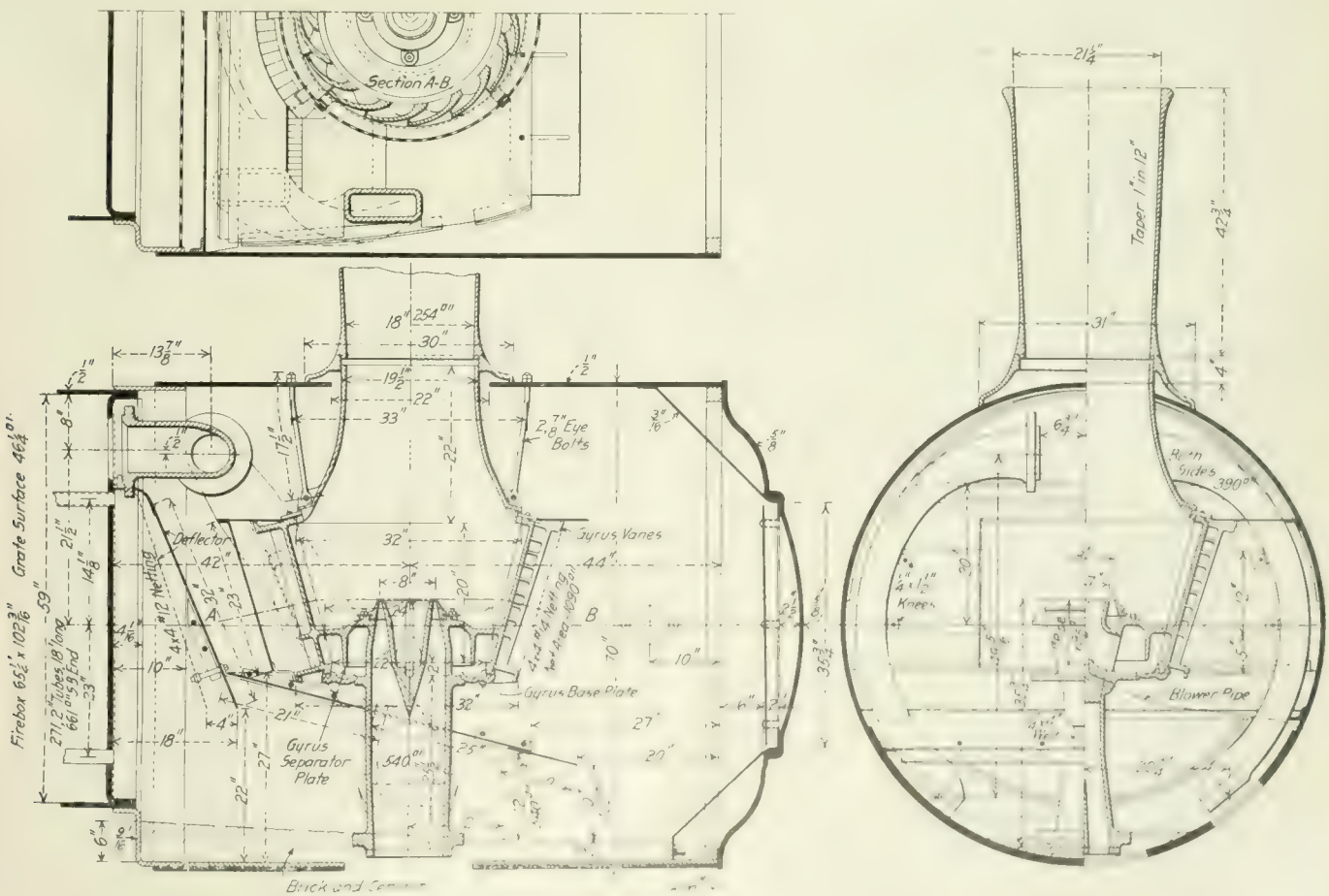
The railway now has 21 Pacific locomotives in that region which are equipped with special spark arresters for use when burning lignite coal. These engines have cylinders 20 in. by 26 in., a grate area of 46.55 sq. ft., driver 63 in. in diameter, and the total heating surface is 2119.7 sq. ft. The smokebox is 70 in. in diameter and 86 in. long, which permits a large area of baffle plates and netting; but the principal features of the locomotive which enables it to burn lignite successfully are the gyrus spark arrester and the annular exhaust nozzle. These were developed by the American Locomotive Company in co-operation with the Chicago & Northwestern, and are here illustrated in detail.

The annulus of the exhaust nozzle has an outside diameter of 8 in. and an inside diameter of 7 in., and there is a side opening in the partition wall of the exhaust base which causes a uniform distribtuion of the gases and sparks through the gyrus. The gyrus is a large cast iron barrel surrounding the exhaust nozzle, shaped like a truncated cone with the small end down. The diameter of the flanges is 32 in. at top, 22 in. at the bottom. This barrel is built up of 16 vanes, 20⅝ in. long under the flanges, and these vanes have on their outer surface seven curved ribs, which act as deflectors and retard the escape of the sparks. The floor of the smokebox is covered with firebrick 3 in. to 6 in. thick and there is a 3/16 in. sheet iron jacket to protect the front end. The usual baffle plate in front of the tubes is covered with No. 12 netting, which gives the sparks an initial abrasion and throws



Details of the Gyrus Spark Arrester.

them toward the brick floor. A flat deflector plate laid 10 in. from the floor at the front end and 27 in. at the rear end, tends to keep the sparks down until the exhaust draws them forward and into the gyrus, where they finally make their escape to the stack in a fine state.



Gyrus Spark Arrester Applied to Locomotive Smoke Box.

CONFERENCE COMMITTEE METHODS IN HANDLING RAILWAY LEGISLATION ON MECHANICAL MATTERS.*

BY C. A. SELEY,
Mechanical Engineer, Rock Island Lines.

The regulation of the railways by means of administrative bodies divides itself naturally into two general classes. The one has to do with that feature of the regulation in which is involved a conformity with the law as interpreted by the courts, and the other with the administration of the physical and as distinguished from the legal. The first of these has to do mainly with the prevention of discriminations and other abuses, while the second touches the railways in the matters of every-day life, and the influence extends down into every portion of the service. As the speaker is not a lawyer, it is not his purpose to cover more than one phase of the subject wherein the engineer has been useful in shaping the details of legislation.

The laws which regulate the various functions of the railways are administered mainly under the control and direction of the Interstate Commerce Commission. Many of these require elaborate codes of rules and explanations for their proper understanding and administration, and the inquiry naturally arises as to how these rules and instructions which have to do with technical details were originally derived. Surely it would be difficult to find a department of the government dealing with more diverse subjects and on which there must be a multitude of questions arising from the various subjects covered by the regulation which the commission is empowered to direct. One might expect to find a very competent staff of legal, accounting and engineering talent in connection with such a department of the government, and there may be, but the mechanical engineer is not strongly in evidence.

It is self-evident that without the expenditure of great sums of money and a great deal of time the government cannot obtain the services of a body of experts which can compare in ability with those already in the service of the railways; and, second, that even if they could obtain such a body of experts, to bring these men to the point which has been reached by the railways' through so many years, would take another long period. As a result, it becomes peculiarly an act of good citizenship on the part of the railways to place their expert knowledge at the service of the government.

Some two years ago the idea was advanced that inasmuch as it was clearly evident that public policy required the enacting of laws and regulations further controlling the activities of the railways it might be well if the men engaged in the practical operation of the roads would interest themselves in the form which the statutes proposed to be enacted should take, not with a view to necessarily making them less comprehensive, but with the idea that the intrusion of practical thought in their formation might result in their being workable to a certain degree. At that time this was considered a very radical view; nor was it completely formulated in the first instance. This policy developed a further field of co-operation, in the fact that under most of the legislation covering physical regulation there was involved the formulation of rules and standards for the government of the carriers, and in these formulations the experience of practical men would be just as valuable, and in fact more so, than in the consideration of the primary law itself upon which the regulations were based.

Acting on this theory, during the Sixty-first Congress it was the policy of the roads whenever any bill was under consideration relating to railway operation to present before congressional committees, men who from their knowledge and experience could tell such committees exactly what the proposed legislation meant and what the effects thereof would be. There is no question as to the necessity for this procedure. As an illustration, it is a matter of record that it was necessary for one of these witnesses to explain to a committee that the water in a locomotive boiler was not contained in the tubes; and to this co-operation between congressional committees and witnesses for the railways may be attributed the fact that such legislation affecting the physical operation of railways, as passed the Sixty-first Congress, was intelligent and of a character that it was possible to enforce without testing the matter in the courts. Under some of these statutes it was necessary to formulate certain standards and rules, notably the standards of United States safety appliances, and the rules for locomotive boiler inspection. The first of these was under consideration before any of the others. There was serious danger that the United States safety appliance standards would be formulated without due consideration as to practicability and difficulty of enforcement, and for some time there was very serious question as to whether any co-operation or assistance from the railways would be accepted on the part of those responsible for the formulation of such standards. However, after this principle was established the proceedings were rapidly conducted, and the benefits of such an arrangement were so manifest that in every case which has occurred since that time not only has this co-operation been welcomed, but in many cases has been sought by the representatives of the departments of the government charged with the enforcement of the laws.

United States safety appliances have been referred to; these are the ladders, handholds, sill stops, running boards, etc., on railway cars and locomotives. The Master Car Builders' Association, a representative body, had for years illustrated and described consistent arrangements of these appliances in its proceedings as standards, and, if all railways had fully complied with the requirements of these standards on their rolling stock it is not likely that the recent legislation on that subject would have been enacted. It is a fact that the standards of the M. C. B Association are not obligatory on the railways, but its practice in respect to the safety appliances was satisfactory to the Interstate Commerce Commission for many years as complying with the law. The labor organizations engaged in railway transportation developed a feeling that this was not sufficient and succeeded in persuading congress to pass an act directing the Interstate Commerce Commission to prescribe the number, dimensions, location and manner of application of these various appliances, so that they would be uniform as nearly as possible on all cars.

The standards were to apply on all cars built after July 1, 1911, and the commission was authorized to name the time limits in which equipment built before that date should be changed to comply. The latter equipment, including about two and one-half millions of freight cars, was by far the most important feature, as it would be comparatively easy to change drawings and specifications for new equipment not yet built. To go over every old car and make the necessary changes to comply with a set of rather rigid requirements involved enormous expense, both direct and indirect. The secretary of the Interstate Commerce Commission asked for a committee from the railways to assist in compiling the proposed standards for new cars, and when this work was done the Interstate Commerce Commission had a hearing at which these proposed standards were submitted in the usual form with opportunity for argument.

The railways present by their representatives at once took the ground that the matter was not in shape for a hearing and final determination; that while they could comply with the requirements on new cars, that the rigidity of the standards should be modified, variations allowed, and that liberal time should be granted for changing the older cars. Some little time was taken in discussing the details, but it all proved that the position of the railways was correct and the hearing was adjourned to permit of a conference committee handling of the matter. This committee consisted of fifteen members, five railway mechanical men, five Interstate Commerce Commission inspectors and five labor organization chiefs, representing the locomotive engineers, firemen, conductors, trainmen and switchmen. The conference lasted several days with much argument and mutual concession and set-

*Part of an address delivered before the engineering students of the University of Illinois, January 4, 1912.

tled the matter entirely save two or three points on which no agreement could be reached. These and the agreed points, together with the respective arguments, were submitted to the Interstate Commerce Commission in a second hearing, and an order was issued under which the railways are now working.

The labor organizations were also not satisfied with the inspections of locomotive boilers, as made by the railways; at least they apparently could not understand why the engine crews were generally blamed in case of boiler explosions, and they determined to have a federal boiler inspection law. Several bills were introduced in Congress, but by intelligent presentation of information and records of the roads' methods of inspection and tests at the committee hearings the more radical and unreasonable bills were successfully opposed. It was, however, recognized by the railways that they could not consistently oppose reasonable regulation in the matter, and conferences were held with those interested to determine the essentials of a reasonable boiler inspection law. The Master Mechanics' Association had reported a set of minimum rules applying generally to all locomotives based on general practice. These were considered together with methods of administration, force and the scope of their duties, etc., and the present law was framed to include these considerations and was not opposed by the railways.

The law provided that the Interstate Commerce Commission should formulate and issue the rules under which the railways should inspect, test and report their boilers. The five railway mechanical men who had conducted the safety appliance negotiations met with the boiler inspectors of the commission and the labor organization representatives and agreed to the code of rules which by order of the commission now regulates our boiler inspection.

I will not weary you with the detail of all the routine necessary in those negotiations; of the calling of a general meeting of the railways to settle preliminaries, of the authorizing of the conference committee to represent all the roads, of the reporting to the general meeting for approval of the results reached in conference before they are submitted to the commission, and the final discharge of the conference committee, so far as that subject is concerned after the commission's order has been issued.

Recently the post office department asked for a conference with the roads in regard to formulating specifications for the construction of steel full postal cars and for the uniform arrangement of the equipment of both full postal and apartment cars. The matter was taken up by a general meeting of the roads who again authorized the conference committee of mechanical officers, reinforced by a couple of mail traffic managers, to represent them, which they did, first ascertaining the scope and extent of the general features desired to be covered. The committee, assisted by the engineers of the car building companies, who cheerfully gave of their experience and knowledge, then formulated a specification for steel full postal cars. After the specification was completed and unanimously concurred in by all members of the committee and by the assisting engineers of the car builders, it was referred to and approved by a general meeting of the railways. It was then submitted to the committee of the post office department and thoroughly discussed in an extended conference. It will doubtless take some little time to entirely settle the matter, as the specification is very complete and voluminous. The post office department committee found it rather difficult to understand and assimilate the engineering portions of the specification relating more particularly to the strength of the structure, as section moduli was a term not ordinarily used in post office transactions. They were surprised that we could not give them direct comparisons of the strength of wooden and steel cars and had hoped that we could help them to arrive at a single standard of design. The specification was printed in the November 24 issue of the *Railway Age Gazette*, pages 1049 to 1051, and there were editorial references in the issues of November 17 and December 1.

The work of the committee had to include several important considerations. First, the post office department had accepted several designs of steel postal cars, none of which had been demonstrated as a failure. Hence, it was obvious that the specification should be broad enough to include all of the designs.

Second, the specification, in order to be authoritative, should have the approval of all the designers of the various types included, and also of the users of the cars who by experience in handling and maintaining them could judge of their suitability to the service and the general results of the designs in normal operation as well as in repairs and wrecks. We were fortunate in having the unanimous approval of all the engineers and of the railways back of our specification.

Third, due regard must be paid to the evolution of steel car construction in the future, and the form of the specification should not be such as to bar progress in design and improvement in materials.

Fourth, Congress may pass one of the several steel passenger car bills that have been introduced, and doubtless the postal car specification would be studied as to its application to other types of steel passenger equipment cars.

It is admitted that as the postal car is generally placed next to the engine it is in a place of greater hazard than are other cars in the train in the case of a head-end collision, and we agreed to furnish a greater measure of strength in the end framing to minimize the danger of telescoping. Aside from this, however, we do not feel that the structure of a postal car should necessarily be stronger than that of other types of cars and the best results can be obtained by having consistent strength throughout the train.

The public has gained some very erroneous opinions about the strength of steel cars. If they were in fact so strong as to resist deformation in a severe wreck it must be apparent that they would pass the shock along to the contents of the cars, human and otherwise, in dissipating the stored energy. It has been amply demonstrated by experience in several wrecks that the amount of damage and injury is greatly lessened by providing a yielding resistance in the end of the car, such as the folding up of the vestibule or platform or partial failure of the end construction. If these parts are so strong as to resist failure, the shock will be transmitted until it is dissipated at a greater risk to life and the contents of the cars.

The principal advantages of steel passenger car construction are the absence of splintering and less danger of fire from external causes in case of wreck. Danger has been feared when both wooden and steel cars are used together in trains, but a wooden sleeper has been known to telescope a steel sleeper, and a prominent lumber association has spread broadcast photographs showing how well a wooden dining car in an otherwise steel train had withstood injury in a severe wreck. The truth is that wreck conditions are seldom so similar as to permit direct comparison, and, while the wooden cars are the result of an evolution covering several decades, the steel car is of very recent origin, and, that we can reasonably expect improvements in design, reduction in weight, and cost as has been the case in development generally of equipment, machinery and other structures.

The postal car specification provides that the underframe is to be calculated on an assumed end shock equivalent to 400,000 lbs. static load, which will take care of very heavy switching and service conditions, but not of extreme collision shocks, which should be dissipated by end failure. Thus it will be seen that the duties of the conference committee have been so varied as to require a considerable range of practical information as well as technical and engineering knowledge. The handling of these questions in the conferences required skill in debate and argument suited to the caliber and character of the people with whom issue is raised.

As the conference committee represented all of the railways, the members must of necessity take the broad view and not just that of their own little or big road, as the case might be. The personnel of the committee included the highest officers in the mechanical departments of such railway systems as would

practically represent all sections of the country, and while the time necessarily devoted to these protracted conferences was a heavy tax, both on the individual and to his company, yet the results obtained have been so satisfactory as to justify the expenditure of time and the methods employed.

It cannot be too strongly emphasized that the amount of work committed to the various governmental agencies through legislation is vastly in excess of the capacity of the present organization of such agencies to perform satisfactorily. The administration of such vast interests, which should be committed to men of first rate ability in some cases, and in others to men of thorough technical equipment, is left to the tender mercies of men who, however well meaning, have not the equipment necessary for the effective administration of their offices, nor under the conditions with regard to compensation which now exist can these agencies hope to secure men of the type desired. Under these circumstances, the cordial co-operation of the railway administrations is practically essential to prevent utter demoralization in the transportation industry.

That this co-operation has been willingly afforded is clear evidence of the desire of the railway corporation to contribute to the success of the governmental agencies upon their administrative side, and in this respect the railways, which have been a mark for every petty politician for so many years, have demonstrated the appreciation on the part of their officers of their duties as "citizens of no small country."

NEW YORK PUBLIC SERVICE COMMISSION'S ANNUAL REPORT.

The Public Service Commissioners of the state of New York, Second district, F. W. Stevens, M. S. Decker, J. E. Sague, J. B. Olmsted and W. A. Huppuch, have completed the fifth annual report of that commission, and have issued a brief abstract from which we take the following data:

During the year the commission has had presented to it 2,321 propositions, the work having steadily increased during the four years of the commission's existence. The number of formal complaints disposed of during the past year was 314, and 1,593 were conducted by correspondence; 572 public hearings were given, occupying 285 days, nearly 100 days more than in the preceding year.

The railways reporting to the commission had an increase of 3.2 per cent. in their gross receipts, but a decrease of 7 per cent. in net as compared with the preceding year, though the net receipts were 6 per cent. better than in 1909. The electric railways reporting to the commission had total receipts of 27 millions and net over 10 millions, which last is 50 per cent. greater than in 1907. The business of the electric railways grows steadily. During the past year they carried 542,695,000 passengers; increase in receipts 8 per cent.; in operating expenses 4 per cent.; and in net receipts 15.1 per cent.

Careful inspection of steam railways has been continued, and there has been a decided permanent improvement in roadway, equipment and structures. The commission has given considerable attention to the matter of rail breakages, and it is found that the total number of breakages for the year ended June 30, 1911, was 3,228, as against 3,670 for the year ended June 30, 1910. As there are probably somewhat more than four million rails in the main tracks of the railways of the state, the figures this year correspond to a yearly breakage of about one rail in 1,250, or one break per year in each 3.8 miles of track.

Referring to the serious accidents happening on the Lehigh Valley at Burdette and Manchester, and on the Buffalo & Susquehanna at Scio, it is noted that the rails involved were rolled by so-called independent steel companies. No conclusion can be drawn, however, from this fact, as the records of the commission indicate a rate of breakage higher than the average in some particular orders made by a number of mills in the country, including some of those owned by the United States Steel Corporation. The commission has in mind cases where roads have on their own initiative removed rails amounting to thousands of tons, where excessive breakage was shown by their records, rather than run the risk of accidents.

In relation to the Lehigh Valley accident at Manchester, the commission says that a careful study fails to show any failure whatever on the part of the railway company to provide reasonable and proper safeguards, including first-class track and an automatic signaling system, with electric track circuit, and rails of ample strength, for which an extra price had been paid, with a view to securing superior quality.

Attention is called to the fact that a large proportion of rail breakage on lines using electric track circuits has been detected by interruption of the circuits and the consequent setting of signals at "stop," and there appears to be no doubt that a considerable number of accidents have thus been prevented.

Rear collisions continue to be too frequent and the inspectors are trying to secure improvements in signaling and in discipline. The inspectors of cars and engines report that on most of the roads the boilers, machinery and safety appliances are in much better condition than in former years. There is a general tendency to improve the repair terminals and facilities, to raise the standard of inspection and to increase the efficiency of locomotives. The New York Central has labored under great difficulties by reason of a strike of employees in its boiler shops. Some of the smaller roads have inadequate repair facilities and some even have no officer who is sufficiently posted as to the importance of maintaining safety appliances in good condition. The commission has under its supervision for inspection 8,616 locomotive boilers. A year ago 208 boilers were below the standard of safety, but this number has now been reduced to 15. In the State Forest Preserve the commission has required the use of oil-burning locomotives and there has been only one railway fire of importance during the year.

Twenty-nine crossings of steam railways have been abolished during the year and work is in progress on seven others. Since 1897 the State has appropriated for this work $2,317,607 and 272 crossings have been eliminated. There still remain about 8,500 grade crossings of steam railways, and the commission asks for $550,000 from the State treasury for grade crossing work this year.

The electric railways supervised by the commission aggregate 2,722 miles in length. The interurban roads have killed no person in a collision this year, a result due to the efficiency of motormen, conductors and operating officers. The commission has required the improvement of methods of operation. Five persons have been killed at grade crossings of electric roads; and the improvements in highways and the increase in the number of automobiles indicate that this death record will grow larger rather than smaller. A majority of these accidents are believed to be due to the recklessness of automobile drivers. The commission has made thorough investigation of street railway conditions in Syracuse, Albany and Ithaca, resulting in important improvements.

A large part of the report is devoted to gas and electric lighting. Gas meters, which were inspected to the number of 87,893, show improvements during the past three years, though even now only 80 per cent. are found correct; about 6 per cent. were found fast.

This commission has jurisdiction over telephones throughout the State, including both the first and the second districts. During the year 424 central offices have been inspected and "a vast number" of defects in operating efficiency have been found.

One of the victims of the Chinese insurrection was Tuan-fang, the general manager of the Canton-Hankow Railway. He had been governor of a province, and while in charge of the construction of this railway was put in command of troops which marched against the insurgents.

DAILY STATEMENT OF TRANSPORTATION EXPENSES ON THE MILWAUKEE.

The Chicago, Milwaukee & St. Paul, in addition to the fuel report which has been used for a number of years, has adopted a form for making daily statements of transportation expenses, primarily for the use of division and terminal superintendents. The reports are made up in the office of each superintendent, and copies are supplied to the offices of the assistant general superintendents.

The fuel report is made in each train despatcher's office from the train sheet and coaling station records. This shows for eastbound, westbound and total business the train mileage, ton mileage, average tons per train, pounds of coal consumed and average pounds of coal per 100 ton miles. These reports are made daily, and are combined in the office of the fuel inspector into weekly and monthly fuel reports, which are serving well to compare economies in fuel consumption over the entire system. The figures are compared with the corresponding figures for the same week or month of the previous year.

The clerk in the superintendent's office who has charge of the daily statement of transportation expenses has access to this fuel report, from which he takes the train mileage, ton

Chicago, Milwaukee & St. Paul Railway Co.

DAILY STATEMENT OF TRANSPORTATION EXPENSES.

Division ____ 191__

REVENUE FREIGHT TRAIN STATISTICS—MAIN LINE

Train Miles ____ Ton Miles ____ Average Tons per Train ____

	DAILY TOTAL	Cost Per 1000 Ton Miles	ACCUMULATED TOTAL	Cost Per 1000 Ton Miles
Proportion of Superintendent's Office Force				
Train Masters, Train Dispatchers and their Office Forces				
Station Agents, Telegraphers and Telephone Operators				
" " " " " " Overtime				
Signal and Interlocking Operators				
Other Station Employes				
Yardmasters and Clerks				
Switchmen and Switch Tenders				
" Overtime				
Yard Enginemen				
" " Overtime				
Freight Trainmen, Road Time				
" " Overtime				
" " Terminal Delay				
Freight Enginemen, Road Time				
" " Overtime				
" " Terminal Delay				
Cost of Coal for Freight Train Engines				
" " " Yard Engines				
Coal Houses Forces				
Crossing Watchmen				
Pumpers, Switch Light Tenders				
Total				
Average Expenses per 1,000 ton miles		Cents		Cents

PASSENGER TRAIN MILEAGE—MAIN LINE

Wages of Trainmen				
" " " Enginemen				
Cost of Coal for Passenger Engines				
Total				

BRANCH LINE TRAIN MILEAGE—PASSENGER FREIGHT OR MIXED

Wages of Trainmen				
" " " Overtime				
" " Enginemen				
" " " Overtime				
Cost of Coal for Branch Lines				
Total				

WORK TRAIN SERVICE—TOTAL HOURS

Wages of Trainmen				
" " " Overtime				
" " Enginemen				
" " " Overtime				
Cost of Coal for Work Trains				
Total				

NOTES ____

Form for Reporting Operating Costs per Ton Mile.

mileage and average tons per train to be entered on the blank under main line revenue freight train statistics. The statement of cost includes every item of expense carried on station, yard and train pay rolls, together with wages of enginemen, cost of coal and a proportion of expense of the superintendent's office and such items from track rolls as pertain directly to transportation: viz., wages of coalheavers, pumpers, crossing watchmen, etc. One-half the wages of the force in the superintendent's office is charged to this transportation account. The items covering enginemen's and trainmen's wages are secured from the train sheets by figuring the exact time that each train is on the road, taking into account the difference in rates for through and way freights, different classes of engines, and overtime and terminal delays. The amount chargeable to overtime and terminal delay is shown separately from road time. The daily cost is reduced to a per 1,000 ton mile unit. This unit is not the actual cost of performing the service, since it does not con-

Chicago, Milwaukee & St. Paul Railway Co.

DAILY STATEMENT OF TRANSPORTATION EXPENSES.

Terminals ____ 191__

TOTAL NUMBER OF CARS HANDLED IN YARDS, ____

SWITCHING SERVICE	DAILY TOTAL	Cost per Car	ACCUMULATED TOTAL	Cost per Car
Proportion of Superintendent's Office Force				
Yardmasters and Clerks				
Switch Tenders				
Switchmen, Transfer Crews				
" Overtime				
Yard Enginemen				
" " Overtime				
Cost of Coal for Yard Engines				
Signal and Interlocking Operators				
Coal Houses Forces				
Crossing Watchmen				
Pumpers, Switch Light Tenders, etc				
Total				
Average Expense per car		Cents		Cents

TOTAL TONS OF FREIGHT HANDLED, CAR LOADS, ____

" " " " " LESS CAR LOADS, ____

STATION SERVICE	CAR LOAD	LESS CAR LOAD
Proportion Superintendent's Office Force		
" Station Office Forces		
" " Freight House Forces		
" " Outside Forces		
Grain Elevators		
Total		
Average Expense per ton for handling freight	Cents	Cents

Total Tons all Freight handled, ____ Tons

Total Expense all Freight handled, $ ____

Average Expense per ton, all Freight, ____ Cents

NOTES ____

Form for Reporting Yard and Station Costs.

tain any charge for maintenance of equipment, roadbed and structures. The items making up this unit are the ones directly under the jurisdiction of the superintendent, so that it serves to show accurately fluctuations from day to day, as influenced by increases or decreases in the tonnage handled, and the adjustment of forces and movement of trains.

The costs for freight service are kept in four columns—the daily total, a daily cost per 1,000 ton miles, an accumulated total and a cost per 1,000 ton miles for the entire month up to and including that day. The accumulated total is carried forward from day to day throughout the month.

The statements of cost of passenger train, branch line and work train service include only the wages of trainmen and enginemen and the cost of coal consumed. The passenger and branch line train service costs are reduced to train mileage units, and work train costs to an hourly basis.

The daily statement of terminal expenses is divided into two sections, one covering cost of switching service and the other cost of station service. The statement of switching service is computed on the basis of the total number of cars handled, counting total number of cars in and total number of cars out. In includes all items of expense which enter into this cost except maintenance, as explained above in connection with revenue freight service. Daily and accumulated totals and costs per car are carried on the blank. The station service costs are divided into carload and less-than-carload costs. Expenses for station office forces are pro-rated between the two classes of business, the proportion for carloads being from 10 to 20 per cent. of the whole office ex-

penses. The expenses for freight house and outside forces can ordinarily be distributed directly to the account of less-than-carload and carload business, respectively. The cost of station service is reduced to a per ton unit.

These forms have been in use on the Milwaukee for about one year, and the management is well satisfied with the results which are being secured. When the system was first installed it was found that superintendents were apt to compare costs on different divisions with the idea of keeping their figures below those for other divisions on the road. This tendency has been discouraged, as it is recognized that because of the widely different conditions existing on the different divisions the unit costs could not be expected to be the same. The desire on the part of the superintendents to economize is encouraged as much as possible, and it is thought that the data furnished by these blanks is a very material aid to them in recognizing what efforts to economize are proving successful. To illustrate: too much tonnage may be given the trains, causing them to incur a lot of overtime, thus raising the unit cost. Trains may be delayed for want of an open telegraph office; an operator is put on, increasing the station rolls, but reducing the overtime of trains, and, likewise, the unit cost. Terminal delay may be excessive because of insufficient yard force, and by making a trial with additional yard engines or supervision the result should be reflected in the unit cost.

THE MIMEOGRAPH FOR RAILWAY PRINTING.

A number of railways are finding an important economy, both in time and money in the use of the mimeograph for printing tariffs, division sheets, tracers, circulars, instructions and many other forms, of which a number of copies are desired, but hardly enough to justify the expense of a printer's bill. Not only in the freight and tariff departments, but in the mechanical, engineering and other departments also, these machines are becoming more and more useful in preparing copies of forms of various kinds which would require tedious and expensive work on the typewriter to secure the required number, but which would be still more expensive if sent to a printing office. Thousands of tariffs, supplement sheets, etc., are being issued daily by the railways which require but one or two sheets, and of which but a few hundred copies or less are needed. To have this work done by printing press costs large sums in the aggregate, and the amount of this kind of work has been steadily increasing in recent years.

On the mimeograph, tariffs and similar matter may be readily prepared without going outside of the office and in a short time, merely requiring the cutting of a stencil by copying the matter on a typewriter, inserting the stencil on the machine and having as many copies as are desired run off by an office boy operating the machine.

Many railways have been deterred from adopting this economical process by the fact that the Interstate Commerce Commission in several instances has rejected mimeographed tariffs. The tariff department of a railway which has made an extensive use of the mimeograph, and found that it has resulted in marked economy and efficiency, took the question up with the commission and was advised that the only objection was to carelessly done, illegible work on poor paper which had been submitted for filing. To this the commission had registered a decided objection, but no prohibition was made against the use of the mimeograph or any other printing process provided the tariffs complied with the requirements of legibility and satisfactory quality of paper. This railway made an exhaustive comparison of the cost of printing tariffs by mimeograph and found it to be approximately 20 per cent. less than the cost of obtaining excellent work by the printing press. The actual expense of printing 500 ten-sheet tariffs with cover by mimeograph was found to be $10.99, or 2⅕ cents per tariff complete, including the time of the typewriter operator in making the stencils and of two boys employed in operating the mimeograph and in binding the copies. Over three-fourths of the issues of this road for one month were found to be of less than 200 copies each.

IMPERIAL TAIWAN RAILWAYS.*

The removal of the capital of the island of Formosa from Tainanfu, on the coast, to Taipeh, gave Governor Liu Ming Chuan an excuse to construct a railway between the capital and the coast in spite of the opposition in Peking. In 1889 a twelve-mile line connecting Tuatutia and Saitingka was opened to traffic. The work was continued until 1893, at which time 62 miles were opened to traffic between Hsinchu and the northern port of Keelung. At this period the Peking government issued an order to suspend further construction work. All the collieries were closed, and, with the exception of passenger traffic there was little activity in transportation.

When the Japanese assumed control of Formosa in 1895 they found the 62 miles of railway in operation. This line represented a cost to the Chinese of approximately $1,360,758, but, owing to the opposition of the Peking government, it had not been properly maintained. The Japanese decided to reconstruct the road throughout and a special survey was made for the extension of the existing line. In 1899 the government of Formosa planned the construction of a trans-insular line. The estimated expenditure of the new line was $14,400,000, to be spread over a period of ten years. This sum was included in the general development budget and the funds raised formed part of the Japanese government Taiwan public works loan, which was issued for the purpose of carrying out various works and the construction of railways. The cost of construction was lower than the estimate, owing to the fall of wages and a modification of the original route.

The main line and branches comprise 18 tunnels, aggregating over four miles; 28 bridges of over 300 ft. long, totaling over six miles. Much of the route lay in mountainous country, presenting many difficult engineering problems. The estimate of $14,400,000 was reduced by $625,000. This makes an average cost of about $50,000 per mile for the 271 miles of narrow gage line. Such satisfactory progress was made in the construction of the main trunk line between Shinchiku and Taokow that about 247 miles were completed by April, 1908, together with a branch line from Daitoku to Tamsui, 14 miles, and another connecting Taokan with Kukiyodo, 11 miles, a total of 272 miles. On October 24, 1908, the line was officially opened to traffic. The results for the first year of operation were most satisfactory to the Japanese government which guaranteed $12,901,686 of the bonds.

The report showed that the general condition of the road was satisfactory and that there was a balance of $653,695 for just a little over one year's operation. The rolling stock consisted of 54 engines, of which 8 were made in America; 112 passenger cars and 826 freight cars, and was valued at $1,319,670. The passenger revenue was $615,119; the freight revenue, $755,867; miscellaneous receipts, $4,424; total revenue, $1,375,410. Expenditures were $721,715. The number of passengers carried during the year was 2,691,034, and the freight tonnage was 711,930 tons. There were 2,756 persons employed on the line and the salaries and wages amounted to $281,840.

Plans have been adopted for the extension of the system by two branch lines in the eastern and southern parts of the island. The Taito line, about 60 miles long, will run along the southeast coast connecting Taito with Karenko, both of which are important towns having populations of 4,000 and 2,500 respectively The cost of this line is estimated to be $2,119,986. The work was started in January, 1910. The other branch line will be about 41 miles long and will start at Kagi, where a bamboo pulp factory is located. This line will tap the camphor trees district at Mount Ari. The estimated expenditure of this line is $1,326,672. The gage of both these branch lines will be 3.06 ft.

*Abstracted from an article in *The Far Eastern Review*.

Maintenance of Way Section.

WE wish to call the attention of our readers to the contest on track kinks which closes January 25, and to urge that contributions be sent in promptly. A description of any novel method or device applicable to track work by which a saving in time, labor or material can be effected is eligible to this contest. In view of the large number of such kinks developed in track work in different parts of the country the contributions should be numerous and valuable in character. Those descriptive of the handling of winter track work, either in terminals or out on the line, will be especially helpful. Prizes of $25 and $15 will be awarded the best two contributions, and we will pay our regular space rates, with a minimum rate of $3, for all others accepted for publication. Contributors are urged to send in collections of kinks, each of which will be paid for if accepted. All contributions must be in the hands of the Civil Engineering Editor of the *Railway Age Gazette*, 417 South Dearborn street, Chicago, not later than January 25.

SIX papers were submitted in the contest on Improvements in Maintenance Work During 1911, which closed December 25, 1911. The judges, L. R. Clausen, division superintendent Chicago, Milwaukee & St. Paul; E. D. Swift, engineer maintenance of way Chicago & Western Indiana, and F. M. Patterson, assistant engineer Chicago, Burlington & Quincy, awarded the first prize to P. H. Hamilton of the St. Louis & San Francisco, Pittsburg, Kan., and second prize to M. Ganley, roadmaster Atchison, Topeka & Santa Fe, Argentine, Kan. Other papers submitted by R. C. White, division engineer Missouri Pacific, Little Rock, Ark.; E. R. Lewis, division engineer Michigan Central, Bay City, Mich.; J. D. Archibald, assistant supervisor Northern Central, Baltimore, Md., and F. L. Burrell, general foreman bridges and buildings Chicago & North Western, Fremont, Neb., have been accepted and will be published in this and succeeding issues. Probably in no recent year has more attention been paid to this phase of railway work than in the past year. The papers submitted describe simple methods which can be put into use on almost any division with good results.

ALTHOUGH the Wood Preservers' Association is but eight years old, it is one of the strong organizations in the maintenance of way field. It is growing rapidly in strength, having during the past year nearly doubled its membership. It has made for itself a reputation as an authority on timber-treating, and its proceedings are in demand. The convention of this week was the best which has been held, and the papers presented are an evidence of the interest taken by the members, both in their individual work and that of the association. Although the timber-treating industry is not confined to the railway field, it receives its main application there and the importance to which it has grown illustrates the wide and constantly increasing diversity of the work under the supervision of the chief engineer of the modern railway. It is not many years since the chief engineer had supervision over new construction only and had but one assistant, a bridge engineer. In fact, frequently these offices were combined. Now the chief engineer of a large railway has several assistants in charge of different departments, some of which are in turn sub-divided. The bridge engineer, engineer maintenance of way, signal engineer, architect, superintendent of water service, and superintendent of timber preservation have on many roads been required to build up staffs to handle the large amount of work under their supervision, larger than that formerly maintained by the chief engineer. The erection of a station is a good example of the wide diversity of problems met in one engineering project. Such a piece of work was a comparatively simple matter a few years ago. Now, however, the architect is called in to design the station, the passenger subways under the tracks are designed by the bridge department, the engineer plans the track layout, and the plumbing, lighting and heating all require specialists, while the chief engineer must be able to intelligently supervise the combined work.

THERE is no time which so taxes the ability of the maintenance of way officer as a period of weather similar to that of the past three weeks, unless it is a series of washouts. It is even doubtful if washouts are as severe a test of a maintenance organization as the recent extremely cold weather, accompanied, as it was, by a heavy snowfall, for the weather conditions have been such that a man could not work without serious bodily discomfort, and frequently serious injury by freezing. Coming at a time when the forces are reduced to a minimum, severely cold weather in many cases finds the maintenance forces inadequate to cope with the situation. Conditions are especially severe about terminals, and the larger the terminals the greater the difficulty. Switches must be kept open throughout the yards, tracks about the engine houses and in coach yards must be kept free from ice in spite of the fact that water and steam are constantly escaping and freezing, for it is highly important that passenger trains at least be able to leave terminals on time. All this work requires constant attention both day and night and at such times the roadmaster or the supervisor usually spends a large portion of the 24 hours on the track. The same difficulties are shared to a somewhat lesser extent by those in charge of water service and signals. If passengers complaining of delays to passenger trains, or shippers of delay in delivery of freight, would realize the efforts put forth by employees in all departments, and especially of those in the maintenance department, to keep trains moving under the extremely severe weather conditions and would more fully appreciate the difficulties under which they work, there would be few, if any, complaints.

IF asked the cost of a work train the average roadmaster or master carpenter will mention the figure given in the general circular covering such work. But this figure may or may not be near the actual cost to the railway in a given instance. The average maintenance officer will order a work train too often rather than not often enough if left to his own judgment. For this reason it is very pertinent that he stop to consider what really enters into the cost of a train. The price given in the general circular usually is an arbitrary figure made to cover the average cost on the entire system. The cost varies widely on different divisions and on branches of the same division. A work train can do less on a busy main line than elsewhere, because of the time lost in keeping out of the way of scheduled trains; and it is a cause of delay to extra trains. The resulting overtime of train crews is an actual part of the cost of the work which the railway has to pay, although it may not be practicable to so assign the charges. Again, in times of congestion of traffic when motive power is scarce an engine is worth far more than in times of light business, because of its greater earning power. If an engine can earn $200 a day by hauling revenue freight it really costs the road that much to withdraw it for work train service. The complicated wage schedules of the train and enginemen are often not as fully understood by the maintenance men as they should be, and because of this trains are sent back and forth over the road, running up mileage without securing the greatest results. These and other items enter into the real cost of doing the work. The closer the man in charge estimates this cost when deciding on the method to be followed the nearer will he be able to so do the job as to promote the best interests of the company. A roadmaster on a busy double track line, handling over 50 trains in 24 hours, most of them in the day time, called for a work train recently to unload seven cars of cinders about a mile out from the nearest siding. His superior officer studied the matter and found that a gang of about 30 men would be necessary to economically unload the cinders in the short intervals during which they could work on the main line. He therefore concluded that it would be cheaper to haul them

by teams from the adjacent siding. The total expense incurred in this way was less than would have been the cost merely of the labor which would have been necessary in handling it with the work train. In addition there was no interference with traffic on the main line. While the maintenance officer usually does not have the data to estimate accurately the cost of a work train, he is closely enough in touch with local operating conditions to arrive at the approximate figure, and should consider carefully these possible variations from the average cost.

MAINTENANCE WORK IN 1911.

IN looking back over 1911 the tendency which stands out most most prominently in maintenance of way work is the very general effort to introduce economies. While retrenchment did not approach the limits reached in 1908, little attempt was made to raise the standards of maintenance or to do extensive new work. But a small amount of new construction, double-tracking and terminal improvement was done. In some cases the usual quantities of rail and ballast were not supplied. There were, in consequence, smaller forces to handle, which gave the supervising officers more time to study possible economies; and probably few recent years have witnessed so great an improvement in the thrift with which track work has been done. Few radical changes were made; the tendency was rather toward comparatively small improvements in many directions. The effort was largely to secure greater efficiency from the men through education and through more effective organization of the competent groups.

The idea that a track man is an unskilled laborer has been allowed to take root so firmly that it will probably take years to remove it from the minds of many, and in the meantime maintenance work will continue to suffer. However, there is a growing dissatisfaction with this attitude which is beginning to make itself felt. One evidence of this was the increase in the wages of section foremen on many roads during the past year. This ought to continue until the wages and conditions of employment are such as to induce enough good men to enter this field to provide a satisfactory supply of foremen.

The educational work for employees which was begun on the Union Pacific over a year ago was carried on actively during 1911. Last summer the courses were extended to the Illinois Central. The effect on the better class of foremen and maintenance employees seems sure to be beneficial. Many roadmasters and master carpenters have continued to hold regular meetings of foremen to discuss subjects in connection with their work. The keeping of cost data of work under way, and its comparison with previous work, has also proved instructive in many cases.

The most important result of the study of the organization of gangs is seen in the tendency to reduce their size. During the last few years many have realized that with the increasing inefficiency of labor greater supervision is necessary, and that it is impossible for a foreman, even with an assistant, to handle properly a gang of 75 or more men. One road has materially reduced the size of its ballast gangs during the past year and believes it has made a very large saving over previous years. The same thing has been done with rail-laying gangs, one instance of which is described in this issue. Study in this field has only begun and there is much room for further advancement. The premium system as a method of encouraging the foremen to better work was adopted last year on the Rock Island and has been continued on other roads.

There were few important developments in track materials, and the increase in the use of higher-priced materials for special service, such as screw spikes and manganese frogs and crossings, was checked by the curtailment of expenditures. However, there was an increase in the use of such standard materials as treated ties, tieplates and open hearth as well as Titanium steel for rails.

In view of the inefficiency of much track labor, the most attention is being devoted to the development of devices which will eliminate much of the work now done by hand. A rail-laying car is a prominent example of this kind of development last year. It is but the forerunner of a large number of labor-saving devices which will find their way into track work.

The introduction of motor cars for maintenance forces has increased very fast, and their use has demonstrated their economy. Some progress has been made in the adaptation of the motor on the car to driving power machinery in connection with track work.

Among the more interesting developments in handling maintenance work have been the experiment in maintaining automatic block signals on double track on the Union Pacific and the contracting of certain kinds of maintenance work on the Erie and Michigan Central, described in recent issues of the *Railway Age Gazette*. The year was productive of many improvements, and with the increased attention now being given to maintenance work by operating men, progress in succeeding years should be greater.

UNIFORM SPECIFICATIONS FOR TIE PRODUCTION.

ALTHOUGH many men interested in the railway cross tie problem have given the subject careful study, especially in connection with the work of the Wood Preservers' Association and the American Railway Engineering Association, there are still lines of investigation which have not been thoroughly studied, and much is still to be desired in the shape of actual results from such investigations. The work of the Wood Preservers' Association has, of course, been directed almost entirely toward methods of treating soft wood ties. The tie committee of the American Railway Engineering Association has recommended tie specifications and has made an attempt to secure service records. These records, however, have covered only the species of the wood and the treatment as influencing its life, and very little attention has been given to methods of cutting and handling the ties, which, in many cases, are important factors in determining the length of service which the tie will give.

The preparation of uniform specifications for tie production has been suggested at various times, but the number of varying conditions to be considered render this very difficult. Some roads have lines reaching tie-producing territory and buy all ties from local producers along such lines; others have to buy all ties from companies operating on a large scale in another portion of the country. Some roads refuse to take certain soft woods under any conditions; others use many soft woods, either treated or untreated. Conditions of climate and soil so influence the timber that a given species may exhibit quite dissimilar characteristics when taken from different sections; the season during which the tree can be cut to make a good tie may vary by several months, and the length of time required for freshly cut ties to develop incipient rot may also vary considerably. The method of handling the ties from the point of cutting to the point of delivery also greatly influences their value. They may be cribbed on a river bank for months awaiting a favorable stage of water and meanwhile developing rot; they may be rafted down stream immediately after cutting, the water soaking out the sap and retarding injurious checking, or they may be hauled out to a railway siding, properly piled and loaded direct to cars.

Unless ties are properly cut and seasoned before treatment their failure in the track may or may not be due to poor treatment. One of the papers presented at the convention of the Wood Preservers' Association cited an instance in which 90,000 beech ties were found to be in such bad condition after delivery to the treating plant that it was useless to treat them, and their first cost was a dead loss. Probably such cases are not common, but it would be hard to say how many failures of treated ties which puzzle maintenance men are due to some mishandling of ties before the treatment was applied. No road can experiment with all species grown in all territories and bought under all variations of specifications. Each road, however, is constantly learning by experience that certain species, cut in certain months and handled in a certain way, are giving either good or bad results in track. If by co-operation through the associations now studying the problem such experiences were exchanged, it is probable that certain general requirements in the production of ties could soon be made uniform, to the mutual advantage of tie producers, tie preservers and the railways.

IMPROVED MAINTENANCE METHODS IN 1911.

FIRST PRIZE.—ECONOMY IN MATERIAL.

BY P. H. HAMILTON.

St. Louis & San Francisco, Pittsburg, Kan.

The greatest improvement in the maintenance of way department on this division during the past year has resulted from the efforts made to economize and the willingness with which the foremen endeavored to help out is encouraging. In the past the foremen were not closely restricted in the hiring of men or in the use of material and there is no doubt that some injudicious foremen were wasteful in using new material where it was not fully needed simply because they had it on hand. On this road and on others this habit has been overcome by requiring the foremen to consult with the roadmasters before making extensive track repairs. The roadmasters also closely check the foremen's requisitions for material and tools, in this way preventing them from gathering an excessive supply. When a foreman is allowed to keep only a small supply of material and tools on hand he will be inclined to take care of what he has and will use it more carefully. By a small supply is meant enough material for general repair work and emergency repairs and enough tools to completely equip the gang. To cut down wasteful use of tools and to prevent them from being carried away the use of a mimeograph form of tool report has been started. This form is similar to a material report and all tools are listed on it. The foreman is required to account for all broken and worn out tools. One column shows the tools which can be spared for other sections, and another column lists those which will be needed for the coming month. From these reports the roadmaster can make up his monthly requisitions and distribute the equipment.

With the aim of receiving more credit for scrap released, the foremen have been urged to pay more attention to the picking up and handling of this material. In the past considerable scrap material has been stolen, but as a result of greater care on the part of foremen this trouble has been largely eliminated. After running the scrap car over the division the car department is always allowed to look over the material and pick out any which it can use.

A frog repairer at $90 per month and his helper at $60 per month spend their entire time going over the division repairing broken and worn frogs in track and those which have been removed for repairs. They also repair all of each foreman's tools before leaving his section. The cost of frog repairs, including bolts, rivets, springs and rails, rarely exceeds $9 each. Before shipping scrap on sales orders it has always been necessary to cut frogs apart. Recently all the good parts have been saved for the use of the frog repairer. Recently while working over the scrap piles at division headquarters this frog repairer recovered in one week enough material to more than pay the wages of himself and helper for three months.

Considerable economies have been effected in the use of stationery. The foremen are now furnished with blank instead of printed letterhead paper. They are also furnished with self-addressed envelopes for their correspondence with the roadmasters, which envelopes are returned to them and used over and over. The roadmaster is provided with similar envelopes addressed to each foreman which he uses in the same way. This has decreased the use of the new envelopes in the roadmaster's department about 90 per cent.

Another thing which has been given attention this year is the maintenance of approaches to highway crossings at grade. In most cases track men have been maintaining these approaches in good condition out to the right of way line. Many times at the request of the township road supervisor a foreman will put in several hours with his entire gang on such work. With the increase in automobile traffic on the highways the maintenance of these crossings has become more costly. Following the receipt of 15 complaints regarding the conditions of such crossings at one time recently the Kansas law relating to this subject was investigated by the legal department which made the following ruling:

"When the railway is constructed across a public highway, after the highway has been laid out and dedicated to public use, it is the duty of the railway company to restore the highway to it's former condition, as nearly as practicable, and if in doing this it is necessary to construct approaches to the railroad track it should do that. If it is necessary to put drains in the approaches the railway is required to maintain these drains.

"When a public or private road is opened across railway tracks it is not the duty of the railway company to construct the approaches or put in and maintain the drains in the approaches. It is, however, the duty to plank the crossing by placing a plank on each side of each rail, these planks to be not less than 12 ft. long, 10 in. wide and not less than two in. thick, and shall fill the space between the two inside boards with gravel or broken stones, or shall floor the space with boards not less than two in. thick and 12 ft. long."

It is now the practice on this division for the foreman to only maintain the portion of the crossing between the ties. Wherever it is not a certainty that crossings were laid out and dedicated to public use after the railroad was built they maintain the drains under the crossings.

SECOND PRIZE.—EDUCATION OF THE FOREMAN.

BY M. GANLEY,

Roadmaster, Atchison, Topeka & Santa Fe, Argentine, Kan.

During the past year the following educational programme has been carried out on this division with good results and it is planned to continue it during the new year:

Meetings for the foremen have been held at intervals of about six weeks in which each one of the men was called on for a discussion of some subject pertaining to his work or to the safety of the employees. We have also discussed in a general way methods of getting along with the public living along the line, and especially with the farmers, with excellent benefits. I have found that by picking out subjects for some foremen whom it was difficult to interest otherwise and outlining the argument for them, and by assigning the opposite side of the same subject to another foreman at the other end of the territory, very valuable discussions will be brought out in such meetings, and often points are emphasized which had not been thought of before. In this way some of the men who are not able to work up a subject for the meeting bring out some of the most valuable discussions in debate.

It has been found of advantage occasionally to bring a track walker into these monthly meetings. While most of these men are foreigners and do not fully understand the English language, they have a chance to learn track work here and the roadmaster and foremen are enabled to get in touch with them. Such contact with them gives the roadmaster opportunity to study the more intelligent ones and to determine where he can secure his next foremen.

Last March I selected two of the foremen on the division and allowed them to attend the Railway Appliances exhibit at Chicago. This year the foremen will select two from their number to go, as it is believed that even better results will be secured by allowing the men to select their representatives. The men who attended the meeting last year noticed a great many new things in track material and tools which were of interest and value to them and which they have endeavored to explain to the other foremen.

Another good method of educating the foremen to see the

difference in the work of other foremen is to take them on an informal inspection trip over the division. Three or four of the foremen are gathered at one end of the division and go over it with the roadmaster on the rear end of some passenger train. In this way the small number of men does not annoy the passengers, while they secure all the benefits of a larger inspection trip.

EDUCATION.

BY E. R. LEWIS,
Division Engineer, Michigan Central, Bay City, Mich.

Reviewing the maintenance work of 1911 and considering the improvements made during this year as compared with the years gone by is undoubtedly of benefit. Is it not of equal or even greater service to consider now what improvements may be made in 1912 by the application of methods which have been tried in 1911 and found to be superior to those in use during former years? And may each one not benefit by some one or more of the "kinks" brought out through the agency of the *Railway Age Gazette's* contests during the present year? Improvements in track maintenance on the northern division of the Michigan Central during the year 1911 as compared with former years have been sought chiefly along the lines of increased efficiency through a policy of progressive organization.

The theory of scientific management, as applied to maintenance of railways, is at the same time plain and fascinating. It appears almost easy, at first glance. The putting of the theory into practice, however, reveals the real nature of the proposal. It is a matter of education, of man to man talks. It requires and demands the personal touch, toward a definite end. A beginning in this quest was made on this division in 1911. No startling innovations have been made. The roadmasters have been brought to the division office regularly once a month on the first Monday on or after the 15th and there have been no absentees. Efficiency methods have been discussed. Costs have been tabulated and compared. The knowledge imparted has been passed on to the section foremen, who take great interest in the matters considered.

Sketch blueprints have been distributed to the foremen showing the approximate position of each siding and turnout on each section. The length of every siding or spur is shown in figures while a summary in miles of main, passing, yard and industrial tracks, number of switches and railway crossings on the section appears in a compact table on the face of the blueprint which is of note book size, about 3½ in. x 6 in. In cases of sections in large yards, several blueprints, numbered to fit each other are necessary. Tracks joined with other roads are shown in colors. These prints are found very handy when describing the location of derailments or other happenings by the section foreman. By sending in his blueprint with the location marked, he can often explain what he could not otherwise make clear, and thereby do away with the necessity for a trip by the roadmaster or assistant engineer or both to view the premises. These blueprints have also been the cause of improvement of office records, the foremen being keen to observe errors in any detail. A most important result of the placing of these blueprints and cost data in the hands of the section foremen is their education in the reading of maps and masses of figures. The progress along these lines is remarkable.

The ultimate object of our efforts toward education is of course to reach and teach the section man: in other words, to increase the efficiency of the working unit. It does not seem that the railway managements of this country recognize or realize that the section man is a skilled laborer. To be of any use as a section man, a laborer must possess skill and experience.

The section man is the working unit. He should be, and often is, a sound thinking unit. A maintenance force is valuable in direct ratio to the knowledge and skill of the unit of organization. It is, then, absolutely necessary to pick and train the section man if the efficiency of the department is to be increased as a whole and progressive results obtained. This must be done by daily instructions of all employees and officers. The knowledge gained must be passed down to the section men. But the superiority is not all on one side. There is often a passing up of knowledge, or even exchange of ingenious ideas and progressive methods. The roadmasters must bring the section foremen together. The foremen must bring the men together, to the mutual benefit of all concerned. These meetings and teachings must be persisted in and wisely carried out to be of value. There are altogether too many lines of cleavage in railway organization. They must be narrowed down, and gradually wiped out. Individual effort cannot avail. The best results are to be had from united effort—increased team work.

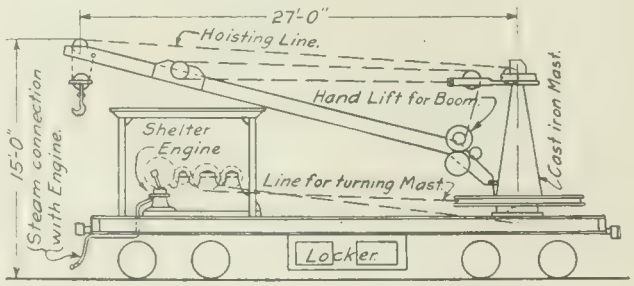
It is desirable and necessary to bring the section men into our confidence, to give them hearings, to know their views and to have them more clearly understand all sides of this great problem of transportation to the solving of which they are giving the efforts of their waking hours as the working units.

Here is the gist of the whole problem. Increased efficiency necessitates increased education in details of the work in hand, not only of the section man but of all the servants of the railways from the lowest to the highest. Along these lines the work of 1911 has been wrought. The results are encouraging. The field is far-reaching. The task is only begun. But the pathway is plain and the near future cannot but bring vast improvement. There will come a time when the value of the section man must be recognized by railway managements. Shall that recognition be forced upon unwilling ears or shall we set our house in order by recognition now of the true value of this working unit and by intelligent and constant effort toward its improvement for the lasting benefit of the employers? There is none too much time left.

THE USE OF A DERRICK CAR FOR HANDLING TRACK MATERIAL.

BY J. D. ARCHIBALD,
Assistant Supervisor, Northern Central, Baltimore, Md.

One of the laborious and dangerous pieces of work which track forces frequently have to perform is that of unloading frogs or other heavy track material from gondola cars. In addition to their weight, such articles are very awkward to lift because of the poor grip which it is possible to secure and very frequently a man has a foot crushed or is otherwise injured. Having a number of carloads of frogs and switches, in addition to a number of heavy manganese knuckle rails for slip switches,



Derrick Car for Handling Track Material.

to unload during the past summer, a derrick was secured from an adjacent division, but when it was received it was of very little use as it was equipped with a short steel boom of 10 tons capacity with a fixed radius of 10 ft. The car was sent to the shops and the boom was replaced with one having a radius of 27 ft., which allowed the hoisting line to reach the center of a 34-ft. car when coupled to it. This boom was arranged so that when out of service it could be turned through 180 deg. and allowed to rest

on the engine shelter, as shown in the drawing, in this way eliminating the idler car. No change was necessary for the engine or drums as the derrick was provided with one drum for hoisting and another for turning the mast. An old hand crab was placed on the boom for raising and lowering it. A man was selected from one of the gangs to operate the derrick, thus eliminating the steam engineer's wages.

In addition to unloading the frogs and switches, this car was used during the past season to move a standpipe about 200 ft. Here the plumbers dismantled the standpipe and disconnected the cast-iron seat and slow-closing valve. The derrick transferred the seat and valve to the new pit, requiring but a few minutes for work which would otherwise have required several hours for a gang of men. This car has also been used to good advantage in moving semaphore signal poles, only about 20 minutes being required to move a pole. This did away with the necessity of erecting gin poles.

The derrick was also found to be very convenient in loading a large quantity of rail for shipment. The chains were passed around several rails and they were hoisted into a car in one operation. Here two men were required on the rail pile and two in the car, with one man at the engine and one to give signals to the engineer. When loading by hand 16 men would have been required and would have made but one-third the progress made with the derrick. In such instances the use of a work-train is expensive, and the advantage of a derrick car is as important in the reducing of this expense as in the reduction of labor. The above are but instances of the wide variety of uses to which a derrick may be put with advantage.

BENEFITS OBTAINED FROM A CAREFUL STUDY OF THE COST OF WORK.

BY F. L. BURRELL,
General Foreman, B. & B., C. & N. W., Fremont, Neb.

"It is a good plan to hope for the best but a much better one to hustle for it." This is a fine maxim for anyone to follow, and the best way that one can obtain results is to keep his eye on his men and records, and hustle for a better record.

At the opening of the season of 1911 we called our foremen into the office and went over the records of the work done the previous year. The cost of this work was compared with the cost of that done in 1909 and if the 1909 cost was found to be lower than that for 1910 that figure was taken for the record of the two years; if the 1910 figure was lower we took that. An average cost for the different classes of work was made up and we started out with the intention of beating the record if we could.

It was not possible to eliminate all the undesirable men in our gangs at once, but we have made a reduction and believe we have reached a minimum. The men as a rule are taking pride in their work and are trying to make their respective gangs the best on the division. They have been given to understand that the word "efficient" does not mean spasmodic speeding up or poor work. It does mean the finding of a unit of work to be done in a given time in the most workmanlike manner and at the most economical cost. To accomplish results it is absolutely necessary to proceed without friction and with the most effective team work.

The men have been shown where head work can save unnecessary labor. Where possible cheap men have been put on for flagging trains and placing tools conveniently near to those who are paid higher wages to save the higher priced men from running from the work to the tool box and otherwise wasting time.

The foremen have taken a great deal of interest in this work and a number have kept diaries or logs of each day's progress. These have been turned in and have been found to be of much use in deciding where savings may be made the coming year. This action on the part of the foremen is of distinct value, for we not only have a record of the work done with the method by which it was done and the cause for any extra cost, but we also have a record of any outside influence, such as delays caused by poor train despatching or poor work-train service.

An analysis of the results secured by working under the above program shows that while we have paid a little higher wages than in 1909, we have beaten the records of both 1909 and 1910. We have made an average reduction of 6 per cent. in the labor cost of work done, not including work-train and other service, while the foremen have made a decided advance in their efficiency.

ORGANIZATION OF RAIL RELAYING GANG.

BY R. C. WHITE,
Division Engineer, Missouri Pacific, Little Rock, Ark.

In contrast with the customary method of relaying rail with a gang of from 70 to 100 men in charge of a foreman and assistant foreman, gangs of 35 men with foreman and assistant foreman have been used on one division of the Missouri Pacific during the past year with excellent results. The detailed distribution of the men and the method of handling the work are here given.

On starting work in the morning six men begin adzing the shoulder of the tie on the outside of the rail and on a level with its base. At the same time nine men with claw bars are set to work pulling two spikes and starting the third spike, each man taking a rail and after finishing it going ahead to the ninth rail. Two men follow with spike mauls to drive down or pull out the stubs that the men in advance have left. Following this 16 men, under the direction of the assistant foreman, place the rails to be laid on the ends of the ties, heeling them in to the adjoining rails and directly opposite their final position in the track. These rails are turned on their sides with the ball towards the old rail and about 10 in. from it. One man carries water and one handles the tools.

A gang arranged in this manner will have from 5,000 to 6,000 ft. of rail in place by 10 o'clock. Such a gang should then be able to put in 160 rails in about three hours, with allowance made for at least six connections to permit trains to pass in this time. This still leaves four hours of a working day in which at least 40 more rails should be put in.

When starting to relay rail after 10 o'clock the gang is organized as follows: Two men flag trains; two with claw bars pull the remaining outside spikes and one pulls the spikes inside where the new joints will come; four with small bars throw the old rail out over the top of the new rail on to the shoulder of the ballast. The assistant foreman and an engineer with expansion shims at the rear end, with a laborer at the forward end, throw the new rail into place with small steel bars. Two men hold this rail in place while eight full spike it and eight others put on the bolts. Two men look after compromise connections; three distribute angle bars, bolts, spikes and other material and two carry water and do other miscellaneous work.

While daily records were kept showing the performance of various gangs it is almost impossible to arrive at accurate results by simply checking daily operations, which showed that a 38-man organization was laying from 80 to 160 lineal feet of rail per man per day. However, the actual cost of relaying 18 track miles of 75-lb. rail with 100-lb. rail, including the unloading and distributing of material and relaying 14 turnouts, is as follows:

Relaying rail labor, including foreman, assistant foreman and engineer	$3,066
Relaying 14 switches—labor, including foreman, assistant foreman and engineer	490
Labor unloading 18 miles of rail and 14 complete switches	216
Work train, including fuel and engine house expense unloading rail and switches	620
Total cost	$4,392
Cost per mile, including switches, and unloading	$244
Cost per mile excluding labor account laying switches and labor and work train account of unloading and distributing	177.33

Cost per track foot		.0335
Daily expense:		
1 Foreman ($85.00 per month)	$3.73	per day
1 Assistant foreman ($65.00 per month)	2.50	"
1 Assistant engineer ($65.00 per month)	2.50	"
35 Laborers (15c. per hour)	52.50	"
38 men, or 380 hours	60.73	"
Cost of labor per man per day of 10 hours	1.60	"
Average track ft. per man per day ($1.60 ÷ .0335)	47.76 ft.	
Average lineal ft. per man per day of 10 hours	95.5 ft.	

The above work was performed with negro labor under ordinary weather conditions during the early summer. The average number of trains between 7 a. m. and 6 p. m. was 12; while the average number of connections made per day was 8.

ABSTRACT OF ENGINEERING ARTICLES SINCE DECEMBER 15.

The following articles of special interest to engineers and maintenance of way men, and to which readers of this section may wish to refer, have appeared in the issue of the *Railway Age Gazette* since December 15:

Shallow Bridge Floors.—An abstract of a paper on this subject by O. F. Dalstrom, read before the Western Society of Engineers, was published on page 1268 of the issue of December 22. The author analyzes the subject completely and shows the differences between the various types of shallow floors now in use on railway bridges. An editorial commenting on the same subject appeared on page 1265 of the same issue.

The importance of properly inspecting and maintaining highway crossings over Railway Track was emphasized in an editorial note in the issue of December 22, page 1263.

New Construction in 1911.—The annual statistics compiled by the *Railway Age Gazette* showing miles of line built during the past year were published in the issue of December 29. The mileage for the year compared with the mileage built during the previous years as far back as 1893 is shown on page 1307, and a detailed statement of the mileage built arranged by states was published on page 1320. This issue also included statistics of mileage block signaled, cars and locomotives built and ordered, etc., and numerous expressions of opinion as to the outlook for 1912 by railway officers.

Notes on Pile Protection.—An abstract of an article read before the Boston Society of Civil Engineers by T. Howard Barnes, which includes a description of work done on wharf construction for the protection of piles, was published on page 1345 of the issue of December 29.

New Ore Dock at Two Harbors, Minn.—The Duluth & Iron Range ore dock recently built at Two Harbors, Minn., is one of the best examples of recent tendencies in the construction of ore-loading docks on the Great Lakes. Its size and the number of special features involved in its design make it of particular interest. An illustrated description of the structural details and operating mechanisms of the dock was published on page 8 of the issue of January 5.

The New General Office Building of the Union Pacific at Omaha.—The Union Pacific has practically completed a new 12-story office building at Omaha. A perspective view and floor plan of this building were shown in connection with a general description of its construction in the issue of January 5, page 18.

Exhibitors at the Railway Appliances Association March Exhibit.—The list of exhibitors for the March exhibition was published on page 65 of the issue of January 12, and an editorial note commenting on the outlook for this exhibit appeared on page 39 of the same issue.

The Rail Situation.—An editorial, presentiing additional facts in substantiation of the statements made in an editorial on the subject of rail breakages, published December 15, appears on page 42 of the issue of January 12. This editorial includes summaries of the best statistics in existence on this subject.

Effect of Cold Weather on Tonnage Rating.—An abstract of a paper on this subject by Edward C. Schmidt, read before the Central Railway Club, appeared on page 44 of the issue of January 12. It was illustrated by numerous curves showing the effect of temperature changes on train resistance as determined by an extensive series of tests by the Engineering Experiment Station of the University of Illinois.

Improved Method of Treating Ties and Timbers.—W. F. Goltra presents detailed plans for a timber preservation plant embodying a number of advanced ideas and including approximate costs of the process outlined.

COMMITTEE APPOINTMENTS; AMERICAN RAILWAY BRIDGE & BUILDING ASSOCIATION.

The following appointments have been made for the committees of the American Railway Bridge and Building Association for 1912:

Fireproofing Timber Trestles.—Lee Jutton (C. & N. W.); W. H. Moore (N. Y. N. H. & H.).

Derricks and Other Appliances for Handling Material in Supply Yards.—J. N. Penwell (L. E. & W.); A. S. Markley (C. & E. I.); A. Yappen (C. M. & St. P.); D. B. Taylor (B. & O.); E. A. Stanley (M. P.).

Sash—Size and Kind of Glass for Roundhouses and Shops.—A. A. Wolf (C. M. & St. P.); H. Bender (C. & N. W.); H. A. Horning (M. C.); F. L. Thompson (I. C.).

Concrete Tank Construction.—F. E. Weise (C. M. & St. P.); W. H. Finley (C. & N. W.); W. M. Clark (B. & O.); D. G. Musser (Penna. Lines West).

Best and Most Economical Pumping Engines.—C. E. Thomas (I. C.); J. Dupree (C. T. H. & S. E.); G. H. Jennings (E. J. & E.); J. B. White (C. & N. W.).

Roofs and Roof Coverings.—T. J. Fullem (I. C.); G. W. Andrews (B. & O.); C. W. Richey (P. R. R.); C. A. Marcy (C. & N. W.); J. H. Nuelle (N. Y. O. & W.); H. H. Kinzie (N. Y. N. H. & H.).

Reinforced Concrete Culvert Pipe.—L. D. Hadwen (C. M. & St. P.); H. H. Decker (C. & N. W.); R. O. Elliott (L. & N.); F. O. Draper (I. C.); F. E. King (C. M. & St. P.); George Loughnane (C. & N. W.).

The Construction and Maintenance of Long Pipe Lines for Locomotive Water Supply, Intakes, Pump Pits, Reservoirs, Etc.—B. J. Mustain (E. P. & S. W.); E. S. Hume (West. Australia Gov. Rys.); E. R. Floren (C. R. I. & P.); D. Burke (So. Pac.); W. C. Dale (O. S. L.).

The Development of Turntables to Meet Operating Conditions for the Modern Locomotive, Showing Most Improved Practice.—C. E. Smith (M. P.); J. S. Berry (St. L. S. W.); F. G. Jonah (St. L. & San F.); A. S. Markley (C. & E. I.); C. H. Fake (M. R. & B. T.).

Track Scales—Construction and Maintenance.—A. M. Van Auken (M. D. & G.); E. R. Wenner (L. V.); A. W. Merrick (C. & N. W.); Wm. H. Vance (La. & Ark.); H. M. Jack (I. & G. N.).

Painting and Structural Iron or Steel, for Both Bridges and Buildings.—C. Ettinger (I. C.); R. H. Reid (L. S. & M. S.); E. E. Wilson (N. Y. C. & H. R.); O. F. Barnes (Erie); O. F. Dalstrom (C. & N. W.).

Relative Merits of Brick and Concrete in Railway Buildings and Platforms.—George W. Hand (C. & N. W.); H. A. Horning (M. C.); G. H. Jennings (E. J. & E.); Peter Hofecker (L. V.); W. F. Strouse (B. & O.); E. M. Dolan (M. P.).

The executive committee of the Roadmasters' and Maintenance of Way Association has decided to publish an official programme, which will be ready for distribution by July 15, 1912, and which will include the committee reports and papers which will be presented at the thirtieth annual convention at Buffalo in September. This will enable the members to study the reports before going to the convention and they will be better able to discuss them.

THE USE OF SECTION MOTOR CARS ON THE SAN PEDRO, LOS ANGELES & SALT LAKE.

An example of the economies secured by the use of motor cars for section forces is afforded by the experience of the San Pedro, Los Angeles & Salt Lake last summer. Although light motor cars have been used for inspection purposes by the superintendent, engineer maintenance of way, roadmasters and foremen of bridges and buildings for about eight years, section motor cars were first provided last year. Four Fairbanks, Morse & Company cars were bought and were placed in the hands of foremen, some of whom were white and some Japanese, and none of whom had had any previous experience with gasolene engines or motor cars. No attempt was made to pick out men to run them. As was to be expected, there has been some irregularity in their performance, partially due to the fact that they have not been continuously in the hands of the same men. The variations, however, have been such as may be readily understood and no difficulty is anticipated in reducing the performance to a fair degree of regularity.

The cars are being used on grades as high as 3.6 per cent. and it is found that they will carry a gang of five or six men with their tools up such a grade with a little pumping on the part of the men, the engine itself being not quite strong enough to climb the hill alone with this load. Reports of their performance are made monthly to the roadmaster and the division engineer, from which the following figures are taken. It will be noted that the cars average about 22 miles per gallon of gasolene and that the total cost of operation has averaged $1.48 per 100 miles. The reports are posted daily by the foremen and summaries are made at the end of the month.

As a result of the experience with these cars authority has been granted to equip three branch lines throughout with motor cars. These branches aggregate 101 miles and have heretofore been divided into 11 sections. With the motor car but seven sections will be required, thus relieving four foremen with their hand cars, push cars and some tools. It is estimated that it will cost about $1,500 to equip the seven sections with motor cars, and that the total cost of operating them for the first five months will bring this amount up to $1,800. The saving in wages, hand and push cars and tools will offset this expense, and after five months the annual saving in wages alone without reducing the number of laborers is estimated at a trifle over $3,000. In addition to this, the local officials believe that they will get more efficient track work.

Motor Car Performance on S. P. L. A. & S. L.

July, 1911.

Car No.	Days in Use	Miles Run.	Miles per gallon. Gasolene.	Miles per gallon. Lub. oil.	Cost per 100 miles, oil and gasolene.	Supplies, other than oil and gaso.	Repairs, labor and material.	Total cost per 100 miles.	Delays	Remarks
5770	14	243	20.25	243	$1.12			$1.12		Gasolene, $0.20 per gal.
5617	28	641	23.31	427	.94			.94		Lubricating oil, $0.50 per gal.
5624	29	265	22.08	265	1.03			1.03		
Average		383	22.31	328	$1.00			$1.00		

August, 1911.

5770	31	294	17.29	98	$1.50	$1.8		3.11		Lubricating oil used.
3476	31	407	16.28	136	1.47			1.47		Excessive oil used.
5617	31	304	23.38	347	.95			.95		
5624	31	302	25.17	302	.91			.91		
Average		327	19.51	166	$1.22	$0.14		$1.36		

September, 1911.

5770	30	341	24.36	248	$0.95	$1.5		$1.45		Storage battery, 15 cells, dry batteries.
3476	30	250	25.00	286	.92	.91		1.28		
5617	30	413	22.94	300	.98			.98		
5624	30	294	24.50	336		1.5		1.53		
Average		325	24.04	288	$0.95	$1.1		$1.29		

October, 1911.

5770	31	489	23.29	301			$3.60			
3476	31	478	23.78	311			3.60			Clearing engine.
5617	31	184	19.37	74			13.63			Storage battery, 15 cells, dry batteries.
5624	31	346	24.71	346						
Average		367	23.15		$0.97	$0.13	$1.44	$2.54		

November, 1911.

5770	30	480	23.29	384	$0.92			$1.20		Storage battery, 15 cells, dry batteries.
3476	7	509	25.45	407	.87					
5617	30	588	22.62	314	.99	1.82		1.30		Dirty spark plug.
5624	30	405	27.00	432	.82	2.47		1.43		
Average		496	24.47	384	$0.91	$0.29			10 min.	
Average for 5 months		379			$1.01	$0.18		$1.48		

ERECTION OF ROCK ISLAND BRIDGE OVER IOWA RIVER, COLUMBUS JUNCTION, IOWA.

The Chicago, Rock Island & Pacific has recently completed the reconstruction of a bridge over the Iowa river about 300 ft. south of the junction of the Iowa and Cedar rivers, near Columbus Junction, Iowa, in which the erection of the steel work was handled by a new and original method. This work was described in a recent number of the *Rock Island Employees' Magazine*, from which the following information is taken:

The old bridge consisted of six 150-ft. through latticed trusses and one 58-ft. deck plate girder over the channel of the river proper, with a series of 66-ft. deck plate girders on the approaches. The girders on the approach spans were supported on stone masonry piers. Three of the piers supporting the truss spans were also of stone and were constructed over 40 years ago. These piers were in such bad condition that they had to be replaced. The other piers supporting the truss spans were of concrete and were constructed about six years ago.

Although the through truss spans were in good condition, they were constructed several years ago and were not designed for the present day heavy traffic. For this reason their renewal became necessary and they were replaced by 11 deck plate girder spans, two of which were 75 ft. long, six 78 ft. long, and three 103 ft. long. These various lengths of girders were necessary in order to utilize the existing concrete piers. Six new concrete piers were built between the old ones in addition to the stone piers rebuilt, requiring in all 1,700 yds. of concrete.

Instead of following the general practice of supporting the old bridge and erecting the new one on false work, a new plan was adopted, in order to eliminate the heavy cost of the



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Old Rock Island Bridge at Columbus Junction, Iowa.



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Lowering 103-ft. Girders Into Place With Steam Wrecking Cranes.



Copyright, J. G. Baker, Columbus Jct., Iowa.

Completed Bridge Over Iowa River.

false work and the danger of its being carried away or injured by floods. The use of false work would have required this work to be done at low water stage.

As many rivets as could safely be spared from the floor system of a truss were cut off in advance, and the top laterals and one portal were removed. Two heavy steel beams with steel pins from which block and tackle could be suspended were then placed on top of the trusses over the locations of the ends of the girders to be placed, as shown in the smaller photograph. Two sets of blocks were suspended from each beam. The girder span to be placed was riveted up and placed on two flat cars with half the track ties in position on it. When everything was in readiness a train, consisting of an engine, a flat car arranged so that the lines from each set of blocks could be attached, two cars loaded with the span to be placed, and a derrick car, was run on to the bridge. The cars holding the girders were spotted so that these girders were directly above their final location, and block and tackle were hooked on to each end of the girders. Lines from these blocks were attached to the flat car next to the engine, which had been moved ahead three or four car lengths. The engine then moved slowly forward lifting the span clear of the cars, which were then shoved out of the way. The girders were held suspended by the engine until the track and floor system of the old bridge were removed. All



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Lowering Girders Into Place by Block and Tackle.

the remaining rivets in the floor system were taken out. Two runner lines from the derrick car were then hitched to a floor beam and it was raised clear of the bottom chord of the trusses, when both the floor beam and stringers were quickly dropped into the river and recovered later. After the floor system was out of the way, the girder span was lowered into place by the engine, the rails laid on the ties and traffic resumed. The best time made in placing one of the shorter spans was 1 hour and 25 minutes from the time the track was blocked until traffic was resumed. Because of their great weight, the 103-ft. girders were placed by two wrecking cranes, as shown. The longest time required in placing one of these girders was three hours. In placing these 11 new spans and taking down the eight old ones, no train was delayed, although it was necessary to handle a traffic of from 10 to 15 trains during working hours.

When the girders which replaced the truss spans had been set the trusses were braced and supported from the new girders to provide for wind stresses until they could be taken down piece by piece by the derrick car. The practicability of this method, as compared with false work, is shown by the fact that three of the trusses were replaced during the highest flood stage of the river, at a time when false work would have been torn out by the ice and drift. The handling of this steel work was all done by company forces under the general direction of J. B. Berry, chief engineer, and I. L. Simmons, bridge engineer.

NEW SEATTLE TERMINALS; OREGON-WASHINGTON RAILROAD & NAVIGATION COMPANY.

The new yard and terminal facilities of the Oregon-Washington Railroad & Navigation Company at Seattle, Wash., are practically completed as far as they will be built at the present time, and most of them are now in regular service. They were made necessary by the inauguration of train service into Seattle by the Oregon-Washington Railroad & Navigation Company on January 1, 1910. The establishment of regular independent train service by the Harriman Lines between Seattle and Portland forms the closing chapter in the history of the efforts of this system to enter the Puget Sound territory, which had been previously occupied exclusively by the Hill Lines. This contest had reached the stage where the O. W. R. R. & N. had started the construction of its own line and had completed 3,000 ft. of tunnel in Tacoma when negotiations were consummated for the perpetual joint use of the Northern Pacific tracks from Portland to Tacoma and the temporary use of their tracks from Tacoma to Seattle. Since that time a new track has been built jointly by the O. W. R. R. & N. and the Chicago, Milwaukee & Puget Sound from Tacoma to Black River Junction, nine miles from Seattle, and a line was built independently by the Harriman line from Black River Junction to Seattle.

Because of this entrance into Seattle entirely new freight and passenger terminals were necessary. The arrangements for the joint use of the Northern Pacific tracks were not concluded until about December 21, 1909, and passenger service was inaugurated on January 1, 1910. This gave but ten days to make preparations to handle the engines and equipment. The land for terminal facilities had been secured before an entrance into the city had been decided on. A temporary terminal was hurriedly provided. A frame enginehouse, boilerhouse and sandhouse were erected and a small coach-cleaning yard was equipped. A temporary passenger station was erected on the site of the proposed permanent local freight station. When the first train entered these temporary facilities were ready and remained in operation until replaced by the permanent structures. In the two years since the inauguration of this service a complete terminal layout has been built and today modern passenger and freight stations and a freight yard, with engine house coal shute, storehouse and other buildings, have been completed. Six passenger trains and several freight trains now enter and leave Seattle daily over the O. W. R. R. & N.

The most prominent feature in the Seattle improvements is the new passenger station which was opened on May 20, 1911. This station faces north on Jackson street and is directly across Fourth avenue from the Northern Pacific-Great Northern station. The building is of concrete and steel construction, with brick curtain walls, and white artificial stone trimmings. It is three stories high above the street, while the track level is depressed 24 ft. below the street. The general waiting rooms are located on the first floor, while the second and third floors are devoted to offices. The C. M. & P. S. uses this station under arrangements made subsequent to its completion. Additional details of the station, together with plants showing the track layout, were given in the *Railway Age Gazette* of January 21, 1910.

By depressing the tracks, grade crossings at Seattle boulevard, just south of the station, and of Jackson street, just north of the station, were avoided. This depression required heavy concrete work, both in the viaducts carrying Seattle boulevard and Jackson street, and in a heavy retaining wall just east of the station, supporting the west side of Fifth avenue. The adoption of a special design for this wall allowed Fifth avenue to be widened without any loss in track room below. That portion of the roadway above the tracks is supported on a concrete floor, one side of which rests on the wall and the other on reinforced concrete posts, spaced 20 ft. center to center. The sidewalk is carried by cantilever construction, extending beyond the posts. This arrangement allows one track to be laid between the line of



Oregon-Washington Railroad & Navigation Company's Station, Seattle, Wash.



Main Waiting Room of the Station Before the Seats Were Placed in Position.



Retaining Wall at Fifth Avenue, Seattle.



Interior of the O. W. R. R. & N. Co.'s Engine House, Argo Yard, Seattle, Wash.

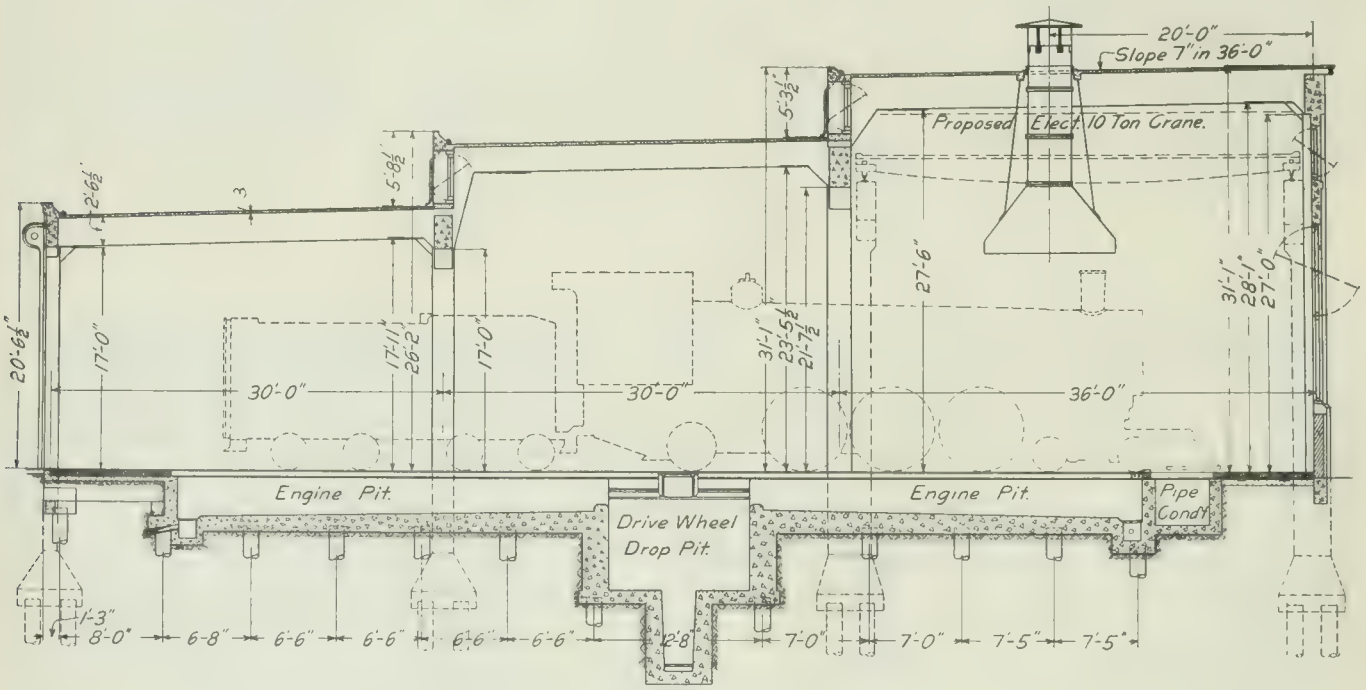
concrete posts and the wall. This wall is shown in the accompanying view, and the detailed plans were given in the *Railway Age Gazette* of December 16, 1910. A reinforced concrete bridge was also constructed by the railway on Fourth avenue, which parallels the station grounds on the west.

A three-track coach yard, with a capacity of 62 coaches, has been built just south of the station where coaches will be stored. It is planned to build four main tracks from the station across the tide flats to Argo yard, 3 miles south, but only two tracks are being bulit at the present time. They crossed these flats, which are submerged at high tide, on long wooden trestles which were filled in completely before service was inaugurated. The recent report of the Municipal Plans Commission of Seattle, published in the *Railway Age Gazette* of November 24, 1911, recommended that these tracks and the Argo yard be elevated above the level of proposed streets. This recommendation will be voted on soon by the citizens of Seattle.

A freight station has been constructed in the wholesale district between Railroad and First avenues at Dearborn street, which includes an inbound freight house, 800 ft. long x 50 ft. wide, and an outbound house 580 ft. long x 30 ft. wide. Only the north, 320 ft. of the inbound house, is constructed at the present time. Six tracks will be built between these houses with a 12-ft. platform, with an umbrella canopy between the middle tracks. Teamways are provided along Railroad and First avenues for the loading and unloading of freight. All platforms, both on the team and track sides at both houses, are protected by canopies covered with wire glass. All construction is of reinforced concrete. The floor consists of 6 ins. of concrete, with a one-inch asphalt wearing surface. Reinforced concrete fire walls are provided in both houses at intervals of about 150 ft.

The new terminal freight yard and facilities are located about 3 miles south of the passenger station in the suburb of Georgetown, recently annexed to Seattle. At this point a large tract of low, unimproved land was secured some time before the final arrangements were made for inaugurating service. This tract extends northwesterly, about 1¼ miles, from the Argo crossing with the Northern Pacific. Entrance to the yard was secured temporarily by a single track lead connecting with the O. W. R. R. & N. main line at this point, which lead is now being double-tracked on its permanent location. In designing this yard plans were made for a large terminal covering practically all of this area and providing for a considerable increase over present needs. Only a part of these tracks will now be built and others will be added as needed without necessitating any change in those tracks already laid. At the north end connection is made with a spur leading to industries along the Kitsap avenue docks and Harbor Island. The Argo crossing at the south end of the yard is the busiest railway crossing in Seattle, probably one of the busiest in the West, and plans are nearing completion for a modern interlocking system to be installed by the companies interested. Sixty-four first-class and 30 second-class train movements are scheduled across this crossing daily, in addition to extra freight and switching movements.

When finally completed the main yard will consist of a 10-track receiving yard, a 7-track departure yard, a 9-track additional receiving and departure yard and a 21-track storage yard. Two running tracks will extend around each side of the main yard and there will be one running track on each side of the departure yard. Two additional storage yards are planned north of the main yard. Of this layout the two running tracks on the north side and one on the south side of the yard, four tracks in the receiving yard and five in the departure yard, are now built.



Cross Section of the Argo, Seattle, Engine House; O. W. R. R. & N. Co.

The ladders are laid on a No. 7 angle and No. 7 frogs are used throughout the yard, except at connections with the main line, where No. 10 frogs are used. New 75-lb. rail is used, and all curves and leads are tieplated. Because of the crossings at the south end of the yards, all switching will be done at the north ladders.

The yard is a flat yard built on a fill, averaging 6 ft. About 400,000 yds. of filling material have been hauled in from Black River Junction, where cuts have been widened on the new line. This earth was handled by contract and was hauled about 6 miles over the main line. Most of the material was in place before regular train service was established, although some hauling continued after traffic was turned over to this line, the hauling trains then working only under the direction of the despatcher. The grading has been discontinued now as embankment has been provided sufficient for 10 additional tracks.

One of the special features of the yard is that, with the exception of the coal chute, all buildings are of reinforced concrete construction. A 10-stall enginehouse, with a locker room, storeroom and a boiler washing system occupying the space of another stall, has been built. The stalls are 96 ft.

long, and drop pits are provided under the three stalls at the west end. The floor is of creosoted wooden blocks. The building is well lighted and ventilated by windows in the sides and end, and lights are placed in the vertical portion of the roof. Vertical rolling lift doors are used at the inner circle entrance to the house. A 2-ft. gage track is laid in front of the stalls for use in transferring heavy materials from one part of the house to another. A temporary 12-in. brick wall placed at the west end of the house to be removed when the house is extended. The reinforcing bars in the concrete are allowed to project beyond this wall so as to form a future bond, as shown in one of the photographs.

The use of coal is somewhat of an innovation on the western Harriman Lines where oil has been used extensively, but was adopted here as a result of successful tests recently made with lignite by the O. W. R. R. & N. A. Holmen type coal chute, with a 2½-ton double lift counterbalanced bucket, was erected on concrete foundations. Two Robinson pneumatic cinder conveyors are installed.

A three-story storehouse, 40 ft. x 100 ft., and a yard office, are built of reinforced concrete. In the yard office individual lockers are provided for each switchman and the same provisions are made for other employees in the other buildings. Hot and cold water and electric lights are provided in all buildings, and there are independent sewerage facilities.

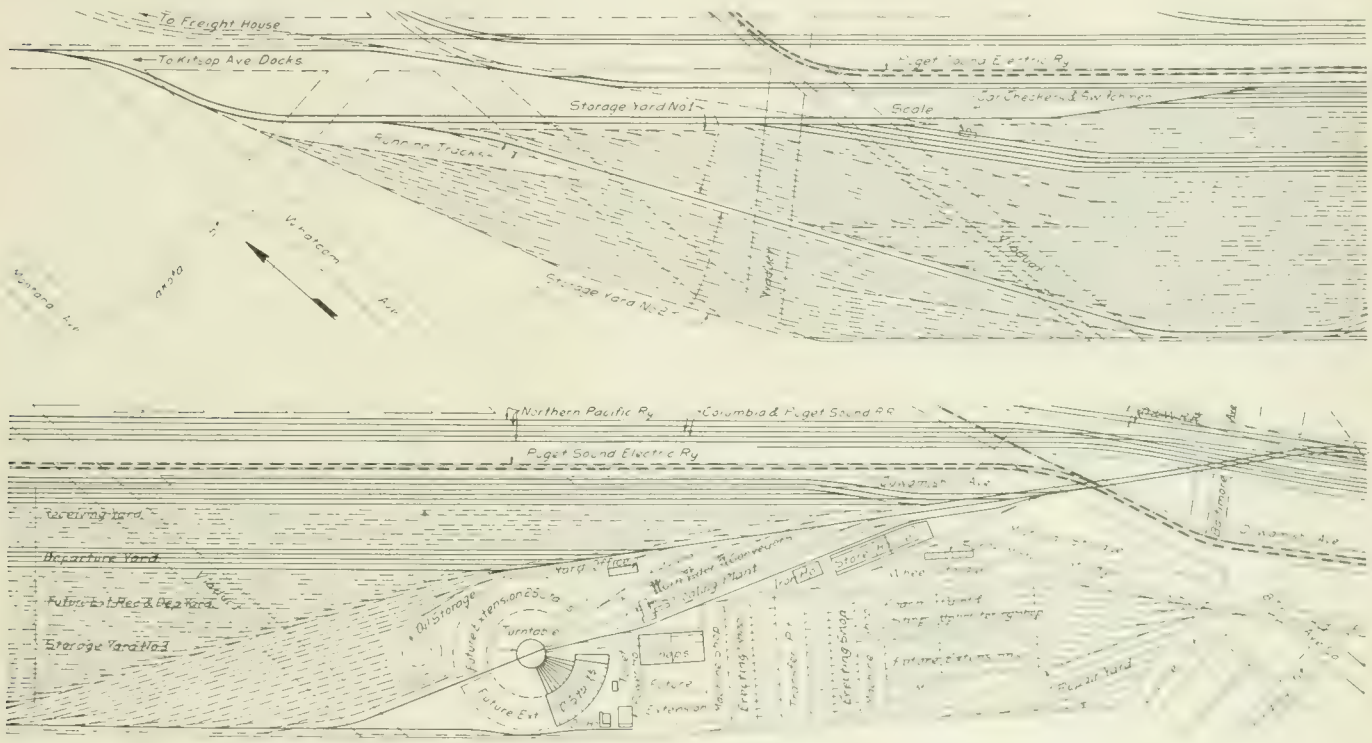
There is a 65,000-gal. steel tank, resting on a steel tower on concrete pedestals. An 80-ft. turntable is installed on a concrete base, and a 60-ft. 100-ton Fairbanks, Morse & Company automatic registering scale, on a concrete foundation, is provided near the north end of the yard. All streets crossing this yard are vacated, with the exception of First avenue, which crosses on a long timber viaduct. As the yards were made on a fill, piling was placed under all foundation walls.

Work still under construction, to complete the facilities to be provided at present, includes a concrete machine shop, 90 x 180 ft., a powerhouse with reinforced concrete chimney, electric wiring system, piping system and the completion of a sewer system.

All concrete work was done by contract. The company furnished the cement and reinforcing steel bars, and the contractor furnished all other material and labor. This work was done under the direction of John D. Isaacs, consulting engineer of the Harriman Lines; J. R. Holman, assistant general manager, O. W. R. R. & N., and C. C. Berkley, assistant engineer in direct charge of the work.

In laying track with a tracklaying machine on the Pecos & Northern Texas it was found that the oil dripping from freshly-treated ties soon resulted in the rails becoming slippery, making it difficult for the machine to grip them and frequently breaking the driving chain.

The Nashville, Chattanooga & St. Louis has adopted the practice of placing one switch-point, together with the necessary guard rail, ahead of the other point on sharp curves and finds that this arrangement effects quite a saving in the wear of the points.



Track Layout at the Argo, Seattle, Terminal of the O. W. R. R. & N. Co.

Tracks shown in full lines now laid. These shown by dotted lines will be added in the future.

A committee of the Canadian Society of Civil Engineers has recommended that experimental tests be made with ties 10½ ft. long, the reason for adopting this length being that it is believed the distance from the center of the rail to the end of the tie should be the same as from the rail to the center of the track. As the ties are now spaced as closely as practicable the only alternative to securing a greater bearing surface is to lengthen them.

The roadmaster on the Eastern Kansas division of the Santa Fe has devised an insulated end post which eliminates much of the common trouble with the fibre end posts cutting and mashing out in the tests made so far. A steel post ⅛ in. thick is cut from a rail of the same section and inserted with the fibre, forming a buffer for the rail. The side that is next to the fibre is dressed smooth and does not cut the fibre post. Four such joints are now in service experimentally on this division and are giving good satisfaction.

WOOD PRESERVERS' CONVENTION.

The eighth annual convention of the Wood Preservers' Association was held in the Hotel Sherman, Chicago, January 16-18. The opening meeting on Tuesday morning was called to order at 10:30 by President John T. Logan. The officers of the association for the year just closed are as follows: President, John T. Logan, president National Lumber & Creosoting Company, Texarkana, Ark.; first vice-president, Andrew Gibson, superintendent T. P. & T. T. plants Northern Pacific, St. Paul, Minn.; second vice-president, R. J. Calder, secretary and treasurer International Creosoting & Constructing Company, Galveston, Tex.; third vice-president, D. Burkhalter, superintendent creosoting plant, Buffalo, Rochester & Pittsburgh, Bradford, Pa.; secretary and treasurer, F. J. Angier, superintendent timber preservation, Baltimore & Ohio, Baltimore, Md.

In his opening address President Logan commented on the growth of the association both in membership and prestige and emphasized the necessity of meeting the problems in connection with the growth and development of the industry by methods in keeping with present-day industrial practices. A committee presented a resolution expressing sympathy for the family of C. D. Chanute, one of the active members of the association who died during the past year, the resolution being unanimously adopted. W. F. Goltra presented a fitting tribute to Mr. Chanute and his father, Octave Chanute, who died about one year earlier.

The report of the secretary-treasurer showed the association to be in excellent condition financially and to have made a remarkable growth in membership during the year. The balance on hand in the treasury is $529.89. The increase in membership for the year is 46, making a total membership at present of 104.

A paper on Creosoted Wood Paving Blocks was read by A. E. Larkin, general superintendent Republic Creosoting Company, in which the following points in connection with the production of wood block pavements were brought out. The wide variation in the qualities of different species of wood have made it necessary to limit very closely the rules under which paving blocks can be successfully produced. This production involves the cutting of the timber, storing, seasoning, shipping, sawing of the planks, treatment, etc., in each of which there is opportunity for faulty methods to injure the value of the final product. The problem of securing efficient and equitable inspection of blocks is a matter that it is difficult to agree upon between producers and purchasers. A final inspection before laying in the street is recommended as sufficient. The use of original specifications rather than standard specifications is not considered advisable.

A paper on Wood Block Pavement from a Construction Standpoint was read by Day I. Okes, of the Kettle River Company. The most essential factor in the life of creosoted block pavements is the foundation. This foundation should have a smooth surface and should be covered by a cushion never exceeding one inch in thickness and used only to obtain a smooth wearing surface for the blocks. Sand is usually specified for this cushion, although in cases where the pavement is subject to vibration a mortar cushion is preferable. It is usually conceded that block pavements wear best when the blocks are placed at an angle of 45 to 67½ degrees with the curb.

A paper on Preservation of Power Transmission Poles by W. R. Wheaton, timber engineer, San Joaquin Light & Power Company, discussed the results of a series of tests made under the direction of the author on about 600 poles treated by various methods and compared with untreated poles under similar conditions, recommending a first class treatment of the butts of such poles.

A paper on Economic Materials for Boat and Barge Construction by A. E. Hageboeck, inspector in charge of creosoting operations, U. S. Engineer office, Rock Island, Ill., discussed the kinds of timber used for barge construction and the life to be secured from various kinds of material. A table of comparative costs showed that while the first cost of creosoted fir is somewhat higher than that for untreated timber, the annual cost per barge shows a considerable saving in favor of this material.

THE PRODUCTION OF THE WOODEN CROSS TIE.

A. R. Joyce read a paper on this subject of which the following is an abstract:

Statistics prepared by the Forestry Service of the United States show that of the 125,000,000 cross ties bought by the railways last year almost 80 per cent. were hewed ties. The sawed tie, while occasionally produced by mills built particularly for this purpose, is more generally a by-product of general lumber operations. The best board cuts are taken from the side of the logs, and the heart is boxed into ties and cut off to standard lengths. Small logs are also cut into ties when the value of the lumber they would make is not more than that of the ties the same stick would produce.

The greatest tie producing section in the United States is that portion of the country extending from Virginia to Missouri and Arkansas, south from the Ohio river to the Gulf of Mexico. In this territory the oak family predominates in the North and the pine family in the South. In addition to saw mill, logging and tie operations in this section, there are thousands of farmers producing millions of cross-ties annually. In seasons of the year when agricultural pursuits do not require attention they cut ties and logs, often putting in crews of men for the winter months. These men are paid by piece work, from 10 to 15 cents apiece for making a tie. An experienced cutter will make from 10 to 15 ties a day, and will produce a thousand ties in the four months from November to February.

From the point of making in the woods the ties are hauled by wagon to rail or water transportation; thus the tie producing territory is limited to strips of land lying on either side of railways or rivers, varying in width according to the condition of the wagon roads and the value of the tie at the point of sale. Ties are seldom hauled by wagon more than 25 miles, and this distance can be made only on good roads. The average haul probably eight to ten miles and the average load 12 to 15 ties.

The railway traversing timber lands buys ties for its own use along its right of way. Ties are piled in ranks or cribs a certain distance from the track convenient for loading and are inspected and branded by the railway tie inspector and spotted with paint before being loaded. The inspectors usually take up ties along the right of way once a month, or more often if the output warrants. In some territories tie dealers buy ties along the right of way, in which case their buyer counts, brands, spots and pays for the ties on the ground. When a sufficient quantity is purchased the tie company arranges for a special train and a railway inspector, and the ties are loaded out. Usually, however, tie companies buy ties only at sidings or stations, where cars can be spotted for loading.

Another method of handling ties is where the railway crosses or touches a stream. Ties are bought along the banks of streams at landings, the same as along railways at stations or sidings. Tie buyers make regular trips down stream in gasolene boats, stopping at all landings, getting out among the merchants, farmers, tie dealers, loggers and saw mills, urging or retarding the production of ties according to the requirements of their companies. They buy ties on the bank, paying cash, and inspecting, branding and spotting the ties with a certain color paint, which color the tie company records with the county recorder in the various countries through which the stream flows.

On navigable rivers the tie company contracts with a tow-boat company to barge the ties to the point of shipment by rail, where an incline track is laid into the water. The tow-boats take from three to six empty barges up stream and work down, rigging up chutes to the ties on the bank and loading the barges down as far as possible. Seven or eight thousand oak ties make a very good load for the average river barge, and such a tow of barges loaded in this way requires about seven feet of water to keep from grounding, so that towing on most rivers is possible only in certain seasons of the year. The barges are delivered at the loading point to a harbor boat, which spots them at the incline and does the work corresponding to that of a switch engine in a freight yard.

Inspectors for the railway inspect these ties as they are being transferred from barge to car, and the fact that they are working on a large number of ties results in a very economical inspection for the railway. Cull ties or rejects are yarded, as such a shipping point is very favorable for the sale of this material.

On streams that are not navigable ties are bought on the bank the same as on navigable water, but are held until conditions are favorble for rafting. They are then put into the water and made into rafts and floated down stream to a loading point. The usual method of loading from a raft to cars is by a tie hoist, which consists of a cradle lowered and raised on an incline track from the water to a loading platform. This kind of a tie hoist, operated by a gasoline engine, is efficient and can be installed at a reasonable cost. Where the bank of the stream is low the rafts are some times broken up and hauled out by horses, then loaded into cars by piece work or banked to be loaded into barges later. When the rafts are to be loaded into barges from the water a tie sweep is used, consisting of a stout pole used as a lever, with the fulcrum on the bank and the short end over the water. Chains grapple a section of raft which is lifted from the water, swung around over the barge and lowered into place.

Rafting is apt to be a hazardous proposition, as streams in rough or mountainous country often rise 40 to 50 ft. in 24 hours. It is practically impossible to hold rats under these conditions, so that many tie companies prefer to buy rafted ties only f. o. b. the tie hoist or bank after the rafting is completed. The element of danger from flood is also present in banking ties along navigable rivers, although not to such an extent as along head waters. The manager of river territory must be thoroughly conversant with all landings where his men are buying ties, as well as river conditions in general.

In managing railway territory, ties may be moved at any time of the year, the only hindrance being car shortages or strikes. But in river territory many landings are accessible for only one or two months in the year, so that in buying a large stock of ties under such conditions great care should be used in cleaning up such landings when conditions are favorable. Otherwise the stock must be carried over for another year. In fact, in operating any river territory all landings should be cleaned up at least once a year.

The cross tie being a staple commodity, the same as wheat, corn or cotton, country merchants buy ties, paying cash or giving merchandise credit in exchange. The merchant being on the job every day in the year has an advantage over a tie buyer, who is making that point only once or twice a month. This has led to the establishment of local yard men, paid either on a salary or commission basis. These men buy ties on the ground as they come off the wagons, inspect and pay cash for them. They in turn are checked up by the tie buyers. In many cases a local merchant acts as the company agent, and the tie company takes the inspection of the merchant, verifying his count and spotting the ties.

The tie business is strictly competitive, and while tie buyers could improve the grade of ties by having them cribbed before inspection, or, better still, by rolling them, this cannot always be done, especially when the demand for ties is sharp.

Ties are very seldom sold to a railway and shipped subject to inspection. The rule is for the railway company inspector to inspect all ties as they are loaded into cars from the ground. There are two exceptions to this, namely, when the ties are shipped into a concentrating point for transfer either by rail or water. If the ties are to be transferred to another car and shipped by rail, the railway company for whom the ties are destined, inspects at the point of transfer. If by boat on cargo shipments, this is also the case, but on river shipments by barge the ties are not inspected by the railway tie inspector until they reach their final loading point to be shipped by rail.

There are no standard specifications for treatment ties among railway companies. The red oak and pine families are, of course, the basis on which practically all treatment ties are figured, but specifications beyond this are apt to differ widely. Elm, beech, hackberry, hickory, maple, birch, gum and other woods are taken by some roads, either all or in part, and not by others. Many of these woods make splendid ties when cut in the winter months and properly handled before treating, but if they are left in the woods or on the bank, ranked indifferently, many of them become worthless in from three to nine months. This applies particularly to river business, where ties can be moved only when the stage of water is favorable. Treatment ties that are properly cribbed for seasoning not only remain marketable, but the extra cost of cribbing is more than made up by the difference in freight.

At the present time along the banks of the Ohio river and tributaries are thousands of treatment ties that are absolutely worthless except as fuel wood, because they have been held too long under conditions favorable to the development of rot.

One railway company in getting out specifications for treatment ties this year, has limited its specifications to the red oak family exclusively because last year some 90,000 ties were split into fuel wood at the treatment plant on account of rot. A large number of these ties were beech. Although beech takes a splendid treatment and makes a serviceable tie, it would be a hard matter to get it into these specifications in the face of their recent experience.

It would be a splendid proposition if the railway companies and commercial treating plants would get together and put their experience in the handling and treating of ties in a common kettle and let it boil down to a standard set of specifications. Such a proceeding would not only insure a better tie for the railways, saving many of them a considerable item in dollars and cents, but would materially improve conditions among tie companies in the operation of their business.

DISCUSSION.

W. F. Goltra: Many roads are rejecting ties on account of rotting; this can be prevented. Some ties deteriorate more rapidly than others, due to the saps and juices fermenting and causing decomposition. The way to remedy this is to steam as soon as possible. If many ties which deteriorate rapidly are eliminated on that account the supply is decreased and the cost increased.

E. A. Sterling (Pennsylvania): Ordinary hewed ties are sold for but little over the cost of production. Sawed ties are put on the board-foot basis, making a heavy increase in price. Certain kinds of ties deteriorate rapidly in some localities and not in others. I do not see how any steaming or hot air blast seasoning can be applied to trees in the woods. In West Virginia it is often months before the ties reach the river and are rafted and delivered. Fermentation is not the fundamental cause of the decay of wood. It is the result of a fungus growth in which moisture assists.

D. Burkhalter (B. R. & P.): Beech can be seasoned for a long time in the North without deterioration.

J. B. Card: There is little decay if the ties are properly piled in seasoning. Piling is very important if the ties are to be held over a year.

A. R. Joyce: The ninety thousand ties referred to were piled solid along the railway tracks until loaded and were properly cared for after arrival at the treating plants.

J. H. Waterman (C. B. & Q.): Ties cut in winter will not deteriorate as rapidly as those cut in the spring and summer. Beech ties cut in the spring and piled tight, exposed to air, sun and rain, become worthless in six weeks. Beech cut in the winter and piled open will make good ties.

Mr. Goltra: There are two kinds of rot, dry rot and wet rot. Dry rot occurs on the inside due to fermentation. Decay starts very soon after manufacture.

Walter Buehler (Kettle River Co.): I do not believe there are two kinds of rot. We should know what rot is.

H. F. Weiss (Forest Products Laboratory): What rot is, is not definitely settled at the present time. Rot in the interior of wood has some external cause. It must originate from the exterior. There may be some deterioration due to fermentation,

but it is not serious. The fundamental cause is fungi, which are of many varieties. Some live on substances contained in wood cells. Tests show that the strength of wood sap stained by fungi is not affected. The most injurious effect is caused by wood destroying fungi. There is no such thing as dry rot. Some fungi are capable of living with a small amount of water; they are commonly called dry. This fungus has the ability to destroy wood fiber. The interior decay of a growing tree may be due to injury in young tree not noticeable later.

Mr. Card: Why do trackmen say black and red oak rots from the inside out?

Mr. Weiss: It may be due to the outer fibers being so dry that fungi cannot live.

Mr. Case. Hardened ties are very liable to interior decay.

L. B. Moses: I have found variations of 20 per cent. in rot in the same yard with the same kind of ties piled differently.

CUTTING AND SEASONING TIMBER.

A paper on this subject was read by A. Meyer, supervisor C. B. & Q. tie plant, Galesburg, Ill., of which the following is an abstract:

Owing to the scarcity of timber it has been found necessary to use inferior species of wood which heretofore have been considered as of little or no value for railway ties. Among those woods are the hard and soft maples, gum, sycamore, birch and beech. None of the above have, up to the present date, given very satisfactory results on account of their tendency to decay rapidly during the seasoning period, and only when a successful seasoning has been obtained are any of the above kinds of wood worth treating. There is no doubt that hard maple, and more especially beech, which possesses a great spike-holding power, will make very good ties when thoroughly seasoned and treated.

When beech ties are cut in the winter and are properly taken care of and are seasoned at least from six months to one year, a very good treatment can be obtained. If, however, the beech ties are made from timber cut in the spring or summer and piled up to season it is nearly impossible to keep the wood from decaying and splitting. The writer has seen beech ties which, when received at the treating plant, have been covered with fungi, and therefore absolutely worthless for treatment, although it was claimed by the shippers that these ties were cut during the months of February and March, when no sap was expected to be in the wood. An examination of some of these ties showed that the wood contained a considerable amount of sap.

In regard to the physical strength of wood cut in the different months, very interesting tests were made by the Economical Society, Westfalen, Germany, giving the following results: Beech timber cut in December and January gave an average mechanical life of six years, whereas the same kind of timber cut in the same location in February and March gave a service of only two years.

Four spruce trees, which were growing very close together in the same kind of soil, of the same age, and apparently alike, were cut one in each of the months of December, January, February and March. It was found that the wood in the tree cut in January possessed only 88 per cent. of the strength of the wood cut in December, the wood in the tree cut in February 80 per cent., and the wood in the tree cut in March 62 per cent.

DISCUSSION.

William A. Fisher (A. C. L.): Tests made on fresh cut heart pine ties, seasoned till the standard weight is obtained, requiring four months, showed the following results: Average sap wood, 12 to 15 per cent. Weight per cubic foot at start 49.5 lbs. Weight per cubic foot at end 45.12 lbs. Loss per cubic foot 4.38 lbs., or 8.86 per cent.

F. D. Beal: I have treated shasta sap pine, 50 to 75 per cent., with .246 lbs. zinc chloride per cubic foot, by the seasoned steam and vacuum process. It was cut in May and June, and was not piled before or after the treatment, and was placed in the track within a few months after cutting; it lasted only three years. I believe if the same ties were cut in December or January and properly air seasoned before and after treatment their life would have been increased to ten years. The necessity of seasoning is not so great in heart timber. Douglas fir with the same treatment and the same seasoning, lasted eight to nine years; the rain-fall in the territory where the sap ties were laid was five or six inches per year. Heart ties lasted 20 years.

F. S. Pooler (C. M. & St. P.): It is not possible for a railway to compel a tie company to cut its timber in any one month, and it is also difficult for an inspector to detect the month in which the timber was cut. I believe it advisable for the company to mark each pile with the month of cutting.

Mr. Logan: In the southern country we have no difficulty in determining the time of cutting, but are unable to control the time for cutting because of labor conditions. One cannot get tie makers for a few months only.

G. W. Signor: It takes about a year to organize a crew. We handle about 3,000,000 ties a year, requiring a big organization. Smaller companies have the same problem. No tie maker will accept work for three months.

THE SCIENTIFIC MANAGEMENT OF TIMBER PRESERVING PLANTS.

D. Burkhalter, superintendent B. R. & P. wood preserving plant, presented a paper on this subject, of which the following is an abstract:

The best available labor for use in a timber preserving plant is a negro in the South, old-Mexico Mexican in the west, a Swede in the north, an Austrian in the east. On the Pacific coast, the Jap hardly reaches the size of a one-man tie carrier, even with a 130-lb. tie. Among them all, perhaps, the Jap absents himself from work least often and the negro the oftenest. The lowering of economic efficiency among the Latin races through too frequent holidays is well known. Such a difficulty seriously affects the operating organization. The carrying of an increased force at slightly higher rates is the usual result, the tendency to aggravation of the disorder by larger earnings in a day being counteracted by the lesser amount of work supplied each man on a piece-work basis. It is often possible to escape this dilemma by the establishment of a "side-issue" in the shape of a floating crew in a lumber yard or other material yard to take the overflow. It may happen that over-head charges, and depreciation, etc., are high enough to point towards a reduction in net cost per tie through the payment of wages high enough to ensure maximum output.

When more than one man is required to handle each piece, complications not heretofore mentioned become prominent. The diameter of the retort; the stamping of the ties; the kind of road-car; the height of the tie-pile; the number of piles in a row or tier, all affect the determination of the most efficient working unit or gang of men. A two-man crew will handle ties weighing 170 lbs., and a three-man crew 270 lbs. In putting ties on trams direct from road-cars, the distance from tram-track to road-car is to be considered, and also the design of tram-car arm. In a two-man crew, with one man inside the car and the other out, with ties weighing 175 lbs., there is the least waste of time or effort if the ties be shoved or hauled, with some support in the doorway or on side of car. This assumption that these conditions call for a two-man instead of a three-man crew, is borne out by the earnings per man being greater in the first case than in the second. Machinery may often be introduced at this juncture to reduce, or even do away with, the necessity, and corresponding expense of the effort. The loading of treated ties into open cars homeward bound is usually accomplished with a derrick, a tram-load at a time.

A heavy and irregular tie cannot be so accurately placed on a tram-car by one man as by two. But too much time wasted in getting the very last tie on the tram results in the same kind of a loss as overloading a locomotive on the road, i. e., the tonnage doesn't get moved. When one man of a three-man crew smashes a finger and gets shopped for repairs, the other two can continue working. The output per unit of space on the loading platform

is increased with every increase in the size of the crew. This reduces the time of making up trains, and affects favorably both switching movements and the supply of trams. A three-man crew works advantageously in unloading box cars into storage. In practice one man can throw out a tie which it takes two to carry away. And where piles are three tiers deep, i. e., track centers 72 ft. for an 8-ft. tie, ties may be so heavy or piles so high as to require all three men in carrying. With the usual remote location of tie-plant, and with heavy ties, the extra effort required to maintain the third tier will capitalize in terms of considerable trackage. Regarding the kind of road-car, it may be said that unloading a car with high sides is likely to require two men in the car, unless it be a ballast car which can be opened underneath; and if the tie be 8½ ft. long, the loading of coal cars by hand with such ties needs an additional man in the car to place the ties lengthwise.

There are two more questions of yard layout that vitally affect any scheme of operation. One is an arrangement that will supply empty trams for reloading as fast as they are released, whenever the number of trams is limited; when the speed of working the crew is low; when the area to be worked is limited; or when the approach of darkness is imminent. It is hardly necessary to remark that often all of these difficulties arise simultaneously. The other point is the use of a parallel track instead of a third rail in lumber yards where cars may be expected to come in with forty sizes of lumber on each load to distribute along a 1,000-ft. frontage of different dimensions. Really busy tracks of that character would require a narrow gage track on each side.

The use of the large diameter retorts makes the cost of construction lower, and the output is affected advantageously in the same way that "heavy power" affects transportation on a railway. Everything else must be adjusted to correspond. The laborer works at a disadvantage proportional to the weight of the tie. The heat coils work at a disadvantage proportional to the reliance of the process on various thermodynamic effects; to the lack of absolute dryness of the timber; to the necessity for reduction of viscosity of preservative by heating, and to the lack of uniformity of absorptive capacity throughout the charge.

It should be said at this point that efficiency is increased by any betterment in the grade of labor. The payment of a bonus wage is an effort to effect such an improvement. Taking ties weighing 150 lbs., for example, and with a two-man crew, pay $2.10 for the first 300 ties; 40 cts. for the next 50; 45 cts., for the next 50, and a cent a tie thereafter. This amounts to $2.95 for 400 ties, or about 74 cts, a hundred; and 800 ties come to $6.95, or about 87 cts. a hundred. With the low point adjusted so that the normal supply of poor labor cannot make their prevailing rate by a considerable amount, the able-bodied but lazy specimens among them will take occasional chances, the fair article will earn with some exertion a fair return, and the very rare expert a handsome stipend, which has its advertising value, and may equal seven times the wage of the worst.

The gradual accumulation of skilled workers in fine condition brings flexibility of operation corresponding to a lowering of the load on the management in the way of demand for nicety of execution of plans and general manoeuvres. Such a grade of men is likely to be more contented also. They will work at top speed for about seven hours only. By increasing slightly the number of workers, the resultant lowering of their wage promotes the availability of a sufficient number at irregular hours, and the capacity for making a rush in the morning or at the close of the day. In some climates the men are often more efficient at night, so that a lower rate can be paid to net them the same earnings per month.

In building a new plant, the proper time to begin to build the office is when the ground is broken for the plant. Complaint may be made that the use of the building and furniture by construction forces would have unhappy results. Some regulations would, of course, have to be enforced. But construction is often hampered by lack of office facilities, and the advantage to the operator of systematic and permanent recording of every detail of construction is enormous. Too often a legacy of chaos is bestowed on the newly arrived operator. The timber may have been arriving for some time, in spite of the fact that improper location in the yard is pretty certain to result in constitutional weakness in operating efficiency that it may take years to eradicate. Catalogue numbers of fittings in the engine room are not known, and there are no spare fittings. If the plant is owned by a railway, their standard stock sizes have not been considered in construction, so that subsequent maintenance will have to look towards the gradual adoption of those standards. Gland packing and gaskets have usually got to be measured while things wait in idleness; and the breaking-in of the engineers and firemen is accompanied by a necessity for fertility of invention and a strain of one's presence of mind.

The quicker things get going the sooner dividends arrive. If, in the meantime, a clerk has learned the names of employees, and the stationery for a loose-leaf accounting system is on the shelves, control will come the sooner. For the control is in the office, and first-class recording and modern filing is the mother of it.

The treatment of timber is more uniform, if uniformity be considered a desideratum, in a retort holding only one carload than in a retort of twice the size. Compared with a large plant, the opportunity for closer control of treatment is an offset to high "overhead charges." The tax on timber supply and transportation facilities is more readily borne.

For effective control, nothing is better than a schedule to cover the next 48 hours, put out every day at about the same hour. Dictate to a stenographer the program of the runs to be made, showing the serial numbers for 48 hours, with the hour and minute due in and out of the retorts, the contents of each retort, and length of train. Write the engineers of any special features to be expected, and send carbon of both memorandums to both loading and unloading foremen. File copies in the office, and require interested parties to advise promptly if they see that predicted events are going to be unfulfilled, or early, or late. Furnish billing clerks with copies of instructions to loading foremen and switchmen, and in general make advices "join" to the extent that co-operation and co-ordination are assured. This interchange of notes is promoted by the use of compartment boxes in the office, with an extra desk for the use of all comers, and the requirement that periodical visitations, probably through the aid of water-boys, be made to it. When the time of treatment varies from three to thirty hours, there is room for much planning. The long pull should arrive at night, and the briefest events take place in the daytime, at the most favorable hour, and nearest the retorts. It is possible to make five trips in 24 hours with three sets of tram cars, and carry the load on a tie organization fairly steady. If it be admitted that the greatest irregularity in time of treatment indicates the greatest success in classifying material for treatment, conversely, by assuming that uniformity in time is a marked aid in all directions to ease off operation, there should be great room for the exercise of skill in putting together trains of refractory and easy stuff in a way to accomplish the purpose.

EFFICIENCY IN PLANT OPERATION.

A paper on this subject was presented by E. A. Sterling, Forester, Pennsylvania Railroad, of which the following is an abstract:

Modern business management demands a reduction in operating expenses in order to keep net profits from falling off on account of keener competition and the higher cost of labor and material. To meet this need, a comparatively new business system, known as scientific management, is being evolved and put into practice in many industries. As to how far the principle of scientific management can be applied to wood-preserving plants, further developments alone will disclose. It is certain that there are ample opportunities for increased efficiency at many plants. On the other hand, there is less opportunity to decrease operating

costs than in manufacturing plants, where labor constitutes a larger percentage of the cost of the product. At a creosoting plant which treats ties with, say 10 pounds of oil per cu. ft., at a cost of 35 cents, approximately 80 per cent. of the cost will be represented by the creosote, 5 per cent. by overhead charges, and 15 per cent. by labor; while in many purely manufacturing establishments labor may constitute more than 50 per cent. of the total cost. Obviously, the possibilities for cutting costs are not as great where labor represents 15 per cent. or 20 per cent. as where it amounts to 50 per cent. or more. Assuming that labor charges are practically the same, regardless of the process, it follows that the percentage value of the preservative used is less with the cheaper treatments using mixtures, mineral salts, or empty-cell injections, and the possible saving by increased efficiency becomes a higher percentage of the charge per tie. Moreover, the saving is not necessarily confined to labor, although this is the most fertile field, but should include economy of fuel, tools, preservatives and miscellaneous material.

In the application of a system which will insure greater efficiency in operation, the local conditions at each individual plant play a large part, and the man in charge must work out most of the problems for himself. There are, however, several fundamental conditions common to all plants which may form the basis for cost reductions all along the line.

In the yard there is the question of general arrangement as related to economic unloading and proper seasoning. The piling system should give maximum rapidity of seasoning, and the arrangement should be such that the unloading can be done without carrying the ties too far or too high. The chances are that most unloading gangs taught themselves and are paid on a day or piece-work basis for what they think is a fair day's work. Efficiency engineers would assert that the various motions necessary to pick up ties and carry them to the piles should be systematized, and that each man should be carefully instructed by a superior in intellect as well as rank as to just what moves to make, how to make them, when to rest, etc. This seems ridiculous at first thought, but the fact remains that wonderful showings in efficiency have been made by such detailed methods. In some cases carefully thought out mechanical devices may be the means of reducing costs in tie handling. What would apply to unloading and piling ties would hold in loading cylinder cars and on the shipping platform.

In changing charges and in the mechanical operations during treatment, little manual labor is involved, and efficiency becomes a matter of saving time, fuel and preservatives. In the one operation of opening and closing the cylinder door, much time can be saved, and it is common knowledge that men properly directed will do the work much quicker and easier than by their own method. In the engine house the speed of the pumps is an important factor, and their proper regulation will have a marked influence on steam consumption, time and character of treatment, and cost of maintenance. The firing of the boilers, the operation of the valves, and the many other every-day operations will bear close study with the view of steam economy, better penetration and saving of time.

Proper plant equipment is essential to efficient operation; while facilities for prompt and careful repairs of tools and machinery will reduce maintenance charges. Large pipes for filling and emptying the cylinder, ample steam capacity of the boilers, and oversized rather than small pumps will increase the output and reduce costs. Cylinder cars are an important part of the equipment, yet, at many plants, small, hard-running cars without coupling attachments are still used. It is economy to scrap worn-out or antiquated equipment and replace it with new.

DISCUSSION.

Mr. Sterling: Conditions at different plants vary so greatly that no one is able to say what should be done at any particular plant. Each superintendent must apply fundamental efficiency principles in his own plant to suit his own needs.

A. Gibson (N. P.): Plants which use the same kind of treatment for long periods can do much better than others, having to change their kind of treatment frequently. A very important factor in efficiency is securing proper co-operation of the employees for the benefit of the company rather than for the individual department. Piece work should be applied wherever possible, as employees know increased efforts mean increased earnings.

Mr. Waterman: The efficiency of a plant is measured by the percentage of time the retorts are busy. The first place to look for efficiency is in the speedy charging of the retorts. The most efficient work in the yard is secured by piece work. I would have good shower baths at the plant where men handling treated ties can take baths throughout the year. Take care of the men and you will secure co-operation and efficiency.

Mr. Angier: I have mimeographed delay reports showing the retort number, the delay and the cause. I figure that each retort should be busy 24 hours. If a retort is delayed two hours, the report shows the cause. At the end of the month we tabulate the hours of delay and the different causes, and then endeavor to apply the remedy. The first report showed several hundred hours delay on account of lack of tram cars. This report persuaded the management to purchase more cars. Allow 20 minutes for changing the retorts. All over 20 minutes should be called delay.

Mr. Sterling: I do not see the way clear yet to issue instruction cards for the operation of a treating plant 48 hours in advance, because of the many uncertainties of operation, however, much could be secured by working toward this end.

On Wednesday morning a paper was read by S. R. Church, chemist, Barrett Manufacturing Company, giving a summary of the various specifications and outlining the difficulty of complying with the American Railway Engineering Association's specifications. This paper will be published in a later issue. A paper was also read on Wednesday morning by P. E. Fredenoll, chemist, Atchison, Topeka & Santa Fe, on the Evaporation of Creosote, in which evaporation tests of ties in yards and oils in open pans, showing the relative evaporation of different grades of oils, were outlined. This paper will be published in a later issue. B. H. M. Rollings also read a paper on the Comparison of Expansive Properties of Creosoted Wooden Blocks, giving results of preliminary tests on this subject.

The paper by H. F. Weiss, Forest Products Laboratory, illustrated with stereoptican views, discussed the structure of commercial woods. In considering the treatment with preservatives, woods can be classified under three heads, ring porous, uniformly porous, and non-porous. The treatment of woods in the first class, such as read oak fills large pores in spring wood and does not penetrate to the interior. In the second class such as beech, oil may penetrate uniformly or in streaks. In the third class such as conifers, including pines, hemlock, cedars, spruce and fir, which are uniform in structure and dry rapidly, the treatment varies.

Resin ducts in non-porous woods may facilitate treatment as in southern pine. Some porous woods, such as white oak, have partitions across the cells making the treatment difficult but increasing the durability on account of the difficulty of fungus gaining entrance. Air seasoned timber contains about 69 per cent. of air. Tests show that this air does not leave the wood on treatment. It is not compressed in the middle of the stick. It may be compressed in each cell or in the pockets throughout the stick.

Tests show that if vacuum is applied before treatment, removing some air, the oil injected stays in the wood better. A large percentage of sap wood in ties is usually considered preferable. If sap wood surrounds the heart, the treatment covers the wearing faces of ties to a good depth.

In hewed pole ties there is a thick layer of sap wood on all sides of the heart and the wood is exposed on both faces. It takes high absorption in treatment, but is not benefitted much, for very little penetration is secured on the wearing faces.

In sawed ties little sap wood is left on the sides. The treatment is light but effective for the penetration is deeper and more uni-

form on the face. If the railways would allow sawed ties, the additional cost of three or four cents each for production would be more than saved by the decreased absorption in the treatment and the increased effectiveness of such treatment.

Use of sawed ties would also help conserve the timber resources of the country. Ties should be carefully peeled before seasoning, for the bark is waterproof and causes uneven drying, making uneven penetration in the treatment.

Tests to determine the relative penetration in different directions within the sticks, show for woods having resin ducts-like pines, for 1 in. tangentially, 30 in. radially and 50 in. longitudinally; for woods like hemlock, 1 in. tangentially, 1 in. radially and 80 in. to 100 in. longitudinally.

CREOSOTES AND CREOSOTING OILS.

David Allerton presented a paper on this subject of which the following is an abstract:

Creosote seems to have been originally adopted in England as the synonym for dead oil of coal tar, and the product was first called dead oil because its specific gravity was greater than water. When it was found necessary to define creosote by a certain specification, not much being known about it at the time, except that it contained tar acids and naphthaline, a specified amount of these constituents was required as well as a specific gravity greater than water. Afterwards, as more chemical work was done in coal tar derivities, a process of analysis by fractional distillation was devised, the original object being to determine that the creosote had been obtained from crude bituminous coal tar. Also a specific gravity greater than water, at least 1.02 and upward was required, this fractionation was so graded as to eliminate the very light oils and water and leave only an inconsiderable residue at the end of the process. At first the distillation was not usually carried above 310 or 315 deg. F., but afterward as high as 354 deg., when only a very small amount was allowed to remain in the retort. The method of distillation was also standardized, and that method still obtains, the oil complying with certain requirements in a general way. There seems to be no doubt that all pure tar creosotes are good wood preservatives, even if they vary to some extent. It is evident that the less the viscosity of a liquid, either an oil or an aqueous solution, the easier it is forced into wood fiber, and that in treating refractory wood it is desirable to have a preservative of a very low viscosity. It is impossible to get an exactly even penetration in any charge of timber or ties, and the greater the viscosity the greater the variance.

In quite recent years so-called standard specifications have been adopted by different associations defining the properties of creosote to be used in the treatment of ties and timber, as well as paving blocks. These specifications, usually require very high specific gravity and distillation points calling for an addition of coal tar or pitch (it seems to be known by both terms), but viscosity is lost sight of, although but a limited amount of insoluble matter or carbon is permitted, it being assumed that no matter how thick and heavy the liquid is it can be made to penetrate wood if it contains no insoluble matter. This is fallacious. At first it was not definitely stated what the creosote was to contain, the required analysis only being given and allowing a large, and, in the paving mixture, a very large residue above 354 deg., merely stipulating that this residue should be soft. With American creosote it is always hard, but that does not seem to matter. These mixtures are not what was originally meant by the term creosote, and I think that they should have been defined as to what they should contain besides the dead oil. The inventors of these heavy mixtures considered them a great improvement on the lighter preservatives, and they were governed by purely altruistic motives.

The cause for the excessive oozing of the oil, commonly called bleeding, from paving blocks can be traced very simply to the use of such oils, as when they are treated with creosote this bleeding is very slight and increases with the weight of the oil.

Using crude coke oven tar as a basis, which contains somewhere about 30 per cent. of creosote, this material contains all the preservative necessary, as 30 or 40 per cent. of creosote is amply sufficient in any preservative mixture where a neutral body is used.

Coal tar is inert matter as regards preservative qualities and is used in creosoting for precisely the same purpose as barytes are used in paints, its fault being, as I have before stated, its high viscosity; but at present there seems to be no substitute on the market, and there is in some quarters a return to creosote as formerly used by those who have tried the heavy mixture. However, the combined creosote and tar will undoubtedly still be used, and the purpose of this paper is to suggest a correct appelation of the various creosoting mixtures and creosotes.

I propose the dead oil of coal tar be designated as creosote; other creosotes, such as wood creosotes, oil tar creosote, etc., be so designated, and the mixture of creosote with coke oven tar, filtered tar, oil tar, etc., be designated creosoting oils, and the specifications for such oils to call for the per cent. of creosote contained and the per cent. and kind of matter added.

There was no discussion.

CREOSOTE SPECIFICATIONS AND ANALYSIS.

Hermann von Schrenk's paper on this subject, of which the following is an abstract, was read by the secretary:

Creosote should fulfill two, and possibly three, requirements. First, it should be antiseptic, i. e., prevent the growth of wood-destroying organisms; second, it should be of such composition that it will remain in the wood as long as possible, i. e., it must not evaporate. To these a third claim or requirement has recently been added, particularly in connection with the wood-paving industry, that it must act more or less as a waterproofing material.

While creosote, more properly called coal tar creosote, is called a substance or compound, it cannot be considered as a definite compound. It is simply a fraction or distillate obtained from coal tar, composed of a large number of chemical compounds or substances, which are more or less loosely united. These substances probably do not exist as such in the combination called creosote, but can be isolated either by applying heat or subjecting the creosote to chemical decomposition. When speaking of creosote, therefore, one must remember that it differs in this respect from zinc chloride, copper sulphate, lime or any of the other substances used in wood preservation.

The first requirement of creosote is that it must be antiseptic. It was found many years ago that ordinary coal tar prevented decay, and later on that its derivative did the same. The question early arose as to what parts of the creosote were most effective in preventing decay. Practically all students of creosote oil agree that both the tar acids and naphthalene are good antiseptics. No two investigators have been able to agree, however, as to the relative values of certain percentages of either of these compounds in a creosote oil. It seems to make very little difference whether the tar acids compose 3 per cent. or 10 per cent. of the oil, and the same is true of the naphthalenes. I have no hesitation in saying that probably all parts of creosote oil are sufficiently antiseptic to prevent decay, i. e., for practical purposes. Pieces of wood treated with naphthalene, low boiling tar acids, high boiling tar acids, coal tar, etc., have been in our rotting pit for years, and where the preservative injected is still present in large quantities, the wood is sound. The minute the preservative disappears, decay sets in. This is particularly instructive in the case of naphthalene. The pieces were injected with all the naphthalene they would hold. For three years they remained solid. Now much of the naphthalene has disappeared and the pieces show it. A good many results have also been obtained from pieces of creosoted wood of different ages and exposures. All of these pieces were sound. In the oldest pieces only the highest boiling compounds were present, and these pieces are sound; in others, where much naphthalene was originally used, and where it was prevented from escaping, as in piles under water, the wood is sound.

The second requirement of creosote is that it must be more or less permanent. Investigations of recent years have shown that all creosote oils after injection into wood change in composition. These changes are due largely to the fact that some of the compounds evaporate. The extent of such evaporation will depend on the original composition of the oil injected, its distribution in the wood, the climatic conditions under which the wood is exposed, and the position of the exposure, i. e., under water, above ground, below the soil, exposure to sun, rain, etc. In a paper published several years ago my associates and myself showed by comparative tests of the same oils exposed in open pans and injected into wood, that the lower boiling fractions of the creosote evaporate with the greatest rapidity, and as the fractions increase in specific gravity, and as their boiling points rise, the rate of evaporation decreases, reaching an approximate permanence in the pitch. We furthermore were able to demonstrate that the results obtained in these experiments were borne out by the changes in creosote injected into poles. Since our first publication these tests have been repeated, particularly abroad. In Germany the same results have lead the users of creosote to demand heavier oils. The same is true in other European countries. An investigation was reported last year by the British Post Office Department, a part of which may be referred to here: It was found in one pole "that the creosote at the top of the pole was only one-seventh of the amount originally present, and that it was only slightly greater in the middle of the pole; whereas at the ground line the quantity was one-third of that originally present." An examination of the creosote contained in this particular pole, which was one of the older ones in the line, showed that nothing distilled below 320 deg. C. The author states, "It is evident, therefore, that the phenol, cresol and other phenoloids and also the naphthalene had disappeared, but the basic substances, such as acridine, were still present." He concludes: "It would seem, therefore, that the opinion put forward by Mr. Boulton is justified (Mr. Boulton urged the heavy constituents of creosote oil), and that the heavier portions of the creosote are the most durable and effective."

The differences with respect to the evaporation are very marked. The higher per cent. of low boiling fractions, the greater the per cent. of evaporation. I give herewith the evaporation from a pan of three European oils, together with the composition of each:

	No. 836.	No. 1535.	No. 1521.
Sp. Gr.	1.062	1.045	1.022
210 deg. C.	4.0	1.9	5.6
235 deg. C.	16.0	33.8	26.5
270 deg. C.	21.4	20.8	22.6
315 deg. C.	20.2	16.5	17.1
355 deg. C.	23.6	19.5	17.1
Residue	14.5	7.5	10.7
Residue	1,206		0.0 per cent.

The differences are certainly striking. It will be noted that the oil having the highest specific gravity shows the least loss, while the one with the lowest specific gravity shows the highest loss. Oil No. 1521 had a very high percentage of tar acids. In this connection it is interesting to note the following table showing losses of individual fractions of a creosote oil:

	Sp. Gr.	Loss after 14 mos.
210 deg. C.—235 deg. C. fractions	1.008	90.4 per cent.
235 deg. C.—270 deg. C. fractions	1.022	71.9 per cent.
270 deg. C.—315 deg. C. fractions	1.053	26.5 per cent.
315 deg. C.—355 deg. C. fractions	1.059	4.0 per cent.

The rate of evaporation from creosoted wood has assumed particular importance in recent years, because of the general use of processes using small quantities of oil distributed through a stick. With a full cell treatment, while a loss by evaporation is not desirable, it is not as serious as it is with a treatment using a very much smaller quantity of oil. Where oils are used having high percentages of low boiling compounds, a large amount will disappear in a year. An oil with 35 per cent. to 45 per cent. distilling up to 235 deg. C. (M. of W. method), will not stay in the wood as long as one in which only 12 per cent. or 15 per cent. distill up to 235 deg. C. The general realization of the loss by evaporation is causing a general demand for heavier oils, or where such oils are not obtainable, for the injection of larger quantities of the poorer oils.

Although all parts of coal tar are antiseptic, and therefore acceptable, it appears, when their stability is considered, that many of them should be ruled out. In view of the different composition of creosote oils obtained from different coals, and in view of the general value of *all* compounds from an antiseptic standpoint, furthermore in view of the rapid disappearance of the low boiling fractions (meaning thereby those distilling below 235 deg. C.), what more can be said for a good creosote oil than that it must be a coal tar product and have as small a percentage of low boiling compounds as possible?

I have frequently warned against too great refinements in a specification. There are many kinds of creosote oil whose actual composition is beyond control, because that depends on the coal. The distiller can control the various fractions to a certain extent, and depending on the demand for naphthalene, anthracene, hard or soft pitch, he will vary the composition of the oil. Beyond that, however, there is little to be done. If he has a pure coal tar product, a small part of which consists of low boiling compounds, he makes a good creosote oil. That is the view of the Europeans, and their specifications are extraordinarily simple. Their requirements are brief, and the demand for small percentages of low boiling fractions is universal. Another fact in this connection is that in most countries lengths of life of 25 to 30 years are obtained from creosoted ties, irrespective of the specification, showing, to my mind, that discussion as to individual fractions, except as they pertain to permanence, are more or less absurd. Our Maintenance of Way specification attempts to do the same. I was told by railway officers in several European countries this winter that it met their ideas more completely than any of their own. It calls for a high grade oil, such as will fulfill the requirements, indicated by past experience. This specification has been severely criticized, because it is stated that very little oil can be purchased in this country which will fill that specification. This is not entirely true, but if it were, is that any reason for making a poorer specification? We get millions of gallons of creosote every year which does fill that specification. That there is oil available, which does not do so, is no reason for abandoning the standard. Such oil can be used, in larger quantities, and allowances can be made for the extent to which it falls below the standard. In view of perfectly uncontrovertable facts as to the rate with which the poorer oils leave creosoted timber, particularly where economical processes are concerned, a high standard is the only safe course. My claim is that the heavier the oil the more certainty there will be that long life will be obtained.

Reference has been made to a third requirement of creosote oil, namely, water-proofing qualities. Specifications have been written calling for "creosote oil" of a specific gravity, in many instances as high as 1.10 or more. Any one familiar with coal tar creosote realizes that such a requirement is impossible, because there is no coal tar creosote in any quantity having such a high gravity. The heaviest oils known rarely exceed 1.082. To make an "oil" with a specific gravity of 1.10 or more means that coal tar pitch has to be added in considerable quantities to creosote, and this is what is being done. Creosote will waterproof wood to a certain extent; the extent being largely determined by the quantity injected. A piece of wood with 5 lbs. of creosote per cubic foot will absorb very much more water than one with 15 lbs. per cubic foot. The heaviest injections, however, will not entirely waterproof wood fiber. A good heavy creosote will answer every purpose.

A creosote analysis consists essentially of two parts: a chemical determination for the purpose of detecting adulterants, such as petroleum, water-gas, creosote, or tar, etc., and, what I call, a physical determination or fractionation, to determine the relative amounts of low and high boiling quantities. The first analysis is the business of the chemist, and should not be attempted by anyone but a trained chemist.

The fractionation has for its object the determination of the per cents. of low and high boiling fractions. It is not a chemical method in the exact sense of that term. The present Maintenance of Way method was most widely used, hence its adoption. It is being criticized because varying results are obtained by various operators. This will also happen with other methods. A slight technical advantage should not be allowed to overshadow the serious results which might result with an entire revolution in our methods of stating fractions.

YARD ARRANGEMENTS AT TREATING PLANTS.

J. H. Waterman gave an informal talk on this subject, illustrating his remarks by blue prints. An abstract of this talk will appear in a later issue.

TREATING SEASONED VS. UNSEASONED TIES.

F. J. Angier, superintendent timber preservation, B. & O., read a paper on this subject, an abstract of which follows:

The writer made the following report on treating seasoned vs. unseasoned ties, while in charge of a timber treating plant in Illinois.

The first question is, What is a seasoned tie? By an unseasoned tie, is meant one freshly cut, or, at least, one that has been recently cut and has lost but a very small amount of the moisture which it originally contained. A seasoned tie, therefore, is one that has been cut for some time and the moisture allowed to evaporate to a greater or less degree.

The time necessary to season a tie so that it can be properly treated varies in different localities, as well as in different seasons. The kind of wood also is of considerable importance. Oak ties, in Illinois, must be air-seasoned six months or more, according to the time of year, before they can be properly treated. Some kinds of ties may be seasoned in three or four months.

For the purpose of illustration, and as a basis for argument, assume that it requires six hours to treat a charge of thoroughly seasoned ties, and nine hours to treat a charge of unseasoned ties. This has been found to be a fair average. It should be stated here that the treatment referred to is with a mixture of creosote and zinc-chloride, known as the Card process.

The two following tables show the cost of treating in a plant having a maximum capacity of 1,800,000 seasoned ties a year, and the cost of treating in the same plant, where the maximum capacity is reduced to 1,200,000 unseasoned ties a year.

SEASONED TIES.

Capacity of Plant, 1,800,000 *per Year.*

Unloading from cars to ground to season at $0.007 each	$12,600
Loading from ground to trams at $0.0055 each	9,900
Switching trams at $0.002 per tie	3,600
Loading treated ties out at $0.0065 each	11,700
Fixed expenses	23,268
Preservatives at 15c. per tie	270,000
Fuel (assume ⅓ less for seasoned over unseasoned ties)	5,600
Insurance carried on 1,000,000 ties (estimated)	4,000
Interest on 1,000,000 ties for six months, or 5 per cent. on $250,000	12,500
	$353,168
600,000 more seasoned ties treated than unseasoned, worth $0.044 each (see statement)	26,400
	$326,768

$0.1815 per tie.

UNSEASONED TIES.

Capacity of Plant, 1,200,000 *per Year.*

Unloading one-fourth from cars to ground to enable prompt releasing of cars, at $0.007	$2,100
Loading 900,000 ties from cars to trams at platform and 300,000 ties from ground to trams at $0.0055	6,600
Switching 300,000 ties from yard to retorts at $0.002	600
Loading treated ties out at $0.0065 each	7,800
Fixed expenses	23,268
Preservatives at 15c. per tie	180,000
Fuel	8,400
Insurance carried on 300,000 ties (estimated)	1,200
Interest on 300,000 ties, or 5 per cent. on $75,000	3,750
	$233,718

$0.1948 per tie.

In each case the total cost of handling is shown from the moment the ties are received at the plant until they are loaded into cars for shipment. In the case of fixed expenses there are included the salaries of the superintendent, general foreman, office force, engineers, firemen, etc., that is, all labor which would not change one way or the other, whether treating seasoned or unseasoned ties. This amounts to $0.0129 per tie when treating 1,800,000 ties per year, and $0.0194 when treating 1,200,000 ties per year.

In the case of seasoned ties, where no steaming is done, it is assumed that insurance is carried on 1,000,000 ties for six months and that $250,000 will be continually invested at 5 per cent. In the case of unseasoned ties, we must assume that at least 300,000 will always be in the yard. This stock is necessary to provide against delay to plant at certain times of the year, when traffic is so great that company material cannot be moved with regularity. Also, at certain times of the year, ties will be received faster than they can be treated, necessitating the storing of a portion of them.

It is shown in the following table that a treated tie is worth $0.044 to the company.

UNTREATED TIES.

First cost	$0.50	
Cost of putting in track	.15	
Cost of tie in track		$0.65
5 per cent. interest on investment for six years		.195
Second renewal, end of six years		.65
5 per cent. interest on first investment for six years, and on second investment for six years		.39
Total cost of tie for period of 12 years		$1.885
Average cost per tie per year		$0.157

TREATED TIES.

First cost	$0.70	
Cost of putting in track	.15	
Cost of tie in track		$0.85
5 per cent. on investment for 12 years		.51
Total cost of tie for 12 years		$1.36
Average cost per tie per year		$0.113

Saving per tie per year, $0.044.

Untreated ties are assumed to last six years, and treated ties twelve years.

Assuming this to be reasonable, and that 600,000 more ties per year can be treated when thoroughly seasoned, the value of 600,000 ties, at $0.044 each is deducted from the cost of seasoned ties. This shows a difference of $0.0133 per tie in favor of treating seasoned ties. This multiplied by 1,800,000, the number of seasoned ties treated per year, represents a saving of $23,940 in favor of seasoned ties.

In addition there would be a better penetration of the preservatives; therefore a longer life obtained for the ties and the lessened possibility of injury to the wood by steaming. When steaming there is always a large amount of sewage to dispose of, while in non-steaming there is practically none. The disposition of sewage is a difficult problem at most plants, because no matter how it is handled some of it will get into the rivers or creeks and pollute the water to such an extent that damage suits may result. This is entirely avoided when using seasoned ties.

Discussion of this and the following paper will be printed in a later issue.

INSPECTORS AND INSPECTION OF MATERIAL AND TREATMENTS AT COMMERCIAL PLANTS.

R. L. Allardyce, of Texarkana, Texas, read a paper on this subject of which the following is an abstract:

I am aware that only the commercial plants have this problem to contend with. The tendency is growing for the purchasers to have their representatives at the plant to inspect both the raw material and the treatment, and where the inspector is competent it is really a benefit to the plant, as it acts as a check on their work.

The raw material should be inspected at the saw mill or tie and piling camps, as inspection of material at the plant works a hardship. While the treating companies may have their own inspectors taking up the material, no two inspectors will take the same view of a piece of timber, and especially is this so in piling; one may consider a small defect of no consequence and accept it to have it thrown out by the purchaser's inspector, who might take one that had some other defect in it

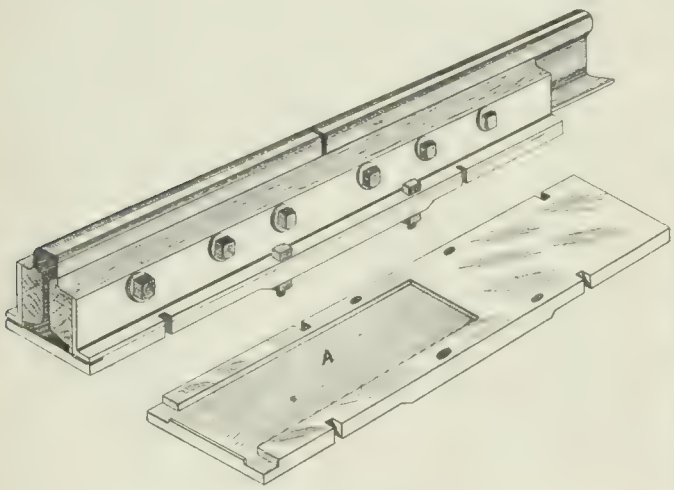
If the material is shipped in subject to inspection at the plant the culls have to be contended with, as well as controversy with the shippers. I have found that taking care of the rejects will entail as much, if not more, expense than handling the same amount of material through the retorts. They must be kept separate; each piece must be marked with the number of the car from which it came and must be stacked away properly. When the shipper comes along it must be handled again for him, to show him the defects. This expense is generally left for the plants to bear. Also, if a cull or reject is found in the last car of the order, it is necessary to hold up the order until the pieces can be replaced from some other car coming in to the plant. We have a small saw mill at our Texarkana plant to try and take care of the culls, but on large timbers we generally have to hold up the order until we can replace them as above.

I am of the opinion, when an order is of any size or consequence, the plants should request an inspector at the origin of the material, as well as an inspector of treatments at the plants.

At the annual banquet on Wednesday night there were about 65 present.

INSULATED RAIL JOINT.

The demand for insulated rail joints has rapidly grown with the great increase in the number of automatic signals placed in service. The accompanying illustration shows one type of joint which has been in use for several years on a number of roads. It consists essentially of a forged steel base plate on which the rail rests, two wooden filler blocks and two angle irons, with the necessary bolts. The forged steel base plate is 1⅛ in. thick through its center portion and weighs about 75 lbs. The metal driven out in making the depression at *A* is forced into the center of the plate and a slab of white oak, 7-16-in. thick, is forced into the recess. As this slab is wider than the base of the rail resting on it and extends beyond the center of the joint it affords insulation for one rail base. White oak filler blocks are placed in the fishing space of both rails and are held in place by two angle bars weighing about 30 lbs. The horizontal bolts passing through the web of the rail are insulated in the angle irons at both ends and holds the blocks and rails in position. These angle bars are held to the forged base plates by four vertical bolts. The only fibre insulation necessary is for the bushings and washers on the horizontal bolts and two fibre end posts. With this joint the use of spikes is not recommended as internal stresses are generated by the running of the rail which tend to wear the bolt insulation.



Insulated Rail Joint.

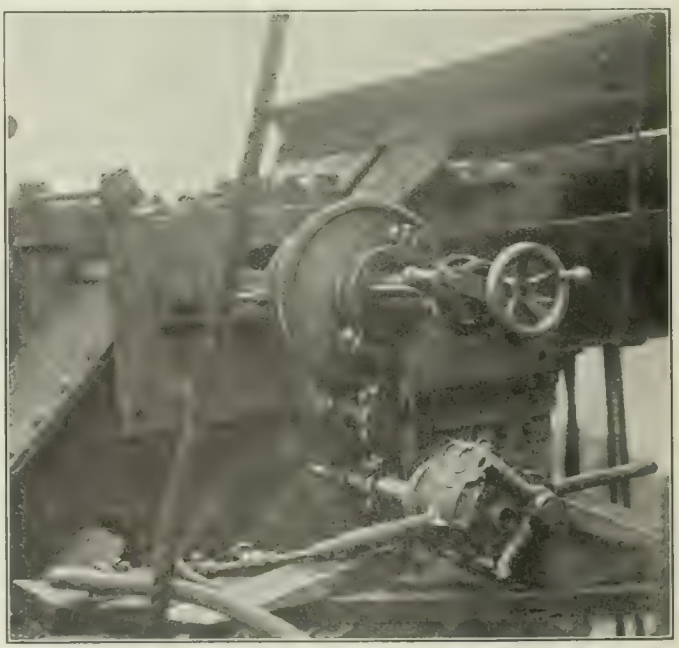
It is said that in five years the renewals of some 2,000 joints of this type has not exceeded 20 per cent., and that in this case the white oak has proven superior to the fiber when it is encased and pounded. An examination of a few joints having been in service for 2 years showed that the oak was in a fine state of preservation and had become somewhat harder due to compression, while the maximum life with fibre slabs under the same conditions was found to be six months. So far it has been found immaterial whether the wood base is located under the receiving or departing rails. Twelve joints of this type were installed experimentally on the Philadelphia & Reading on March 15, 1901, and were taken out of the track on May 5, 1908, without any repairs having been made, an average of about 250 trains daily passing over these joints. On October 15, 1897, some of these joints were put in track at the Reading Terminal and remained there until December 2, 1908. During this time new wooden filler blocks and base plates were installed every three years. An average of 600 trains and engines passed over these joints each day.

Among other roads this joint is now in use on the Pitttsburgh, Cincinnati, Chicago & St. Louis; Chicago, Milwaukee & St. Paul; Philadelphia & Reading; Pennsylvania; Michigan Central and Lehigh Valley. It is made by the Q & C Company, of New York.

A NOVEL METHOD OF RENEWING THE PINS IN A TRUSS BRIDGE.

A very interesting method of renewing the pins in a pin-connected through Pratt truss was recently worked out on a bridge of the Chicago, Milwaukee & St. Paul crossing the north branch of the Chicago river in Chicago. This is a swing bridge 230 ft. long with unequal arms and rests on a pier on the north bank, with its long arm extending across the river. It was built in 1902 and the pins and borings had become worn.

The common method of handling such work by driving piling and erecting false work to support the track while the different members were taken to the shop and rebored was not advisable.

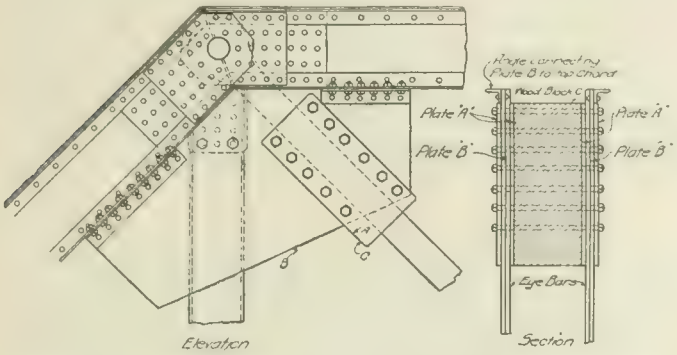


Boring Machine in Position for Reboring Pin Holes.

Even under the most favorable circumstances this method would have stopped navigation for several days and difficulty would have been met in getting permission from the government to block the channel for this length of time. To avoid this the following novel method was devised and followed: Before removing each pin it was necessary to fasten the eye bars centering at the joint to the upper chord members. To do this two steel plates marked *A* in Fig. 1 were placed on each side of each eye bar, with a block of wood, *C*, fitting between the inner two plates. The two outer plates reinforced plates *B*, which were

directly in contact with the eye bars. The entire connection was bolted tightly together with 1-in. bolts, thus developing enough friction between the plates to take care of the dead load stress in the eye bars. The two plates, *B*, one on each side, were fastened to the lower flange of the top chord and to each end post by angles and bolts, as shown in the drawings. In this way when the pins were driven out all members were rigidly held in position.

When the pins were removed they were found to be considerably worn and their bearings somewhat enlarged. The holes were rebored from the original 5-in. diameter to 5¼ in. by means of a portable boring bar, made by J. T. Ryerson & Co., Chicago, which, although designed primarily for boring locomotive cylinders in the shop, gave excellent satisfaction under these adverse circumstances.



Method of Renewing Pins in C. M. & St. P. Bridge at Chicago.

The accompanying views show this appartus in position for reboring the holes and the bracing necessary to support the machine in this position. The power was furnished from a section car provided with a gasolene engine and an air compressor. The boring bar was directly driven by a small air drill which operated the shaft and furnished the required power.



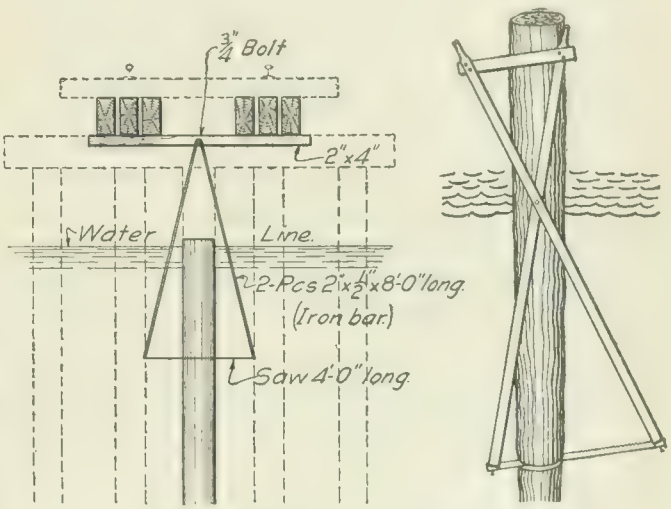
Arrangement of Apparatus for Reboring Pin Holes in Truss Bridge.

The work was started at 6 o'clock on the morning of November 6, and by 8:15 p. m. of the same day the four pins had been removed, the holes rebored and new pins inserted, and traffic was passing over the bridge.

SAWING PILING UNDER WATER.

It often becomes necessary to saw piling off under water following the use of falsework or the driving of new bents in the reconstruction of a bridge. The following methods have been used for this purpose for a number of years in different parts of the country, but conversations with a number of bridge men recently has disclosed the fact that many are not familiar with them and resort to less satisfactory expedients. They are worth describing therefore.

A simple method was used recently at Madison, Wis., where it was necessary to remove a large number of piles at the Chicago & North Western crossing of Lake Monona. The apparatus shown in the sketch was made up of two pieces of 2 in. x ½ in. strap iron 8 ft. long, fastened at the upper end to a 2 in. x 4 in. timber 6 ft. long, which was, in turn, fastened to the bridge stringers. The saw extended between the lower ends of these iron pieces. By rotating the frame through a small arc with the saw bearing against the pile it was sawed off, the men working from a raft. In this instance two men sawed off from eight to ten piles per day with the device and better progress could have been made had the lake not been rough, interfering with the work to some extent.



Two Methods of Sawing Off Piling Under Water.

Another rigging quite similar to this consists of two 2 in. x 4 in. timbers fastened in the manner shown in the second sketch. These timbers are held apart at the upper end by a third timber and the saw is fastened at the lower end of the timbers. It is operated in the same manner as the one previously described. Very frequently piling will saw easier in this way under water than out of it, for the water removes the sawdust so that it does not clog the opening.

Another method occasionally used is to cut off piling with dynamite. A hole is bored down the center of the pile with a ship augur and a stick of dynamite inserted and exploded. Seventy-five per cent. dynamite should be used to insure clean work, as lighter strength dynamite sometimes tends to shatter rather than to cut off the timber.

The Panama Railroad has contracted for 75,000 hard wood ties for use on the relocation of the railway. These ties will be accepted in two classes, those in one to be 7 in. by 9 in. by 8 ft. 6 in. long, and in the other 6½ in. by 8 in. by 8 ft. 3 in. long. The second class may not aggregate over 10 per cent. of the total number delivered. These ties will be purchased in Santo Domingo, for although there is hard wood in Panama no one could be found who would take a contract of this size to cut the timber.

General News Section.

At Pau, France, January 13, Jules Vedrines, flying in the aerodrome on his monoplane, made 88⅓ miles in one hour.

At Walbridge, Ohio, January 10, the carpenter and repair shops of the Hocking Valley were destroyed by fire; loss, including a coal house, a sand house, an oil house and a material shed, $75,000.

The Chesapeake & Ohio, following prolonged conferences with its telegraphers and the government commissioners, Messrs. Knapp and Neill, has granted the operators an increase of pay, said to be 10 per cent.

The boilermakers working in the shops of the American Locomotive Company, who have been on strike for three months, in sympathy with the strike of the New York Central boilermakers, have called off their strike.

The Gulf, Colorado & Santa Fe announces the opening of passenger and freight traffic on that portion of its Lometa West extension from Brady, Tex., to Eden, a distance of 31.94 miles. This completes the extension from Lometa to Eden, 98.3 miles.

Chicago railway men have incorporated The Railroad Club of Chicago as a social organization with a membership of 350. Permanent club rooms will be established at 329 Plymouth Court. W. P. Gomph of the Transcontinental Freight Bureau is president.

The attorney-general of Texas has instituted a suit against the Chicago, Rock Island & Gulf to recover $100,000 in penalties for alleged violation of the state law in running trains more than 30 minutes late during the month of January and February, 1910.

The Chicago & North Western on January 14 opened to traffic the last section of its new line between Milwaukee and Sparta. The line was opened from Milwaukee to Wyeville on December 11, and the last section extends from Wyeville to Sparata, 23.4 miles.

In the latest time table of the Salt Lake division of the Southern Pacific, Pacific standard time is used east of Sparks, Nev., instead of Mountain time. The change from Mountain to Pacific time is, therefore, now made at Ogden, Utah, instead of at Sparks.

Inspectors of the Interstate Commerce Commission have been conducting an investigation of the derailment of the Great Northern's "Oregonian" train, near Sharon, N. D., on December 30, which was caused by a broken rail. The commission has asked the railway to forward the rail to Washington.

The Isthmian Canal Commission has ordered 75,000 bayahonda ties from Santo Domingo. This wood is costly, but is harder and more durable than anything available in the United States; and the hard woods which grow on the isthmus are unavailable because thus far the commission has found no contractor who would cut and deliver ties in that territory.

The Pennsylvania Railroad, encouraged by the reduction in the number of trespassers killed along its lines, as a result of the persistent efforts of its officers during the past four years, intends to redouble its efforts during 1912. New warning notices will be put up and the authorities will be requested to enact more stringent laws. General manager S. C. Long has issued a circular to officers and employees, and has called upon all employees to assist in decreasing the death roll.

The attorney-general of Texas on January 4 filed in the District Court at Austin, Tex., suits to recover $400,000 in penalties from the Missouri, Kansas & Texas of Texas, on account of train delays between September 8 and November 8, 1910, in alleged violation of the state law imposing penalties for trains over 30 minutes late. The Texas railway commission is also making a compilation of the train reports of other roads, with the intention, it is reported, of instituting additional suits.

The fifth annual report of the Oregon railway commission for the fiscal year ending June 30, 1911, calls attention to the increase in railways in the state from 2,051 miles to 2,899 miles since June 30, 1906, an increase of 838 miles, as compared with an increase of but 394 miles from 1889 to 1906. The report states that "it is demonstrable from the court records and the files of this commission that the continuous annual saving to the shipping interests of the state due to rate reductions will conservatively aggregate $750,000 annually."

Forty-six complaints have been filed in the United States district court at New Orleans against the Illinois Central, alleging violations of the safety appliance act. Eleven complaints are brought under the air brake provision of the law, 25 under the provision regarding the use of automatic couplers, and 10 under the provision relating to the use of grab iron. Suit has been entered in the United States district court at Salt Lake City against the Denver & Rio Grande for 15 violaions of the hours of service law. The Illinois Central on January 3 pleaded guilty and was fined $200 at Springfield, Ill., for violations of the hours of service law.

Statistics compiled by the pension department of the Southern Pacific show that since the establishment of the pension department in January, 1903, the sum of $948,538 has been disbursed in pensions to retired employees. The total disbursements for last month were $17,073, and for the year 1911 were $184,704. Since the organization of the pension department the Southern Pacific has pensioned 692 of its former employees. The number on the pension roll at the close of 1911 was 467. The beneficiaries of the pension bureau in 1910 organized an annual reunion. This year the reunion will be held on May 10, the forty-third anniversary of the driving of the last spike, at Promontory, Utah, connecting the Central Pacic and Union Pacific railways.

Reports of delays to trains and interruption of traffic generally, by reason of the severely cold weather, have been general throughout the northern and western states for the past two weeks; and instances of passenger trains being stalled all night are "too numerous to mention." At Kinsley, Kan., two passenger trains being snowbound, the passengers had to secure accommodations at private houses, the hotels being insufficient. Snow blockades were reported in northwestern Texas as lasting a whole week. At Lynchburg, Va., a passenger train with many leaky pipes was frozen to the track so that it had to be bumped at the rear by three engines to loosen the wheels. Similar occurrences are reported in other places nearly as far south. On the Great Northern, near Java, Mont., January 10, a relief train headed by a rotary snowplow was knocked off the track by an avalanche, and fell over a precipice 100 ft. high, this accident, occurring while the temperature was 26 deg. below zero. Two men were killed. From Livingston, Mont., it was reported on the 10th that all trains were ordered to limit their speed to 20 miles an hour. At Utica, N. Y., where on January 9 the temperature fell to 12 deg. below zero, it was reported that 13 rails were found broken in the tracks between Rome and Greenway, four miles. In Chicago last week the work of the thousands of men engaged in switching and yard work was made at least 50 per cent. harder than usual by the difficulties incident to snow, ice and low temperatures. The president of the Ann Arbor Railroad, Newman Erb, returning from an inspection of the company's lines, reported that freight traffic was tied up through the northwest, and moreover, that insufficient forces caused much delay. On one railway, said Mr. Erb, 29 enginemen reported sick on one of the cold mornings of last week. Steamboats were much hindered and troubled by floating ice as far south as Memphis, Tenn., and at Louisville, Ky., the Ohio river was filled with ice. One observer says that the roads of the country as a whole have suffered more from cold weather than before in eight years, and that the delays and difficulties are due in part to the unpreparedness of the men. As a result of long immunity it is said that many men have not supplied themselves with proper clothing. A road which supplied its men with sheepskin lined coats is said to have had less trouble than some of its neighbors.

The Hine System Established on the Georgia & Florida.

The Hine system of organization has been established by the Georgia & Florida, and the number of officers is increased. This is intended to abolish the practice of having clerks sign the names of officers, and increases the authority of the officers. The following appointments have been made: A. Pope, formerly

traffic manager, is now assistant general manager, with office at Augusta, Ga; D. F. Kirkland has been appointed superintendent, with office at Douglas, and the following officers are now assistant superintendents: R. S. Thompson, trainmaster; W. A. Walker, general roadmaster; J. F. Sheahan, master mechanic; W. A. Swallow, chief engineer, and A. E. Curling, car accountant, all with offices at Douglas, and the titles of trainmaster, general roadmaster, master mechanic, chief engineer and car accountant will be retained only as may be necessary for compliance with laws and existing contracts. H. C. McFadden, formerly general freight agent, is now traffic manager. C. H. Gattis, formerly general passenger agent, J. M. Crute and W. E. Blitchington are now assistant traffic managers, all with offices at Atlanta. The titles of general freight agent and general passenger agent will be retained by the present holders, or their successors, only as may be necessary for the proper compliance with the laws and existing contracts. W. F. Carroll and F. W. Schanck are assistant auditors.

Exports of Iron and Steel.

Figures compiled by the bureau of statistics, Department of Commerce and Labor, show that the United States follows England and Germany in the tonnage of iron and steel exports. The progress of the United States in that branch of commerce has been rapid, total exports of steel having increased from $103,000,000 in 1901 to nearly $250,000,000 in 1911. In the last ten years the United States has exported $1,500,000,000 of iron and steel.

Safety of the Pennsylvania.

The Pennsylvania Railroad in 10 months has decreased the number of serious injuries to employees in its shops by more than 63 per cent., and in recognition of this work the American Museum of Safety on Thursday evening, January 18, presented a medal to the company as the American employer who, in its judgment, "had done the most for the protection of the lives and limbs of workmen, by means of safety devices for dangerous machines and processes." The medal was received by Vice-president W. W. Atterbury, head of the operating department.

In the fall of 1910 experts from one of the large accident insurance companies were employed and, accompanied by inspectors of the motive power department, inspected all of the road's larger shops. Following this, safety committees were organized on all divisions. As a result, the number of serious injuries per thousand shop employees, which in January was 8.7, was reduced as follows: February, 7.3; March, 8.3; April, 6.0; May, 7.9; June, 5.2; July, 4.7; August, 3.4; September, 3.4; October, 3.2. During this period, the average number of employees was 33,242.

The Pennsylvania's efforts toward protecting the lives of passengers and employees, in other directions are well known. Since 1906 all new passenger cars have been made of steel. In all new railway tracks, public crossings of highways at grade have been forbidden; and existing tracks have been safeguarded in ways innumerable.

Chicago Car Interchange Bureau.

The Chicago Car Interchange Bureau was organized on January 1 to supervise the inspection and recording of cars interchanged between roads within the Chicago district, under the auspices of the General Superintendents' Association. The bureau is a development of the Joint Car Inspection and Interchange Bureau organized July 1, 1910, to supervise interchange at the Union Stock yards, where an interesting experiment has been worked out in combining the work of car inspection for the mechanical department and the making of records required by the transportation department for cars interchanged. The office of the new bureau is at 603 Grand Central Station, and it is under the management of a chief interchange inspector, F. C. Schultz, heretofore chief car inspector of the Chicago division of the Chicago, Burlington & Quincy. The chief interchange inspector reports to an interchange committee of the General Superintendents' Association. An assistant interchange inspector is assigned to each of eight districts into which the city has been divided, the Union Stock Yards district being one. The Stock Yards bureau employs its own inspectors and will maintain its own rules and regulations, but its central office has been transferred to the office of the Chicago bureau and its chief interchange inspector, Charles Bossert, has been made one of the eight assistants. For the present the methods worked out by the Stock Yards bureau have not yet been extended to the other districts of the city, and in the latter the inspectors are still employed by the individual railways and render their reports as before instead of through the bureau. The assistants are now engaged in making a study of the conditions in their districts and in instructing the railway inspectors in the M. C. B. rules, in place of the former Chicago district rules, with the idea of having all the interchange inspection ultimately performed by the bureau. The work of the Stock Yards bureau has already demonstrated the efficiency of combining the mechanical and the transportation inspection, and has resulted in a marked improvement in the promptness with which reports are delivered.

Railway Supply Manufacturers' Association.

Circular No. 1 of the Railway Supply Manufacturers' Association gives such details as are at present available concerning the plans for the exhibits of the Master Mechanics' and Master Car Builders' conventions at Atlantic City, N. J., next June. The exhibits will be as usual on Young's Million Dollar Pier and 81,764 square feet of exhibit space has been provided, an increase of about 5,500 sq. ft. The arrangement of the space has been considerably improved. The price of space is 40 cents per sq. ft., as before. Space will be assigned on February 15, 1912, at the office of the secretary, J. D. Conway, Oliver building, Pittsburgh, Pa.

New York Railroad Club.

At the next regular meeting of the New York Railroad Club, to be held January 19, W. B. Potter, chief engineer of the railway department of the General Electric Company, Schenectady, N. Y., will present a paper on Self Propelled Motor Cars.

International Railway Fuel Association.

The fourth annual convention of the International Railway Fuel Association will be held at the Hotel Sherman, Chicago, May 22-25, 1912.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.; annual May 7-10, Richmond, Va.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Boston, Mass.; annual, May 10-11, San Francisco, Cal.

AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York; next convention, Seattle, Wash.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Chicago.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September; annual, March 17, Chicago.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York.

AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOC.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOC.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—M. H. Bray, N. Y., N. H. & H., New Haven, Conn.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Car Accounting Officers.—G. P. Conrad, 75 Church St., New York.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

Engineers Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago. Convention, May 22-25, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

Master Car and Locomotive Painters' Assoc. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass. Convention, 2d week in September.

National Railway Appliances Assoc.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railway Club.—C. L. Kennedy, C., M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Business Association.—Frank W. Noxon, 2 Rector St., New York.

Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

Railway Gardening Association.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.

Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio. Convention, May 20-22, Buffalo, N. Y.

Railway Supply Manufacturers' Assoc.—J. D. Conway, 2135 Oliver Bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

Railway Tel. & Tel. Appliance Assoc.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling; September, 1912, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transfortation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; August, 1912.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month except July and August, Chicago.

Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md.

Traffic News.

The Canadian Pacific is to run a special train carrying a "traveling agricultural college" over its lines in New Brunswick; but not for several months yet.

Representatives of the railway passenger associations will meet in St. Louis on January 23, with the national baggage committee, representing the commercial interests, to discuss uniform arrangements for handling baggage.

Traffic representatives of the Union Pacific held their annual "family" meeting in Omaha on January 15. The meeting afforded opportunity for their first inspection of the new general office building, which has just been completed.

A feature of the dinner given by the Louisville Transportation Club on January 5 was a debate on the long and short haul clause of the Interstate Commerce law, participated in by three representatives each of the railways and the shippers.

The city of Shreveport, La., has established a quarantine against Fort Worth and Dallas on account of the prevalence of cerebro-spinal meningitis at those Texas cities; and at Fort Worth an order was issued last week discontinuing the sale of tickets to Shreveport.

The Southern Pacific, by making a slight change in the train schedules and by providing for a connection at Port Costa, Cal., between the Shasta Limited from Seattle, and the "Owl" for Los Angeles, has shortened the trip for passengers between Seattle and Los Angeles to 44 hours, a saving of nearly a day.

The Rock Island will operate an agricultural demonstration and lecture train between St. Louis and Kansas City, January 23-27. Lectures on dairying and poultry raising will be given by professors from the University of Missouri, and some of the best dairy cattle and poultry in Missouri will be shown on the train.

Special trains carrying members of the Western Classification Committee and shippers who will appear before the committee at the semi-annual meeting of the classification committee which began at Galveston, January 16, were run from Chicago on Sunday by the Chicago & Alton and Chicago & Eastern Illinois railways.

The Texas & Pacific and the International & Great Northern have announced the organization of an agricultural department, effective on February 1, for the purpose of promoting the development of the agricultural resources of their territory. R. R. Claridge, now traveling immigration agent of the Gould Lines, will be at the head of the department.

The New York state superintendent of public works reports that the traffic on the canals of the state during the past season amounted to 3,007,068 tons, a slight increase over the preceding year. Only about 20 per cent. of this consisted of through shipments, and in both through and way shipments the eastbound movement greatly exceeded the westbound.

The Illinois Central has organized a subsidiary company, the Central Fruit Despatch, to handle its fruit and vegetable traffic, which has been showing a continuing increase. The company was incorporated in Illinois last week with $1,500,000 capital stock. E. F. McPike, who has been refrigerator service agent of the Illinois Central, will be general manager of the despatch line.

A jury in the federal court at Memphis, Tenn., has awarded the Darnell-Taenzer Lumber Company reparation of 10 cents per 100 lbs. on all its shipments of hardwood lumber from southeastern territory to the Pacific coast during 1907 and 1908. The Interstate Commerce Commission in 1908 reduced the rate from 85 to 75 cents, and the case was prosecuted as a test in behalf of the members of the Hardwood Lumber Association.

J. M. Belleville, of Pittsburgh, president of the National Industrial Traffic League, has issued a circular to the members of that body, asking them to use their influence with members of Congress to secure favorable action on the request of the Interstate Commerce Commission for the construction of a fireproof building for the commission in Washington; this because the shippers of the country are vitally interested in the preservation

of the great mass of documents which are on file in the offices of the commission.

At a meeting of the Central Passenger Association on January 10, it was decided to make summer tourist fares this year from June 1 to September 30 from Chicago and St. Louis to eastern resorts on the same basis as last year, approximately a fare and a half for the round trip. The round trip fare to New York on this basis will be $30 on the standard lines, and $27 by the differential lines; to New Jersey points the rates will be $29.50 and $28.50.

From Cheyenne, Wyo., it is reported that the soldiers living at Fort Russell, two or three miles out of the city, have withdrawn their boycott against the Cheyenne Electric Railway, after going afoot six months as a protest against the rates of fare charged by the company. The company has agreed to establish a fare of 5 cents between Cheyenne and the fort, on the understanding that the regimental exchanges will buy not less than $2,250 worth of tickets each month.

Beginning February 1, the Southern Railway will run a dairy instruction car over its lines, under the supervision of Dr. C. M. Morgan, dairy agent of the road. Assisted by experts from the state and federal agricultural departments, Dr. Morgan will "spread the doctrine of more and better cows," and of the improvement of milk, cream and butter. A car will be fitted up with all of the best kinds of machinery, and in the lectures to be given a stereopticon will be used. Free tests will be made of milk which may be offered, and cows will be examined and reported on.

Following a conference in Baltimore, called by Governor Crothers of Maryland, the governors of sixteen southern and southwestern states, acting in conjunction with the presidents of the principal railways in those states, have decided to create a large committee which will be charged with the duty of making and carrying out a plan to co-ordinate all of the agencies working to promote immigration to these states. Among the chief speakers at Governor Crothers' conference, were Presidents Finley of the Southern Railway, Johnson of the Norfolk & Western, and White of the Richmond, Fredericksburg & Potomac.

Shippers of explosives and dangerous articles are now required by law to keep themselves posted as to the provisions of the Interstate Commerce Commission's rules and to furnish and supply the necessary labels and placards on goods and cars shipped, the carriers being no longer required to furnish printed matter free of charge. Complying with frequent requests, Col. B. W. Dunn, chief inspector of the Bureau of Explosives, 30 Vesey street, New York, has prepared copies of all the necessary pamphlets, labels, etc., and has issued a circular giving the prices at which these will be sold by the single copy or in lots of 100. 500 or 1,000.

Conference committees have been appointed by the Chicago railways and the shipping interests of the city to handle questions relating to the uniform switching rates and regulations which were adopted last year for the Chicago district. The purpose of the committees was discussed in an editorial in the *Railway Age Gazette* of December 22, page 1262. One committee represents the railways, and another the shippers, and they will ordinarily meet separately, but if questions of sufficient importance arise the committees will meet jointly in an effort to effect a solution of the difficulty. The committee for the railways consists of C. G. Burnham, vice-president Chicago, Burlington & Quincy; William Hodgdon, freight traffic manager Pennsylvania Lines; Marvin Hughitt, Jr., freight traffic manager Chicago & North Western; G. H. Ingalls, freight traffic manager New York Central Lines; E. S. Keeley, vice-president Chicago, Milwaukee & St. Paul, and W. L. Ross, vice-president Chicago & Alton. The shippers' committee consists of H. C. Barlow, Chicago Association of Commerce; Oscar F. Bell, Crane Company; Richard A. Hale and F. B. Montgomery, Illinois Manufacturers' Association; W. M. Hopkins, Chicago Board of Trade, and J. J. Wait, Hibbard, Spencer, Bartlett & Company.

Through car service from Chicago to California over the Chicago, Burlington & Quincy, and the Rock Island Lines via Ogden and Salt Lake City, which was withdrawn on December 19 on account of a controversy between these roads and the Southern Pacific, Western Pacific and San Pedro, Los Angeles & Salt Lake over the method of division of the through fares, will be resumed beginning on January 28. The Burlington announces daily standard cars to San Francisco over the Denver & Rio Grande and Southern Pacific, daily tourist cars to Los Angeles over the Denver & Rio Grande and San Pedro, Los Angeles & Salt Lake, tri-weekly tourist cars to Los Angeles over the Denver & Rio Grande and Southern Pacific and tri-weekly tourist cars to San Francisco over the Denver & Rio Grande and Western Pacific. The Rock Island Colorado-California Express will have both standard and tourist cars to be run over the Western Pacific from Salt Lake City and from Ogden by the Southern Pacific. The lines west of Ogden and Salt Lake last year refused to shrink their proportion of the rates when the local rates from Salt Lake City to San Francisco and Los Angeles were ordered by the Interstate Commerce Commission to be reduced. The division controversy was recently settled by a compromise agreement.

Marking Express Shipments.

The following circular letter calling the attention of shippers to proper methods of marking and packing express shipments has been issued by the express agents of Chicago:

"Have you experienced loss of shipments by express? If so, have you considered that possibly you are partly to blame for that loss by incorrectly or insecurely marking your shipments?

"In the necessary haste in the handling of express shipments, especially where necessary to transfer them en route, unless package, box, barrel or other class of shipment is securely marked, there is a very great chance of mark being lost or torn off.

"Shipments should always be marked with brush or crayon on the box, package or crate if possible, or, better still, with a label showing the shipper's name and address as well as that of the consignee.

"Shipments which can be marked with a label pasted on shipment, or directly on the shipment itself, as above described, should never be marked with a tag alone; but in the case of castings or other shipments to which it is impossible to attach the mark by a label or on the shipment direct, and where a tag must be used, two tags should be attached, and in different places.

"Another frequent cause of loss of shipments in transit is failure on the part of shippers to remove old marks from second-hand boxes, barrels, cases, and even wrapping paper which is used. Packers and shipping clerks should be cautioned before using second-hand packages of any kind to remove all old marks.

"Will you not co-operate with the transportation companies in an effort to avoid loss to you and to them, by properly and securely marking your shipments?"

Grain Receipts at New York.

The receipts of grain at New York for the 12 months ending December 31, as reported by the Produce Exchange, amounted to about 120 million bushels, or 20 per cent. more than in the year preceding. The receipts by the different roads and by water were as follows in bushels:

Routes.	1911.	Per Cent.	1910.	Per Cent.
N. Y. C.	14,016,787	11.76	13,105,092	13.36
West Shore	27,014,823	22.66	19,997,226	20.39
Erie	18,847,387	15.80	15,047,433	15.34
Pennsylvania	8,213,344	6.89	7,558,783	7.71
D. L. & W.	19,564,431	16.41	11,605,137	11.83
Lehigh	17,162,401	14.38	15,551,148	15.86
[illegible]	[illegible]	1.70	1,484,288	1.62
Various	[illegible]	[illegible]	[illegible]	[illegible]
Total rail	107,411,728	90.10	86,635,278	88.34
Total water	11,808,254	9.90	11,442,288	11.16
Total	119,219,982	100.00	98,077,566	100.00

It will be seen that the two lines of the New York Central brought in more than one-third of the whole.

Traffic Club of New York.

The regular meeting of the club will be held on Tuesday evening, January 23, at 8 p. m., at the Waldorf-Astoria. The entertainment committee has arranged for a vaudeville performance, to be followed by refreshments.

The entertainment committee has decided for the meeting of March 26 to give an amateur night, composed of local talent, and the chairman of the committee would appreciate any information as to members who would assist in this performance.

REVENUES AND EXPENSES OF RAILWAYS.

FIVE MONTHS OF FISCAL YEAR, 1912.

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Alabama & Vicksburg	142	$436,057	$222,320	$707,953	$109,533	$136,817	$19,101	$233,976	$26,165	$525,592	$182,361	– $397	$24,126	$157,838	—$55,463
Alabama Great Southern	309	1,285,883	516,400	1,967,867	210,217	440,380	53,505	592,534	46,602	1,343,238	624,629	- 1,376	74,640	548,613	42,798
Ann Arbor	291	605,632	267,947	933,082	112,105	90,445	22,070	308,281	37,539	570,440	362,642	6,289	69,928	299,003	60,131
Arizona Eastern	366[1]	571,206	161,128	779,463	121,038	59,252	11,508	208,702	32,158	432,658	346,805	771	48,520	299,056	52,663
Atchison, Topeka & Santa Fe	7,613[2]	25,001,834	9,548,880	37,449,828	6,121,332	5,779,560	782,615	10,651,187	786,264	24,120,958	13,328,870	.....	1,523,480	11,805,390	—1,808,152
Atlantic Coast Line	4,523[3]	8,490,913	3,146,769	12,539,826	1,733,207	1,954,426	207,791	4,336,920	349,806	8,582,150	3,957,676	.....	535,000	3,422,676	171,986
Baltimore & Ohio—System	4,433[4]	30,505,738	6,894,226	39,734,130	5,141,568	6,974,335	818,555	13,214,451	806,330	26,955,239	12,778,891	—269,379	1,216,292	11,295,220	532,677
Baltimore & Ohio Chicago Terminal	77	.....	13,064	703,698	160,888	86,889	4,719	278,420	29,107	560,023	143,675	4,163	91,032	56,806	7,217
Bangor & Aroostook	627	1,035,532	309,344	1,423,434	243,096	163,633	20,234	410,707	58,006	895,676	527,758	.....	46,250	481,508	63,811
Bessemer & Lake Erie	203[5]	4,178,125	177,035	4,400,980	395,257	676,548	43,772	972,436	39,864	2,127,877	2,273,103	.....	35,000	2,238,103	377,954
Boston & Maine	2,224[6]	11,233,279	7,593,638	20,275,689	3,073,020	2,612,478	205,957	8,694,931	417,429	15,003,815	5,271,874	105,457	880,229	4,497,102	—377,110
Buffalo, Rochester & Pittsburgh	572[7]	3,490,198	504,499	4,121,938	576,353	772,118	48,935	1,294,189	83,017	2,774,612	1,347,326	1,184	85,000	1,263,510	—238,232
Butte, Anaconda & Pacific	46	373,390	52,429	456,284	56,510	89,666	3,468	199,205	13,396	362,245	94,039	.....	10,850	83,189	—39,106
Carolina, Clinchfield & Ohio	238[8]	787,856	70,901	882,047	58,446	109,695	25,940	174,398	38,549	407,028	475,019	1,138	38,000	438,157	182,530
Carolina, Clinchfield & Ohio of S. C.	17	43,903	7,559	52,799	2,732	406	4,675	12,873	2,253	22,939	29,860	.....	2,500	27,360	3,369
Central of Georgia	1,915	3,793,646	1,680,484	6,002,610	712,247	1,092,748	171,704	1,903,777	192,472	4,072,948	1,929,662	30,769	232,680	1,727,751	134,566
Central of New Jersey	671[9]	8,051,557	2,605,553	11,229,965	1,175,932	1,548,660	160,514	3,140,566	194,871	6,220,543	5,009,422	142,221	471,419	4,680,224	828,127
Central New England	276[10]	1,200,833	158,212	1,426,620	249,065	102,056	6,540	364,938	11,910	734,509	692,111	101	45,000	647,212	176,410
Charleston & Western Carolina	340	613,822	163,416	818,719	148,785	110,769	14,642	277,338	20,096	571,630	247,089	.....	25,000	222,089	28,556
Chesapeake & Ohio Lines	2,241[11]	11,136,425	2,525,923	14,248,634	1,889,832	2,661,258	259,383	4,140,616	310,929	9,262,018	4,986,616	13,611	440,483	4,559,744	—112,788
Chicago & Alton	1,025	4,303,779	1,921,796	6,699,853	1,035,397	1,158,922	201,928	2,258,086	162,723	4,817,056	1,882,797	—14,648	182,500	1,685,649	46,872
Chicago & Eastern Illinois	1,275[12]	5,042,872	1,293,365	6,801,127	812,913	1,217,702	147,642	2,293,780	203,275	4,675,312	2,125,815	- 10,502	192,500	1,922,813	—37,427
Chicago & Erie	269	1,789,225	321,615	2,310,203	382,330	411,678	104,349	1,006,400	51,305	1,956,062	354,141	.....	76,738	277,403	—60,643
Chicago & Northwestern	7,764[13]	21,086,157	9,233,048	33,444,292	4,539,212	4,124,358	603,089	12,667,988	609,914	22,544,561	10,899,731	5,808	1,375,000	9,530,539	- 58,474
Chicago, Burlington & Quincy	9,074[14]	25,602,364	10,033,587	39,028,443	5,026,190	6,392,753	654,794	11,844,538	934,235	24,852,510	14,175,933	41,759	1,322,095	12,812,079	—439,985
Chicago Great Western	1,496[15]	3,885,396	1,378,495	5,693,117	702,785	779,986	235,098	2,165,212	176,453	4,059,534	1,633,583	571	165,185	1,468,969	64,742
Chicago, Indiana & Southern	359[16]	1,375,989	139,349	1,570,421	225,635	325,813	38,155	570,495	41,125	1,201,223	369,198	1,862	69,500	301,560	84,928
Chicago, Indianapolis & Louisville	616[17]	1,877,390	753,882	2,885,805	384,738	383,950	89,856	965,495	72,056	1,896,095	989,710	.....	117,097	872,613	43,373
Chicago, Milwaukee & Puget Sound	2,058[18]	5,287,088	1,240,820	7,053,162	463,688	672,286	267,414	2,471,204	89,417	3,964,009	3,089,153	109,406	396,671	2,801,888	- 119,811
Chicago, Milwaukee & St. Paul	7,511	18,724,510	6,615,792	28,045,976	4,629,120	3,881,549	535,971	10,890,071	455,813	20,392,524	7,653,452	18,833	1,197,829	6,474,456	—1,371,263
Chicago, Peoria & St. Louis	255	537,629	166,604	741,476	95,443	147,200	36,598	312,915	29,075	631,231	120,245	.....	21,500	98,745	– 236
Chicago, Rock Island & Gulf	476[19]	851,728	278,778	1,215,093	152,485	85,035	49,168	394,281	39,703	720,672	494,421	—1,190	33,428	459,803	37,933
Chicago, Rock Island & Pacific	7,551[20]	17,174,209	8,477,535	27,368,376	4,312,032	3,652,847	782,833	10,292,076	693,130	19,732,918	7,635,458	– 61,971	1,082,908	6,490,579	957,213
Chicago, St. Paul, Minneapolis & Omaha	1,743	4,158,233	2,141,866	6,776,989	973,143	761,691	132,800	2,526,955	150,530	4,545,119	2,231,870	5,848	332,341	1,905,377	—631,631
Chicago, Terre Haute & Southeastern	351	785,652	92,680	796,338	123,860	127,182	13,750	231,417	36,168	532,377	263,961	– 323	43,500	220,138	.....
Cincinnati, New Orleans & Texas Pacific	337	3,086,857	743,210	4,029,759	401,009	810,548	99,324	1,121,294	88,473	2,530,648	1,509,111	- 2,310	109,000	1,397,801	—101,018
Cincinnati, Hamilton & Dayton	1,014	3,263,263	794,261	4,555,241	478,019	703,463	97,388	1,804,161	94,198	3,177,229	1,378,012	.....	198,839	1,179,173	203,400
Cincinnati Northern	245[21]	453,230	107,381	590,424	110,820	111,601	14,043	215,284	14,168	465,916	124,508	.....	27,500	97,008	– 19,155
Cleveland, Akron & Cincinnati	344	1,142,397	381,174	1,628,709	252,747	265,527	20,635	530,613	26,056	1,095,578	533,131	.....	98,200	434,931	5,273
Cleveland, Cincinnati, Chic. & St. Louis	2,010[22]	8,684,809	3,586,437	13,383,308	1,440,542	2,024,685	402,581	4,932,299	265,990	9,066,097	4,317,211	– 8,581	490,000	3,818,630	1,202,210
Colorado Midland	337	708,124	144,251	927,622	115,229	157,466	35,986	371,228	26,848	706,757	220,865	—1,114	40,000	179,751	33,868
Colorado & Southern	1,106[23]	2,678,437	717,262	3,626,594	434,705	686,537	55,338	1,096,119	116,036	2,388,735	1,237,859	—4,897	123,500	1,109,462	—187,290
Cumberland Valley	162	895,911	304,753	1,258,783	217,446	152,687	24,010	390,648	35,795	820,586	438,197	2,487	25,707	414,977	—128,821
Delaware & Hudson Co.—R. R. Dept.	851[24]	7,510,144	1,560,018	9,380,288	658,953	1,300,065	110,045	3,045,373	224,200	5,338,636	4,041,652	—6,850	244,968	3,789,834	165,563
Delaware, Lackawanna & Western	930	11,634,140	3,524,567	16,146,391	2,140,243	2,447,813	326,019	4,575,940	322,622	9,812,637	6,333,754	208,911	822,500	5,720,165	—38,312
Denver, Northwestern & Pacific	214	358,158	197,618	580,218	73,110	73,755	12,949	173,225	16,759	349,798	230,420	.....	15,000	215,420	1,610
Detroit & Mackinac	353[25]	327,790	161,680	522,016	95,968	84,780	12,340	160,928	15,292	369,308	152,708	1,663	41,373	112,998	—41,430
Detroit, Toledo & Ironton	441	643,627	81,685	778,877	147,567	97,798	13,858	350,293	27,258	636,774	142,103	– 13	34,584	107,506	33,670
Duluth & Iron Range	190[26]	4,170,295	110,249	4,330,966	523,455	297,001	4,670	690,151	52,748	1,567,525	2,763,441	17,893	174,515	2,606,819	—499,730
Duluth, Missabe & Northern	328[27]	4,252,931	198,760	4,502,387	529,337	360,554	10,177	690,373	61,888	1,652,329	2,850,058	37,352	185,960	2,701,450	—2,351,306
Duluth, South Shore & Atlantic	622[28]	885,842	465,480	1,424,137	226,785	137,258	51,447	512,331	44,109	971,930	452,207	9,558	90,000	371,765	—72,854
El Paso & Southwestern Co.	901	2,373,134	391,436	2,917,113	386,420	420,590	60,615	806,409	113,103	1,787,137	1,129,976	– 7,746	115,379	1,006,851	—133,020
Elgin, Joliet & Eastern	841[29]	3,914,000	25	4,131,692	380,369	746,954	20,407	1,150,002	71,132	2,368,864	1,762,828	.....	83,625	1,679,203	515,779
Erie	1,995[30]	16,114,688	4,160,712	21,837,404	2,693,880	3,544,857	478,899	6,860,963	433,167	14,011,766	7,825,638	75,753	738,520	7,162,871	191,457
Florida East Coast	583	656,440	406,816	1,221,294	281,290	241,870	28,136	472,630	43,048	1,061,974	159,320	—304	77,500	81,516	– 13,842
Fort Worth & Denver City	454	1,411,695	711,977	2,229,016	167,704	304,238	37,309	680,544	66,242	1,256,037	972,979	—3,426	60,500	909,053	—50,291
Galveston, Harrisburg & San Antonio	1,338	3,211,250	1,234,319	4,677,549	555,851	739,211	153,014	1,673,761	130,045	3,251,882	1,425,667	—22,688	152,210	1,250,769	—55,794
Grand Rapids & Indiana	587	1,213,321	890,933	2,279,481	226,047	351,936	56,779	888,690	72,364	1,595,816	683,665	- 178	114,868	568,619	127,064
Great Northern	7,344[31]	23,106,736	6,532,575	31,633,770	3,514,386	3,124,119	465,484	7,730,134	505,718	15,339,841	16,293,929	110,445	1,374,691	15,029,683	2,603,706
Gulf & Ship Island	307	575,871	187,706	827,639	120,746	154,106	12,090	229,452	39,131	555,525	272,114	.....	22,887	249,227	—30,788
Gulf, Colorado & Santa Fe	1,603[32]	3,824,772	1,365,378	5,506,203	1,049,897	781,063	132,706	1,955,924	155,433	4,075,023	1,431,180	.....	178,806	1,252,374	—148,185
Hocking Valley	352[33]	2,716,714	418,047	3,338,485	442,686	513,219	40,983	953,874	78,396	2,029,158	1,309,327	.....	211,958	1,097,369	—240,346
Houston, East & West Texas	190	382,383	148,730	562,018	101,153	55,335	9,249	171,441	17,726	354,904	207,114	.....	19,958	187,156	—10,999
Houston & Texas Central	789	1,812,598	852,731	2,847,773	356,215	410,055	95,857	1,029,313	102,277	1,993,717	854,056	—6,139	110,591	737,326	—163,684
Illinois Central	4,755[34]	16,079,589	5,940,014	25,279,142	3,982,569	5,594,307	589,631	9,362,061	648,614	20,177,182	5,101,960	—52,240	1,154,247	3,895,473	—2,428,910
Iowa Central	558	1,214,664	247,267	1,526,711	195,038	237,898	37,167	630,286	41,619	1,142,009	384,702	.....	48,269	336,433	14,967
Kansas City Southern	827	2,876,909	714,167	4,033,549	406,493	566,510	132,851	1,355,611	148,600	2,610,065	1,423,484	.....	173,059	1,250,425	—305,699
Lake Erie & Western	886	1,862,290	440,046	2,439,491	339,747	405,838	64,926	901,616	54,147	1,766,274	673,217	.....	99,410	573,807	112,588
Lake Shore & Michigan Southern	1,775[35]	13,532,112	5,333,475	21,450,300	2,292,920	2,662,260	442,438	6,469,455	354,618	12,221,691	9,228,609	5,481	745,000	8,489,090	2,742,014
Lehigh & Hudson River	96	622,516	23,451	656,639	90,381	90,893	5,878	208,650	21,337	417,139	239,500	.....	17,500	222,000	9,730
Lehigh Valley	1,431[36]	13,846,383	2,309,974	16,713,873	1,874,671	2,779,658	416,395	5,439,848	331,116	10,841,688	5,872,185	—80,905	547,100	5,244,180	7,273
Long Island	398[37]	1,440,984	3,453,831	5,096,808	640,843	550,033	76,855	2,076,378	100,923	3,445,032	1,651,776	381,965	267,768	1,765,973	135,000
Louisiana & Arkansas	255	447,612	92,636	564,230	110,445	87,886	11,750	152,975	23,897	386,953	177,277	.....	16,350	160,927	—47,285

Mileage operated on November 30, 1910—[1] 347; [2] 7,546; [3] 4,493; [4] 4,434; [5] 204; [6] 2,242; [7] 573; [8] 236; [9] 631; [10] 277; [11] 2,224; [12] 1,276; [13] 7,743; [14] 9,091; [15] 1,489; [16] 340; [17] 615; [18] 1,954; [19] 470; [20] 7,395; [21] 247; [22] 1,982; [23] 1180; [24] 819; [25] 360; [26] 188; [27] 293; [28] 608; [29] 808; [30] 1,959; [31] 7,274; [32] 1,518; [33] 350; [34] 4,552; [35] 1,662; [36] 1,432; [37] 389. — Indicates Deficits, Losses and Decreases.

REVENUES AND EXPENSES OF RAILWAYS.

FIVE MONTHS OF FISCAL YEAR, 1912—(CONTINUED).

Name of road.	Mileage operated at end of period.	Operating revenues			Maintenance		Operating expenses				Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Louisiana Ry. & Navigation	350	$652,354	$121,599	$834,481	$102,109	$75,712	$29,446	$298,726	$31,842	$537,835	$296,646	.....	$23,300	$273,346	$141,235
Louisville & Nashville	4,704[38]	17,051,742	5,248,383	23,667,302	3,580,857	4,117,288	460,972	7,273,521	430,657	15,863,295	7,804,007	—$8,595	744,750	7,050,662	684,080
Louisville, Henderson & St. Louis	199	331,106	186,361	549,931	128,169	60,980	21,280	172,885	15,406	398,720	151,211	1,947	15,000	138,158	7,022
Maine Central	1,179	2,839,250	1,692,455	4,810,061	974,611	538,688	48,838	1,630,051	125,597	3,317,785	1,492,276	—3,794	212,423	1,276,059	121,408
Michigan Central	1,804[39]	8,420,926	3,708,417	13,409,094	1,400,553	1,426,240	341,449	4,848,614	215,717	8,232,573	5,176,521	23,766	570,000	4,630,287	1,727,698
Midland Valley	373[40]	417,781	189,567	646,220	138,150	106,415	15,775	199,594	30,797	490,731	155,499	526	27,422	128,593	—11,737
Minneapolis & St. Louis	1,027	1,272,377	572,014	2,001,180	223,485	253,072	53,299	842,786	61,210	1,433,852	567,328	— 182	102,719	702,047	—234,284
Missouri, Kansas & Texas	1,743[41]	4,958,154	1,931,701	7,326,052	1,192,717	1,055,697	174,540	2,240,592	205,679	4,869,225	2,456,827	—7,628	282,626	2,166,573	—151,455
Missouri, Kansas & Texas of Texas	1,345[42]	3,167,763	1,767,416	5,223,671	1,109,402	477,922	120,601	2,376,257	149,232	4,233,414	990,257	—3,125	140,000	847,132	—640,361
Mobile & Ohio	1,114	3,972,658	638,169	4,884,868	568,885	905,168	160,970	1,683,493	154,791	3,473,307	1,411,561	—5,219	122,975	1,283,367	56,273
Monongahela	64	479,393	11,573	498,064	80,949	34,768	1,662	105,711	9,810	232,900	265,164	.....	13,700	251,464	17,954
Nashville, Chattanooga & St. Louis	1,255	3,489,569	1,291,314	5,123,915	789,102	935,753	185,340	1,851,392	125,312	3,886,899	1,237,016	— 5,582	119,080	1,112,354	16,615
New Orleans & North Eastern	195	1,169,025	265,646	1,532,707	149,539	282,978	45,722	546,478	56,965	1,081,682	451,025	—4,279	45,250	401,496	—38,853
New Orleans Great Northern	282	508,023	151,571	708,188	107,064	91,002	13,615	220,530	35,309	467,520	240,668	—433	10,000	230,235	—31,702
New Orleans, Mobile & Chicago	404	581,648	155,242	783,855	120,037	83,637	13,894	233,129	39,465	490,162	293,693	—121	22,798	270,774	—13,096
New York Central & Hudson River	3,591[43]	26,459,523	14,840,284	46,029,949	6,200,705	6,637,722	950,045	15,889,022	1,099,857	30,777,351	15,252,598	165,223	2,622,045	12,795,776	1,904,121
New York, Chicago & St. Louis	561	3,869,310	780,337	4,841,892	596,128	499,593	225,738	1,864,765	83,184	3,269,408	1,572,484	—5,900	210,000	1,356,584	122,062
New York, New Haven & Hartford	2,091[44]	13,057,997	12,049,681	27,544,956	3,148,784	3,118,490	168,744	10,055,897	796,185	17,288,100	10,256,856	627,288	1,600,000	9,284,144	—9,425
New York, Ontario & Western	565[45]	2,966,174	954,421	4,089,912	609,450	643,735	48,932	1,455,694	80,033	2,837,844	1,249,068	1—2,606	89,584	1,156,878	—214,549
New York, Philadelphia & Norfolk	112	1,153,212	208,681	1,466,029	159,792	254,882	20,181	546,056	60,872	1,041,783	424,246	.....	37,500	386,746	—38,943
New York, Susquehanna & Western	152	881,415	264,915	1,282,271	141,893	112,955	9,816	465,578	26,391	756,633	525,638	21,655	89,368	457,925	47,568
Norfolk & Western	2,004[46]	14,167,332	1,974,041	16,728,327	2,117,243	3,094,355	250,755	4,695,544	304,727	10,462,644	6,265,683	—9,942	575,000	5,680,741	290,792
Norfolk Southern	607[47]	825,928	385,551	1,324,032	153,682	159,788	29,102	422,361	65,704	830,637	493,395	—3,147	37,500	452,748	26,614
Northern Central	472[48]	4,156,540	1,048,759	5,513,253	548,141	1,083,071	75,910	2,668,048	116,204	4,491,374	1,021,879	3,886	201,683	824,082	91,611
Northern Pacific	6,018[49]	19,880,583	7,489,807	29,226,452	3,832,274	2,991,448	493,640	8,649,467	402,041	16,368,870	12,857,582	207,825	1,461,313	11,604,094	—591,963
Oregon Short Line	1,689[50]	6,543,782	2,234,266	9,297,934	1,120,714	792,106	137,469	2,111,098	171,577	4,332,964	4,964,970	3,150	544,032	4,424,088	—66,822
Oregon-Washington R. R. & Nav. Co.	1,919	4,715,268	2,381,981	7,566,084	969,892	669,385	219,666	2,435,755	203,994	4,498,692	3,067,392	8,344	516,563	2,559,173	.....
Pecos & Northern Texas	296	583,800	149,601	767,178	112,159	148,586	11,313	232,306	23,732	528,096	239,082	.....	23,047	216,035	—17,841
Pennsylvania Co.	1,415	17,798,383	3,850,177	23,526,060	2,963,638	4,058,788	374,871	7,549,245	418,164	15,364,706	8,161,354	—5,469	863,447	7,292,438	—624,957
Pennsylvania R. R.	3,978[51]	48,723,608	15,281,610	68,415,352	7,293,927	13,080,939	924,250	24,346,718	1,670,635	47,316,469	21,098,883	569,896	3,029,657	17,499,332	—1,371,809
Peoria & Eastern	351	931,517	345,750	1,359,654	198,268	192,561	28,708	536,843	29,357	985,737	373,917	.....	52,500	321,417	—83,563
Pere Marquette	2,331[52]	4,972,526	1,999,575	7,573,047	905,186	1,097,250	189,314	3,169,016	158,145	5,518,911	2,054,136	—13,624	281,345	1,759,167	199,723
Philadelphia, Baltimore & Washington	718[53]	4,063,004	3,367,424	8,213,785	1,060,923	1,359,129	127,791	3,210,470	176,825	5,935,138	2,278,647	.....	253,489	2,025,158	73,796
Pittsburgh & Lake Erie	218[54]	1,153,286	701,022	2,162,904	754,058	1,102,982	67,178	1,567,163	116,316	3,607,697	3,555,207	—1,298	151,590	3,402,319	—655,523
Pittsburgh, Cincinnati, Chic & St. Louis	1,467[55]	11,765,353	3,577,975	17,209,348	2,488,946	3,058,680	344,194	5,819,268	322,743	12,033,831	5,175,517	—4,758	633,970	4,536,789	—90,369
Pittsburgh, Shawmut & Northern	131	500,387	46,852	576,795	73,518	121,859	5,525	161,994	18,875	381,771	195,024	.....	7,915	187,109	78,196
Richmond, Fredericksburg & Potomac	93	4,400,842	348,816	959,189	104,717	133,019	14,132	351,798	28,674	632,340	326,849	.....	5,470	321,379	17,603
Rutland	408	840,279	590,237	1,577,918	192,423	205,000	39,534	592,084	31,950	1,060,991	516,927	.....	55,732	461,195	—5,182
St. Joseph & Grand Island	319	466,106	199,516	729,103	131,773	84,817	26,226	296,732	26,551	566,099	163,004	176	28,557	134,623	47,885
St. Louis & San Francisco	4,731	11,172,853	5,013,811	17,431,885	2,230,312	2,285,829	436,761	5,857,777	485,224	11,295,903	6,135,982	.....	795,973	5,340,009	189,458
St. Louis, Brownsville & Mexico	507	566,548	287,500	960,613	202,467	60,730	14,793	314,114	40,226	632,330	328,283	.....	22,500	305,783	191,293
St. Louis Merchants' Bridge Terminal	9	.....	1,495	713,180	123,515	48,346	2,181	372,631	25,961	572,634	140,546	.....	28,950	111,596	—147,671
St. Louis, San Francisco & Texas	243	367,164	156,891	554,098	94,516	81,825	15,419	237,171	22,583	451,514	103,094	.....	5,173	97,921	67,859
St. Louis Southwestern	746	2,446,152	584,616	3,241,284	288,063	551,179	138,983	770,264	115,850	1,864,339	1,376,945	—5,414	97,820	1,273,711	—5,290
St. Louis Southwestern of Texas	703	1,334,495	483,607	1,936,869	238,812	399,733	59,561	693,070	85,263	1,476,439	460,430	—916	50,000	409,514	221,632
San Antonio & Aransas Pass	727	1,485,544	567,730	2,168,699	336,337	234,052	27,634	701,627	48,477	1,348,127	820,872	.....	55,000	765,872	30,688
San Pedro, Los Angeles & Salt Lake	1,113	1,765,107	1,[illegible]755	3,[illegible]076	709,566	775,449	157,236	1,412,222	87,021	3,141,494	546,582	—19,900	124,050	402,632	—243,586
Santa Fe, Prescott & Phoenix	204	479,383	158,[illegible]	[illegible]632	104,548	65,337	15,075	201,875	27,044	413,879	281,753	.....	16,825	264,928	16,140
Southern	7,[illegible]	17,[illegible]758	7,47[illegible]447	26,[illegible]765	3,117,295	4,333,075	680,275	8,899,220	749,644	17,779,509	8,960,256	29,732	983,877	8,006,111	205,906
Southern in Mississippi	280	2[illegible]414	172,304	564,414	116,130	44,268	11,557	185,265	18,139	375,359	129,055	.....	26,083	102,972	19,983
Southern Kansas of Texas	124	473,253	78,[illegible]	578,621	104,376	114,279	10,239	198,899	20,965	448,658	124,963	.....	13,012	111,951	—78,633
Southern Pacific Co.	6,[illegible]	23,[illegible]4.7	13,[illegible]4.5	40,[illegible]456	4,634,035	4,377,410	859,823	10,933,898	987,395	21,792,561	18,415,895	160,664	1,543,864	17,032,695	—900,131
Sunset	5[illegible]	3[illegible]700	8[illegible]902	449,532	42,129	8,922	290	117,975	1,431	170,747	278,785	.....	16,949	261,836	8,617
Syracuse, Binghamton & New York	80	[illegible]00,009	1[illegible]86	509,432	78,703	30,871	13,568	171,527	11,312	305,981	203,451	.....	31,100	172,351	—11,115
Tennessee Central	[illegible]	487,611	17[illegible]044	675,[illegible]04	110,843	90,354	26,175	237,315	44,670	509,337	165,847	.....	21,060	144,787	—76,109
Terminal R. R. Ass'n of St. Louis	[illegible]	.....	1,[illegible]67	1,125,860	175,[illegible]84	107,786	3,568	389,814	28,489	705,041	420,319	39,833	138,379	321,773	—85,285
Texas & New Orleans	4[illegible]	1[illegible]454	443,[illegible]67	1,[illegible]449	279,735	352,413	36,751	617,367	46,855	1,333,121	312,378	—2,429	61,240	248,659	—50,318
Toledo & Ohio Central	4[illegible]	1[illegible]156	311,[illegible]13	2,[illegible]323	357,743	287,759	35,237	756,734	40,814	1,478,287	846,036	—4,436	124,258	817,342	—136,198
Toledo, Peoria & Western	[illegible]	[illegible]30	[illegible]0,[illegible]70	54,[illegible]64	87,689	117,588	11,667	201,443	16,765	435,152	114,012	.....	24,000	90,012	—17,652
Toledo, St. Louis & Western	4[illegible]	1,[illegible]736	[illegible]55,[illegible]48	1,[illegible]4,[illegible]3	224,610	315,745	41,824	610,278	43,182	1,235,639	488,684	.....	72,500	416,184	—96,678
Trinity & Brazos Valley	[illegible]	[illegible]	[illegible]07,[illegible]01	1,[illegible]15,859	156,[illegible]61	133,782	49,018	471,689	55,786	866,996	348,863	.....	34,505	314,358	150,548
Union Pacific	3,[illegible]	21,[illegible]717	4,[illegible]715	[illegible],[illegible]669	2,[illegible]94	2,301,934	533,210	5,720,814	509,184	11,171,136	10,989,533	6,149	821,750	10,173,632	—1,867,763
Union R. R. of Baltimore	[illegible]	[illegible]6,[illegible]68	[illegible]0,[illegible]85	[illegible]0,[illegible]83	53,[illegible]77	.....	4,860	27,868	11,404	98,009	548,[illegible]74	.....	20,614	518,[illegible]60	—52,219
Union R. R. of Pennsylvania	51	.....	.....	2,[illegible]5[illegible]40	162,[illegible]84	40[illegible]768	514	644,586	13,706	1,224,458	881,082	19,451	44,500	856,033	211,867
Vandalia	8[illegible]7	2,[illegible]4,851	1,[illegible]01[illegible]	4,[illegible]5[illegible]66	652,[illegible]06	817,398	135,043	1,626,856	97,318	3,336,581	1,019,785	.....	140,[illegible]05	879,180	—196,935
Vicksburg, Shreveport & Pacific	171	3[illegible]0,[illegible]9	[illegible]4,[illegible]8	[illegible]08,[illegible]13	108,406	109,470	16,087	186,556	23,009	443,548	160,285	—1,542	31,[illegible]0	127,[illegible]43	—59,360
Virginia & Southwestern	[illegible]0	[illegible],441	7[illegible]1	[illegible]8,[illegible]5	[illegible]4,[illegible]18	139,113	9,205	200,260	20,409	453,605	275,160	.....	23,[illegible]0	251,610	84,339
Virginian	47[illegible]	1,[illegible]7,[illegible]02	1[illegible]	1,[illegible]83,[illegible]8	[illegible]7,[illegible]28	348,375	25,150	587,997	39,[illegible]50	1,177,900	806,[illegible]08	26,106	75,[illegible]0	757,[illegible]34	181,305
Washington Southern	[illegible]3	[illegible]4,[illegible]6	17[illegible]	[illegible]4,[illegible]19	65,[illegible]03	40,098	6,030	172,672	13,074	295,477	153,542	.....	16,264	137,[illegible]48	—23,[illegible]06
West Jersey & Seashore	[illegible]5	7[illegible]1,[illegible]6	2,[illegible]0[illegible]3	[illegible],[illegible]44	484,[illegible]0	517,829	66,565	1,225,709	51,[illegible]46	2,[illegible]95,569	944,175	—15,461	117,367	771,347	—195,[illegible]3
Wheeling & Lake Erie	[illegible]7	[illegible]5,[illegible]0	[illegible]4,[illegible]4	[illegible],[illegible]4[illegible]	427,[illegible]5	577,863	38,165	1,089,403	70,481	2,170,377	1,[illegible]88,173	12,419	144,704	1,[illegible]55,888	237,[illegible]20
Yazoo & Mississippi Valley	1,[illegible]1	7[illegible],5[illegible]	1,[illegible]1[illegible]	[illegible],[illegible]4[illegible]	863,[illegible]54	581,769	81,134	1,5[illegible],746	133,039	3,186,[illegible]42	1,0[illegible],130	3,[illegible]26	196,000	805,404	—167,[illegible]10

[38] Mileage operated on November [illegible]; [39] 1,746; [40] 303; [41] 1,[illegible]; [42] 1,348; [43] 3,587; [44] 2,041; [45] 545; [46] 1,951; [47] 602; [48] 470; [49] 6,019; [50] 1,594; [51] 3,970; [52] 2,337; [53] 717; [54] 191; [55] 1,468; [56] 501; [57] 768; [58] 1,105; [59] 7,038; [60] 6,193; [61] 56; [62] 34; [63] 444; [64] 3,472; [65] 188; [66] 473; [67] 353. — Indicates Deficits, Losses and Decreases.

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways, of the American Railway Association, in presenting statistical bulletin No. 111, giving a summary of car shortages and surpluses by groups from September 14, 1910, to January 3, 1912, says:

"The effect of the mild weather in the latter part of December and of the holidays is apparent in a further increase of 53,670 cars in the car surplus, the total surplus for the period ending January 3, 1912, being 142,316 cars as against 88,646 cars on December 20, 1911. This is 31,884 cars more than on January 4, 1911. There is a decrease in box car surplus of 3,216 cars compared with last year. The increase in surplus is chiefly in open cars, and, with the exception of group 6 (Iowa, Illinois, Wisconsin, Minnesota, Dakotas), although still showing a large surplus, decreased 2,176 cars in the total number of surplus cars. The car shortage shows a decrease of 5,454 cars as compared with the length, dimensions and cubical capacity of the cars used. The information required by this order is, the commission says, substantially contained in the Official Railway Equipment Register, and the commission suggests that the simplest and most economical way in which railways can comply with this order would be to adapt that publication to these requirements and have it issued and filed with the commission.

The commission has modified its order relative to posting tariffs at stations so as to only order the posting of tariffs at every point at which a complete file of tariffs is required to be kept.

Reparation Awarded.

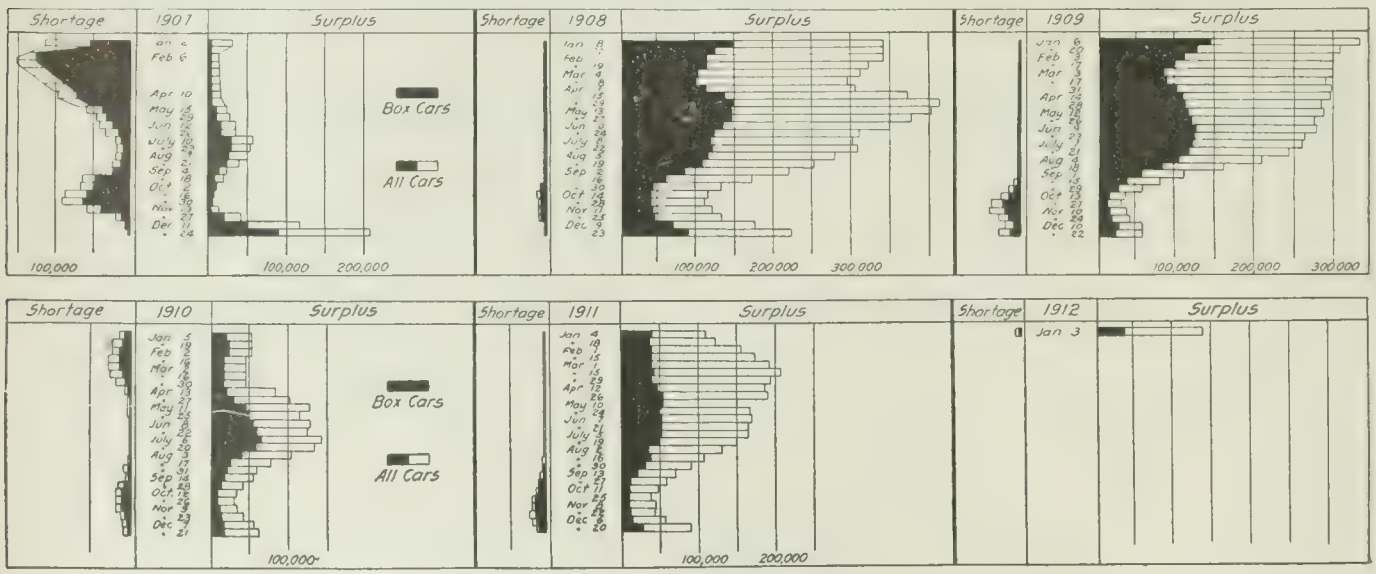
E. F. Sanquinetti v. Illinois Central et al. Opinion by Commissioner Lane.

Rates charged on merchandise from certain eastern points to Yuma, Ariz., found to be unreasonable. (22 I. C. C., 185.)

Car Surpluses and Shortages.

Date.	No. of roads.	Surpluses Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Shortages Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1.—January 3, 1912	7	1,122	2,150	2,812	367	6,451	0	0	0	30	30
" 2.— " 3, 1912	25	3,442	337	14,271	5,975	24,025	6	0	0	3	9
" [illegible] " 3, 1912	25	6,655	1,163	33,182	4,501	45,501	284	0	0	22	306
" 4 " 3, 1912	11	1,259	131	3,981	1,420	6,791	111	4	0	0	115
" [illegible] " 3, 1912	20	1,739	348	1,640	1,342	5,069	140	65	72	15	292
" 6.— " 3, 1912	23	6,360	888	3,529	5,073	15,850	304	5	6	10	325
" 7 " 3, 1912	3	641	901	46	765	2,353	0	0	[illegible]	0	0
" 8 " 3, 1912	18	2,913	500	1,569	2,062	7,044	0	30	0	0	30
" 9 " 3, 1912	10	3,890	205	563	948	5,606	0	0	0	0	0
" 10.— " 3, 1912	20	7,133	1,969	3,126	9,687	21,915	163	0	10	0	173
" 11.— " 3, 1912	5	991	412	0	308	1,711	4,945	0	0	153	5,098
Total	167	36,145	9,004	64,719	32,448	142,316	5,953	104	88	233	6,378

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland, and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages.

previous report. Of the 5,454 car decrease, 3,712 are box, 158 are flat, 1,381 are coal and 203 are miscellaneous cars. The recent and present cold weather will probably result in decreasing the surplus next reported to about the figure of last year."

The accompanying table gives car surplus and shortage figures by groups for the last period covered in the report, and the diagrams show total bi-weekly surpluses and shortages in 1907 to 1911.

INTERSTATE COMMERCE COMMISSION.

The commission has ordered that all railways shall by July 1, 1912, either cancel all provisions in their tariffs that provide that minimum charges shall be based on the marked capacity, length or cubical capacity of the cars used, or publish and file with the commission publications showing the marked capacity,

Definition of an Interestate Service.

Citizens of Somerset, Md., Drummond and Friendship Heights v. Washington Railway & Electric Co. et al. Opinion by the commission.

There are three street or interurban railway companies operating which together form a line between the business district of Washington and Somerset in Maryland. The Washington Railway & Electric operates as far as Georgetown, in the District of Columbia, and transfers to the Georgetown & Tennallytown, which operates as far as the district line, and the Washington & Rockville, a Maryland corporation, which operates between Rockville, Md., and a point within the District of Columbia. Heretofore a passenger could ride from the business district of Washington to Somerset for a cash fare of five cents or a ticket sold six for 25 cents. After the passing of a law by the state of Maryland reducing the number of five-cent zones on the Wash-

ington & Rockville, in Maryland, from four to three, the company began charging a five-cent fare from Somerset to the district line, and an additional five-cent fare to get from the district line into or through Washington. This increase in fare took place since the passage of the Mann-Elkins amendment, and therefore the commission holds that the burden of proof to justify the increase rests on the railway company. The commission holds that it has jurisdiction in the case since the Commerce Court has upheld the commission in its contention that it has jurisdiction over street railways doing an interstate business. The contention of the defendants that they do not do an interstate business, because the District of Columbia companies only carry passengers as far as the District of Columbia line, is found by the commission not to be in accordance with the facts. The commission finds that passengers are carried through without change of cars; that cars are run through without change of crews, and that the companies have heretofore held out their service as a through route. This the commission finds to constitute interstate business, and since no other justification is offered for the rate than the Maryland law, which the commission finds does not affect interstate business, the defendants are ordered to restore the former single five-cent rate. (22 I. C. C., 187.)

STATE COMMISSIONS.

The Indiana Commission has proceeded in court against the Pennsylvania for violation of the state law requiring locomotives to be equipped with automatic bell ringers.

The Georgia Railroad Commission has declined to order a reduction in fares on the lines of the Savannah Electric Company. Employing the American Audit Company to examine the company's books for 12 months past, the commission found that the net earnings on a fair valuation had amounted to 6.75 per cent., which was held not to be excessive.

The South Carolina commission has adopted and published a standard freight tariff, making uniform regulations for all of the more important railways of the state, but not materially changing the rates. The commission has also issued an express tariff, reducing the rates for merchandise packages for certain distances, the reduction amounting, according to one report, to 8 per cent.

The Railroad Commission of Louisiana has fined the New Orleans Great Northern $1,000 for failing to operate its trains on schedule time, post bulletins when its trains were late, accept freight destined to Hill Switch, failing to have its coaches properly heated and supplied with ice water, and failing to keep its roadbed in safe condition between St. Tammany station and Pearl River. The commission says that the evidence was so conflicting that it found it necessary to appoint a committee of competent engineers to make an independent investigation.

The New York Public Service Commission, Second district (up State), has given the Catskill Traction Company permission to extend its line from Leeds to Cairo, seven miles. This extension parallels the steam road of the Catskill Mountain Railway, and while the commission finds that there is clearly not enough business to support two parallel steam roads, the fact that the extension is a trolley road, which will have low fares and serve conveniently people living along the highway, makes it possibly profitable. The commission, however, makes as a condition of its permission a limitation of bond issue to $11,900 per mile, the balance of the money required to build the line to be raised by the sale of $60,000 6 per cent. cumulative stock to be sold at not less than par. The commission says that it understands that this stock will be raised principally by local investors who are familiar with the business which is proposed to be developed by the new extension. The commission does not believe that the adverse effect on the Catskill Mountain Railway is sufficient cause for the denial of the application, and that there is reason to believe that the electric line will have but little adverse effect on the earnings of the steam line, and on the contrary, that the new line may build up the territory and justify the establishment of additional accommodations for summer boarders, and in the end increase the freight traffic and thus at least partially offset the reduction in the passenger earnings.

COURT NEWS.

The Indiana Appellate Court, in an opinion by Justice Myers, has held that the Postal Telegraph Company cannot enjoin the Chicago, Lake Shore & South Bend Electric Railway, whose line parallels the Postal wires on the adjoining right-of-way from using the single-phase alternating current at 32,000 volts in propelling its cars, thereby producing in the telegraph wires induced currents which interfere with the transmission of messages.

The Supreme Court of Louisiana on January 15, sustained the right of a negro to a seat in a street car, in New Orleans, notwithstanding the existence of a "Jim Crow" law. It appears that the negro, Joseph Anderson, had taken a seat in the compartment assigned to negroes, but that the movable partition between the white and black compartments was afterwards put into a different position, so as to bring Anderson's seat within the white compartment. After this change, the person in charge of the car sought to eject Anderson; but as there was no seat in the newly established black compartment, the court sustains him in his right to stay in the seat which he occupied.

Federal Employers' Liability Law Sustained.

The Supreme Court of the United States in an opinion by Justice Van Devanter has upheld the constitutionality of the employers' liability act of 1908 in four cases before it, the principal ones being the New York, New Haven & Hartford vs. Mondon and the Northern Pacific vs. Babcock. The Court of Appeals for the state of Connecticut, which held that an action to recover under the law could not be brought in a state court is overruled, and the case remanded. The judgment of the court was written by Judge (now Governor) Simeon E. Baldwin. The action was brought in one of the courts of the state by a fireman to recover damages for personal injuries sustained in the line of employment and due to the negligence of a fellow servant. The action was brought under the Federal law, although begun in the state court.

In a demurrer the railway not only attacked the constitutionality of the Federal employers' liability act, but also raised the point that action arising under a Federal law could not be brought in the same court. The demurrer was sustained. The Supreme Court in reversing this judgment says:

"We are quite unable to assent to the view that the enforcement of the rights which the congressional act creates was originally intended to be restricted to the Federal courts. The act contains nothing which is suggestive of such a restriction. The circuit courts of the United States have original cognizance, concurrent with the courts of the several states, of all suits of a civil nature, at common law or in equity, where the matter in dispute exceeds, exclusive of interest and costs, the sum of $2,000, and arising under the constitution or laws of the United States. . . . By an amendment made in 1910 it is declared that 'the jurisdiction of the courts of the United States under this act shall be concurrent with that of the courts of the several states, and no case arising under this act and brought in any state court of competent jurisdiction shall be removed to any court of the United States.'"

"The amendment," says Justice Van Devanter, "instead of granting jurisdiction to the state courts presupposes that they already possessed it."

Justice Van Devanter says further:

"The suggestion that the act of Congress is not in harmony with the policy of the state, and therefore that the courts of the state are free to decline jurisdiction, is quite inadmissible, because it presupposes what in legal contemplation does not exist. When Congress in the exercise of the power conferred on it by the constitution adopted the act it spoke for all the people and all the states, and thereby established a policy for all. That policy is as much the policy of Connecticut as if the act had emanated from its own legislature, and should be respected accordingly in the courts of the state.

"The exercise of jurisdiction by the state courts will not be attended by any appreciable inconvenience or confusion; but, be this as it may, it affords no reason for declining a jurisdiction conferred by law. The existence of the jurisdiction creates an

implication of duty to exercise it, and that its exercise may be onerous does not militate against that implication.

"Besides, it is neither new nor unusual in judicial proceedings to apply different rules of law to different situations and subjects, even although possessing some elements of similarity, as where liability of a public carrier for personal injuries turns upon whether the injured person was a passenger, an employee or a stranger. But it never has been supposed that the courts are at liberty to decline cognizance of cases of a particular class merely because the rules of law to be applied to their adjudication are unlike those applied in other cases."

In the other three cases the court holds that certain things are well established as to the power of Congress under the commerce clause of the constitution, among them that the term "commerce" means more than mere exchange of goods and embraces "commercial intercourse in all its branches, including transportation of passengers and property by common carrier whether carried on by water or by land"; that the right "to regulate" gives Congress the power "to foster, protect, control and restrain, with appropriate regard for the welfare of those who are immediately concerned and of the public at large"; also that the power "is complete in itself and extends incidentally to every instrument and agent by which such commerce is carried on" and may be exerted "to its utmost extent over every part of such commerce."

It was contended that Congress exceeded its power by abrogating the "fellow servant" rule and restricting the defenses of contributory negligence and assumption of risk; that the regulations were faulty in that they limited the liability to instances where the injured employee is engaged in interstate commerce and do not confine it to instances where both the employee injured and the co-employee through whose negligence the injury may have occurred were in interstate commerce; that the law interferes with the liberty of contract and finally that it creates a favored class of employees in interstate commerce.

Replying to these contentions the court reiterates its doctrine that a person has "no vested interest in any rule of the common law." The act under consideration, says the decision, departs from the common law in the matter of the fellow servant, the comparative negligence of the employee, the denial of the assumption of risk and the benefits accorded designated relatives in the case of death.

"The natural trend of the changes described," says the decision, "is to impel the carrier to avoid and prevent the negligent acts and omissions which are made the basis of the rights of recovery, and as whatever makes for that end tends to promote the safety of the employees and to advance the commerce in which they are engaged we entertain no doubt that in making those changes Congress acted within the limits of the discretion confided to it by the constitution.

"We are not unmindful that the end was being measurably attained through the remedial legislation of the various states, but the legislation has been far from uniform, and it undoubtedly rested with Congress to determine whether a national law, operating uniformly in all the states upon all carriers by railway engaged in interstate commerce, would better subserve the needs of the commerce."

The objection that Congress erred in including cases where the culpable fellow-servant might be engaged only in intrastate commerce the court dismisses with the observation that such a theory treats of the "source of injury rather than its effect upon interstate commerce, as the criterion of congressional power."

Of the curtailed right of contract implied in the act's declaration that assumption of risk by the employee shall not free the employer from liability, the court said:

"If Congress possesses the power to impose the liability, which we hold that it does, it also possesses the power to insure its efficiency by prohibiting any contract, rule, regulation, or device, in evasion of it."

The creation of classes by the selection of only employers and employees in interstate railway traffic is not unconstitutional, nor does the constitution condemn exertions of the power merely because they occasion some inequalities. On the contrary it admits of the exercise of a wide discretion in classifying according to general rather than minute distinction and condemns what is done only when it is done without any reasonable basis, and therefore is purely arbitrary. Tested by this standard, this classification is not objectionable.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

The Hine system of organization has been established on the Georgia & Florida. See an item under General News.

E. C. Wells has been appointed auditor of the Jasper & Eastern, a part of the Santa Fe system, with office at Kirbyville, Tex.

H. C. Hale has been appointed treasurer and auditor of the Texas City Terminal Company, with office at Texas City, Tex., succeeding R. B. Smith, resigned.

H. U. Wallace, vice-president of the Fort Dodge, Des Moines & Southern, having resigned, the duties of that office have been assumed by C. H. Crooks, general manager.

H. H. Field, general counsel of the Chicago, Milwaukee & Puget Sound at Seattle, Wash., has been appointed general solicitor of the Chicago, Milwaukee & St. Paul, with office at Chicago.

W. E. Shirley, assistant claims attorney of the Quincy, Omaha & Kansas City at Kansas City, Mo., has been appointed claims attorney, with office at Kansas City, succeeding W. S. McCaull, resigned.

Frederick W. Whitridge, for the past four years receiver of the Third Avenue Railroad at New York, has been elected president of the new Third Avenue Railway Company, and Edward A. Maher has been elected vice-president and general manager.

J. S. Pyeatt, superintendent of the St. Louis & San Francisco at Chaffee, Mo., has been elected vice-president and general superintendent of the St. Louis, San Francisco & Texas and the Fort Worth & Rio Grande, with office at Fort Worth, Tex., succeeding W. B. Drake, resigned to engage in other business.

Joseph Taney Willcox, who was appointed assistant secretary of the Pennsylvania Railroad, with office at Philadelphia, Pa., as has already been announced in these columns, was born at Glen Mills, Delaware county, Pa., on September 15, 1886, and was educated at St. Joseph's College and Roman Catholic High School, Philadelphia. He was admitted to the bar in October, 1907, and was appointed assistant to the secretary of the Pennsylvania Railroad in October, 1910, which position he held at the time of his recent appointment as assistant secretary, as above noted.

Col. W. A. Henderson, general solicitor of the Southern Railway and the Northern Alabama Railway, with headquarters at Washington, D. C., has been assigned to special service, reporting as heretofore to the general counsel at Washington, and L. E. Jeffries, division counsel for Alabama, has been appointed general attorney, with headquarters at Washington, D. C. J. T. Stokeley has been appointed division counsel for the Alabama law division, with headquarters at Birmingham, Ala., and Pettus, Fuller & Lapsley have been appointed assistant division counsel, with headquarters at Selma, Ala.

B. L. Winchell has been elected chairman of the board and vice-president of the New Orleans, Mobile & Chicago, with office at St. Louis, Mo. W. F. Owen, vice-president and general manager, has been elected president, with office at Mobile, Ala. M. H. Smith has been elected vice-president, with office at Louisville, Ky. George W. Crary, secretary and treasurer, has been appointed treasurer, with office at Mobile, and T. D. Heed has been appointed assistant treasurer, with office at New York. F. H. Ricker has been appointed secretary, with office at Mobile, and H. L. Borden has been appointed assistant secretary, with office at New York. B. L. Winchell is also president and T. D. Heed assistant secretary and assistant treasurer of the St. Louis & San Francisco. M. H. Smith is also president of the Louisville & Nashville.

William Alfred Worthington, assistant to the director of maintenance and operation of the Union Pacific System and the Southern Pacific Company, has been appointed assistant director of maintenance and operation, with office at New York, succeeding W. B. Scott, recently elected vice-president and general manager of the Union Pacific at Omaha, Neb. Mr. Worthington was born

on June 18, 1872, at Vallejo, Cal., and was educated in the public schools. He began railway work on March 1, 1887, with the Southern Pacific as stenographer and clerk in the superintendent's office at Sacramento, and in 1888 was appointed secretary and chief clerk in the office of the engineer of maintenance of way at San Francisco. In October, 1893, he was promoted to statistician of the general manager's office, and two years later was made chief clerk of the same office. He was transferred as chief clerk to the assistant to the president in October, 1901, and on April 1, 1904, was made chief clerk in the office of the director of maintenance and operation of the Union Pacific System and the Southern Pacific Company at Chicago. Mr. Worthington was promoted to assistant to the director of maintenance and operation, with office at Chicago on November 1, 1907, which position he held at the time of his recent appointment as assistant director of maintenance and operation, with office at New York.

Major Charles Hine, who, as special representative of the director of maintenance and operation of the Harriman Lines, has had charge of the installation of the unit system of organization on those lines, has been elected vice-president and general manager of the Southern Pacific of Mexico and the Arizona Eastern, with office at Tucson, Ariz., effective January 15. Major Hine was born March 15, 1867, at Vienna, Va. He graduated in 1885 from the high school at Washington, D. C., in 1891 from the United States Military Academy at West Point, and in 1893, while serving as a lieutenant in the United States Army, graduated from the Cincinnati Law School, and was admitted to the bar. In 1895 he resigned his army commission and entered the service of the Cleveland, Cincinnati, Chicago & St. Louis, with which company he remained for four years as freight brakeman, switchman, yardmaster, emergency conductor, chief clerk to superintendent and trainmaster. In 1898 he obtained a leave of absence and served through the Santiago campaign in the Spanish war as major of the United States volunteers. On February 1, 1899, he returned to the service of the Big Four as trainmaster at Cincinnati, and on September 1, 1899, was appointed general superintendent of the Findlay, Fort Wayne & Western. This position he resigned to take charge of his father's estate in Virginia. Since that time he has been engaged in special railway work in various staff positions on both large and small railways, including the Chicago & Alton, the Chicago, Rock Island & Pacific, the St. Louis & San Francisco, the Chicago, Burlington & Quincy, the Erie, the Delaware & Hudson, the Intercolonial and the National Railways of Mexico. In 1900 he was for a time inspector of safety appliances for the Interstate Commerce Commission. In 1907 he assisted in the revision of business methods of the Department of the Interior at Washington; in 1907 and 1908 he was receiver of the Washington, Arlington & Falls Church Electric Railway, and in 1910, as temporary special representative to President Taft, outlined a program for improving the organization and methods of the executive departments of the United States government. From July, 1908, until the date of his new position he held the title of special representative of Julius Kruttschnitt. Major Hine is the author of many magazine articles and of two series of "Letters from an Old Railway Official to His Son," the first of which was published in *The Railway Age* in 1904, and the second in the *Railway Age Gazette* in 1911.



Charles Hine.

Operating Officers.

The Hine system of organization has been established on the Georgia & Florida. See an item under General News.

W. H. Homan, chief despatcher of the Texas & Pacific at Big Spring, Tex., has been appointed trainmaster, with office at Big Spring, and C. C. Kilway, night chief despatcher, succeeds Mr. Homan.

The office of J. G. Lorton, superintendent of terminals of the St. Louis and San Francisco, at Oklahoma City, Okla., has been abolished, and the jurisdiction of the superintendent of the Southwestern division has been extended to cover that terminal.

C. M. Bryant, formerly assistant general manager of the Missouri, Kansas & Texas, of Texas, who was granted a leave of absence on account of illness about three months ago, has been appointed superintendent, with office at Greenville, Tex., succeeding F. S. James, assigned to other duties.

O. H. McCarty, superintendent of the St. Louis & San Francisco at Sapulpa, Okla., has been appointed superintendent, with office at Chaffee, Mo., succeeding J. S. Pyeatt, elected vice-president and general superintendent of the St. Louis, San Francisco & Texas. W. G. Koch, assistant superintendent at Newburg, Mo., succeeds Mr. McCarty.

H. E. Bruffey, trainmaster of the Feyetteville district of the Atlantic Coast Line at Rocky Mount, N. C., has been appointed trainmaster of the Richmond district, with office at Richmond, Va., succeeding G. B. McClellan, who has been transferred as trainmaster to the Fayetteville district, with office at Rocky Mount, N. C., succeeding Mr. Bruffey.

W. H. Dabney, division agent of the Delaware & Hudson, at Albany, N. Y., in charge of the territory from Saratoga Springs to Rouses Point and all branch lines, has been appointed division agent in charge of the territory from Ballston Spa to Binghamton, and all branch lines, with office at Albany, succeeding W. W. Bates promoted. H. A. Empie succeeds Mr. Dabney.

William Doherty, traffic manager of the St. Louis, Brownsville & Mexico at Kingsville, Tex., has been appointed assistant general manager of that road and the New Orleans, Texas & Mexico, with office at Kingsville, reporting to J. H. Elliott, vice-president and general manager at Houston, Tex. R. B. Fowler, general manager of the New Orleans Terminal Company at New Orleans, La., has been appointed superintendent of the St. Louis, Brownsville & Mexico, with office at Kingsville, succeeding to the duties of C. B. Rodgers, general manager, resigned; and the office of general manager of that road has been abolished. The title of J. D. Finnegan, superintendent at Kingsville, has been changed to assistant superintendent.

Alexander Purves Gest, who was appointed to the new position of special agent of the New Jersey division of the Pennsylvania Railroad, as has already been announced in these columns, was born on February 2, 1853, at Philadelphia, Pa., and was educated at the school of Dr. J. W. Faires, the University of Pennsylvania, and the Rensselaer Polytechnic Institute, graduating from the latter institution in 1874 with the degree of civil engineer. He entered the service of the Pennsylvania Railroad in 1875, in the engineering department. On March 1, 1883, he was appointed division engineer of the Monongahela division, and the following October was transferred in the same capacity to the Pittsburgh division. He was again transferred as division engineer in January, 1886, to the New York division. Mr. Gest was appointed superintendent of the Bedford division in September, 1889, and in January, 1891, was transferred in the same capacity to the Frederick division, and since January, 1893, until his recent appointment as special agent of the New Jersey division he was superintendent of the Belvidere division.

James Buckelew, whose appointment as superintendent of the West Jersey & Seashore, with office at Camden, N. J., has been announced in these columns, was born on October 7, 1864, at Jamesburg, N. J., and entered the service of the Pennsylvania Railroad on July 23, 1885, in the engineering department as a rodman. He was later transferred to the maintenance of way department, and was made assistant supervisor in May, 1888, and was promoted to supervisor in April, 1890. In January, 1900, he was appointed assistant engineer of the Renova division, and the following January he was transferred in the same capacity to the Tyrone division, and one year later was again transferred in the same capacity to the Pittsburgh division. He was appointed principal assistant engineer of the

Philadelphia, Baltimore & Washington on June 1, 1903, and on January 1, 1906, he was appointed superintendent of the Central division. In April, 1907, he was transferred in the same capacity to the Allegheny division, which position he held at the time of his recent appointment as superintendent of the West Jersey & Seashore.

E. M. Rine, whose appointment as general superintendent of the Delaware, Lackawanna & Western, in charge of the transportation department, with office at Scranton, Pa., has been announced in these columns, was born on September 4, 1867, at Brilliant, Ohio, and was educated in the public schools. He began railway work in September, 1886, as a telegraph operator on the Cleveland & Pittsburgh, on the River division of the Pennsylvania Company. He later went to the Baltimore & Ohio, serving as train despatcher and then as trainmaster until October 4, 1899, when he went to the Delaware, Lackawanna & Western as train despatcher. About two months later he was made chief train despatcher, and then for seven months was trainmaster, when he became superintendent at Scranton, Pa., and from August, 1900, until March, 1908, he was superintendent of the Morris & Essex division of that road. He was promoted to assistant general superintendent on December 1, 1910, which position he held at the time of his recent appointment as general superintendent, as noted above.

John Wilfred Higgins, assistant general manager of the Missouri Pacific-Iron Mountain system at St. Louis, Mo., who has been appointed general manager, with office at St. Louis, as has been announced in these columns, was born October 12, 1864, at Newport, R. I., and began railway work as a messenger on the Illinois Central when he was 15 years old. From that time until June, 1892, he was consecutively, track laborer, switchman, telegraph operator, freight and passenger brakeman and baggageman, freight conductor, chief clerk to the superintendent of the Chicago division, trainmaster of the Centralia district, chief clerk to the general superintendent, and assistant superintendent of the Louisiana division. For six months from June, 1892, he was superintendent of the same division, and was then until April, 1896, superintendent of terminals, first at New Orleans, and then at Chicago. From April, 1896, to May, 1899, he was superintendent of the Amboy division, and on the latter date was made superintendent of transportation. He was promoted to general superintendent of transportation of the Illinois Central system on January 1, 1901, which office he held for two years and a half. For over a year, from September, 1903, he was with the Grand Trunk as assistant superintendent, first on the Eastern, and then on the Middle division. He went to the Missouri Pacific as inspector of transportation in December, 1904, and in March of the following year was appointed assistant general manager, from which office he has just been promoted.



J. W. Higgins.

Charles Otto Dambach, whose appointment as superintendent of the Wabash Pittsburgh Terminal and West Side Belt, with office at Pittsburgh, Pa., has been announced in these columns, was born on January 15, 1877, at Greenville, Pa., and was educated in the public and high schools of his native town. He began railway work in February, 1893, with the Pennsylvania Lines West of Pittsburgh as a clerk, and in August of the same year he went to the Pittsburgh, Shenango & Lake Erie, now part of the Bessemer & Lake Erie, as telegrapher and clerk in the office of the superintendent of transportation and was then consecutively baggage master, assistant weigh master, yardmaster, extra despatcher, chief clerk in the car record office, then chief clerk to the trainmaster and acting trainmaster, with the same company. In September, 1902, he was appointed assistant general yardmaster of the Standard Steel Car Company, at Butler, Pa. In March, 1903, he went to the West Side Belt Railroad as chief clerk to the superintendent, and was promoted to chief despatcher in June, 1905. The following October, he was made chief clerk to the general superintendent of the Wabash Lines east of Toledo, the West Side Belt having been consolidated with that system, and shortly afterwards he was appointed also superintendent of telegraph. On July 1, 1907, he was appointed trainmaster of the Eastern district of the Pittsburgh-Toledo division of the Wabash Lines east of Toledo, and at the time of the separation of the Wabash Pittsburgh Terminal and the West Side Belt from the Wheeling & Lake Erie on account of receivership proceedings, he remained with the former companies, and on June 15, 1908, he was appointed trainmaster of these companies, which position he held at the time of his recent appointment as superintendent as above noted.

Victor Wierman, whose appointment as superintendent of the Trenton division of the Pennsylvania Railroad, with office at Camden, N. J., has been announced in these columns, was born at Towanda, Bradford county, Pa., on December 20, 1855, and was educated at preparatory schools, also the Harrisburg Academy, and graduated from LaFayette College, Easton, in 1876. The same year he entered the chief engineer's office of the Pennsylvania Canal Company, at Harrisburg, Pa., and previous to November, 1878, he was engaged in making right of way surveys for that company and was in the service of the Lehigh Valley Railroad. Mr. Wierman went to the Pennsylvania Railroad on November 14, 1878, as assistant supervisor on the New York division, with office at New Brunswick, N. J., and in May, 1882, was promoted to supervisor on the same division. In December, 1884, he was appointed assistant engineer of the Western Pennsylvania division, and in January, 1886, was transferred in the same capacity to the Pittsburgh division. He was promoted to superintendent of the Bedford division in October, 1893, and two years later was made superintendent of the Lewistown division. He was transferred as superintendent on January 1, 1899, to the Frederick division, and in February, 1902, was again transferred as superintendent to the Amboy division. On January 1, 1912, when the Amboy and Belvidere divisions were combined to form the Trenton division, he was appointed superintendent of that division, with headquarters at Camden, N. J.



V. Wierman.

Traffic Officers.

The Hine system of organization has been established on the Georgia & Florida. See an item under General News.

Reuben M. Andreas has been appointed traveling passenger agent of the Union Pacific, with headquarters at Minneapolis, Minn.

J. E. Hansen has been appointed agent of the Lackawanna Line, with office at Des Moines, Iowa, succeeding C. R. Strickler, transferred to Peoria, Ill.

E. L. Davison has been appointed assistant foreign freight agent of the Mobile & Ohio and the Southern Railway, with headquarters at Mobile, Ala.

James A. Cummiskey has been appointed advertising agent of the Queen & Crescent Route, with office at Cincinnati, Ohio, succeeding W. F. Beyreiss, deceased.

J. Q. David, traveling freight agent of the Chicago, Indianapolis & Louisville at Chicago, has been appointed traveling freight agent, with office at Indianapolis, Ind.

D. M. Dodge has been appointed general agent of the Louisiana Railway & Navigation Company, with office at Kansas City, Mo., succeeding E. C. Hastings, resigned to go into other work.

W. G. Grutchfield, traveling freight agent of the Southern Railway Company at Anniston, Ala., has been appointed commercial agent with office at Anniston, and his former position has been abolished.

I. P. Spining, general agent in the passenger department of the Cleveland, Cincinnati, Chicago & St. Louis and the Michigan Central, with office at Chicago, has resigned to engage in other business.

Ely Ensign has been appointed southwestern passenger agent of the Atlanta & West Point and the Western Railway of Alabama, with headquarters at Houston, Tex., succeeding C. C. Johnston.

Charles J. Koepsell, soliciting freight agent of the Kansas City Southern at Chicago, has been appointed traveling freight agent, with headquarters at Chicago, and Charles G. Douglas succeeds Mr. Koepsell.

R. H. McKay, commercial agent of the Atlanta, Birmingham & Atlantic, at Thomasville, Ga., has been appointed commercial agent at Moultrie. E. M. Fleming succeeds Mr. McKay, with office at Thomasville.

Charles N. Gray, chief clerk to the commercial agent of the St. Louis & San Francisco at Dallas, Tex., has been appointed soliciting freight agent, with office at Dallas, succeeding W. H. Winnfield, resigned.

R. J. McMillan, chief clerk to the traffic manager of the St. Louis, Brownsville & Mexico, has been appointed general freight and passenger agent, with office at Kingsville, Tex., succeeding to the duties of William Doherty, traffic manager, promoted, and the office of traffic manager has been abolished.

James E. Williams, assistant general freight agent of the Pere Marquette at Detroit, Mich., having resigned to go with the Uniform Classification Committee, the duties of his office have been assumed by the general freight department, under the immediate direction of R. P. Paterson, assistant general freight agent at Detroit. A. Harry Greenly has been appointed chief of the tariff bureau, in charge of the compilation and publication of tariffs, with office at Detroit.

J. R. Christian, general freight agent of the Galveston, Harrisburg & San Antonio, the Houston & Texas Central, the Houston East & West Texas and the Houston & Shreveport; T. J. Anderson, general passenger agent, and Gentry Waldo, assistant general freight agent, all at Houston, Tex., have had their jurisdiction extended over the Texas & New Orleans; Mr. Christian succeeding T. G. Beard, who has been appointed assistant general freight agent of all the lines mentioned, in charge of solicitation; and Mr. Anderson succeeding Joseph Hellen, appointed assistant general passenger agent of all the lines. S. G. Reed, assistant general freight agent at Dallas, Tex., has been appointed assistant general freight and passenger agent at that place.

Frank H. Plaisted, whose appointment as assistant to the director of traffic of the Harriman Lines, with office at New York, has been announced in these columns, was born June 9, 1866, at Cincinnati, Ohio. He received a high school education and began railway work on October 7, 1884, with the Kansas City, Fort Scott & Gulf, now part of the St. Louis & San Francisco. On March 20, 1889, he went with the Union Pacific at Salt Lake City, Utah, and was traveling freight agent of that road for nine years from 1892; first at Salt Lake, then at San Francisco, and from April, 1897, when the Oregon Short Line was segregated from the Union Pacific, again at Salt Lake. He was transferred to the Oregon Short Line staff in 1901, and the next year was made district freight and passenger agent at Boise, Idaho. On October 1, 1905, he was appointed assistant general freight agent, with office at Salt Lake City, from which position he was promoted, effective January 1, 1912.

Engineering and Rolling Stock Officers.

The Hine system of organization has been established on the Georgia & Florida. See an item under General News.

J. G. Kelly, master carpenter of the Chicago, Burlington & Quincy at Centerville, Iowa, has been transferred to Beardstown, Ill., succeeding J. O. Thorn, resigned.

W. S. Hanley has been appointed division engineer of the New Orleans Great Northern, with headquarters at Bogalusa, La., succeeding D. L. Cullom, resigned to go to another company.

C. E. Boss, master mechanic of the Fort Worth & Rio Grande at Sherman, Tex., has been appointed master mechanic of the Texas & Pacific, with office at Big Springs, Tex., succeeding J. Potton.

W. H. Harland, Jr., signal engineer of the New York, Ontario & Western, with office at Middletown, N. Y., has been appointed electrical and signal engineer in charge of the maintenance of all electrical equipment and signals.

J. W. Senger, supervisor of materials in the locomotive and car department of the Lake Shore & Michigan Southern at Cleveland, Ohio, has been appointed master car builder, with headquarters at Englewood, Ill., succeeding T. H. Goodnow, resigned to accept service with another company.

T. H. Goodnow, master car builder of the Lake Shore & Michigan Southern at Englewood, Ill., has been appointed general superintendent of shops of the Armour Car Lines, with office at Chicago, succeeding W. E. Sharp, resigned to become vice-president and general manager of the Grip Nut Company.

C. E. Gossett, master mechanic of the Minneapolis & St. Louis, at Minneapolis, Minn., has been appointed general master mechanic, and his authority has been extended over the Eastern division. The authority of P. W. Helwig, general car foreman, Minneapolis, has also been extended over the Eastern division.

J. T. Wallis, whose appointment as general superintendent of motive power of the Pennsylvania Railroad, with headquarters at Altoona, Pa., has already been announced in these columns, was born on June 11, 1868, at New Orleans, La., and was educated in the public schools of his native town, the University of Louisiana (now Tulane University) Georgetown College, and graduated from Stevens Institute with the degree of mechanical engineer in 1891. The same year he entered the service of the Pennsylvania Railroad as an apprentice at the West Philadelphia shops, and was then consecutively assistant road foreman of engines, assistant master mechanic, assistant engineer of motive power, master mechanic, and superintendent of motive power. Mr. Wallis was appointed superintendent of the West Jersey & Seashore on May 1, 1910, which position he held at the time of his recent promotion to general superintendent of motive power as above noted.

J. M. Henry, who was recently appointed master mechanic of the Pennsylvania Railroad at the West Philadelphia, Pa., shops, as has been announced in these columns, was born in 1873, and entered the service of the Pennsylvania Railroad in 1889. He was appointed machinist apprentice in November, 1890, and then entered Purdue University, from which he graduated in 1900. The same year he re-entered the service of the Pennsylvania Railroad in the motive power drafting room at Altoona, and the following year was appointed motive power inspector at Altoona, from which position he was promoted in February, 1909, to assistant engineer of motive power on the Erie & Northern Central division. He was again promoted in July, 1903, to master mechanic at the Elmira, N. Y., shops. He was transferred in the same capacity in April, 1906, to the Sunbury, Pa., shops, and was again transferred as master mechanic on May 1, 1911, to the Olean, N. Y., shop, which position he held at the time of his appointment as master mechanic at the West Philadelphia shops.

J. E. Greiner, consulting bridge engineer of the Baltimore & Ohio, with office at Baltimore, Md., has been appointed consulting engineer of the Chicago Elevated Railways to design an important city and elevated railway bridge over the Chicago river. Mr. Greiner was born at Wilmington, Del., in 1859, and graduated from Delaware College. He began railway work in 1885 as

draftsman on the Baltimore & Ohio, having had some previous experience in outside companies, and in 1889 he was made assistant engineer in charge of bridge designing. From 1893 to 1908 he was assistant chief engineer of the Baltimore & Ohio, and had charge of the design, among others, of the Ohio river bridge at Parkersburg, the Ohio river bridge at Benwood, the Susquehanna river bridge at Havre de Grace, and designed a bridge across the Albemarle Sound, five miles long, for the Norfolk Southern, also a number of other structures. He has at various times been consulting engineer also for the Erie, the Peoria & Pekin Union, and the Kentucky & Indiana Terminal, and has been engaged to design and build a combined steam railway, electric railway and highway bridge over the Ohio river at Louisville, Ky., to cost $2,000,000.

Henry S. Hayward, whose appointment as consulting engineer of floating equipment of the Pennsylvania Railroad lines east of Pittsburgh, has been announced in these columns, was born on September 19, 1845, at Brooklyn, N. Y., and entered the service of the Pennsylvania Railroad on April 1, 1873, as a machinist and was later draftsman. He was then for one year assistant road foreman of engines, and from April 1, 1875, to October, 1882, he was assistant superintendent of motive power of the United Railroads of New Jersey division, and in October, 1882, was promoted to superintendent of motive power on the same division. Two years later his authority was extended over the West Jersey & Seashore Railroad, which position he held at the time of his recent appointment as consulting engineer of floating equipment as above noted, with headquarters at Jersey City, N. J.



H. S. Hayward.

Purchasing Officers.

John H. Guess, whose appointment as general purchasing agent of the Grand Trunk, with office at Montreal, Que., has been announced in these columns, was born near Raleigh, N. C., on February 5, 1878, and began railway work as a telegraph operator in 1895, on the Seaboard Air Line. From May, 1900, to February, 1901, he was clerk to the vice-president and general manager of the Seaboard Air Line, and from February, 1901, to March of the following year was clerk to the vice-president and general manager of the Atlanta, Birmingham & Atlantic. He was appointed assistant general purchasing agent of the National Railroad of Mexico in March, 1902, and in 1905 was made also assistant secretary and assistant treasurer of that company. From September, 1905, to September, 1910, he was general purchasing agent of the National Railroad of Mexico, and its successor, the National Railways of Mexico. Mr. Guess went to the Grand Trunk as assistant general purchasing agent in 1910, which position he held at the time of his recent appointment as general purchasing agent of that road.



J. H. Guess.

OBITUARY.

J. A. Duncan, vice-president of the Durham & South Carolina, died on January 12 at Toronto, Can., at the age of 45.

W. W. Lowell, master mechanic of the Chicago, Burlington & Quincy, with office at St. Joseph, Mo., died at that place on January 8.

Guy L. Stewart, agricultural and industrial agent of the St. Louis Southwestern, with office at St. Louis, Mo., was burned to death on Tuesday of this week in a collision at Illmo, Mo.

Goldsborough M. Serpell, general superintendent of the Norfolk district of the Atlantic Coast Line, with office at Norfolk, Va., died recently at that place. Mr. Serpell was born on December 23, 1839, at York, Pa., and was educated at St. John's College at Frederick, Md. He began railway work in 1866, and during the following two years was engineer on the Louisville & Nashville. From 1871 to 1880 he was engineer and master of road on the Baltimore & Ohio, and was later master of transportation and master of road. He was president of the Chowan & Southern from April, 1884, to November, 1899, and during part of this time was president also of the Meherrin Valley, a road which has since been abandoned. When the Chowan & Southern was absorbed, in November 1899, by the Norfolk & Carolina, he became general manager of the latter road, and was later appointed general superintendent of the Norfolk district of the Atlantic Coast Line with office at Norfolk, Va.

George W. Blodgett, formerly and for 23 years electrical engineer of the Boston & Albany, died recently at his home in Lakewood, N. J., at the age of 62. Mr. Blodgett was born at Guildhall, Vt., and was graduated from the Massachusetts Institute of Technology in the class in civil engineering in 1873. He entered the service of the Boston & Albany in 1880 and had charge of the automatic signals on that road before the signal department was organized. The Boston & Albany had a considerable mileage of automatic signals before the profession of signal engineer had come to be recognized. Mr. Blodgett also had charge of the other electrical work of the company and equipped with electric lights, about 1887, one of the express trains running between New York and Boston, which was one of the first, if not the first, train thus lighted in the country. He lectured on electrical subjects at the Massachusetts Institute of Technology, at Cornell and Columbia Universities and in other institutions. He was a member of the Boston Society of Civil Engineers and the American Institute of Electrical Engineers. After leaving the Boston & Albany, Mr. Blodgett was for five years in the engineering department of the Brooklyn Navy Yard, leaving there for New Jersey in 1908 in the interest of the health of his family. He is survived by a widow and two daughters.

FOREIGN RAILWAY NOTES.

Preparations are being made for supplying the Congo Railway and the various steamboats on the Congo river and its tributaries with petroleum for fuel, in spite of the fact that an almost unbroken forest covers the hundreds of thousands of square miles of this territory. A company is laying a pipe line along the old Congo Railway from Matadi to Leopoldville, and storage tanks have already been erected. The change of the locomotives to oil-burners has begun.

A short railway has been open a few years south of Lake Nyassa, Africa, connecting at Port Herald with a navigable tributary of the Zambesi river. In this region an English company has been experimenting with cotton raised from American seed, and also with tobacco. It reports great success with both, and it is now purposed to extend this railway short distances both to the Zambesi river and to the Lake Nyassa, and moreover to build another railway from the north end of the lake northwestward to the south end of Lake Tanganyika, something over 200 miles, which would give an outlet to the navigation on the latter lake, which is more than 400 miles long. Lake Nyassa has British territory on the west, German and Portuguese on the east. It is some 300 miles east of the Indian ocean.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

THE INTERNATIONAL & GREAT NORTHERN is preparing specifications for 20 locomotives.

THE CENTRAL VERMONT has ordered 4 Pacific type locomotives from the Baldwin Locomotive Works.

THE WABASH will send 20 locomotives to the Lima Locomotive & Machine Company for heavy repairs.

THE NORFOLK & WESTERN has ordered 15 Mallet locomotives from the American Locomotive Company.

THE VIRGINIAN RAILWAY has ordered four superheater Mallet compound locomotives from the American Locomotive Company. The dimensions of the cylinders will be 28 in. x 44 in. by 32 in.; the diameter of the driving wheels will be 56 in., and the total weight in working order will be 540,000 lbs.

CAR BUILDING.

THE BESSEMER & LAKE ERIE has issued specifications for 2,000 gondola cars.

THE TEXAS & PACIFIC is preparing specifications for 20 passenger cars and 200 freight cars.

THE NORTHERN PACIFIC has ordered 1,500 refrigerator cars from the American Car & Foundry Company.

THE PENNSYLVANIA LINES WEST have ordered 1,400 freight cars from the Standard Steel Company.

THE BUFFALO, ROCHESTER & PITTSBURGH has ordered 100 flat cars from the Standard Steel Car Company.

THE INTERNATIONAL & GREAT NORTHERN is preparing specifications for 20 passenger cars and 100 ballast cars.

THE CHESAPEAKE & OHIO is reported to be in the market for 100 box cars. This item has not been confirmed.

THE NEW YORK CENTRAL LINES have ordered four combination passenger cars from the Pullman Company.

THE MERCHANTS' DESPATCH TRANSPORTATION COMPANY, New York, will build 66 refrigerator cars at the company's shops.

THE SPOKANE, PORTLAND & SEATTLE is in the market for 12 first-class coaches, 5 second-class coaches, 4 observation cars and 1 dining car.

THE ROCK ISLAND LINES have asked for bids on the revised specifications for the 700 gondola cars for which they have been in the market.

THE DETROIT & MACKINAC has ordered 35 box cars from the Barney & Smith Car Company and four refrigerator cars from the American Car & Foundry Company.

THE CHICAGO & NORTH WESTERN has ordered 25 steel coaches, 6 steel dining cars, 4 steel parlor cars and 2 observation parlor cars from the Pullman Company and 5 steel coaches and 10 steel smoking cars from the American Car & Foundry Company.

THE CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA has ordered 7 steel coaches and 3 steel smoking cars from the American Car & Foundry Company and 4 steel baggage cars and 2 steel combination passenger and baggage cars from the Pullman Company.

IRON AND STEEL.

THE CHICAGO GREAT WESTERN is in the market for 2,000 tons of bridge steel.

THE NORFOLK & WESTERN has ordered 2,000 tons of bridge material from the American Bridge Company.

THE MICHIGAN CENTRAL has ordered 11,000 tons of structural steel from the Jones & Laughlin Steel Company, for the new station at Detroit, Mich.

THE NASHVILLE, CHATTANOOGA & ST. LOUIS has ordered 5,000 tons of rails with the Tennessee Coal, Iron & Railroad Company, in addition to the 10,000 tons mentioned in the *Railway Age Gazette* of December 29.

THE NEW YORK CENTRAL LINES have ordered 110,000 tons of rails. About half the order will go to the United States Steel Corporation, the majority of the remainder to the Lackawanna Steel Company, and a small portion to the Bethlehem Seel Company. Of this order 64,500 tons are for use on the lines East of Buffalo, N. Y., and 45,500 tons, on lines West of Buffalo.

THE NORTHERN PACIFIC has ordered 36,000 tons of rails, of which 13,000 tons were placed with the Illinois Steel Company, 10,000 with the Colorado Fuel & Iron Company, and the rest divided between the Lackawanna Steel Company, the Bethlehem Steel Company and the Pennsylvania Steel Company.

GENERAL CONDITIONS IN STEEL.—The Steel Corporation is now operating at almost 89 per cent. of its capacity. Large orders are scarce, but the total tonnage is holding up well. Steel consumers are congratulating themselves on having held the prices level thus far, and preventing the advances on finished steel products, which were predicted at the opening of the year. It is generally believed that an increase in prices at present would put an immediate stop to the buying movement. Export business has been very large.

SIGNALING.

The plans of the Chicago, Rock Island & Pacific for the present year, include the erection of automatic block signals on the line from Bureau, Ill., to Peoria, 47 miles; and from Albright, Neb., to Lincoln, 53 miles.

At the Grand Central Terminal, New York City, both of the large interlocking machines in station A are now in use, the 360-lever machine for the upper level having been put in use January 7. The construction of the yards is not yet completed, and for the present only 165 levers of this machine are connected to their functions. The transfer from the temporary machine to the new one in station A was made in 18 minutes.

FOREIGN RAILWAY NOTES.

The Uruguayan minister of public works has almost completed the plans for the 8½ miles of railway which is to be constructed at once along the docks at Montevideo. Contracts for the ties have been signed, while the rails and other materials required have been arranged for. The fireproof warehouses on the wharves are nearing completion, and the whole work should be completed in January, 1912.

The Russian export chamber has had under consideration the question of constructing the Kiahta-Muisova Railroad in Siberia, which line would run 150 miles from Muisova on the Baikal Railroad to the town of Kiahta on the Chinese frontier. The question will be put before the ministerial council for its final decision. This line, if furnished with cold-storage accommodation, may lead not only to supplying all the Russian Far East with meat, but also develop a considerable export of Mongolian meat to European Russia and abroad, Mongolia being a rich cattle-breeding country.

The Yunnan Railway, China, built by the French, in the 112 miles from the border, which is at the junction of the Nan-Ting river with the Saluin river, to the plateau, has 75 tunnels, the longest of which is 1,965 ft. long, and 120 viaducts and small bridges, besides three bridges of considerable size. At one place the line reaches a basin in the hills, and there is a distance of a little more than nine miles, having 24 tunnels and a great viaduct over a gorge between two tunnels. Another viaduct 220 ft. long is 260 ft. above the bottom of the valley. At the plateau the line is 4,250 ft. above sea level. Thence to the terminus at Yunnan there is a rise of 2,290 ft. in 184 miles, and there are 82 tunnels and 74 viaducts and bridges on this line. The road is of 3 ft. gage. Trains run about 15 miles an hour, and 17 cars make the longest permissible train. The decaying rocks of the mountains on the line are brought down in great quantities by the summer floods, and in 1910 blocked the line completely for many miles. A thousand coolies worked three months to clear it. The company has a quarantee from the French government.

Supply Trade News.

E. H. Baker has been made second vice-president of the Galena Signal Oil Company, Franklin, Pa.

Edward R. Pool, general manager of the Colorado, Nev., branch of the American Steel & Wire Company, Chicago, died at his residence in Denver, Col., last week.

The Columbia Nut & Bolt Company, Bridgeport, Conn., has added a complete line of hot pressed and cold punched castellated nuts to its line of railway supplies.

The American Locomotive Company, New York, has received an order from the Copper River & North Western for one rotary snow plow with 18 in. x 26 in. cylinders, and a 12 ft. 6 in. cut.

Joseph T. Ryerson & Son, Chicago, have opened a branch office in the Ford building, Detroit, Mich., in charge of J. H. Marlotte. This company has also moved its Minneapolis, Mo., office to 501 Third street, South Minneapolis, where larger floor space has been secured.

William J. Coane, manager of the Philadelphia, Pa., branch of the Joseph Dixon Crucible Company, Jersey City, N. J., and for 25 years with that company, has been made second vice-president and sales manager of the Ajax Metal Company, Philadelphia.

Henry F. Lofland, general manager of the erection department and a director of the American Bridge Company of New York, died at Milford, Del., January 13 of tuberculosis at the age of 48. He had been with the American Bridge Company since its organization. Mr. Lofland graduated from the University of Virginia as a civil engineer.

The George W. Jackson & E. A. Clark Company, consulting engineers, with offices at 754 Jackson boulevard, Chicago, and 228 West Forty-second street, New York, has been organized. Mr. Jackson was formerly president of George W. Jackson, Inc., and Mr. Clark was connected with the same company. The new company will make examinations and reports on subways, tunnels, conduits, water and sewer systems, power plants, mining properties, etc.

C. R. Jamison, for the past five years connected with the Berger Manufacturing Company, Canton, Ohio, has been made sales manager of the Acme Supply Company, Chicago. Mr. Jamison graduated from the civil engineering school of Purdue University in 1905 and completed a post-graduate course in 1908. In 1906 he was masonry inspector of the Cleveland, Cincinnati, Chicago & St. Louis, and later was assistant engineer in the testing department of the United States Geological Survey at St. Louis, Mo.

The Spencer Otis Company, Chicago, has recently moved its main office to room 747 Railway Exchange building, Chicago, where a new feature has been introduced in the way of exhibiting several of the company's devices. The American Kron scale for railway work is exhibited in all sizes and capacities, the Au-Tra-Kar for boring holes and driving screw spikes is set up under power together with several other gasolene-propelled cars for railway work. This company will shortly open an office in San Francisco, Cal.

Henry C. Valentine, president of Valentine & Company, New York, varnish manufacturers, died at his home in New York January 15, at the age of 82. Mr. Valentine came to New York from Cambridge, Mass., where he was born, and went into business with his older brother, the late Lawson Valentine. Mr. Valentine was made president of his firm in 1882, and remained at its head until 1900, when he was made chairman of the board of directors. In 1909, owing to failing health, he retired from business. Mr. Valentine was a member of the Union League Club and the New England Society.

TRADE PUBLICATIONS.

Rail Planers.—The Vixen Tool Company, Chicago, has issued a catalog describing the Vixen rail planer for use in removing cupped joints and corrugations from rails.

Railway Construction.

New Incorporations, Surveys, Etc.

Alabama & Northwestern.—Incorporated in Alabama with $160,000 capital. The company owns a line from Pine Hill, Ala., northwest to Sweet Water, in Morengo county, about 20 miles. J. T. Cochrane, president; William Toxey, chief engineer, and P. C. Pyre, superintendent, Pine Hill.

Central Illinois.—Incorporated in Illinois with $25,000 capital, and headquarters at Aurora. The plans call for building from Chicago west through the counties of Cook, DuPage, Kendall, Lasalle, Bureau, Henry and Rock Island to Muscatine. The incorporators include G. A. Ackerman, Kaneville; J. M. Raymond, Aurora; W. E. Williamson, Marseilles; H. Hoganson, Seneca, and L. A. Fruland, Ottawa.

Erie Railroad.—This company, which leases the New Castle branch of the Sharon Railway Company, will carry out the improvements arranged by the latter several years ago. This includes a double track line from Pymatuning, Pa., to New Castle, 30 miles, and building a roundhouse at Ferrona.

Fairchild & Northeastern.—According to press reports this company will build an extension from Fairchild, Wis., west to Eau Claire and Dunn counties, about 30 miles. W. Foster, vice-president and general manager, Fairchild. (December 1, 1911, p. 1148.)

Grand Junction-Paradox Development.—This company, with headquarters at Grand Junction, Colo., has made preliminary surveys for a railway from Grand Junction through the Unaweep canyon to Gateway, thence to Bedrock, about 80 miles. It is expected that the permanent survey will be made in March as far as Paradox. The line is to be extended eventually to Farmington, N. M., and can be built with less than 2 per cent. grades, except on a section of about one mile and a quarter, where the grade will probably be about 2¼ per cent. The company expects to develop a traffic in agricultural products, live stock and ore. Thoas M. Todd, president; Karl A. Bickel, secretary; William Campbell, treasurer, care of the Grand Valley Bank, Grand Junction.

Grand Trunk.—According to press reports, Foley, Welch & Stewart, who have the contract for work on the section from Tete Jaune Cache, B. C., west to Ft. George, are planning to have the work finished by next fall. Sub-contracts have been let as follows: H. E. Carlton & Co., Edmonton, 25 miles west from Tete Jaune Cache; Burns, Jordan & Company, Spokane, Wash., 50 miles, and Sims Brothers & Keary, St. Paul, Minn., 75 miles. There remains about 30 miles yet to be sub-let on this section.

Lake Erie & Ohio.—Under this name a company is to be organized at Wellston, Ohio, with a capital of $8,000,000, to develop southern Ohio timber and coal lands, and to build a railway from Portsmouth, Ohio, to a point near Sandusky. B. F. Howland and C. F. Butterfield of New York, and E. V. Lingham, Toledo, are back of the project.

Maine Central.—The Rangeley Lakes & Megantic, which was organized to build from Oquossoc, Me., north to the International boundary, will build the ten-mile section from Oquossoc to Kennebago. T. L. Dunn, chief engineer, Portland, Me.

Missouri, Arkansas & Gulf.—An officer writes that a contract has been given to E. E. Young & Co., Rolla, Mo., to build from Rolla south via Lecoma, Licking, Oscar, Stutz, Willow Springs and West Plains to Bakersfield, 125 miles. Maximum grades will be 1½ per cent., maximum curvature 6 deg. The heaviest work will be on a 12 ft. cut and fill on the first 80 miles. The company expects to develop a traffic in timber products, live stock, farm products and minerals. Gilbert Lay, president, St. Clair, Mo., J. B. Payne, chief engineer, Rolla.

Missouri, Oklahoma & Gulf.—According to press reports, this company has taken out a new charter in Oklahoma to build the extension from Henrietta, Okla., west to Oklahoma City, 102 miles, and other proposed extensions. It is understood that contracts will be let for the Oklahoma City line in the near future. J. J. Harrison, chief engineer, Muskogee, Okla. (November 24, 1911, p. 1080.)

NEW YORK SUBWAYS.—A contract has been given to the Underpinning & Foundation Company, New York, at $2,295,000, to build section 3 of the Broadway-Lexington avenue subway, in the borough of Manhattan. This work is under Broadway, and extends from Howard street to a point midway between Houston and Bleecker streets.

NORTH BUFFALO RAILROAD.—Incorporated in New York with $100,000 capital. The company will operate a line between Harriet, N. Y., and Tonawanda, Erie county. The incorporators' names are not given.

OREGON SHORT LINE.—An officer writes that the Oregon Eastern is now building from Vale, Ore., southwest through the Malheur river canyon to a point near the north shore of Malheur and Harney lakes, in Harney county. Grading work has been started, but no track has yet been laid. The Utah Construction Company, Ogden, Utah, has the grading contract. There will be 27 steel bridges, aggregating 4,305 ft., also two tunnels aggregating 2,640 ft. The line is being built under the direction of W. H. Bancroft, vice-president and general manager, and Carl Stradley, assistant general manager, will be in charge of the construction work.

OREGON EASTERN.—See Oregon Short Line.

RANGELEY LAKES & MEGANTIC.—See Maine Central.

STATESVILLE AIR LINE.—An officer writes that grading has been finished on about eight miles between Statesville, N. C., and Mt. Airy. The route is via Yadkinville, Booneville and Dobson, maximum grade will be 1½ per cent., maximum curvature 6 deg. There will be five steel bridges, of a total length of 700 ft., and seven small trestles. R. L. Greenlee, Statesville, may be addressed.

TIDEWATER & SOUTHERN (Electric).—An officer writes that contracts have been let to the Daae Construction Company, Sacramento, Cal., and work is now under way from Stockton via Modesto and Ceres to Turlock, 50 miles. Grading is nearly completed, and work is now under way on the trestles. Track has been laid on 5 miles. There will be two steel bridges, each 125 ft. long, and two steel bridges each 150 ft. long. J. H. Wallace, chief engineer, Stockton, Cal. (December 15, 1911, p. 1259.)

UTAH ROADS.—A line is projected from the Black Hawk mining district to connect with the Denver & Rio Grande at Wellington, Utah, about 12 miles. David Eccles, Ogden, may be addressed.

WINNIPEG, SALINA & GULF.—This company has been granted authority in Kansas to issue bonds for building 1,080 miles of railway. The company was incorporated in Kansas in 1909, and the plans call for the construction of a north and south line from Winnipeg, Can., to the Gulf of Mexico, with a cross line from Kansas City, Mo., to Des Moines, N. M. It is proposed to carry out the work first on a section from Omaha, Neb., to Oklahoma City, Okla., and on the cross line from Kansas City, Mo., to Des Moines, N. M. H. Leon Miller, Salina, Kan., president. (January 12, 1912, p. 77.)

RAILWAY STRUCTURES.

ANDERSON, S. C.—See Greenville, S. C.

BATON ROUGE, LA.—Plans have been prepared for a $10,000 addition to the freight station of the Yazoo & Mississippi Valley.

BELTON, S. C.—An officer of the Piedmont & Northern writes that a contract has been given to Wilkinson & Moffett, Durham, N. C., to put up a combined freight and passenger station at Belton, 30 ft. by 60 ft., to cost $7,000. The building will be of white brick construction with tile roof. Contracts have also been let to the same firm to put up similar stations at Donalds, Hodges and Honea Path.

BOYLES, ALA.—The new shops of the Louisville & Nashville at Boyles, which have been under construction for about two years, were recently opened for business. The cost of the improvements was about $1,000,000. (April 21, 1911, p. 972.)

CENTRALIA, WASH.—The Northern Pacific is to begin work at once on the construction of a large roundhouse and machine shops.

CHICAGO, ILL.—The Chicago Elevated Railways is having plans made for putting up a combined city and elevated railway bridge over the Chicago river.

CINCINNATI, OHIO.—A meeting of the executive officers of the roads entering the city was held on January 9 to discuss plans for the proposed new union station, provided for in the city ordinance recently passed. Owing to some changes in the final draft of the ordinance, no action was taken pending a report of the railway engineers as to the cost of the structure.

CONFLUENCE, PA.—See Ohio Pyle, Pa.

DONALDS, S. C.—See Belton.

ELKHART, IND.—The Cleveland, Cincinnati, Chicago & St. Louis proposes to build a new enginehouse this year at Elkhart, Ind., also one at Carey, Ohio, and one at Terre Haute, Ind.

FERRONA, PA.—See Erie Railroad under Railway Construction.

FROSTBURG, MD.—See Ohio Pyle, Pa.

GARRETT, PA.—See Ohio Pyle, Pa.

GREENVILLE, S. C.—An officer of the Piedmont & Northern writes that a contract has been given to the Goode Construction Company, Charlotte, N. C., to put up a one-story freight house 40 ft. x 240 ft., at Greenville, to cost $18,000. The building will be of white brick construction with tile roof. A contract to put a similar building at Anderson has also been let to the same company.

HODGES, S. C.—See Belton.

HONEA PATH, S. C.—See Belton.

LATHROP, ORE.—The Southern Pacific will build a new passenger station at Lathrop.

MASON CITY, IOWA.—The Chicago, Rock Island & Pacific, and the Chicago Great Western have secured property on which to erect two new freight stations and a joint passenger station.

MEMPHIS, TENN.—An officer of the Rock Island Lines advises that a bill has been introduced in Congress to authorize the erection of a bridge across the Mississippi river at Memphis, for the use of the Rock Island. The bridge will be in the vicinity of the present St. Louis & San Francisco bridge. No plans have been made for the structure, but after the bill has passed Congress work will be started promptly, and it is hoped to begin construction some time next summer. (January 12, p. 77.)

MYERSDALE, PA.—See Ohio Pyle, Pa.

OHIO PYLE, PA.—The Western Maryland has given contracts, it is said, for putting up stations at Ohio Pyle, Confluence, Rockwood, Garrett and Myersdale, in Pennsylvania, and at Frostburg, Md. It is understood that the six stations will cost $50,000. These are to be built on the new line between Connellsville, Pa., and Cumberland, Md.

PIQUA, OHIO.—The Pennsylvania Lines have submitted to the city council plans for elevating their tracks through the city and building a new station.

ROCKWOOD, PA.—See Ohio Pyle, Pa.

RUSHVILLE, IND.—The Indiana railway commission has ordered the Pennsylvania Lines to build a new passenger and freight station.

SACRAMENTO, CAL.—The Central California Traction Company has plans made for building a large freight house in the Oakpark section, Sacramento.

SPOKANE, WASH.—Plans are being worked out for a large new union station to be erected by the Chicago, Milwaukee & Puget Sound and the Oregon-Washington Railroad & Navigation Company.

VALE, ORE.—See Oregon Short Line under Railway Construction.

VIDALIA, GA.—According to press reports a contract has been let to build a union passenger station for the Georgia & Florida, the Seaboard Air Line, and the Macon, Dublin & Savannah, at Vidalia. The cost of the improvements will be about $15,000. (July 28, p. 200.)

YARDLEY, WASH.—The Northern Pacific is about ready to let a contract for new shops, and a 56-stall roundhouse.

Railway Financial News.

Boston & Maine.—See Fitchburg Railroad.

Buffalo & Susquehanna.—Gustavus Babson, of Chicago, a holder of the B. & S. Railroad 4 per cent. bonds and the B. & S. Railway 4½ per cent. bonds, in a letter to other bondholders, says in part: "The writer has just returned from an inspection of the property and is more convinced than ever that its only salvation is the purchase of more coal lands near Du Bois and the inauguration of a selling system which will dispose of the large tonnage of coal. While the receivership has done everything that proper railway management can do, it has taken out 2,000,000 tons of coal, thereby reducing our assets just that much. After four or five years the property will, I believe, be so gutted that it will not more than pay operating charges.

"How dependent the property is on its coal is shown as follows: Ninety per cent. of all its freight traffic is its own freight or freight for the consumption of its employees. The entire road passes through a country of non-agricultural possibilities, being barren, mountainous and cut over lumber lands. The timber has practically all been cut and in five years will be exhausted. Built to get lumber, the road has excessively bad grades and curvature. Between Buffalo and Du Bois it is 40 miles longer than its competitor, the B. R. & P. (a first class railway) and crosses two summits on 3 per cent. grades with switchbacks and 20-deg. curves. The B. & S. lost outright in the Austin disaster $75,000, and at this station, which was probably the best paying office on the entire line, the monthly receipts, formerly $15,000, are now trifling, as the saw and pulp mill were both destroyed."

Canadian Pacific.—It is said that this company has sold £1,000,000 ($5,000,000) 4 per cent. preferred stock and £1,000,000 ($5,000,000) debenture stock in London.

The Canadian Pacific has leased the South Ontario & Pacific for 999 years, beginning January 1, 1912.

Central California Railway.—See Southern Pacific.

Chicago & Eastern Illinois.—The *Commercial and Financial Chronicle* quotes B. F. Yoakum as confirming the report that Kuhn, Loeb & Co., New York, have become the bankers for the C. & E. I.

Chicago & North Western.—This company has asked the railway commissions of Wisconsin, Michigan and Nebraska for permission to issue $15,000,000 4 per cent. bonds to finance the Milwaukee, Sparta & North Western, principal and interest to be guaranteed by the C. & N. W. Presumably the bonds will be issued under the general mortgage due 1987.

Chicago, Rock Island & Pacific *Railway*.—Speyer & Co., New York, have bought $20,000,000 5 per cent. debentures of 1911-1913. The *Railway* is the operating and owning company, nearly all of whose stock is owned by the *Railroad*, which in turn is controlled by the Rock Island Company. The proceeds of the debenture sale will be used for terminal improvements at Omaha; new terminals and a bridge across the Mississippi river at Memphis; for additions and betterments, and to pay at maturity securities falling due in 1912 and 1913. There are approximately $1,494,000 series J and an equal amount of series K of the Chocataw purchase money 4 per cent. bonds falling due in the next two years. The first and refunding bonds and any terminal securities issued during these two years under the terms of the mortgage are not to be sold but will be taken in to the *Railway* company's treasury.

Fitchburg Railroad.—The New York Public Service Commission, Second district, has authorized the Fitchburg Railroad to issue $1,200,000 4½ per cent. bonds at not less than par. Of the proceeds, $100,000 will be used to refund bonds of the Fitchburg Railroad and the remainder will be paid to the Boston & Maine to reimburse it for payment for improvements and betterments under the lease.

Grand Trunk.—A press despatch from Wheeling, W. Va., the accuracy of which cannot be confirmed from the railway company, says that the Grand Trunk has bought 21,000 acres of coal land on the Ohio River & Western Railroad, which runs from Zanesville, Ohio, to Bellaire. The price paid is said to be $87 per acre.

Lehigh Valley.—The directors have declared an extra dividend of 10 per cent. calling for the payment of $6,060,800. Stockholders have the option of receiving cash or stock at par of the Lehigh Valley Coal Sales Company, a new company which has been formed with $10,000,000 stock, of which $6,060,800 is to be issued immediately. Drexel & Co., Philadelphia, have underwritten the sale of this selling company's stock.

Henry B. Coxe has been elected a director, succeeding P. A. B. Widener, who declined re-election.

New Orleans, Mobile & Chicago.—Henry Walters, of the Atlantic Coast Line and the Louisville & Nashville, has been elected chairman of the board of directors of the N. O. M. & C. Milton H. Smith, of the Louisville & Nashville; B. F. Yoakum, of the St. Louis & San Francisco; W. F. Owen; B. L. Winchell, of the St. Louis & San Francisco; W. L. Mapother; C. W. Hillard, of the St. Louis & San Francisco, and J. H. Ellis have been elected directors, succeeding Elisha Walker and Alonzo Potter, both of William Salomon & Co.; E. D. Pray, William C. Sheldon, C. W. Jester, E. K. Stallo and S. Wexler.

New York Central & Hudson River.—The New York Public Service Commission, Second district, has authorized the N. Y. C. & H. R. to issue $5,000,000 3½ per cent. bonds of 1897-1997, to be sold at not less than 86. These bonds are to be issued in lieu of the $5,000,000 notes authorized by the commission in March, 1911, the proceeds of which were to be used in connection with the purchase of the New York & Hartford Railroad.

Norfolk & Western.—Stockholders are offered the privilege of subscribing at par up to March 1, 1912, to 4 per cent. convertible bonds of 1912-1932, equal to one-eighth of their respective holdings of stock. The bonds are convertible at par into common stock.

Pacific Railway & Navigation.—The Southern Pacific has bought this road, which runs from Hillsboro, Ore., to Tillamook, 90 miles.

St. Louis Southwestern.—A. J. Hemphill, president of the Guaranty Trust Co. of New York, has been elected a director and a member of the executive committee, succeeding Howard Gould.

South Ontario & Pacific.—See Canadian Pacific.

Southern Pacific.—The Central California Railway, which is leased to the Southern Pacific, has increased its capital stock from $1,000,000 to $5,000,000. The money to be raised by the sale of the additional stock is to be used to pay for the extension from Dumbarton bridge to Redwood City.

Virginian Railway.—There has been a rumor, confirmation of which is refused, that the directors will ask stockholders, at the special meeting on January 27, to authorize an increase in the capital stock from $36,000,000 to $65,000,000 through an issue of $29,000,000 5 per cent, cumulative preferred.

Wabash.—Arthur Coppell, of Maitland, Coppell & Co., has been elected a member of the stockholders' protective committee.

Wisconsin & Michigan Railway.—Frank McKey has been appointed receiver of this company on the application of the Otto Gas Engine Co. The road runs from Iron Mountain, Mich., to Peshtigo, Wis., 76 miles.

An agreement has been concluded between the Chinese and Japanese commissioners at Mukden, Manchuria, regarding the extension of the tracks of the Peking-Mukden line across the tracks of the South Manchurian Railway and the removal of the Mukden station of the former railway from its present position to the end of the proposed extension. The Chinese government agrees that the Peking-Mukden Railway administration shall build a line between the proposed new station and the station of the Manchurian Railway, in order that the lines may make good connections and thereby extend traffic. The Japanese government agrees that the South Manchurian Railway shall raise an embankment and build a bridge over the extension of the Peking-Mukden line at the point of intersection of the two roads.

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NO railway accident since that in which Samuel Spencer was killed has so shocked the railway men of the United States as did that on the Illinois Central, which cost the lives of J. T. Harahan, F. O. Melcher, E. B. Peirce and E. E. Wright. Messrs. Harahan, Melcher and Peirce were widely known, the first as a former president of the Illinois Central. Mr. Melcher, besides being a prominent operating officer, had achieved great and deserved reputation and prestige by his work as chairman of the Special Committee on the Relations of Railway Operation to Legislation. He had retired from the chairmanship of the committee, but was still an active member. Mr. Melcher's death, because of the important work for all the railways that he had been doing, and was still engaged in, was an especially great loss to the railways of this country. As chairman of the Special Committee on Relations of Railway Operation to Legislation he developed a remarkable breadth of view regarding regulation of railways, and great skill in dealing with commissions, the lawmakers and the representatives of the railway brotherhoods, and in bringing about a good understanding and healthy co-operation between them and the roads at a time when such understanding and co-operation were peculiarly needed. He was thus successful in many cases, not only because he was a skillful diplomatist, but because he was also a clear-headed, honest one, who saw and contended that the railways could not consistently ask and could not hope to receive a square deal from others unless they were willing to give a square deal in return.

MR. PEIRCE was probably more intimately familiar with the work of the Interstate Commerce Commission than any other lawyer in the United States. He was the author of the Digest of Decisions Under the Act to Regulate Commerce, which Digest the commission uses as about its most important text book. He not only tried cases before the commission, but in many cases was of great service to the commission itself, having the confidence of the commissioners, and being recognized by them as an unusually broad-minded traffic expert, as well as a lawyer. Mr. Peirce had that unusual quality, which we recognize almost instantly in certain men, of being able to attack delicate matters in a straightforward way that precluded the possibility of giving offense. He was in the position of constantly having to tell the traffic men of his own company what they could not do, and this in cases that were of greatest importance, and yet he succeeded in retaining both their sincere regard and their entire confidence. Unusual quality in a lawyer, he was an advocate of frankness and practiced it.

PERHAPS the most suggestive feature of the report for 1911 of the New York Public Service Commission, Second district, is the return showing the gross magnitude of its corporate material and the reach of its official functions. It has jurisdiction of more than a thousand corporations of nine different kinds with a capitalization of more than four and a half billion dollars. It has held 572 public hearings, on an average of just 11 a week; it has had before it 2,321 questions raised, or an average of more than 7 a secular day and an increase over 1910 of nearly 13 per cent.; the number of days occupied in hearings has risen to 285 as compared with 196 in 1910, an increase of more than 45 per cent.; and in four years the questions before it have risen almost 44 per cent. If some of the questions have been simple and local, others have been complicated, general and necessarily of importance as precedent for future rulings, if for nothing else. And this is a commission that has jurisdiction of only part of a state, though a commonwealth of large corporate interests. The returns show strikingly how commission work in our states tends to increase. The more questions a state commission settles—or tries to settle—the more questions arise to be settled, and commission work makes the meat it feeds on. No wonder there has been in New York state complaint of the long delays. But the situation has its suggestions along more far-reaching lines. One is the tendency of the states to consolidate several commissions in one, which is thus almost sure to be overloaded. The other is the resulting and secondary tendency, as the powers and jurisdiction of state commissions expand, to trench upon the province of legislation. Just such a question is now about to arise in Connecticut over the right of the Public Service Commission to regulate freight rates and fares, which right, it is asserted by good lawyers, is vested in the legislature alone and cannot be delegated. Inside of the

states and bearing on intrastate corporations we are likely to see ere long very much such a confusion of powers between state commission and legislature as is now evident between federal and state authority in the matter of interstate commerce. There will then be plenty of additional work for the state courts, and besides this additional work for the state courts there will be the resulting appeals to the federal tribunals, already with too much work.

WE noted last week the postmaster general's jaunty proposition to buy up the telegraph lines—a little item of $250,000,000. The Taft administration having already committed itself in favor of a parcels post, the next natural move would seem to be an official pronouncement in favor of government ownership of railways. If Mr. Hitchcock can refer to English experience with government telegraph lines as a "notable" example of successful and profitable operation, it would be easy for him to found an argument on the history of foreign government-owned and tax-supported railways for railway nationalization in this country. The British government's experience in operating telegraph lines has recently been made the subject of an exhaustive study of Laws Webb, who apparently reads cold figures in a different light from some of our American politicians. He relates that when the project of taking over the British telegraph lines for operation by the postoffice department was first agitated in 1866 it was estimated for the benefit of Parliament that the probable cost would be $12,500,000, and that the net revenue would be 8.8 per cent. on the capital. A few years later, the estimates having been largely increased, Parliament appropriated for the purpose about $35,000,000. When the purchase was completed some more overlooked millions had swelled the capital cost to nearly $55,000,000. Frequent advances by Parliament of large sums to be used by the postoffice authorities for telegraph development have now brought the total investment up to $105,000,000. Since the first two years of government ownership, a large part of the interest on this enormous capital investment has not been earned, but has been a charge on the taxpayers; even operating expenses have not been earned in some of the years. Said the *London Spectator* of February 25, 1911:

> "When all these facts are taken into account—namely, the original capital which has never been repaid, the advances from Parliament upon which no interest is charged, and the annual deficiencies on working expenses—it will be found that the aggregate commercial loss to the country by the state purchase of the telegraphs is not less than $175,000,000. Nor can we console ourselves with the reflection that for this $175,000,000 the state has a valuable asset, for that asset, such as it is, involves every year of its working an additional loss of over $5,000,000."

Mr. Hitchcock is quoted as suggesting that the freedom of government-owned property "from taxation and other charges to which private corporations are subject," would make possible a reduction of telegraph rates. The state taxing authorities may be trusted to answer Mr. Hitchcock on that point. The rates of all privately-owned public utilities might be reduced by the abolition of taxation of them without resorting to government ownership. The general public might object, however, to supplying from its own pocket the taxes thus remitted in order to give cheaper service to the comparatively few users of the service of many public utilities; in the case of the telegraph, chiefly business houses and corporations. Similarly, railway freight rates might be lowered by the simple expedient of exempting the railways as at present owned from paying taxes that now require nearly 3 per cent. of their gross earnings, or over $100,000,000 annually. If other taxpayers would add to their present burden of taxes those now carried by the railways, the shippers might be able to save over 5 per cent. of their freight bills, meanwhile consoling the taxpayers with the assurance that the reduction in freight rates would be reflected in the prices paid by them for food, clothing and other things in their capacity of ultimate consumers.

ORE-LOADING DOCKS.

THE rapid growth in the volume of iron ore carried on the Great Lakes from the Minnesota and Michigan ranges to the furnaces in the Chicago and Pittsburgh districts, in keeping with the developments in the iron and steel business in all lines, has made necessary the provision of extensive loading facilities at upper lake ports and equally extensive unloading facilities at the receiving ports, as well as the building of numerous low grade railways equipped for very intensive operation, and the building of a large number of ore boats of greatly increased capacity. The latest available data shows that eight railways engaged in the iron ore business on the Minnesota and Michigan ranges own 24 docks for loading this ore to lake steamers at six upper lake ports. The total storage capacity of these docks is approximately 1½ million tons, or about 6 per cent. of the annual output of the ranges.

These docks consist of elevated structures supporting hoppered bins, into which ore is dumped from cars running over the structure and from which it runs by gravity into ore boats anchored alongside. The type of dock in general use has not materially changed in the last 20 years, the supporting structure being a framed timber trestle and the bins being built entirely of wood. The life of the superstructure of such docks has been found to be from six to eight years, while in some cases the portion below the bin floors has shown a life of 20 years. In addition to the high cost of maintenance necessary on such a structure, the principal objection to this type of dock has been that the danger from fire is very great. Two new docks were placed in service during the past season, and one is now being completed to go into service next season, which eliminate as far as possible the use of wood in their construction. The general dimensions, height, width of pocket, slope of floor and length of spout, are interdependent and must be worked out to meet certain requirements of service and design. The spouts when in the loading position must clear the holds of an empty ore boat; the width of pocket, slope of floor and arrangement of doors and spouts must provide for the most rapid emptying of the pockets, and the relation of height to width must be designed to give the most economical use of material per lineal foot. The length is determined by conditions in the harbor and by the capacity desired.

The large number of new docks that have been built has provided ample opportunity to test various combinations of these dimensions, and the effect of such changes is now well understood. It is natural, then, that in changing the design to eliminate wood the general form and dimensions of the old timber docks should be in large measure retained. The new docks mentioned illustrate three distinct forms of construction and will furnish some interesting comparisons. The Duluth & Iron Range dock at Two Harbors, described in the *Railway Age Gazette* of January 5, is essentially a steel trestle, concrete being used only for foundations and bin partitions. The Great Northern dock at Allouez, described in this issue, utilizes concrete entirely for the supporting structure. The usual form of trestle is modified to form massive concrete columns non-reinforced, which support the bins and tracks. The Lake Superior & Ishpeming dock at Presque Isle combines steel and concrete in its construction, the steel framework being designed to carry the load and the concrete in the columns serving principally to protect the steel.

An important incidental advantage in the use of these more permanent forms of construction is the fact that the additional strength of the substructure allows the capacity of the bins to be increased, reducing the length necessary for a given storage capacity. Timber docks have used 175-ton pockets quite generally, while the three new docks mentioned have pocket capacities ranging from 250 to 325 tons. In all three of these structures special details have been worked out to facilitate the loading of ore and thereby increase the efficiency of the dock as an ore-handling machine. In all three the pitch of the bin floors is

greater than 45 deg., which was formerly quite generally used. In each case the operation of spouts and doors is effected by motor equipment, instead of by hand, as in older designs. In the latter two the most important change is probably the substitution of curved steel bin ends for square wooden ones, which is expected to eliminate to a great degree the arching of the ore. In the first dock mentioned the most improved type of door yet designed was installed. The influence of these improvements is shown in the records already made by the two docks in service, and the future performance of all three of them, both as to loading records and cost of maintenance, will be carefully watched by engineers responsible for the design and maintenance of similar structures.

THE LEHIGH VALLEY AND THE COMMODITIES CLAUSE.

IT is not at all unlikely that the troublesome "commodities clause" of the Interstate Commerce Act, which has already been twice before the Supreme Court, may have an opportunity to appear there again, as a result of the action last week of the directors of the Lehigh Valley Railroad Company and of the Lehigh Valley Coal Company. The Supreme Court over two years ago, in the Delaware & Hudson case, seemed to hold that the clause forbidding a railway to transport in interstate commerce, except for its own use, commodities which it owned, did not prohibit the transportation of coal owned by a company whose stock was held by a railway. However, in the Lehigh Valley case last April, the court declared that such interpretation was justifiable only when the affairs of the two corporations were not "commingled." If the two corporations were one for all practical purposes the commodities clause was effective. This decision overruled the lower court, and gave the government permission to file an amended bill against the Lehigh Valley. The directors of the Lehigh Valley, instead of adopting the expedient resorted to by the Lackawanna, and distributing the stock of the coal company to the railway shareholders, propose to resort to an entirely unique scheme for solving their difficulties.

This is to organize a Lehigh Valley Coal Sales Company, incorporated under the laws of New Jersey with an authorized capital of $10,000,000. A contract with the sales company is to be entered into by the coal company under which the sales company will purchase and sell all the coal of the coal company. A dividend has been declared by the railway company just sufficient to pay for the shares of the sales company, which will therefore be distributed pro-rata to the railway shareholders. However, there is no obligation on the part of the railway stockholders to subscribe for sales company shares. They may, if they choose, take their dividends in cash. The outcome of the plan will be a mining company operating as an industrial corporation in the state of Pennsylvania owned by a railway company, but transporting none of its product, and a buying and selling corporation which buys and ships coal, but whose stock is owned by individuals. It will be for the courts to say whether this arrangement constitutes the "indirect" ownership contemplated by the commodities clause. It would seem that the courts could do nothing but hold the plan to be a legal one. Certainly the fact that no prosecution has been undertaken against the Lackawanna since its distribution of coal shares, and that the combined holdings of a group of individuals of Great Northern and Northern Pacific stock subsequent to the dissolution of the Northern Securities Company has been permitted to go unchallenged, would lead to this conclusion. Whether or not in fact the situation is the same before and after such a reorganization depends upon the closeness with which the securities are held. But, however one may sympathize with the financial difficulties with which these corporations have had to contend in their attempts to meet the requirements of the law, one is forced to conclude that the commodities clause as yet has failed to effect the purpose intended by Congress and has simply been the means of wasting large sums of government money in futile litigation.

ODESSA AND KINMUNDY.

THE disastrous rear collision at Odessa, Minn., December 18, is at last explained, the railway commissioners of that state having made a report; and the causes are given in another column of this issue of the *Railway Age Gazette*. The behavior of the steel sleeping and dining cars was described in our last issue. As we receive these particulars by mail, the telegraph brings a report of a still more startling collision of a similar character, that at Kinmundy, Ill., Monday morning, January 22, about 12½ o'clock. This last is more notable, because though the victims are less numerous, three of them are prominent and widely known railway men. It is a repetition of the disaster that killed Samuel Spencer, president of the Southern Railway and six other men, at Lawyer, Va., November 29, 1906. The disheartening feature of both of the cases now reported is that the causes are of the same old familiar character. In the means of preventing collisions there has no doubt been a good deal of progress in late years, but none of this progress seems to have had any effect in the localities where these collisions occurred.

The first thing necessary in removing the root of this disgraceful feature of American railway practice is to exclude from the discussion all secondary matters. The qualities of steel cars as compared with wooden may be discussed with profit in the proper place, but that discussion does not assist in preventing collisions. The St. Paul road may have been too strenuous in its efforts to carry costly shipments of silk across the continent in record-breaking time, but that is far aside from the main issue, for no block system is worthy of the name unless it protects all trains, at whatever speed they may be running. And flagging is a secondary matter. Everybody seems to worship the Standard Code, and especially Rule 99, with all the fervor of the ancients who lived in A. D. 1886; but the cold fact remains that to depend partly on the block system and partly on the flagman is an effort to sit on two stools, which never can be defended; that has caused trouble times without number, and that at last has shown its weakness so plainly that even the uninstructed public understands and marvels at the crudity of the practice. At Odessa, the engineman, the conductor and the rear brakeman all failed; but this must not blind us to the fact that the most elementary block system, properly managed, would have held second 18 at "Junction" until first 18 reached Appleton, whether the journey required 20 minutes or 20 hours; whether the leading train stopped once or a dozen times. At Kinmundy, the conductor, flagman and engineman were all negligent, and apparently grossly negligent, and so must bear the immediate blame; but the block system was not in use. Under the time interval system, as there used, for a train falling back on the time of a following train of the same class, the flagman, with his hand signals, visual and audible, was the only protection. The reports thus far received seem to indicate that at midnight—when the collision occurred—the stations at which a ten-minute interval could be maintained were 14 miles or more apart. If, with the time interval system, the stations are far enough apart and the speed of the following train is sufficiently faster than that of the leading train—the trains being of the same class—the second train will overtake the one preceding while running normally; and this is in full accordance with the standard code! In this case, however, the engineman seems to have disregarded a fixed signal, there being a crossing at Kinmundy.

There can be no doubt that this tragedy will stimulate progress in the introduction of the space interval. The lesson, of course, is to use the block system, *fully*. To have the system on the books, but not regularly use it; to use any modification, and expect it to be as good as absolute blocking, or to employ the space interval under any but the strictest supervision, means danger. It is a matter of deep regret that this must be said concerning a road which, like the St. Paul, was a pioneer in its appreciation and introduction of the space interval. For an operator, *and a despatcher*, to allow a fast train to follow another fast train into a block section on a clear signal when the

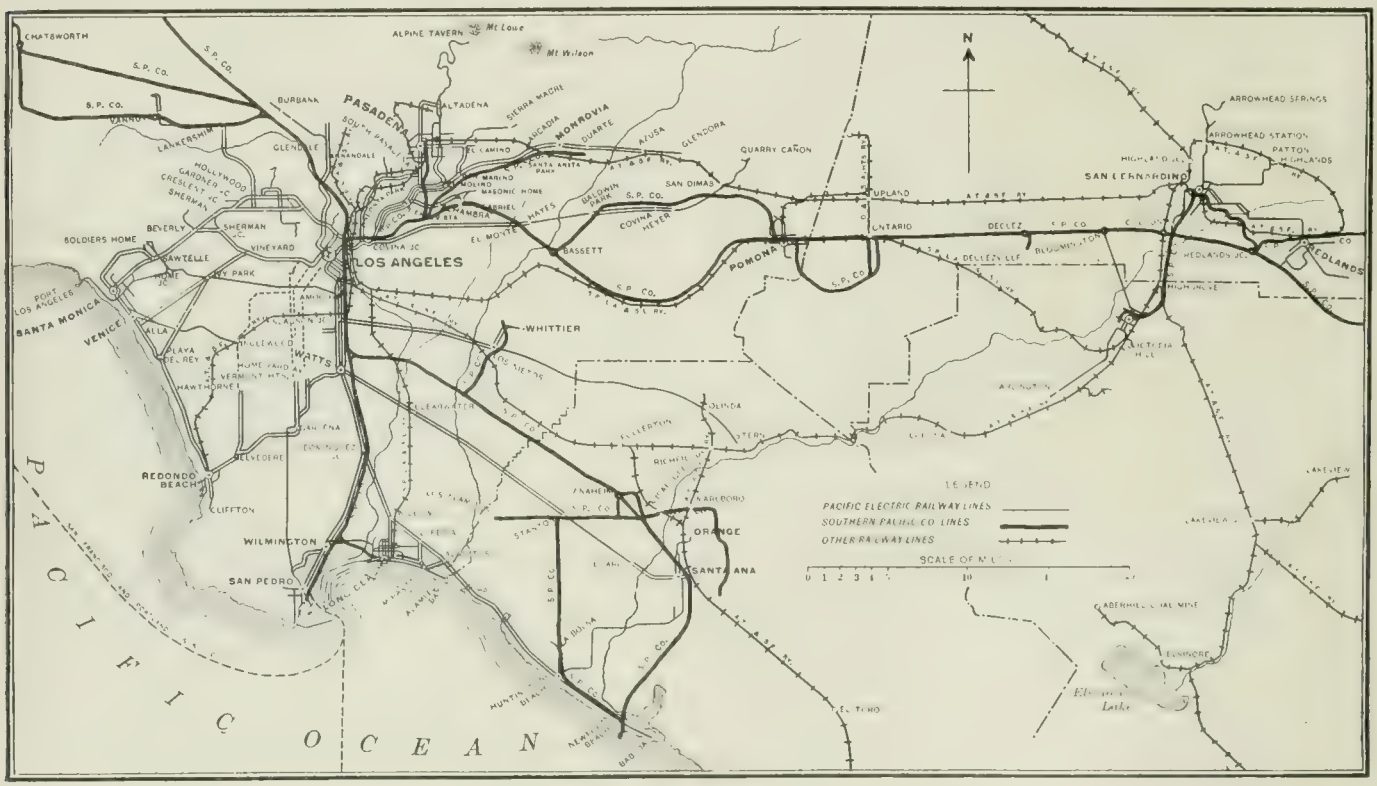
leading train is reported as having *almost* reached the outgoing end of the section, can only indicate that the habit of mind of these men has been cultivated in a mental atmosphere where old rule-of-thumb methods and not space interval methods prevail.

The Minnesota commissioners say that the block section was too long (21 miles) and as a practical matter could not be operated; and that the practice "persuades" employees to take chances and officers to wink at such looseness. This expression on the part of the commissioners no doubt reflects the tone of the testimony that they heard. Whether it does or does not so reflect, it is a fact that it would fit the actual situation on more than one road. To be "persuaded" to incur danger by disregarding a rule of safety is something that ought not to happen with any railway man who is in his right mind; and yet it is quite likely that the Minnesota commissioners, notwithstanding some illogical statements in their report, exercised a pretty clear vision in this matter, and are here giving a true picture of the situation as they found it. "Taking chances" has not been exterminated on American railways. A section 21 miles long is as easy and simple to manage as a short section, if only the superintendent determines actually to use the block system and to abolish those loose practices which seem to be inseparable from the time-interval system. With 20-mile sections trains running at a mile a minute must keep apart 20 minutes plus the time necessary to convey the message, work the signal and give space for the engineman to read it. The trouble in cases of this kind usually turns out to be that instead of delaying trains to make the time interval correspond to the length of the block section, the block system is "modified" for the purpose of making the system conform to a time interval which is too short. This idea will always be impossible of accomplishment, for a "modified" block system means an abandoned block system.

The commissioners propose to investigate the use of the manual block system. It is to be hoped that their investigation will extend to England. All that they may desire to learn as to the principles of the system and to its success, when used in a normal way, will there be found ready to their hands, without any labor of investigation. They could find some good practice in America, but not so much of it. Our American managers have turned to automatic signals whenever they felt the need of improving their manual signaling, and therefore in many cases no doubt the manual system has not been perfected as it should have been. But no well-posted railway officer needs to be told that it is the best safeguard against collisions until he gets the money for the installation of a more complete system. The Minnesota commissioners can have no difficulty in finding what is the best system, in any given situation; their inquiry will have to be directed rather to the question how to insure the regular and rigid use of the best system after it has been installed.

SOUTHERN PACIFIC COMPANY.

THE two factors that in addition to the increase in wage scales common to all railway companies, account for the reduction in net earnings of the Southern Pacific Company and proprietary companies from $51,760,000 in 1910 to $47,620,000 in 1911, were a considerably shorter average haul for freight and an increase in passenger train mileage out of proportion to the increase in passenger business. The shorter average haul reduced gross revenues, and the increased passenger train mileage increased transportation expenses. While the total number of tons of freight carried amounted to 26,710,000 in the fiscal year ended June 30, 1911, as against 25,960,000 in 1910, and the average revenue per ton per mile was 1.175 cents in 1911 and 1.162 cents in 1910, the average haul was 232 miles, as against 255 miles, so that gross revenue from freight amounted to $73,680,000, a decrease of $3,340,000, or 4.34 per cent. from 1910. Transportation expenses totaled $36,520,000 in 1911, which is more by $870,000, or 2.43 per cent., than in 1910.



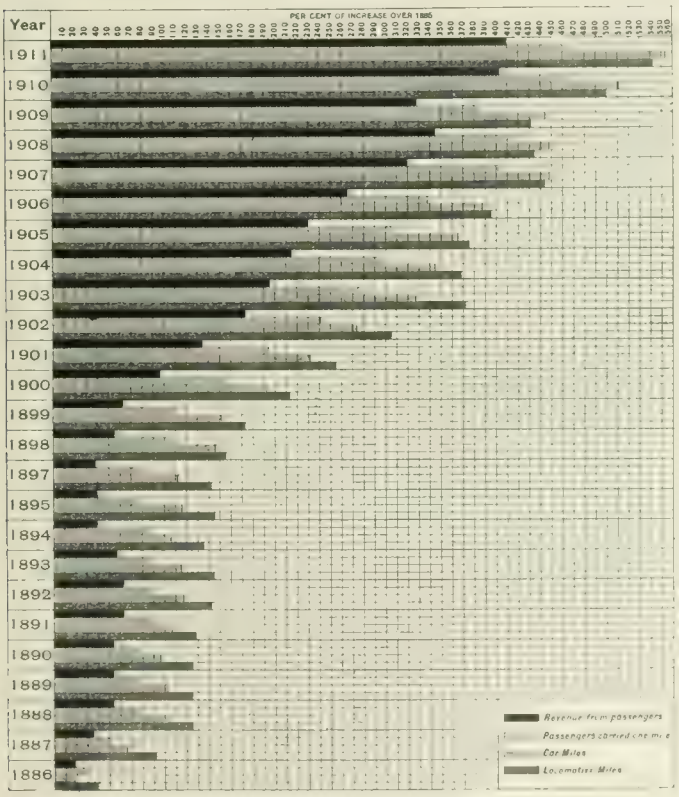
The Southern Pacific's Electric Lines Near Los Angeles.

In judging of the future earning power of a road as contrasted with judging of its showing made in one year as compared with the previous year, the three most important factors to be taken into consideration are the territory through which the road runs, the organization of its forces and the policy of the management toward upkeep. The Southern Pacific has a lion's share of quite a part of the transportation business of southern California, one of the richest and most rapidly developing sections of the United States. It has a main line across southern Louisiana and through Texas that enables it not only to share in the agricultural and business development of this territory, but to carry on a very profitable water and rail transcontinental business from New

York. It has two lines connecting Los Angeles and San Francisco, which give it a share in the agricultural business being developed in the San Joaquin valley, and a monopoly of the passenger business between Los Angeles and San Francisco by the coast route. The coast route serves Santa Barbara and Del Monte, and similar summer and winter resorts. Finally, the Southern Pacific has a main line running from San Francisco to Ogden, over which Union Pacific transcontinental freight moves.

The Southern Pacific's problem in organization was extensive, not intensive. This is especially true of the Sunset Lines and coast lines. Divisions are necessarily very long; labor available for trainmen is comparatively scarce, and there is a generally more independent spirit and less respect for law and order than is found in the more fully settled parts of the country. Notwithstanding these physical difficulties, the Southern Pacific has perfected an organization so unusually strong that it has been a most important factor in bringing about the prosperity of the company. The organization is a modification of the Hine system of unit arrangement, but whether or not the *form* of organization has been responsible for its strength, the important fact is that the Southern Pacific gets a grade of officer and a loyalty of service that are comparable to those of the best roads in any part of the country.

The Southern Pacific spends between $1,500 and $1,600 per

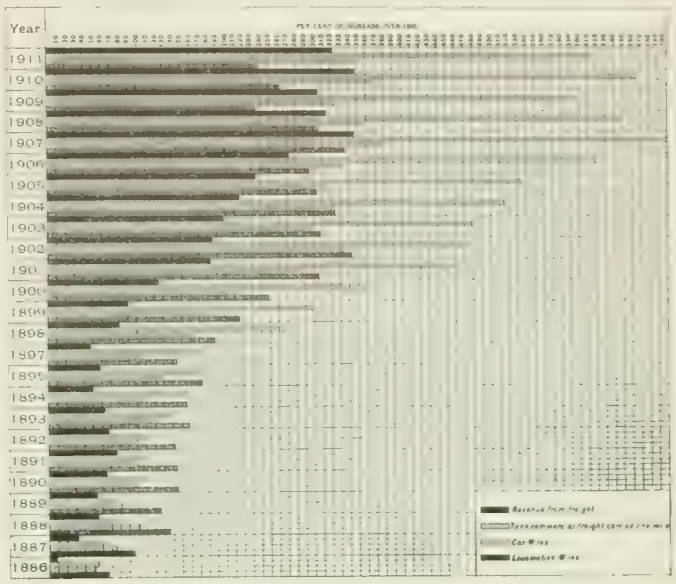


Passenger Service and Traffic.

mile of all main track for maintenance of way and structures, and over $3,500 for repairs and replacements of locomotives per locomotive. However, unsatisfactory these two units of "main track mile" and "locomotive" are for accurate comparisons, the sums spent by the Southern Pacific would in any case indicate a very high standard of maintenance, and this is borne out by the condition of the property itself.

In 1911 the total amount of revenue freight carried, as was previously mentioned, was 27,430,000, and of this tonnage, 20.89 per cent. was furnished by products of agriculture. This products of agriculture tonnage was 580,000 tons, or 11.34 per cent., more in 1911 than in 1910. Products of mines furnished 28.79 per cent. of the total tonnage; products of forests, 19.94 per cent., and manufactures, 16.32 per cent. There is a rather interesting increase in the tonnage of stone, sand and like articles from 2,140,000 tons in 1910 to 3,400,000 tons in 1911, an increase of nearly 59 per cent. It was, notwithstanding this large increase in traffic which presumably bears a low ton-mile rate, that the company got a somewhat higher average ton-mile rate for all classes of freight in 1911 than in 1910. It is possible, however, that this is explained by the much shorter average haul.

The Southern Pacific has rather high grades on some of its lines and carries a comparatively small proportion of low grade freight, so that we would expect to find a rather small average train load; and, compared with the Hill Lines, the train load is small. In 1911 the average tons of commercial freight per train



Freight Service and Traffic.

was 397, as compared with 396 in 1910. The Southern Pacific has, however, over both its San Francisco-Ogden line and its Los Angeles-New Orleans line a great deal of freight moving on fast schedule, not permitting of heavy train loading. This fact also helps to explain the high average ton-mile rate which the company receives.

The Southern Pacific does not, like the Union Pacific, make a distinction in paying its dividend as between profit from railway operations and profit from banking operations. The banking operations of the Southern Pacific have had largely to do with the financing of its subsidiary companies, and for this reason are quite different from the investments of Union Pacific in Baltimore & Ohio, New York Central, etc. In 1911, after the payment of all fixed charges and rentals, and 6 per cent. dividends on the common stock, the Southern Pacific had a surplus of $9,730,000. This compares with a surplus of $18,180,000 after the payment of dividends in 1910; but it will be recalled that in 1910 the company received an extra dividend of $4,590,000 from Wells, Fargo & Company stock. The decrease in surplus, therefore, as between the two years is not as large as it looks. Ninety-one million, seven hundred and thirty thousand dollars is a comfortable margin over dividend requirements.

In 1911, besides its expenditures for maintenance, the company spent $11,060,000 for additions and betterments, $24,860,000 for construction and acquisition of new lines, and $12,620,000 for stocks and bonds. These expenditures, together with advances to electric lines in California and certain other advances to subsidiaries, totaled $53,370,000 charged to capital account in the past year. The sum spent for additions and betterments was more by a little over $1,000,000 than was spent on this account in 1910. The most noticeable increase in betterment work is the putting in place of 3,004 lineal feet of concrete and steel structures in 1911, as compared with 1,661 ft. put in place in 1910. There was on the other hand $2,350,000 spent in 1911 for additional main track, as compared with $3,930,000 spent for additional main track in 1910.

During the year the total funded debt outstanding increased only $2,350,000, with no increase in capital stock. In addition to

this slight increase in funded debt, the company borrowed from the Union Pacific $9,110,000, making the total amount on June 30, 1911, owed by the Southern Pacific to the U. P. $20,000,000. This is included in current liabilities, which in the aggregate totaled $43,800,000, an increase of $7,800,000 over 1910, and compared with total current assets of $56,890,000 at the end of 1911, as against $49,590,000 at the end of 1910. These current assets include $11,140,000 cash and $24,960,000 time loans and deposits.

The large sums advanced to subsidiary companies, the comparatively small amount of financing done last year and the size of the debt to the Union Pacific suggest that some time within the next year, or so, the company will either itself issue a considerable amount of securities, or its subsidiaries will.

The par value of stock other than those of subsidiary companies owned by the Southern Pacific amounted to $119,000,000, an increase over the par value of stocks owned at the end of 1910 of $52,700,000. The principal changes were the sale of $2,250,000 stock of the Los Angeles Railway Company and the purchase of $21,000,000 stock of the Los Angeles Pacific Company; $12,000,000 stock of the Peninsular Railway; $10,000,000 stock of the Pacific Electric Railway, and $5,000,000 stock of the Los Angeles Pacific.

The passenger business on the Southern Pacific is more than usually important to the company from the point of view of earnings. Of the total earnings from rail lines in 1911 of $121,910,000 $73,680,000 was from freight and $40,810,000 was from passenger business. The importance of the beautiful coast country between Los Angeles and San Francisco has already been mentioned. The growth of Los Angeles itself has been extraordinary. The population of Los Angeles increased in the decade between 1900 and 1910 from 102,479 to 319,198, an increase of 212 per cent., and Pasadena, just outside of Los Angeles, increased in the same ten years from 9,117 to 30,291, an increase of 232 per cent. The Southern Pacific found that the interurban railways, especially those around Los Angeles and connecting Los Angeles with the coast, could be used to advantage as feeders for the steam railway. The company bought in 1903 half of the stock of the Pacific Electric, which was building out from Los Angeles into the surrounding territory. H. E. Huntington owned the other half of the Electric railway's stock, but in November, 1910, sold his holdings to the Southern Pacific, and after the Southern Pacific had bought stock of other railways radiating from Los Angeles, a new company—the Pacific Electric Railway—was formed and took over a total of 490 road miles of electric railways used for both freight and passenger service. Of this road mileage, 270 miles are double-track and 11 miles have four tracks. Some idea of the electric company's freight business may be had from the fact that the company owns 14 electric locomotives, 33 express freight motor cars, six express freight trailers and 1,115 other freight train cars. The earnings of the company for the four months ended October 31, 1911, totaled $3,060,000, and after the payment of expenses and taxes the company had net $1,060,000. The total bonds of the company amounted to $49,690,000, and of these the Southern Pacific Company owns, in addition to all the stock, $20,940,000.

The principal figures for operation of the Southern Pacific Company and proprietary companies in 1911, as compared with 1910, are given in the following table:

	1911.	1910.
Average mileage operated	9,895	9,752
Freight revenue	$73,677,293	$77,018,554
Passenger revenue	40,814,400	40,344,856
Total rail operating revenue	121,911,028	124,423,905
Maint. of way and structures	15,889,130	16,098,705
Maint. of equipment	15,312,206	15,808,391
Traffic	2,947,064	2,481,186
Transportation	36,524,585	35,658,046
Total rail operating expenses	74,521,660	73,514,034
Taxes	4,850,348	4,519,374
*Net operating income	42,764,978	47,238,385
Gross corporate income	49,393,755	†57,947,565
Net corporate income	26,117,207	35,463,218
Appropriated for water power examinations	26,215	46,323
Dividends	16,361,426	17,238,347
Surplus	9,727,566	18,178,549

*After clearing outside operations.
†Includes $4,756,011 extra dividend on Wells, Fargo & Co. stock.

Letters to the Editor.

INCONSISTENCY IN SIGNAL LIGHTS.

Boston, January 3, 1912.

To the Editor of the Railway Age Gazette:

Mr. Whitney talks interestingly on classification signals, in your issue of December 29, commenting on "D. A. D.'s" splendid suggestion to make this a positive instead of a negative proposition, as now. He assumes, however, the necessity for a continuance of the present green light or flag on the engine. Is it not about time to do away with this, substituting yellow? Let us be consistent all the way through. Years ago, the New York, New Haven & Hartford, followed by other roads, adopted green for "proceed" and yellow for "caution" in fixed signals. "There was a reason"—and it is obvious.

There is a like good reason for abolishing green on engines. In foggy or stormy weather, with the red light of a home signal at a crossing or crossover obscured or extinguished, the engineman may see the green light on an engine or caboose and mistake it for a "proceed" light in the fixed signal, and things begin to happen.

Why not be consistent and substitute yellow for markers on cabooses and for the "following section" signal on engines? We are today using one color not only for various meanings—but for diametrically opposite meanings. In one case we flash a green light in the engineman's face to convey to him the information that another train is following and to keep clear of it; and then use the same colored light to tell him all is well and that he may proceed on a clear track.

D. A. G.

San Francisco, Cal., January 9, 1912.

To the Editor of the Railway Age Gazette:

You conclude your comments on my letter published in your issue of December 29 by saying: "The *Railway Age Gazette's* remedy for the faults of classification signals is to use the block system and do away with such signals entirely."

Your statement is open to contradiction. From the standpoint of safety alone the use of a block system of Utopian perfection would enable classification signals to be entirely done away with, but from the standpoint of convenience it would hardly be desirable to do so. These signals are necessary in order to prevent delay to following sections. Suppose classification signals are done away with; and a freight train, delayed between telegraph stations, is waiting in a blind siding for an opposing passenger train running in two sections. The freight has been given no telegraph notice of the existence of the second section. Irrespective of any block system, if the freight pulls out in the face of the second section there will be a delay which could have been avoided had classification signals been carried by the first section. Wherever the time table is used as authority for the movement of trains, classification signals are necessary.

M. B. WHITNEY,
Student in Operation, Southern Pacific.

"D. A. G." ignores our recommendation to depend wholly on the block system, and the other correspondent thinks that the recommendation cannot be carried out. We forgive "D. A. G.," because he is a superintendent and his sense of responsibility to ancient traditions forbids him to adopt so radical a proposition. As it is "a condition and not a theory" that confronts him, we endorse his plea for consistency. The New York Central already has adopted yellow for the side and front glasses in tail end markers. Even without the block system, the running of trains without classification signals in front has been successfully carried on. If we remember correctly it was the practice on the Canada Southern for several years. The answer to Mr. Whitney is that the supposed troublesome practice outlined by him is already in effect, and is not troublesome. It is on the Southern Pacific, in the snowshed district, where the train staff is used. Trains do not "pull out of blind sidings."

It is true that the staff system makes a complete block system, and that blind sidings have no place in a respectable block system; but "Utopian" is hardly a proper word to apply to the case. It is true that "wherever the time table is used as authority for the movement of trains," classification signals may be necessary; but the beauty of the block system is that the time table is not used as an authority for the movement of trains. And this applies to every-day American railways, a good way this side of Utopia.—EDITOR.

FALLACIES IN FIGURING COST OF FREIGHT CAR REPAIRS.

CHICAGO, January 6, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The usual method of figuring the cost of repairs to freight cars per car mile—viz., dividing the total freight car miles, system and foreign, into the total cost of repairs to system and foreign cars, plus the Master Car Builders' vouchers payable, less Master Car Builders' bills receivable—is likely to lead to some erroneous deductions as to the efficiency of the mechanical department with respect to this phase of its work, unless consideration be given to the important factor of equalization of car balances during the period under analysis. As the M. C. B. rules are amended from time to time, increasing the owners' reliability for repairs to their cars while on foreign lines, the necessity for considering this matter increases.

Under M. C. B. rules owners are responsible for practically all defects arising from the ordinary wear and tear to equipment due to use, the borrowing line having to pay only for repairs due to rough usage, wrecks, and destroyed cars. The theory is that the per diem payment covers interest, depreciation and repairs. But under the Interstate Commerce Commission's rules, no portion of the per diem earnings are credited to freight car repairs. It is, therefore, evident that in the case of a road owning 1,000 cars and borrowing 500 foreign cars, the cost of keeping up repairs to one-third of the total equipment making mileage, is paid by the owning road by Master Car Builders' vouchers. The owning road is, of course, reimbursed through the per diem account, but the cost of repairs per car mile as usually figured would be lessened, and the usual inference is that the mechanical department has made a good showing, whereas a careful analysis might show just the reverse condition.

FREIGHT CAR REPAIRS PER CAR DAY, BASED ON M. C. B. BILLS RECEIVABLE AND PAYABLE.

Month.	Year.	Foreign Car Days on R. I.	M. C. B. Bills Receivable.	Cost per Car Day.	R. I. Car Days on Foreign Lines.	M. C. B. Bills Payable.	Cost per Car Day.
January							
February ..							
March							
Total							

On the other hand, if the road is one which loans its equipment to a considerable extent, as for example, a heavy coal-carrying line, it should readily be seen that the expense for maintenance of this equipment has to be charged to the mechanical department, but as the foreign mileage made by such equipment cannot be included in the divisor, the cost per car mile increases.

It is, of course, difficult under the present car accounting method of only reporting car days and not the mileage of foreign equipment to ascertain the mileage of equipment when away from its owner's rails. In the absence of such data, the next best course is to estimate the mileage made, which will give the nearest approximation to the real situation. In making the estimate consideration should be given to the class of equipment away from home. If it is relatively of the same class as the foreign equipment used, it would seem reasonable to assume that the holding road makes as many miles per day with such equipment as is made with foreign equipment on your own line.

It occurs to me that a comparison from month to month, or from year to year, of the M. C. B. bills made against the foreign car days and private line car days on your own line and the M. C. B. bills paid against the system car days on foreign lines, would give some interesting figures. It should, of course, be appreciated that a single month's bills and mileage would not be a criterion, and that the comparison should include several months in order to get a general average. The accompanying form is suggested for keeping track of this matter, which may be of value to others, and it is hoped it may lead to a more general investigation and discussion of this important subject.

N. D. BALLANTINE,
Superintendent Car Service, Rock Island Lines.

THE FULL COST OF FREIGHT MOVEMENT.

PITTSBURGH, Pa., January 15, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

We are all familiar with statements showing cost per car mile and cost per ton mile; but do we take all important factors into account? The expense of delays to cars is not considered. It is expensive for cars to remain idle, also expensive for cars to meet with delays while enroute.

Assuming that cars are worth twenty cents a day when idle, $1.20 when moving empty, and $4.80 when moving loaded, we can figure the cost of car movement, with a more just and accurate result.

On any given date the general manager could have before him, for example, a statement showing car movement for a certain day as follows:

1,000 cars idle 1 day @ 20c.....	$200
1,000 delayed empty car hours @ 5c.....	50
1,000 delayed loaded car hours @ 20c.....	200
Total	$450

This expense should be added to the cost per car mile as now obtained from cost of crew, supplies, etc.

The cost of holding engines for trains is calculated very closely, but the delay to cars is not given so much attention. The enormous tonnage of a certain engine moving over the road is frequently exhibited as a stroke of economy, but the delay incident to such movement is not shown.

If a train of 30 loaded cars were scheduled to move a certain distance in 12 hours, but consumed 14 hours in making the run, we have 60 delayed loaded car hours at twenty cents, an expense of $12, which should be taken into account when considering the train expense. The same cars are allowed on the schedule a dead time of one hour to pass through the yard at a terminal, but if they consume two hours, there is an expense of $6, which should be charged to the yard expense.

The old saying that whenever the wheels stop turning the company is losing money, can be more readily appreciated when the figures are thus placed before us.

There is also the expense of paying claims when cars reach destination behind the schedule quoted to shippers by the soliciting agent.

CLIFFORD VAN ALLEN,
Trainmasters' Clerk.

When the proposition was made in 1897 for the Swiss government to buy the five principal railways of Switzerland, estimates of the cost of each were presented, the aggregate being $192,400,000. The plan was carried out, and it is now reported that the actual cost was $239,000,000, 24 per cent. more than the estimates. The company with the largest system obtained one-third more than the estimate.

RAILWAY OFFICERS KILLED IN COLLISION.

A rear collision on the Illinois Central at Kinmundy Illinois, in the early morning of Monday, January 22, resulted in the instant death of J. T. Harahan, former president of the Illinois Central, Chicago; F. O. Melcher, second vice-president of the Rock Island Lines, Chicago; E. B. Peirce, general solicitor of the Rock Island Lines, Chicago, and E. E. Wright of Memphis, Tenn., attorney for the Rock Island for Tennessee. The accident occurred between 12:30 and 12:35 a. m., while they were asleep in Mr. Melcher's business car, attached to the rear of train No. 25, the Illinois Central's New Orleans Express, southbound, which was run into by train No. 3, the Panama Limited, after No. 25 had stopped at 12:30 a. m. at Kinmundy station to take water. The business car was of all-wood construction, while the other cars in both trains were of all-steel construction. The members of the party were on their way to Memphis on business connected with the plans of the Rock Island for building new freight terminals and a bridge across the Mississippi river at Memphis. Mr. Harahan, who retired last year as president of the Illinois Central, was recently elected president of the Arkansas & Memphis Railway Bridge & Terminal Company, a corporation organized to make the improvements. The other members of the party in the car—T. S. Buzbee, attorney for the Rock Island for Arkansas and Louisiana, and Byram Curry, secretary to Mr. Melcher—and two porters, escaped without injury, as they were in the forward part of the car. No passengers on either train were injured, but the fireman on No. 25 and the engineer on No. 3 sustained slight injuries.



J. T. Harahan.

Kinmundy, where the collision occurred, is on the main line of the Illinois Central, 227 miles south of Chicago and 23 miles north of Centralia. It is south of the territory covered by the automatic block signal system as at present installed. An installation of automatic block signals to cover this portion of the line had been authorized as far south as Mason, 17 miles north of Kinmundy.

Inspectors representing the Interstate Commerce Commission and the Illinois Railroad & Warehouse Commission proceeded to the scene of the wreck early on Monday.

The New Orleans Express leaves Chicago at 5:50 p. m., and is the coach section of the Panama Limited, a sleeping car train which leaves Chicago at 7 p. m. No. 25 was 38 minutes late at Kinmundy, where it was scheduled to stop at 11:52 p. m., and No. 3 was nearly on time. The two trains were reported at Edgewood, 14 miles north of the scene of the accident, at 12:10 and 12:20 a. m. respectively. The regular time interval between trains on this portion of the line is 10 minutes. The express had not finished taking water at Kinmundy, and it was still at the station when it was struck by the engine of the limited, which was not to stop at that point and was running at its regular rate of speed. It is estimated that the speed was 25 miles an hour when it struck. The flagman appears to have gone back a very short distance, and he is reported as declaring to the conductor that the engineman of No. 3 answered by whistle, acknowledging the red light was seen, but just when this was does not appear. The force of the collision was so great that the standing train, with brakes locked, was pushed 200 ft. ahead. The conductor of No. 25 is reported as claiming that at Effingham, 29 miles back, he had told the flagman that the limited was less than ten minutes behind, and to make a quick run to the rear when the train stopped at Kinmundy for water. A freight immediately ahead of No. 25 delayed it in getting water.

Mr. Melcher's car was of wood, while the other cars in both trains were all-steel. No. 25 consisted of six steel coaches and steel chair cars, in addition to the private car, while No. 3 consisted of eight all-steel cars. The locomotive penetrated halfway through the business car doing the worst damage on the right side, where the staterooms were, while other cars in both trains were not damaged, although the passengers were badly shaken up. The bodies of Messrs. Harahan, Melcher and Peirce were brought to Chicago on a special train on Monday, and that of Mr. Wright was sent to Memphis.

The Illinois Central management immediately ordered a public investigation into the causes of the wreck, which was begun at Champaign, Ill., on Tuesday. W. L. Park, vice-president and general manager, conducted the hearing, and the following were appointed as members of the investigating board: R. W. Baxter, general superintendent of the Illinois Central; H. Battisfore, superintendent of the Illinois Central; J. B. Berry, chief engineer of the Rock Island; W. F. M. Goss, dean of the engineering department of the University of Illinois; G. L. Pittinger, of Champaign. This board, on January 24, issued its finding, which follows in part:

"Testimony showed that the rules of the company governing the movement of these trains were clear and definite and thoroughly understood by the crews of the respective trains. It was fully developed and clearly shown that the management had by rules and systematic instruction to the trainmen and enginemen and by repeated efficiency tests, impressed upon the employees the necessity of strict observance of these rules. The crew of train No. 25 was provided with both caution and stop fusees, neither of which were used either to space or to stop the following train. The conductor, the flagman and the baggagemen of train No. 25 all testified that it would have been easy for them to have used a fusee, and had one been used it would have been seen by the engineman of the train following. The conductor testified that he had instructed the flagman to look out for train No. 3, but his testimony showed that he did not follow this up to see that his in-

structions were carried out. Only after the train stopped did any member of the crew concern himself with No. 3. The testimony showed that the atmosphere was clear and the temperature somewhat above freezing. The engineer of No. 3 while following closely No. 25 on long stretches of straight track between Effingham and Kinmundy, states he did not at any time see the tail lights of No. 25, though he admitted that such lights could normally be seen at a distance of four or five miles. The crew of No. 3 admitted there were bulletin instructions posted restricting the speed of all trains through Kinmundy to ten miles an hour. The engineman of No. 3 testified that he had made a light service application to the brakes to reduce the speed for Kinmundy and had almost immediately discovered his proximity to train No. 25. Whereupon he made emergency application of the air brakes but too late to avoid the collision. The board on personal observation on the night of January 23 could be seen for at least one mile. The equipment of No. 3 was all perfect.

James Theodore Harahan had been president of the Illinois Central for five years, and an officer of the road for 20 years when he was retired under the rules of the pension system on January 12, 1911, on his seventieth birthday, and was succeeded by C. H. Markham. He had already made a notable record as an operating officer when he came to the Illinois Central, November 1, 1890, as second vice-president; but his reputation was made by planning and executing the handling of the enormous World's Fair traffic at Chicago in 1893. For 16 years he was the real executive officer of the road, with jurisdiction over both the operating and traffic departments, while President Fish maintained his office in New York. During the period the Illinois Central increased its mileage from 2,799 to 4,374, not counting the Yazoo & Mississippi Valley with its 1,210 miles.



F. O. Melcher.



E. B. Peirce.

were able to see the tail lights of No. 25 under conditions similar to those on the night of January 21 from a point two miles north of Kinmundy, also at all intermediate points. In view of this and other related testimony the board of inquiry finds that the conductor and the flagman of No. 25, knowing that No. 3 was following closely, were negligent in not using the means they had in protecting their train. The board also finds from this and related testimony that the engineman of No. 3 was negligent in not discovering earlier his proximity to No. 25."

The report was signed by all the members of the board. The engineman had been in service 25 years, 16 years on this division. He was not regularly in passenger service, but had made several trips extra. The towerman at Kinmundy Junction stated that after No. 25 stopped he threw the distant signal to caution position. This signal was 809 ft. north of the rear of No. 25, and

In November, 1906, he was elected president, following the memorable contest between Stuyvesant Fish and E. H. Harriman for the control of the road.

Mr. Harahan was a man who always kept closely in touch with the details of the management of his road, and was a tireless worker. During his administration the Illinois Central was regarded as a highly successful property and a well-managed road. Its reputation was marred only by the car repair graft scandal which was exposed during 1910 by investigations instituted by Mr. Harahan.

Mr. Harahan was born at Lowell, Mass., January 12, 1841, and began railway work in 1864 at Alexandria, Va. Until 1872 he was employed in various capacities consecutively with the Orange & Alexandria, the Nashville & Decatur, the Louisville & Nashville, and the Shelby Railroad. For seven years he was

roadmaster of the Nashville & Decatur, now part of the Louisville & Nashville, and in 1879 went with the latter road as superintendent of the Memphis line. He was then made superintendent of the New Orleans division; was general superintendent of the road south of Decatur, Ala., from December, 1883, to July of the following year, and was then for six months general manager of the entire line. From January to April 1, 1885, he was general superintendent of the Pittsburgh division of the Baltimore & Ohio, and on the latter date returned to the Louisville & Nashville as assistant general manager. He was again made general manager in October, 1885, which office he held for three years. From October, 1888, he was consecutively, assistant general manager of the Lake Shore & Michigan Southern, general manager of the Chesapeake & Ohio, and general manager of the Louisville, New Orleans & Texas, going to the Illinois Central as second vice-president on November 1, 1890. In 1906 he was elected president of that road, the Indianapolis Southern and the Yazoo & Mississippi Valley.

Frank Otis Melcher was born June 14, 1864, at Damariscotta, Me., and graduated from Tufts College in 1887, receiving the degree of civil engineer from the same school in 1895. The year he graduated he began railway work on the Fitchburg Railroad as an instrument man, and was later appointed assistant engineer and then chief engineer of the same road. He was appointed division superintendent in 1897; was promoted to general superintendent the following year, and from July, 1900, to November 1, 1902, was superintendent of the Fitchburg division of the Boston & Maine, which had taken over the Fitchburg. On the latter date he went to the Chicago, Rock Island & Pacific as superintendent of the Illinois division, was made general superintendent of the Choctaw district in February, 1904, and in June of the following year was made general manager of the Central and Northern districts. His jurisdiction as general manager was extended over the entire system of the Chicago, Rock Island & Pacific in December, 1906, and on the dissolution of the Rock Island-Frisco system in December, 1910, he was elected second vice-president in charge of the operating department of the Rock Island, succeeding H. U. Mudge, who was elected president.

Edward B. Peirce was born August 14, 1868, at Kosciusko, Miss. He was educated at the University of Mississippi, and in 1890 began railway work as assistant to the general solicitor and attorney for Arkansas of the Choctaw, Oklahoma & Gulf. When that road was absorbed by the Rock Island in 1904 Mr. Peirce was made attorney for Arkansas of the Chicago, Rock Island & Pacific, and in October, 1906, was promoted to commerce counsel of the Rock Island and the St. Louis & San Francisco, with office at Chicago. When the dissolution of the Rock Island-Frisco system took place in December, 1909, he was made general solicitor of the Rock Island.

Eldridge E. Wright was a prominent lawyer in Memphis, besides holding the office of attorney for Tennessee for the Rock Island. He was a son of General Luke E. Wright, former Secretary of War, and was a part owner of the Memphis *Commercial Appeal.*

President Markham of the Illinois Central after the accident gave out the following statement: "The unfortunate accident which resulted in the death of James T. Harahan, our late president, F. O. Melcher, E. B. Peirce and E. E. Wright at Kinmundy, Ill., early this morning has inexpressibly shocked the officers and employees of the Illinois Central Railroad Company from the highest to the lowest and they extend to the families of the dead their most profound sympathy on the irreparable loss which they have sustained."

The Bolivian chamber of deputies has authorized the federal government to obtain estimates and bids for the construction of a railway 108 miles long from Quiaca, on the northern boundary of the Argentine republic, to Tarija, Bolivia. The government will guarantee interest on the money invested in construction at the rate of 5 per cent. per annum.

OTIRA TUNNEL IN NEW ZEALAND.

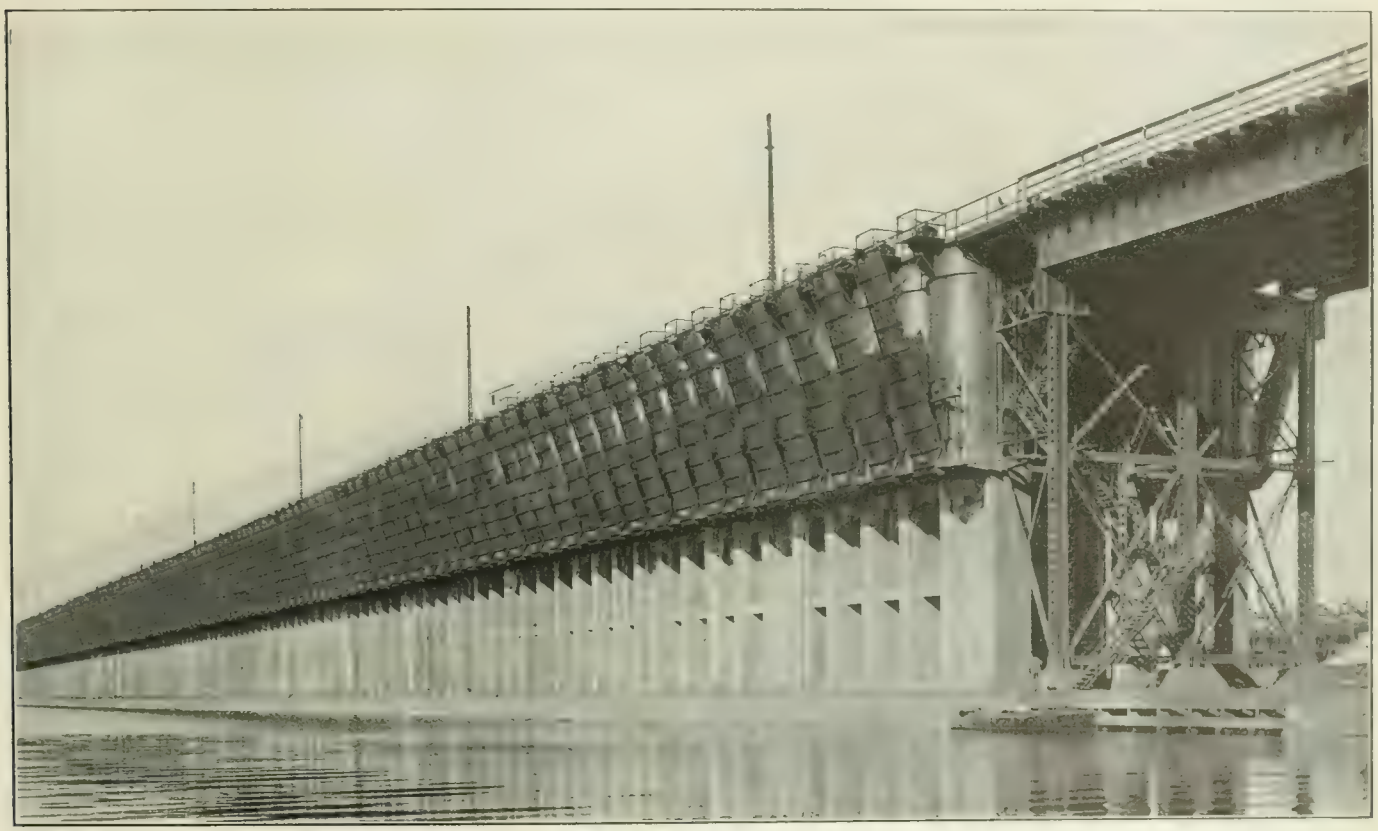
In the South island, New Zealand, construction is proceeding on a railway to connect Nelson, on the northern coast, with Reefton, about 100 miles to the south, which is already connected by a railway of 47 miles with Greymouth, the leading west coast port, and the center of a rich gold, coal and sawmilling district. Also Greymouth is to be connected with Christchurch, the largest city of the South island. There is now a railway from Christchurch 72 miles westward to Cass, and from Greymouth a railway 51 miles eastward to Otira, in the Otira gorge. Connecting Cass with Otira will therefore connect Christchurch with Greymouth. This connection necessitates a 5⅓-mile tunnel, piercing the Southern Alps. I recently witnessed construction work at this tunnel, which it is estimated will cost over $3,500,000. There is a grade in this tunnel of 1 ft. in every 33 ft. upward from the west coast side, which makes it difficult to keep water out of the eastern end, even with pumping, so that work at this end must necessarily be much slower than at the other end, where the water will easily drain out. From the western side at Otira, in company with the engineer for the work, I went 1½ miles into this tunnel—as far as completed. We were taken in on a train of trucks loaded with concrete, drawn by an American electric locomotive fed with current from an overhead wire. During the last quarter of a mile, where considerable work is going on and the passage is only partially excavated, it is unduly dangerous to have live wires in the tunnel, so use is made of an ingenious contrivance of an insulated cable wound up on the locomotive, which is made to connect with the trolley wire, and spins out as the locomotive goes on its course, the current being received through this cable and applied to the locomotive, so it continues its uphill course through the tunnel without endangering human life. This interesting locomotive is much used, I understand, in tunnel work and mining operations in the United States, where the engineer in charge, who was formerly employed on the Western Pacific Railway, had occasion to notice its usefulness, and so introduced it into New Zealand. All the rock building in the tunnel is worked by compressed-air machinery, which is also of American manufacture. Early in the construction of the tunnel, when an accident imprisoned some of the men for about 80 hours, this American machinery pumped fresh air and food into the prison chamber, so that when the men were finally rescued they were little the worse for their trying experience. Work on the tunnel is proceeding on the same general plan of top headings as in the Simplon tunnel in Switzerland, the top first being cut out, then the bottom, and then all sides trimmed off and finally arched with concrete. The work at the western end now proceeds at the rate of about 12 ft. per day. It has been going on for about three years and may require about five years more to complete. A small water-power plant near the western end drives the machinery, but recently it seems that dry weather has reduced the power below necessary requirement and so interfered with the work.

The electrification of this tunnel will be an interesting and necessary future development, for without electrification the smoke of engines puffing up the heavy grade would make the air somewhat stifling. It is possible that electric power for this purpose will be obtained from some nearby waterfall, or possibly electric power from the Lake Coleridge scheme, near Christchurch, on which the government is just about to begin work, will be transmitted. The opening of the Otira tunnel will have a most important economic influence on the development of the South island of New Zealand. The tunnel will require 50,000 cu. yds. of concrete construction. It is 14 ft. wide at the rail level. The total height is 16 ft. 9 in., though about 4 ft. at the top will include concrete arch and also some hollow space between that and the natural rock. It is being constructed under contract by McLean & Company, Wellington, under supervision of engineers of the public works department of the New Zealand government. —*Consular Report.*

GREAT NORTHERN ORE LOADING DOCK AT ALLOUEZ, WIS.

The Great Northern has steadily extended its ore lines until they now reach all the important points on the Mesabi range. According to the terms of the Hill ore lease, the company is assured a very heavy tonnage from the Steel Corporation mines for at least the next three years. The minimum tonnage specified in the lease is to be 4,500,000 tons in 1912 and 5,250,000 tons in 1913. In addition to this, a considerable tonnage is also handled from the mines of independent companies on the range.

In order to care for the loading of this ore the company last year placed in service a new steel and concrete dock at its terminal on Allouez Bay, near Superior, Wis., which is the largest ore-loading dock of its kind on the lakes. It is 1,900 ft. 7½ in. long from end to end of the cribs, and contains 151 pockets on each side, built to the standard spacing of 12 ft., making the distance between centers of the end bin walls 1,812 ft. The base of the rail on the structure is 75 ft. above mean water level, and the width on the top of the dock, exclusive of machinery platforms, is 62 ft. 6 in. Each bin has a capacity of 325 tons and is designed to hold seven 46-ton carloads of ore, although in actual operation only six carloads are usually dumped in one pocket. This gives the dock a total storage capacity of 98,150 tons. A loading dock is built primarily, however, as an ore-handling machine rather than a storage bin, and the records already made in handling ore prove that this one is among the most efficient loading docks on the lakes. Soon after its completion 9,500 tons of ore were loaded into a single vessel in 25 minutes, and a short time later eight vessels with an aggregate tonnage of 62,000 tons were loaded in six hours, an average rate of 10,344 tons an hour. The size of the dock allows six of the largest ore boats to be loaded simultaneously.



General View of the Great Northern Ore Dock at Allouez, Wis.

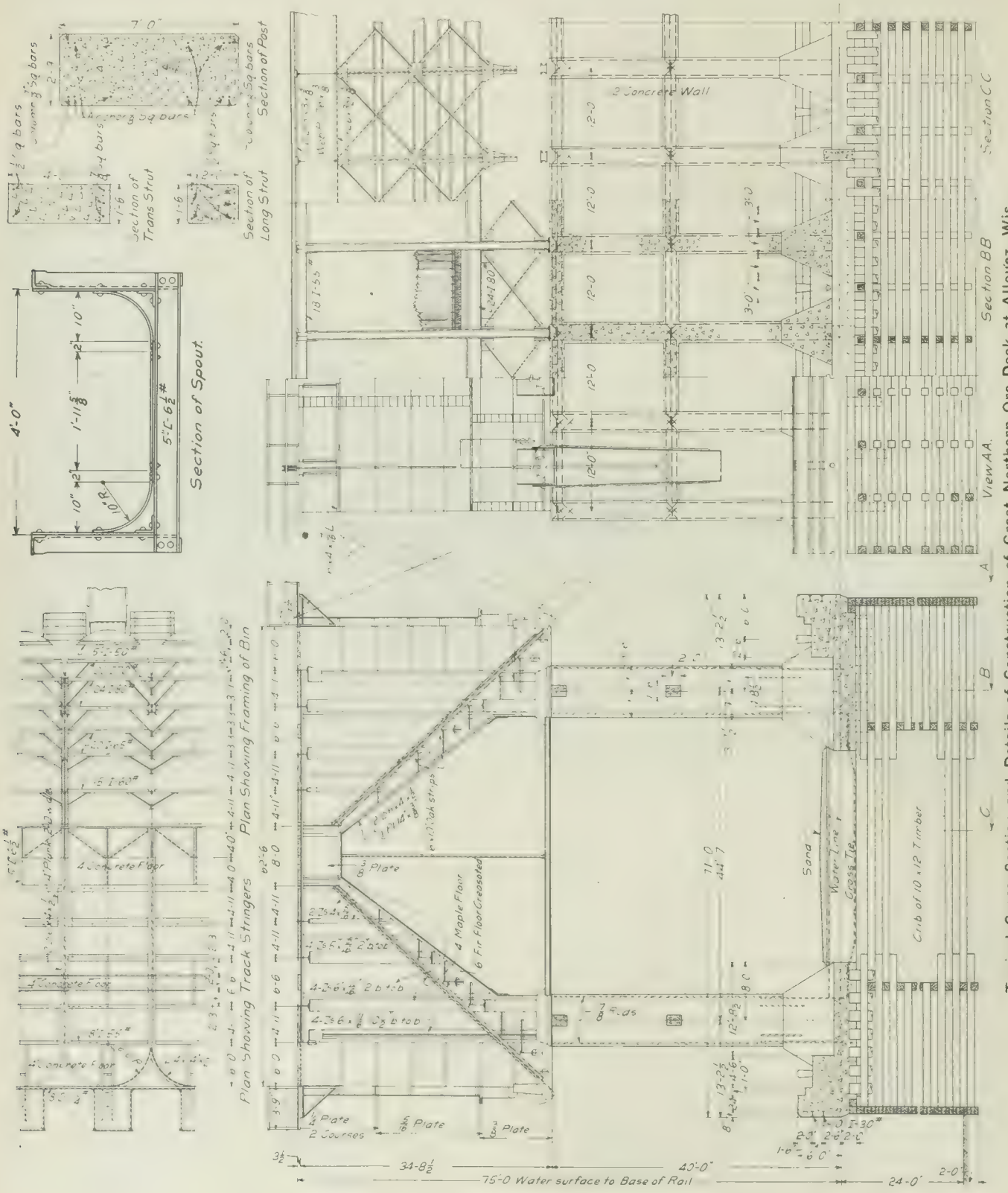
In structural details a number of unique features are presented. The familiar steel trestle supporting the pockets has been entirely eliminated, and in its place massive concrete columns or piers, without transverse bracing, are used. No longitudinal girders are provided at the tops of the supporting columns, the load on the tracks being carried by stringers to the panel points and the load on the bin floors being carried by longitudinal purlins to web plates connecting the vertical columns in the partition walls. These web plates make the partition walls act as transverse beams spanning between the concrete columns and carrying the load on the dock. One of the most striking features about the construction is the use of curved steel plates for the ends of the pockets. This design has the double advantage of being entirely self-supporting and of materially aiding in breaking up the arching of the ore in the pocket which seriously retards its flow.

The dock is approached by a long timber trestle and 300 ft. of steel trestle. The latter consists of three towers supporting 32 ft. 6 in. tower girders and 62 ft. 5½ in. intermediate girders. The grade is continuously ascending toward the dock, being 0.52 per cent. to the outer bent of the third tower of the trestle approach, 0.43 per cent. over the third tower, 0.176 per cent. over the last intermediate girder, and level over the dock proper.

The foundations under the entire structure are carried on piles, the dock being supported on two parallel timber cribs carried down to 20 ft. below water level, or 2 ft. below the bottom of the slip. The piles in these cribs are driven in transverse rows, 7 piles in a row, spaced 2 ft. 6 in. between piles and 2 ft. 4¾ in. between rows. The cribs are framed of 10-in. x 12-in. timbers, each crib being 16 ft. in inside width. The outer walls of the cribs are of solid 12 in. x 12 in. timbers made permanently sand-tight, the cracks being stopped where necesessary by 1 in. x 4 in. pieces nailed on the inside. The inner walls of the cribs are open and the entire space between the two outside walls is filled with sand. At intervals of approximately 28 ft. 9⅝ in. the two cribs are tied together with four 10-in. x 12-in. timbers, two at the top and two at the bottom. Each course of timbers is drift-bolted to the course below, and cross-timbers are dovetailed into the outside walls. The piles are cut off 1 ft. below water level, and are capped by continuous longitudinal concrete slabs carried down 1 ft. below the top of the piles. These slabs

are 3 ft. thick under the column pedestals and 8 ft. thick at the outer edge, where they are designed to form copings. The face of each slab is protected from contact with the boats by two 10-in., 30-lb. I-beams set flush with the surface. Drainage over these slabs is provided by sloping the upper surface of the concrete between the columns 1 in. in 16 ft. and by providing a 6-in. drain hole through the coping.

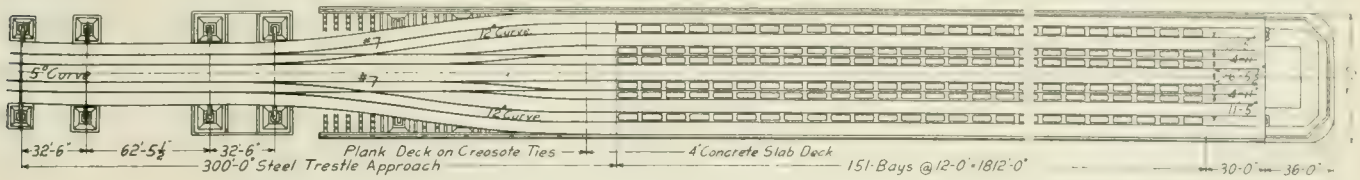
The pedestals under the concrete columns are 7 ft. high above the surface of the slabs, and the columns are 31 ft. 10 in. high above the top of the pedestals. The columns are 7 ft. x 2 ft. 9 in. in cross-section reinforced by ⅞-in. square bars near each corner, designed solely to protect the corners against injury. The slabs and pedestals are of 1:2:5 concrete and the posts of 1:2:4. The columns are connected longitudinally by two sets of concrete beams, each 2 ft. deep and 1 ft. 6 in. wide. The upper row of beams is flush with the top of the columns and the lower row 14 ft. 11 in. above the top of the pedestals. These longitudinal struts are reinforced by 8½ in. square bars, which are carried into the columns at either end of the struts and turned up to secure a firm bond. The structure is further stiffened by 16 tower bays, the piers of every tenth bay being connected by a 10-in. concrete wall. In these bays the reinforcing



Typical Cross Section and Details of Construction of Great Northern Ore Dock at Allouez, Wis.

steel used in the longitudinal struts is placed in the same position that it would occupy if the struts were used in that bay. Expansion and contraction is provided for by 15 expansion bays spaced every tenth bay, the joint in the longtitudinal foundation slab consisting of two inches of tarred box board.

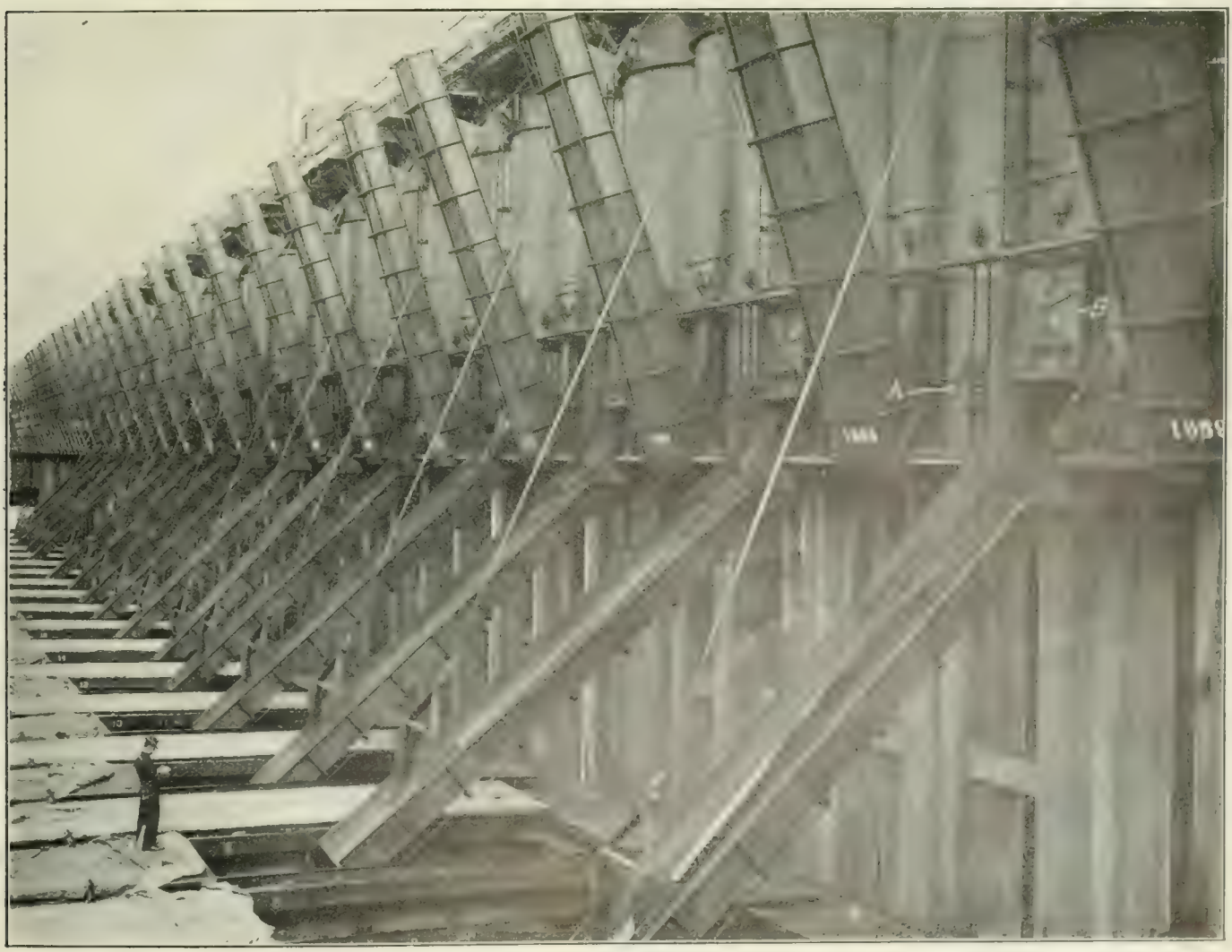
The vertical struts under the dock tracks are built up of Z sections. The two struts over each concrete column are made up of four 6 in. x 11-16 in. Z bars, the two inner struts being four



Plan of the Great Northern Dock at Allouez, Wis.

5 in. x 5-16 in. Zs and two 4 in. x 5-16 in. Zs respectively. The inner rail of the inner track over each pocket is carried on a longitudinal plate girder, built up of two top flange angles, 3 in. x 3 in. x ⅜ in., a ⅜-in. web plate and one 6 in. x 3½ in. x ⅜ in. lower flange angle. This plate girder and the struts in each partition wall are connected by continuous ⅜ in. plates, spliced by 6½ in. x ⅜ in. vertical plates. This plate is stiffened along its lower edge by two 6 in. x 4 in. x ½ in. angles. The struts are encased in concrete flush with the backs of the Z bars, making the surfaces of the partitions smooth. Seven I-beam purlins connect these bin walls and directly support the pocket floors. The plates at the points of connection of these I-beams are stiffened by angles placed horizontally and extending out to the lower edge of the plate. The filling layer of the pocket floor is of 6 in. creosoted fir, and the surface is of 4 in. hard maple. The floor makes an angle of 47½ degs. with the horizontal, which is in accordance with recent practice in increasing the pitch in order to facilitate the flow of the ore.

The steel plates forming the semi-circular ends of the bins are placed in seven courses with riveted lap joints. The upper two courses are ¼ in. plate, the next three are 5-16 in., and the bottom two are ⅜ in. The tendency of the ore to arch in the bins has been found to be almost entirely due to the presence of the square ends, the arch usually forming between the face of the bin and the floor of the pocket, and very rarely between the parallel partition walls. The curved steel ends present only diagonal surfaces to the pressure of the ore, practically eliminating the arching effect. The pockets empty clean, with only 4 or 5 cu. ft. of ore remaining. The doors are of the ordinary sliding type, and are not counterbalanced. They are hoisted by



Side of Dock Showing Hand Winch (A) and Locking Mechanism (B) of the Bin Doors; also Spouts and Operating Platforms.

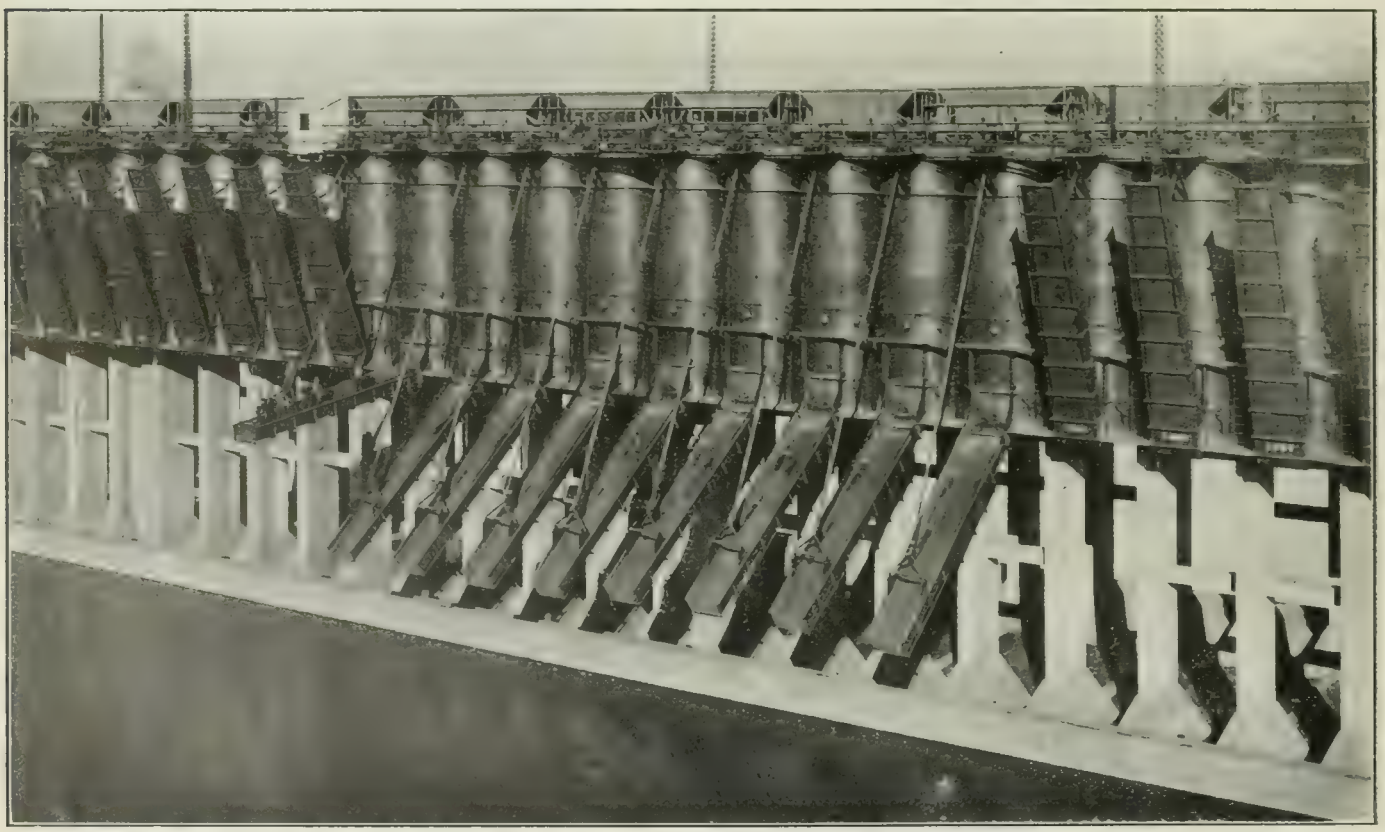
hand winches as shown at *A* on one of the accompanying photographs, the hoisting rope being attached to the latch mechanism shown at *B*. The winch is geared to hoist the door with a pressure on the handle of 35 lbs. As soon as the door is unlatched the pressure of the ore forces it out a little and the stream commences to flow. It can then be hoisted by the winch as far as desired. When in the open position the door can be prevented from closing accidentally by a safety bolt which fits in a hole milled in the cheek plate. The door is of steel plate, slightly convex outward to give it additionl stiffness. It cannot be closed while the stream of ore is flowing. The clear opening provided is about 5 ft. x 2 ft. 7 in.

The spouts are 34 ft. 6 in. long and are rectangular in cross-section with fillets of 10 in. radius in the corners. The sides and bottom are reinforced by angle bars and channels, making a very rigid construction which eliminates much of the tendency to warp and buckle which is present in the semi-circular spouts ordinarily used. The spout is 5 ft. 6 in. wide at the upper end and 4 ft. at the lower end, this taper being provided to increase the friction of the stream of ore against the sides of the spout and thereby reduce its velocity so that the impact in the hold of the vessel is reduced and the stream can be more readily controlled. The spouts are operated by electric hoists and are not counterweighted. The ⅜ in. x 5 in. flat wire hoisting rope is wound around a drum connected to an electric hoist on the machinery platform at the top of the dock. These hoists are operated in groups from a line shaft, the drum being connected to the shaft by a friction clutch controlled by an operating lever. Alternating current, 3-phase, 60-cycle, 440-volt motors of 25 h. p. capacity are used, one motor being provided for every ten spouts. The capacity of the motor allows it to handle several spouts at one time, and the line shaft is so arranged that in case the motor operating any particular group is damaged the adjacent motor can be used. Connections to the line shaft are so arranged that the spouts are lowered under control of the motor and it is impossible for them to drop suddenly.

In order to more equally distribute the ore in the pockets and to avoid trimming, three tracks are provided over each set of pockets, as shown in the accompanying plan. The four inside tracks, however, are built in two sets, each of which has one rail in common, so that it is only possible to shunt cars on four of the six tracks at one time. Floor slabs of 1:2:4 concrete, 4 in. thick, are provided outside of the outside dock rails and between the inner track rails. These slabs are reinforced by ½ in. square bars spaced 6 in. center to center, running longitudinally. A similar floor slab 2 ft. wide, reinforced with wire cloth, is provided between the outside and the center track over each pocket. The approach over the steel trestle is on a 5 deg. curve, and the turnouts to the outside dock tracks are 12 deg. curves.



Deck of the Dock Showing Track Construction, Machinery Platforms and Lighting Arrangement.



Side View of the Dock with Ore Cars on the Structure.

No. 7 frogs are used. The track construction is clearly shown in one of the accompanying photographs.

The dock is lighted by flaming arc lamps suspended on structural steel posts 35 ft. high, spaced 192 ft. apart. By the use of flaming arcs a considerable saving in the number of lamps necessary was affected, the ordinary spacing for carbon arcs being from 108 to 120 ft.

The dock was designed and built under the direction of A. H. Hogeland, chief engineer of the Great Northern, Max Toltz, of St. Paul, acting as consulting engineer. The Barnett & Record Company, of Minneapolis, Minn., were contractors for the foundation and concrete work, and Whitney Bros. for the dredging. The steel work was fabricated by the American Bridge Company and erected by the Pittsburgh Construction Company. The spouts were built by the Minneapolis Steel & Machinery Company, Minneapolis.

HEAD END ELECTRIC TRAIN LIGHTING.*

BY C. R. GILMAN,

Chief Electrician, Chicago, Milwaukee & St. Paul.

A head end lighting system is one where a steam turbine driven dynamo is placed either on the locomotive or in the baggage car, taking steam from the locomotive to operate it. Auxiliary lighting is maintained, when locomotives are changed or cars stand in terminals, by two, three or four storage batteries, depending on the number of cars in the train. These batteries float on the main train wires in parallel with the dynamo, lighting the lamps should any thing happen to the dynamo, turbine or steam hose or if the train should part and pull out a connector.

Although the general system of head end train lighting is the same as used 15 years ago, there have been a number of improvements and changes made. These, with the adoption of the new types of electric lamps, storage batteries, fixtures and reflector glassware, make this system efficient and reliable, where first-class uniform lighting is required on a heavy train.

One of the advantages of the head end system is that as far as its lighting is concerned the number of cars on the train is limited only by the number the locomotive can haul. A seventeen mixed car train is, therefore, taken as an example.

The train is made up as follows:

1 dynamo baggage car	14 lamps
2 mail cars	66 lamps
1 mail tender	8 lamps
1 Comp. sleeper	60 lamps
1 12-section sleeper	80 lamps
1 buffet car	82 lamps
5 12-section sleepers	400 lamps
1 dining car	42 lamps
1 parlor car	42 lamps
3 coaches	78 lamps
17 cars	872 lamps

EQUIPMENT.

One 25 kw. Curtis turbo-generator, 3,600 r. p. m. 110-125 volts.
Switch board and dynamo connection in baggage car.
Automatic loop connectors.
Standard 2-compartment tray of train lighting batteries.

Eight hundred and seventy-two 104-volt, 8 c. p. lamps are used and the total lamp load is 20,627 watts. The losses in the machine and the train lines is 22 per cent., so the load on dynamo is 25,219 watts, which is the full capacity of the machine. In actual operation we seldom get continual steam pressure enough to operate this load, and the storage batteries help out until the number of lights is reduced, as the passengers retire for the night.

Charging batteries en route requires plenty of current, lamp regulation, and means to determine the amount of charge or discharge the batteries are receiving. While there are a number of good automatic lamp regulators on the market, they are quite expensive and each car on the train must have one. Owing to the large number of cars required to make up this train, the cost of automatic regulators would have been over $1,700. And we cast about to see if we could not substitute some means to accomplish the desired results at less expense. Without altering or adding to the present three-wire standard we have accomplished this by connecting the battery to the same main wires as the dynamo and placing a hand operated resistance in the main lamp return wire, in the baggage car. This lamp resistance is brought into use by opening the connector loop at the rear of the train and closing it on switch in the baggage car.

In lighting a 17-car train having over 800 lamps it was found hard to keep the batteries charged and give satisfactory illumination, and on account of the heavy all night load of 75 amperes. I therefore suggested that we reduce the load on this train by adopting 60 volts, and using tungsten and tantalum lamps; this was tried out on the Pioneer Limited. On November 10, 1910, this train arrived in the yard at 11:00 a. m., and when it left at 5:30 p. m. the 110-volt system had been changed to 60 volts and the train had been lamped and tested. The operation that night was all that was expected and the lighting was beyond reproach. To convert the 110-volt dynamo into a 60-volt machine, we placed an extra field rheostat in series with the old one and a shunt across the compound field terminals. The cost of converting this machine from 110 to 60 volts was $7.50.

Compared with a test of a 104-volt train the amount of steam required to operate the dynamo averaged about 18 lbs. less, and the battery charging current available was 50 per cent. greater. The voltage was more uniform, 12 c. p. lamps being used instead of 8 c. p., which increased the light on train 60 per cent. In comparing the operation costs of the two systems, the following items should be considered:

Consumption of steam.	Lamp renewals.
Weight hauled.	Yard labor.
Battery depreciation.	Total candle power.

110-VOLT TRAIN.

The average load on this train was 14.96 k. w. Taking the tests made by Mr. Wray, published in Bulletin No. 268 of the University of Wisconsin, for the efficiency of the turbine, it is found that at a load of 15 k. w., 88 lbs. of steam were used per k. w. hr., which for 19 hours gives 25,080 lbs. of steam used per trip. This divided by 5.5, the pounds of water evaporated per pound of coal, gives 4,560 lbs. of coal used per trip, which multiplied by 182, being the number of trips per year, equals 829,920 lbs. of coal, costing $830.

There were four sets of batteries carried, each set having 54 cells, which together weighed 18.68 tons. This multiplied by the mileage gives 2,787,803 ton-miles, and at a charge of .0015 cents per ton-mile gives a cost of $4,181.70. The battery depreciation figured at 15 per cent. amounts to $679.40. The yard labor was $554.80. There were 5,232 carbon lamps used which, at a cost of 20 cents each, amounts to $1,046.40.

60-VOLT TRAIN.

The average load on this train was 10 k. w., and the average amount of steam used was 105 lbs. per k. w. hr., which figured on the same basis as the 110-volt train, gives the cost of coal as $660. Four sets of batteries having 32 cells each were hauled at a hauling cost of $2,503.80. The battery depreciation of this set amounted to $403.20. While there are 20 per cent. less batteries to be handled in the yard the other work on the train remains the same, so 65 per cent. of the yard cost of the 110-volt train was estimated to be sufficiently accurate. This amounts to $360.12. On this train tungsten and tantalum lamps were used at an average cost of 47 cents per lamp. Ten per cent. more lamps were used than on the 110-volt train, which makes their cost $2,704.85.

The cost of the 110-volt train is therefore $7,292.30, while that of the 60-volt train is $6,631.97, which gives a saving of $660.33 in favor of the 60-volt system. Although the difference in operating expense is not very large, the lighting service was about 100 per cent. better. The total candle power of the 110-volt train was 6,976, while that of the 60-volt train was 10,464, and this increase in candle power has greatly reduced the operating troubles, for formerly reports were constantly received of poor lighting, where as with the 60-volt system very few reports of this kind have been received.

*Abstract of paper read at the meeting of the Western Railway Club, Chicago, January 16, 1912.

NASH'S DUPLEX PASS FORM.

C. L. Nash, auditor and general freight and passenger agent of the Interstate Railroad, Big Stone Gap, Va., in revising his pass forms to make convenient a proper compliance with the new regulations of the Interstate Commerce Commission, has devised a duplex form. The front page is shown slightly reduced, Fig 1 (pass No. 330, filled out but not signed). Stubs both for the going portion and the return, are printed on sheets of exactly the same size and folded (at the top) so as to lie beneath the pass and be filled out with the pass, at one writing, by means of carbon paper. The top fold is used as being the most convenient for insertion in the typewriter. The going portion of the pass, Norton to Blackwood, bears on its back the following: "If not issued, or if issued and not used, send to Auditor. Date lifted ———, 191—" The back of the return portion, Blackwood to Norton, reads:

Not transferable and if wrongfully presented, conductor will take up and collect fare.
Holder is not prohibited by law from receiving this pass, and agrees it will be lawfully used.
The person accepting this pass assumes risk of accidents, injuries and damages to person or property under all circumstances, without claim on the carrier from any cause.
I accept the above conditions, and agree to return to carrier any portion of this pass not used by me.

.....

Not valid until signed in ink by holder.
Date lifted.....191...

The two stubs are virtually duplicates of each other; the left-hand one is to be retained by the officer issuing the pass, and the right-hand is for the auditor. The back of the auditor's stub reads:

User's Address .....
Requested by .....
Detach and send this copy at once to Auditor together with unissued portion if pass is one way only.
See back of issued pass for conditions under which this pass is issued.

The auditor's stubs, 5 in. wide x 3 in. high, when sent to the central office, can be filled numerically in a card index drawer, while the issuing office can retain and file the smaller stubs, either numerically or alphabetically. No stub remains in the pass book. The central office thus has to make but one index card, the card which is to be filed alphabetically; and this need only contain the name of the user and the number of the pass for cross reference to the stub received from the issuing office. Only one name card is needed for each user, as under this name an indefinite number of pass numbers may be inserted. Passes taken up by the conductors are filed by the central office numerically, with the carbon stubs.

For an index of annual and term passes, Mr. Nash uses a card index made up of yellow cards 5 in. wide x 3 in. high, which reads:

Name.....Pass No.....
Address .....
Issued account of.....
Territory—Entire Line .....
Date of Expiration*.....
Request of .....
Date Issued .....
Remarks .....
.....

Instructions—Invariably execute this card for each Annual Pass and each Term Pass issued, and send one copy of card at once to C. L. Nash, Auditor, Big Stone Gap, Virginia. Retain one copy if desired. *Term Pass only.

This also is provided by the printer in duplicate (folded) so that the issuing officer can fill out one for himself and one for the central office at the same time. This could, of course, be made in triplicate to provide a card for a separate alphabetical card index.

Mr. Nash has devised a sheet 11 in. high x 8½ in. wide (9½ in. including a margin at the left for a loose leaf binder) for his pass stock record, this being a more convenient size than the forms for such records which are generally used. A sample of one of these stock records, reduced in size, is shown in Fig. 2 This form is used also for stock records of baggage checks, etc.

INTERSTATE RAILROAD COMPANY
TRIP PASS. No. 300
ISSUED Jan 25 1912
PASS A Mann
ACCOUNT Trav Fgt Agt
FROM Norton VA
TO Blackwood VA
EXPIRES Feb 29 1912
SUBJECT TO CONDITIONS ON FACE AND BACK OF ATTACHED PORTION OF PASS
VOID IF DETACHED THEREFROM

INTERSTATE RAILROAD COMPANY.
TRIP PASS No. 300
ISSUED January 25 1912
PASS A Mann
ACCOUNT Trav. Fgt. Agt
FROM Blackwood VA. TO Norton VA.
GOOD FOR ONE TRIP ONLY WHOLLY IN THE STATE OF VIRGINIA.
UNTIL Feb 29 1912
VALID WHEN COUNTERSIGNED BY MYSELF OR BY C.L.NASH
COUNTERSIGNED BY
A. H. Reeder
GENERAL MANAGER.
SUBJECT ALSO TO CONDITIONS ON BACK

Fig. 1.—Form for Trip Passes, Interstate Railroad.

INTERSTATE RAILROAD COMPANY.

Auditor's Record of TRIP PASS Stock Received and Distributed

STOCK RECEIVED—DEBIT				STOCK DISTRIBUTED—CREDIT				
Date	CONSECUTIVE NUMBERS		Number	Date	CONSECUTIVE NUMBERS		Number	Furnished to
	Commencing	Closing			Commencing	Closing		
1912 1/ 1	1	5,000	5,000	1912 1/ 1	1	100	100	O.Mann, G.M.
					101	200	100	B.Mann, Compt.
					201	300	100	C.Mann, Aud.
					501	1,500	1,000	D.Mann, Supt.

Fig. 2.—Record of Pass Blanks Received and Delivered.

SELF-PROPELLED CARS.*

BY W. B. POTTER,
Engineer of Railway Department of the General Electric Co.

Considering the use of self-propelled cars from the standpoint of what is usually regarded as steam railway transportation, they are of interest as providing a service costing less than with steam locomotives and at the same time increasing the traffic by offering a cleaner and more attractive mode of travel. To the passenger traffic department they offer the advantage of a service practically equivalent to the electric trolley, with the inducement to increased travel which for some not well defined reason seems to be characteristic of independent and frequent car service. The operating department will find a decreased expense for labor, as at least one man less is required for the train crew than with a steam train, and in service where there is little baggage to handle, two men, an engineer and conductor, are sufficient. There will also be a decreased expense for fuel, maintenance and incidental expenses, the total of these savings annually amounting to a very appreciable item. The performance of a self-propelled car, in the interest of its reliability and economic operation, warrants a careful study of its essential features, on the part of those handling it.

Within the limits of our present knowledge, steam storage batteries and the internal combustion engine are the types of motive power entitled to consideration. Steam passenger motor cars fit into the regular steam railway organization from the standpoints of operation and maintenance, and granted sufficient boiler capacity to give them the required schedule speed, there is undoubtedly a field of service for which the steam car is suitable. The motive power equipment of the Rock Island and the Lackawanna steam motor cars, was designed by C. J. Mellin and is a type of equipment comparable to that of the highest development of steam locomotives. A description of the Rock Island car is given in the *Railway Age Gazette* of September 18, 1908. Oil is used for fuel, the steam is superheated and the engine is cross compound. It is doubtful whether, within the dimensions, a steam equipment of greater capacity could be constructed. The inference from the limited extent to which steam-driven cars have been utilized is that they do not fully meet the requirements of independent car service.

The storage battery as a portable form of energy for electric motors, offers a very simple type of equipment and one that is particularly suitable for motor car operation within certain limits as to schedule, speed and mileage between available opportunities for recharging and for light cars. To perform economically a service demanding cars weighing 40 to 50 tons, and often hauling trailers, capable of a maximum speed of 60 m. p. h., and making 150 to 200 miles for the round trip, is a very different matter. It appears that the first cost, maintenance and cost of power, for the storage battery car in this class of service is in excess of that for cars driven by internal combustion engines. Facilities for recharging and the time required for doing so have also to be taken into account. The storage battery and internal combustion engine equipment each has unquestionably its legitimate field of operation and where these fields overlap, the selection will naturally be governed by local conditions.

The internal combustion engine utilizing gasolene as fuel has thus far been the most successful type of motive power for self-propelled cars and is in more general use than any other form of car. The Strang car, described in the *Railway Age Gazette* April 17, 1908, page 568, is equipped with both the internal combustion engine and the storage battery. The addition of the storage battery does not permit using a smaller engine, as the engine without aid from the storage battery must be able to drive the car continuously at full speed. Considering the battery as supplementing the engine to develop greater tractive effort, this result can more economically be obtained without the battery by lowering the voltage and increasing the ampere output of the generator. The battery does afford a means for moving the car without the engine and also provides a simple method of starting the engine. These minor advantages are more than offset by the increased cost, weight, maintenance and greater fuel consumption because of the less efficient method of control as compared to simply an electric generator with a variable voltage control.

The type of equipment developed by W. R. McKeen and the gas electric motor car of the General Electric Company, both use gasoline engines and are the two types more generally used in this country. A description of the McKeen car was given in the *Railway Age Gazette,* January 15, 1909, page 110, and the General Electric car has been described several times. The essential difference between the McKeen motor car and the gas electric car is in the method of control and type of transmission between the engine and the driving wheels. The McKeen car has a mechanical drive with speed change gearing, and as such it is exceptionally well designed for the purpose.

The electric method of control and transmission, as used on the gas electric car, is solely for the purpose of utilizing the inherent characteristics of the gas engine to the best advantage and to relieve the engine from mechanical strain and shock. The control of the electric motors provides for series parallel connection, which is of itself equivalent to a two to one change of gear ratio between the engine and driving wheels, and supplementing this connection there is obtained by regulating the generator voltage an equivalent change of gear ratio for slow speed with a tractive effort of 12,000 lbs. or more, up to a speed of 60 m. p. h., or over, with a corresponding reduction in tractive effort. Throughout this entire range of speed and tractive effort, the full power of the engine is utilized without interruption of power to the driving wheels. The electric drive also facilitates the economical handling of the engine, as the engine speed bears no fixed relation to the speed of the car and the speed of the car may be maintained at a maximum by raising the voltage of the generator with the engine speed reduced to the minimum which is sufficient to develop the necessary power.

As there is no mechanical connection between the engine and driving wheels, the engine can be slowed or shut down without giving any attention to the control system. With the car standing still or moving, the power of the engine may be applied in either the forward or reverse direction without mechanical strain or shock. The advantage of this flexible relation between the engine and the speed of the car will be found in the decreased maintenance of the engine and in the insignificant maintenance of the electrical equipment. A man capable of handling the engine will be competent to make any minor repairs that may be required in the electrical equipment. The engine used on the gas electric car has eight cylinders, 8 in. in diameter, 10 in. stroke and at the normal speed of 550 r. p. m. will deliver 100 k. w. to the motors with some margin to spare.

A Stromberg carbureter is used, which was developed especially for this engine. The conditions required a carbureter that would work effectively on light load and respond immediately to the full opening of the throttle. This result was finally secured by combining a small and large carbureter into one, the larger one coming into action automatically as the smaller one reaches its capacity. Two Bosch magnetos are used, one for each side of the engine and the ignition system is low tension, with make and break spark plugs actuated magnetically.

The general features of the engine and its operation do not differ materially from the gasolene engines commonly used. Compressed air is used for starting. Practically no delay in starting results from shutting down the engine, as the car is in motion within three or four seconds after the engineer admits

*Abstracted from a paper read January 19, 1912, before the New York Railroad Club. Copyrighted by the New York Railroad Club, 1912. Reprinted by permission.

air through the starting valve. Thus the engine may be shut down when power is not required, and thus effect an appreciable saving in gasolene. The economy of operation, as affected by the fuel consumption, is really measured by the quantity of gasolene required for a given service, and in this respect the gasolene consumption with electric control does not differ materially from that which is required with mechanical control. The quality of gasolene commonly used is known as "painters' naphtha," and can be purchased for approximately six cents per gallon. This naphtha is even higher in heat units than the higher grades of gasolene, but does not vaporize as readily, and while it is used successfully with this engine, it would not be suitable for use in automobiles.

The electric motors on the driving truck are standard railway motors with 600-volt windings and are the same in every respect as those used on electric trolley lines. These motors are mounted on the forward truck under the engine and the disposition of weight is such that about 65 per cent. of the total weight of the car is on the driving wheels. As the voltage generated by the large engine varies from 200 to 800 volts, the current for lighting the car is supplied by a separate two-cylinder gasolene engine direct connected to a lighting generator. This small engine has also an air compressor cylinder for furnishing a supply of air for starting the large engine. Connected to the large engine is also a compressor cylinder which maintains the air pressure once the large engine has been started.

The cars are equipped with both straight and automatic air brakes, the latter for the purpose of handling trailer cars. The engine compartment in the forward end is about 12 ft. long, and in dimensions and arrangement is the same on all cars regardless of the remainder of the car body, which may be arranged in any way desired. A 70-ft. car, with stops every 2 miles, could maintain a schedule speed of about 25 m. p. h. The maximum speed on level track would be about 60 m. p. h.

From available data the following comparison has been prepared on the cost of operation by steam, including a locomotive and two cars, and gas electric cars on the basis of the same daily mileage. The run consisted of 150 miles daily (except Sunday) amounting to 3,900 miles a month.

	Steam Train per Mile.	Motor Car per Mile.
Wages of Crew—		
Engineer or motorman	$.0400	$.0400
Fireman	.0240	.....
Conductor	.0280	.0280
Baggagemaster	.0183	.0183
Total wages of crew	$.1103	$.0863
Note.—Based on no overtime allowance.		
Fuel, Water and Engine Lubrication—		
Coal for locomotive, 67 lbs. at $2.25 per ton	$.0750	.....
Water for locomotive	.0050	.....
Painters' naphtha, 6 gals. at $.06 per gal	.....	$.0360
Engine lubrication	.0025	.0050
Other Expenses—		
Locomotive repairs	$.0850	.....
Locomotive enginehouse expenses	.0250	.....
Coaches (2) repairs and expenses	.0250	.....
Gas-Elec. motor car, general overhaul	.....	$.0215
Gas-Elec. motor car, running repairs and expenses	.....	.0210
Other supplies	.0025	.0050
Superintendence	*	.0065
*For steam locomotives this is assumed to be included in items of locomotive repairs and enginehouse expenses.		
Total cost per train mile	$.3303	$.1813
Saving per train mile	$.1490	
Saving per day (except Sunday), 150 miles a day	$22.35	
Saving for 26-day month	$581.00	
Gross yearly saving	$6,970.00	

Note.—When no baggage and express is handled and when operation conditions will permit, the gas-electric motor car can be operated without the third man.

As an illustration of actual results obtained from the gas-electric car during the months of July, August and September, 1911, on the Minneapolis, St. Paul, Rochester & Dubuque, which has five of these cars, the following table of expenses is given. The run was between Minneapolis, Minn., to Northfield, a distance of 37.5 miles. The 5 cars made a total mileage of 39,352 miles in 92 days, occasionally hauling one or two trailers, the mileage of the trailers being 7,879 miles.

	Total.	Per Train Mile.
Total Wages of Crew	$2,249.40	$.0573
Fuel and Lubrication, Engine—		
24,944 gals. of gasolene at $.62 per gal	1,534.20	.0391
755 gals. of gas engine oil at $.25 per gal	189.76	.0048
Running Repairs and Expenses—		
Total running repairs, material and labor	410.36	.0104
Car cleaning, materials and labor	135.70	.0035
Other supplies	81.83	.0021
Total expense	$4,601.25	$.1172

Discussion.—The question was brought up by G. W. Wildin as to the service of such cars on branch lines with no facilities for turning the car at the end of the line either by turntable or wye; on most roads the installation of either of these facilities would be impracticable. He also questioned the expense of locomotive repairs and enginehouse expenses, as shown in the table, believing that they were much too large for the class of service handled by the motor car.

Mr. Potter replied by saying that wherever these cars have been installed it was found that a wye could be easily installed. Also that he appreciated the value of operating the cars from either end, but at the present time it had been found more logical to keep the driver at the end in which the engine was located, so that he might watch its action. Then again, by having a car operated from only one end, several additional seats were possible. Concerning the expenses of the locomotive, he stated that he was restricted to the data he had at hand and would be glad to receive any additional information which would lead to any fairer comparison between this car and an ordinary steam train. He also emphasized the increase in efficiency due to the decrease in the weight of the car per passenger.

In replying to W. J. Harahan's question as to the reliability of the car, Mr. Potter stated that only once had he known of any car having to be drawn into its terminal under any other except its own power.

MINNESOTA REPORT ON ODESSA COLLISION.

The report of the Railroad and Warehouse Commission of Minnesota on the collision at Odessa, on the Chicago, Milwaukee & St. Paul, December 18, is in substance as follows (for other details see our report last week, page 84):

The commission has carefully considered the report filed by its engineer and the facts disclosed at the investigation. The accident happened at 4:25 a. m. at Odessa. Eastbound passenger train No. first 18, known as the "Columbian," was standing on the main track in front of the station when train second 18, (carrying no passengers) ran into it. The engine of second 18 forced itself under the west end of the sleeper "Beverly," thereby acting as a wedge sufficient to tilt its east end down, and, at the same time, force it under the connecting dining car. This resulted in the telescoping of the sleeping car, when ten persons were killed and eighteen injured.

The evidence proves that the collision resulted from violation by the employees of the rules of the company, and also neglect on the part of the company in seeing that its rules are observed. The report here quotes the rules of the manual block system, which is absolute, for following trains, "except when the train despatcher authorizes the use of permissive card or caution signal. . . ."

Nine men violated the rules and eight contributed in a greater or less extent to the accident.

The manual block section extends from Junction Switch east to Appleton, a distance of 20.6 miles. Odessa is about 5 miles east of Junction Switch. Two signalmen are maintained at Odessa, but no operator is at the tower from 1:30 a. m. to 8:00 a. m. When the operator vacated his place at 1:30 a. m. he negligently left the signal at "stop."

When first 18 arrived at Odessa at 3:52 a. m. the engineman found the signal against him and stopped about 900 ft. *east* of the

block signal. He then backed the train to a point which brought the rear end 300 ft. west of the block signal, without first waiting for back-up signals or being assured that the rear end was protected, as required by the rules. It cannot be said, however, that the action of the engineman contributed to the accident.

If the conductor and rear flagman had observed the ordinary precautions for protecting the train there would have been no danger in making the stop. The rear flagman failed to protect the rear or to throw the switch to the passing track, as ordered by the conductor, and the conductor failed to see that the flagman performed his duty, although he had thirty-three minutes in which to do so. He says he told the brakeman to throw the switch and go back and flag the train (second section) and then admits that he saw him pass the switch without throwing it. It is evident that both of these men were relying too much upon the block at Junction Switch to protect the rear.

Second 18 arrived at Junction Switch at 4:08 a. m. The conductor . . . asked the operator for a clearance, and got it, after the operator had wired to Appleton twice and, according to his statement, had received word that first No. 18 was coming close. The operator was also advised by the despatcher at Aberdeen that the passenger train was coming close to Appleton and was ordered to issue a clearance for second No. 18. The conductor, knowing these facts, accepted the clearance and proceeded with the train, being reasonably sure that first No. 18 would soon pass or had already passed through Appleton, and that no other train was in the block. The train despatcher did not order a permissive card, as provided by Rule 32, and hence the clearance given by the operator at Junction Switch, upon the instructions of the despatcher, was a clear violation of that rule. The conductor should not have proceeded upon the clearance. The operator at Appleton denies that he said that first No. 18 was coming, or coming close, and testifies positively that he reported to the contrary. The weight of the evidence according to the report [report of the commission's engineer?] is against his statement.

The despatcher, the operator at Junction Switch and the conductor of second No. 18 knew that they were violating the rules. The practice of violating rules on the part of the employees, taken in connection with certain admissions made at the hearing, shows that the railway company should be charged with knowledge that its rules are frequently disobeyed, and the commission cannot refrain from condemning this condition.

The block section at this point is the longest one on the Milwaukee system. It is too long for practical operation, and the demand for rapid service and the large volume of business done by the company makes it practically impossible to keep trains moving in the same direction over twenty miles apart. This fact persuades the employees to "take a chance," and has a tendency to cause men in authority, and the officers, to wink at violations of the rules when they have no disastrous results. The interest of the public, as well as of the stockholders of the companies, requires absolute fidelity to rules, and if this practice can be developed it will result in a very substantial reduction in the loss of life and destruction to property. Where it can be shown that a company permits the violation of rules which result in injury to person or property it should be held strictly responsible.

The report here considers the behavior of the cars when the collision occurred and discusses the question of steel car construction. This part throws no light on the subject, and therefore we omit it. An illustrated account of this feature of the wreck was given in our last issue, page 84. Continuing, the commission says:

The commission is of the opinion that a number of the employees were guilty of gross criminal negligence and recommends that the proper officials take such action as will insure the indictment and speedy trial of the responsible parties. This report, together with the findings of our engineer and the evidence taken will be filed with the Attorney General. . . . There should be a system of governmental inspection of the construction of cars, rails and all structural iron or steel work used in the manufacture of cars. . . . The commission withholds making any comment upon the safety of the manual block system until it has made a careful investigation. This will be done at an early period.

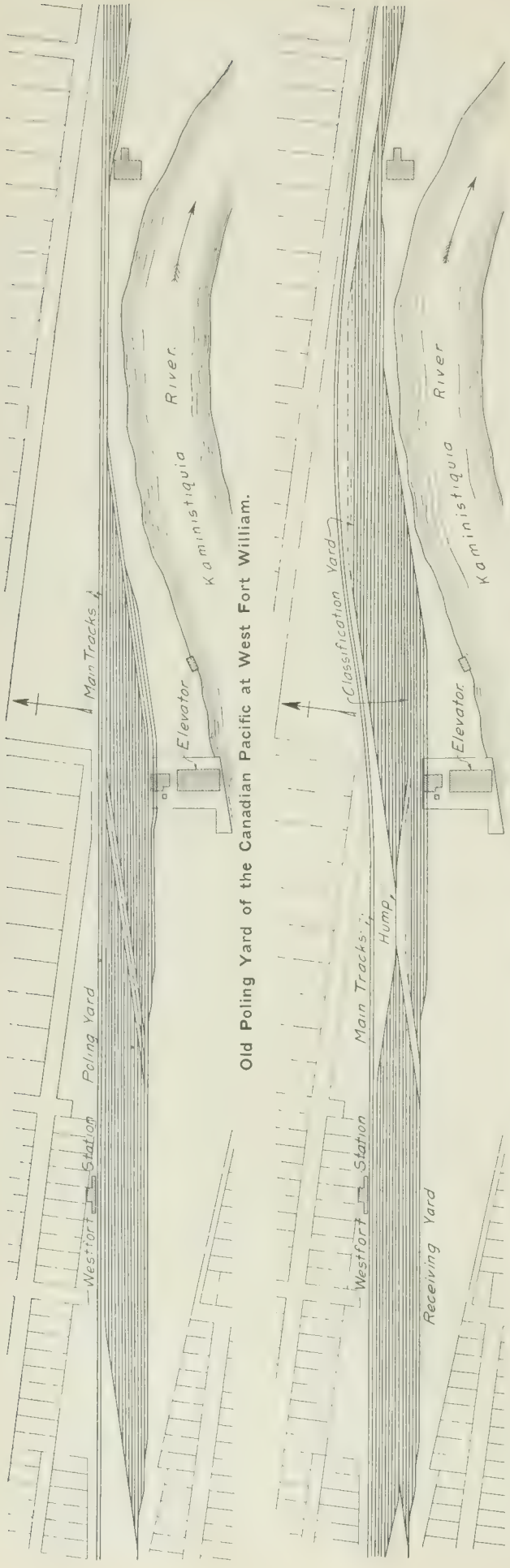
REPORT OF KENTUCKY RAILWAY COMMISSION.

The railroad commissioners of Kentucky, L. B. Finn, W. F. Klair and H. G. Garrett, have issued the annual report of the commission for the year ending December 1 last. Following a brief statistical chapter, the report deals mainly with proposed legislation. The most important litigation in the history of the commission is now in progress, the Louisville & Nashville having resisted in the courts an order of the commission making a reduction in rates for the transportation of grain. If the law, under which the commission took this action, should be held unconstitutional, it will be necessary, say the commissioners, for the legislature to immediately take action, or the beneficial power of the commission would be destroyed. However, the commission expects a favorable decision from the supreme court of the United States.

The commissioners declare that Kentucky is too conservative. She is now far behind even the most conservative of the other states in the regulation of railways. But the people have at last awakened, and a forward move should be made. To pass just now a radical and comprehensive law, like that of New York, would not be wise, and the commission contents itself with recommending a few provisions. It would like a law to impose upon railways a forfeit when they do not furnish cars promptly for loading, and the commission should have specific power to investigate complaints of lack of cars or delay in transportation; it should have power to inquire as to the efficiency of freight and passenger service; to impose penalties for not filing tariffs and to forbid unreasonable increases in rates; to order the correction of unsafe conditions of tracks or bridges, and in general to secure the convenience and safety of the public.

RECONSTRUCTION OF CANADIAN PACIFIC YARD AT FORT WILLIAM, ONT.

Largely because of the satisfactory service secured from the large gravity yard of the Canadian Pacific at Winnipeg, the poling yard at West Fort William was changed to a gravity yard during the past summer. This yard, which is used for westbound traffic only, consisted originally of 14 receiving tracks averaging about 2,000 ft. long and 14 classification tracks averaging about 1,200 ft. long, the east ladder of the receiving yard and the west ladder of the classification yard being parallel and separated by a running track. In the work of reconstruction it was necessary to make extensive changes along these ladders. The center track of the receiving yard was extended through to the classification yard and raised to form a hump. All the receiving tracks north of this were shortened by the construction of a ladder leading to the hump. To compensate for this shortening these tracks were extended at the west end the same amount they were shortened near the hump, as may be noted by comparing the two accompanying plans. Owing to restricted space, it was necessary to raise the east end of the receiving yard and the west end of the classification yard to form the approaches to the hump. The grade of the approach from the receiving yard is approximately 1.8 per cent., while on the opposite side there are 200 ft. of 3 per cent. grade, easing off to a .15 per cent. grade through the yard. To provide room for additional classification tracks, both the east and westbound main tracks were thrown north about 100 ft. and new yard tracks were laid in this space. In the new yard there are seventeen



classification tracks varying in length from 900 to 2,100 ft.

On the arrival of a train at the yard it is broken up, and any cars which may be billed through to the East by rail are taken from the classification yard to a yard further east, which is used as a departure yard for both east and westbound trains. These changes were completed and the yard put in service about the middle of September, and so far the results have been most satisfactory.

TRAIN ACCIDENTS IN DECEMBER.[1]

Following is a list of the most notable train accidents that occurred on railways of the United States in the month of December, 1911. This record is based on accounts published in local daily newspapers, except in the case of accidents of such magnitude that it seems proper to write to the railway manager for details or for confirmation.

Collisions.

Date.	Road.	Place	Kind of Accident.	Kind of Train.	Kil'd.	Inj'd.
2.	Union Pac.	Ogden.	xc.	P. & F.	1	3
4.	Erie	Kent.	xc.	F. & F.	2	4
6.	Penn.	Manon	rc	F. & F.	6	3
8.	Balt. & Ohio	Clarksburg.	bc.	P. & F.	1	3
8.	Illinois Central	Paducah.	rc.	F. & F.	1	2
11.	N. Y. C.	N. White Pl's.	xc.	P. & F.	1	5
13.	Grand Trunk	W. Paris.	bc.	P. & F.	0	6
13.	Missouri Pac.	Willington.	rc.	P.	1	3
14.	Union Pac.	Castle Rock.	bc.	F. & F.	2	2
15.	Penn.	Buffalo.	xc.	P. & F.	0	4
18.	Chi., B. & Q.	Tracey, Iowa.	rc.	F. & F.	0	0
18.	Chi., M. & St. P.	Odessa.	rc.	F. & P.	10	11
21.	Chi., M. & St. P.	Glencoe.	rc.	P. & P.	0	3
22.	Texas & Pac.	Kildare.	bc.	P. & P.	1	18
23.	Erie; C. & O.	Hammond.	rc.	P. & F.	0	20
26.	N. Y., Susq. & W.	Stockholm.	bc.	F. & F.	1	3
31.	Southern	Crandall.	rc.	P. & F.	0	4

Derailments.

Date.	Road.	Place.	Cause of Derailm't.	Kind of Train.	Kil'd.	Inj'd.
1.	Atlantic C. L.	Kissimmee.	.....	P.	1	1
1.	Illinois Central	Paducah.	d. track.	P.	0	20
6.	Southern	Helena, Ga.	d. track.	P.	2	3
8.	Chicago & Alton	Alma, Mo.	unx.	P.	0	3
11.	Southern	Pelzer, S. C.	neg.	F.	2	1
*12.	Del. & Hudson	Carbondale.	runaway.	F.	2	6
12.	Boston & M.	Wells River.	rock.	F.	2	0
13.	Trinity & B. V.	Dallas.	boiler.	F.	2	1
14.	St. Louis & S. F.	Bryant.	unx.	F.	2	2
15.	Penn.	Philadelphia.	unx.	P.	..	..
19.	St. Louis & S. F.	M't'n Grove.	unx.	P.	2	0
*19.	N. O., Mobile & C.	Stringer, Ala.	.....	P.	0	4
20.	Penn.	New Phila., O.	b. rail.	F.	1	0
20.	Del., L. & W.	Analomink.	runaway.	F.	0	1
20.	Southern	King's M't'n.	acc. obst.	P.	..	..
20.	Buffalo & Susq.	Wellsville.	b. rail.	F.	1	2
21.	Seaboard A. L.	Gloster.	b. rail.	P.	0	40
23.	Wabash	Knights.	b. frog.	P.	0	4
23.	Chi. & N. W.	Albion.	d. track.	P.	0	4
24.	Virginia & S. W.	Natural Tunnel.	acc. obst.	F.	3	2
27.	C., C., C. & St. L.	La Grange.	unx.	P.	0	15
28.	Chesapeake & Ohio	McKendree.	unx.	P.	2	5
30.	Great Northern	Sharon.	b. rail.	P.	6	13

The trains in collision at Ogden, Utah, on the 2d, were an eastbound passenger train which had just started from the station and a switching engine; and the engineman of one of the two engines drawing the passenger train was killed. The passenger train was moving at low speed, and none of the persons in its cars were injured. The switching engine had backed through a crossover so as to partially foul the main track. The men in charge of this engine were responsible for making this unauthorized movement, and a switch tender is also held negligent

[1]Abbreviations and marks used in Accident List:

rc, Rear collision——bc, Butting collision——xc, Other collisions——b, Broken——d, Defective——unf, Unforeseen obstruction——unx, Unexplained——derail, Open derailing switch——ms, Misplaced switch——acc. obst., Accidental obstruction——malice, Malicious obstruction of track, etc.——boiler, Explosion of locomotive on road——fire, Cars burned while running——P. or Pass., Passenger train——F. or Ft., Freight train (including empty engines, work trains, etc.)——Asterisk, Wreck wholly or partly destroyed by fire——Dagger, One or more passengers killed.

in giving an all-right hand signal to the passenger train before the switching engine was clear of the main line.

The rear collision of westbound freight trains at Manor, Pa., on the 6th, was apparently due to careless running by the engineman of a train running under a permissive signal, the train ahead of him having been unexpectedly stopped. The collision was not a very bad one, but the wreck, which fouled the other westbound track, was run into by a train of express cars; and in this train there was a car carrying 20 valuable horses, accompanied by a half dozen caretakers. Three of these caretakers were killed, together with one express messenger and the engineman of the express train. Ten men, altogether, were injured. Some of the cars of the express train fell down a bank 20 ft. high. The value of the horses killed was estimated at $50,000.

The rear collision near Paducah, Ky., on the 8th, was on an ascending grade. A freight train, which was unable to proceed at regular speed, was run into at the rear by a light engine which was running at the rate of 50 miles an hour. Several cars were wrecked and ditched and one brakeman was killed.

The butting collision of freight trains at Castle Rock, Wyo., on the 14th, was due to a westbound train becoming uncontrollable on a steep descending grade about 2 a. m. One fireman and one brakeman were killed and several other trainmen were injured. The eastbound train was standing at Castle Rock station, and it is said that the air brakes on the westbound train had been tested and found in good condition about five miles back. This train, which consisted of 50 cars, was brought partially under control by use of hand-brakes, but not sufficiently to avoid the collision; and it struck the standing train at about 30 miles an hour.

In the collision at Tracey, Iowa, on the 18th, a freight train ran into an empty passenger train which was being switched, near the station, damaging two passenger cars. No persons were injured. The engineman of the freight had dropped dead a few minutes before. When the freight train sounded the station whistle one mile west of the station a brakeman in the cab looked across and said to the engineman, "We head in here." This message he acknowledged, and he was at that time apparently in his usual health. A moment later both the brakeman and the fireman noticed that the speed of the train was not decreasing as it should, and then looked across the boiler head; but they were unable to see the engineman. The fireman then attempted to get in on the engineman's side of the cab, but found that the door was fastened on the inside, whether by the engineman or by the button working into a position that would hold the door, cannot be determined. As soon as this situation was discovered the brakeman crawled over the boiler head, put the air in emergency and reversed the engine; but not in time to prevent the collision. The engineman was lying on the floor of the cab, dead, the result of a stroke of apoplexy. The train had moved less than a mile from the point where it is known that the engineman was alive and acknowledged the brakeman's instructions to head in.

The collision at Odessa, Minn., on the 18th, was reported in the *Railway Age Gazette*, December 22. Ten persons were killed, and 18 injured. An eastbound express train was run into, at the rear, by the second section of the same train, carrying no passengers. The steel sleeping car at the rear of the standing train was crushed for nearly its whole length. The causes of this collision are dealt with in this issue under another head.

The derailment at Carbondale, Pa., on the 12th, occurred in the freight yard and was due to a train of 42 cars becoming uncontrollable at the head of a steep grade. The air brakes were not in operation, and after the train was separated by the failure of a drawbar, 40 cars ran uncontrolled to the foot of the grade, where the leading car jumped the track and fell against a cabin occupied by hostlers and other employees. Two of these men were killed and five injured. The wreck also set fire to a machine shop which was burnt down, and five locomotives were badly damaged by fire. A tank of gasolene was set afire by an overturned stove and several cars were burnt up.

The derailment at Philadelphia, on the 16th, was not a very bad one, but was noticeable because of its location. It was about one mile from the entrance of the Broad street station and for over an hour no train arrived at or departed from that station. The rear car of a westbound passenger train ran off the track and fell against a signal bridge, knocking it down and blocking four tracks. Access to the station was still possible over the tracks of the Maryland division, but those tracks approach from the west on a very steep grade.

The derailment near Analomink, Pa., on the 20th, was due indirectly to a freight train becoming uncontrollable on a steep descending grade. The train, consisting of 51 cars, ran off the track at a curve. Only one trainman was injured, and he but slightly. It appears that the train did not run away; but its speed increased so that the engineman applied his independent locomotive brake; and he applied it too hard and kept it on too long, so that the tires of his driving wheels became heated and loosened; and this so changed their position on the wheel centers that they spread the rails at a curve. The trainmen had manned the handbrakes and controlled the speed.

The derailment near Sharon, N. D., on the 30th, was due to a broken rail. The train was westbound, No. 3, the "Oregonian," and all the cars in the entire train, with the exception of the engine, were either partly or totally derailed; four of the passenger cars, including the diner, fell down a 20 ft. bank. One passenger, one brakeman and one cook were instantly killed; another cook and a passenger received fatal injuries; the former died in about an hour and the latter about five hours after the accident; eight other persons were injured. All of those killed, excepting one, were riding in the dining car, and apparently fell through the side windows as the car turned over down the bank and life was instantly crushed out of all except one, who was promptly extricated and removed to an officer's private car, which was on the train. All of the injured were very soon cared for in the standard sleeper and the officer's car, both of which, though derailed, were standing upright. It was about 15 below zero at the time, with a strong north wind blowing. The three persons who were instantly killed were held fast under the body of the diner and their bodies were partly burned, fire having caught in the diner and tourist car from the ranges. These cars were destroyed, together with the first-class coach, which remained coupled to them.

Electric Car Accidents.—Of the 12 accidents to electric cars reported in the newspapers as having occurred in the United States in the month of December, only one appears to have been attended by fatal results. This was a butting collision at Wolcott, Kan., on the 18th, in which two persons were killed; one the motorman of the car and the other a despatcher employed by the road. Nine passengers were injured. At Burlington, N. J., on the 19th, a car broke through an iron bridge and fell into a creek; and 11 persons were saved from drowning only by being pulled through the windows and through a hole in the roof of the car, by rescuers in boats. Near Pottsville, Pa., on the 26th, a car in which were 61 passengers fell off a bridge 15 ft. into a shallow creek, and all but three of the passengers were injured. The report said that six were fatally injured.

An American at San Pedro Sula, Honduras, has submitted a proposition to the government of that republic for the construction of a railway, which will start from some point between Punta de Hisopo and Punta Cocalito, on the Tela, and Puerto Sal Bays, and terminate at El Progreso, department of Yoro. Another proposal has been made to the government of Honduras by a civil engineer for the construction of a railway from Puerto de Tela, or Puerto de Sal, on the Atlantic, to Zacate Grande Island on the Pacific, via Tegucigalpa, or with a branch to that place from some convenient point to be selected by the concessionaire with the approval of the government. He also proposes to construct branches from points on the main line, to the boundaries of Salvador, Guatemala and Nicaragua respectively.

HIGHLY SUPERHEATED STEAM FOR LOCOMOTIVES.*

BY GILBERT E. RYDER.

From the results that have been obtained with superheaters in service, it is conservative to say that the saving which has been effected in the fuel consumption under average working conditions is 25 per cent. The saving is so large that we are liable to overlook the significance of the fact that this 25 per cent. saving in fuel really means an increased hauling capacity of 33 1-3 per cent. For instance, assume that we are burning 6,000 lbs. of coal per hour in a saturated steam locomotive, and are developing 1,500 h. p. hr. Suppose that we equip this same locomotive with a superheater, by the use of which we have been able to save 25 per cent. in fuel, that is, 4,500 lbs. of coal, are now developing 1,500 h. p. hr. Now, when 6,000 lbs. of coal are fired per hour the superheater locomotive will develop 2,000 h. p. hr., or an increase of 500 h. p. hr., which is an increase of 33⅓ per cent. in horse power hour.

Dry or moderately superheated steam has been frequently tried, but with little economy compared with a high degree of superheat. Many forms of superheaters designed to be located in the smoke box or in an intermediate combustion chamber have been tried but with unsatisfactory results. The smoke box type is open to serious objection on account of its low degree of superheat, and that it obstructs the front end and is expensive to maintain, due to the corrosion of the pipes and their deterioration occasioned by the abrasive effect of the cinders.

Prof. Benjamin and Prof. Endslay in a paper read at the Master Mechanics' Convention in 1910, gave the following data from tests: "The coal consumption per indicated h. p. hr. at 180 lbs. steam pressure for the locomotive using saturated steam was 3.50 lbs., and for 80 degs. of superheat was 3.40, a gain in efficiency of 2.8 per cent., while the consumption at 160 deg. superheat was 3.00 lbs., a gain of 14.8 per cent., which is five times the saving of the first 80 deg. Now, if points are plotted and a line indicating a steam pressure of 180 lbs. is carried as a smooth curve to 240 degs. superheat, it would indicate a coal consumption of 2.35 lbs., or a saving over the saturated engine of 32.8 per cent."

The fire tube superheater, which gives a superheat of from 200 to 250 degs., has been largely adopted by railways using superheated steam, because of the increased efficiency of the locomotive using such high degree of superheat. At present there are something over 12,000 locomotives in all countries equipped with fire tube superheaters furnishing highly superheated steam, and over 2,000 of this number are in service in the United States. The principal advantage secured through the use of highly superheated steam is due to the increased volume of steam delivered per lb. of water evaporated and the prevention of cylinder condensation. Tests show that, in Mallet compound engines without superheaters, the condensation in the receiver pipe runs up to over 20 per cent., while in simple saturated engines using a short cut-off, cylinder condensation runs up to over 35 per cent. of the weight of steam admitted to the cylinders; that is, for every 100 lbs. of steam delivered to the cylinder only 65 lbs. are available for doing work. This loss can be overcome by the use of highly superheated steam.

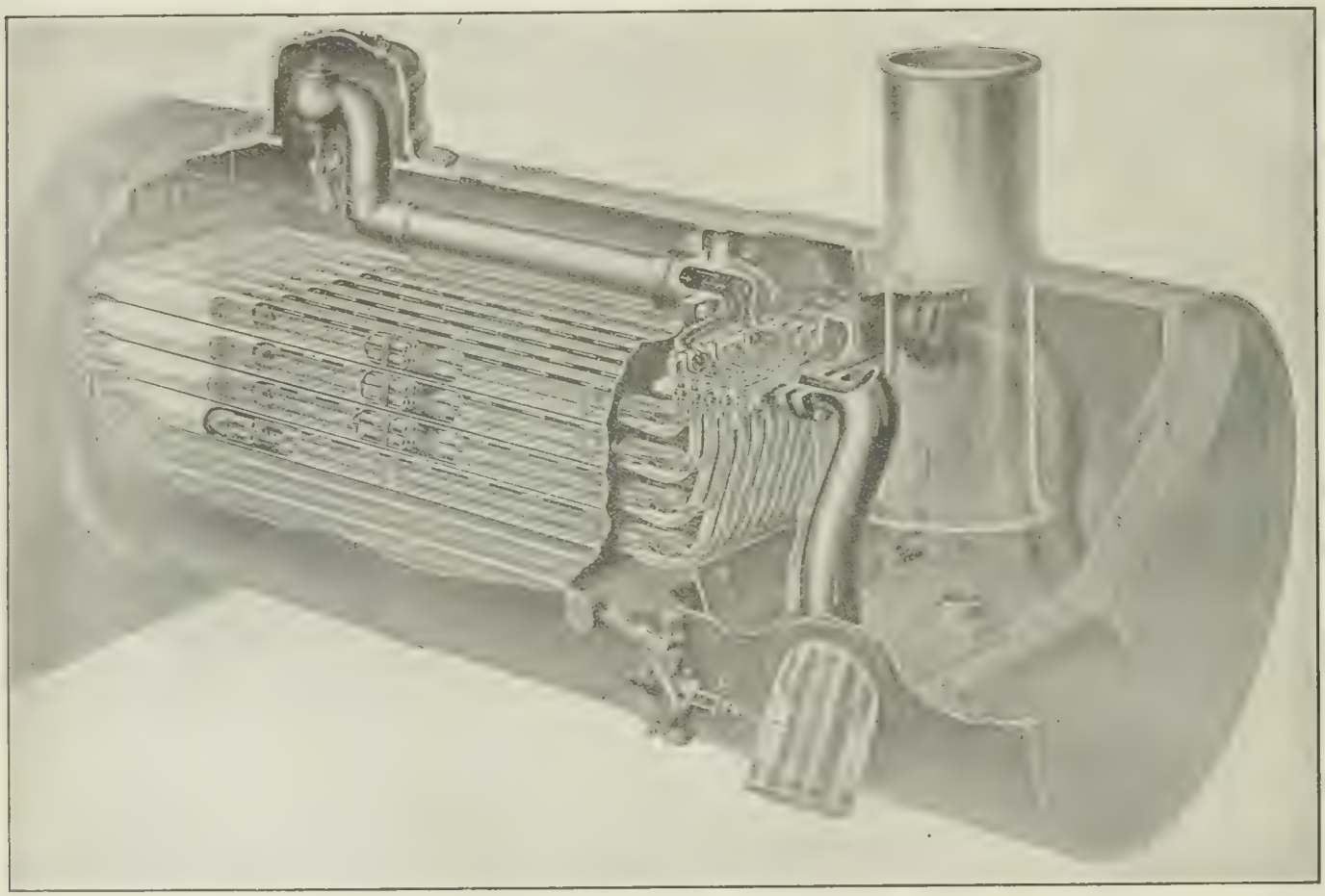


Fig. 1—Top Header Fire Tube Superheater.

Superheated steam partakes the nature of a perfect gas. It has a larger volume per unit of weight than saturated steam, and like a gas is a poor conductor of heat, giving up its heat to the cylinder walls and steam pipes less rapidly. Superheated steam at 170 lbs. pressure with 200 deg. F. superheat, has a volume of 3.27 cu. ft. per lb. against 2.47 cu. ft. per lb. for saturated steam. Of course, when superheated steam passes from the superheater

*Read before the Southern and Southwestern Railway Club, Atlanta, Ga., January 18, 1912.

to the comparatively cold cylinder walls some of its superheat is given up to these walls and the passages traversed in reaching the cylinders, but the condition differs from that of saturated steam in that it does not condense, until it has lost all of its superheat, and therefore, the superheater must be so designed that under all working conditions it furnishes more superheat than the steam can loose in the cylinders.

The effect of the superheater on the boiler is to increase the boiler capacity which would tend to decrease the demands that are made on it. It is therefore economical to force a superheater engine while it is not economical to force a saturated boiler in the same way. The fact has been proved that locomotives equipped with superheaters developing high degrees of superheat, have at least 25 per cent. greater boiler capacity than the same size of engine without a superheater.

In engines operating in poor water districts where foamy water and fluctuations in water level would tend to increase the amount of water carried over from the boiler, it can readily be seen that a device which reduces the demand on the boiler, and which still, in addition, prevents the water from reaching the steam chest and cylinders, will greatly lengthen the life of the valves and pistons, prevent breakage of cylinder heads from water pressure, and also lengthen the life of the boiler. Another feature which favors the boiler in the use of superheated steam is the comparatively low boiler pressure which may be carried, as the size of the cylinders is not limited, as in the saturated steam engines where the diameter of cylinder must be limited in order to reduce condensation. Standard recommendations for boiler pressure to be used in connection with superheaters are 180 lbs. for freight engines and 200 lbs. for passenger engines. In bad water districts even lower boiler pressures may be used with correspondingly enlarged cylinders.

The superheater shown in Fig. 1 consists of a header *A* supported on brackets in the smoke box and making a joint with the steam pipe in the same manner as the tee head. Attached to the header and in communication with it are the coils or units *B* made of cold drawn seamless steel tubing and screwed into return bends. Each unit is located inside a large flue *C*, and extends to within about 2 ft. of the back flue sheet. The larger boiler flues are set into the front and back flue sheets in very much the same manner as the ordinary small boiler tubes. The flow of gases through these tubes is controlled by a damper *D* which is operated by the damper cylinders *E* located at the outside of the smoke box. The normal position of the damper is open when the engine throttle is open, thus allowing the gases to pass through large tubes and come in contact with the superheater unit. It is operated by steam from the steam pipe, so that when steam is passing to the cylinders the damper will be open.

When the throttle valve is open saturated steam passes through the dry pipe and into a portion of the superheater header designed to receive the saturated steam. From this portion of the header which is in communication with one end of the superheater units the steam passes downward through one tube of the unit, backward toward the back flue sheet, forward and backward again, and then forward and upward to the other side of the header designed to receive the superheated steam. From the header it then passes into the steam pipes, then into the steam chest and into the cylinders. A detailed view of the header casting through several sections is shown in Fig. 2. Section through *AA* shows a section of the steam pipe connection of the header and the passageway and also the back and front end passage for the saturated and superheated steam. The passage way marked *S* represents the superheated and that designed *W*, the saturated steam passageway, which are in communication with the respective chambers marked *S* and *W*, in the section to *CC*. The units, which are shown in Fig. 3, are held in place by a bolt which extends through slots in the header casting between the superheated steam and saturated steam chambers, and are prevented from turning by bosses or lugs located at the top facing of the header. The section through *BB* shows a section of one of the top steam pipe connections, and is similar in other respects to section *AA*. In the plan view of the lower side of the casting

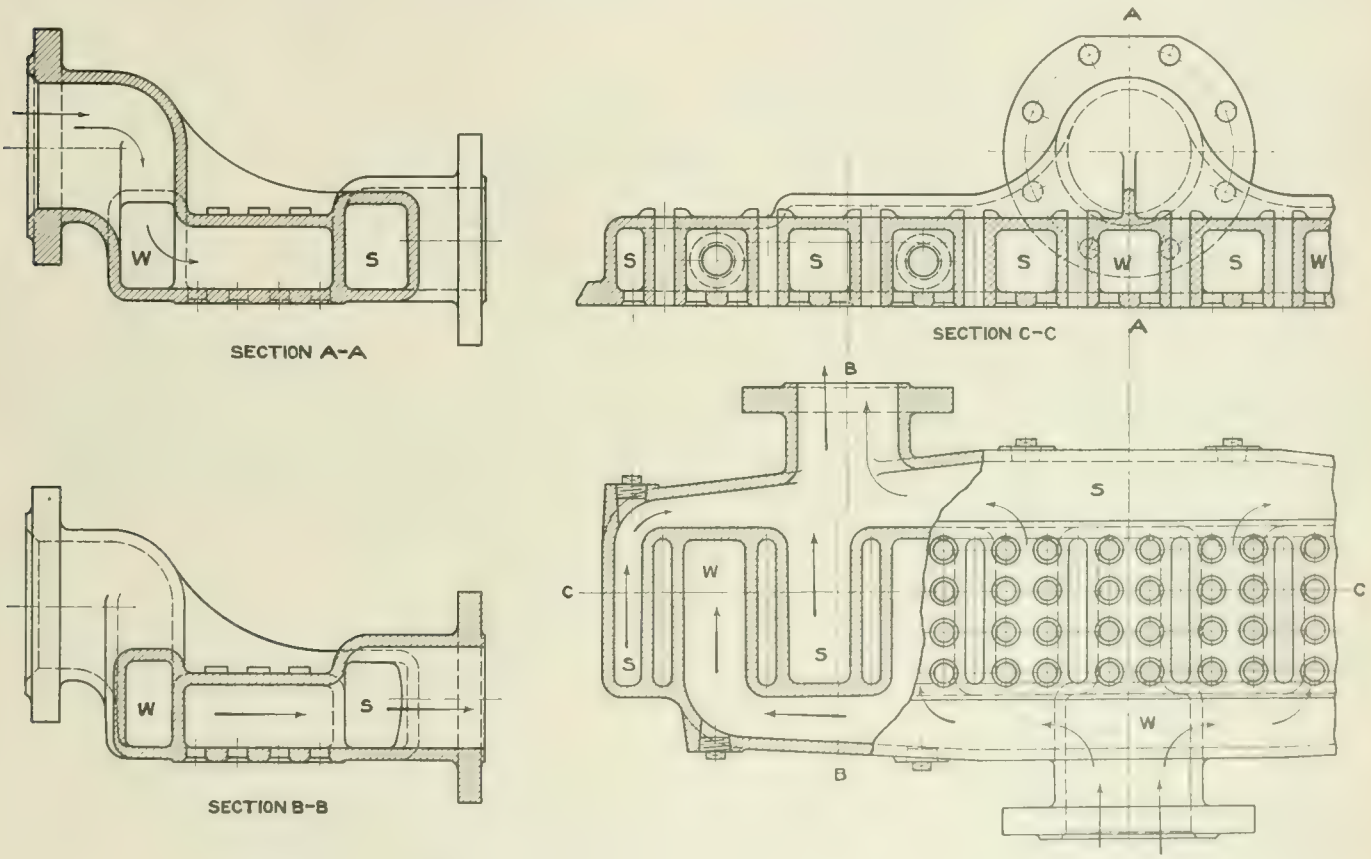


Fig. 2—Sections Through Superheater Header.

is also shown a part cut away to indicate the arrangement of the saturated and superheated steam chambers and the direction of the flow of the steam through their passages. The ball connections of the tube units, shown in Fig. 3, are each ground to fit the seats in the header casting and are clamped to the header. This clamp is supplemented by a ball ring fitting under the ball of the

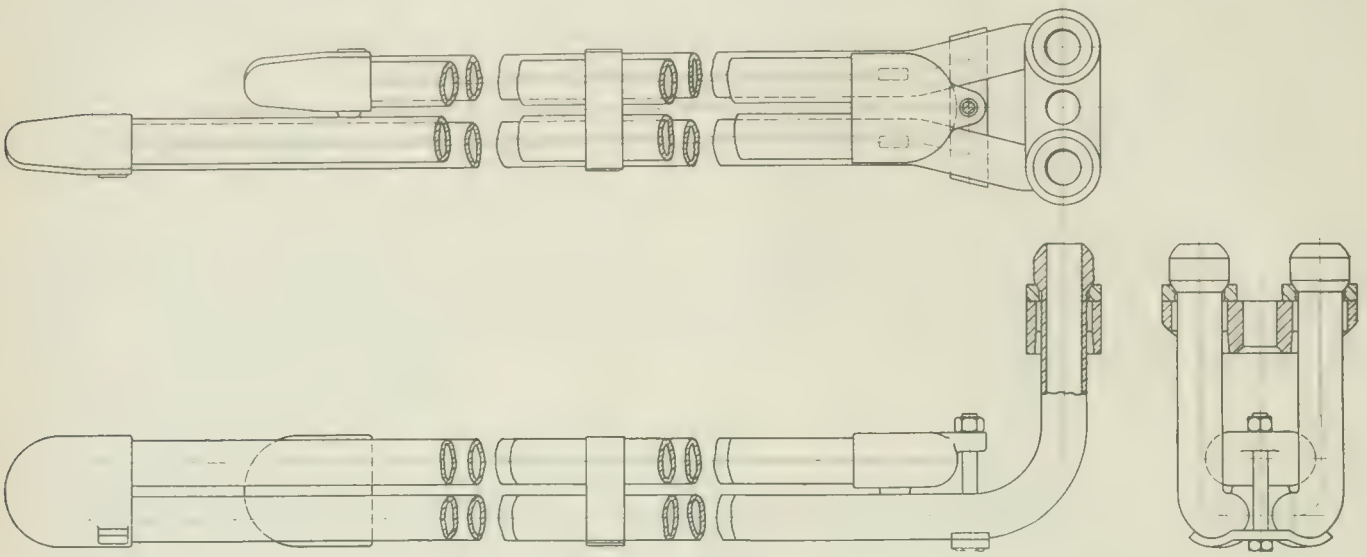


Fig. 3—Small Tubes Composing Superheater Unit.

tube in a manner that will provide for any irregularity that may occur in the ball heads or in the depth of the seat in the header. The return bends are of cast steel and are provided with lugs which rest against the inside of the large flues and keep the superheater units in the upper part of each flue.

The superheater tubes may be easily removed and replaced and in doing this it is not necessary to take down the steam pipes. It is also possible to thoroughly inspect the front end, and do all necessary work on the boiler flues, boiler tubes and the front tube sheet seam, without the necessity of taking down the superheater header or the steam pipes. A hand hole opening is usually provided on the smoke box sides through which inspection may be made of the entire front end of the superheater by the aid of a light, without taking down the front end netting or even opening the smoke box door.

The joint rings between the steam pipes and header, and the steam pipes and cylinder should be made of cast iron, as a brass ring would not stand the high temperature. Piston valve rings, piston rings and bushings should be made of close grained cast iron. The ordinary designs of piston rod packing rings should have a higher melting point than usual in saturated engines. An alloy of 80 per cent. lead and 20 per cent. antimony has given satisfaction. A very essential requirement in connection with the superheater locomotive is the use of good oil and continuous lubrication. The system found to be best adaptable for a simple two-cylinder engine is a five-feed lubricator, the leads being placed in the steam pipes or in the center of the steam chests and into the center of the cylinder. The fifth feed is for the air pump steam pipe, as is usual. The feeds to the steam chest should enter the center of the steam chest and should not be branched off. The steam chest should get three or four drops of oil for each drop fed to the cylinder. Vacuum valves of ample size on each steam chest are more essential in a superheater engine than in ordinary engines on account of the higher temperature of the steam chest walls. While the engine is working steam, the oil is sufficiently protected by the steam against carbonizing. While drifting, however, the oil has no such protection, and on account of the high temperature of the steam chest walls would have a tendency to carbonize, which can be overcome by a vacuum valve letting cold air in. For similar reasons we recom-

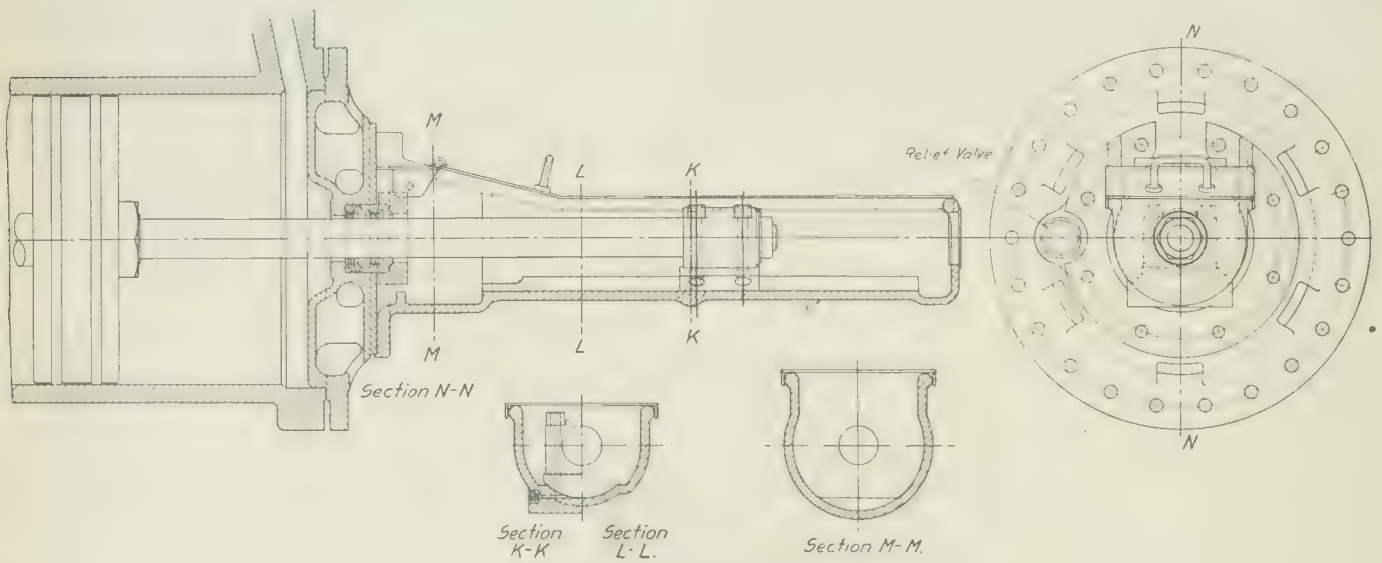


Fig. 4—Piston Rod Extension and Guide.

mended the use of drifting valves or at least to crack the throttle at the beginning of a long stretch of drifting.

The piston rod extension has also been found to be of considerable value in reducing the wear of cylinder bushings and cylinder packing rings. The extended rod riding on guides relieves the cylinder bushings and rings from the weight of the piston, and thereby reduces the friction and the wear upon them. The design of the extended piston rod which is illustrated in Fig. 4 has been applied to a large number of superheater engines during the last twelve months with satisfactory results. This design was developed by F. J. Cole, chief consulting engineer of the American Locomotive Company. The history of the extended piston rods is marked by a number of designs which have not been successful. A piston rod extension to be satisfactory must be of simple yet rigid construction; easy to lubricate and easily removed without interfering with other parts of the locomotive, and above all, it must have an ample bearing surface, a feature which was lacking in all of the earlier designs of piston rod extensions.

As will be seen from the illustration, the principle of the present style of extended rod guide is that of a miniature crosshead at the front end of the extended rod, and this slides on a cylindrical surface, which is rigidly supported and easily located on the cylinder head. The design permits of maintenance being easily and quickly made by lining up between the small crosshead shoe and its body. The packing on the extended rod is easy to access and may be attended to without difficulty.

The guide for this small crosshead is self-centered on the circular flange of the cylinder head and thereby requires no adjustment in service, as it cannot get out of position. A feature of this design of extended piston rod is that the guide is made with an open top so that when it is necessary to remove it, it can be dropped from the rod and does not require a large amount of space ahead of the cylinder.

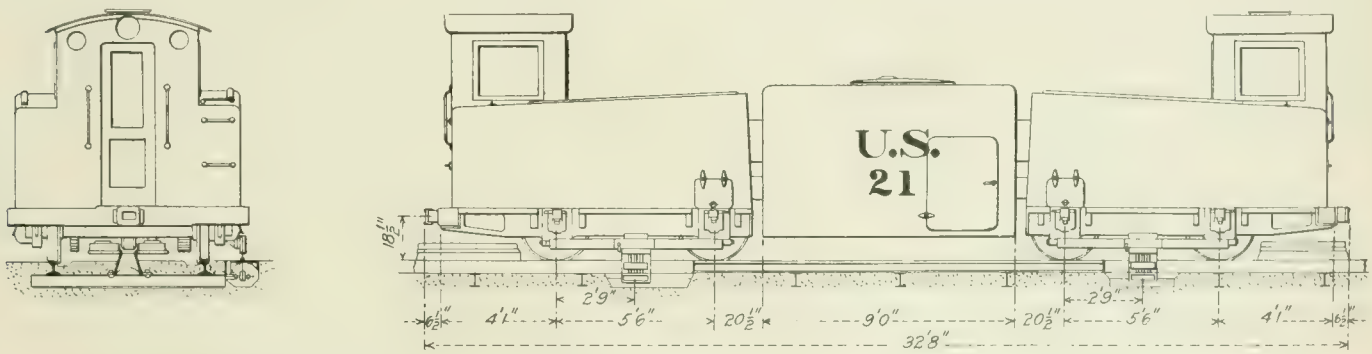
The superheater can be successfully applied to any of the existing types of locomotives provided these locomotives are equipped with piston valves, and with it the locomotive will be able to haul correspondingly heavier trains on the same schedule, on the same trains on a proportionally faster schedule. It has been found in many cases that trains double headed with saturated engines could be handled with one superheater engine. The boiler maintenance is also reduced in that it is possible to use a lower boiler pressure if the construction of the cylinders is such that their diameter may be increased. By increasing the size of the cylinders without decreasing the boiler pressure the engine is given a greater starting power and the increased boiler capacity will more than take care of the demands of the larger cylinders for steam.

The railway connecting two navigable stretches of the upper Congo, in the very heart of Africa, has recently been completed, and on October 11 last a steamer was launched to ply on the upper stream. The new railway is 221 miles long, and runs past rapids in the river. The boats above it penetrate the copper mine district called Katanga.

ELECTRIC TOWING LOCOMOTIVE FOR THE PANAMA CANAL LOCKS.

The contract for building an electric locomotive to be tried out in canal service at the Isthmus has been awarded to the General Electric Company, Schenectady, N. Y. If this locomotive, after sufficient tests, proves to be adequate for service 39 more will be ordered from the same company. This is in accordance with the plans of the commission. The system of towing outlined has been patented by Edward Schildhauer, and the commission has the right to use the machines covered by this patent without making any compensation therefor. Under this system four locomotives are required to tow a vessel of moderate size through the locks. Two are to be used ahead, one on either wall, for towing; and two behind, trailing. The latter are for the purpose of keeping the vessel in the middle of the lock and to bring it to a stop when entirely within the lock chamber.

The speed of the ship through the locks will be at the rate of 2 m. p. h., and the vessel will be held steady between four lines of taut cables. The ship will come to a full stop in the fore bay of the lock, where the cables will be attached to it, two forward on either side and two aft. The other ends of the cables will be attached to the windlasses on the four towing locomotives operating on the lock walls. When towing or taking the inclines between locks the locomotive will operate on a rack rail.



General Design of Electric Locomotive for Canal Towing Service.

In returning, except on the inclines between lock levels, the locomotive will travel under friction tractive effort at 5 m. p. h. This change of speed is made through jaw clutches operated by solenoids which connect the wheel trucks with the traction motors.

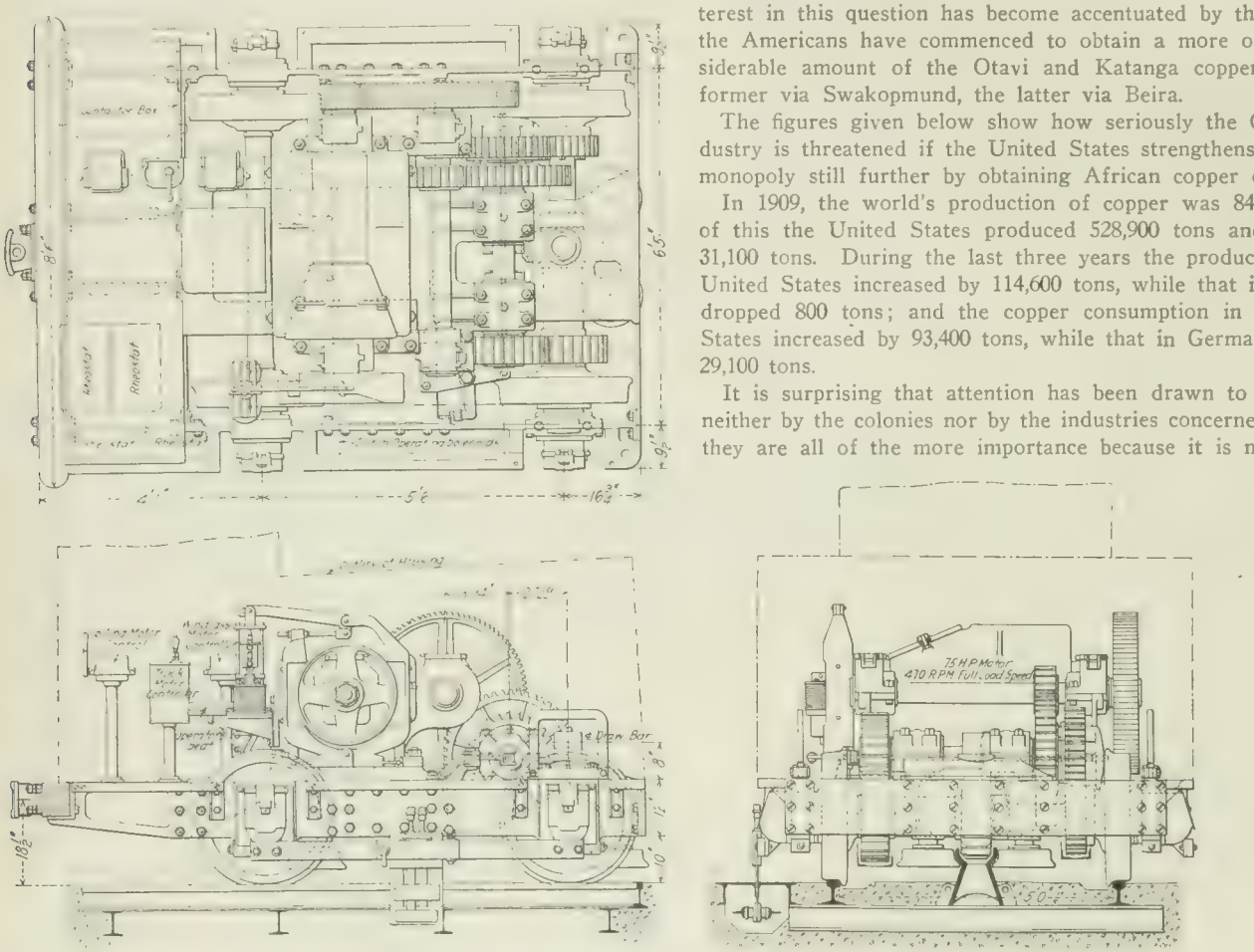
The track gage is 5 ft. and the short inclines between lock levels have a rise of 1 ft. in 2 ft., with vertical curves of 100 ft. radius and horizontal curves of 200 ft. radius. The maximum load that will be thrown on the traction motors, gearing and rack occurs when the locomotive, without load, ascends the inclines between lock levels. As little weight is required for adhesion when driving the locomotive empty, care is taken to avoid surplus weight, and the whole locomotive will be made as light as is consistent with its strength and durability.

The illustrations show the general plan of the central portion of the locomotive, as planned by the commission, which is called the body. It will contain the motor-driven windlass for hauling in or paying out the towing line; also a high-speed motor driven attachment for coiling the towing line when it is out of service. The windlass drum is to be fitted with a friction device so that the load on the tow line can never exceed 25,000 lbs. By means of semi-flexible connections this central body is supported at either end by the trucks. The two trucks are identical in every way, and they contain the traction motors and the control apparatus. The truck has a plate frame with pedestals for the journal boxes something like that of a locomotive, but these boxes are fixed and there are no springs above them. The frame supports the motor, base plate and counter shaft bearing.

No special electric motors are specified, but it is required that they shall be such as have been developed and successfully used in railway work or in the operation of steel rolling mills for a period of one year, that service being comparable to the service

proposed. Experience has shown that the climatic conditions on the Isthmus have a very deleterious effect on all ordinary insulation and a marked effect in accelerating corrosion of metal parts. Special attention must, therefore, be given in the construction of motors to secure materials and construction which will avoid as far as possible these results.

The motors will be 3-phase, 25-cycle, 220-volt, totally enclosed, moisture proof, high torque, railway or mill type. Those for traction purposes must have a full speed torque of 840 lbs. at 1 ft. radius, a full load speed of not less than 470 r. p. m., and be capable of developing not less than 75 per cent. greater torque for a period of one minute. The motor for the windlass must have a full speed torque of 120 lbs. at 1 ft. radius, and be capable of exerting 50 per cent. greater torque for one minute and have a full load speed of 660 r. p. m. The motor for coiling the cable is to have 30 lbs. torque at 1 ft. radius, with 50 per cent. overload for one minute, and a full load speed of not less than 630 r. p. m.



Details of Truck for Electric Towing Locomotive.

The tow line will be 1 in. in diameter, made of plow-steel wire rope composed of six strands of 37 wires each, with a hemp center, these wires to have a tensile strength of not less than 22,500 lbs. per sq. in. The ultimate breaking strength of the rope must be not less than 70,000 lbs. The length of the line to the center of the loop is to be 225 ft., and no splicing will be allowed except at the loop.

The 3-phase current will be collected for the locomotive by means of plows in an open conduit, each plow carrying two contact shoes insulated from each other and bearing on the two conductor rails, respectively, one for each of the two phases, while the third phase will be carried by both track rails. The specifications for these locomotives are very elaborate, and include many of the standard specifications adopted by the canal commission for various materials, and also cover inspection and tests required by the government for acceptance.

THE TRANS-AFRICAN RAILWAYS.*

In Africa, owing to the export of ore from the Katanga district, the following railways have come to the fore: the Cape to Cairo railway, initiated by Cecil Rhodes, which after some delay has now in its southern section already crossed the southern frontier of the Congo Free State, 2,145 miles from Cape Town, and is operated up to Elizabethville 2,323 miles; and the lines proposed by the author [State Councillor Schwabe], namely Daressalam-Bismarckburg-Katanga Lobito (Indian to Atlantic ocean) and Swakopmund-Victoria Falls-Beira (Atlantic to Indian ocean).

The chief object of these three lines is the transport of ore, especially copper ore from the Katanga district of the Belgian Congo to the Indian ocean ports, Beira and Daressalam, and to the Atlantic ocean ports, Swakopmund and Lobito. The interest in this question has become accentuated by the fact that the Americans have commenced to obtain a more or less considerable amount of the Otavi and Katanga copper ores, the former via Swakopmund, the latter via Beira.

The figures given below show how seriously the German industry is threatened if the United States strengthens its copper monopoly still further by obtaining African copper ore:

In 1909, the world's production of copper was 844,100 tons; of this the United States produced 528,900 tons and Germany 31,100 tons. During the last three years the production in the United States increased by 114,600 tons, while that in Germany dropped 800 tons; and the copper consumption in the United States increased by 93,400 tons, while that in Germany dropped 29,100 tons.

It is surprising that attention has been drawn to these facts neither by the colonies nor by the industries concerned, although they are all of the more importance because it is necessary to carry out important undertakings, during a number of years, in order to prevent the permanent injury of German interests by the Americans.

The state of affairs is at present as follows: as yet no coal has been found in the Congo Free State. The nearest coal is in the Wankie pits on the Cape to Cairo line, at a point 72 miles south of the Victoria falls; this is said stated to cost $25 per ton in the Katanga district. This enormous price makes it impossible to smelt the ore, so it is concentrated and taken to Beira, on the Indian ocean, and there shipped in more or less large quantities to America. Now the distance by rail from Elizabethville to Beira, 1,625 miles, is shorter by 649 miles than the way via the Congo, but is still 414 miles longer than the proposed railway line Elizabethville-Moliro-Bismarckburg-Kilossa, to connect with the Daressalam-Kilossa line which is already in operation.

This makes it all the more probable that this great reduction

*From the *Zeitung des Vereins Deutscher Eisenbahnverwaltungen.*

of distance will make it possible to divert at least part of the traffic to and from Beira through German East Africa to Daressalam, all the more so as this way makes it possible to smelt the copper at works to be erected at the junction with the Kivira branch, where cheap Kivira coal is available, and then export the copper in the metallic state. Apart from this traffic, the Kivira coal is also of no less importance for the Katanga district as well as for the steamers on both lakes, for firing on the railway and for supplying ocean steamers putting in at Daressalam; then also the cotton wool exported from Rikwasenke comes into consideration. This state of affairs will be but little affected by the subsequent opening of the Benguela line, Lobito-Katanga, as Angola also has no coal and consequently, as the railway routes to Daressalam will be of approximately equal length, the existence of Kivira coal will continue to be a distinct advantage.

In addition to the Daressalam-Kilossa-Bismarckburg line just mentioned, we also have to take into consideration the central railway, which is already being built beyond Kilossa; at the end of March the rails were already laid to a point 260 miles beyond Morogoro. When this railway has reached Tabora it will probably, owing to economical and military reasons, be continued without break to Ujiji, on Lake Tanganyika. This is very probable, as the Belgian colonial minister has submitted to the Chamber a report in which five different railway lines are described as necessary:

1. The Katanga line from Elizabethville to Bukama, the point up to which the Lualaba is navigable.
2. A line from Katanga to the lower Congo, from Bukama to Lusambo (later on perhaps to Leopoldville).
3. The Tanganyika line from Kabalo to the Tanganyika in the Lukuga valley (at present under construction).
4. A junction line connecting a point on the Katanga line (Ruve) to the Angola frontier, to join the Lobito line.
5. The Urua line from Pueto to Kiambi and Ankoro.

It is worth noting that the Belgian colonial minister, in spite of the competition with the Congo road, intends to build not only line No. 4, in order to connect with the Lobito line, coming from the Atlantic ocean, which is being built by an English company, but he also wishes to build line No. 2 to Lusambo and perhaps later on to Leopoldville, the terminus of the old Congo line Matadi-Leopoldville in order to cut off the curve, larger than a semicircle, of the Congo with the two lines Stanleyville-Ponthierville and Kindu-Kongulu, which cut off the cataracts. Seeing the great cost, it may be doubled whether the whole length of this line will be built. It is remarkable that in these plans so little attention is paid to the German East African railway plans. Line No. 3 is, it is true, to reach Lake Tanganyika, but by the Lukuga valley, about 93 miles south of Ujiji, hitherto taken as terminus for the central line. Hence Germany and Belgium must come to an agreement that the railways ending on the two sides of the lake should come opposite to each other, so as to make it possible to have a steam ferry for taking the train across, to avoid the necessity for any transshipment.

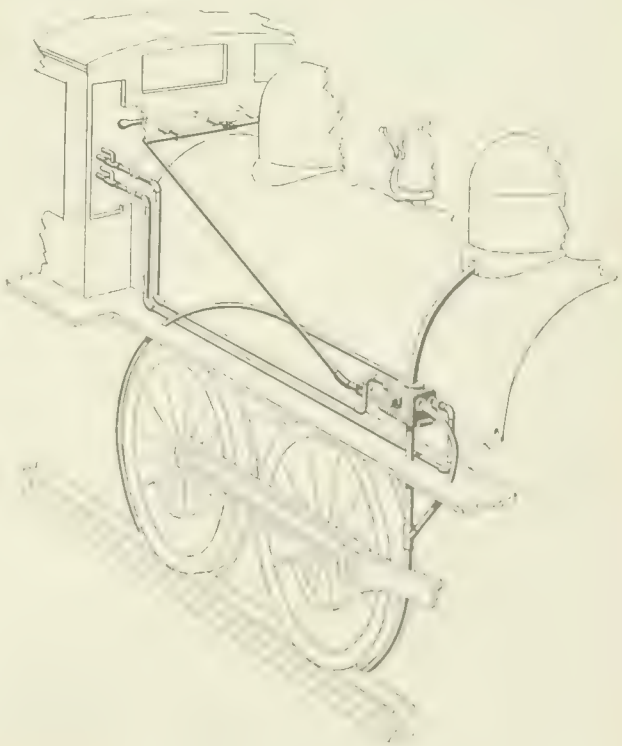
It might seem even more remarkable, that instead of line No. 5 it has not been proposed to build a line from Pueto to Lake Tanganyika in the Bismarckburg direction, and to the west to join line No. 4 to Lobito bay, so as to import the cheap Kivira coal with the help of a steam ferry across the lake, and to carry the ore from the Katanga district by the shortest route to the Indian ocean, and so make a connection between the Indian and the Atlantic ocean.

As regards the conditions on the second Trans-Continental line, Swakopmunde-Victoria Falls, of which the section, about 540 miles long, from the terminus of the Otavi line through the Caprivi district to its connection with the Livingstone Victoria Falls station on the Cape to Cairo line still has to be built, it is true that, according to the statements of Captain Streitwolf in his recently published book Der Caprivizipfel, conditions are on the whole less favorable than was hitherto thought. It has been found that in this district the land near the river is extensively flooded every year, as in the case of the Nile, but that the mud deposited by the water is not rich, as in the case of the Nile, but is sandy. Nevertheless, there are large areas of good and of very good land which only awaits the plough. In the country flooded by the Okavango, in particular, we find fertile ground, green fields and splendid woods. Moreover, it has been found that the Zambesi, which forms the boundary of the Caprivi district for a length of about 68 miles is, it is true, navigable, but can hardly be used, on account of the many rapids, for the carriage of goods, even if small motor boats are used. Finally, it was found that the Katimo-Molina falls only form the biggest of the existing rapids, and it is, consequently doubtful whether there is sufficient fall to make it possible to put up a larger power station. Nevertheless, the Caprivi district is valuable not only on account of its richness in timber, but also because there are extensive stretches of land suitable for growing cotton.

As regards the question of building a railway through the Caprivi district, one has in the first place to consider the great importance to German industries of having a road from the Atlantic ocean through southwest Africa to northern Rhodesia and to the Katanga district of the Congo Free State; another important consideration is whether it will be possible to divert part of the northern Rhodesia and Katanga ores, which now go via Livingstone to Beira and then are sent a long way round the Cape to the United States, to Swakopmund, as the distance Livingstone-Bulawayo-Salisbury-Beira is about 955 miles, while the distance Livingstone-Grootfontein-Swakopmund is only about 905 miles; thus, quite apart for the shorter sea journey, the railway journey is still 50 miles shorter.

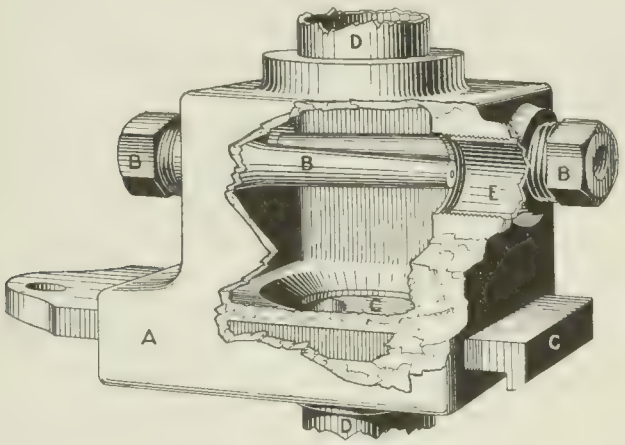
STICKLEY TRACK SANDER.

The Stickley sander, which has been successfully used for more than 3 years on one of the large railway systems is shown in the accompanying illustrations. The general arrangement shows it located just above the running board with a pipe leading from the sand box, and delivery pipes to either the front or back drivers. The cross section shows the slide *C*, which is operated by hand from a lever in the cab. This slide insures the



Stickley Track Sander.

removal of any obstruction, and when it is open offers a free passage equal to the area of a 1¼ in. pipe from the sand box to the rail. This is intended as a safety feature to obviate any chance of the sander becoming clogged and inoperative by air. The box, *A*, containing this valve is made of malleable iron and is 4 in. square. In it are two air nozzles, *B*, one for the rear driver and one for the front, and these are operated by separate handles in the cab. When the air is first turned on it blows



Discharge Box of Stickley Sander.

out what little sand is in the front of the nozzle, and this creates a vacuum immediately behind the end of the nozzle or outlet *E*, and the pressure at *E* carries the sand through the pipes to the rail. The back-up sanding feature is as efficient as the go-ahead, and this is particularly advantageous on switch or freight engines. The sander is simple and durable, as there are few parts to wear. Those in use three years have caused no expense for repairs. This sander is sold by the Jerome Metallic Packing Company, Chicago.

MISSOURI PACIFIC SIGNAL LAMP WITH FRESNEL LENS.

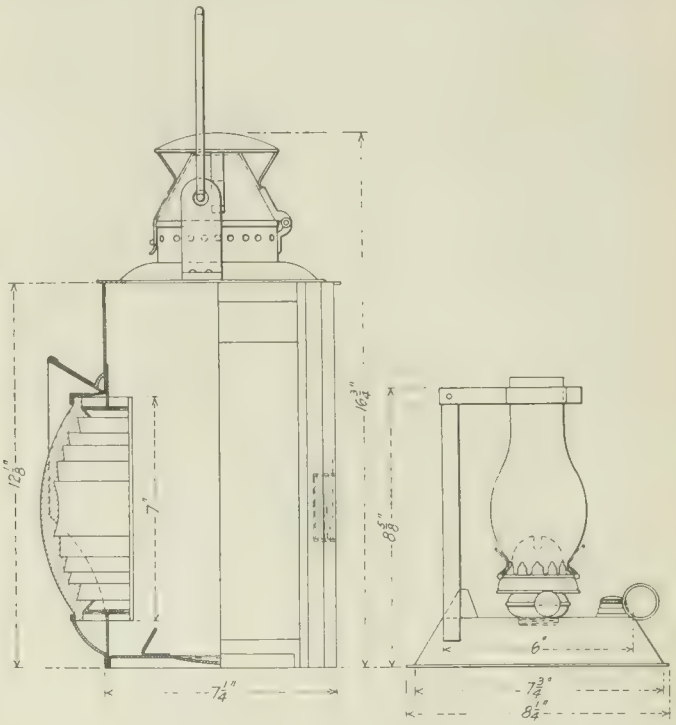
The drawing shown herewith, for which we are indebted to B. H. Mann, signal engineer of the Missouri Pacific, shows the construction of the tail lamp for passenger trains recently introduced on that road and which was noticed in the *Railway Age Gazette* a few weeks ago. This lamp is carried on the platform of the car, the regular markers at the sides of the car, near the roof, being of the usual style with bull's eye glasses. The general appearance of the new lamp is shown in the photograph.

The lens is 7 in. in height and the same in width. The size of the lantern at the bottom is 7¼ in. x 8⅞ in., and the extreme depth from front to back, including the hood at the sides, is 10½ in. The door at the side has an opening of 5½ in. The lamp has a ⅞-in. burner and a chimney 6 in. high. Having so large a lamp it was necessary to provide liberal space for ventilation, and auxiliary air inlets are provided, one on either side. Through these the air from the atmosphere enters at the top and passes into the lamp at the bottom. The openings for the admission of air are covered by hoods, one of which is seen at the right, near the top, in the photograph.

With a Fresnel lens the rays of light are spread through a field of 90 deg., or (on a straight road) 45 deg. to either side of the roadway, thus insuring a better view of the lamp from a following train when on a slight curve; and even on a considerable curve, if there be no buildings or other obstructions to the view on the inner side of the curve.

Mr. Mann informs us that this light compares favorably as to distinctness with the standard bull's eye tail lamps of the road, which have red lenses 6⅜ in. in diameter and ordinary ⅝ in. signal burners without chimneys.

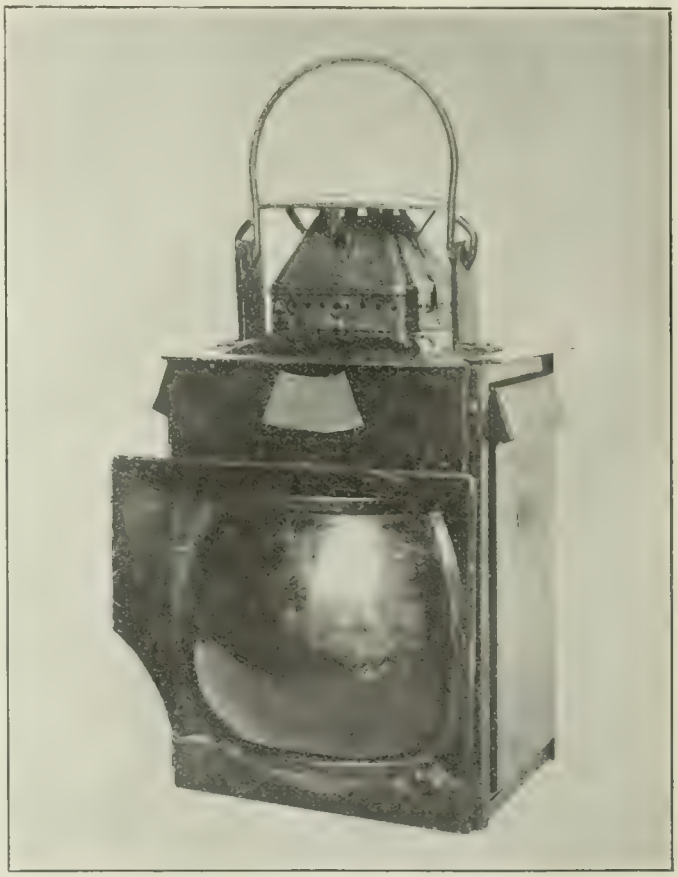
A lamp with Fresnel lenses has been adopted also for the cupola of freight cabooses. In this the lenses are white instead of red, because it is necessary frequently to change the color



Missouri Pacific Tail Lamp.

from red to green. This is accomplished by 5-in. colored roundels fixed in a revolving case inside of the lamp. This cupola lamp shows both to the front and the rear.

The passenger lamp costs about $10 and the caboose lamp $14.



Tail Lamp with Fresnel Lens

General News Section.

The government has brought 16 suits against the Erie in the federal court at Pittsburgh, Pa., for violation of the hours-of-service law.

The Texas & Pacific has announced its intention to run motor cars regularly between Dallas, Fort Worth and Mineral Wells, Tex. There will be three cars in service.

Pacific time is now the standard throughout the Western Pacific from Oakland to Salt Lake City. Heretofore Mountain time has been the standard east of Gerlach, Nev.

The Illinois Central has issued an order allowing the wood from 40 worn-out freight cars being dismantled at the Burnside shops to be given away to the poor for fuel, on application.

The Interstate Commerce Commission is gathering together data on the cost to the roads of underwriting recent issues of securities, and it is understood that the commission has a history of the financing of 20 railways.

The Western district of the Southern Railway, made up of the Atlanta, Birmingham, Columbus and Mobile divisions, will, after February 1, be known as the Southern district; and the St. Louis and Louisville divisions will be known as the Western district.

The assistant attorney-general of New Jersey, in an opinion issued last week, holds that a railway company, in issuing a pass to an officer of the state, where the furnishing of the pass is required by law, cannot require the officer to enter into an agreement exempting the carrier from liability for damages.

The Missouri State Board of Health has issued an order prohibiting the use of the common drinking cup, roller towel and comb on railway passenger trains in the state after March 1. The railways have advised the board that individual cups and towels will be supplied on the trains, but passengers will hereafter be expected to furnish their own combs.

Mr. Parker, of Salem, has introduced in the New York legislature a bill to amend the public service law so as to provide that reorganizations of railway and other public service corporations shall be subject to the control of the public service commission. The Court of Appeals recently decided that the Third Avenue (surface street) Railroad, New York City, could be reorganized under the old law without going to the commission.

The semi-annual meeting of the National Association of Scale Experts was held at St. Paul, Minn., on January 14. Twenty-nine members were present, including representatives of ten railways. Papers were read as follows: "Railroad Track Scale Foundation," by F. L. Berry, Fairbanks, Morse & Company; "Relation of Care in Weighing to the Scale as a Means of Weighing," by D. G. McGrath, scale expert Minnesota Railroad & Warehouse Commission; "Wagon Scale Construction," by Frank Wondra, Fairbanks, Morse & Company. The next meeting will be held in St. Paul, July 14, 1912.

A bill providing for publicity of the security issues of corporations engaged in interstate commerce has been introduced in Congress by Representative Harrison of New York. The bill embodies recommendations which were presented in the report of the Railroad Securities Commission recently sent to Congress by President Taft. The bill provides that interstate corporations issuing stocks or bonds shall, under regulations to be prescribed by the Interstate Commerce Commission, make public the total amount to be issued; the amount to be retained in the treasury; the dates of maturity and rates of interest of any such bonds, notes or other evidences of indebtedness and all other information relating to security issues of concern to prospective investors.

The Public Utilities Commission of New Jersey, holding less positive views than the governor of the state, reports to the legislature that the passage of a full crew law at the present time is not advisable. The bill on this subject, which was presented in the last legislature, is declared to be too drastic and not fitted to cure the evil which it seeks to correct. The commission takes the view that it possesses the power already, under the law, to order an increase in the size of a train crew, where such increase may be necessary to furnish safe, proper and adequate service. Still, as the railways always carry everything to the courts, thus resisting the action of the commission so far as possible, it may be necessary to deal with the full crew question by statute.

The Pennsylvania announces that its offer to pay its men for valuable ideas has already produced good results. For some reason not disclosed the offer was promulgated only on the Buffalo & Allegheny Valley division, which has only one-fifth of the road's mileage. Suggestions at once came in from all quarters. A roundhouse clerk won a premium by submitting a plan for increasing economy by the further use of carbon sheets which remain in repair card books, after the cards have been filled up and removed. He devised a way of using this carbon paper in connection with a form for ordering material from the store houses. A tinsmith discovered an improved method for fastening in engine cabs the boxes which contain flags, torpedoes and medical case. By standardizing the heights of coal gates on tenders, a fireman saw a way to minimize the loss of coal through vibration. He was paid for the idea. At one of the terminals, an appliance for cleaning and sterilizing drinking cups used in coaches was perfected by a car inspector, and he received payment for it. Many worthless suggestions came in, but the officers say that the saving effected by those which are adopted makes it very much worth while to investigate them all. And there is the indirect gain in the added interest that the employees take in their work, and in the watchfulness and originality which is developed.

A Correction.

In an article on "The Mimeograph for Railway Printing," published in the *Railway Age Gazette* of January 19, page 94, it was stated that the cost of printing tariffs by mimeograph had been found to be approximately 20 per cent. less than the cost of obtaining excellent work by the printing press. The statement should have read that excellent work could be obtained by the mimeograph at 20 per cent. of the cost by the printing press.

Opening of the Florida East Coast to Key West.

The Florida East Coast Railway was opened for traffic through to Key West, Fla., on Monday last, according to the announcement, with an elaborate celebration lasting three days. Mr. Flagler, the builder of the road and chairman of its board of directors, who is now 82 years old, was one of the principal figures in the public exercises. Warships were present in the harbor from a number of foreign nations, together with vessels of the fifth division of the American Atlantic fleet. The President of the United States was represented by R. S. Oliver, Assistant Secretary of War, and there was a large representation of Congressmen who, after the celebration, made a trip to Havana on the cruiser *Washington*.

The construction of this remarkable railway, which for a distance of over 70 miles is over water and so far from the main coast that the passengers in the cars are at times unable to see land, was described and illustrated in the *Railroad Gazette*, February 7, 1908. The following statistical data we take from the *Wall Street Journal*, while the tribute to Mr. Flagler, contained in our last two paragraphs, is from the *New York Sun:*

Construction of the Key West extension was probably as difficult a piece of railway building as has ever been attempted. It is a unique and expensive structure, in some places costing as much as $900,000 a mile. It includes six miles of solid concrete viaduct, 81 miles of embankment 30 ft. above low water level, and eight fixed and two draw bridges. The longest viaduct is a solid concrete structure of 180 arches and nearly two miles long. Protection from the action of the ocean is furnished by a series of interposing keys, the construction of which called for a heavy additional outlay of time and money. The entire length of the road from Jacksonville to Key West is 522 miles and there are 95 miles of branch lines. The cost of the entire road was approximately $37,000,000, all of which was carried by Henry M. Flagler personally until 1909, when $10,000,000 first mortgage

bonds were sold, reducing his investment to about $27,000,000. The road was completed from Jacksonville to Miami in 1895 and from Miami to Knight's Key in 1908. Construction of the last 45 miles to Key West has taken over three years. Capitalization of the road is $3,000,000 stock outstanding, with $2,000,000 authorized for sale at par to cover cost of the present extension and the purchase of car ferries and other equipment, $10,000,000 first mortgage bonds and $20,000,000 general mortgage income bonds. Cost of the entire road was approximately $60,000 a mile, stock outstanding $5,000 and bonds $50,000 a mile. Gross earnings for the year ended June 30, 1911, of the 476 miles of road to Knight's Key were $4,181,278, or $8,784 a mile. Net was $1,566,517, or $3,291 a mile. Surplus after all charges, including 4 per cent. on the income bonds, was $67,130.

Mr. Henry M. Flagler's imagination was as potent as his money in the daring enterprise of extending the Florida East Coast Railway to Key West. It is a grand thing to possess the means to build an ocean railway to the isolated city of winds and waters from which Havana can almost be seen across the strait. But the dollars without the imagination would never have built this prodigy.

Perhaps within the shelter of this unique railway the indefatigable coral makers will find such congenial surroundings that in the future the keys and bridges on which the rails rest will become one structure, solid and beautiful. But should nature be content to leave Mr. Flagler's creation in the present condition, it will stand as a sufficient monument to the courage and previson of a man who, not satisfied with redeeming a state, has had the audacity to run a railway where nobody else ever thought such a thing possible. If Mr. Flagler had not done it what other man in the United States in our time would have thought of doing it? A man approaching 80 who could plan such an enterprise and resolutely push it to completion in the face of obstacles that often seemed insurmountable, is a man of heroic mould. New York has been brought within fifty hours of Havana, and the sea part of the journey has been reduced to six hours. Key West is now really in the United States and can get its supplies by rail. Its importance as a naval base has been vastly increased. The most southerly county seat in the United States, with its feet in the waters of the Gulf and its eyes for nearly a hundred years straining enviously in the direction of the continental United States, it now promises to become a great seaport. This was a great day for Florida, for Key West, and for Henry M. Flagler. What man of 82 ever before enjoyed such a triumph?

Mr. Hill's Business Creed.

The fundamental economic factors underlying the present position of the United States and governing its immediate future are few and simple. Only a multitude of counselors and words have made them appear complicated or difficult to deal with. A firm, dispassionate enforcement of the law, a rearrangement of tariffs and other industrial conditions such as to enable us to compete in foreign markets, encouragement for the farmer and improvement in agriculture that will double our farm products, the discontinuance of attacks on business as business and capital as capital, with assurance of protection and undisputed possession of reasonable profits for every industry conducted within the law, the social ostracism and political retirement of the demagogue, who sows evil a thousand times more deadly than he professes to cure, the establishment of strict economy and expenditure both in public and private life, cessation for the time being of legislative activity, not directed toward curative or tonic end, these are the fundamental economic factors underlying present day conditions in the United States. By so simple a program may the country not only enjoy a new and prolonged prosperity but achieve a distinction, both industrial and civic, such as it never knew before.—J. J. Hill, in New York *Times*.

Rebuking the Station Agent.

Back in the 70's there were two railways entering Fulton, Ky. On a certain day there was in the waiting room awaiting a Mayfield train, a very distinguished, revered and beloved citizen. He was an unpretentious, ordinary looking man, but was very intelligent and possessed of a big and sympathetic heart and loved his country and its people. He was upon this occasion pacing the floor, apparently in deep thought, when a man in the humbler walks of life entered and called for a ticket to Martin Station, which was located on the other line. The ticket agent informed him in a very abrupt and sarcastic manner that he was not selling tickets to points on that road.

The inquirer, much embarrassed, withdrew, when the distinguished citizen advanced to the window and calling the ticket agent by given name said: "I have been over a great deal of this country; I have occupied a seat in the Congress of the United States; I have been to Europe and have met and conversed with many of the great men of the land, including the president of the United States, as well as foreign representatives, and have been in the presence of Her Majesty, the Queen. But let me say to you upon the honor of a man, I have never felt my insignificance half so much as when in the august presence of a dirty, stinking little railway ticket agent." And he quietly resumed the walking of the floor.—A. P. Dulin in *Illinois Central Employees' Magazine*.

Economy Campaign on the Chicago Great Western.

Hiram J. Slifer, general manager of the Chicago Great Western, has had posted at shops, stations and other points, a large poster calling attention to various methods of saving money. The circular is printed in large type emphasized by several words in red ink and is headed "Stop! Look! Listen! Small Leaks Mean Great Waste." The body of the poster reads in part as follows:

"If you are in the station, train or yard service you can assist in stopping the leaks. . . . Little leaks, carelessness and indifference are the basis of many claims. Stop the leaks and you stop the claims. . . . If you think a penny is too small an item for your consideration you can help to save the dollars." Here follow the subjoined rules:

When furnishing cars to shippers for loading see that they are in first-class condition and clean.

For grain and flour loading see that cars are swept out and that they have not previously been used for oil, lime, coal or like commodities.

For grain loading see that grain doors are tight and no holes in floor or sides.

For live stock see that old manure is cleaned out, thereby cutting out the dead weight. If there are drinking troughs see that they are clean and in usable condition.

In order to prevent overheating in summer or freezing in winter, care should be taken to see that refrigerating and ventilating appliances are in good working order, before perishable freight is loaded into refrigerator cars.

See that all freight is in good order when received and that it checks as to quantity for which receipt is given.

See that it is billed out promptly and not unnecessarily delayed enrote.

See that L C L freight is loaded into proper cars, in order to expedite delivery and to avoid stray shipments, and that it is properly stowed in cars to avoid damage by shifting.

Avoid rough handling of freight. This applies to single packages in warehouses as well as to carloads in yards or trains.

Deliver to consignees all freight received, if waybill calls for it, but look out for OVERS. Get full receipts. If damaged, keep proper record and make prompt report.

Our claim department is too busy. Help us to reduce the work or to abolish the department altogether.

N. B.—Station agents and baggagemen can save the pennies—and dollars too—by handling other peoples' baggage as they would like to have their own handled.

The Pennsylvania Safety Medal.

The medal which was awarded to the Pennsylvania Railroad Company last week, as noticed in the *Railway Age Gazette*, page 119, was given by the Travelers Insurance Company; and in accepting the medal on behalf of the railway company, Vice-president Atterbury said that to the Travelers Company should be accorded the credit of initiating on the Pennsylvania the systematic methods of industrial safety which have been followed by the officers and employees of the company during the time that this great improvement in safety has been made. Mr. Atterbury said that the medal would have great value as an incentive to the officers and employees of the road to still further achievement. It is the hope and intention of the officers to increase and extend the movement for greater safety. Alleged disregard of human life on the part of the American people is not a fundamental

characteristic, said Mr. Atterbury; it is rather the natural result of deficient education. Children should be trained in schools about this matter, thus making them instinctively cautious. We carefully step aside from a snake in the road and carefully avoid crossing a field in which there is a bull. This is instinctive caution. Children should be taught to be equally cautious at a grade crossing. One state already has directed its school teachers to instruct children between the ages of 6 and 14 regarding dangers from fire. A certain street car company has issued cards warning children how to get on and off cars. The value of such notices is not limited to the children; the influence reaches their parents. Mr. Atterbury again called attention to the fact that the railways, in their efforts to put a stop to trespassing, receive but little encouragement from the authorities who ought to enforce the laws.

American Wood Preservers' Association.

At the close of the convention of the Wood Preservers' Association, held in Chicago, January 16-18, the following officers were elected for the ensuing year: President, E. A. Sterling, forester, Pennsylvania Railroad, Philadelphia, Pa.; first vice-president, Amos Smith, superintendent Ayer & Lord Tie Company, Argenta, Ark.; second vice-president, H. M. Rollins, superintendent Gulfport Company, Gulfport, Miss.; third vice-president, Grant B. Shipley, president Pittsburgh Wood Preserving Company, Pittsburgh, Pa.; secretary and treasurer, F. J. Angier, engineer of timber preservation, Baltimore & Ohio, Baltimore, Md. The next convention will be held during the third week in January, 1913, at Chicago. The name of the association has been changed to the American Wood Preservers' Association.

The Air Brake Association.

The nineteenth annual convention of the Air Brake Association will be held at the Hotel Jefferson, Richmond, Va., May 7-10, 1912. The program includes the following papers and reports: Friction—Recent Tests of Brake Shoes, by R. E. Auger; The Cleaning Date, by C. P. McGinnis; The Westinghouse P. C. Equipment in Service, by T. F. Lyons; Report of the Committee on Air Hose Failures, by T. W. Dow, chairman; The New York L. T. Equipment, by O. E. Moore; Right-Angled Pipe Fittings in Air Brake Service, by T. L. Burton; Report of the Committee on Recommended Practice, by S. G. Down, chairman; The Westinghouse P. C. Equipment, Questions and Answers, by S. J. Kidder; stereoptican lecture on Recent Air Brake Developments, by W. V. Turner.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.; annual May 7-10, Richmond, Va.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Boston, Mass.; annual, May 10-11, San Francisco, Cal.

AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York; next convention, Seattle, Wash.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Chicago.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September; annual, March 17, Chicago.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York.

AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOC.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOC.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—M. H. Bray, N. Y., N. H. & H., New Haven, Conn.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conrad, 75 Church St., New York.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

ENGINEERS SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

ENGINEERS SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago. Convention, May 22-25, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOC. OF U. S. AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Convention, 2d week in September.

NATIONAL RAILWAY APPLIANCES ASSOC.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

NORTHERN RAILWAY CLUB.—C. L. Kennedy, C., M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

OMAHA RAILWAY CLUB.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 2 Rector St., New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOC.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

RAILWAY GARDENING ASSOCIATION.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.

RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio. Convention, May 20-22, Buffalo, N. Y.

RAILWAY SUPPLY MANUFACTURERS' ASSOC.—J. D. Conway, 2135 Oliver Bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

RAILWAY TEL. & TEL. APPLIANCE ASSOC.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling; September, 1912, Buffalo, N. Y.

ST. LOUIS RAILWAY CLUB.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; August, 1912.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month except July and August, Chicago.

Traffic News.

The charter of the Globe Express Company, operating over the Denver & Rio Grande and Western Pacific, has been renewed for 20 years.

Members of the Indianapolis Trade Association are going on a "trade extension" excursion through the southern states and to Cuba; and they think of taking along a few Indiana made automobiles, as samples of what they have to sell.

At Memphis, Tenn., last week, there was a meeting of cotton shippers and bankers to protest against the continuance of the "Liverpool plan," under which bills of lading for cotton are sent through a recording office in New York City to be validated.

The Minneapolis, St. Paul & Sault Ste. Marie and the Canadian Pacific have filed tariffs from Saskatchewan adjusting rates on wheat and oats in order to give Minneapolis and Duluth the same rates as those now in effect to Fort William and Port Arthur.

The Panama Railroad and the Panama Steamship Line, both owned by the United States government, have announced new freight tariffs, to go into effect February 4, by which rates on most commodities passing across the Isthmus of Panama are increased.

The number of vessels passing through the Suez Canal last year was 4,969, and the receipts of the canal amounted to 134,010,000 francs ($26,802,000). The dredging of the canal to a depth of 35 ft. (4 ft. deeper than the former level) has been almost finished.

Since January 1 on the Union Pacific ticket refunds have been handled by the passenger department instead of by the auditor of passenger accounts as in the past. Drovers' tickets hereafter will be issued by the general passenger department instead of by the general freight department.

The St. Louis railways have appointed a committee of seven to consider the demands of the Business Men's League of St. Louis for a readjustment of the rates on coal from Illinois mines to St. Louis and East St. Louis. The bridge arbitrary now creates a difference of 20 cents in favor of East St. Louis.

The agricultural instruction trains of the Canadian Pacific are to be increased in both number and size and the plans for their management include all important sections of the territory traversed by the company's lines. Moreover, the lecturers will give instruction on household economy, care of sick persons and other subjects of interest to women.

The Missouri Pacific, in connection with the Chicago, Milwaukee & St. Paul, has established a new package car service between Milwaukee and Kansas City, making third morning delivery at the latter point. Similar new service has been established by the two roads from Chicago to Kansas City and Wichita, making fourth morning delivery at Wichita.

The electric trains running between Church street, New York, and Park Place, Newark, N. J., over the Hudson & Manhattan and the Pennsylvania, will hereafter on Sundays be run at intervals of 10 minutes throughout the day from 6:30 a. m. and until midnight. Heretofore these trains on Sunday have run only half as often. The traffic between New York and Newark by these trains both week days and Sundays has shown a very large increase.

The Railway Ticket Protective Bureau has issued a circular letter giving the syllabus of a comprehensive opinion delivered by the supreme court of Colorado dealing decisively with features and conditions commonly urged in courts of law in defense of the business of ticket scalping. In the case of Kirby et al. versus Union Pacific the court held that "A railway company may lawfully issue tickets which are not transferable by the owner. The condition which prohibits transfer is a legal contract, and the railway company is under no obligation to carry a person presenting such tickets unless he is in fact the original purchaser. Such tickets are not property in the hands of the purchaser in such sense that they can be sold. Dealing therein is a fraud both upon the railway and the traveling public and cannot be made a legitimate business. A railway ticket is a mere token to show that the person properly in possession of it had paid his fare. If transferred in violation of its terms it is no longer property in any sense, but is as much under ban of the law as counterfeit money. One who prosecutes a lawful business has a property therein, and is entitled to protection against unlawful interference therewith."

The Merchants' Association of New York, supported by the Chamber of Commerce and other organizations, and also by officers of the state and of the city, has again appealed to the Interstate Commerce Commission to order the abolition of the differentials by which export and import freight moving through Boston, Philadelphia and Baltimore is carried by trunk line railways at lower rates than those charged on shipments through New York City. A petition, accompanied by elaborate statements and arguments, was laid before the commission this week. Representatives of New York, in presenting their case, said that it was necessary to make rates which would take export flour through New York, for the reason that without the New York brand the flour trade in Latin-American countries could not be held. Merchants in those countries not only demand the New York trademark, but also depend on the long-time credits which they get in New York. Canada and Argentine are now strong competitors in the wheat and flour trade. Commissioner Clark asked whether the rates to New York should be reduced or those to other ports increased, and was answered that the change should be made by a reduction, thus increasing the export trade. Testimony was given to the effect that burlaps for export now go to Baltimore rather than to New York. Corn apparently has an advantage at Baltimore, not only of a lower rate over the railways, but also by reason of certain rules of the Baltimore Board of Trade. The tramp steamers go to Baltimore and merchants in that city are able to sell grain in Germany cheaper than it can be bought of New York dealers.

Bolivian Railway Company's Construction.

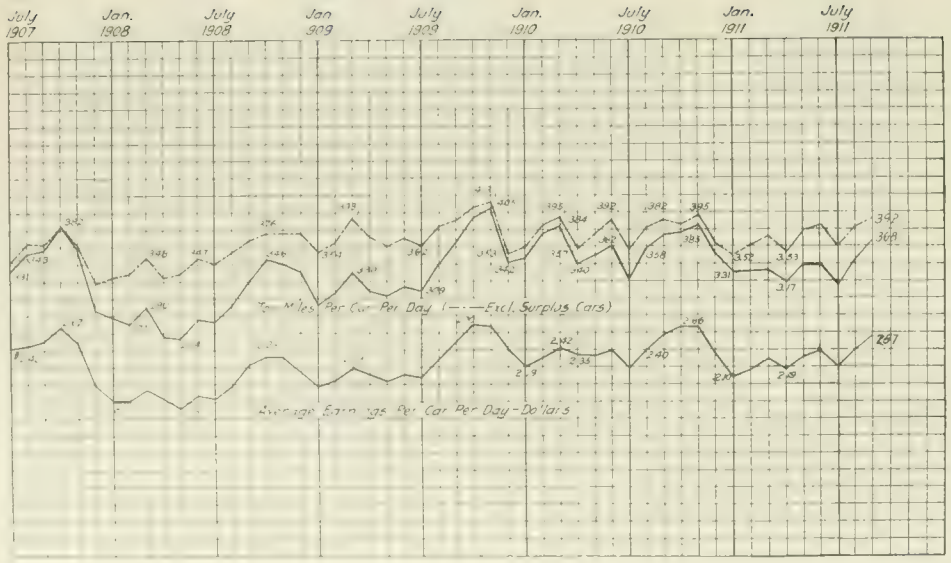
The main line of the Bolivian Railway Company's road to Potosi has been completed from Rio Mulatos to kilometer 80, and from Potosi to kilometer 33. There have been completed 197 culverts and 62 bridges, the station at Rio Mulatos has been erected, and the telegraph line extended to kilometer 136. Over 1,500 laborers are engaged in construction work, and 32 miles of the railway line still remain unfinished. The new line to Cochamba has been staked off to kilometer 107. Grading has been finished to kilometer 60, and grading work is actively progressing between kilometers 60 and 107. Ballasting has been finished up to kilometer 21, and is being pushed forward between kilometers 21 and 60. Track has been laid to kilometer 55, and the telegraph line is in operation to kilometer 93. Over 3,500 workmen are employed in the construction of this line, and preliminary work is being undertaken between kilometers 85 and 107. No active work has been done on the remainder of the road covering a distance of about 72 miles. The line to Tupiza is staked up to kilometer 86, and grading is being done over this part of the right of way. Over 500 workmen are employed in the construction of this line. The line to Yungas has been definitely surveyed to kilometer 67, and active preparations are being made for pushing construction as fast as possible.

Freight Car Balance and Performance.

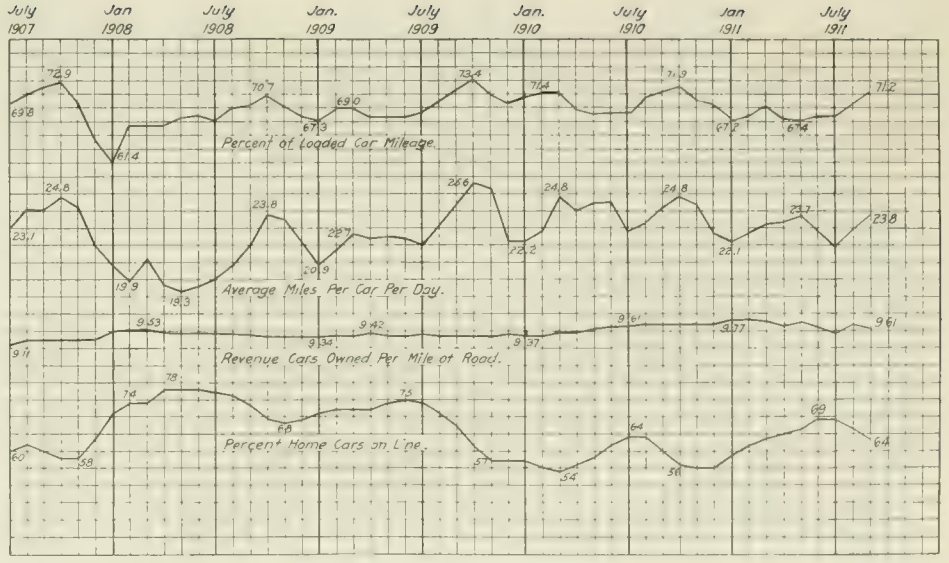
Arthur Hale, chairman of the committee on relations between railways of the American Railway Association, in presenting statistical bulletin No. 112, covering car balance and performance for September, 1911, says:

"An improvement in the traffic conditions during the month of September, 1911, is shown by increases in all but one of the performance averages. The averages are slightly under those of one year ago. The only average which did not increase is average ton miles per loaded car, that figure remaining the same as in the previous month. The average miles per car per day for September, 1911, is 23.8 miles, an increase of 0.9 miles over August, 1911, but 0.4 miles under the average for September, 1910.

"The per cent. of loaded mileage increased from 69.6 per cent. in August, 1911, to 71.2 per cent, in September, 1911, an increase of 1.6 per cent. The average ton miles per loaded car mile remained the same (21.6) for August and September, 1911, but the average ton miles per car mile and average ton miles per car per



Average Car Earnings and Mileage.



Monthly Car Performance.

CAR BALANCE AND PERFORMANCE IN SEPTEMBER, 1911.

	New England	N. Y., N. J., Del., Md., Eastern Pa.	Ohio, Ind., Mich., Western Pa.	Va., W. Va., No. and So. Carolina.	Ky., Tenn., Miss., Ala., Ga., Fla.	Iowa, Ill., Wis., Minn.	Mont., Wyo., Neb., Dakotas.	Kan., Colo., Okla., Mo., Ark.	Texas, La., New Mex.	Ore., Idaho, Nev., Cal., Ariz.	Canadian Lines.	Grand Total.
Revenue freight	[illegible]	498,154	214,008	182,934	173,493	391,632	18,597	136,084	29,486	143,848	81,583	1,957,200
Average number	[illegible]	314,083	136,405	140,869	102,791	278,256	7,079	88,907	24,679	65,660	74,086	1,252,302
Railway owned	41,458	161,984	95,016	57,325	52,482	122,492	11,484	48,372	19,212	56,121	37,856	707,372
Total Railway	[illegible]	476,107	231,421	168,194	155,273	400,748	18,563	137,279	43,894	141,790	111,512	1,959,574
Home	7,827	[illegible]	17,413	[illegible]	[illegible]	9,116	[illegible]	1,195	14,405	[illegible]	30,959	2,814
Per cent of capacity [illegible]												
Home	55	63	64	61	59	71	38	65	84	46	93	64
Foreign	51	33	44	31	30	31	62	36	65	39	46	36
All railway	146	96	108	92	89	102	100	101	149	85	138	100
Private refrigerator	3,996	32,532	12,456	3,628	6,425	14,907	2,063	8,251	3,776	10,834	3,469	100,867
Total, [illegible]	[illegible]	509,139	243,877	170,822	161,698	415,665	20,626	145,530	47,667	152,624	115,721	2,060,441
Per cent of [illegible]	7.88	8.21	9.44	6.43	9.33	6.21	7.03	8.02	5.25	5.72	7.61	7.64
Number [illegible]	1,441	7,775	3,072	3,093	2,712	6,339	525	2,671	760	2,083	1,181	33,196
Average [illegible]	[illegible]	65	79	55	60	66	39	54	63	49	54	62
Total [illegible]	[illegible]	65,440,117	151,968,132	148,833,222	120,029,112	307,271,980	32,260,496	91,008,340	37,696,059	149,037,138	74,000,428	1,631,770,460
Average [illegible]	23.3	23.3	24.8	24.2	24.7	24.6	23.1	23.8	23.9	23.7	27.3	23.8
Per cent loaded [illegible]	71.3	68.7	70.8	68.8	72.4	72.4	71.0	72.7	73.4	74.6	74.9	71.2
Locomotive [illegible]	[illegible]	[illegible]	[illegible]	2,014,780,851	1,661,177,861	2,706,277,971	447,668,168	[illegible]	[illegible]	[illegible]	[illegible]	2,861,142,191
Average [illegible]												
Per car [illegible]	14.5	16.4	17.1	16.3	14.0	14.7	14.5	14.1	14.7	15.0	14.1	15.4
Per loaded [illegible]	21.1	23.0	23.7	23.7	19.3	20.3	20.4	19.6	17.3	20.1	18.7	21.6
Per car per day	349	377	376	393	349	359	306	308	258	345	265	368
Gross freight [illegible]	[illegible]	[illegible]	$14,313,033	$12,173,485	$11,902,827	$32,454,006	$3,703,470	$11,351,673	$3,114,[illegible]	[illegible]	$9,136,306	$173,859,014
Average [illegible]	[illegible]	$1.47	$1.44	$2.32	$2.29	$2.76	$6.08	$2.70	$4.08	$3.06	$3.77	$2.71
Per [illegible]	[illegible]	[illegible]	[illegible]	2.47	2.41	2.56	2.70	6.29	3.67	3.15	4.26	2.73	2.71
All cars on line	1.34	1.41	1.97	2.38	2.45	2.60	5.66	2.52	2.90	4.17	2.65	2.57

day increased 0.4 and 18 ton miles respectively. The average daily earnings for all cars on line increased from $2.39 in August, 1911, to $2.57 in September, 1911, and the same item excluding surplus cars increased from $2.61 in August, 1911, to $2.72 in September, 1911."

The accompanying charts show monthly car earnings and performance in 1907 to 1911, and the table gives car balance and performance figures for September.

INTERSTATE COMMERCE COMMISSION.

The commission will hold a hearing in Chicago on January 29 to investigate the changes made in the Western Classification by issue No. 51, which has recently been filed to take effect February 15.

The commission has suspended until May 23, certain tariffs presented by transcontinental railways showing increased rates on hops from the North Pacific Coast terminals to the Atlantic seaboard.

The commission has suspended until May 24, tariffs presented by various railways showing increases in the rates on freight from Cincinnati and other points, to places on the Carolina, Clinchfield & Ohio.

Special Examiner Mackley called a hearing at Topeka, Kan., on January 19, on the complaint of the Kansas railway commission and several intervening shippers, alleging discriminations in freight rates from Mississippi river points to interior Kansas points.

Commissioner James S. Harlan began a hearing in Chicago on January 19 on the complaint of the Colonial Salt Company of Akron, Ohio, and nine other independent salt companies, involving the joint rates on salt made by the railways in connection with the Michigan, Indiana & Illinois line and the Ludington Transportation Company, operating steamship lines on the Great Lakes, and said to be controlled by the Morton Salt Company. The complaint brings into question the legality of the divisions paid to the steamship lines for the haul across the lakes from the points of origin of the salt to Milwaukee and Chicago, where the salt is stored under transit privileges and then shipped out by rail to the ultimate points of destination.

Rates on Crude and Gas Oil Equalized.

Sun Company v. Indianapolis Southern et al. Opinion by Commissioner Clark.

The rule in western classification, which estimates gas oil at substantially less than its actual weight and crude oil used for the same purpose at as much or more than its actual weight, is found to be unreasonable and reparation is awarded. (22 I. C. C., 194.)

Discrimination Against Paducah.

Paducah Cooperage Co. v. Nashville, Chattanooga & St. Louis. Opinion by the Commission.

Rates on stave and heading bolts to Paducah, Ky., found to be unreasonable to the extent that they exceed rates between local points of the N. C. & St. L. for similar distances. (22 I. C. C., 226.)

Rates on Canned Goods Equalized.

Empson Packing Co. v. Colorado Midland et al. Opinion by the commission.

Rates on canned goods from Colorado to Pacific coast terminals is 80 cents per 100 lbs. and is found to be reasonable, but rates from the same points to California terminals of 85 cents is found to be unreasonable, insofar as it exceeds 80 cents. (22 I. C. C., 268.)

Rate from Whiteland, Ind., Reduced.

Whiteland Canning Co. v. Pittsburgh, Cincinnati, Chicago & St. Louis et al. Opinion by Commissioner Prouty.

Advanced rates on evaporated milk from Whiteland, Ind., to central freight association territory refused, because the railways fail to sustain the burden of proof to show the reasonableness of new rates. (22 I. C. C., 261.)

Minneapolis-Denver Rate Reduced.

Minneapolis Traffic Association v. Chicago, Burlington & Quincy et al. Opinion by Commissioner Prouty.

The complaint is that class rates from Minneapolis, Minn., to Denver, Col., are discriminatory as compared with class rates from St. Louis, Mo., and Chicago. The vice-president of the Union Pacific made no serious opposition to the complaint, but says that the rates asked for had not been granted, since it would constitute an acquiescence in the principle announced by the commission in the so-called Kindel case which reduced the rates from St. Louis and Chicago to Denver. The commission ordered the Minneapolis rates reduced. (22 I. C. C., 259.)

Walsenburg Coal Rate Order Amended.

Colorado Coal Traffic Association v. Atchison, Topeka & Santa Fe et al. Opinion by the commission.

The commission's order in 17 I. C. C., 479, establishing through rates on coal from Walsenburg, in Colorado, to points on the A. T. & S. F., excluded 77 points in Kansas and points in Texas and Oklahoma. The commission now refuses to extend its order to the 77 points in Kansas, but holds that the defendants should establish through rates to points in Oklahoma and Texas comparable with those ordered by the commission in the case above referred to. (22 I. C. C., 264.)

Reparation Awarded.

De Camp Brothers & Yule Iron, Coal & Coke Co. v. Virginia & Southwestern et al. Opinion by the commission.

Where a joint rate was improperly published and concurrence had not been obtained from the other carriers by the initial carrier, complainant is entitled to reparation from the initial carrier. (22 I. C. C., 274.)

Complaint Dismissed.

R. W. Silvester et al. v. City & Suburban Railway of Washington et al. Opinion by the commission.

The commutation fares on the electric line between Washington, D. C., and Laurel, Md., not found to be unreasonable. (22 I. C. C., 201.)

Heath Hardware Co. et al. v. Pennsylvania Railroad et al. Opinion by the commission.

The rates charged on certain shipments of sheet iron and iron wire fencing from Youngstown, Ohio, to Monroe, N. C., and from Monessen, Pa., to Lawrenceville, Va., although higher than they would have been if southern classification ratings had applied, were materially lower than if official classification ratings had applied and are not found to be unreasonable. (22 I. C. C., 223.)

Marion Iron & Brass Bed Co. v. Toledo, St. Louis & Western et al. Opinion by the commission.

The fact that the defendant's tariffs do not provide that in case of a mixed carload shipment, where the sum of the carload rate on one or more of the articles and the L. C. L. actual weight rate on the remainder of the article is less than the mixed carload rate, the lower rate should be charged, is not unreasonable. (22 I. C. C., 272.)

M. A. Kennedy & Co. v. St. Louis Southwestern et al. Opinion by the commission.

A rate of 34 cents per 100 lbs. was named between St. Louis, Mo., and Monroe, La., but the delivering line was not named as a participant. At the same time there was a rate of 40 cents in which all the railways had concurred. The complainant having suffered no damage, and the 40-cent rate being found lawful and reasonable, the complaint is dismissed. (22 I. C. C., 277.)

Chamber of Commerce of City of Augusta v. Southern Railway et al. Opinion by the commission.

The rate of $2.10 per ton on coal from Coal Creek mines, in Tennessee, to Augusta, Ga., is not found to be either unreasonable or discriminatory. (22 I. C. C., 233.)

Brook-Rauch Mill & Elevator Co. v. St. Louis, Iron Mountain & Southern et al. Opinion by the commission.

Charges for necessary out-of-direct-line service on shipments of grain not found to be unreasonable. (22 I. C. C., 249.)

Fairmont Creamery Co. v. Chicago, Burlington & Quincy. Opinion by the commission.

The rate on cream from Concordia, Kan., to Crete, Neb., not unreasonable. (22 I. C. C., 252.)

Edwin D. Johnson v. Minneapolis, St. P. & Sault Ste. Marie. Opinion by the commission.

The complaint is as to service taking place wholly within Wisconsin, and the state commission and not the I. C. C. should pass on the complaint. (22 I. C. C., 255.)

Readjustment of Arizona Rates.

Maricopa County Commercial Club v. Santa Fe, Prescott & Phoenix et al. Opinion by Commissioner Lane.

Advanced rates on barley, bran and wheat from Phoenix, Ariz., to other points in Arizona are found to be unreasonable and new rates are prescribed. (22 I. C. C., 216.)

Maricopa County Commercial Club v. Phoenix & Eastern et al. Opinion by Commissioner Lane.

Rates on condensed milk from Creamery, Ariz., to points on the Atchison, Topeka & Santa Fe found to be unreasonable and new rates are prescribed. (22 I. C. C., 218.)

Same v. same. Opinion by Commissioner Lane.

Rates on coal from Gallup, N. Mex., to Tempe, Ariz., and Mesa are found unreasonable and new rates are prescribed. (22 I. C. C., 221.)

Maricopa County Commercial Club v. Maricopa & Phoenix Railroad et al. Opinion by Commissioner Lane.

Class rates from El Paso to Arizona found to be unreasonable. (22 I. C. C., 279.)

Discrimination Against Louisville.

Norman Lumber Co. et al. v. Louisville & Nashville et al. Opinion by the commission.

It is claimed that the rates on hardwood lumber into and out of Louisville are such as to give the lumber dealer at Memphis and at Cairo, Ill., an undue advantage over the lumber dealer at Louisville. The commission, since it has fixed the rate relation between Memphis and Cairo in previous cases, finds that it can settle the Memphis-Louisville question by an adjustment of the Cairo-Louisville rates. It is found that the rates to Louisville are higher than those to Cairo, and the defendants fail to justify this difference, and discrimination is found against Louisville.

Complaint is also made that since one cent per 100 lbs. is charged on northbound shipments for bridge service, Louisville dealers ought to pay one cent less on inbound shipments from southern lines than is paid by dealers on the north bank who are reached by the southern lines. The commission upholds the contention that Louisville, on the south bank of the river, ought not to pay inbound a rate which is sufficient to cover the transportation of traffic to the north bank of the river, and then when reshipping the traffic to the north, again pay an amount sufficient to cover the transportation across the bridge. The commission does not make an order at present, however, because of the difficulties in entering such an order. (22 I. C. C., 239.)

Commission Investigates Manufacturers' Railway.

Special Examiner Mackley, of the Interstate Commerce Commission, held a hearing in St. Louis last week on the question of the right of the Manufacturers' Railway, controlled by the Anheuser-Busch brewing interests, to receive divisions of through earnings from the trunk line railways entering St. Louis, in the form of a switching allowance. The commission after a formal hearing last year held that the payment of the allowance was not unlawful, but made no order, pending a further hearing.

President G. F. Moore and other witnesses for the railway defended the allowance, on the ground that the road handled a large amount of other traffic, and said that application had been made for membership in the American Railway Association. Milton H. Smith, president of the Louisville & Nashville, testified that in his opinion the absorption by the trunk lines of a $4.50 switching allowance to the Manufacturers' Railway amounted to an illegal rebate to the brewery company and a discrimination against other shippers. He believed it also illegal for the roads to issue passes to the officers of the brewery company or to officers of the Manufacturers' Railway.

As an example, he cited a shipment of ten cars from the brewery to Memphis over the Louisville & Nashville, on which the total revenue was $391.60, at 16 cents per 100 lbs., of which $4.50 per car, or $45, was paid to the Manufacturers' Railway for the "alleged service" of delivering the loaded cars to the tracks of the Wiggins Ferry Company. This allowance or "rebate," he said, amounted to 11½ per cent. of the total revenue for a movement over a track 4,000 ft. long (the Manufacturers' Railway), while the L. & N. bore the cost of moving the traffic from the point of interchange with the Wiggins Ferry Company to Memphis, a distance of 477 miles, including the crossing of four rivers, besides furnishing the terminal facilities at Memphis. This constituted a discrimination, in his opinion, in favor of the Anheuser-Busch Brewing Association against 21 other breweries in St. Louis and East St. Louis. Mr. Smith also testified that to pay allowances on traffic other than that of the brewery was, in his opinion, a discrimination against industries located at points where their shipments must be moved by street vehicles between their plants and the railway receiving stations. A further hearing in the case is to be held.

Division of Through Rate Not Criterion of Local Rate.

Railroad Commissioner of Nevada v. Nevada-California-Oregon Railway and Sierra Valleys Railway. Opinion by Commissioner Lane.

It is claimed by the Railroad Commission of Nevada that there is discrimination against Reno because the local rates from Reno to points on the defendant's lines are higher than the division of the joint rate from Sacramento or San Francisco for the same hauls, and it is also claimed that the local rates from Reno are unreasonable in themselves. It is urged in this case that since through freight must all be transferred at Reno, there is not the usual excuse for a lower division of a through rate than for a local rate. The commission, however, believes that the general principles remain that a through rate may be lower than the sum of the locals, although the cost of service is the same, if the lower through rate is forced by competition which does not affect the local rates. Competition is clearly shown in this case. It is not found that the local rates from Reno are unreasonable *per se*.

In conclusion it may be pointed out that the real basis of the complaint is the fact that Reno merchants find it impossible to compete with Sacramento traders in markets which geographically may be said to belong to Reno. This complaint has much merit, but no reduction in the local rates of the Nevada-California-Oregon Railway can overcome the disadvantage under which Reno labors. The real difficulty lies in the transcontinental commodity rates to Reno. The commission has considered these in another proceeding. The relief therein proposed would enable Reno to get its share of the business along the Nevada-California-Oregon Railway, and no other action by the commission can have this effect.

The complaint will be dismissed. (22 I. C. C., 205.)

STATE COMMISSIONS.

The Illinois Railroad Commission in the case of the West Side Packing Company of East St. Louis v. the Vandalia, decides that the railway cannot charge for car rental in addition to switching charges.

The South Dakota railway commission has petitioned the Interstate Commerce Commission to allow special half rates for the transportation of seed grain to South Dakota districts that suffered from drought last spring.

The California railway commission and many shippers on the Pacific coast have sent telegrams to the Secretary of War and to the California senators, protesting against the proposed advance in westbound freight rates by the Panama Railroad. The rates were to have gone into effect January 1, but were postponed by the Secretary to February 4. He is now asked to postpone the advance again, to allow the coast shippers to present arguments.

Indiana Headlight Law.

The Indiana Commission has filed in the Federal court a bill of exceptions protesting against the finding by Special Master N. C. Butler, handed in to the court last month, in the case involving the headlight law. The master reported to the court that the order issued by the commission a year ago requiring railways to equip locomotives with headlights of not less than 1,500 candle power, was legal in the sense that the commission had power in the premises, but that it was invalid because its

provisions were not sufficiently definite. The commissioners claim that their order is sufficiently definite for use as a basis of action until the status of the law can be settled in the courts.

The part of the order which the special master finds does not have the certainty and definiteness required in a penal statute or order is that part which provides that the railways shall equip the engines "with headlights of not less than 1,500 candle power." He points out that locomotive headlights have an initial source of light and also have reflectors, which gather and concentrate the rays of light that otherwise would be emitted in all directions. The order of the commission does not contain any provision with reference to the dimensions or use of reflectors, or the spread of light from them. While the initial lights contained within two separate headlights might be of exactly the same candle power, one light might be far more brilliant and effective than the other, because of difference in the shape, size, material or character of the reflector which is part of the headlight. The master says, also, that the commission's order does not indicate the point at which the measurement of the candle power should be made. Illustrations of the variation in the measurement of apparent or equivalent candle power at different distances are given in the master's report.

Another question before the master was whether the road should have applied to the commission for a rehearing before beginning its suit in the Federal court. The master finds in favor of the railways on this matter.

"Operation of a railway is a hazardous business," said the master, "and it is more hazardous at night than it is by daylight. If the commission, after having investigated the subject, is of the opinion that in more light on the track there is greater safety, and gives expression and effect to that opinion by an order for headlights of a higher power than such as are now in use, it can not be said that the order is wholly unconnected with the protection of persons and property, which is the avowed purpose of it."

This language is followed by the conclusion of law that the order of the commission in the headlight matter is not an arbitrary and unreasonable exercise of power. The master also found that the act of 1909, on which the order was based, was not a delegation of legislative power.

COURT NEWS.

The Supreme Court of the United States has set the intermountain rate cases, on which an appeal by the Interstate Commerce Commission was taken from the injunction granted by the Commerce Court, for hearing on February 19.

The Baltimore & Ohio and other railways have petitioned the Commerce Court at Washington for an injunction forbidding the Interstate Commerce Commission to enforce its order requiring a freight connection to be made with an electric line at Madeira and Hillsboro, Ohio.

In the United States district court at Buffalo, N. Y., on Tuesday of this week, Judge Hazel fined the Standard Oil Company $55,000 for 143 violations of the law in accepting illegal rates on oil from Olean, N. Y., to Burlington, Vt. The offences were committed in 1904 and 1905; and the case has been in the courts several years. The railways, the Pennsylvania and the New York Central, some time ago paid fines of $35,000 and $20,000 respectively.

The Illinois Brick Company has filed a suit in the superior court at Chicago against the Baltimore & Ohio Chicago Terminal to collect $60,000 damages for alleged unjust rates on shipments of brick from Chicago Heights to Chicago between January 20, 1910, and August 31, 1911. The suit arises from an alleged agreement between the Chicago Terminal Transfer Railway, which the Baltimore & Ohio purchased at a foreclosure sale, and the Chicago Heights Land Association, providing for reductions in rates on all shipments from Chicago Heights. The amount of the alleged overcharge is $16,000.

The Supreme Court of the United States in a decision by Justice Lurton, handed down this week, in a case against the Louisville & Nashville, declares unconstitutional, so far as it affects interstate traffic, the law of Kentucky, passed in 1906, forbidding the transportation of intoxicating liquors into districts in that state where the sale of such liquors is forbidden. The railway company refused to carry such shipments from Indiana, basing its refusal on the terms of the Kentucky law. The Federal court in Indiana enjoined the railway on the ground that the Kentucky statute, in violation of the constitution, attempted to regulate interstate commerce. The Court of Appeals affirmed this decision, and it is now sustained by the Supreme Court. Justice Lurton approved the action of the plaintiffs in this case in appealing to the courts rather than to the Interstate Commerce Commission. The commission has jurisdiction over administrative questions and matters of fact, but the courts must deal with questions of general law.

The appellate division of the supreme court of New York last week affirmed a judgment against the Postal Telegraph Company for $39,409.74 damages for an error in a telegram. The message was an order to sell cotton at "12.70," but was delivered reading "1207" and the senders, Stephen N. Weld & Company, claim that they lost $27,565. This was in 1906, and the case has been pending in the courts since that time. The suit had to be tried a second time because the first trial was set aside on the ground that the jury ought to have been allowed to decide whether the message was a part of a gambling transaction. The present decision is by Justices Clarke, Scott and Miller. Justice Ingraham dissents; and Justice Laughlin also dissents, because of a difference of opinion as to whether the telegraph company should have repeated the message. A request to charge that the defendant should have repeated the message was made at the trial by counsel for the plaintiffs, to which an exception was allowed to counsel for the telegraph company. Justice Clarke, in presenting the majority opinion of the Appellate Division, says of the question of repeating a message:

"I have reached the conclusion that, in view of the main charge and the previous request of the defendant, the charging of this request was not reversible error. The case was not being tried upon any specific item. It was in evidence that on the figure '20,' there had been such misunderstanding between the two operators that New York had been asked to 'confirm' and had done so, and when this last request used the language 'confirm or repeat,' I do not think that it can be held that it referred to the full form of repeating a message, which had been testified to as meaning the rehandling of the message by four operators instead of two, for which the sender paid extra, but rather meant to confirm or repeat as between the operators, which had been shown in many instances to have been the custom for their mutual understanding."

The Southern Pacific, the Corvallis & Eastern and the Independence & Monmouth have filled a petition in the Commerce Court, asking that the order of the Interstate Commerce Commission of June, 1911, in the Willamette Valley lumber case, be set aside. The petition alleges that the commission has in effect overruled the Supreme Court of the United States by its order. The rate on lumber from the Willamette Valley and Portland to San Francisco and Bay points for many years was $3.10 a ton, and in April, 1907, it was advanced by the carriers to $5. On complaint of the Western Oregon Lumber Manufacturers' Association and others, the commission fixed rates of $3.40 and $3.65. The Supreme Court held that the record made the conclusion inevitable that the complaint was directed not so much against the reasonableness per se of the $5 charge as against an increase in a rate long maintained. In a later proceeding the commission, last June, fixed the rates ten cents higher, $3.50 and $3.75. On this point the petition says: "The amount of the increase above the former rates is insignificant, and petitioners believe and so charge that it was not made by the commission for the purpose of making such rates reasonable in themselves for the services rendered, but was solely to make some variation from the former rates, while at the same time substantially retaining those rates for the reasons set forth in their former opinion. The commission, though advised of the opinion and decree of the Supreme Court, did not accept and act upon them according to their true intent and meaning, according to which, as petitioners are informed and believe, they should have set aside their order of suspension and left in effect the said rate of $5; but rendered their opinion and made their order, by which, either from a misconstruction of the true intent and meaning of the opinion and decree of the Supreme Court, or arbitrarily, they, as petitioners are informed and believe, in effect, overruled the Supreme Court of the United States."

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

O. W. Dynes, whose appointment as commerce counsel of the Chicago, Milwaukee & St. Paul and the Chicago, Milwaukee & Puget Sound, with office at Chicago, has been announced in these columns, was born May 31, 1869, at Columbus, Wis. He was educated at the Oshkosh (Wis.) Normal School and at Cornell University, and for fourteen years was engaged in the general practice of law at Chicago, representing principally corporation interests. Mr. Dynes was made assistant general solicitor of the Chicago, Milwaukee & St. Paul in May, 1907, which position he held at the time of his promotion as above noted.



O. W. Dynes.

Clarence F. Parker, purchasing agent of the Illinois Central at Chicago, has been elected vice-president in charge of purchases and supplies, with headquarters at Chicago, a new office. Mr. Parker was born February 14, 1865, at Charleston, Ill. He was educated at Washington University, St. Louis, Mo., and from 1888 to 1896 held various positions in train service, having been car accountant, secretary to the general manager and purchasing agent, and assistant general manager and purchasing agent of the St. Louis, Alton & Terre Haute, now part of the Illinois Central. He was general manager from January to April, 1896; on the latter date he became general agent of the Illinois Central at St. Louis, and in May, 1902, was promoted to coal traffic manager. From June, 1904, until his recent election as vice-president he has held the office of purchasing agent.



C. F. Parker.

Operating Officers.

Andrew Ross, superintendent of the Old Colony division of the New York, New Haven & Hartford, with office at Taunton, Mass., has resigned.

R. L. Barrett has been appointed trainmaster of the Brunswick division of the Atlanta, Birmingham & Atlantic, with office at Fitzgerald, Ga., succeeding G. F. Dickson, resigned.

Harry B. Sargent, chief clerk to the president and general manager of the New Orleans & Northeastern, the Alabama & Vicksburg and the Vicksburg, Shreveport & Pacific, has been appointed superintendent of transportation, with office at New Orleans, La., succeeding E. A. Kelley, appointed general manager of the New Orleans Terminal Company.

R. F. Carr has been appointed superintendent of the Red River division of the St. Louis & San Francisco, with office at Francis, Okla., succeeding S. H. Charles, resigned. Effective February 1.

E. G. Evans has been appointed master of trains of the Louisville & Nashville and subsidiary lines, in charge of the territory from Boyles, Ala., to Anniston, and from Anniston to Calera, with office at Anniston, succeeding P. E. Kemp, trainmaster at Anniston, resigned.

E. A. Kelley, superintendent of transportation of the New Orleans & Northeastern, the Alabama & Vicksburg and the Vicksburg, Shreveport & Pacific at New Orleans, La., has been appointed general manager of the New Orleans Terminal Company, with office at New Orleans, succeeding R. B. Fowler, resigned to become superintendent of the St. Louis, Brownsville & Mexico.

Under a change which has been made in the division of duties of the operating and transportation departments of the Texas & Pacific, effective February 1, Page Harris, assistant general superintendent at Dallas, Tex., has been appointed superintendent of transportation, with office at Dallas. J. W. Everman, general superintendent, will have supervision over operating matters.

P. W. J. Smith, passenger trainmaster of the New York, New Haven & Hartford on the division between New Haven and New York, has been appointed superintendent of the New York, Westchester & Boston, with temporary office in New York city. H. J. Reynolds, trainmaster in charge of freight service west of New Haven, succeeds Mr. Smith, and E. E. Regan, assistant trainmaster on the Shore Line division, has been appointed acting trainmaster in charge of freight service between Woodlawn and New Haven, including the Danbury, Ridgefield and New Canaan branches.

Traffic Officers.

H. H. Smith has been appointed traveling freight agent of the Virginian Railway, with office at Cincinnati, Ohio.

John E. Windsor has been appointed coal traffic manager of the Chicago, Terre Haute & Southeastern, with office at Chicago.

C. P. Gaither has been appointed contracting freight agent of the Seaboard Air Line, with office at New York, succeeding C. I. Malone, transferred.

H. C. Maggard has been appointed soliciting freight agent of the Trinity & Brazos Valley, with office at Houston, Tex., succeeding S. H. Shire, resigned to engage in other business.

John T. Bowe, formerly general agent of the Denver & Rio Grande at Chicago, has been appointed traffic manager of the Pullman Company, with office in the Pullman building, Chicago.

William Pedrick, Jr., district passenger agent of the Pennsylvania Railroad at Philadelphia, Pa., has been appointed assistant district passenger agent, with office at New York, and Roy A. Stall, traveling passenger agent, succeeds Mr. Pedrick, with office at Philadelphia.

W. V. Lifsey, assistant to the general eastern passenger agent of the New York Central & Hudson River at New York, has been appointed general eastern passenger agent, with office at New York, succeeding E. J. O'Hayer, resigned to go into other business, effective February 1.

Howard M. Morton has been appointed traveling freight solicitor, in connection with the Ironton, Ohio, agency, of the Star Union Line of the Pennsylvania Lines West. Charles A. Whittlesey has been appointed traveling freight solicitor, in connection with the Akron, Ohio, agency.

J. G. Royster, soliciting freight agent of the Mobile & Ohio at Kansas City, Mo., has been appointed traveling freight agent at that place. Joseph McDonough has also been appointed a traveling passenger agent, with office at Kansas City, and C. C. Harvey has been appointed soliciting freight agent.

W. D. Morgan, commercial agent of the Missouri, Kansas & Texas of Texas, at Denison, Tex., has been appointed commercial agent, with office at Dallas, Tex., a new position. Elbert Blair, commercial agent at Waco, Tex., succeeds Mr. Morgan, and O. C. Thomas, agent at Bonham, Tex., succeeds Mr. Blair.

T. J. Fitzgerald, passenger and ticket agent of the Missouri, Kansas & Texas at Kansas City, Mo., has been appointed passenger and ticket agent of the Missouri, Kansas & Texas of Texas, with office at Houston, Tex., succeeding A. S. Wagner, resigned to accept service with another company. B. R. Morton, passenger and ticket agent at St. Louis, Mo., succeeds Mr. Fitzgerald, and W. P. Overbay, district passenger agent at Detroit, Mich., succeeds Mr. Morton.

C. C. Clark, general agent in the passenger department of the Cleveland, Cincinnati, Chicago & St. Louis at Cincinnati, Ohio, has been appointed general agent in the passenger department of that road and the Michigan Central, with office at Chicago, succeeding I. P. Spining, resigned to go into other business. Ernest R. Whelan, city passenger agent at Cincinnati, succeeds Mr. Clark. W. L. Dewey, traveling freight agent of the C. C. C. & St. L., at Richmond, Va., has been appointed commercial agent, with headquarters at Norfolk, Va., and J. H. Meglemry, traveling freight agent at Birmingham, Ala., has been appointed commercial agent, with office at Atlanta, Ga. H. H. Squire has been appointed commercial agent, with headquarters at Detroit, Mich.

G. H. Corse, Jr., until November 15, 1911, general Oriental agent of the Chicago, Milwaukee & St. Paul, at Shanghai, China, has been appointed general passenger agent of the San Francisco Overland Route, a through passenger route made up of the Pacific Mail Steamship Company, the Southern Pacific, the Union Pacific, the Atchison, Topeka & Santa Fe, the Chicago & North Western, the Pennsylvania Lines and the New York Central Lines, and he will have his office at Yokohama, Japan. Mr. Corse began railway work in 1889, when he was about 16 years old, as relief operator on the Chicago & Iowa, now part of the Chicago, Burlington & Quincy; and for 15 years from 1891 was employed in various capacities in the traffic department of the Southern Pacific and the Union Pacific. He was made freight clerk of the Pacific Mail Steamship Company at Hong Kong, China, in 1906, and from April, 1909, until November of last year was general Oriental agent of the C. M. & St. P.

Engineering and Rolling Stock Officers.

L. E. Hassman, master mechanic of the Illinois Central, with office at Clinton, Ill., has resigned, effective February 1, to engage in other business.

The office of John D. Isaacs, consulting engineer of the Union Pacific and the Southern Pacific, was removed from Chicago to New York City, effective January 20.

A. H. Graham has been appointed master mechanic of the St. Louis, San Francisco & Texas and the Fort Worth & Rio Grande, with office at Sherman, Tex., succeeding C. E. Boss, resigned to accept service with another company.

B. F. Dye, roadmaster of the Norfolk & Western, has been appointed foreman in charge of construction work now in progress between Eckman, W. Va., and Welch, and R. M. Wilson has been appointed roadmaster of the Clinch Valley district, with office at Bluefield, W. Va., succeeding Mr. Dye.

T. N. Russell, general inspector in the car department of the Cincinnati, Hamilton & Dayton at Lima, Ohio, has been appointed superintendent of the car department, attached to the office of superintendent of motive power and car department at Cincinnati, Ohio. C. M. Hitch, general car foreman at Ivorydale, Ohio, has been transferred to Lima, in charge of freight and passenger car shops at that place.

C. K. Shelby, who has been appointed master mechanic of the Pennsylvania Railroad at Olean, N. Y., shops, as has been announced in these columns, was born on September 18, 1870, in Allegheny county, Pa., and after attending St. Paul's School, Concord, N. H., he was graduated from Lehigh University in 1892, with the degree of mechanical engineer. He entered the service of the Link Belt Engineering Company, and later went to the Baldwin Locomotive Works. In November, 1894, he became a special apprentice at the Altoona shops of the Pennsylvania Railroad, and was appointed assistant foreman of passenger car inspectors in February, 1899. One year later he was made assistant master mechanic at the Juniata shops, and in December, 1902, he was transferred in the same capacity to the Renova shops, and was acting master mechanic at those shops from May until June, 1903. Mr. Shelby was appointed assistant engineer of motive power of the Philadelphia & Erie Railroad division and the Northern Central Railway in July, 1903, with office at Williamsport, Pa., and was made master mechanic of the Elmira division of the Northern Central in April, 1906, which position he held at the time of his recent appointment as master mechanic of the Buffalo division.

Joseph A. Boyden, whose appointment as master mechanic of the Mahoning division of the Erie Railroad, with office at Cleveland, Ohio, has been announced in these columns, was born on September 2, 1876, at Susquehanna, Pa., and was educated at the high schools and at Wyoming Seminary. Mr. Boyden began railway work on November 6, 1892, at the Susquehanna shops of the Erie as an apprentice, and after completing his apprenticeship in 1896, he was for one year in the drafting room. In January, 1898, he went to the Pere Marquette as a machinist at Saginaw, Mich., and in February of the following year returned to the service of the Erie Railroad as a machinist at Susquehanna. In August, 1899, he was transferred in the same capacity to Dunmore, Pa., and in February, 1900, he was again transferred to the Baldwin Locomotive Works at Philadelphia, inspecting the engines being built for the Erie. He returned to the Susquehanna shops in September of the same year, and in January, 1901, was promoted to machine shop foreman at Port Jervis, N. Y. He was again promoted in February, 1904, to general foreman at Newburgh, N. Y., and in March, 1905, was transferred as general foreman to Bergen, N. J. Four years later he was again transferred as general foreman to Cleveland, Ohio, and since April 1, 1911, he was general foreman at Hornell, N. Y.



J. A. Boyden.

William Schlafge, who has been appointed general mechanical superintendent of the Erie Railroad, with office at New York, as has been announced in these columns, was born in Berlin, Germany, on October 11, 1868, and after receiving a common school education he attended night school. Mr. Schlafge began railway work in the machine and car shops of the Lehigh Valley at Packerton, Pa., and left that company in 1887, to go to the Minneapolis, St. Paul & Sault Ste. Marie shops at Minneapolis as an apprentice. After completing his apprenticeship he was engaged in various railway and contract shops as mechanic and foreman, and returned to the service of the Soo Line in 1893 as roundhouse foreman at Gladstone, Mich. He remained in this position until 1898, when he went to the Escanaba & Lake Superior as locomotive fireman and was then engineman and later was appointed master mechanic. His next position was roundhouse foreman at Newark, Ohio, with the Baltimore & Ohio, and three years later he was promoted to general foreman in charge of the loco-



W. Schlafge.

motive and car departments, with office at Chicago Junction, Ohio, remaining in that position until 1903. Mr. Schlafge went to the Erie in March, 1903, as general foreman at Port Jervis, N. Y., and the following year was made master mechanic at Jersey City, N. J. In December, 1906, he was made master car builder, with office at Meadville, Pa., and then within the next few months was general master mechanic and assistant mechanical superintendent of the same road. In October, 1907, he was promoted to mechanical superintendent of the Erie grand division and the New York, Susquehanna & Western, with office at Jersey City, which position he held at the time of his recent appointment as general mechanical superintendent of the Erie system.

W. T. Leyden, road foreman of equipment of the Minneapolis & St. Louis at Watertown, S. D., has been appointed acting master mechanic of the Eastern division, with office at Marshalltown, Ia., succeeding William Gill, granted leave of absence. William Gemlo has been appointed acting road foreman of equipment in charge of the Western division and the fourth district of the Central division, with office at Watertown, succeeding Mr. Leyden.

Purchasing Officers.

A. C. Mann, chief clerk in the purchasing department of the Illinois Central at Chicago, has been appointed assistant purchasing agent, with headquarters at Chicago, succeeding John C. Kuhns, promoted to purchasing agent.

John C. Kuhns, assistant purchasing agent of the Illinois Central at Chicago, has been appointed purchasing agent, with office at Chicago, succeeding C. F. Parker, elected vice-president. Mr. Kuhns was born at Waterloo, Iowa, August 18, 1871, and received his education in the public schools at Waterloo. He began railway work in 1887 as machinist apprentice at the Waterloo shops of the Illinois Central. Two years later he left the railway service to enter the insurance business, and in 1891 returned to the Illinois Central as clerk in the office of the supervisor of bridges and buildings at Waterloo. In 1894 he was transferred to Chicago in the bridge and building department, and on June 1, 1901, entered the purchasing department as assistant chief clerk. He was later promoted to chief clerk, and on May 23, 1907, was appointed assistant purchasing agent.



J. C. Kuhns.

OBITUARY.

E. B. Hooser, division freight agent of the Rock Island Lines, with office at Wichita, Kan., died at that place on January 16.

E. N. Hicks, formerly traveling passenger agent of the Lake Erie & Western, with office at Indianapolis, Ind., died at that place on January 15.

Joseph A. Brown, formerly for 28 years freight agent for the Cunard Steamship Company at New York, died from heart disease on January 21, in Brooklyn, N. Y.

William D. Bishop, Jr., formerly for many years secretary of the New York, New Haven & Hartford, died on January 23 at his home at Sea Cliff, N. Y., at the age of 53. Mr. Bishop was born at Bridgeport, Conn., and was a son of William D. Bishop, former president of the New York, New Haven & Hartford Railroad.

Bernard N. Farren of Massachusetts, formerly a well known railway contractor, died in Philadelphia, Pa., January 21, at an advanced age. Mr. Farren was one of the principal figures in the construction of the five-mile Hoosac Tunnel and the Troy & Greenfield Railroad, which together constitute that section of the Boston & Maine's line to the Hudson river, which was built by the state of Massachusetts. He was also engaged in numerous other important enterprises, including the construction of Turner's Falls, now an important manufacturing center.

D. B. McCoy, formerly and for 15 years superintendent of the Hudson division of the New York Central & Hudson River, with office at New York City, died on January 20, at the home of his son at Bogota, N. J., at the age of 67. Mr. McCoy began railway work when he was 15 years old as a telegraph operator on the Pittsburgh division of the Pennsylvania. He subsequently became train despatcher, and then division superintendent on the Pittsburgh, Fort Wayne & Chicago, the Pennsylvania's line to Chicago. In 1881 he went to the Chicago & North Western as superintendent of the Milwaukee and Wisconsin divisions. Three years later he returned East and was made superintendent of the Buffalo division of the West Shore, and in 1890 was promoted to be superintendent of the Hudson and Putnam divisions of the New York Central. He remained in this office until September 26, 1906, when he was appointed assistant to the general manager of the New York Central, from which position he was retired on a pension in December, 1908.

Elias A. Ford, formerly and for over 25 years at the head of the passenger department of the Pennsylvania Lines west of Pittsburgh, died on January 20, at his home in Pasadena, Cal., of heart disease. Mr. Ford was born on April 15, 1840, at Burton, Geauga county, Ohio, and began railway work in 1863. Previous to 1865 he was clerk at the union ticket office at Cleveland. He then became general western passenger agent of the Cleveland, Columbus & Cincinnati, and from 1868 to 1869 was general passenger agent of the Bellefontain Railroad, a part of the same system. From 1869 to 1871 he was general passenger agent of the consolidated system, the Cleveland, Columbus, Cincinnati & Indianapolis. Then for about four years he was general passenger agent of the Missouri Pacific and the Atlantic & Pacific Railways. In 1876 he was appointed general passenger agent of the St. Louis, Iron Mountain & Southern. From 1879 until his retirement in 1910 he was with the Pennsylvania System, beginning as general passenger of the Vandalia Line. From 1881 to May, 1904, he was also general passenger agent of all the Pennsylvania Lines West of Pittsburgh, including the Vandalia. In the latter year he was promoted to passenger traffic manager. Mr. Ford went to Pasadena about three years ago.

Charles F. Cox, treasurer of the Lake Shore & Michigan Southern, the Michigan Central, the Cleveland, Cincinnati, Chicago & St. Louis, and other New York Central lines west of Buffalo, died at his home in Yonkers, N. Y., on Wednesday last, after a short illness of pneumonia. Mr. Cox was born on Staten Island (New York City), January 16, 1846, and had been in the service of the Vanderbilt lines for over 40 years. He was educated at the College of the City of New York and at Oberlin College, Ohio, being graduated from the latter class of 1869. His uncle was president of that college. Immediately after graduating, he entered the service of the Canada Southern as an accountant, and was successively assistant treasurer, secretary, vice-president and president of the road. He has been at the head of the treasury department, as above noted, for several years. Mr. Cox was prominent not only as a financier, but as a scientist, and was one of the chief promoters of the Young Men's Christian Association on the New York Central Lines. For two years he was president of the New York Academy of Sciences; and was a member of numerous other scientific organizations, both in this country and in Europe. He was a member of the Madison Square Presbyterian Church, New York City, and of the railway committee of the International Committee of Young Men's Christian Associations. He was prominent in numerous charitable organizations in New York City, and was vice-president of the Transportation Club. He leaves a wife and one daughter, Mrs. E. B. Jenks.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Delaware, Lackawanna & Western is figuring on 40 locomotives.

The Delaware & Hudson has ordered 12 consolidation locomotives from the American Locomotive Company.

The Canadian Pacific has ordered 25 ten-wheel locomotives and 8 freight locomotives from the American Locomotive Company and will build 50 ten-wheel locomotives and 25 switching locomotives at the company's shops.

CAR BUILDING.

The Bingham & Garfield is said to be in the market for 50 sixty-ton gondola cars. This item has not been confirmed.

The Cananea Consolidated Copper Co., Cananea, Mex., has ordered 12 Ingoldsby dump cars from the Pullman Company.

The Pennsylvania Railroad will build 400 freight cars at its Altoona shops. This company is now in the market for 150 passenger cars.

The Chicago, Milwaukee & St. Paul is said to be in the market for from 500 to 1,000 box cars and 500 refrigerator cars. This item has not been confirmed.

The Bessemer & Lake Erie, mentioned in the *Railway Age Gazette* of January 19 as being in the market for 2,000 gondola cars, is now in the market for 1,500 50-ton all steel gondola cars; 500 50-ton steel underframe box cars; 500 50-ton all steel box cars.

The Pennsylvania Lines West, instead of having ordered 1,400 freight cars from the Standard Steel Car Company, as mentioned in the *Railway Age Gazette* of January 19, have ordered 1,000 box cars from the Western Steel Car & Foundry Company; 800 coke cars from the Cambria Steel Company; 200 coke and 400 gondola cars from the Standard Steel Car Company; 600 gondola cars from the American Car & Foundry Company. This company is now in the market for 53 passenger cars.

The Rock Island Lines, as mentioned in the *Railway Age Gazette* of December 29, have ordered 2,500 steel underframe box cars from the Pullman Company. These cars are for July and August delivery, and will have a capacity of 80,000 lbs. The inside measurements will be 40 ft. long and 8 ft. 6 in. wide. The over-all measurements will be 40 ft. 3½ in. long, 8 ft. 7⅝ in. wide and 13 ft. ⅞ in. high. The special equipment will be as follows:

Bolsters—Buckeye.
Brakes—Westinghouse.
Brake beams—Chicago Railway Equipment Co.
Brasses—Chicago Bearing Metal Co.
Couplers—Major.
Door fastenings—Climax.
Draft gear—Farlow.
Journal boxes—Bettendorf.
Paint—Railway's standard.
Roofs—Murphy.
Springs—Railway Steel Springs Co.
Trucks—Bettendorf.
Wheels—Cast iron.

IRON AND STEEL.

The Chicago Junction has ordered 2,500 tons of rails from the Illinois Steel Company.

The Canadian Pacific has ordered 3,500 tons of structural steel from the Carnegie Steel Company.

The Baltimore & Ohio has ordered 1,500 tons of structural steel from the Pennsylvania Steel Company.

The Chicago Great Western has ordered 263 tons of steel for viaducts at Omaha, Neb., from the Vierling Steel Company.

The Delaware, Lackawanna & Western is said to have ordered 20,000 tons of rails from the Lackawanna Steel Company. This item has not been confirmed.

The Erie has ordered 13,890 tons of 90-lb. rails and 4,730 tons of 80-lb. rails from the Carnegie Steel Company; 8,000 tons of 90-lb. rails from the Lackawanna Steel Company, and 3,050 tons of 80-lb. rails from the Illinois Steel Company.

The New York Central Lines, as mentioned in the *Railway Age Gazette* of January 19, has ordered about 110,000 tons of rails. This order was divided as follows: United States Steel Corporation, 47,000 tons; Lackawanna Steel Company, 47,000 tons; Bethlehem Steel Company, the balance.

General Conditions in Steel.—The Steel Corporation continues to operate at about 89 per cent. of its capacity. During the past week there has been a temporary lull in new business received, but the orders on the books are so heavy that mill operations at almost capacity are assured for several months. For the first time in four years premiums are being offered for prompt deliveries. Rail orders have not been as heavy as were anticipated and are somewhat less than in 1911. Some large orders are pending, however, and it is expected that they will be placed shortly.

SIGNALING.

The Delaware, Lackawanna & Western has completed plans to install automatic block signals on 56 miles of single track between West Nanticoke, Pa., and Rupert, Pa.; and between Sherburne and Waterville, N. Y. The signals will be lower quadrant, two-position. Lower quadrant signals to govern movements on the eastward and westward freight tracks between Stroudsburg and Henryville, Pa., 10.5 miles, will also be installed during this year, each post to have a home and distant arm. An electric interlocking plant of 41 levers will be installed at Montclair, N. J.; a 16-lever mechanical plant at the entrance to the passing siding at Henryville, Pa., and an electric machine of six levers at the entrances to Oxford Tunnel, N. J.

Automatic Signals on Canadian Pacific.

The Canadian Pacific has ordered from the Hall Signal Company automatic block signals sufficient to equip 192 miles of its lines, including about 33 miles of double-track. Style "K" top post signals, with the arms working in the upper quadrant and three positions, will be used, and the work of installation will be begun in the spring after the frost is out of the ground. On the Canadian Pacific the night signal colors are green for proceed, yellow for caution and red for stop. The signals will be arranged to stand "normal danger," and the apparatus and construction will conform to the specifications of the Railway Signal Association. This will be the first extensive installation of automatic signals in the Dominion of Canada. The termini of the section, to be signaled are indicated below:

St. John to Vanceboro, 90.25 miles single track.
Romford Junction to Sudbury, 3.2 miles single track and 3.8 miles double track.
West Toronto to Bolton, 21.6 miles single track.
Place Viger to St. Therese, 20 miles double track.
Montreal Junction to Brigham Junction, 34.5 miles single track and 9.5 miles double track.
Islington to Streetsville, 12.9 miles single track.

FOREIGN RAILWAY NOTES.

A Russian commission has reported on the practicability of a tunnel through the Caucasus from Vladi Kaukaz north of the mountain range into the trans-Caucasian territory. It would be physically practicable to build such a tunnel, but it would be 13½ miles long—a mile longer than the Simplon tunnel in Switzerland, and it would have comparatively little traffic. There is already rail connection by a line which goes entirely around the Caucasus range at its eastern end. The territory has also good connection with western Russia by steamers on the Black sea.

Freight rates on the Hungarian State Railways are to be increased March 1. The advance is 7 per cent. for the ordinary rates and 5 per cent. for a group of articles which have been carried at less than the ordinary rates, presumably because they would not move at full rates. Various interests have urged that the advance should not apply to their particular freights, but the minister of railways said that the net earnings must be increased. If exports should actually be reduced by the higher charges, each case may be attended to hereafter as necessity arises.

Supply Trade News.

Charles R. Crane, the oldest son of the late R. T. Crane, has been made president of the Crane Company, Chicago, at the annual meeting, held on January 22.

The Automatic Signal & Appliance Company has been incorporated in Ohio with a capital stock of $10,000. James B. Hoge, of Cleveland, Ohio, is president, and N. G. Coen, also of Cleveland, is secretary.

The following officers of the Watson-Stillman Company, New York, have been elected: Vice-president, E. A. Stillman; treasurer, J. P. Bird; secretary and works manager, A. F. Stillman; chief engineer, Carl Wigtel.

The Firth-Sterling Steel Company, McKeesport, Pa., has opened a new branch office at Sixteenth and Connecticut streets, San Francisco, Cal. This office is in charge of E. O. Reynolds as manager, assisted by H. S. Norman and Alfred Olsen.

W. H. Lawrence has been made manager of the waterproofing and mastic department of the H. W. Johns-Manville Company, New York, with office in Chicago. Mr. Lawrence will have supervision of all the waterproofing work of the company throughout the country.

C. A. Delaney, for a number of years superintendent of the Dickson works of the American Locomotive Company, New York, with office at Scranton, Pa., and later sales representative at that place, has been made western representative of that company with office in Chicago.

The Smith Locomotive Adjustable Hub Plate Company, Pittsburg, Kan., is equipping a number of new locomotives for the St. Louis & San Francisco and the Missouri Pacific with its adjustable hub plates at the Schenectady, N. Y., plant of the American Locomotive Company, New York.

The Independent Pneumatic Tool Company, Chicago, has recently placed on the market a new One Man drill, which is equipped with compound planetary gears, and is particularly adapted for drilling, tapping and screwing in staybolts and studs of all sizes up to 1¼ in. This drill is of the reversible type, weighs 20 lbs. equipped with No. 3 Morse taper socket, and has Corliss valves.

The stockholders of the Dominion Iron & Steel Company, Sydney, N. S., have approved the proposal of the directors to issue $7,000,000 of the 6 per cent. preferred stock to be exchanged for the 6 per cent. income bonds of the subsidiary company. Of the preferred stock, $17,500,000 is authorized, and it is intended later to offer the unissued balance to holders of shares of the Dominion Iron & Steel Company, and of the Dominion Coal Company, Montreal, Que., at a price to return the present dividend rate. The plant of the Dominion Iron & Steel Company has been improved, so that the capacity is now 450,000 tons annually as compared with 250,000 tons in 1909.

William Wilkes Young, purchasing agent of the Union Switch & Signal Company, Swissvale, Pa., died at his home in Wilkinsburg on January 21 of cancer in the stomach. Mr. Young was born in Manchester, N. H., December 16, 1857. He came to the Union company in 1889, and served as district agent, as general agent, and for about six years as purchasing agent. He had a hard boyhood and was without technical education, except such as he picked up as he went along. He acquired a good fundamental knowledge of signaling and interlocking, and an excellent detail knowledge of mechanical and electro-pneumatic work, and of the simpler forms of direct current work. He had great capacity for organization and administration, which made him particularly useful on construction and installation. The last important work of that nature which he did for the Union company was the interlocking at the St. Louis, Mo., terminal. Mr. Young had entire field charge of that work, and he handled it with singular tact, skill and economy.

In the application by the American Brake Company, (which was taken over by the Westinghouse Air Brake Company, Pittsburgh, Pa., in 1898) for a preliminary injunction against the New York Air Brake Company, New York, in the district court of the United States, Southern district of New York, the court has granted an injunction against the infringement of claims 1, 2 and 5 of McKee patent 533,485, and claims 1, 2 and 3 of Lencke patent 568,777, and has refused to grant the injunction on the Wahlert patent 696,521. The court, in its memorandum granting the injunctions, says that "it will usually be better, in the ordinary administration of justice, to refuse preliminary injunctions in the first instance on untested patents even comparatively new, and leave matters to the tribunal which can speak with practical finality." These considerations, the court says, would have led to a denial of the present motion "were it not for the very recent and determined infringement complained of, and the imminent expiration of the principal patent; a determination so imminent that if complainant cannot get an injunction now, it never can get one. This peculiarity of the case leads to an expression of opinion positive, though not, perhaps, as full as it would be at final hearing." The complainant manufactures automatic brake adjusters under the patents brought up in this suit and under two other patents, the last one of which expired January 10, 1910. This last patent formed a basis of the complainant's business in brake adjusters, and in it there was undoubtedly public acquiescence of the strongest kind. The McKee and Lencke patents involved in this suit purport to be no more than improvements on the expired patents. The Wahlert patent is for the combination of a brake adjuster of a closed casting with certain parts of a brake adjuster. The Wahlert patent still has upwards of seven years to run, and the court holds that it should be left to be finally passed on without the granting of a preliminary injunction; but "it is also in my [the court's] judgment fairly shown by a preponderance of expert evidence that it displays no patentable invention, and that at best it is no more than an aggregation of previously known and long used parts in a form convenient, to be sure, but displaying nothing more than mechanical skill." The expired McKee patent was admittedly the fundamental patent for the type of slack adjuster here in controversy. Its characteristic most important in this case was that the fulcrum block, which was moved by the action of the piston of the take-up motor, was attached to the fulcrum of the dead lever. "The expired McKee patent covered the necessary application of this take-up device to any (practicable) one of the brake rigging levers. What the public has acquiesced in for more than 17 years is not so much any patent now in suit as the McKee patents of 1892 and 1893; nevertheless, the expiration of these last mentioned patents did not produce any competitor for a year and a half after the earlier McKee patents ran out." Then the defendant put on the market a device which, for all practical purposes, "is what our senior judge has so often called a Chinese imitation of the complainant's apparatus. If imitation be the sincerest flattery, it is impossible to conceive any more fulsome tribute to the McKee devices (one and all) than defendant's machine and apparatus, and every equitable consideration is in favor of complainant unless it can be clearly shown that defendant has taken nothing to which complainant is still entitled. It is, I think, proved (as defendant states) that slack may be taken up at one point or another at the option of the instructor, and in divers machines it has been taken up in divers places, but where one particular method of taking up makes an original apparatus so compact, durable and desirable as does the McKee patent of 1893, I think invention is thereby shown." The same method of criticism is applicable to the Lencke patent as to the McKee patent. It is narrow; it is for a very particular apparatus or a very special style of apparatus, "but it is not fair to assert at this late date that what so ingenious an inventor as McKee did not find obvious in 1893, was too plain to permit invention to be ascribed to the solution thereof in 1896."

TRADE PUBLICATIONS.

DIGGING MACHINERY.—The Hayward Company, New York, has issued an attractive folder illustrating various uses of its buckets and digging machinery in different kinds of excavation and dredging work.

BORING AND TURNING MILLS.—The Betts Machine Company, Wilmington, Del., has published a 100-page well illustrated catalog of its heavy machine tools for high speed steel. These machine tools are especially adapted for railway, locomotive and car shops. Each machine is illustrated by full page illustrations and is clearly and concisely described.

Railway Construction.

New Incorporations, Surveys, Etc.

Arizona Eastern.—See Southern Pacific.

Atchison, Topeka & Santa Fe.—According to press reports the Dodge City & Cimaron Valley has given a grading contract to Ransom & Cook, Ottawa, Kan., for work from Dodge City, Kan., southwest to Santa Fe Junction, in Haskell county. E. L. Copeland, secretary and treasurer, Topeka. (December 9, 1911, p. 1188.)

Beaverton & Willsburg.—See Southern Pacific.

Canadian Northern.—This company is negotiating with the city of Montreal with reference to the proposed terminals in that city. The plans call for the following work: A double track tunnel 3.3 miles long and 40 to 700 ft. deep, from a point half a mile west of the Canadian Pacific's Outremont yards to Lagauchetiere street; an underground station on Dorchester street; elevated tracks from the tunnel mouth to the present Brennan street tracks; elevated freight sheds, and river front connection with the Moreau street station; also a spur line there to the Dorchester street tunnel. (January 5, p. 37.)

Canadian Pacific.—An officer is quoted as saying that the company will spend a large amount of money during the coming year extending the system in the western provinces. The plans include a large amount of double tracking work, construction of branch lines and the extension of terminal facilities at various places. It is understood that the main line will be double tracked on all congested sections. Plans have been approved for double tracking between Regina, Sask., and Chaplin, between Hammond, B. C., and Vancouver, also between Alyth, Alta, and Sunalta. Important extensions are to be made to the terminal facilities at Vancouver, Calgary, Swift Current, Moose Jaw, Regina, Broadview, Brandon and Fort William. A new terminal is to be built at Coquitlam, B. C. To improve the terminal facilities at Winnipeg, Man., two alternative surveys are now being made, one of them includes a cutoff from Reaburn. The extension work includes about 100 miles from Viceroy, Sask., to the Weyburn line; 85 miles is to be added to the line northwest of Swift Current, and construction work will be started on the main line west of Medicine Hat in a southwesterly direction. About 470 miles of line will be laid with 80-lb. rail to replace lighter sections. J. G. Sullivan, chief engineer, Winnipeg, Man.

Catskill Traction Company.—The New York Public Service Commission, Second district, has granted this company permission to build from Leeds, N. Y., to Cairo, about 7 miles. H. C. Cowen, president, Catskill.

Central California.—See Southern Pacific.

Central Pacific.—See Southern Pacific.

Chicago & Eastern Illinois.—Financial arrangements are being made to build a connecting line between the Chicago & Eastern Illinois and the New Orleans, Mobile & Chicago, under the plans for the extension of the latter company to form a new short route between Chicago and Mobile, Ala., and New Orleans, La. L. C. Hartley, engineer maintenance of way, Chicago, Ill.

Elkin & Allegheny.—An officer writes that this company plans to build from Elkin, N. C., northwest to Sparta about 25 miles through a mountainous country. Track has been laid on 12 miles. H. G. Chatham, president, Elkin.

Georgia & Alabama.—Incorporated in Alabama to build a 50 mile line from Tallapoosa, Ga., southwest through Haralson county, Ga., and Cleburne and Randolph counties, Ala., to a connection with the Atlanta, Birmingham & Atlantic, near Malone, about 50 miles. The names of the incorporators are not given.

Louisville & Nashville.—According to press reports a contract has recently been let for double tracking work between Black Creek, Ala., and Nashville, Tenn. J. B. Smith & Company, Knoxville, has a contract for 19 miles of concrete and steel work south of Nashville, and another contract has been given to the McDowell Company. Additional contracts are expected to be let in the near future. W. H. Courtenay, chief engineer, Louisville, Ky.

Louisiana Western.—See Southern Pacific.

Mexican Pacific.—An officer is quoted as saying that this line will be built from Acapulco, Mex., to Sihuatanejo, another port on the west coast, thence to Balsas, where a connection is to be made with the National Railways of Mexico, about 530 miles. Work was started some two years ago, at which time the company only had a concession between Acapulco and Sihuatanejo, but this has since been extended. The line will traverse a rich mining section. Construction work is to be pushed from three points, and in addition the company plans to build a branch about 100 miles long to connect with the Rothschild mines. Joseph Castellot, vice-president; Henry Weiss, general manager, both of Mexico City.

Midland Continental.—According to press reports this company has secured funds for completing the line from Jamestown, N. D., northeast to Winnipeg, Man., and construction work is to be started in April. The first 50 miles from Jamestown north has been built. F. K. Bull, president, Racine, Wis.

Milwaukee, Peoria & St. Louis.—According to press reports this company will begin work at once on the section from Peoria, Ill., north along the east bank of the Illinois river to a crossing of the Atchison, Topeka & Santa Fe, near Chillicothe. The line is to be extended north to Rockford, about 120 miles from Peoria. F. W. Cherry, Princeton, is back of the project, and B. Schreiner is chief engineer. (November 17, p. 1036.)

Minnesota, Dakota & Western.—According to press reports, work may be started this year on an extension to complete a connection between International Falls and Thief River Falls. The proposed route is from Loman, Minn., west through Koochiching, Beltrami, Marshall and Pennington counties. The company now operates a 23-mile line from International Falls west to Loman, and is said to have made preliminary surveys for the extension. F. Shiefield, chief engineer, International Falls.

Montreal Transcontinental.—Application will be made in Canada for incorporation to build from Montreal, Que., northerly and northwesterly through the counties of Hochelaga, Laval, Terreboone, Argenteuil, Montcalm, Labelle, Wright and Pontiac, to connect with the Grand Trunk Pacific near Grand Victoria lake. The names of the promoters are not given.

Montrose-Paradox Railroad Construction Company.—This company is said to be planning to build a line between Montrose, Colo., and the Paradox valley, about 100 miles. S. S. Sherman, G. O. Gilbert and J. F. Kyle, Montrose, S. E. Blakeslee and K. B. Hequenbourg, Paradox, are incorporators.

Morgan's Louisiana & Texas.—See Southern Pacific.

Nevada & California.—See Southern Pacific.

New Orleans, Mobile & Chicago.—See Chicago & Eastern Illinois.

New York Subways.—Bids have been opened for the construction of section 2 of the Broadway-Lexington avenue subway from a point 75 ft. south of the center line of Park Place to a point 90 feet north of the center line of Walker street, in the borough of Manhattan. The length of the section will be 2,800 ft. There is to be a station at City Hall.

Norfolk & Western.—According to press reports this company will start double-tracking work soon on about 15 miles between Gilmerton, Va., and Suffolk, and on the completion of this work, the line between Petersburg and Concord will also be double tracked. It is understood that the company is planning to carry out some improvements at the yard at Lamberts Point.

Oregon & California.—See Southern Pacific.

Oregon Eastern.—See Southern Pacific.

Oregon-Washington Railroad & Navigation Company.—An officer is quoted as saying that it is the intention of the Harriman Lines to build a direct line from Seattle, Wash., north to Vancouver, B. C., 180 miles. The line is eventually to be extended to other points in British Columbia. J. D. Isaacs, consulting engineer, Chicago, Ill.

OREGON WESTERN.—See Southern Pacific.

PACIFIC RAILWAY & NAVIGATION CO.—See Southern Pacific.

SACRAMENTO SOUTHERN.—See Southern Pacific.

SOUTHERN PACIFIC.—The report of this company for the year ended June 30, 1911, shows that the following lines are now open for operation:

Beaverton & Willsburg.—Beaverton, Ore., to Willsburg Junction, 10½ miles.

Central California.—Newark, Cal., to Redwood, 11 miles.

Central Pacific.—Built about 5 miles.

Louisiana Western.—Eunice, La., to Mamou, 9½ miles.

Morgan's Louisiana & Texas.—Lafayette, La., to Baton Rouge Junction, 51 miles.

Nevada & California.—Olancha, Cal., to Owenyo, 30 miles.

Oregon & California.—Crabtree, Ore., to Lebanon, 8 miles.

Southern Pacific of Mexico.—Under the concessions granted for the construction of the railway lines in Mexico, there was completed during the year 12½ miles, making a total of 912 miles completed to June 30. On the main line projected from Empalme, Mexico, to Guadalajara 839 miles, there has been finished a total of 683 miles. Work is now under way on 32 miles, and there remains 124 miles yet to be built. The branch lines projected total 652 miles, of which 230 miles are finished, and 422 miles remain to be built. Under the concessions as revised, the company has until November, 1915, to complete the line to Guadalajara, and until November, 1920, to complete the branch lines.

Work is nearing completion on the electrification of the suburban lines connecting with the ferries from San Francisco, Cal., to Oakland Mole and Alameda Mole, and extending into the cities and districts of Oakland, Alameda and Berkeley, and into other San Francisco bay districts.

Work is now under way on the following lines:

Arizona Eastern.—Phoenix, Ariz., to Hassayampa, 39 miles, on which track laying has been finished; Winkelman to San Carlos, 33 miles, track has been laid on 7 miles; Hayden Junction to Winkelman, 4 miles, track has been laid on 1½ miles, and grading is completed on one mile additional.

Oregon Eastern.—Klamath Falls, Ore., north, 86 miles, track has been laid on 28 miles, and grading is under way on 8 miles; Natron south, 105 miles, track has been laid on 24 miles, and grading is completed on 8 miles, and is under way on 2 miles additional.

Oregon Western.—Drain, Ore., to Marshfield, 73 miles.

Pacific Railway & Navigation Company.—Hillsboro, Ore., to Tillamook, 91 miles, track has been laid on 78 miles, and grading is finished on the other 13 miles.

Sacramento Southern.—Sacramento, Cal., to Walnut Grove, 24 miles, track has been laid on 10 miles, and grading is finished on 13 miles additional.

SOUTHERN PACIFIC OF MEXICO.—See Southern Pacific.

STUTTGART & RICE VALLEY.—An officer writes that this company, which now operates a line from Mesa City, Ark., south to Stuttgart, 22½ miles, has projected an extension from Stuttgart south to Coopers Ferry, 20 miles. J. H. Davisson, general manager, Stuttgart.

WICHITA FALLS ROUTE.—The Wichita Falls & Northwestern has amended its charter in Oklahoma, providing for an extension of the main line in Custer, Dewey, Woodward, Harper, Ellis and Beaver counties to the town of Forgan. M. M. Cooke, chief engineer, Wichita Falls. (December 22, p. 1301.)

WICHITA FALLS & NORTHWESTERN.—See Wichita Falls Route.

WICHITA, KINSLEY, SCOTT CITY & DENVER AIR LINE.—This company, which was organized in Kansas in 1909, has been given permission to make a mortgage to secure funds for building from Wichita, Kan., to Burlington, Colo. W. F. Burn, president of Pratt county, Kan., president, and H. P. Ketcham, secretary.

YOUNGSTOWN & SOUTHERN (Electric).—According to press reports, this company will build an extension from Columbiana, Ohio, east via New Waterford, to East Palestine. Rights of way have been secured. E. H. Raupp, general manager, Youngstown.

RAILWAY STRUCTURES.

ARGENTA, ARK.—The St. Louis, Iron Mountain & Southern will build a 30-stall roundhouse at this place.

ARGO, WASH.—The Oregon-Washington Railroad & Navigation Company has given a contract to Grant, Smith & Company, Seattle, for the erection of a machine shop 90 ft. x 180 ft., a power house 40 ft. x 90 ft., and a storehouse 36 ft. x 36 ft., all of reinforced concrete construction.

BALTIMORE, MD.—According to press reports, the Western Maryland has plans made for putting up a large terminal at Baltimore.

BAY CITY, MICH.—The Grand Trunk is reported to have awarded a contract to the Milwaukee Bridge & Iron Company for 1,400 tons of steel for bridge over the Saginaw river.

CHICAGO.—The Central Terminal Railway, which is building a freight terminal in Chicago for the Minneapolis, St. Paul & Sault Ste. Marie, has acquired by condemnation 58 parcels of land, in addition to 105 parcels secured some time ago between West Twelfth and West Fifteenth streets, and between Canal and Jefferson streets.

COQUITLAM, B. C.—See Canadian Pacific under Railway Construction.

FORT STOCKTON, TEX.—It is reported that the Kansas City, Mexico & Orient will build a 20-stall roundhouse and shops at this point.

GASTON, ORE.—The Southern Pacific will build a new station, it is said, at Gaston.

JERSEY CITY, N. J.—The Pennsylvania Railroad has given a contract to the J. S. Rogers Company, Morristown, N. J., for building a passenger station at Summit and Sip avenues, Jersey City. It is understood that the improvements will cost about $76,000.

JOPLIN, MO.—The new office building to be erected by the St. Louis & San Francisco is to occupy an area of 100 ft. x 127 ft., will be eight stories in height, and will cost about $350,000. It will contain a passenger station, store room and offices, and is expected to be completed by January 1, 1913. Mauran, Russell & Crowell are the architects.

MARION, KAN.—The Atchison, Topeka & Santa Fe will build a new brick combination freight and passenger station, to cost $17,000.

MONTREAL, QUE.—See Canadian Northern under Railway Construction.

NATIONAL CITY, CAL.—The Atchison, Topeka & Santa Fe will build a roundhouse, at National City, and will also construct a 2,600 ft. concrete pier.

NOGALES, ARIZ.—The Southern Pacific will soon start work, it is said, on a freight station at Nogales.

PANAMA CITY, PANAMA.—Plans are being made by the Panama Railroad Company for building a new passenger station at Panama City. It is understood that the new building will be of reinforced concrete construction, two or three stories high, and will have concrete platforms and train sheds.

SCHENECTADY, N. Y.—An officer of the Delaware & Hudson writes that this company is putting up a new bridge over the Mohawk river near Schenectady, where the proposed barge canal is to use the channel of the Mohawk river. The bridge is to carry two tracks, and will replace the existing single track bridge.

SANTA ANA, CAL.—The Pacific Electric, it is said, will build a new concrete bridge to have two 60-ft. spans, at West Twelfth street.

SWEETWATER, TEX.—The Texas & Pacific proposes to begin soon the erection of a new freight depot.

TACOMA, WASH.—According to press reports the Oregon-Washington Railroad & Navigation Company will shortly let a contract for new shops.

WINLOCK, WASH.—The Northern Pacific is asking for bids for a new passenger station, to be built at Winlock, to replace the structure recently destroyed by fire.

Railway Financial News.

Baltimore & Ohio.—This company has sold to Speyer & Co., and Kuhn, Loeb & Co., both of New York, $10,000,000 ten year 4½ per cent. car trust certificates.

See also Cincinnati, Hamilton & Dayton.

Chicago & Eastern Illinois.—It is said that the appointment of Kuhn, Loeb & Co. as the bankers for the company is preparatory to the financing of a connection between the C. & E. I. and the New Orleans, Mobile & Chicago. See an item under Railway Construction.

Cincinnati, Hamilton & Dayton.—Kissel, Kinnicutt & Co., New York, are offering $2,000,000 of the authorized $20,000,000 C., H. & D. 4 per cent. bonds, guaranteed principal and interest by the Baltimore & Ohio, at 81½. The bonds were issued calling for fixed interest payments from 1911 to 1914 at 1 per cent. annually; from 1914 to 1916, 3 per cent. annually, and after that, 4½ per cent. In addition, the bonds have interest coupons calling for the payment of the full 4½ per cent. interest for the entire period they are outstanding, if such interest is earned; and the bonds at present offered have deposited with the Bankers' Trust Co., New York, as trustee, the full amount of cash to pay the difference between a fixed 4 per cent. dividend and the fixed rate called for by the bonds from now until 1916. The bonds may run to 1930, or may in 1916 be purchased by the B. & O. at 85 for 4 per cent. bonds, guaranteed principal and interest by the B. & O.

Colorado & Southern.—This company has brought suit against the trustees of its two bond issues to compel them to consent to the sale of the stock of the Colorado Midland, which is held as additional security for the two issues of the Colorado & Southern's own bonds. An offer of $150,000 has been made for the stock of the Colorado Midland, held by the Colorado & Southern, and the Colorado & Southern, in its suit, claims that if the Colorado Midland defaults on its bond interest and foreclosure proceedings are brought, the stock of the Midland owned by the C. & S. will be rendered almost valueless. Control of the Midland is held jointly by the C. & S. and the Denver & Rio Grande.

Colorado Midland.—See Colorado & Southern.

Denver & Rio Grande.—See Colorado & Southern.

Frankfort & Cincinnati.—See Louisville & Nashville.

Grand Trunk.—This company is to ask the Canadian parliament for permission to buy or sell first mortgage bonds of the Grand Trunk Western to an amount not to exceed $30,000,000, and for permission to guarantee bonds, debentures or debenture stock of any company, the control of which is held either by the Grand Trunk or the Grand Trunk Pacific.

See also Grand Trunk Pacific.

Grand Trunk Pacific.—This company is to ask the Canadian parliament for permission to issue £5,000,000 ($25,000,000) perpetual or terminal debenture stock.

[The Grand Trunk and Grand Trunk Pacific were closely allied with the Laurier government, which failed to retain office at the last general election.]

See also Grand Trunk.

Hampden Railroad.—F. S. Moseley & Co., Boston, Mass., have bought $1,000,000 of an issue of $1,400,000 one-year notes. The Hampden Railroad is a subsidiary of the New York, New Haven & Hartford, and when completed will be operated under lease by the Boston & Maine.

Louisville & Nashville.—The Kentucky Board of Appeals has overruled the petition, by the Louisville & Nashville, for a rehearing of the case in which the Court of Appeals originally decided that the L. & N. and the Frankfort & Cincinnati, which runs from Frankfort, Ky., to Paris, are parallel and competing lines, and that therefore the L. & N. cannot absorb the Frankfort & Cincinnati.

See Louisville, Henderson & St. Louis.

Louisville, Henderson & St. Louis.—A preferred stockholders' protective committee has been formed consisting of Otto Marx, Felix Rosen, Alfred Shepherd, E. F. Enslen, W. M. Bullitt, with H. Hoffman, secretary, 37 Wall street, New York. The Louisville & Nashville controls the Louisville, Henderson & St. Louis through the ownership of $1,631,385 of the $2,000,000 common stock and $771,081 of the $2,000,000 preferred stock.

New York Central & Hudson River.—In connection with the offer, mentioned last week, of the New York Central & Hudson River to buy at $175 per $50 share the stock of the New York & Harlem, the N. Y. & H. stockholders are offered as a separate proposition the right to subscribe at $92 for new 4 per cent. debentures which the New York Public Service Commission, Second district, has authorized, to an amount not to exceed $35,000,000.

New York, New Haven & Hartford.—See Hampden Railroad.

Ocilla Southern.—This company, with a road running from Fitzgerald, Ga., to Alapaha, has been granted permission by the secretary of state, Georgia, to increase its authorized capital stock from $150,000 to $1,000,000.

Virginian.—Stockholders are to vote on January 27 on the question of increasing the capital stock from $36,000,000 to $65,000,000. Of the total, $29,000,000 is to be 5 per cent. cumulative preferred and $36,000,000 common. The preferred stock is not to be entitled to receive more than 5 per cent., but is entitled to receive full payment in par in the case of dissolution before anything is paid on the common.

Wabash.—F. A. Delano, receiver, is making arrangements for the issue of receiver's certificates. The application to the court will probably be for about $5,000,000 to provide funds for equipment and increased track facilities.

The bond holders' protective committee, J. N. Wallace, chairman, have engaged J. W. Kendrick, formerly vice-president of the Atchison, Topeka & Santa Fe, to make an inspection, and report on the requirements of the Wabash.

FOREIGN RAILWAY NOTES.

According to a circular letter sent to shareholders, the board of directors of the United Railways of Havana, Cuba, have decided to acquire the ownership of the Eastern Railway. The transaction will be effected through an exchange of the shares of the one company for those of the other.

A very satisfactory report was read at the extraordinary general meeting of the Armavir-Tuapse Railway Company, Russia, held on December 28, where 17 shareholders, representing 25,205 shares, were present, including the Russo-Asiatic Bank, with 4,000 shares. It was shown that the operation of the Armavir-Bielorietchensk-Maikop section during the first eight months of 1911 gives hope of a larger net profit at the end of the year than was expected. The management considers its forecasts to be fully justified and anticipates equally satisfactory results in 1912. The construction of the following three branch lines were approved at the meeting: Armavir-Stavropol-Petrovsk-Blagodarnoye, Petrovsk-Divnoye and Kurgana-Babinski. The length of these branches will be about 226 miles, and the cost of their construction, $11,946,000.

The transportation and navigation committee of the Bolivian chamber of deputies has recommended that the Bolivian congress grant a concession to Simon I. Patiño for the construction of a railway from Cochabamba to a port on the Chimore river. This railway is to be operated by electric or steam traction, or both, at the opinion of the concessionaire. The recommended gage of the railway is 2 ft. 4 in., but if this gage should be found unsuitable after the railway route has been surveyed than a 3-ft. gage line may be constructed. The survey is to be made within 18 months from the date of the concession, and the work must be completed within six months after the opening of the Oruro to Cochabamba railway to public traffic. The main line may be extended, or branch lines constructed, but in such cases the previous consent of the government must be obtained. Recommendation is made that no parallel railways be allowed to be built within a zone extending 25 miles on either side of the right of way of the main line of the road. The construction material for building the railway is to be imported free of duty. At the end of 99 years the line and all its rolling stock are to revert to the government. The approximate cost of the railway is $3,000,000.

ANNUAL REPORT

TWENTY-SEVENTH ANNUAL REPORT OF THE SOUTHERN PACIFIC COMPANY AND PROPRIETARY COMPANIES.

INCOME FOR THE YEAR.

The gross receipts and disbursements, after excluding all offsetting transactions between the Companies, were as follows:

	This Year.	Last Year.	+Increase. —Decrease.
Average miles of railway operated proprietary and non-proprietary	9,895.07	9,752.26	+ 142.81
TRANSPORTATION OPERATIONS.			
Gross operating revenues	$121,911,028.10	$124,523,905.08	—$2,612,876.98
Outside operations—revenues	10,709,511.41	10,498,701.79	+ 210,809.62
Total	$132,620,539.51	$135,022,606.87	—$2,402,067.36
Operating expenses	$74,521,659.84	$73,514,034.42	+$1,007,625.42
Outside operations—expenses	10,483,554.02	9,750,813.57	+ 732,740.45
Taxes (rail lines and properties dealt with as outside operations)	4,850,347.57	4,519,374.01	+ 330,973.56
Total	$89,855,561.43	$87,784,222.00	+$2,071,339.43
Operating revenues over expenses and taxes	$42,764,978.08	$47,238,384.87	—$4,473,406.79
INCOME OTHER THAN FROM TRANSPORTATION OPERATIONS.			
Interest on bonds owned of Proprietary Companies (Table No. 4)	$1,051,971.39	$854,174.84	+ $197,796.55
Interest on bonds owned of companies other than Proprietary Companies (Table No. 4)	2,935,575.94	1,285,723.65	+ 1,649,852.29
Dividends on stocks owned of companies other than Proprietary Companies (Table No. 5)	781,796.08	1,349,573.28	— 567,777.20
Wells, Fargo & Co.'s Express extra dividend	—	4,590,000.00	— 4,590,000.00
Income from lands and securities not pledged for redemption of bonds	956,529.05	894,164.31	+ 62,364.74
Income from sinking funds pledged for the redemption of bonds	93,532.54	161,514.97	— 67,982.43
Balance of interest received on loans and of interest accruing to June 30, on open accounts other than with Proprietary Companies	728,454.03	1,508,878.56	— 780,424.53
Miscellaneous income	80,917.41	65,150.84	+ 15,766.57
Total	$6,628,776.44	$10,709,180.45	—$4,080,404.01
Surplus	$49,393,754.52	$57,947,565.32	—$8,553,810.80
FIXED CHARGES.			
Interest on outstanding funded debt of Southern Pacific Co. and Proprietary Companies (Table No. 6)	$20,847,162.83	$20,140,675.54	$706,487.29
Sinking fund contributions and income from sinking fund investments	374,712.54	378,514.97	— 3,802.43
Hire of equipment—balance	250,481.77	448,342.77	— 197,861.00
	$21,522,346.84	$21,027,522.98	+ $494,823.86
Less rentals for lease of road, for joint tracks, yards, and other facilities, viz.: Collections ..$810,675.29 Payments 704,262.86	106,412.43	320,885.20	— 214,472.77
Total fixed charges	$21,415,934.41	$20,706,637.78	+ $709,296.63
Surplus over fixed charges	$27,977,820.11	$37,240,927.54	—$9,263,107.43
OTHER CHARGES.			
Land department expenses	$225,689.21	$113,866.28	+ $111,822.93
Taxes on granted and other lands	319,517.29	278,085.58	+ 41,431.71
Miscellaneous expenses	34,121.52	29,260.10	+ 4,861.42
Taxes and other expenses of Southern Pacific Company	291,703.42	317,082.52	— 25,379.10
Additions and betterments payable from income of Southern Pacific Company	123,033.79	511,819.89	— 388,786.10
Reserve for depreciation of rolling stock owned by Southern Pacific Company and leased to other companies	866,547.65	527,594.94	+ 338,952.71
Total other charges	$1,860,612.88	$1,777,709.31	+ $82,903.57
Surplus over fixed and other charges	$26,117,207.23	$35,463,218.23*	—$9,346,011.00

*The normal income of the Company decreased $4,756,011. The receipt last year, however, of an extra dividend of $4,590,000 from Wells, Fargo & Co.'s Express augmented the normal decrease by that sum.

EQUIPMENT.

The changes in equipment during the year were as follows:

	Condemned, Destroyed, Sold or Transferred to Another Class, and Credited to Equipment.		Added and Charged to Equipment.		Added and Charged to Fuel Assets, S. P. Co.		Total.	
	Number.	Original Cost.	Number.	Cost.	Number.	Cost.	Number.	Cost.
Locomotives	37	$376,224.49	166	$2,202,978.58	*79	$[illegible]	88	$1,271,477.36
Baggage cars	11	.....	53	.....	*7	.....	43	.....
Baggage and mail cars	—	.....	4	.....	*2	.....	2	.....
Baggage and passenger cars	2	.....		.....	—	.....		.....
Baggage, mail and passenger cars	2	.....		.....		.....		.....
Business cars		.....	1	.....		.....	1	.....
Composite cars	1	.....		.....		.....		.....
Dining cars	—	.....	-	.....	1	.....	12	.....
Motor cars (gasoline)	—	.....	6	.....	5	.....	11	.....
Motor car trailers	1	.....	3	.....	*3	.....		.....
Motor cars (electric)	—	.....	—	.....	65	.....	65	.....
Other cars (electric)	—	.....	-	.....	50	.....	50	.....
Observation cars	—	.....	2	.....	10	.....	12	.....
Passenger cars	30	.....	46	.....	25	.....	71	.....
Postal cars	16	.....	18	.....	34	.....	44	.....
Total passenger-train cars	63	353,971.39	125	847,136.02	186	2,523,964.10	311	3,371,100.12
Box cars	796	.....	1,596	.....	876	.....	2,472	.....
Box automobile cars		.....		.....	500	.....	500	.....
Caboose cars	12	.....	4	.....	21	.....	25	.....
Flat cars	895	.....	766	.....	*76	.....	750	.....
Fruit cars	9	.....		.....		.....		.....
Furniture cars	15	.....		.....		.....		.....
Gondola cars	72	.....	101	.....	450	.....	551	.....
Gondola (D. B.) cars	-	.....	-	.....	200	.....	200	.....
Gondola (H. B.) cars	68	.....		.....		.....		.....
Logging cars	—	.....	50	.....		.....	50	.....
Refrigerator cars	2	.....		.....		.....		.....
Stock cars	36	.....	320	.....	254	.....	574	.....
Tank cars	11	.....	157	.....	*150	.....	7	.....
Narrow gauge cars	9	.....	1	.....		.....	1	.....
Total freight-train cars	1,925	1,064,677.44	2,995	2,684,653.58	2,135	2,366,492.91	5,130	5,051,146.49
Work equipment	357	114,000.12	394	201,186.85	286	325,947.13	680	527,133.98
Total		$1,908,873.44		$5,935,955.03	—	$4,284,902.92		$10,220,857.95

NOTE:—Included in the above are 1 work car added, and 1 passenger and 7 freight cars vacated, the property of the California Northeastern Ry. Co., operated by the Central Pacific Ry. Co.

*Sold by Southern Pacific Company to Proprietary Companies. † Include 9 baggage, 17 passenger, 4 postal, 198 box, 4 caboose and 100 flat cars vacated and transferred between Proprietary Companies.

The original cost and salvage value of equipment retired during the year, and the amount charged to operating expenses in respect thereof, were as follows:

	Total.	Locomotives.	Passenger-Train Cars.	Freight-Train Cars.	Work Equipment.
Original cost (estimated if not known)	$1,908,873.44	$376,224.49	$353,971.39	$1,064,677.44	$114,000.12
Proceeds from sale or salvage value	935,780.99	96,457.44	264,522.33	524,031,63	50,769.59
Charged to operating expenses	$973,092.45	$279,767.05	$89,449.06	$540,645.81	$63,230.53

The locomotives added during the year averaged 116.77 tons total weight of engine, without tender, and 90.15 tons upon drivers, and freight-train cars 48.74 tons capacity.

The number of locomotives and cars of standard gauge owned, and the total and average capacity of freight-train cars at the close of the year were as follows:

Standard Gauge.	This Year.	Last Year.	Increase.	Per Cent.
Locomotives	1,858	1,808	50	2.77
Total weight, excluding tender (tons)	142,493	134,790	7,703	5.71
Average weight, excluding tender (tons)	76.12	74.02	2.10	2.84
Total weight on drivers (tons)	117,491	111,097	6,394	5.76
Average weight on drivers (tons)	62.76	61.01	1.75	2.87
Passenger-train cars	2,190	1,942	248	12.77
Freight-train cars	48,192	44,979	3,213	7.14
Total capacity (tons)	1,917,650	1,728,039	189,611	10.97
Average capacity (tons)	40.41	39.05	1.36	3.48
Work equipment	6,636	6,318	318	5.03

TRANSPORTATION OPERATIONS.

The results of the year's transportation operations compared with those of the preceding year are as follows:

	This Year.	Last Year.	Increase or Decrease.	Per Cent.
Average miles of railway operated	9,895.07	9,752.26	142.81	1.46
Revenues.				
Freight	$73,677,292.78	$77,018,554.26	—$3,341,261.48	4.34
Passenger, including extra baggage	40,814,399.52	40,244,855.79	569,543.73	1.42
Mail and express	5,165,948.87	4,976,272.55	189,676.32	3.81
Switching, rentals, and all other sources	2,253,386.93	2,284,222.48	—30,835.55	1.35
Total rail lines	$121,911,028.10	$124,523,905.08	—$2,612,876.98	2.10
Outside operations—revenues	10,709,511.41	10,498,701.79	210,809.62	2.01
Total revenues	$132,620,539.51	$135,022,606.87	—$2,402,067.36	1.78
Operating Expenses.				
Maintenance of way and structures	$15,889,129.83	$16,098,705.22	—$209,575.39	1.30
Maintenance of equipment	15,312,205.79	15,808,390.67	496,184.88	3.14
Traffic expenses	2,947,063.58	2,481,186.30	465,877.28	18.78
Transportation expenses	36,524,585.10	35,658,045.72	866,539.38	2.43
General expenses	3,848,675.54	3,467,706.51	380,969.03	10.99
Total rail lines	$74,521,659.84	$73,514,034.42	$1,007,625.42	1.37
Outside operations—expenses	10,483,554.02	9,750,813.57	732,740.45	7.51
Total expenses	$85,005,213.86	$83,264,847.99	$1,740,365.87	2.09
Gross revenues over total expenses	$47,615,325.65	$51,757,758.88	—$4,142,433.23	8.00
Freight Traffic. (Commercial Freight Only—Way-bill Tonnage).				
Tons of freight carried	26,706,631	25,962,704	743,927	2.87
Tons of freight carried one mile	6,189,785,390	6,628,685,724	—438,900,334	6.62
Ton miles per mile of road (a)	632,245	678,797	—46,552	6.86
Revenue from freight per mile of road. (a)	$7,269.16	$7,772.58	—$503.42	6.48
Revenue from freight per *revenue train* mile (a) (b)	$4.56	$4.53	$0.03	.66
Average revenue per ton per mile (cents)	1.175	1.162	.013	1.12
Average distance carried (miles)	231.77	255.32	—23.55	9.22
Passenger Traffic.				
Revenue passengers carried	39,989,058	40,190,200	—201,142	.50
Revenue passengers carried one mile	1,808,133,603	1,805,834,993	2,298,610	.13
Revenue from passenger trains per mile of road (a)	$4,570.09	$4,553.98	$16 11	.35
Revenue from passenger trains per *revenue train* mile (a) (c)	$1.78	$1.89	—$0.11	5.82
Average revenue per passenger per mile (cents)	2.215	2.188	.027	1.23
Average distance carried (miles)	45.22	44.93	.29	.65

Note.—The material carried for the construction of additional main tracks and the construction of new lines on which a rate of freight is charged was dealt with as commercial freight in last year's results. This material has been excluded from commercial freight in this year's results, and is separately shown in Table No. 31.

(a) Based on traffic over rail lines only, length of ferries used between rail stations excluded in distance over which traffic was moved. (b) Based on revenue freight train and all mixed train miles. (c) Based on revenue passenger train, and *all* mixed train miles, including miles run by motor cars.

Compared with the preceding year, the per cent. of operating expenses to the gross revenues was as follows:

Rail Lines.	This Year.	Last Year.
For "Maintenance" (*Maintenance of Way and Structures, and Maintenance of Equipment*)	25.59	25.62
For "Operation" (*Traffic Expenses, Transportation Expenses, and General Expenses*)	35.54	33.41
Total rail lines	61.13	59.03
Total rail lines and outside operations	64.10	61.67

The operating revenues and operating expenses for the year for all lines, distributed in accordance with the accounting regulations of the Interstate Commerce Commission, are shown in Table No. 28, and for each company in Table No. 29. Details of passenger and freight traffic are shown in Tables Nos. 31 and 32.

The expenses of the rail lines for "Maintenance" decreased $705,760.27 or 2.21 per cent.; expenses for "Operation" increased $1,713,385.69 or 4.12 per cent., a net increase of $1,007,625.42 or 1.37 per cent.

The increase resulted from higher wage schedules, greater cost of locomotive fuel, and the increase in passenger train mileage.

There were in service 34 gasoline motor cars. The mileage of these cars, aggregating 686,088 miles, or 2.88 per cent. of the total revenue passenger train mileage, is included in the mileage statistics.

The increase in expenses for outside operations occurred principally in the operation of the steamship lines, and was the result in part of higher wage schedules, increased rental for new piers in New York, and of the increase in service to the public.

In the following statements the operating expenses, although distributed as provided for in the classification of the Interstate Commerce Commission, have been combined under comprehensive titles of accounts so as to present the year's expenses in a concise form.

Maintenance of Way and Structures.

	This Year.	Last Year.	Increase or Decrease.	Per Cent.
Average miles of railway operated and maintained—first and additional main tracks	10,113.64	9,989.40	124.24	1.24
Ballast	$224,782.13	$438,785.22	—$214,003.09	48.77
Ties	2,004,200.00	1,900,097.81	104,102.19	5.48
Rails	757,163.48	812,116.76	—54,953.28	6.77
Frogs, switches, and other track material	1,509,563.48	1,722,552.05	—212,988.57	12.36
Total material for roadway and track	$4,495,709.09	$4,873,551.84	—$377,842.75	7.75
Repairs of roadway and track	6,499,314.98	6,357,014.43	142,300.55	2.24
Bridges, trestles, and culverts	1,178,396.55	1,203,268.68	—24,872.13	2.07
Buildings, grounds, and appurtenances	2,210,535.30	2,178,647.77	31,887.53	1.46
Snow and sand fences and snow sheds	147,113.53	181,324.31	—34,210.78	18.87

	This Year.	Last Year.	Increase or Decrease.	Per Cent.
Electric power, telegraph, and telephone lines	113,589.79	138,810.69	—25,220.90	18.17
Superintendence	873,995.05	832,846.56	41,148.49	4.94
Stationery and printing	39,230.62	40,138.91	—908.29	2.26
Other expenses	69,124.83	92,817.18	—23,692.35	25.53
Property abandoned	262,120.09	200,284.85	61,835.24	30.87
Total	$15,889,129.83	$16,098,705.22	—$209,575.39	1.30
Cost per mile—all main tracks	$1,571.06	$1,611.58	—$40.52	2.51

The expenditures this year include $193,106.15 for account of the new steel bridges across the Willamette River at Portland, Ore., and the Sacramento River at Sacramento, Cal., required by the construction of second main track.

The following rails, ties, tie plates, and continuous rail joints were used in making renewals and the entire cost thereof charged to operating expenses, with the exception of $645,657.84 for increased weight of rail and improved frogs and switches charged to additions and betterments in accordance with the Classifications of Expenditures for Additions and Betterments promulgated by the Interstate Commerce Commission:

	This Year.	Last Year.	Decrease.
Miles of new steel rails (track miles)	483.11	757.74	274.63
Per cent. of renewal of all rail in track, including sidings	3.56	5.69	2.13
Number of burnettized ties	2,211,334	2,231,076	19,742
Number of other ties	1,378,821	1,383,337	4,516
Total number of ties	3,590,155	3,614,413	24,258
Equal to miles of continuous track	1,258.44	1,277.18	18.74
Per cent. of renewal of all ties in track, including sidings	9.27	9.59	.32
Number of tie plates	5,365,865	6,647,605	1,281,740
Equal to miles of continuous track	940.43	1,174.49	234.06
Number of continuous rail joints	372,598	566,798	194,200
Equal to miles of continuous track	582.19	805.11	222.92

The weight of rails per yard in main line and branches at the close of the year was as follows:

Miles of first and additional main tracks operated and maintained.	Total.	164-lb.	141-lb.	116-lb.	96-lb.	90-lb.	80-lb.	76-lb. and 75-lb.	70-lb.	65-lb.	61.5-lb. and 60-lb.	56-lb.	54.6-lb. and 54-lb.	52-lb. and less than 52-lb.
Main line	5,636.24		1.09	—	20.36	1,145.94	2,532.21	1,801.78	—	—	108.47	.98	—	25.41
Branches	4,507.96	.05	1.69	.24	.02	126.99	193.91	854.46	9.44	264.43	1,506.17	142.24	271.24	1,137.08
Total	10,144.20	.05	2.78	.24	20.38	1,272.93	2,726.12	2,656.24	9.44	264.43	1,614.64	143.22	271.24	1,162.49
Per cent. of total miles of track	100.00	—	.03	—	.20	12.55	26.87	26.19	.09	2.61	15.92	1.41	2.67	11.46
Per cent. last year	100.00	—	.02	—	.21	7.69	27.96	27.14	.11	2.44	17.35	1.31	2.97	12.80

At the timber-treating plants of the Companies, 3,278,208 cross ties and 21,307 switch ties were burnettized, and 632,805 cubic feet of piling and other timber were creosoted.

Maintenance of Equipment.

	This Year.	Last Year.	Increase or Decrease.	Per Cent.
Locomotives	$6,352,424.32	$6,452,213.63	—$99,789.31	1.55
Passenger train cars	1,840,836.49	1,913,598.23	—72,761.74	3.80
Freight train cars	5,307,918.95	5,665,182.95	—357,264.00	6.31
Work equipment	375,290.21	338,764.54	36,525.67	10.78
Floating equipment	307,408.23	331,417.59	—24,009.36	7.24
Shop machinery and tools	361,183.79	372,183.43	—10,999.64	2.96
Superintendence	640,961.50	631,900.65	9,060.85	1.43
Other expenses	126,182.30	103,129.65	23,052.65	22.35
Total	$15,312,205.79	$15,808,390.67	—$496,184.88	3.14

The decrease in these expenses resulted principally from a decrease of 22,971,094 miles or 4.16 per cent. in the miles run by freight and caboose cars, and from a less number of locomotives and cars vacated.

As in the past, the companies have charged to operating expenses the original cost (estimated if not known) or purchase price, less salvage, of all rolling stock condemned, destroyed, sold, or vacated from any cause during the year. The sums thus charged are reported under "Renewals" in Table No. 28, and amounted for the year to $973,092.45.

The average cost of repairs and renewals per locomotive (excluding motor cars) and per car per annum, and the average number of serviceable locomotives and cars owned during the year were:

	Average Cost Per Annum. (*Including original cost, less salvage, of equipment vacated.*) This Year.	Last Year.	Average Serviceable Number. This Year.	Last Year.
Locomotives, for repairs	$3,361.12	$3,342.82		
for renewals	155.17	208.09		
Total	$3,516.29	$3,550.91	1,803	1,821
Passenger train cars, for repairs	$1,005.73	$1,032.14		
for renewals	44.30	86.25		
Total	$1,050.03	$1,118.39	2,019	1,883
Freight train cars, for repairs	$101.80	$108.55		
for renewals	11.55	17.70		
Total	$113.35	$126.25	46,829	44,873

The equipment owned by the respective Companies is shown in Table No. 25, and the capacity, the service, and the average cost of maintenance, are shown in Tables Nos. 33, 34 and 35.

Traffic Expenses.

	This Year.	Last Year.	Increase or Decrease.	Per Cent.
Outside agencies	$1,027,790.73	$964,728.18	$63,062.55	6.54
Advertising	1,027,180.27	680,402.51	346,777.76	50.97
Superintendence	638,244.61	582,875.60	55,369.01	9.50
Stationery and printing	217,047.51	210,652.50	6,395.01	3.04
Other expenses	36,800.46	42,527.51	—5,727.05	13.47
	$2,947,063.58	$2,481,186.30	$465,877.28	18.78

Transportation Expenses.

	This Year.	Last Year.	Increase or Decrease.	Per Cent.
Locomotives, fuel for	$9,423,602.40	$9,061,522.80	$362,079.60	4.00
Locomotive service, other than fuel	7,520,221.55	7,306,933.04	213,288.51	2.92
Train service	6,127,538.50	5,865,668.33	261,870.17	4.46
Station and terminal service	8,838,858.98	8,627,740.71	211,118.27	2.45
Ferry and river service	660,885.07	675,816.87	—14,931.80	2.21
Injuries, loss, damage, and other casualties	1,946,513.04	2,256,754.68	—310,241.64	13.75
Superintendence	1,572,868.21	1,459,396.31	113,471.90	7.78
Stationery and printing	328,563.15	331,100.99	—2,537.84	.77
Other expenses	105,534.20	73,111.99	32,422.21	44.35
	$36,524,585.10	$35,658,045.72	$866,539.38	2.43

The increase in these expenses resulted from higher wage schedules, the higher prices paid for locomotive fuel, and the increase in passenger train mileage.

The average number of tons of freight per train, of loaded cars per train (excluding caboose), and of tons per loaded car for the year were:

Commercial and Company Freight. (Way-bill Tonnage.)	*Tons per Train. Tons.	+Increase. —Decrease. Tons.	Per Cent.	Loaded Cars per Train. Cars.	+Increase. —Decrease. Cars.	Per Cent.	Per Cent. of Loaded Car Mileage to Total Car Mileage.	Tons per Loaded Car. Tons.	+Increase. —Decrease. Tons.	Per Cent.
Lines east of El Paso	387.36	+4.57	1.19	19.38	+ .49	2.59	68.82 — 1.47	19.99	— .28	1.38
Lines west of El Paso	527.87	— .28	.05	25.54	+ .52	2.08	72.06 + .60	20.67	— .44	2.08
Average all lines	473.93	—2.10	.44	23.18	+ .36	1.58	70.99 — .12	20.45	- .41	1.97

*Ton miles per revenue freight train and all mixed train miles.

The work done by the transportation department of the rail lines compared with that of last year is as follows:

	Increase.	Decrease.	Per Cent.
Gross operating revenues	—	$2,612,876.98	2.10
Transportation expenses	$866,539.38		2.43
Revenue passengers carried one mile	2,298,610	—	.13
Mileage of cars in passenger service	10,275,919	—	6.86
Locomotive mileage with passenger and mixed trains, including helping	1,702,997	—	6.80
Tons of commercial freight carried one mile	—	438,900,334	6.62
Tons of commercial and company freight carried one mile	—	402,838,047	6.18
Mileage of cars in freight service	—	22,971,094	4.16
Locomotive mileage with freight and mixed trains, including helping	—	1,324,394	6.45
Total locomotive mileage in service for which the attendant expenses are charged to "Transportation Expenses"	122,315	—	23

The cost per locomotive mile (excluding motor cars) run in revenue service and in non-revenue service for which the expenses are charged to "Transportation Expenses" was:

	This Year.	Last Year.	+Increase. —Decrease.
Fuel for locomotives	17.93 cents.	17.19 cents.	+ .74 cents.
For all transportation expenses	68.57 cents.	67.64 cents.	+ .93 cents.

General Expenses.

	This Year.	Last Year.	Increase or Decrease.	Per Cent.
Salaries and expenses of general officers	$287,889.88	$300,944.92	—$13,055.04	4.34
Salaries and expenses of clerks and attendants	1,838,686.48	1,649,445.36	189,241.12	11.47
Law expenses	506,785.83	491,720.43	15,065.40	3.06
General office expenses	215,899.22	203,845.70	12,053.52	5.91
Stationery and printing	165,839.92	157,685.82	8,154.10	5.17
Insurance	340,941.02	310,574.31	30,366.71	9.78
Pensions	182,482.41	175,090.77	7,391.64	4.22
Other expenses	310,150.78	178,399.20	131,751.58	73.85
Total	$3,848,675.54	$3,467,706.51	$380,969.03	10.99

ELECTRIC LINES.

The many attractions of California to tourists, and as a place for village and suburban residence, as well as for outdoor life generally, with its temperate climate and the absence of snow, make it an attractive field for suburban electric railway transportation. In 1903 the Southern Pacific Company acquired 50 per cent. of the capital stock of the Pacific Electric Railway Company, which had previously projected and was then rapidly extending from Los Angeles into a large radius of Southern California, an extensive system of suburban electric railway lines designed to carry freight as well as passengers, and thereafter, until November 1, 1910, it was managed by a Board of Directors elected by joint agreement of the Southern Pacific Company and Mr. H. E. Huntington, who, with his associates, owned the other 50 per cent. of the stock. On the latter date this company took over the entire stock and the exclusive management of the Company. At the same time in the same transaction, it disposed of its stock, amounting to 45 per cent., in the Los Angeles Railway Company, which owned or operated the street railway lines in Los Angeles and certain city lines of the Pacific Electric Railway Company, which were not a part of and in no wise necessary to the suburban system. It was believed that the street railway lines in a city so large as Los Angeles could not be utilized as feeders and were not otherwise useful to the transportation system operated by the Southern Pacific Company. The Pacific Electric Railway Company owned the stock of the Los Angeles Inter-Urban Railway Co., the Riverside & Arlington Railway Co., the San Bernardino Valley Traction Co., the San Bernardino Inter-Urban Railway Co., and the Redlands Central Railway Co. The Southern Pacific Company had already acquired the entire capital stock of the Los Angeles Pacific Company, and, on November 1, 1910, in connection with the acquisition of the outstanding 50 per cent. of the stock of the Pacific Electric Railway Company, acquired the entire capital stock of the Los Angeles & Redondo Railway Co.

In order to unify the operations of these several systems and effect important economies, as well as to improve the service to the public, all these companies were, on September 1, 1910, consolidated pursuant to the Laws of the State of California under the name of *Pacific Electric Railway Company*. All of the stock of this company (except shares necessary to qualify directors) is owned by the Southern Pacific Company. The lines of the consolidated company are shown on the map on the opposite page. The mileage owned is as follows:

Single main track	209.41	miles.
Double main track	269.61	"
Four main tracks	11.43	"
Total road miles	490.45	"
Equal to single track miles	794.35	"
Spurs and sidings	87.30	"
Total	881.65	"

The Company owns also 14 electric locomotives, 507 passenger motor cars, 19 passenger, express, and mail motor cars, 53 other passenger train cars, 33 express freight motor cars, 6 express freight trailer cars, 1,115 other freight train cars, and 72 service cars.

Of the 794.35 miles of single track, 549.93 miles are on private right of way and 244.42 miles on public highway.

The outstanding bonded indebtedness of the new company is $49,693,000, the annual interest on which sum amounts to $2,394,920. Of the total outstanding bonds $20,939,000 is owned by the Southern Pacific Company.

The earnings and expenses of the consolidated lines for the four months ended October 31, 1911, compare with the similar period last year as follows:

	Four months this year.	Four months last year.	+Increase. —Decrease.
Gross operating revenue	$3,057,173.40	$2,987,714.62	+$69,458.78
Operating expenses and taxes	1,999,323.25	2,081,639.80	—82,316.55
Surplus over expenses and taxes	$1,057,850.15	$906,074.82	+$151,775.33

The suburban districts of Southern California served by these lines, as well as others into which it is designed in due time to extend them, are developing and the population is increasing rapidly; therefore it is believed that the lines will soon become not only profitable in and of themselves, but will be of very great value as feeders to the steam railroad lines operated by the Southern Pacific Company.

At various times in former years and for the same reason above suggested, the Southern Pacific Company acquired the control of the Stockton Electric Railroad Co., owning 6.25 miles of double main track in the City of Stockton; of the Peninsular Railway Co., owning 51.62 miles of single and 14.97 miles of double main track, serving the cities of Palo Alto and San Jose and the country adjacent thereto; of the Visalia Electric Railroad Co., owning 23.69 miles of single main track, serving the towns of Visalia, Exeter, and Lemon Cove and the country adjacent thereto; of the Fresno Traction Company, owning 2.96 miles of single and 11.27 miles of double main track, serving the city of Fresno and the country adjacent thereto, and of the San Jose Railroads, owning 15.81 miles of single and 11.73 miles of double main track, serving the cites of San Jose and Santa Clara and the country adjacent thereto.

Notwithstanding the very low rates which have prevailed for many years for suburban passenger traffic conducted by the Company by its ferries from San Francisco to the Oakland Mole and Alameda Mole, and thence by trains into Oakland, Alameda and Berkeley, and into other San Francisco Bay districts, it was deemed necessary to improve the service by the electrification of the suburban lines connecting with the ferries, and reaching into the cities and districts mentioned; therefore in the year 1908, a complete plan for such electrification involving an estimated expenditure of $10,702,300 was adopted and work commenced which is now nearing completion; the expenditures on June 30, 1911, amounted to $6,578,294.90.

GENERAL.

Under the concessions granted for the construction of the railway of the Southern Pacific Railroad Company of Mexico, referred to in former reports, there were completed during the year 12.56 miles, making a total of 912.25 miles of railway completed to June 30, 1911. The miles of railway projected under the concessions, the miles completed, under construction, and remaining to be constructed are as follows:

	Projected — Miles.	Constructed to June 30, 1911. — Miles.	Remaining to be Built. Under Construction. — Miles.	Remaining to be Built. To be Built. — Miles.
Main Line Empalme to Guadalajara	839.13	682.43	32.30	124.40
Branch Lines	652.51	229.82	—	422.69
Total	1,491.64	912.25	32.30	547.09

Under the concession as revised November 3, 1910, the time for the completion of the main line from Empalme to Guadalajara was extended to November 6, 1915, and for the branch lines to November 11, 1920.

The advances by the Southern Pacific Company for account of the construction of these lines amounted, on June 30, 1911, to $38,138,720.60. Interest accruing on these advances during the year has not been taken into either the income or the assets of the Company.

The revolutionary movement in the Republic of Mexico did not manifest itself in active hostilities until October, 1910. It was then confined to the States of Chihuahua and Coahuila, and did not extend to the Company's lines in the State of Sinaloa until April, 1911. The bridges and trestles then destroyed were replaced, but, during the month of May, the interruption from this cause became so frequent that the traffic over the line was practically suspended. The armistice which followed the battle of Juarez on the 8th, 9th and 10th of May, 1911, resulted in the cessation of hostilities and the restoration of peace. The bridges and structures destroyed were replaced and traffic was resumed on the 13th day of June following.

On May 31, 1911, the Mexican Congress passed an act appropriating 15,000,000 pesos to pay all direct loss and damage caused by the Revolutionary Army upon private property. Under the provisions of this Act, the Sonora Railway and the Southern Pacific Railroad of Mexico have filed claims, which are now pending before the Commission. The claims amount to 288,118.74 pesos.

In addition to the completed lines of railway reported under "Properties and Mileage" and the railway of the Southern Pacific Railroad Company of Mexico, hereinbefore referred to, construction is progressing on the following lines:

	Length of Projected Line — Miles.	Track Completed. — Miles.	Grading Completed. — Miles.	Grading Progressing. — Miles.
Arizona Eastern Railroad:				
Phoenix to Hassayampa, Arizona	39.22	39.22		
Winkelman to San Carlos, Arizona	32.79	7.29		
Hayden Jct. to Winkelman, Arizona	4.28	1.56	1.13	
Oregon Eastern Railway:				
Klamath Falls, Oregon, North	86.40	28.07	.40	8.03
Natron, Oregon, South	105.40	24.42	7.79	2.03
Oregon Western Railway:				
Drain to Marshfield, Oregon	73.22	—	.51	
Pacific Railway & Navigation Company:				
Hillsboro to Tillamook, Oregon	91.00	77.70	12.88	.16
Sacramento Southern Railroad:				
Sacramento to Walnut Grove, California	23.90	10.25	13.47	.18

Under the pension system put into effect on January 1, 1903, there are carried on the pension rolls of the rail and water lines 503 employes. The payments to them for the year amounted to $191,325.57.

The accompanying report of the Vice-President and Controller shows fully and in detail the financial and other transactions of the Companies.

By order of the Board of Directors,

ROBERT S. LOVETT,
Chairman of the Executive Committee.

SOUTHERN PACIFIC COMPANY AND PROPRIETARY COMPANIES.

NO. 2.—COMBINED INCOME ACCOUNT FOR THE YEAR ENDED JUNE 30, 1911.

(Revenues and Expenses of "Proprietary" and "Non-Proprietary" Lines and Miscellaneous Income of the Southern Pacific Company and Proprietary Companies, combining details shown in Tables Nos. 9 and 15.)

Operating expenses (and taxes) of proprietary lines, interest on funded debt and all other expenses of Proprietary Companies as shown in detail in Table No. 15		$104,620,742.33
Operating expenses, taxes, and all other expenses incurred in connection with the operation of the following non-proprietary lines:		
New Mexico & Arizona R. R.	$279,975.36	
Sonora Railway	885,047.66	
		1,165,023.02
Disbursements of Southern Pacific Company (Table No. 9):		
Expenses of operating steamship lines		6,754,750.81
Interest on funded debt as shown in detail in Table No. 6		5,149,988.24
Interest due to Proprietary Companies on advances and open accounts	$1,408,412.98	
Less interest due from Proprietary Companies including interest charged to Oregon & California R. R. Co.	1,250,017.04	
		158,395.94
Rental to Central Pacific Railway Co.		10,000.00
Rental to Nevada & California Railway Co.		5,000.00
Rental to Oregon & California Railroad Co.		5,000.00
Rental to Southern Pacific Railroad Co.		10,000.00
Taxes		181,679,61
General and miscellaneous expenses		110,023.81
Annual payment for redemption of San Francisco Terminal bonds		5,000.00
Reserve for depreciation of rolling stock owned and leased to other companies		866,547.65
Cost of surveys written off		17,742.38
Cost of examinations for water power written off		10,472.17
Balance to profit and loss (Table No. 3)		26,088,992.68
Total		$145,159,358.64

Revenues of proprietary lines and miscellaneous income of Proprietary Companies as shown in detail in Table No. 15		$127,682,104.79
Revenues of the following non-proprietary lines:		
New Mexico & Arizona R. R.	$254,710.81	
Sonora Railway	707,148.44	
		961,859.25
Revenues of Southern Pacific Company. (Table No. 9):		
Gross revenue from operation of steamship lines		7,071,528.78
Interest on bonds owned of Proprietary Companies		787,682.22
Interest on bonds owned of companies other than Proprietary Companies		2,934,775.94
Dividends on stocks owned as shown in detail in Table No. 5		778,336.08
Rentals from lease of road		1,994,091.13
Hire of equipment		1,927,488.28
Rentals from lease of joint tracks, yards, and terminal facilities		193,436.60
Miscellaneous rentals		112,341,00
Net proceeds from sale and lease of lands		11,582.70
Balance of interest on loans and on open accounts other than with Proprietary Companies		690,351.59
Miscellaneous income		13,780.28
Total		$145,159,358.64

SOUTHERN PACIFIC COMPANY AND PROPRIETARY COMPANIES.

NO. 3.—COMBINED PROFIT AND LOSS—JUNE 30, 1911.

(Combining details as shown in Tables Nos. 10 and 16.)

Dividends on stocks of Proprietary Companies, viz.:		
Central Pacific Ry. Co. preferred	$684,000.00	
Central Pacific Ry. Co. common	6,727,550.00	
Houston & Shreveport R. R. Co.	120,000.00	
Houston & Texas Central R. R. Co.	2,000,000.00	
Louisiana Western R. R. Co.	504,000.00	
Morgan's Louisiana & Texas R. R. & S. S. Co.	900,000.00	
Nevada & California Ry. Co.	193,480.00	
Southern Pacific R. R. Co.	9,600,000.00	
Southern Pacific Terminal Co.	120,000.00	
	$20,849,030.00	
Less paid to Southern Pacific Co.	20,847,946.00	
		$1,084.00
Dividends on common stock of Southern Pacific Co., viz.:		
One and one-half per cent. paid January 3, 1911	$4,090,084.58	
One and one-half per cent. paid April 1, 1911	4,090,085.56	
One and one-half per cent. payable July 1, 1911	4,090,086.08	
One and one-half per cent. payable October 2, 1911	4,090,086.08	
		16,360,342.22
		$16,361,426.22
Discount and commissions on securities sold		5,105,569.35
Premium on bonds purchased and cancelled		12,242.50
Cost on books, less salvage, of property abandoned		195,923.99
Uncollectible accounts written off		23,985.00
Balance June 30, 1911, viz.:		
Southern Pacific Company	$64,137,198.01	
Proprietary Companies	80,621,755.37	
		144,758,953.38
		$166,458,100.44

Balance June 30, 1910, viz.:		
Southern Pacific Company	$54,756,476.75	
Proprietary Companies	80,448,836.27	
		$135,205,313.02
Balance from income account (Table No. 2)		26,088,992.68
Proceeds from sale of unpledged lands		171,172.81
Proceeds from sale of lands pledged for the redemption of bonds		1,034,158.03
Collection of old accounts		711,299.29
Annual payments to sinking funds and income from sinking fund investments		374,712.54
Adjustments in unsettled claims and accounts		818,261.04
Profit on bonds sold		314,968.27
Difference between cost on books and amount received for property sold		36,878.75
Difference between cost and face value of $2,314,500 Central Pacific Ry. Three and One-Half Per Cent., $26,000 Central Pacific Ry. First Refunding Four Per Cent., $800,000 Galveston, Houston & Northern Ry. First Mortgage Five Per Cent., $2,224,000 Gulf, Western Texas & Pacific Ry. First Mortgage Five Per Cent., $842,000 New York, Texas & Mexican Ry., Matagorda Division, Six Per Cent., and $13,000 Southern Pacific R. R. First Refunding Mortgage Four Per Cent. bonds purchased and retired		1,162,504.96
Difference between amounts in suspense credited in former years to contingent liabilities and amounts paid in settlement		495,873.12
Old accounts written off		43,965.93
		$166,458,100.44

NO. 11.—SOUTHERN PACIFIC COMPANY—ASSETS—JUNE 30, 1911.

Assets.	June 30, 1911.	*June 30, 1910.
Capital Assets.		
Stocks and bonds owned Table Nos. 12, 13 and 14	$342,139,975.55	$329,493,190.30
Bay Shore Line terminals, and other real estate	36,647,704.94	30,830,254.21
Timber treating plants, saw mills, and other property	389,723.95	404,698.70
Steamships and other floating equipment—Table No. 24	13,767,289.43	12,625,710.07
Rolling stock—Table No. 25	18,847,153.50	15,820,165.81
Advances for Oakland-Berkeley electric lines	6,578,294.90	2,579,554.49
Advances for construction and acquisition of new lines	42,550,193.07	32,477,147.99
Advances to Southern Pacific Railroad Co. of Mexico	38,138,720.60	35,965,601.75
Advances to electric lines in California	14,244,045.22	12,103,947.75
Advances to Kern Trading & Oil Co	5,129,821.49	4,086,700.63
Advances to Pacific Fruit Express Co	2,208,492.79	1,165,212.25
Lands and other investments	2,531,599.07	1,908,905.19
Total	$523,173,014.51	$479,461,089.14
Sinking funds	295.83	1,044.00
	$523,173,310.34	$479,462,133.14
Current Assets.		
Cash	$11,139,809.25	$10,718,579.79
Time loans and deposits	24,963,456.67	17,047,375.62
Loans and notes receivable	1,023,927.54	3,316,788.85
Agents and conductors	1,098,284.52	2,006,158.68
Income accrued to June 30 on securities owned	1,247,131.30	1,113,904.35
Individuals and companies	2,744,429.42	3,237,510.52
U. S. Government transportation	780,796.19	907,525.38
Material and supplies	13,895,338.50	11,241,592.98
	$56,893,173.39	$49,589,436.17
Deferred Assets.		
Individuals and companies	$461,074.69	$182,422.13
Proprietary Companies.		
Direct Navigation Co	$38,789.18	$46,474.76
Galveston, Harrisburg & San Antonio Ry. Co.	10,575,823.87	10,391,263.47
Louisiana Western R. R. Co	83,462.87	42,334.49
Morgan's Louisiana & Texas R. R. & S. S. Co.	1,598,248.49	664,768.68
Nevada & California Ry. Co	199,723.84	42,823.93
Oregon & California R. R. Co	3,771,116.87	4,946,702.45
Southern Pacific Terminal Co	—	21,533.35
Texas & New Orleans R. R. Co	48,496.54	—
	$16,315,661.66	$16,155,901.13
Due from other Proprietary Companies	$537,779.77	$1,304,416.41
Contingent Assets.		
San Antonio & Aransas Pass Ry. Co.†	$1,754,700.09	$1,390,753.59
Individuals and companies	380,321.57	31,784.07
Unadjusted accounts—Proprietary Companies	109,885.69	138,184.78
Expended for account of Colorado River Crevasse	4,040,648.61	4,022,480.29
	$6,285,555.96	$5,583,202.73
Total assets	$603,666,555.81	$552,277,511.71

NO. 11.—SOUTHERN PACIFIC COMPANY—LIABILITIES—JUNE 30, 1911.

Liabilities.	June 30, 1911.	June 30, 1910.
Capital Liabilities.		
Common stock	$272,672,405.64	$272,672,305.64
Preferred stock called for redemption but not presented	3,325.00	18,325.00
Total capital stocks	$272,675,730.64	$272,690,630.64
First mortgage six per cent. steamship bonds, due January 1, 1911		$1,644,000.00
Four per cent. gold bonds (Central Pacific Stock Collateral), due August 1, 1949: Authenticated by Trustee. $34,018,500.00 Less in treasury 5,249,000.00	$28,769,500.00	28,769,500.00
Four per cent. twenty-year convertible bonds, due June 1, 1929	81,148,000.00	81,137,000.00
Four per cent. convertible bonds—subscription receipts and scrip	3,910.00	15,040.00
Four and one-half per cent. twenty-year gold bonds, due July 1, 1929	227,000.00	227,000.00
San Francisco Terminal first mortgage four per cent. bonds, due April 1, 1950	18,995,000.00	15,000,000.00
Total funded debt	$129,143,410.00	$126,792,540.00
	$401,819,140.64	$399,483,170.64
Current Liabilities.		
Coupons matured but not presented	$92,609.50	$118,635.00
Coupons due July 1	3,104,232.50	3,199,600.00
Interest accrued on bonds and loans to June 30, but not due	3,971,133.33	3,379,871.25
Dividends due—unpaid	139,956.96	120,242.57
Dividends due, July 1 and October 2	8,180,172.16	8,180,168.73
Mortgage bonds satisfied	—	21,000.00
Traffic and car service	653,076.76	322,562.42
Due to Union Pacific Railroad Company	20,007,305.41	10,901,568.97
Vouchers and payrolls	7,656,407.53	9,762,361.83
	$43,804,894.15	$36,006,010.77
Deferred Liabilities.		
Pacific Mail Steamship Co	$79,567.35	$198,220.04
Taxes assessed but not due	439,935.60	346,042.69
Wells Fargo & Co.'s Express contract	112,000.00	144,000.00
Sinking fund uninvested	295.83	—
	$631,798.78	$688,262.73
Proprietary Companies.		
Central Pacific Ry. Co	$34,639,092.32	$4,364,732.82
Houston, East and West Texas Ry. Co	264,723.50	157,742.85
Houston & Shreveport R. R. Co	22,850.52	39,262.72
Houston & Texas Central R. R. Co	1,586,952.80	732,192.87
Southern Pacific R. R. Co	39,623,464.90	40,146,628.73
Southern Pacific Terminal Co	4,133.10	—
Texas & New Orleans R. R. Co	—	377,216.14
	$76,141,217.14	$45,817,776.13
Due to other Proprietary Companies	$2,313,064.67	$1,349,172.58
Contingent Liabilities.		
Marine insurance fund	$3,175,954.02	$3,180,381.32
Steamship insurance fund	1,607,697.54	1,607,697.54
Floating equipment replacement fund	5,571,623.83	5,447,809.15
Reserve for replacement and depreciation of rolling stock	1,253,188.65	1,481,082.40
Insurance fund	353,599.16	225,919.00
Unadjusted accounts	2,743,926.39	2,075,991.87
Principal of deferred payments on land contracts	113,252.83	157,760.83
	$14,819,242.42	$14,176,642.11
Total liabilities	$539,529,357.80	$497,521,034.96
Balance to credit of profit and loss	64,137,198.01	54,756,476.75
Total liabilities	$603,666,555.81	$552,277,511.71

*The assets for last year have been restated to accord with the classification observed this year. †Includes $3,898,000 face value, San Antonio & Aransas Pass Ry. Co. Income Four Per Cent. Bonds, on which interest is payable on January 1, of each year if earned, out of net earnings and income.

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In connection with the action of the St. Paul directors in reducing the dividend on the common stock from a 7 per cent. to a 5 per cent. basis, it may be recalled that during the hearings before the Interstate Commerce Commission early last year in the rate advance case, counsel for the shippers sought to make much of the fact that the road had issued to its stockholders at par the new stock from the proceeds of which it built the Puget Sound extension. Their argument was that the road was distributing undue profits by selling this stock at par when the market price of its old stock at the time was much higher. The Illinois Manufacturers' Association went so far as to publish a special brief on the financing of the Puget Sound Line, in which some 25 pages were devoted to showing that the road by this action "was deprived of $122,500,000 as certainly as if it was in the treasury and lost from it." The reply of the railway to this argument was that had the learned counsel for the Manufacturers' association taken the trouble to examine the authorities with the same painstaking care displayed in reviewing the daily quotations on St. Paul stock, they would have found that since the case of Gray v. Portland Bank, decided in 1897, the courts have almost uniformly held, under the common law and when there are no statutes to the contrary that when a corporation increases its capital stock within the limits of its power, each of the existing shareholders has the right to subscribe for and pay for at par a proportionate amount of the increased stock. The Interstate Commerce Commission decided that the railways did not need an advance in rates, and the St. Paul was thereby prevented from getting $750,000 in increased annual revenue which it had hoped for. There has ensued one of the "lean" years, and the St. Paul's operating income has decreased by $1,300,000 in the first five months of the fiscal year. The stockholders are now in possession of a 5 per cent. stock quoted slightly above par—at this writing around 108. It may have looked like a melon a year ago; but it now appears that the stockholders simply took their chances like other investors and got no more than they paid for.

In another column is published a letter from W. W. Cook, general counsel of the Mackay companies, in reply to the editorial comment in the *Railway Age Gazette* of January 19 on his proposal for bringing all the railways of the United States under the control of a $25,000,000,000 holding company capitalized with guaranteed 3 per cent. stock, and managed by twenty-five directors named by Congress. The editorial expressed grave doubts as to the practicability of securing and continuing in office the most competent men for these enormously responsible directorships. Mr. Cook says in his letter that the selection of the personnel of the directorate, together with the provision of some means for holding them to account or removing them, is but an important detail, and that the objections noted could be overcome in various ways. This detail, in our opinion, is not only important, but vitally important; for on how the directors were chosen would depend what kind of men they would be; and on what kind of men they were would depend the success or failure of Mr. Cook's entire plan. To select the directors by vote of the stockholders would mean simply the substitution of a complete railway monopoly for the present system; while if they were selected by any political body both their selection and their policies would almost necessarily be subject to, if not absolutely determined by, political influences. The doubt expressed in our previous comment might have been extended to the ability of any body of twenty-five men, chosen by any scheme whatever, to manage the 240,000 miles of railway in this country with any greater, or even as great, satisfaction, as is obtained under present methods. Innumerable abuses have been caused by unrestricted competition between separately owned railways. That many and greater evils would result from complete contralization of control seems almost certain. The twenty-five directors Mr. Cook would place in control of the management of our entire vast railway system would be blamed by the public for the real or fancied shortcomings of any and every part of it. The mere fact of such a radical change would raise expectations of a revolutionary improvement in the present methods and results, which would be disappointed; and the board of the holding concern would be subjected to a pressure of conflicting class and sectional demands absolutely dwarfing anything ever experienced by the individual railways. Under separate management the roads are continually charged with favoring particular interests or communities at the expense of others. How much increased and intensified would be these allegations when directed against a single controlling authority, assumed to represent all interests and to have the

power to give each class and section all to which it not only might be entitled, but also all to which it might imagine itself entitled!

AGAIN, the 3 per cent. stock, suggested by Mr. Cook, would naturally attract principally the class of investors who now put their money in savings banks or government bonds, and rest in peace. Without either stress of competition, or the possibility of increased profit, where would be the incentive of the managements of the railways to efficiency? Mr. Cook is a great lawyer, and a recognized authority on corporation law; and his ideas and arguments command respectful consideration. It must be conceded that, as he says, there is a growing tendency toward socialization, not only of the railways, but of other industries. Considered as an ideal, his plan for centralized management presents many features of superior merit as compared with outright government ownership, with the political and other complications which it would involve. As a practical matter, we believe that no plan which will further remove the directors of the railways from direct responsibility to their owners and the public will commend itself, either to those who have a particular interest in the welfare of the railways themselves, or to the so-called "friends of the people." No thoughtful, public-spirited man will try to blind himself to the manifest evils that have prevailed in the past, and which still exist to a reduced extent, under private management. But such men are very far from being convinced that the system of private management has failed. This country is now passing through a transition state in the course of which there is good reason to hope that the major evils of corporate management will be eliminated, while it will also come to be understood that many of the criticisms and complaints against corporations are due to the inherent, ineradicable tendencies of human nature and the natural, inevitable differences of opinion between buyers and sellers, whether the commodity be labor, materials, transportation or securities. The causes of these criticisms and complaints would not be removed by substituting either a gigantic holding company, or the government itself, for the present buyers or sellers, or both. No facts have been adduced or arguments advanced that shake our conviction that the best solution of the railway problem is to be found in private ownership and management under wise, firm, public regulation.

THE cheerless showing of the increase of railway taxation is continued in the returns of the Bureau of Railway Economics for November, 1911. These returns for 90 per cent. of all the steam railways in the country, give for that month an increase of 12.7 per cent. over November, 1910. But, on the other hand, we have some welcome signs that state officials are paying more attention along scientific lines to some of the taxation inequities bearing on steam roads. There was lately held at Boston a conference of state tax officials, some thirty in number and representing the six New England states. Along with other resolutions, the conference adopted one declaring that for purposes of taxation and apportionment of interstate railway values, the "all-track" mileage basis should be taken instead of the miles of line of road. Expressed differently this simply means that if a railway company has double track doing a large business in one state, and in an adjacent state a single track of the same length doing a much smaller business, the values in the two states for purposes of taxation shall not be appraised as equal, but be taken in a ratio of two to one. New England is a section of the country where the railways are old and railway taxation just as old. It is a region where railway taxation ought long ago to have become scientific and standardized. Yet it has taken her tax officials three-quarters of a century to reach so axiomatic a dictum, and now only in the form of a resolution. The actual situation is shown for an example, by the Connecticut law, which for interstate lines imposes taxes by the old "length of line" rule, though excluding from it intrastate branch roads if of less value per mile than one-fourth the average value per mile of trunk road. For such branch lines inside that state there is a separate valuation. The theory of the conference, however, that trackage is a fairer test of railway traffic and business than length of line, while sound, still leaves room for great disparities. A single track, say 50 miles long, may be doing much more than half the business of double tracks of the same length or, indeed, much less than half.

AN illuminating example of the kind of statistics regarding railway conditions by which the people of the United States are frequently misled, has recently been exposed by H. G Askew, statistician for the Texas roads. The auditor of the Texas railway commission gave a statement to the newspapers of the population per mile of the leading Texas lines, based on the population of the counties through which they run. This was published with figures giving the population per mile of the larger railway systems of the country. The result was to make the population density of the Texas lines appear very large, by contrast. An average of 600 persons per mile for the Northern Pacific, the Southern Pacific and the Union Pacific, for example, was compared with figures ranging from 491 for the Galveston, Harrisburg & San Antonio to 4,831 for the St. Louis & San Francisco Railway of Texas. Mr. Askew's analysis of these "statistics" showed that the figures for Texas were arrived at by dividing the population of each county by the mileage, not of all the roads in that county, but of each road in it. The population per mile of the Paris & Great Northern, lying entirely within Lamar county, for instance, calculated as 2,748, was obtained by dividing the entire population of Lamar county by 16.94, the entire mileage of the road; and other roads having a larger or smaller mileage in that county were similarly credited with a smaller or larger number of persons per mile, the entire population of each county being used as many times as there were railways in it. Mr. Askew makes the obviously correct suggestion that the accurate method to have used would have been to divide the entire population of a given territory by the entire mileage of railways in it, and shows that, considering the entire population and the entire mileage, there are only about 250 people in Texas for each mile of railway. The statement of the commission conceded that population density is "not always" a correct index of the earning capacity of a road; but as it is often used as such an index, and as the statistics in question evidently were put out to show that Texas is a good field for railways, the tendency, if not the intent, was to mislead.

IF it is not too late to suggest New Year's resolutions, we would call the attention of railway presidents to two excellent subjects which they can safely recommend to their officers and employees, and which afford appropriate material for a large proportion of the employees of any road; and both of these subjects are brought up at this time by the Interstate Commerce Commission. We refer to the fair and honest treatment of other companies' freight cars and the fair and honest treatment of consignees who have been overcharged in their freight bills. Both subjects were dealt with in decisions by the Commission noticed in our issue of December 15, pages 1252 and 1253. They are suitable subjects for good resolutions, because in each of them so much depends on the good will, interest and energy of the individual immediately concerned, rather than on a command from headquarters. The right handling of cars depends on a right spirit in the minds of not only the superintendents and despatchers, but also the conductors and yard masters; and even the brakemen, firemen and "car-knockers." Prompt settlement of overcharges depends not alone on the claim agent and the treasurer, but also on the good will, alertness and intelligent judgment of the station agents and the clerks in stations and at headquarters. However vigilant the officer may be in enforcing obedience to regulations, his success will be only moderate without the real and hearty cooperation of these men in the lower grades. It is too bad that

the Interstate Commerce Commission had to lay down the rule of conduct in these two matters, for the great need of reform in all parts of the country was well known, and the railway men ought to have cured the evil voluntarily. The commission has put in black and white some plain language. Using another road's cars contrary to the owner's known wishes is stealing. To try to justify such practices is to invoke the "law of the jungle," where might makes right. To overcharge on freight is a violation of law. It always was a violation of the law of good business, and to delay reparation not only offends the law, but injures the railway itself. It is true that the carrying out of these sound precepts cannot be made easy. To do justice to one neighbor while still suffering injustice from another will never be wholly pleasant. The path of righteousness, however, is not lined with roses in any part of the United States. The decision of the commission may be a call to arms between you and some of your neighbors. Conventions of railway officers may discuss till doomsday the improvement of the car service rules, but the real problem is to carry out the rules that we already have. The attainment of exact justice in car-interchange will never be possible. The experience of 40 years has taught us that. It behooves the railways to cure these abuses to the extent of their power, for if the task is left to be attended to by the commission or the courts, it will be done according to the inflexible methods, often difficult of application to particular cases, which necessarily characterize the work of a governmental agency.

THE problem of reducing the number of accidents to persons in the operation of railways recently has claimed the attention of railway managements, governmental regulating authorities and the public to an unusual degree. The urgent need for improvement in this respect seems to have become recognized during the past year or two as never before. Many laws have been passed, many safety appliances have been adopted and installed, and many rules representing the best thought and experience of the railway officers as a body have been put into effect in the effort to increase the safety of railway travel and employment. The laws have been inspired by the idea that railway management has been to blame for accidents; the rules by the effort of railway managements to prevent them from being caused by the carelessness or recklessness of employees. Employees comprise the largest class of victims of accidents, except trespassers. Laws, safety appliances and strict operating regulations have failed to bring about the hoped-for improvement. Railway managers have, therefore, begun to give more attention to means of stimulating keener interest and greater activity on the part of employees in the promotion of safety. One of the results has been the development of the safety committee plan, which has now been put into effect by many of the leading railways of the country, and which has already produced an encouraging showing. First worked out by the Illinois Steel Company, this scheme, which from time to time has been briefly described in the *Railway Age Gazette,* was first applied to railway conditions on the Chicago & North Western in 1910. It has since been adopted by the St. Louis & San Francisco, the Baltimore & Ohio, the Delaware, Lackawanna & Western, the Elgin, Joliet & Eastern, the Chicago Great Western and the Chicago, Burlington & Quincy, while several other roads now have it under consideration, or have adopted other plans to the same end. Although some modifications of the scheme have been made in applying it to different railways, in all cases the fundamental principle is to promote co-operation between the employer and the employees in removing the causes of accidents. Wherever safety committees have been appointed employees have been reported as showing a lively interest in their efforts, and many instances have been discovered where both the management and its men were at fault, the former for not providing suitable equipment or conditions, and the latter for failure to use proper care and for laxity in obeying the orders of superiors and the rules of the companies. That the safety committees have brought about an improvement is indicated by recent reports, showing important reductions in accidents on two of the roads that have had the plan in effect for the longest period of time, although, of course, the improvement may not be due entirely to the work of the committees. On the North Western in eleven months the number of trainmen killed was reduced 47 per cent., and of trainmen injured, 40.8 per cent.; while there was a reduction of 70 per cent. in the number of passengers killed, and of 10 per cent. in passengers injured. On the Frisco, as reported in our news columns this week, there was a decrease of 15 in the number of persons killed and 236 in the number injured in the last six months of 1911, a decrease of 8 per cent. in the total number of casualties as compared with the previous year.

THE SUPREME COURT STILL REVIEWS EVIDENCE.

IF one were to take certain extracts from a recent case decided by the Supreme Court by themselves, ignoring their connection with the rest of the opinion, it would appear as if the court had ruled definitely that the findings of the Interstate Commerce Commission as to facts were not reviewable by the courts, but the full opinion does not corroborate this.

The case is one in which the Supreme Court refuses to grant an injunction against the Interstate Commerce Commission's reduction of rates on fir lumber from the Pacific coast to St. Paul, Minn., which had been advanced by the railways. The opinion of the court, which is by Justice Lamar, says: "In this case the commission had before it many witnesses and volumes of reports, statistics and estimates. . . . There was evidence as to the value of the road, the amounts expended in betterments and paid out in dividends. . . . With that sort of evidence before them, rate experts of acknowledged ability and fairness, and each acting independently of the other, may not have reached identically the same conclusion. . . . Still there was in this mass of facts that out of which experts could have named a rate. The law makes the commission's finding on such facts conclusive."

Such a ruling taken by itself would appear to contradict flatly the decision of the Supreme Court in what was known as the Portland Gateway Case. In that case the commission, after having had full evidence submitted to it, decided on the facts presented that the Northern Pacific did not itself furnish a satisfactory through route to Portland, and that the Union Pacific should be allowed and compelled to furnish a through route to Portland. The Supreme Court overruled this decision, finding on the same facts that the route furnished by the Northern Pacific was satisfactory. The opinion in the present lumber case as a whole, however, does not give evidence that the Supreme Court has changed in any way its attitude toward the powers and authority of the Interstate Commerce Commission. What the court actually does is to say that in this particular case the findings of the commission are not unreasonable and are not proved to be unreasonable. Since, then, the statutes creating the commission give the findings of the commission prima facie validity, the Supreme Court will refuse to overrule the commisison without more evidence than was presented in this case.

The position of the Supreme Court in a way parallels the position of a judge sitting in a case that is being tried before a jury. Ordinarily, the judge rules on questions of law and leaves the jury to pass on questions of fact; but should the evidence strongly tend one way or the other, the judge may instruct the jury to find for or against the defendant; or, should the jury bring in a verdict plainly against the weight of the evidence, the judge reserves the power to set aside such a verdict. This is just about the attitude of the Supreme Court in the lumber case. The court inquires whether or not the evidence submitted to the commission was ample and whether or not the ruling of the commission was plainly against the weight of this evidence; but, failing to find the commission's order plainly against the weight of the evidence, it will not interfere with the order. Justice Lamar concludes his opinion by saying: "Considering the

case as a whole, we cannot say that the order was made because of the effect of the advance on the lumber industry, nor because of a mistake of law as to presumptions arising from the long continuance of the low rate when the carrier was earning dividends, nor that there was no evidence to support the finding. If so, the commission acted within its power, and, in view of the statute, its lawful orders cannot be enjoined." In other words, the decision of the Supreme Court is a negative one; it gives no more finality to the orders of the commission than they were always presumed to have.

ECONOMICAL OIL-BURNING ON LOCOMOTIVES.

THE use of fuel oil for locomotives was confined until recently to the lines in or near the oil-producing fields, but on the Pacific coast it has extended to other and remote regions where coal is expensive. In 1910 over fifty million barrels of California oil were used for fuel purposes, oil practically displacing coal as railway, steamship and manufacturing fuel on the Pacific coast. In the same year the consumption of fuel oil by locomotives in the United States was nearly 24 million barrels. This is equivalent in heat value to six million tons of coal, or about 4 per cent. of the total coal consumed by locomotives in this country. The rate of combustion on large simple locomotives is 6 gal. of oil per minute, and on Mallet compounds 10 gal. per minute. The latter rate is equal to 14.3 barrels per hour, which, at 60 cents per barrel, represents an expenditure of $8.58 per engine hour for fuel. When oil is transported a considerable distance the cost is $1 per barrel, and the expense for fuel per hour proportionately larger.

While oil is regarded as a cheap fuel, this is largely due to the fact that it is used in regions where coal is unusually expensive, and much of the economy attending its use on locomotives is due to matters apart from the evaporation of water. There is less weight for a given heat value, one pound of oil being equal to 1½ lbs. of coal, and the cost of handling oil from cars to engines is decreased; there is no loss by depreciation in this handling or in storage, as there is with coal.

Oil fuel permits of increased mileage per engine, as there is no loss of time in cleaning fires, and the oil capacity of the tender may be 1½ times that for coal; as the work of the fireman is lighter, longer runs are easily possible. All these advantages attending the employment of oil fuel have so favored its use on locomotives that comparatively little attention has been given to its economical use in evaporating water. While tests usually show more than 1½ times the evaporation per pound of oil compared with the same amount of coal, it is certain that this advantage is not fully realized in regular locomotive performance. This is due to several reasons, principally to lack of care on the part of the engineer and fireman, and to the inefficiency of the oil burner. In firing coal the physical limitations of the fireman so control steam production that the cut-off and throttle are regulated to this rate. With oil fuel it is easily possible to make up time by forcing the boiler so that a longer cut-off can be used and the steam consumption is not then economical. This method of operation results also in an excessive and wasteful use of oil.

The instructions to enginemen in handling oil-burning locomotives say that the firing of oil differs very materially from the firing of coal and requires more care to make the combustion of oil fuel economical. The fireman and engineman should work in harmony, and when there is a change in the throttle or reverse lever the fireman should regulate the oil supply to suit the new conditions. In doing this he must exercise skill and be alert, for he can, by a little carelessness, waste more valuable fuel than would be possible on a coal-burning engine. For this reason it is difficult to give arbitrary instructions as to the regulation of the steam and oil supply to the atomizer, the adjustment of dampers or the temperature of the oil in the tender. These details must be left to the intelligence of the engine crew, and their experience must dictate the manipulation of the apparatus to suit the constantly changing conditions of locomotive operation. Experience has shown that proper care is not usually exercised by enginemen in the discharge of these duties connected with economical oil-burning, and a good measure of proper manipulation is the extent of the production of black smoke, although this is not always the attendant of a lack of economy.

The usual method in stationary boiler practice in oil burning is to turn on the oil until there is just a slight indication of smoke, and it is then known that there is a sufficient flow of oil. With the strong draft in the locomotive and an insufficient oil supply, an excess of air will flow through the furnace and tubes, tending to cool the surfaces, and there is again a loss in economy.

As a result of the excessive use of oil or the lack of sufficient air supply, the tubes become coated with soot and it is necessary to clean them at frequent intervals by a sand blast, which, though a very simple device, is quite effective. The fact that this operation is continually necessary would indicate that soot is constantly forming on the tubes and that they are badly coated when the sanding period arrives. The average covering of soot, which is the normal condition of the tubes of oil-burning locomotives is sufficient to interfere with the efficient transmission of heat from the hot gases through the tube wall to the water. The hot gas must, therefore, escape at a high temperature and the rate of evaporation per pound of oil is low compared with that resulting from proper combustion and clean tubes.

There is little prospect that the enginemen, especially the firemen, will materially improve this condition, as it involves a degree of constant vigilance and personal interest in the work such as is not often obtained from the average workman. Some attention should, therefore, be given to improvements in the burner and the process of combustion which will secure an automatic regulation of the oil and air supply so that it is not entirely dependent on the work of the fireman.

The required fuel supply in a locomotive is closely related to the intensity of the draft. The draft pressure could, therefore, be utilized as a means for obtaining the desired regulation. With the ordinary locomotive oil-burner the liquid is atomized by a steam blast, and when properly adjusted the oil is divided into a fine spray, but if there is a surplus feed numerous drops of oil are driven along with the blast, and there is not an adjacent supply of air for their combustion. It is even difficult to regulate and direct the air supply for the proper combustion of the oil which is completely atomized, and there is frequently a flow of gas through the tubes which is surcharged with carbon and tarry products which gradually deposit on the tubes in the form of soot. Such conditions cannot be regarded as satisfactory for economical oil-burning and the burner and the method of air supply should take its share of blame. In the search for some improvement in the method of oil-burning for fuel something can be learned from the practice in burning liquid fuel in automobiles and gas-burning in gas engines. In this practice there is found the automatic regulation, which is desirable, and should, if possible, be applied to oil-burning locomotives.

In the automobile there is a more frequent change of load on the engines than with the locomotive, and it is not necessary to constantly regulate the flow of both air and gasolene. There is a frequent adjustment of the liquid, but by the use of a carbureter the air supply is made automatic by its connection to the vacuum produced by the pistons of the engine. By this means also there is a more intimate mixture of the air and liquid fuel at the carbureter, and it enters the cylinder more in the form of a gas which is in good condition for complete and economical combustion. It is probable that the extensive and growing use of oil for locomotive fuel will have a tendency to raise the price of oil to such a point that the present wasteful methods cannot be continued, and this will stimulate invention in the direction we have indicated. If this is not done and the price of oil becomes too high for locomotive use under present conditions it will have another effect which has been suggested by motive power officers, and that is the utilization of water power in the western mountain regions and its application to electric locomotives.

THE LABOR SITUATION ON THE RAILWAYS—I.

THERE is vital need for better co-operation between the managements and the employees of the railways of the United States. It is necessary to further the best interests of the railways, the employees and the public; and it should relate to numerous and varied matters. More true co-operation could and would so promote efficiency in many ways as to benefit all. It would improve the quality and reduce the cost of transportation. It would reduce accidents. It would often prevent needless and indefensible strikes, such as that from which the Illinois Central, the Harriman Lines and their former shop employees have been suffering for some months—the employees, however, much more than the roads.

That there is want of proper co-operation between the railways and their employees is recognized by every person who is familiar with transportation affairs. The *Railway Age Gazette* believes that frank and full discussion of the situation would bring about a better condition. It is our intention, therefore, to publish several editorials on the railway labor situation, of which this is the first. We hope that they will call forth frank and helpful expressions from both thoughtful railway men and thoughtful employees.

For the existing unsatisfactory relations between managements and employees there have been a number of causes. One of the principal of these has been the great increase in the size of railways systems within the last ten or fifteen years. Another has been the changes in the control, in the official personnel and in the methods of operation of many roads, which often have been incidental to the process of railway consolidation, but occasionally have occurred independently of it.

The increase in the size of railway systems has made it hard or impossible for the higher officers to know, or keep in touch with, many employees. The subordinate officers, because of too highly centralized managements, have often been unable to deal with employees in the spirit and way that their intimate knowledge of the employees' sentiments and needs made them think was desirable. Then, in many cases, as a result of changes of control, officers who had grown up with the roads, who knew and were known to the employees and commanded a spirit of loyalty, have been supplanted by officers imported from other roads. These developments alone have been sufficient to reduce the amount of sympathy and co-operation between railway managements and employees on many lines. There are some railways, large and small, in the country on which such developments have not taken place—which over a long period of years have remained under the same control and have been officered by men trained up on them—and it will, we believe, usually be found that there is more *esprit de corps* and more true co-operation on them than on other lines.

While these changes in railway control and management have been going on, the brotherhoods of employees have been waxing, both numerically and in the perfection of their organization and the skill of their leadership. The natural result of the development and activities of the labor unions has been to cause employees to look to them and their leaders more and more to get them higher wages and easier working conditions; and each addition to their loyalty to the union has been accompanied by a subtraction from their loyalty to the companies and their managers. The organization and growth of the railway brotherhoods was inevitable. It was a natural outcome of the conditions of modern industry. It cannot be doubted, however, that the changes in the control and in the official personnel of many railways, and the movement toward consolidation into large systems, have tended to stimulate the growth of the unions and to increase their influence and that of their leaders.

Thus the tendencies of railway development on the one hand, and of union development on the other, have segregated the managements and the employees, and in some cases have even made so wide a breach as to reduce co-operation between them to a matter of mere perfunctory routine.

There have been numerous other causes of the existing labor situation on the railways. Perhaps the most important of all has been the growing "social unrest" which has not been confined to the railway industry, nor to industry in the United States, but has been, and is, profoundly affecting industrial and political conditions throughout the civilized world. Probably the working classes in civilized countries are now receiving higher wages and enjoy more favorable conditions of employment than ever before. This is unquestionably the case in the United States. It is most conspicuously true of the railway employees of the United States. The fact that the economic and social conditions of the railway employees of this country is probably, on the whole, better than that of any other working men in the world, while, generally speaking, the co-operation between them and their employers probably is no more satisfactory than that between employers and employees in general, indicates that the "social unrest" is not chiefly, or even perhaps largely, a resultant of any specific economic and social conditions, but is simply due to discontent on the part of working people with the present organization of industry and society—a discontent which is, perhaps, less a result of conditions actually affecting working people than of socialistic agitation, the words "socialistic agitation" being used here in no bad sense. This unrest and ferment is, perhaps, chiefly a protest of peoples who have achieved democracy in politics against a highly undemocratic form of industrial organization and management. The railway owners, managers and railway employees are face to face with the same problem that confronts employers and employees all over the civilized world—that of adjusting themselves to changed industrial conditions and to changed ideas regarding the proper relations between railway employers and employees cannot be restored.

There is no prospect of a disintegration of our large railway systems into the small railways which have been united to form them. There is equally little prospect of a dissolution of the railway brotherhoods. In other words, the old relationships between railway employers and employees cannot be restored. But there is no insuperable obstacle to the formation of new relations between them under which there can be brought about the co-operation which their interests and those of the public require. Whether such relations shall be brought about probably will depend mainly on how patiently and perseveringly managers and employees try to work out the principles according to which they can co-operate to the best mutual advantage, and strive to understand and respect each other's rights and to perform their duties to themselves, to each other and to the public.

NEW BOOKS.

Prevention of Railroad Accidents. By George Bradshaw. New York: N. W. Henley Publishing Co. Paper, 173 pages, 4½ in. x 6½ in. Price 50 cents; 100 copies, 35 cents each; 1,000 copies, 25 cents each.

This is a book of exceptional merit. The author has served in the claim department of the New York Central for a number of years, and his admonitions to railway men in regard to protecting themselves and their fellow employees from danger, are not only based on the lessons of actual experience, but are set forth in clear and vigorous language. The main body of the work is much like that of Mr. Richards, of the Chicago & North Western, whose papers and addresses on this subject are familiar to the readers of the *Railway Age Gazette*. Indeed, Mr. Bradshaw uses some of the North Western's pictures. Besides this, he has pictures showing the dangers that beset men in shops and in railway yards like those which have been published by the New York Museum of Safety, and also some from the publications of the Bureau of Explosives, showing how to stow dangerous articles in freight cars. Much of the matter in the book has been used by Mr. Bradshaw in addresses delivered at large meetings of the employees of the New York Central. There are nearly 70 illustrations altogether. Numerous admonitions for trainmen and station men are printed in the back part of the book in large, full face type.

Letters to the Editor.

THE ODESSA WRECK.

To the Editor of the Railway Age Gazette:

Referring to the sentence "Although the car had wooden inside finish which was badly splintered, no fire occurred; and this must be attributed to the use of steam heating and electric lighting, which do not require live flame in the light or live coal in the heater as in the old style methods," in the article "The Steel Passenger Cars in the Odessa Wreck on the St. Paul," which was published on page 85 of your issue of January 19:

I have read everything that I have seen, or that has been brought to my notice, on the subject of fires in railway wrecks; but I have yet to learn of one instance wherein the "old style" method, Pintsch gas, has been responsible for, or contributed toward, conflagration in railway accidents.

MECHANICAL ENGINEER.

[The exceptions of "Mechanical Engineer" are well taken. The comments of the *Railway Age Gazette* were such as to produce an impression that was not intended. The fact is that the reference to "live flame in the light or live coal in the heater as in the old style methods," was meant to apply only to stoves and to oil lights, as, indeed, it was thought would be clear from the use of the qualifying words "old style methods." There are safe methods of lighting besides electric lighting; and those methods cannot be included under the description "old style," for they are in widespread use at the present time. As a matter of fact, the cars in the wreck on the St. Paul were equipped with both Pintsch gas and electric light.—EDITOR.]

D. A. D. AND THE SUPPLY DEPARTMENT.

New York, January 16, 1912.

To the Editor of the Railway Age Gazette:

In reading "D. A. D.'s" remarks we cannot but be impressed with the fact that he knows a whole lot, but there is a great deal that he knows that he does not impart, as it would not be an argument in favor of his position. He knows full well that a master mechanic is, or should be, a mechanic; and a roadway engineer is, or should be, an engineer. Their training is deficient in the matter of handling or caring for material, however well they may know the character of the material; or, in other words, its composition and uses.

The improvements made in storekeeping methods, and when I say this I mean the handling and care of material, have been brought about by material men, and not by mechanics or engineers.

The material men had a platform on which to build their structure, but before they commenced to build they were obliged to get rid of the debris of the mechanical and engineering departments that had accumulated for years. This debris consisted of old tumbled down storehouses, shanties for oil houses, and in some places no storage whatever; the only protection the oil had was the barrels that contained it, and in some places the earth was so soaked with oil that it is surprising that the people on the other side of the earth have not drilled for oil. Any pensioner or old employee could be a storekeeper; he was employed to act, not to think; material was charged to operation as fast as received from the purchasing agent, expenses were pro-rated so that nothing definite was accomplished. The storekeeper was the joke of the other departments; in fact, he was looked upon as a necessary evil.

"D. A. D." would not go back to those conditions, and if he is fair, which I think he is, he will certainly have to give credit where credit is due.

PROGRESSIVE.

A PLAN FOR CHANGING RAILWAY CONTROL.

New York, January 23, 1912.

To the Editor of the Railway Age Gazette:

I appreciate the clearness and accuracy of the synopsis, in your issue of January 19, of my plan for a railway holding company, as published in *McClure's* for January, and I am also glad to read your criticisms. But are you not going rather far in saying the plan will not appeal to many public or business men, because the original twenty-five directors, or their successors, might be incompetent or subject to political influences, and because no way is provided for calling them to account and removing them? I am aware that the selection and continuity of these men is a very important detail, but it is a detail nevertheless, and one which can be worked out in various ways. The main features of the plan—its feasibility, legality, and financial soundness—I am pleased to see are not questioned by you.

Turning to your criticisms, if the twenty-five original directors named in the charter were not experienced and first-class men, the charter would not pass Congress and would not be signed by the President. Absolute incompetency will always wreck the finest plan of organization. In the case of this proposed charter, however, where the first twenty-five directors would be named, public opinion would be centered on it and proper men would be selected.

Your objection to the self-perpetuating feature of the board and to the necessity of someone being able to call them to account is more serious. Here too, however, the danger may easily be guarded against in a number of ways, as, for instance, requiring a certain number of *new* directors each year (as in the old charter of the Bank of England); or requiring the approval of the Interstate Commerce Commission as well as of the President and United States Senate in the selection of the new directors; or even giving limited voting power to the stockholders, as is given today in the Bank of England. There are various devices available in corporation law to meet such contingencies, the simplest being the infusion of new blood each year. Our best men would be glad to serve in such a gigantic public interest, just as all lawyers covet a seat in the Supreme Court of the United States, and just as all Englishmen covet a seat in Parliament.

So, also, as to removing an incompetent or dishonest director. There are various ways of doing this. There is the "recall," as suggested in my article, and that recall might be by the President and Senate, or by the Interstate Commerce Commission, or by the stockholders, and could be made as summary as wished. Or they could be rotated out of office, just as happens in all corporations. That also is a minor detail.

It seems to me that all of your objections apply with much greater force to the personnel under government ownership than to the personnel of a board of directors of a regularly organized corporation. I know you are very conservative, but look at the signs of the times. Postmaster-General Hitchcock's proposition that the government take over the telegraphs will apply to the railways next. It is coming unless something is done to avoid it. My plan is for the purpose of keeping our industries and property out of the hands of politicians, and I believe it will do it. "Better be alarmed by the midnight bell, than be burned in your bed."

I write you because I have been a subscriber to and read your journal carefully for some twenty-odd years last past. I gathered many of my facts and figures from it, and I value highly your opinion.

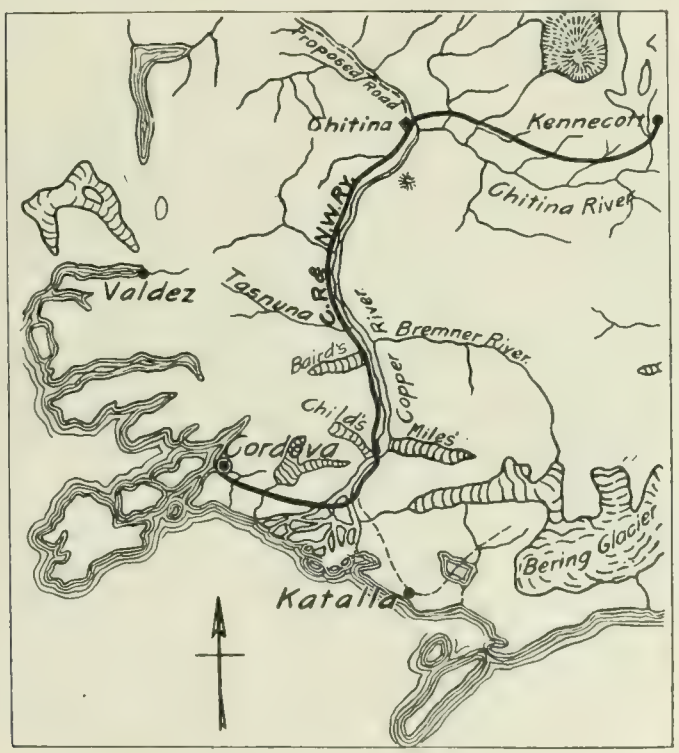
WILLIAM W. COOK,
General Counsel, Mackay Companies.

The public works committee of New South Wales does not favor the construction of the proposed railway from Perthville to Burraga, as referred by the legislative assembly, but recommends that the line be built from Tarana towards Burraga via Oberon.

CONSTRUCTION OF THE COPPER RIVER & NORTHWESTERN.

The discovery of coal in the territory surrounding Fairbanks, Alaska, near the head of Matanuska river, and in the vicinity of Katalla, and of copper along the Chitina river, made very desirable the building of a railway into the interior of Alaska from some convenient harbor on the southern coast. The obstacles to building such a line were so great, however, that several unsuccessful attempts were made before the present line of the Copper River & Northwestern Railway was determined on. The Chugach mountains parallel the southern coast about 50 miles inland, rising to an altitude of from 5,000 to 8,000 ft., with innumerable spurs projecting to the ocean, which form an irregular, broken country with many glaciers. The principal problem in locating a railway to reach inland was to secure a crossing of this mountain range. The gorge in this range, which has been cut by the Copper river, is practically the only pass through these mountains, and it is along this river that the final location was made.

The Katalla Company first began work on a railway having a sea terminus at Katalla on the eastern edge of the flats at the



Copper River & Northwestern.

mouth of the Copper river. Work had to be abandoned here, however, on account of the uncertainty of the shore line and a new project was started by the same company at Valdez, at the head of Prince William Sound, but this was also unsuccessful, as the crossing of the mountains at this point was too difficult. In the meantime, work was begun on the construction of the Copper River Railway, beginning at a small village, which is now in the limits of the new town of Cordova, on another arm of Prince William Sound. Five or six miles of this line had been completed when a consolidation of all the interests in this vicinity was effected under the name of the Copper River & Northwestern. The location of the original Copper River Railway was altered somewhat after careful study, but the original plan of that company to follow the Copper river was carried out in the building of the new road. The first work on the new project was done in the spring of 1908, the main line to Chitina was turned over to the operating department in September, 1910, and the first load of copper from the mines at the end of the Chitina branch line reached the coast in April, 1911.

MAIN LINE.

From Cordova the line runs approximately southeast across the Copper river flats to the west channel of the river, which is crossed by a steel bridge known as the Flag Point bridge. After crossing this channel the line swings northward for a distance of 6 miles on Long Island, which is between the two channels of



Snow Shed at Mile Post 54.

the river, and then crosses again to the west bank by the Hot Cake Channel bridge. From this crossing the line continues up the west bank of the river for about 15 miles, where it is necessary to make a third crossing in order to avoid Miles glacier. For several miles beyond this crossing the line lies in a deep canyon cut by the river, necessitating heavy rock work and more than 2,000 ft. of snow sheds as a protection against the frequent heavy snow slides. For the last 80 miles of the 131-mile line to



Side Hill Work at Mile Post 134.

the new town of Chitina, the road runs through the gorge of the Copper river, which has wide, sandy flats at the junction of the larger lateral streams, but for a considerable portion of the distance is a deep, U-shaped glacial valley with abrupt slopes from 4,000 to 7,000 ft. high. For the last 45 miles of this distance there was continuous heavy rock work, the cost of a portion of this section exceeding $200,000 a mile.

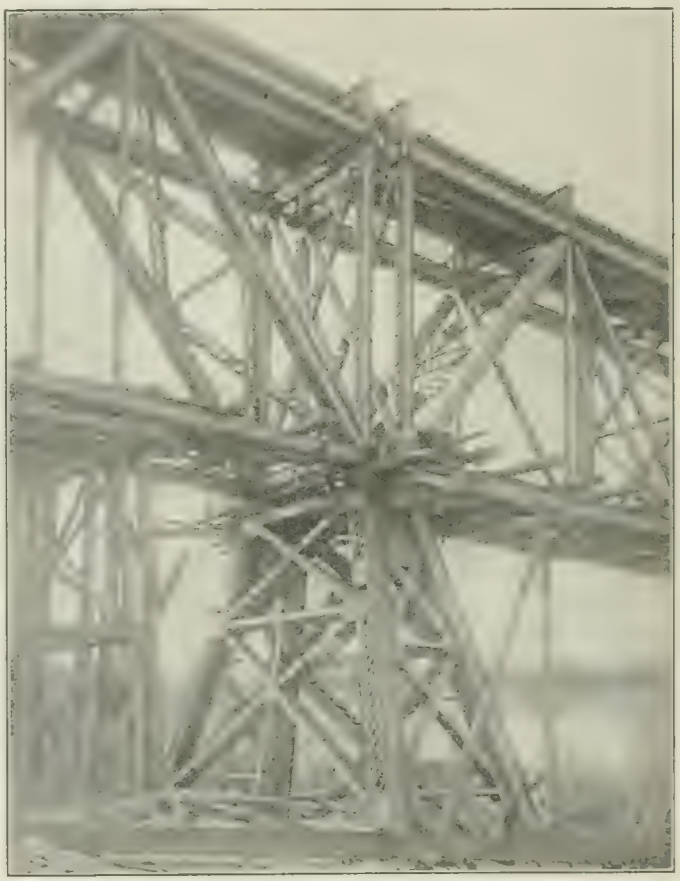
On the 131 miles from Cordova to Chitina [illegible]

northbound grade is .51 per cent., and the maximum southbound is .61 per cent. The maximum curvature per mile is 329 deg., the average curvature 31 deg. 15 min. The total tunnel length is 2,975 ft. divided among 9 tunnels. The total steel bridge work is 4,010 ft. divided among 16 bridges, and the total trestle length is 57,289 ft. The road is standard gage, and is laid with 70-lb. rail, 2,880 ties to the mile.

The tidewater terminus is one-half mile north of Cordova on the east shore of Cordova Bay, where there is a large land-locked harbor, affording ample facilities for commerce at all stages of water. The company's wharf is 738 ft. long and 80 ft. wide, built on creosoted piles and equipped with three large warehouses, loading tracks and derrick for unloading from ship to car. The company's yards, offices, shops and roundhouse are located just south of Cordova, about 2 miles from the terminus. The first 49 miles of the line over the delta of the Copper river contains more than 100 wooden trestles, some of considerable length, as in this flat area it was absolutely necessary to provide ample waterways for the flow waters which cover the delta during the spring thaws.



Driving Sheet Piling for Pier at Flag Point Bridge.



Details of Tower of Kuskulana Bridge.

CHITINA BRANCH.

A branch line from Chitina eastward along the Chitina river was built to serve the copper and coal belt along the Wrangell range. This branch is about 70 miles long, its extreme point being 195 miles from Cordova. The track standards are lighter than on the main line, the rail being 60 lbs., and tie spacing 2,640 per mile. The maximum grade eastbound is 3.4 per cent., and westbound 1.8 per cent. The climatic conditions in this region are the same as those in the central portion of Alaska, being removed from the modifying influence of the ocean. The principal difficulty in railway building results from the frozen soil, which consists of vegetable matter known as "tundra." This frozen sub-soil produces luxuriant vegetation, as it contains an unfailing supply of water, and during the warm season the rich muck supports an infinite variety of plant life. The soil is almost undrainable, and if the upper surface of the muck is removed a new layer begins to thaw and the condition is not improved. In the worst places the ties were laid directly on the ground, and if the muck became too soft a bedding of spruce branches was laid, and the roadbed built up with gravel to a thickness equal to the penetrating power of the sun during the summer months. This insures the freezing of the original surface muck and prevents its thawing, which produces a stable roadbed.

The two principal structures on this branch line are across the Copper river near the point where the branch line leaves the main line beyond Chitina and across the Kuskulana gorge. The former crossing was made on a temporary trestle 2,790 ft. long, which will be replaced later by a steel structure.

Owing to the fact that the railway is not allowed to work the coal fields along the line, its locomotives are operated with oil which is brought to Alaska by steamer from the California oil fields. Daily freight service is maintained to Kennicott and passenger trains meet all steamers.

The traffic to be handled by the present line will be wholly mineral. The Bonanza mine now in operation at Kennicott furnishes a high grade copper ore, while other properties adjacent propose to begin operation in the near future. The line traverses heavy mineralized districts all along its route beyond the first 25 miles. Very good showings of both gold quartz and copper are found. The proposed extension to Chitina will open up a very good agricultural country. There are 200,000 acres in the Tanana valley which can be developed for the raising of hay, grain, potatoes and vegetables, which products are in great demand in the adjacent mining camps. This extension will also furnish a direct outlet from Fairbanks to the coast, the present routes being via the Yukon to St. Michaels or by way of White Horse.

FLAG POINT BRIDGE.

The first crossing of the Copper river is on a structure consisting of nine steel spans, having a total length of 1,860 ft., and supported on concrete piers and abutments. The bridge is divided into three sections separated by a pile trestle and a small island. The first division consists of one 300-ft. pin-connected Baltimore truss and two 150-ft. through riveted trusses; the second section of four 175-ft. through pin-connected spans, and the third section of one 300-ft. and one 260-ft. through pin-connected Baltimore trusses. To carry traffic during the erection of the bridge and to facilitate construction work on the piers a temporary trestle was driven 27 ft. down stream and parallel to the bridge alinement. The two 300-ft. spans and the 260-ft. span were erected on false work by a traveler, and the other spans by a bridge erection car. The concrete was a 1:2:4 mixture in the body of the piers and abutments and 1:1:1 in bridge seats.

The piers and abutments are founded on piles. As it was discovered in driving the piles for the temporary trestle that it was difficult to secure a penetration of more than 10 ft., two 2-in. water jets were used in sinking the piles for the masonry foundations. One of these was placed on each side of the pile, and at the same time the upper end of the pile was struck short blows with a 4,500-lb. hammer. The average penetration secured in this manner was 36 ft. below cut-off. The excavation for the piers was made largely with 6 and 8-in. sand and gravel pumps, and much of the sand excavated was available for use in concrete.

The range in water level at the bridge location is 8 ft. On account of the fact that there are 4 to 8 ft. of ice formed in the river during the winter, the piers had to be protected by armored ice breakers extending to high water elevation. This protection consisted of old 56-lb. rails placed with the ball out and flush with the face of the concrete. The rails were anchored in the concrete by ½-in. corrugated bars 48 in. long, passed through holes drilled 24 in. apart in the web of the rails, the bars being bent in until they touched the rail flange, thus providing nearly 2 ft. of anchorage in the concrete. At two of the piers the river was so deep that no excavation was required and the following method of construction was adopted:

When the foundation piles were driven, 8 short piles were driven on each side, 3 ft. clear of the outside pier piles. These short piles were capped longitudinally with the pier, and 70-lb. rails were spiked longitudinally to the caps and made level for their entire length. On this track was a frame on wheels carrying another track at right angles to the first one. From a frame carried by the second track a circular saw was suspended to the shaft arbor with bolts countersunk on the bottom side of the saw. A 20-h. p. engine, with the saw set at the elevation of the pile cut-off, had no difficulty in cutting off the piles 16 ft. below the water surface. Three courses of grillage were pinned together on ways, on the shore, then launched, completed and floated into position, guides were driven, the forms put up and the grillage sunk by putting in the concrete. The greatest variation from true position in sinking was ½ in.

THE HOT CAKE CHANNEL BRIDGE.

At the second crossing of the river the channel is a little less than 750 ft. wide, with a gravel bar 150 ft. wide 200 ft. from the west bank. The bridge consists of a 200-ft. span from the west shore to the bar, 150 ft. of pile trestle across the bar and two 200-ft. spans over the east channel. Test borings at this bridge site showed a very compact uncemented sand and gravel to a depth of 55 ft. As this material was so dense that piles could not be driven and the gravel was so coarse that a jet could not be used successfully, caissons had to be adopted and as it was not advisable to go to the expense of securing a compressor plant for pneumatic caissons, open caissons, or cribs, were designed and sunk by dredging through hatchways with an orange peel bucket, the entire crib, except the hatchways, being filled with concrete to increase its weight and assist in the sinking. The erection of steel work on this bridge was not particularly difficult and was accomplished without accident.



Kuskulana Bridge; Copper River & Northwestern.

MILES GLACIER BRIDGE.

The crossing of the river below Miles Glacier was the most difficult on account of the proximity of the two glaciers and the necessity of providing a structure which would not be damaged in the future by the boulders and icebergs which fill the stream at this point. Icebergs were observed passing the site which were 50 x 100 ft. in size, rising 8 ft. out of the water, and moving at the rate of 7.2 miles an hour, notwithstanding the fact that they were dragging on the bottom. The range from low to high water was observed as 24 ft., although no records were available as to former elevations. After carefully observ-

ing conditions, four spans were decided on: No. 1, 400 ft.; No. 2, 300 ft.; No. 3, 450 ft., and No. 4, 400 ft. long. This arrangement of spans places each of the piers on a bar and out of the path of the heaviest flow of ice.

As it was important that the bridge be completed during 1910, span No. 3 was designed to be erected as a cantilever, using spans No. 2 and No. 4 as anchor arms. These two arms were to be connected by temporary members from the top end post pins to the same pins in the 450-ft. span, with adjusting wedges, in connection with wedges between the end shoes at the expansion end and cast iron blocks at the fixed end of the 450-ft. span, to hold the outer end of each half of span No. 3 sufficiently high to be able to make the connection at the center span. The fixed ends of spans No. 2 and No. 4 are next to span No. 3. It was necessary for spans No. 2 and No. 4 each to have rigid lower chords if they were to be used as anchor spans, and span No. 3 to be erected cantilever would require a rigid lower chord except the middle panel, so span No. 1 was designed the same as spans No. 2 and No. 4 for the sake of uniformity. On account of the extremely high winds from September to April, these spans were designed for a wind pressure of 40 lbs. per sq. ft. on the loaded structure, and for 60 lbs. per sq. ft. on the unloaded structure.

The piers were designed to place the bottom of the lower chords practically 30 ft. above extreme high water, which is ample to clear all icebergs passing under the bridge.

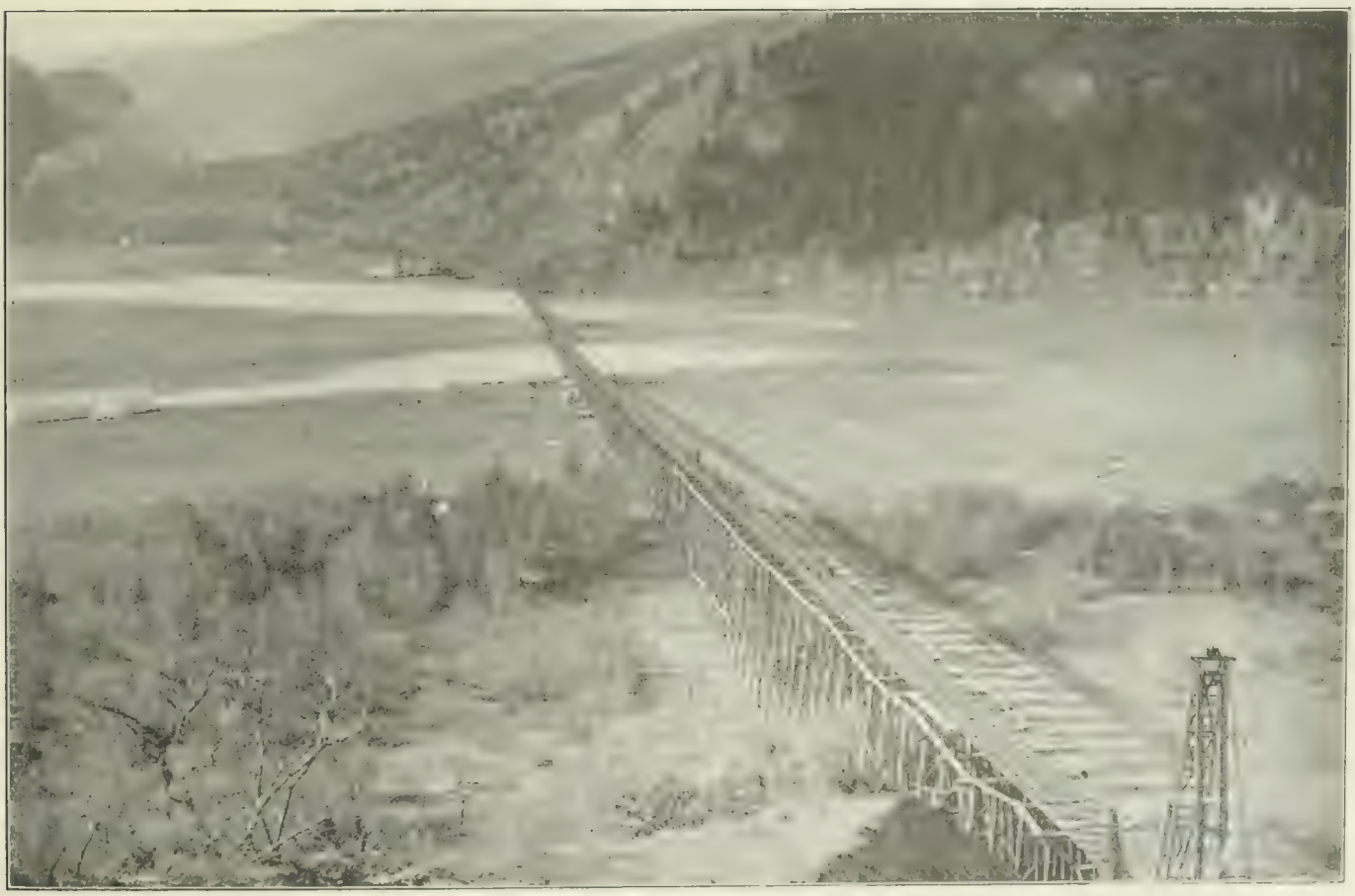
The great flow of icebergs made detached ice breakers necessary at piers No. 1 and No. 2. The ice breakers and all of the piers are armored in the same manner as described above for the Flag Point bridge. Borings at the bridge site showed cemented sand and gravel in the bed of the river with numerous boulders ranging in size from 1 cu. ft. to 20 cu. yds., making it necessary to build the foundations by the use of caissons. Power equipment was installed and pneumatic caissons were used. All equipment for this power plant was ordered as nearly self-contained as possible, and machines were operated on a foundation consisting of 12 in. x 12 in. timbers drift bolted together and resting on the surface of the ground, the only precaution being that no filled ground was allowed under the foundations. The compressors operated almost continuously for nine months without noticeable vibration. The work was begun during the winter and one caisson was completely sunk before the ice went out. Shortly after beginning the work a 1½-in. steel wire cable, supported on towers 100 ft. high on each bank, was stretched across the river to deliver concrete and other supplies to the piers and the opposite bank. The carrier was designed and made on the work after two manufacturers had advised that no carrier is made to operate over the required span, namely, 1,800 ft. The heaviest load carried on this cableway was the man lock, which weighed 5,000 lbs. Two 1-in. steel cables were also supported across the river on a 60-ft. tower on each bank, from which an 8 in. double-riveted steel pipe for supplying compressed air to the caissons was suspended. Air was supplied through this pipe for a distance of 1,300 ft. from the power house with a loss of only 1 lb. from the indicated pressure at the compressor. Concreting was carried on in one of the piers during extremely cold weather by building a house entirely enclosing the pier, with a 6-ft. space outside the concrete forms and over the top of the pier. A 2-in. steam pipe was laid spirally around the pier, the coils being out 6 ft. apart vertically. Two 20 h. p. boilers supplied steam to these pipes and the water for mixing concrete was heated to 110 deg. F. and the sand and rock to about 100 deg. The temperature of the concrete after being carried out over the cableway in buckets, holding ¾ yd., was about 70 deg. F. The sides of the caissons for the ice breakers were made vertical to simplify the framing, and, on account of the excessive friction due to the vertical faces, it was impossible in the case of one of these caissons to force the cutting edge down after having secured a penetration of 19½ ft., although the total load on the caissons amounted to a pressure of 1,410 lbs. per sq. ft. on the exposed sides and the excavation inside the working chamber had been carried 2½ ft. below the cutting edge. False work for the erection of span No. 1 was driven during the winter, when the ice in the river was 7 ft. thick. One-in. steam jets were used to thaw four holes through the ice at the point where each pile was to be driven. Little or no penetration could be secured, however, in the bottom of the river on account of the size of the boulders encountered. After the completion of this false work and during the erection of a three-bent traveler, the water in the river began rising, lifting the ice and false work on two spans. To prevent the false work from being carried away, a large force of men was kept on the ice equipped with steam jets and chisels welded in the ends of 1-in. pipe to clear the ice away from the piling. In spite of the precautions adopted the false work was lifted several inches in places, although in some instances it settled back to the original elevation when the water subsided. Although span No. 3 was designed for cantilever erection, it was found possible under the conditions existing when the steel for this span arrived to erect it from false work. If it had been erected as a cantilever the opening of the bridge would have been delayed a considerable period, and it was very necessary to open it at the earliest possible date.

KUSKULANA BRIDGE.

The channel of the Kuskulana river at the point of crossing is a gorge 190 ft. wide, 175 ft. deep, with rock walls. The base of rail is 240 ft. above the bottom of the gorge, the grade being level and the bridge on tangent. It was decided to build a deck span 225 ft. long over the gorge to be erected cantilever from two 160-ft. anchor spans to be erected on shore. Steel towers were built for piers to support both ends of the channel span and the outside end of one shore span, the outer end of the other shore span resting on a concrete abutment. The delivery of material to this interior point was very difficult, and on this account the cost in many instances was excessive. The cement for this job was bought in Seattle. The barrels were covered with canvas as protection from moisture; they were shipped to Cordova, and carried up the line 101 miles to Tiekel after much delay on account of heavy snows during the winter. It had been expected that the material could be teamed on the ice from this point, but it was so late in reaching Tiekel that the ice had gone out of the river, and it was necessary to haul by team on a new wagon road for a distance of 16 miles. This cement delivered at the bridge site cost the company $20.30 a barrel. As all material was delivered on the south side of the river, a 1½-in. steel cableway was supported on wooden towers on each bank to transport material across to the north side of the river. In excavating for foundations it was necessary to first remove the "tundra" from the surface of the ground, and then wait two or three days for the ground to thaw for a depth of 6 in. to 1 ft. before the next layer could be removed. The climatic conditions at this point were very different from those at the other bridge locations. The temperature is very much lower in winter and higher in summer than along the coast, the range in 1910-'11 being from 67 deg. F. below to 96 deg. above zero. The work of erecting the steel was begun about the first of November, and the work was considerably hindered by the fact that in that latitude the days at this season of the year are only about 4½ hours long, which decreased to about 3 hours in December. On account of the extreme cold weather at this time it was necessary to house all the boilers and engines, and to pipe water and compressed air across the river it was necessary to pack the pipes in a 12-in. box filled with hay and carrying live steam pipes. This box was swung under a suspension foot bridge over the gorge, and in spite of these precautions considerable delay was caused by the pipes freezing. The erection of the steel work was carried on simultaneously from each side by two overhead travelers, one traveler and four hoisting engines having been transferred across the river by the cableway. The two 150-ft. anchor spans and the steel towers were first erected and riveted, and 50 tons of steel



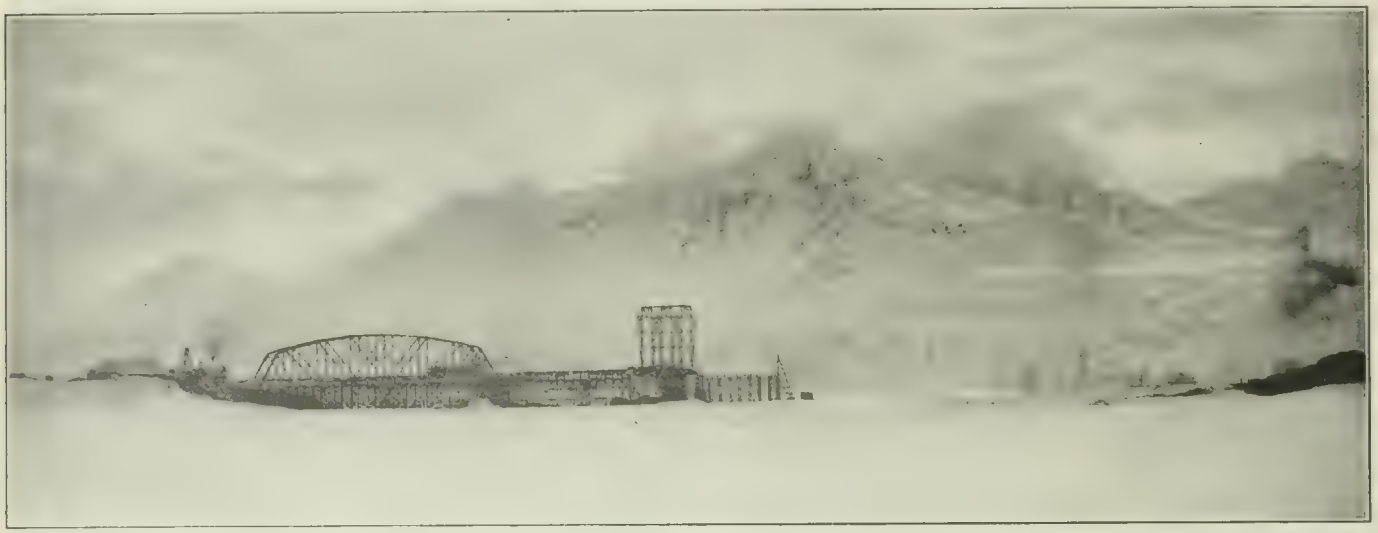
Wharf at Cordova; Copper River & Northwestern.



Crossing of Copper River at Mile Post 133.

rails were placed on the outer end of each of these spans to serve as counterweight during the erection of the cantilever span.

The plan followed in erecting this span was as follows: The top chords of the two 150-ft. anchor spans were connected by temporary bars to the top chords of the corresponding halves of the span to be cantilevered. The end shoes of the two spans at the fixed end of the cantilever span were kept in place by built-up compression blocks between them, while at the expansion end of the 225-ft. span cast steel guides were bolted to the end shoes



Erection of Miles Glacier Bridge; Copper River & Northwestern.

of the two spans and a cast steel wedge driven between the shoes until the segmental rollers were turned as far toward the center of the span as possible. The wedge had a 6-in. steel shaft 16 ft. long, longitudinally through its center, the shaft being threaded for 6 ft. on one end and held in position by a jam nut at each end of the edge. The wedges were operated by a reversible ratchet nut on the outer end of the shaft and held in position by a yoke attached to the outsides of the end shoes by 6-in. pins. This arrangement held the outer ends of the cantilever spans a little higher than normal, and shortened the distance between the lower chord end pins, thus making it easy to drive the pin in the middle of the center panel of the lower chord. After this pin was driven and the middle sections of the upper chords were in position and full bolted at one end, the wedges were slowly drawn while the outer ends of the anchor spans were jacked up, the adjustable bars in the center panel being always under tension. When the unbolted ends of the top chord came into position they were fully bolted, after which the temporary bars connecting the anchor spans and the cantilever span were cut and the shore spans lowered into position.

All equipment was American built and included standard freight and passenger equipment and consolidation locomotives. Practically all other supplies required on the work were manufactured in this country. Bridge timbers were Oregon and Washington fir, while most of the ties and piles were of native hemlock and spruce. The ties secured locally cost 40 cents and piling cost 10 cents a lineal foot. Excellent beds of gravel of



Two Finished Piers and Caisson, Miles Glacier Bridge.

glacial formation were available along the line for filling and ballast. The filling on the line south of the Miles Glacier bridge was practically all secured from three pits, since the material on which track was laid was unsuitable for side borrow. Two large steam shovels were used to excavate this material in the pits and light locomotives to transport it to the desired location. On the upper end of the work considerable filling was handled from side borrow, although the glacial gravel was hauled along the line for ballast. Most of the material used on the interior was delivered by rail, as the track was laid as fast as construction work advanced, but during the summer of 1909, when considerable work was under way near Miles Glacier, two light draft river boats were fitted up for delivering material and men to the camps along the line, and a large ferryboat, with suitable slips for transferring cars of material, was provided in the Miles Glacier lake, an enlargement of the river near that point.

The construction of the main line and the Chitina branch was handled in divisions, each in charge of a division engineer, and each division was sub-divided into residencies under resident engineers. The engineering force was almost entirely composed of experienced railway engineers. The labor was principally Scandinavian and brought in from Canada. A few southern Europeans were employed on the work, but they were soon found to be unable to adapt themselves to the extreme cold. The climate is very healthy, and the work was marked by almost entire absence of illness among the men, while the number of accidents was not above the ordinary for such construction work. An effective hospital service was established at Cordova and Miles Glacier, with emergency hospitals along the line at construction camps.

The work was done under contract by M. J. Heney & Co., under whom a considerable part of the rock excavation was sublet to individuals. The engineering work was under the direction of E. C. Hawkins, vice-president and chief engineer; Alfred Williams, assistant chief engineer; and A. C. O'Neel, bridge engineer.

ANNUAL REPORT OF BLOCK SIGNAL BOARD.

The Interstate Commerce Commission has issued the fourth annual report of the block signal and train control board, M. E. Cooley, Azel Ames, F. G. Ewald and B. B. Adams. One year ago 985 plans of appliances and systems intended to promote safety had been presented and 819 had been disposed of. Since then plans of 96 additional devices have been presented, making a total of 1,081 cases. During the past year 93 cases have been disposed of, and the board now has 169 cases before it for consideration. Statistics of mileage of railways in the United States worked under the block system, have been gathered by the board and published in pamphlet form. Similar information, as of January 1, 1912, is now being gathered.

During the past year three automatic train stops have been approved for test, as follows:

(1) Jones Signal System Company, Atlanta, Ga. Mechanical trip automatic train stop of the ground-contact type. This is an improvement on the device which was mentioned in the last annual report. Permission to install this device has been secured from the New York Central. It is expected that a test will be made during the present winter between Buffalo and Niagara Falls.

(2) The Jones Safety Train Control System Company, Baltimore, Md. Electrically operated automatic train stop of the intermittent contact rail type. An installation has been made on the Western Maryland near Baltimore and it is expected a test will be made during the present winter.

(3) International Signal Company, New York. Automatic train stop of the mechanical trip type controlled electrically. In this system a ramp is fixed on the track in the path of a hanger or plunger carried on the locomotive, the upward movement of which opens a valve in the train line, applying the brakes, unless an arm carried on the locomotive is struck almost simultaneously by a movable roadside contact member working in connection with fixed signals. Movement of this engine arm closes a valve and prevents the application of the brakes.

The Gray-Thurber system, noted in the last annual report, is a cab signal and automatic train stop requiring short sections of insulated track rails and the insulation of either a truck from the remainder of the locomotive or the locomotive from the tender. It was expected that a test would be made on the Lake Shore & Michigan Southern near Cleveland but the plan has been changed and tests are to be made on the Pennsylvania Company's line near Pittsburgh.

The Robinson Coupler Company, Washington, D. C., has an automatic hose connector, which is being tried on the Phoenix branch of the Marcus division of the Great Northern and a test is planned for. Fifty cars used in the transportation of ore between the mines at Phoenix, B. C., and the smelter at Grand Forks, B. C., are being equipped.

Tests of three automatic train-control devices have been completed during the year, as follows:

(1) The cab signal and automatic train stop of the Electrical Automatic Railroad Safety Signal Company, New York. This was installed on 3½ miles of the Staten Island Rapid Transit Railway. Three locomotives were equipped, and tests were conducted from February 27 to April 4, 1911, inclusive. These tests disclosed constructive faults in certain details of the apparatus, but it was the conclusion of the board that if these faults were remedied the system, with proper inspection and maintenance, would be reasonably reliable and would tend materially to promote safety upon a railroad using it. Details of this test, with a description of the device, will appear in an appendix, not yet issued.

(2) The device of H. G. Warthen, Washington, D. C. The installation was made on about 4½ miles of road on the main line of the Buffalo, Rochester & Pittsburgh near Rochester, N. Y. One locomotive was equipped. The test continued from April 12 to 26, 1911, inclusive. This device is an electrical automatic train stop of the intermittent contact type. As installed, the contact points were located in the center of the track about 22 ft. above the level of the running rails, necessitating the use of an overhead trolley. The results obtained from tests of this device were unsatisfactory.

(3) The mechanical trip automatic train stop of the Railway Automatic Safety Appliance Company, Wilmington, Del. This was installed on the Pere Marquette near Saginaw, Mich., and was tested by the board from March 24 to May 16. In this device the trips employed are located at about the level of the buffer beam on the locomotive pilot. In the Saginaw test two track trips were installed and four engines were equipped. The test disclosed constructive faults in certain details of the apparatus used, and after a careful analysis of the results obtained the attention of the proprietors was called to these constructive faults. The proprietors have redesigned those details of the device that failed to work satisfactorily, with a view of overcoming the faults disclosed by the test, and it is expected that the redesigned apparatus will be subjected to further test during the present winter.

The following miscellaneous devices have been held by the board to possess merit in a greater or less degree, but their use does not affect the safety of railway operation sufficiently to warrant the board in taking special action regarding them.

(1) Ratchet brake lever, R. H. Blackall, Pittsburgh, Pa. (2) Burdette chainless hand brake. (3) Watch and clock dial, H. S. Montgomery, Topeka, Kans. On this dial the minute divisions are numbered. It is the opinion of the board that the use of this dial can certainly do no harm, and where watches equipped with it are used in sufficient light so that the figures can be easily read, the dial may be of considerable advantage in eliminating minor mistakes in reading minutes. When used on a clock of considerable size, it is thought that the benefits would be more pronounced, particularly if the dial were at all times well lighted. The board sees no objection to the use of this dial, but is of the

opinion that there is not sufficient practical reason for recommending its general adoption. (4) Woodall low-water alarm, submitted by John McCaslin, New York. (5) Brake shoe and head, H. H. Urquhart, Paducah, Ky. (6) Ground cone, Paragon Sellers Company, Chicago. The object of this device is to secure a good earth connection for electrical apparatus. (7) Triple-lock switch stand, W. F. Bossert Manufacturing Company, Utica, N. Y.

The board, in its report last year, reiterated its recommendation for legislation to require the use of the block system, and summarized the results obtained from tests of two automatic train-control devices of the mechanical trip type. While these tests indicated that both of the devices tested would require some modification to make them entirely satisfactory, the general results confirmed the view that the principle of the automatic stop is sound; and it is the opinion of the board that the use of automatic train stops would tend materially to increase safety in the operation of trains. . . . The board does not, of course, consider that it has by any means exhausted the field of investigation embraced in the terms of the legislation under which its work has been conducted, but the information gained is sufficient to justify the conclusions now presented.

The broadening of the scope of its investigation in 1908, has required the board to take cognizance of the whole question of safety in railway operation, embracing a great variety of questions which can not adequately be dealt with by an organization such as this board, possessing authority merely to investigate and report.

The Block System.—The board can add nothing to what it has said in previous reports concerning the proved superiority of the block system over the time interval or despatching system of train operation. The increase in mileage block signaled during the past year was practically all upon roads that already had the block system in use. The extension of the system to new roads—that is, to roads which had not before used the space-interval method of train operation—was not such as to warrant the belief that the block system will be brought into use generally within any reasonable period of time without governmental action compelling it. There is ample justification for such action when the number, and particularly the disastrous character, of the collisions which have occurred under the time-interval or train-despatching system is considered, together with the small cost of installation and operation of a simple form of the block system which would very materially diminish the chances of collisions, and it is greatly to be regretted that the extension of the block system has proceeded so slowly. . . . All that the commission has asked is that those roads not using the block system gradually conform to the practice of the roads that do.

Automatic Train Stops.—In its last report the board noted an increased interest on the part of the railways themselves in the development of automatic train-control appliances. As was shown by the annual statistics published by the commission as of January 1, 1911, automatic train stops are in use on the lines of the Washington Water Power Co., the Pennsylvania Railroad in New York City, the Hudson & Manhattan Railroad, and the Erie Railroad, and there is now an installation on the San Francisco, Oakland & San Jose.

The information obtained from tests, together with knowledge of the general state of development of the art of automatic train control leads the board to conclude that there are several types of apparatus and methods of application which, if put into use by the railways, would quickly develop to a degree of efficiency adequate to meet all reasonable demands. Such devices properly installed and maintained would add materially to safety in the operation of trains. In many situations, under conditions existing in this country, the board is convinced that the use of automatic train stops is necessary to the safe operation of trains.

The board does not wish to be understood as stating that the conditions of entirely acceptable automatic train control, as formulated by it in the 10 characteristics published in its report of last year, are fully met by any one of the devices it has thus far examined. On the contrary, the art of automatic train control is still largely in the experimental stage; but it is far enough advanced to warrant the installation of available devices with a view to their further development to meet the demands of safety in train operation.

Having in mind the protection of train movements in particularly dangerous locations, the board is convinced that were the use of automatic control devices required in such locations railway managers would have no difficulty in complying with such a requirement in a manner fully to meet the demands of safety. . . . Few, if any, of the mechanical or electrical elements entering into the construction of automatic train-control systems involve any new principles, nor are they materially different from the elements used by the railways in the everyday operation of their interlocking and block signals, train brakes, and other devices. The ingenuity and initiative which have been manifested in the development of much of the apparatus used in the conduct of railway business greatly exceeds that required to produce apparatus which can be superimposed upon existing signal systems adequately to compel obedience to the signal indications.

The question of the actual design and construction of the apparatus necessary for automatic train-control systems has not been as great an obstacle in the way of their adoption as the operating questions involved in their use. In view of the manner in which they have been used in the situations where employed, and the skill with which other problems involving the handling of complicated train movements have been met, it is futile to advance any difficulties involved in such a step as an excuse for failure diligently to undertake the development and practical application of such devices to general steam surface railway conditions.

The railways have been decidedly lax in developing the automatic stop, and actual experience is lacking. The board, therefore, does not believe that at the present time legislative compulsion to this end would be wise; it does believe, however, that the railways should be urged and expected to develop the art of automatic train control. Should this not be done with a reasonable degree of expedition, steps should be taken by the government to stimulate action.

It must not be assumed that the use of automatic devices of any kind will remedy all the faults at present existing in train operation. They can not insure that the fundamental conditions of safety will be observed. . . . Bad methods of operation and management, inefficient supervision and inspection, poor discipline, and lack of co-operation between the different branches of the personnel, deficient structures, roadway, and equipment, all of which introduce fundamentally dangerous conditions, still exist, and can not be remedied by the use of automatic appliances.

General Conditions Affecting Safety.—Notwithstanding the increased safety due to the extension of the block system during the last 10 years and to the increasing use of safety appliances, there is no sensible diminution in the total of railway casualties. The fact which has most strongly impressed the board is the lack of some central authority with power adequately to deal with the subject of safety in all its phases. The trouble with all railway safety legislation thus far seems to be that it has only attempted to deal with the problem in piecemeal fashion. Much of this piecemeal legislation has resulted in good, and it has greatly contributed to safety. The safety-appliance acts particularly have been of inestimable benefit to employees. But it is nevertheless true that legislation of this character lacks correlation, multiplies administrative functions, and duplicates work. It very naturally causes irritation and resentment on the part of railway managers, because they know not where it is going to stop and have constantly to create new functionaries and introduce changes in their already complex organizations in order to meet its demands.

The results contemplated by the present law can not be accomplished by any such organization as this board. The mere examination of devices intended to promote safety in railway

operation can lead to but meager results from the standpoint of public safety. This board can do no more than render an opinion concerning the merits of devices examined, and when favorable opinions are rendered it has only the effect to enable the proprietor of the approved device to advertise more extensively. A further evil in the situation is that the proprietors of approved devices, and even many of those that are not approved, are soliciting Congress for legislation compelling the railways to use their particular devices.

Any further legislation dealing with safety in railway operation, to be fully effective, should deal as comprehensively with the whole subject of the physical operation of railways as existing law now deals with the subjects of railway rates and accounts. In other countries it has been found necessary to put such matters in the hands of a commission, a cabinet minister, or some other officer specially qualified. It is the opinion of the board that with respect to the matter of safety the time has come in this country to inaugurate a system of supervision over interstate roads somewhat similar in character to that now administered through the British Board of Trade. An organization should be created having ample, though carefully restricted, powers of investigation and inspection, as well as of administration of laws sufficiently broad to insure adequate regulation of the details of construction, maintenance and operation of all interstate roads, so far as concerns safety.

Such a body should assume control of the functions now comprehended under the various safety-appliance, boiler-inspection, hours of service, and accident investigation laws, and in addition should take cognizance of matters relating to personnel, methods of operation, and the physical construction of railways, as well as the condition of roadway, track and equipment, and should have authority to require repairs or changes to be made when necessary to remedy dangerous conditions. It should supervise train schedules, in so far as safety in train operation might be affected by the physical condition of roadway and the use or non-use of means to promote safety; in short, it should deal as comprehensively with the question of safety on interstate roads as state railway commissions now deal with the question on the roads under their jurisdiction.

The need for such a federal body is shown by numerous instances of unsafe practice which have been observed by the board. For example, a recent collision on one of the largest and best organized roads in this country, a road which has always been foremost in the use of improved apparatus and methods to promote safety, was found to have been due to a deficiency in an interlocking plant. The electric circuits used for controlling the movement of switches and signals at this plant were entirely different from those shown by the circuit plan provided and on file. Inspections conducted by the board have developed numerous facts which lead to the conclusion that in many cases responsible officers either do not know what is going on on their own roads or that they are permitting inexcusably dangerous practices to continue even when the cost of correcting such practices would be insignificant. Periodical inspections by some governmental agency empowered to correct unsafe conditions would have a strong tendency to insure that inspections made by the railways themselves would be more thorough, and that the corrective measures taken by them would be more effective.

Publicity is undoubtedly a powerful influence, but it is too much like a weathercock, which points only when the wind blows, and, if undirected, it can not logically be expected to acomplish more in the future than it has in the past.

The practical effect of the publicity which would be given to bad conditions by the inspections of an organization such as is here proposed would be to compel the observance of proper methods and a stricter observance by railway companies of their own rules and regulations. The conditions necessary for securing safety are well known to railway managers. They are discussed frequently in meetings of railway associations. The existence of these numerous voluntary associations and of the various state commissions points strongly to the necessity for some clearing house through which the best ideas of all interested parties can pass and be put in such form as to make them available for the benefit of all. The railways are well organized to represent their own interests, as are also their employees, but the public must look to governmental agency to protect its interests. Many of the state railway commissions now exercise within their respective states all the powers here advocated. The board believes that a federal body having similar powers over interstate roads is both reasonable and necessary. The state commissions impose upon the railways a wide variety of regulative restriction, which is not only confusing but annoying. The moral effect of a federal organization in stimulating individuals to greater effort and compelling closer attention to the conditions of safety would be great. In the very nature of things the presence of a properly constituted federal body could not help but tend strongly to unify the practice of different roads, and by co-operation with state commissions evolve a uniformity of governmental requirement highly desirable from the standpoint both of the public and the railways. By harmonious co-operation of the federal government with the companies themselves and with the various state commissions and the associations it is believed that methods could be evolved and standards to suit different conditions gradually adopted in such manner as to prove far from burdensome to the railways and yet greatly promote safety.

Further study could only result in more specific recommendation—such recommendation, in fact, as should form no part of the general legislation proposed. Any further study should be conducted by the railways themselves, acting in co-operation with and under the guidance of such a central authority as is here indicated. Such co-operation is believed to be absolutely necessary if the results obtained are to be homogeneous in character and of any real and lasting benefit. It is idle to expect that any uniformly good results could be expected from the very large number of state commissions acting independently. But if the railways with their organizations and the state commissions can all be brought together and made to co-operate under one central authority, then, and then only, can beneficial results be brought about.

The board has not ignored the fact that the largest railway systems in the world are to be found in this country, and that the magnitude of the problem to be solved is greater than in any other country; the very magnitude of the problem, in fact, is believed to constitute the strongest possible argument in favor of the establishment of a federal body, such as is here advocated, to deal with it. Full weight has also been given to the financial inability of many railways to provide all facilities for promoting safety which their officers would be glad to employ, and full recognition has been made of the progressiveness of the great bulk of railway operating officers. The larger companies, or those whose income is greatest, would probably of their own initiative have undertaken many of the reforms to compel which legislation has been enacted. It is believed that if such an organization as is here proposed were to be created and clothed with adequate power it would be hailed with satisfaction by practically all progressive railway managers.

Such an organization would need to be headed by men of undoubted ability and would require a large force properly to perform its functions. By proper correlation and co-operation of its various agencies, however, the work could be done economically, and it is believed that the total cost of performing these more numerous functions under such a plan would not be greatly in excess of the sum now spent in carrying out the requirements of existing piecemeal legislation.

MINORITY REPORT.

A minority report was submitted by B. B. Adams. He approved the majority report except as to the matter referred to in the minority report. He says that the establishment of a governmental department or bureau to exercise such extensive authority over the railways as is contemplated in the proposal of his

fellow members would be an experiment of such magnitude and would involve such a marked departure from previous practices that it ought not to be tried except in the most cautious and gradual way, after a period of negotiation or tentative action, The evils or weaknesses which are to be found in the railway service, and which are mentioned in the report, are not to be denied or minimized. Many railway corporations are administrative machines of such magnitude that inefficiency in some of their parts is almost inevitable, and in frequent instances the need of correction by an outside authority is undisputed. It is also to be admitted that the piecemeal legislation under which the government at present regulates safety on railways is uneconomical and crude.

In the separate states of the Union and in Europe may be found examples of governmental regulation of the physical operation of railways in which results have been salutary. But to attempt to regulate the operations of 240,000 miles of railway, carried on by 1,500,000 men, in 3,000,000 square miles of territory, through the instrumentality of a man or body of men sitting in Washington, with or without a large number of territorial or district agents, subordinates or associates, would be a task involving many new questions, for the settlement of which there is no precedent to serve as a guide. This government runs the Post Office Department with a good degree of efficiency, but its problems in that department are exceedingly simple compared with the problems of railway operation. The Interstate Commerce Commission inspects freight cars all over the country, and this work has had beneficial results, but here also the problems are simple and are dealt with under the stipulations of a rigid statute The British Board of Trade has exercised useful functions in the promotion of safety on the railways of the United Kingdom, acting through its four accomplished inspecting officers, but these officers' powers have never been other than recommendatory in any department of their field until after a long period of experiment. Compulsory powers have been granted by Parliament only after the inspectors, the public, and the railway officers have had opportunity to study the situation so as to be able accurately to estimate the probable effect of compulsion.

Conservative public sentiment in this country is jealous of governmental interference in private enterprises. The doctrine of laissez faire is not entirely dead and out of date. The country is so large and its problems so difficult that that doctrine is necessary, in spite of its incidental evils. The people are jealous of interference even as to those enterprises which perform public service and exercise monopolistic powers, except as faults of management which harm the public are seen to be so bad that "reform from the inside" can not be hoped for. Bad management, therefore, demands, in the first place, inquiry—publicity. Publicity often cures obscure evils which can not well be reached by governmental agencies directly.

As regards the question of safety, the federal government has thus far attempted no important regulation of railways other than publicity, except to require, as in the safety appliance statutes, that all railways shall adopt the practices of the best railways. In going thus far we are on tolerably safe ground. No very bad mistakes have been made. But for the government to command specific changes in railway practice, except in this cautious way, would introduce a radically different policy. If and whenever an agent of the government decides what a railway officer shall do, the state assumes some degree of responsibility for the acts of such officer.

Beyond publicity we enter an untried field. A railway president has the counsel of a board of directors and the advice of well paid subordinate technical officers. The government investigator, coming in to give these experts advice, labors under serious disadvantage. If he is an expert, like the British officers or like the engineer of an American state railway commission, he will probably have to tackle each problem single-handed. Or, if comparison be made with the doings of some of our state commissions, we see the deadening influence of uncertain tenure of office, imperfect appreciation on the part of the public, resulting in small salaries, and the distraction of political influences. The government officer must be a rare man. If the railways, after due warning from the President, voicing an intelligent public sentiment, shall take no effective steps to correct clearly defined evils, this rare man (or men) should be sought out. . . .

The government investigator should be a "high-grade" man, at least as high as the manager of the operating department of any one of our large railways. The tasks being intricate, the officer's education, experience, and character must be so high that his failure to accomplish what is expected or hoped for will not result in his condemnation. A personal character so strong that the public will accept unwelcome decisions is a prime desideratum.

The successful action of the British government in promoting safety on the railways of the United Kingdom has been accomplished by very slow degrees. The four inspecting officers are men of education, technical training and experience. More than that, they follow a pretty settled policy. The appointing power sees to it that vacancies are filled with men who will work efficiently in conjunction with the older inspectors. (The "board of trade," so far as it relates to safety in details of operation, may be said to be simply a minister—the president of the board of trade, who is a political person—and the four inspecting officers; that is all.) Compulsory legislation is adopted by Parliament only where experience has pointed out a plain path. The inspectors are only human and the rule that their conclusions as to railway operation shall be recommendatory and not mandatory is not only desirable but rational.

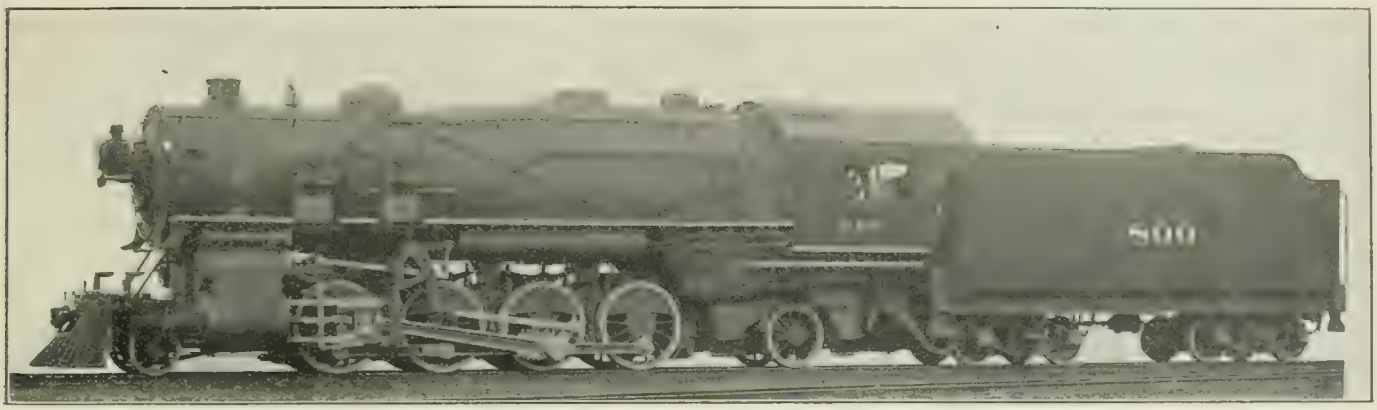
A very reasonable and safe, yet progressive, course for our government to take in the matter of railway safety legislation would be to enact the proposed law making the use of the block system compulsory. The principal section of this law is drawn in general and liberal terms. It simply requires the block system without prescribing apparatus or details. To require the use of the block system is simply the making of the best practice the general practice. Such a law has a firm basis in experience—widespread, general and long-continued experience. . . . The question of automatic stops, from the standpoint of the United States government, is the opposite of the block-signal problem. Instead of being simple, it is to a considerable degree elusive because many questions concerning the efficient installation and operation of automatic stop apparatus are yet to be settled by experiment. Neither the government nor any other body can at this time prescribe simple rules which are sure to be satisfactory; and a statute dealing with matters of this kind is quite likely to be abortive unless it is simple. It is to be remembered that with the best block signaling facilities and interlocking and with competent enginemen the occurrence of collisions which would have been prevented by the use of automatic stops is so very rare that a mathematical comparison of the relative safety in operation (with versus without stop apparatus) can not be made. Compulsory legislation would be likely to be either wasteful of resources or else ineffective by its crudity. . . .

If three, four, five or six men competent to deal with large questions of railway operation were to take up, on behalf of the government, the problems relating to the safety of passengers and employees which are now pending; if, having full powers of investigation, they were to devote to these problems their entire time for a year or two, and if they were then to lay before the commission, the Congress, and the public the results of their studies, then the proposal of the majority of this board could profitably be considered.

The employees of the Baden State Railways, Germany, who are stationed at places where there is no church of their confession, are granted free passage on trains to the nearest station where there is such a church on Sundays and church holidays. Their wives and their children under 18 are to have the same privilege. Heretofore they were limited to twelve such journeys a year.

MIKADO LOCOMOTIVES FOR HEAVY FREIGHT SERVICE.

Directly in accordance with the continual increase in weights and power of the more common types of locomotives, the heaviest and most powerful Mikado yet built is about to be placed in service on the Chesapeake & Ohio. It was built by the American Locomotive Company, being designed to haul a train of 4,000 tons up a 0.3 per cent. grade at a speed of 15 m. p. h. It has a tractive effort of 60,800 lbs., which is unusually large for an eight-coupled road engine, and is some 3,000 lbs. greater than that of any locomotive of the same type yet constructed. This



Powerful Mikado Locomotive for the Chesapeake & Ohio.

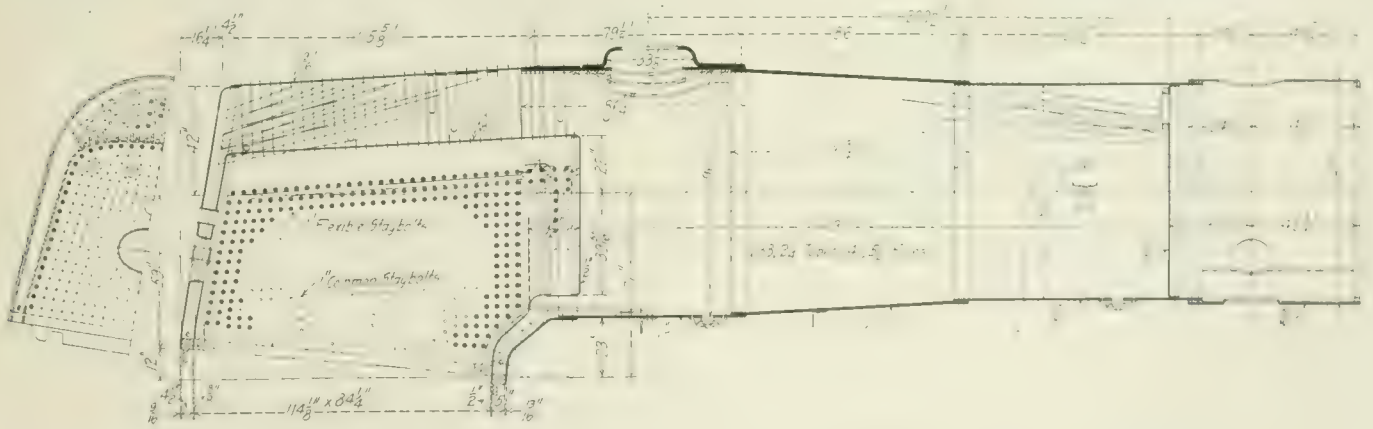
points to widespread possibilities in the Mikado as a design for heavy road service on lines of moderate grades.

Aside from the fact that it is the most powerful locomotive of its type yet constructed, the design presents another still more interesting feature. It was made so that a large number of its parts would be interchangeable with those of the Mountain type locomotives used on the same road and constructed by the same builders. Furthermore, this duplication has been obtained without any sacrifice in the efficiency of the Mikado for its requirements, as a study of the design will show.

The Mountain type provides a larger boiler capacity than the Mikado, and as far as the service possibilities are concerned, this is the real difference between the two. This decrease in boiler capacity is due to the fact that with the 4-wheel truck of the Mountain type locomotive a longer boiler can be used than with the 2-wheel truck of the Mikado. But it will be seen, when comparing this engine with the Mountain type, which was described in the *Railway Age Gazette* of September 22, 1911, that the heating surfaces are not very different, there being a difference of only 180 sq. ft. in the total evaporating surface*. As the length of the tubes is 19 ft. in both cases and the superheating surface is the same, the chief cause of the difference in the boiler capacity is due to the combustion chamber, which in the Mountain type is 42 in. long and in the Mikado, 19½ in long. The smoke box was also shortened. It must be considered, however, that if there had been no combustion chamber in the Mountain type, a reduction of at least 22½ in. in the length of each of the 238, 2¼ in. tubes would still have been necessary, making a total of 263 sq. ft. less of evaporative heating surface for the Mikado, combined with a proportionate reduction in the superheating surface.

Also, in the ordinary design of locomotives equipped with a fire tube superheater of the type used it is unlikely that it would be possible to move the front tube sheet forward, as was done in this case, the front tube sheet of the Mountain type engine being 52½ in. back of the center of the cylinders. If this could not have been accomplished the tubes would have had to be shortened 35 in., which would result in a still greater reduction in boiler heating surface. In the Mikado locomotive the distance between the center of the cylinders and the front tube sheet is 31½ in.

Both types provide a good firebox construction with a deep throat sheet, although that of the Mikado has been altered to suit the boiler requirements. They both have the Security sectional brick arch of the same general design, although the arch in the Mikado engine is about 3 in. nearer the crown sheet on account of the difference in the throat sheet necessitating a different curve in the arch tubes.



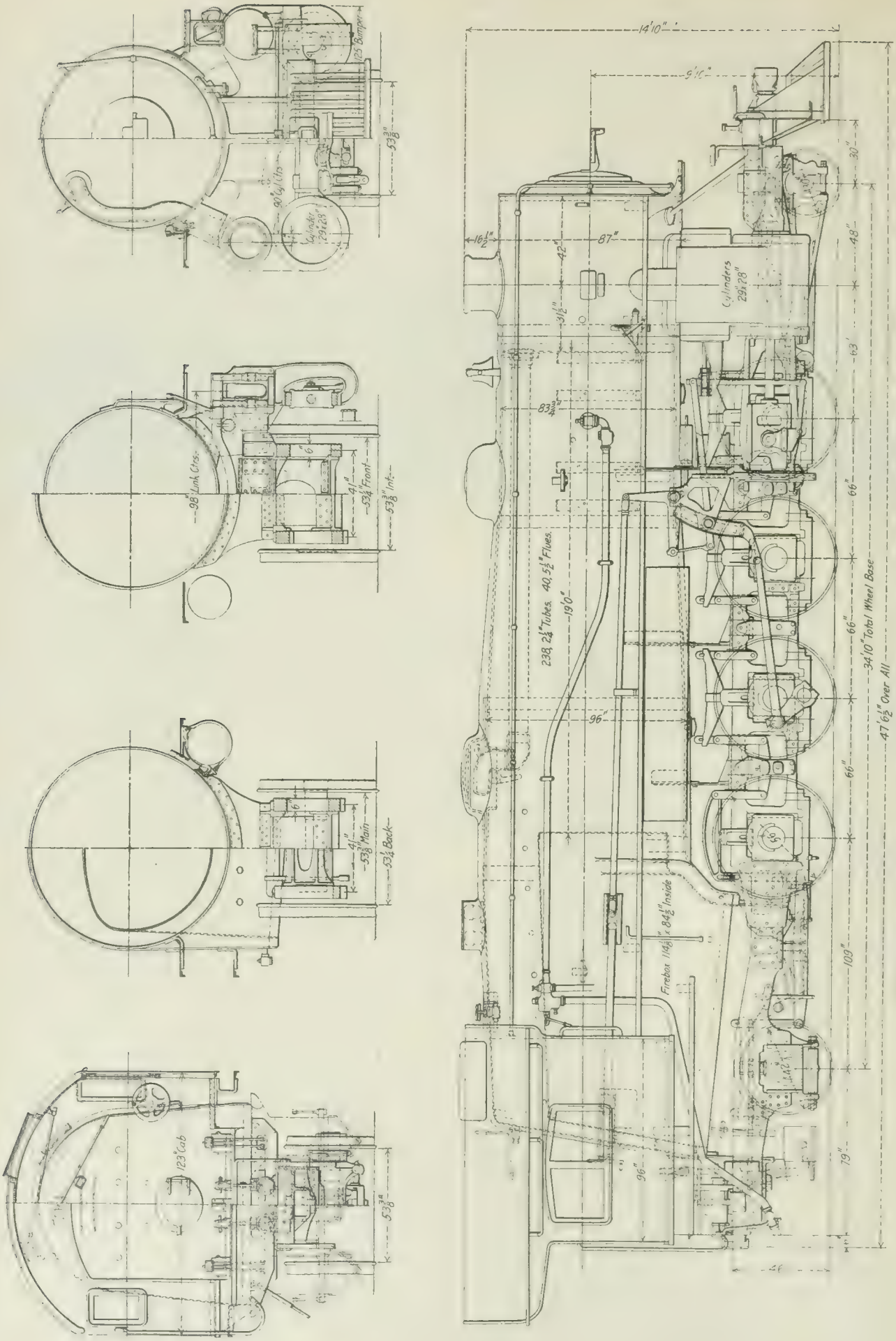
Boiler of the 158-Ton Mikado Locomotive, Chesapeake & Ohio.

Briefly stated, the other relative advantages of these two types of locomotives as far as service possibilities are concerned are:

Mountain type:
- Greater starting power than the Pacific type.
- Greater capacity at speeds proportionate to its smaller drivers than the Pacific type.
- Greater boiler capacity, giving greater hauling capacity at higher speeds than the Mikado.

Mikado type:
- Greater capacity at higher speeds than the consolidation.
- More weight on drivers for less total weight than the Mountain type.
- Greater hauling capacity at moderate speeds than the Mountain type.

*The total evaporating surface of the Mountain type locomotive for the Chesapeake & Ohio is 4,321 sq. ft. and the same number of tubes is used as in the Mikado.



Elevation and Sections of Mikado Locomotive for Heavy Freight Service; Chesapeake & Ohio.

From an analysis of the above characteristics it would seem that the Mountain type lends itself readily to a very satisfactory design of locomotive for fast freight service, particularly where a greater capacity at higher speeds is desired than can be provided in the Mikado type. These two types, therefore, where conditions are favorable, as for instance on systems traversing both low grade and mountain grade districts, as in the case of the Chesapeake & Ohio, offer far reaching possibilities for securing a diversity of motive power equipment with interchangeability of detail parts.

Two of the Mountain type locomotives to which reference has been made have been in very successful operation for the past six months in a most difficult class of passenger service. They are handling trains of 10 and 12 steel cars, weighing 600 to 700 tons on sustained grades of 75 and 80 ft. to the mile with uncompensated curves, making the same schedule speeds (25½ m. p. h.) which the previous 108-ton Pacific type locomotives could barely make with a 350-ton train. The design here illustrated is practically a conversion of the Mountain type into a Mikado by the substitution of a two wheel for the four wheel leading truck of the former with but few other changes, and those are of such a character that there is duplication between the two classes of almost all the parts that require the most frequent renewals, or need to be kept in stock, as the following list shows:

Trailer truck axles, details of ash-pan rigging, tender truck axles, boiler tubes, boiler flues, dome cap, dome casing, driving boxes, trailing truck boxes, driving box bearings, elvin driving box cellars, trailing truck box, trailing truck box bearings, trailing truck, cab, blow-off cocks, injector steam valves, cylinder cock operating valves, cylinder cock operating cylinders, crank pins (except front pin), cross head, cylinders, cylinder heads, cylinder by-pass valves, cylinder head relief valve, coupler (pilot), coupler pocket casting, coupler pocket pins, eccentric crank, exhaust pipe, fire door, frame pedestal caps, frame shoes and wedges, frame cross ties (between back and main drivers, between main and inter. drivers), foot plate, chafing plate, grates, grate details, grate shaker rigging, pilot, pistons, piston rod, piston rod packing, parts of screw reverse gear, side rods, main rod bearings, sand box, smoke box front and door, link motion (similar), steam chest heads, throttle, dry pipe, valves and packing rings, valve rod and stem, valve rod guide, valve rod packing, driving springs, tender truck springs, tender and details, and tender trucks.

Outside of the differences in the wheel arrangement and a reconstruction of the boiler, which this entails, the other principal change is in the drivers, which are 62 in. on the Mountain type and 56 in. on the Mikado. The rigid wheel base on both engines is 16 ft. 6 in., but on account of the leading trucks the total wheel base is different. A mechanical stoker of the same type as that with which the previous engines were equipped has also been applied. The various changes in the design have reduced the weight 15,000 lbs., the engine here illustrated having a total weight of 315,000 lbs., as compared with 330,000 lbs. of the Mountain type.

A boiler pressure of 170 lbs. per sq. in. is used on the Mikado type as compared with 180 lbs. on the Mountain type. With the 56-in. drivers and the same size cylinders as the latter type, this gives the Mikado a tractive effort of 60,800 lbs., as compared with 58,000 lbs. for the Mountain type. It is probable that this engine will be used in service similar to that in which the Mallet locomotives of the Chesapeake & Ohio are now operating. This will give opportunity for interesting comparisons, and will attach especial interest to the performance of the Mikado, which should be carefully followed. Following are the important dimensions and ratios of the Mikado locomotives:

General Data.

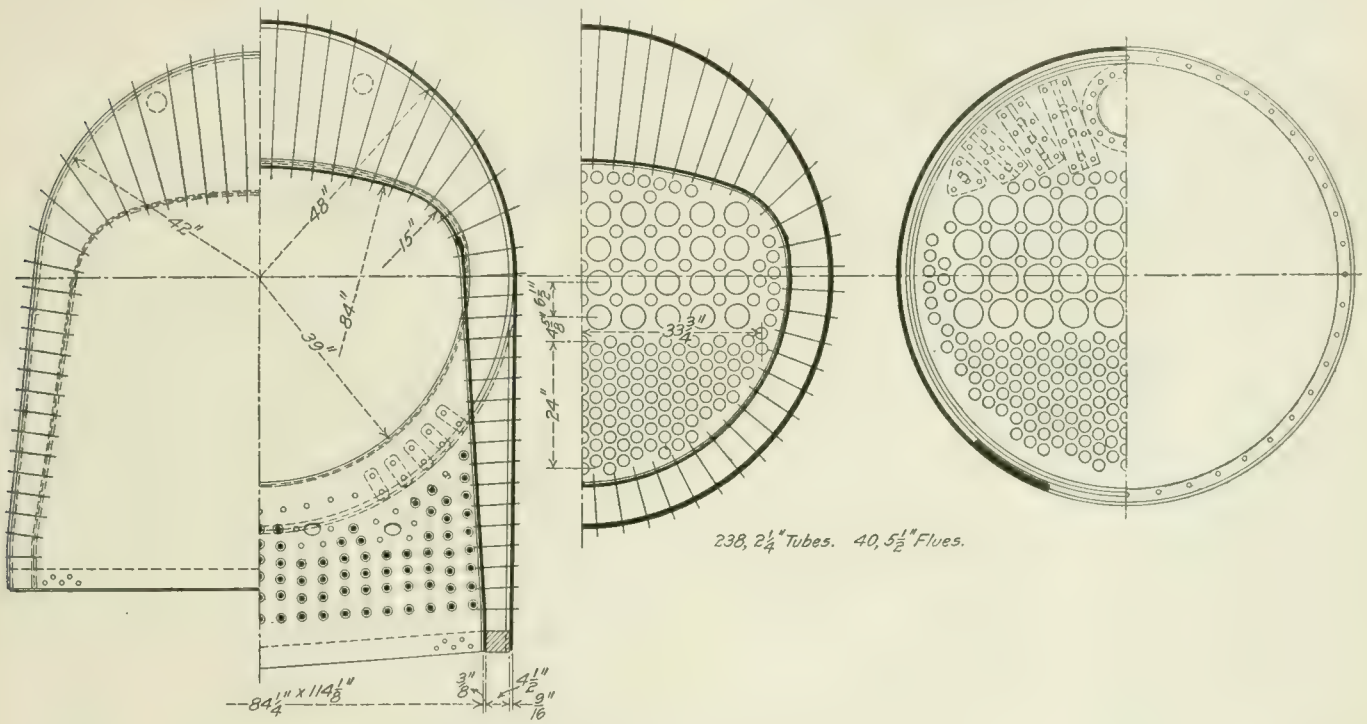
Type	2-8-2
Service	Freight
Fuel	Soft coal
Tractive effort	60,800 lbs.
Weight in working order	315,000 lbs.
Weight on drivers	243,000 lbs.
Weight of engine and tender in working order	484,700 lbs.
Wheel base, driving	16 ft. 6 in.
Wheel base, rear driver to trailing truck	109 in.
Wheel base, total	34 ft. 10 in.
Wheel base, engine and tender	67 ft. 11 in.

Ratios.

Total weight ÷ tractive effort	5.18
Weight on drivers ÷ tractive effort	4.00
Tractive effort × diam. drivers ÷ heating surface	840.
Tractive effort × diam. drivers ÷ *equivalent heating surface	640.
Total heating surface ÷ grate area	60.8
Total *equivalent heating surface ÷ grate area	79.8
Firebox heating surface ÷ total heating surface, per cent.	7.00
Firebox heating surface ÷ total *equivalent heating surface, per cent.	5.31
Weight on drivers ÷ total heating surface	60.
Weight on drivers ÷ total *equivalent heating surface	45.6
Total weight ÷ total heating surface	77.8
Total weight ÷ total *equivalent heating surface	59.2
Volume both cylinders, cu. ft.	21.4
Total heating surface ÷ vol. cylinders	188.
Total *equivalent heating surface ÷ vol. cylinders	248.
Grate area ÷ vol. cylinders	3.12

Cylinders.

Kind	Simple
Diameter	29 in.
Stroke	28 in.



Boiler Cross Sections of the Mikado Locomotive.

Valves.

Kind	Piston
Travel	7 in.
Steam lap	1 3/16 in.
Lead	3/16 in.

Wheels.

Driving, diameter over tire	56 in.
Driving, thickness of tire	3 in.
Driving journals, main, diam.	11½ in. x 14 in.
Driving journals, others, diam.	10½ in. x 14 in.
Engine truck, diameter	30 in.
Engine truck, journals	6¼ in. x 12 in.
Trailing truck, diameter	42 in.
Trailing truck journals	9 in. x 14 in.

Boiler.

Style	Conical connection
Working pressure	170 lbs.
Outside diameter of first ring	83¾ in.
Firebox, width and length	84 in. x 114 in.
Firebox plates, thickness	⅜ in.
Firebox water space, front	5 in.
Firebox water space, sides and back	4½ in.
Tubes, number and diameter	238—2¼ in.
Tubes, number and diameter (superheater)	40—5½ in.
Tubes, length	19 ft.
Heating surface, tubes	3,740 sq. ft.
Heating surface, firebox	283 sq. ft.
Heating surface, arch tubes	28.2 sq. ft.
Heating surface, total	4,051.2 sq. ft.
Heating surface, superheating	845 sq. ft.
Heating surface, total equivalent	5,318.7 sq. ft.
Grate area	66.7 sq. ft.
Center of boiler above rail	9 ft. 10 in.
Top of smokestack above rail	14 ft. 10 in.

Tender.

Tank, style	Water bottom
Frame	13 in. channels
Wheels, diameter	33 in.
Journals	5½ in. x 10 in.
Water capacity	9,000 gals.
Coal capacity	15 tons

*Total equivalent heating surface equals total heating surface (4,051.2 sq. ft.) plus 1½ times superheating surface.

OPPORTUNITIES FOR ECONOMY ON RAILWAYS.

BY L. C. FRITCH, C. E.,*

III.

STATIONERY AND PRINTING.

The item of railway operating expenses classified as "Stationery and Printing" seems to most minds so insignificant as to escape scrutiny, and any effort toward economy in it would seem likely to produce small results. In the aggregate, however, this item forms an important feature of operating expenses. When one reflects that of every dollar expended on our railways a little more than one cent is spent for stationery and printing, it seems worth while to consider if this item is not too large. Not much effort would be required to reduce the expense to three-fourths of a cent, which would mean a saving of about four millions of dollars annually.

During the year 1909 our railways spent about sixteen and one-half millions of dollars for stationery and printing. On one of our largest systems $2,300,000 was spent for this item alone. During the same year on this same system about one-half million dollars less was spent for steel rails than for stationery and printing. Careful supervision was doubtless exercised in the allotment for steel rails, but was the same care exercised in an item that cost about one-fourth more in the aggregate?

These facts indicate the force of the principle that no item of expense is so small that it does not deserve careful scrutiny and supervision, if the most economical results are to be secured. It is almost safe to say that on some of our large systems of railways a careful and reasonable supervision over this particular item of expense would result in sufficient saving to pay the salaries of all the general officers.

It must be borne in mind that the expense herein discussed includes only the cost of material, and neglects entirely the other large item represented by labor which would include the labor of the clerical force required in the use of the material to "finish the product" and the time consumed by numerous other forces, clerical and official, in contemplating the finished work.

*Chief Engineer Chicago Great Western, ex-president American Railway Engineering Association. Mr. Fritch's first article dealt with fuel economy and was published in the *Railway Age Gazette*, November 24. His second article, dealing with material and supplies, was published December 22.

On one of the representative railway systems investigation shows that over 1,400 forms of stationery are in use. Whether or not this number is actually necessary only a careful analysis will prove. One is reminded of the action taken a number of years ago by a general officer of one of our largest systems, who found on examination that 1,500 forms were in use, and who, by a process of careful elimination reduced this number by less than one-half without detriment to the service. While no arbitrary standard can be practically established to determine the number of forms required to carry on properly the business of a large transportation system the fact remains that without proper supervision and check, it is possible that a multiplicity of forms may creep into the operations that could be eliminated without any effect on the results except a reduction in the cost of stationery and printing and the cost of labor in the use of the forms.

On many railways there is in effect a supervision over this item by a "forms committee," whose duty it is to carefully examine all forms in use and to approve all new forms before adoption and issue. This method has a tendency to reduce the number of forms used to actual necessities, and if the committee faithfully discharges its duties, economical results are certain to accrue. The committee should not only pass judgment on the necessity for the forms adopted, but should regulate the quality and quantity supplied.

If officers responsible for putting forms into effect would stop to consider three things, many needless forms would be eliminated. First, is the form contemplated absolutely necessary? Second, is the expense involved in printing and in using justified by the value of the information given? Third, will the results secured be actually utilized?

The requirements imposed upon railways by commissions of various kinds by rules or laws regulating the operation of carriers are annually costing the railways millions of dollars, much of which is an absolute waste, but a waste which the carriers are absolutely powerless to control. To illustrate, the requirement that a set of tariffs shall be kept on file at each station where shipments are handled is one that costs the roads large sums and is of no possible benefit to the public. Not one person in one thousand could secure the information desired by him by referring to the tariffs. The public is given the right to ask for any rate whether the person requesting the information contemplates shipping or not. At certain large centers full tariff bureaus are required to be maintained at heavy expense. The requirement is entirely unnecessary, as the public is fully protected by the fact that penalties are imposed if carriers quote other than the legal rates filed with the Interstate Commerce Commission.

The interstate commerce law has proved beneficial to railways, but many of its requirements impose needless expense. The cost of stationery and printing in the traffic department of each of our largest railway systems exceeds one-half million dollars a year, a large part of which is due to the publication of tariffs under the requirements of the interstate commerce act. To this expense must be added the cost of compiling the data for tariffs. If reasonable rules were made governing these matters, eliminating all unnecessary and superfluous matter, millions of dollars would be saved annually to the carriers and the public interest would be as fully protected. There are millions of tariffs on file at stations on railways and countless other duplicates on file in the federal and state commissions that are never consulted and serve no purpose. All this waste might be conserved.

From one-third to one-half the cost of stationery and printing is chargeable to the traffic department, which is largely due to the issuing of tariffs. Aside from the opportunity for economizing in eliminating unnecessary tariffs now required by law and orders of commissions great savings can be effected in the method often pursued in issuing tariffs. Original data for compiling tariffs is often incomplete, requiring frequent changes in proofs which must often be made at overtime rates. In many instances the changes made in original copy cost more than the

first setting up of the tariffs. The printing of tariffs is one of the most lucrative jobs for the printer, and one of the most expensive for the railways. A careful inquiry into this matter will cause surprise to some of the roads as to what may be accomplished by the exercise of reasonable care in conducting this important branch of the business. A proper system of tariff filing will also aid in economy in the use of tariffs, reducing both the quantity required and the time necessary to consult them.

There should be a general house-cleaning in the matter of forms in use about once every five years by means of a competent committee appointed for the purpose, such committee having a reasonable representative from each department. It is surprising the number of special forms that are established and continue to be issued and prepared long after their original purpose has been accomplished. A special report may be required for some particular purpose. No instructions are issued to discontinue the report after it is no longer needed, and it continues to be issued and on receipt is promptly consigned to the waste basket, or filed away without comment.

The writer has found it very useful to have compiled once each year a special report by large freight stations of each report made showing "Form No.," "Regular or Special," "Period Rendered," "To Whom Issued" and "Cost of Rendering." The statement is then sent to the heads of the departments with the request to eliminate any reports no longer required. Many unnecessary reports are thus eliminated.

It is important for the proper management of a railway that prompt and accurate knowledge be available showing the results of operation. On many roads the practice is to secure this information from the various departments directly. It is believed that the accounting department should be the clearing house for all data bearing on operation in all its phases. A statistical branch of the accounting department can more promptly and economically collect data on any subject than can be done through various other channels. A traffic officer may desire to know the tonnage and earnings of a given commodity moving between certain points for certain periods. The agents are usually requested to compile such information. The sources of information may be various, and the work may require much time and effort. All the billing records are in the accounting department from which the data could be secured by classification in much less time. The same applies to operating statistics which should be compiled and furnished by the accounting department.

Much can be accomplished by standardizing stationery and supplies by reducing to common standard sizes all forms where possible, issuing half sheets for minor points, reducing the quality of the paper and binding to suit conditions of use and keeping a proper check on distribution and use of supplies. It was found on one road that seventy-two kinds of envelopes were being used. Every possible need could be met with one-half that number.

It has often occurred that in collecting superfluous stationery over a system car loads of stock have been accumulated. First, the distribution of supplies must be regular and systematic. Second, the proper care must be taken of supplies in well adapted cases or rooms. Third, their use must be surrounded with intelligent supervision, and wastefulness must be checked. It should be some one's duty at each location to be responsible for the care, issue and use of supplies. It is the disregard of these seemingly unimportant details that causes most of the waste in this item of expense. Stationery and stationery supplies are commonly regarded as property not worthy of special care and every one uses them indiscriminately and wantonly.

There is no uniformity on various railway systems in the item of cost of stationery and printing, as is evidenced by the following statement which shows the expense of this item for three groups of representative roads. Class "A" embraces six roads of 10,000 miles and upward; class "B" roads of 5,000 to 10,000 miles, and class "C" roads from 1,000 to 5,000 miles. The cost of stationery and printing for each department, the total cost for the road and the operating expenses in terms of $1,000 for the year 1909 are given.

Class "A."

Road No.	1,000 Miles.	M. W. Dept.	M. E. Dept.	Traffic Dept.	Trans. Dept.	Genl. Exp.	Total S. & P. Exp.	Total Opr. Exp.	Ratio, Total S. & P. Ex. to Total Op. Exp.
1	11	24	40	359	358	90	871	59,375	1.5
2	11	21	25	218	210	97	571	65,364	.9
3	12	69	77	550	596	204	1,496	149,694	1.
4	11	85	191	595	1,147	281	2,299	194,449	1.4
5	10	69	39	161	210	104	583	57,801	1.
6	10	29	39	212	289	125	694	67,460	1.

Class "B."

1	7.8	18	14	132	184	40	388	43,500	.9
2	7.8	11	13	119	161	52	356	39,410	.9
3	6.9	13	7	72	74	35	201	32,579	.6
4	8.2	22	26	254	279	93	674	55,234	1.2
5	6.0	9	7	78	106	52	252	36,504	.8
6	6.2	20	26	161	153	156	516	36,619	1.5

Class "C."

1	4.5	14	20	171	235	74	514	51,887	1.
2	3.6	7	9	63	211	54	344	35,414	1.
3	1.1	11	11	60	107	31	220	19,344	1.2
4	2.5	15	26	105	136	55	337	35,112	1.
5	1.4	4	9	44	61	22	140	20,576	.7
6	2.9	8	9	54	273	46	388	43,340	.9

An analysis of the above statement will quickly determine the roads on which this expense is above the average. The average cost on all roads is about 1 per cent. of the operating expense. Therefore, if two decimal points are placed at the figures of total operating expenses and compared with the figures under total S. & P. expenses, it will be shown whether the expense is low, normal or excessive. The ratio of operating expenses to total expense for stationery and printing shows at once the result on the various roads represented. The poorest showing is made by Roads 1 and 4, class "A," and roads 4 and 6, class "B," and road 3, class "C." The best showing is made by road 3, class "B." There is possibility of improvement on all roads where the ratio exceeds 1.

There is an opportunity for economy in the item of expense of stationery and printing by railways conducting their own printing establishments. This practice is now in effect on a number of large lines. Where the expense runs from $500,000 to $2,000,000 per year, an independent railway printing establishment would be justified and prove profitable. Railway printing is not of a highly technical character, and the profits resulting therefrom would accrue to the railway as a saving.

A number of smaller roads could unite in establishing a joint printing establishment on a co-operative basis. Common forms could be used by all lines parties to the plan, changes being required only in the road's title? Any technical work which the road's own plant could not handle could be done by outside concerns.

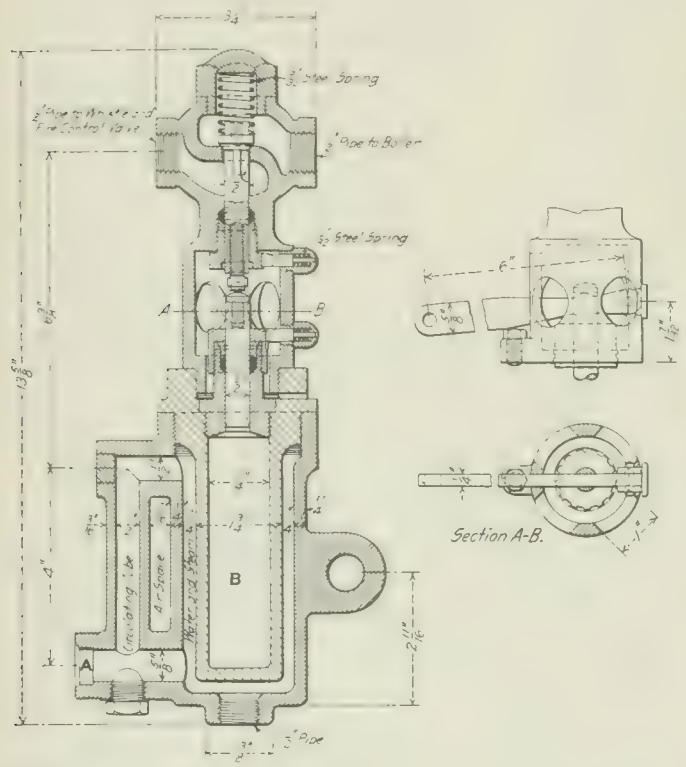
FOREIGN RAILWAY NOTES.

The Russian Warsaw-Vienna Railway, which is to become a state railway, is of the European standard gage, and will probably be changed to the Russian standard (5 ft.). It is almost the only private railway on the Russian border, and in case of mobilization of troops on this frontier a difference of gage would be a serious obstacle, at a point where a very few days' delay might determine whether a campaign would be conducted in Russian or foreign territory.

In the course of his evidence before the New South Wales public works committee in regard to the proposed line from Wyalong to Hillston, via Yalgogrin and Rankin's Springs, W. J. Hanna, under secretary of public works, said that the line would be a little over 110 miles long, and its estimated cost with 60-lb. rails would be $1,758,775; with 70-lb. rails, $1,887,900; with 80-lb. rails, $2,040,075, exclusive of land and compensation. The work on the line will be of like character and the line will pass almost entirely through crown land.

LOW WATER ALARM.

Statistics on boiler explosions, both stationary and locomotive, show that in a large proportion of cases the original cause was low water. This, of course, is generally due to the inattention of the engine crew, but sometimes results from the stopping up of the passages to the water level indicator. For use in either case, an alarm apparatus which automatically blows a whistle when the water level reaches a certain pre-determined point, has been applied to a number of locomotives on the Southern Pacific. It has been in service with excellent results for over a year, and is now being applied to all new power on this road and to some

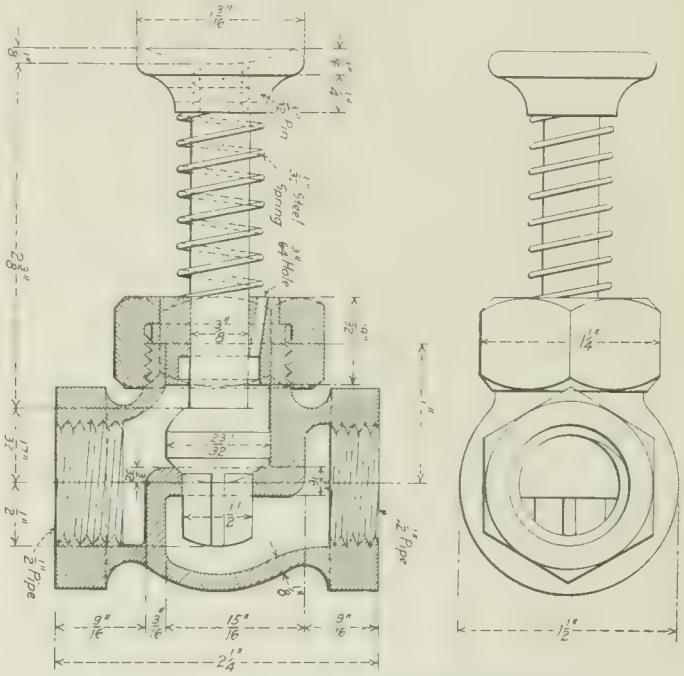


Section of Automatic Low Water Alarm and Fire Control Apparatus.

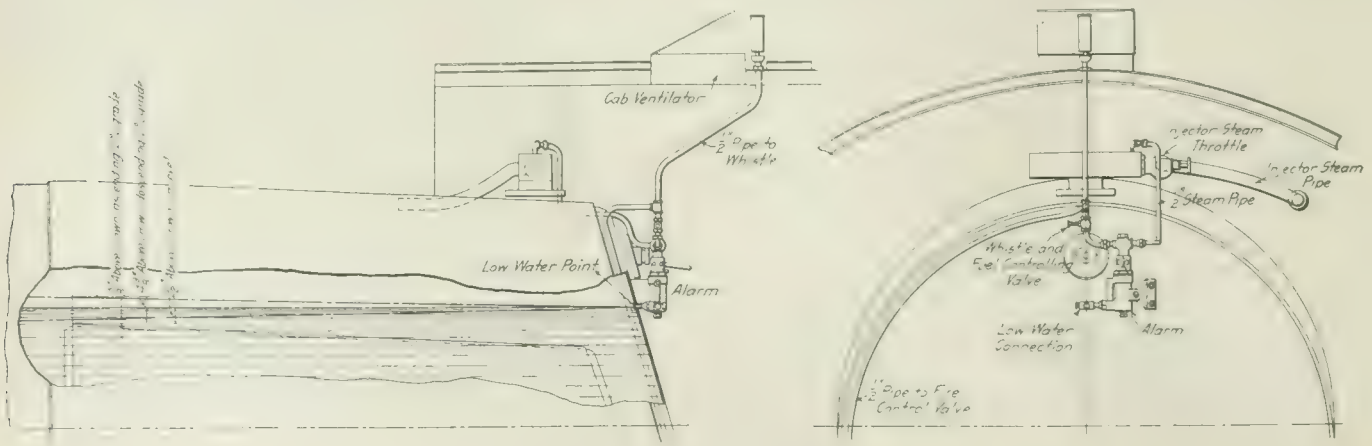
locomotives on other roads. The apparatus was designed at the Los Angeles shops of the Southern Pacific, and has been found suitable for use on stationary boilers as well as locomotives.

As shown in the illustrations, it consists of a cast iron cylindrical chamber with adjacent passages for the circulation of water and steam, which encloses a steel cylinder *B*, containing about 3 lbs. of mercury. There is a ¼ in. space at the sides and bottom between the mercury cylinder and its enclosing casting. A 5/8-in. passage at the bottom leads through *A* to the connection on the boiler, which is located at a point below which it is believed the water should not be allowed to drop. The method of determining this point is shown in the general drawing and depends on the grade on which the locomotive is to be operated. It may be seen that the alarm is thus given before the crown sheet is bared, differing in this respect from fusible plugs. Above the mercury is a half-inch piston suitably fitted with packing, which passes through an adjustable connection to the stem on a half-inch steam valve. This valve is held on its seat by a steel spring of sufficient size to force the piston and connecting parts down as the mercury recedes.

The space around the mercury cylinder contains water which is entrapped from the boiler, and since there is no opportunity for circulation, it becomes cool by radiation and is held in place by the pressure in the boiler up to the time the level drops below the opening to the apparatus. When this occurs the water is replaced by steam, which can circulate through the passages provided for the purpose, and the increase in temperature expands the mercury, forcing up the piston and raising the steam valve, thus allowing the steam to pass to a whistle and to a valve on the oil supply line in case of oil-burning locomotives, or for opening blow-off valve for spraying the fire in case of a coal-burning engine. The whistle will continue to blow and the spray continue over the fire as long as there is any steam in the boiler, unless the semi-automatic valve, which is shown in detail in one of the illustrations is closed. When this is done the flow of steam



Semi-Automatic Valve in Pipe Leading to Whistle and Fire Control.



Application of Low Water Alarm.

is shut off and the water level can be brought up to the proper point and the operation of the locomotive be continued without loss of time. This semi-automatic valve remains closed until the control valve of the alarm is seated by its spring, which will not occur until the space around the mercury is filled with water and cooled down. When the steam pressure on the semi-automatic valve is then released through the leakage port, the spring raises the valve from its seat and puts the whole apparatus into its original condition ready for service.

GARLAND REFRIGERATOR DOOR FIXTURE.

The difficulties found with nearly all forms of fasteners for refrigerator car doors are well known, and large damage claims are made against railways yearly by shippers, due to the failure in closing these doors tightly and securing them. The Garland door closing and opening device has been designed to overcome these difficulties. Doors equipped with this device have to be closed or opened—there is no half-way position. The appliance consists of two operating levers, each pivoted near the top and bottom of the door and connected by a link at the center of the door. These levers extend beyond the top and bottom of the

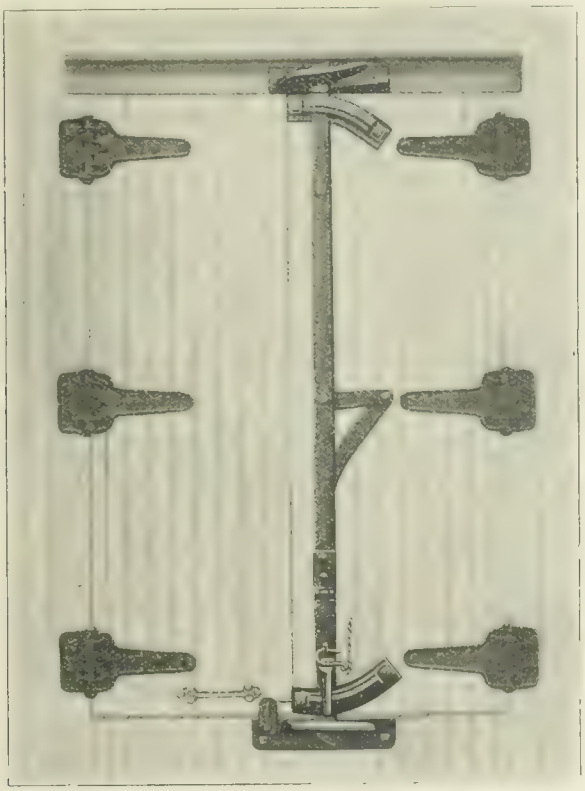


Fig. 1—Refrigerator Door Closed and Ready for Sealing.

door about 3 in. each, forming a wedge. Bolted to the framing over the door, and the sill below it, are keeper castings with beveled lugs for receiving the lever wedges. A locking handle hinged to the upper lever closes over a staple on the lower lever, and is sealed in the usual way. Guides hold the levers in place at the ends.

To close the doors with this device is very simple: First, close the left door; second, place the right door with levers extended to the left, as shown in Fig. 2 (levers will engage keeper castings when door is still between 3 in. and 4 in. open); then pull the hinged lock handle to the right until lever wedges pass into the keeper castings, forcing the doors completely closed. In opening the doors move the handle to the left, causing lever wedges to bear against the inclined face of the keeper castings, forcing the door outward by pressure on the guides. The right door is forced outward sufficiently by the levers so that it can be easily opened by hand. The keeper castings are extended inward under the threshold plate and across the door rail, where each terminates in a stop lug, preventing the left door being forced inward beyond the proper closed position. Pivoted to the base of the lower

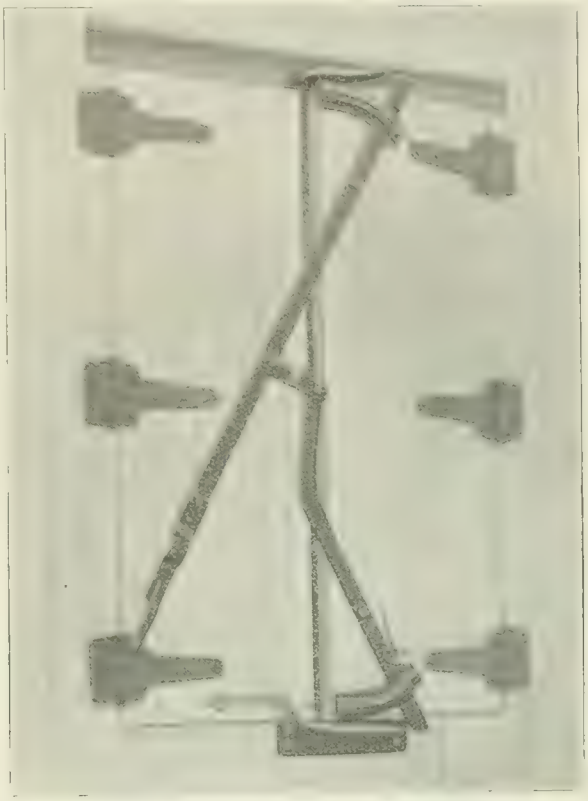


Fig. 2—Levers in Open Position.

keeper casting is a holder to prevent the left door bulging out when the right door is being closed. This device is made and sold by Burton W. Mudge & Company, Chicago.

FOREIGN RAILWAY NOTES.

The railway to Maryvale, Queensland, one of the sections of the long-talked-of Via Recta, was opened September 30. The Premier, who was present, said that the terminus would not remain at Maryvale. Plans for another section between Maryvale and Sandy Creek are to be filed at the next session of the legislative assembly. The great importance of the Via Recta scheme will be that the distance between Brisbane and Warwick will be reduced from 180 miles to 90 miles.

A contract was signed on November 9 between the Uruguayan government and the Midland Uruguay Railway for the construction of a branch line from Tres Arboles to Piedra Sola. This spur of 33 miles will connect the Midland lines and the northern half of the Central Uruguay's northern extension to Tacuarembo and Rivera, and will make a more direct route to Faysandu and Fray Benitos, the latter of which is fast becoming an embarking port of importance for livestock and produce.

To a recent deputation, the commissioner for railways of Queensland announced that he intended to use buffet cars on the railways with the object of supplying tea, coffee, soft drinks and fruit to passengers in transit, a supply of tropical fruits being a feature of the scheme. Approval has been given for the construction of a car at the Ipswich railway shops as an experiment. It has not been decided on what line the car will be tried, but it is probable that at first the car will be run on the western trains.

General News Section.

The government has begun suit in New Hampshire against the Boston & Maine to recover penalties for seven violations of the hours-of-service law, which it is alleged took place last July.

The government has begun suit in the federal court at Hartford, Conn., against the New York, New Haven & Hartford, to recover $11,500 in penalties for violations of the hours-of-service law, in overworking enginemen and trainmen in twenty-three cases.

Suits have been filed in the United States district court at Denver, Colo., charging 22 violations of the federal hours of service law by the Colorado & Southern, and five by the Colorado Midland.

The Canadian Pacific has decided to operate its locomotives on the Mountain division between Field, B. C., and Kamloops, with crude oil as fuel. Seventy-six locomotives are to be converted into oil burners, and seven oil tanks of 200,000 gal. capacity each will be erected at various points on this portion of the line.

At Pau, France, January 24, Maurice Tabuteau, flying in a monoplane, covered a distance of 196⅔ miles in three hours; an average of over 65 miles an hour. At Johannisthal, Germany, on January 25, Dr. Ulrich, flying in a monoplane, with three companions, remained on the wing at the aerodrome one hour thirty-five minutes.

The Texas railway commission has rejected the application of the International & Great Northen for authority to issue $3,000,000 of bonds to cover the cost of laying heavier rails on the lines between San Antonio and Laredo and Valley Junction and Spring. The commission announced that it would adhere to the rule of the Interstate Commerce Commission that only the difference in the cost of new and of old rails can be charged to capital account.

The Erie Railroad has announced the names of the track supervisors and foremen to whom have been awarded prizes for excellence in track work during the past year. The aggregate amount of these prizes was $2,925, the prizes being, usually on the larger divisions, $100 first and $50 second. On the Erie Railroad grand divison, the first prize, $100, went to D. C. Lyons and the second, $50, to J. Kennedy; these in addition to division first prizes awarded to each of these men.

The Federal Civil Service Commission announces examinations to be held February 20 to secure candidates for the position of passenger-rate clerk in the Quartermaster's Department at Chicago; salary, $1,200. There may be vacancies in other branches of the service requiring similar qualifications. A passenger-rate clerk has to revise transportation accounts and see to their payment, and must be thoroughly conversant with the intricacies of the various passenger-rate compendiums and tariffs, and the written and unwritten rules and customs of the carriers.

The Jacobs-Shupert U. S. Firebox Company is to conduct comprehensive tests of the Jacobs-Shupert firebox in comparison with a similar firebox of the standard staybolt type at Coatesville, Pa. Dr. W. F. M. Goss, Dean of the College of Engineering, University of Illinois, is to act as expert, outlining and afterwards directing the tests. The first series of tests will be made February 1, to determine the relative amount of heat absorbed by the fireboxes of the two boilers under similar conditions of operation. A second series, which will concern the low water tests, will begin on or about April 1.

According to investigations made by the New York State Publice Service Commission, Second district, a telephone operator ought to answer calls on an average within 3½ seconds from the time the call is made, and clear the connection, after the conversation, within 3½ seconds. This being done, the operator should be ready to respond to a call for another number within four seconds. Statements of the average results found in a number of cities are given in the commission's report. No single city shows the highest average in any one of these three elements, but at Elmira, N. Y., the average answer was made in 3.4 seconds and the average disconnection at the end of 3.1 seconds.

Committees of the Brotherhood of Locomotive Engineers have presented to all of the prominent railways east of Chicago and north of the Ohio river and the Norfolk & Western Railway, a request or demand for increased pay, the percentage called for being from 15 to 25 per cent. The object of the enginemen is to standardize the scale on all lines in this territory, as was done in the cases of the conductors and brakemen in 1910. The General Managers' Association has been asked to appoint a committee to negotiate with a committee of the Brotherhood in order to deal with the question collectively. A definite relation between the wages paid to enginemen and to trainmen and conductors has heretofore always existed, and the enginemen believe that they are entitled to a fixed advantage in wages over these other arms of the service. The increase granted to trainmen and conductors in 1910 destroyed this settled relation. A president in discussing this phase of the demands asserted that there was only one solution, for a difficult question of this kind at the present time, namely, reduce the wages of conductors and trainmen in the same ratio that those of the enginemen are advanced.

The proposed contract between the Illinois Central and the Board of South Park Commissioners of Chicago, which provides that the railway shall surrender to the board its riparian rights on the shore of Lake Michigan in return for a grant of additional land to permit of the widening and straightening of its right of way in Chicago, together with the right to fill in additional submerged land, has been subjected to considerable objection during the hearings before the city council committee. Members of the City Club have charged that the plan would give the road far greater benefits than would be received by the city. The contract proposed by the board has been defended as of enormous advantage to the city by Mayor Harrison, by the park commissioners and by members of the city plan commission, who are interested in securing the improvement of the lake front, for which the plan provides, including the erection of a new passenger station for the Illinois Central. The members of the City Club presented figures estimating the value of the property to be granted to the road at $21,290,000, and that to be turned over to the city at $3,930,000. It was shown by the advocates of the plan, however, that these figures were obtained by placing a high value on the land to be made by the Illinois Central by filling, without including a corresponding value for the land to be filled in by the city. President C. H. Markham of the Illinois Central has addressed a letter to the Mayor, stating that the company will not accept the ordinance as it has been revised in committee, providing, as it does, for restricting the use both of the land included in the present right of way, and of that included in the proposed grant of additional territory.

Safety Work on the Frisco.

W. B. Spaulding, chairman of the central safety committee of the St. Louis & San Francisco, has compiled a report of the casualties on the Frisco Lines for the last six months of 1911, during which the safety committee plan has been in effect, together with a comparison with the corresponding period of 1910. The report shows a great improvement in the safety of both the passengers and employees, which is attributed largely to the work of the safety committee.

There was a decrease of 5, or 14 per cent., in the number of persons killed, from 108 in 1910 to 93 in 1911. The number of injured was reduced from 2,950 in 1910, to 2,714 in 1911, a reduction of 236, or 8 per cent. In other respects the improvement is shown in the following table:

Year.	No. casualties.	Cash settlements.	Average per case settled.
1910	3,058	1,106	$135
1911	2,807	909	89
Decrease	251 or 8%	197	$46 or 34%

The January number of the company's employees' magazine, *The Frisco Man*, was made a "safety first" issue and contained articles from both officers and employees of the company, including B. F. Yoakum, chairman of the board; President B. L. Winchell and Vice-President W. C. Nixon, uring the importance of

promoting safety in operation. Several illustrations were presented of common ways in which employees are killed or injured, largely through their own carelessness; together with statistics showing the number of casualties to employees during the past year caused in these ways.

Coroner's Verdict Illinois Central Disaster.

The coroner's jury selected to inquire into the accident on the Illinois Central at Kinmundy, Ill., on January 22, has returned a verdict placing the blame for the accident upon Henry Schniederjohn, operator at Edgewood, and Harry J. Broecker, flagman on train No. 25, the express train which was struck by the Panama Limited. The jury also decided that the railway erred in not maintaining a sufficient interval between the trains. The operator is blamed by the jury for the same reason.

According to the report of the board of inquiry, appointed by the railway to investigate the causes of the wreck, whose findings were published in the *Railway Age Gazette* last week, the operator was not at fault. The rules of the railway require a ten-minute interval on that portion of the line, and the board found that the trains were correctly spaced both at Effingham, 30 miles north of Kinmundy, and at Edgewood, 14 miles north. No. 25 left Effingham at 11:49 p. m., passed Edgewood at 12:10 a. m., and was struck by No. 3 between 12:30 and 12:34 a. m. No. 3 left Effingham at 11:59 p. m. and passed Edgewood at 12:20 a. m. As to the flagman, the verdict of the jury coincides with the report of the board, which found the flagman negligent in failing to protect his train.

United States Steel Corporation's Earnings.

The report of the United States Steel Corporation for the quarter ended December 31, 1911, shows that the total net earnings were $23,105,115, after deducting all expenses incident to operation, including those for ordinary repairs and maintenance of plants, and interest on bonds and fixed charges of subsidiary companies. This compares with $25,990,978 earned in the corresponding quarter of 1910, and $40,971,309 in 1909. The earnings for the last quarter of 1911 were better than expected, as it had been estimated they would not exceed $22,000,000. The surplus for the year was $89,638 in 1911, as compared with a deficit of $5,591,968 in 1910. An appropriation of $6,000,000 for additions in 1910 largely accounts for this difference, as no appropriation for additions was made in 1911. The net earnings for the calendar year in 1911 were $104,255,563, compared with $141,054,755 in 1910 and $131,491,414 in 1909. The net earnings for the last quarter of 1911 were lower than for any similar quarter since 1904, when they were $21,466,631. The net earnings for the months of the last quarter of 1911 were $9,159,338 in October, $6,946,717 in November and $6,999,060 in December.

Hard and Soft Rails.

The public demands, and rightly, that railway transportation shall be safe and that rails shall not break. I am absolutely convinced that if the railways are to accomplish this they must be prepared to face a greater wear on steel rails. In other words, under the severe and often unknown demands of modern railway traffic choice must be made between safety and wearing quality in steel rails. Beginning about 1890, the railways of the United States began asking for higher carbon in steel rails, to secure great wear; and the railmakers, unwisely, and many times under protest, made the quality of steel demanded. Gradually the specifications called for still higher carbon, until today I believe the steel is within the danger zone of brittleness.

It is true, many of these hard rails never break, but the liability of breakage is much greater than in the old-time softer steel, and the influence of the unavoidable contingencies of manufacture, such as seams, pipes, and segregation, is much greater. In many respects the steel is more doubtful, more dangerous, and more treacherous. It is unquestionably, in my judgment, an unsafe grade of steel, in view of the severe conditions of service. If safety is to be the first consideration, lower carbon and softer steel would seem to be necessary. With such steel the various unavoidable defects or variations of commercial rails would be far less dangerous.

I believe I am correct in saying that harder steel is used in rails in the United States than in any other country, yet our wheel loads and train loads are much greater than those on foreign roads. When with increased weight of motive power and rolling stock it became necessary to strengthen our bridges, our engineers did not try to do so by using a harder and higher tensile strength steel. They increased the amount of metal of the kind they had been using, because they knew they must have a safe steel and large factor of safety. You might say that a soft rail would wear out more quickly. The old soft rails under the conditions of their day gave very satisfactory wear. It is my belief that that wear would be less rapid than most people estimate, provided of course, the section of rail is heavier.—*President Farrell, United States Steel Corporation, before the Congressional Committee.*

The Steel Corporation and Its Railways.

Herbert Knox Smith, Commissioner of Corporations, has made a report on the cost of steel, in which he says that the United States Steel Corporation makes excessive profits. The report was presented to President Taft and sent to the House Committee on Ways and Means for consideration in connection with revision of the steel schedule.

"The prices of lake ore," the report says, "have been kept for many years at an unreasonably high level compared with the cost of production."

In connection with the alleged excessive profits realized by the corporation from its ore railways, Commissioner Smith raises the question whether the public interest does not require a segregation of the ore railways from the Steel Corporation.

The report is based on an investigation of two-thirds of the country's production of iron and steel from 1902 to 1906, inclusive. It is estimated that the corporation has fully 1,200,000,000 tons of ore in the lake region. It is held that the price of Lake Superior ore during the greater part of the period 1902 to 1906, and, indeed, back to 1895, has been established in large measure by agreement among the principal ore-producing interests.

The transportation of 60 cents a ton realized by the Steel Corporation on its own ore over its principal ore-carrying railways and in lake vessels was "grossly excessive," the report alleges. As evidence of this, it is added that the corporation recently reduced the rates on its two principal ore roads.

It is safe to assume that the present reduced rate of 60 cents a ton is still excessive.

The report adds:

"Integration of industry to permit of large scale operations at minimum costs is exceedingly desirable, but integration of the steel industry with respect to transportation thus far instead of working to the advantage of the public in the form of lower costs to all shippers and lower prices has inured to the benefit of a great combination. Segregation of these railway properties from the Steel Corporation would stop what is unquestionably an evil, the imposition of high rates upon competitors' shipments. While in the case of integration of ordinary manufacturing enterprises it may be entirely proper that the most aggressive concern should reap the benefit of its enterprise, it is unquestionably different in the case of a public utility, such as a railway. Competition in the construction of railways is often impracticable. Moreover, the important ore roads of the Steel Corporation were obtained, not through superior ability, efficiency or foresight, but simply through superior command of capital as a result of combination."

Citing steel rails as an illustration, the report shows the cost of manufacture from the raw material to the finished article, in a comparison between the "book cost" of the corporation, which includes the inter-company profits, and the actual cost. The "book cost" on heavy Bessemer rails was $21.27. The intermediate profits were $2.47, making the revised cost $18.80. The price of Bessemer steel rails, the report says, has been fixed for more than ten years at about $28 a ton. It is roughly estimated, according to this, that the profit on rails thus equals from 11 to 17 per cent. of the investment.

"The most significant profits," the Commissioner continued, "were those on ore and on railway transportation."

Commissioner Smith calls attention to the very low costs for Southern pig iron. The chief reasons for the higher furnace cost of Northern pig iron were the large freight charges involved in assembling the raw materials at the Northern furnaces.

A Bill for Publicity About Sales of Securities.

Representative Harrison, of New York, has introduced in the lower house of Congress a bill which in general embodies the recommendations made by the Hadley securities commission in regard to publicity of the facts relating to the issue of securities by railways and other public service corporations. The bill would require corporations to file with the Interstate Commerce Commission, on or before the date of the issue of securities running more than a year, certain information, and require the filing of the same information for securities running less than a year, but would allow ten days within which to file the information. The principal requirements are that the total amount of the issue of securities authorized and the total amount sold, with a detailed description of the securities, should be filed; that the terms of sale shall be stated, and if part of the consideration is not paid in money, a detailed description of such consideration shall be given; and it is provided that if the par value is not shown on the certificate, the number of shares then and previously outstanding must be shown. It is made the duty of the commission to enforce these provisions and to make public the information received at its discretion, the certificates of notification, however, being at all times deemed public records and open to inspection. The corporations may be required by order of the commission to disclose every interest of the directors in any transaction. It is provided that the penalty for violation of the requirements shall be a fine of not more than $5,000 for each offense; and in addition, any director, officer, receiver, or trustee filing erroneous statements is made guilty of a misdemeanor, and may be fined or imprisoned for not more than two years.

New South Wales Railway.

A vigorous railway extension policy is being pursued by the government of New South Wales, and the following proposals have been referred for the consideration of the public works committee: Railways from Coonabarabran to Burren Junction, 87½ miles; Ballina to Booyong, 12 miles; Henty to Daysdale, 46 miles; Canowindra to Eugowra, 20 miles.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.; annual, May 7-10, Richmond, Va.

American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass.; annual, May 10-11, San Francisco, Cal.

American Association of General Passenger and Ticket Agents.—W. C. Hope, New York; next convention, Seattle, Wash.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Chicago.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September; annual, March 17, Chicago.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York.

American Electric Railway Manufacturers' Assoc.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

American Railway Association.—W. F. Allen, 75 Church St., New York.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

American Railway Master Mechanics' Assoc.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

American Railway Tool Foremen's Association.—M. H. Bray, N. Y., N. H. & H., New Haven, Conn.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

American Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Car Accounting Officers.—G. P. Conrad, 75 Church St., New York.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago. Convention, May 22-25, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

Master Car and Locomotive Painters' Assoc. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass. Convention, 2d week in September.

National Railway Appliances Assoc.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railroad Club.—C. L. Kennedy, C., M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Business Association.—Frank W. Noxon, 2 Rector St., New York.

Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

Railway Gardening Association.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.

Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio. Convention, May 20-22, Buffalo, N. Y.

Railway Supply Manufacturers' Assoc.—J. D. Conway, 2135 Oliver Bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

Railway Tel. & Tel. Appliance Assoc.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. Y., Sterling; September, 1912, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; August, 1912.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except, June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month except July and August, Chicago.

Traffic News.

The Denver & Rio Grande is to run an agricultural demonstration train on its lines in Utah, beginning February 20, carrying lecturers from the state agricultural college.

It is reported that the shippers of Spokane, Wash., have abandoned their plans for a boycott of the Hill Lines as being impracticable, but they are continuing the campaign for subscriptions for a fund to prosecute their contest for lower freight rates.

The Long Island Railroad has notified the newspapers of New York City that the general superintendent and the superintendent may be called by telephone, either day or night, whether they may be at their offices or at their houses, for the purpose of securing the essential facts of accidents or interruption of traffic.

The Atlantic Coast Line has started a "good roads" train which made its first trip on Wednesday last, and which is to traverse the company's lines throughout the State of Florida, making stops for the delivery of lectures on every week day until February 23. Models of road-making machinery will be exhibited in operation.

Five suits have been filed in the United States district court at Cincinnati for violations of the federal 28-hour law in the transportation of live stock. The defendants are the Covington & Cincinnati Elevated Railroad Transportation & Bridge Company, Baltimore & Ohio Southwestern, Cincinnati, Hamilton & Dayton and Cincinnati, New Orleans & Texas Pacific.

The Missouri Pacific has placed in operation between Kansas City and Hot Springs a new passenger train to be known as the "Kansas City-Hot Springs Express," under a schedule several hours faster than the best previously in effect. The train leaves Kansas City at 6:20 p. m. and arrives in Hot Springs the next day at 2:25 p. m. Returning it leaves Hot Springs at 11:30 a. m. and arrives in Kansas City at 7:30 the next morning.

The Secretary of War, after listening to protests from a committee representing the Pacific Coast, has postponed until February 15 the proposed increase in freight rates over the Panama road, and the steamship line between New York and Colon. The order to increase the rates was made because the work on the construction of the Panama Canal has been delayed by the heavy movement of freight over the railway. Besides this, the earnings of the railway and the steamship line for the quarter ending September 30 were not satisfactory.

George J. Charlton, passenger traffic manager of the Chicago & Alton, has been elected chairman of the executive committee of the Western Passenger Association for the ensuing year, succeeding A. L. Craig, general passenger agent of the Chicago Great Western. Mr. Charlton is following in the footsteps of his father, James Charlton, now chairman of the Transcontinental Passenger Association, who was the first president of the executive committee of the Western Passenger Association and served in that capacity for several years, and who was also general passenger agent of the Chicago & Alton from 1871 to 1900.

The extension of the Ocala Northern to Palatka, Fla., was opened for regular passenger and freight traffic on January 26, with two passenger trains each way daily. The whole length of the road is now open, Ocala to Palatka, 53 miles. At Palatka connection is made with the Atlantic Coast Line, the Georgia Southern & Florida, and the Florida East Coast. The railway trip from Ocala to Palatka is now 29 miles shorter than heretofore. Since this road was projected, 150,000 acres of land tributary to the line in Marion and Putnam counties have changed hands. The road has 4 locomotives, 6 passenger cars and 30 freight cars.

In the United States District Court at New York City, January 29, J. E. Bernard, M. Ascher, A. Bontaux and O. F. Kosche, all of Chicago, pleaded not guilty to indictments charging them with using false descriptions of merchandise received from foreign countries and shipped west by railway from New York. The same men were already held in $5,000 each on indictments charging them with having received rebates from the railways, and new bail bonds of $2,500 each were required. One of the charges was that skeletons, on which the charge is $2.25 per 100 lbs., were shipped as "natural history specimens," on which the rate would be 75 cents.

A conference between the National Baggage Committee, representing the commercial interests, and passenger and baggage officers of the railways, representing the various passenger traffic associations, was held at St. Louis on January 22 at the request of the shippers, for the purpose of discussing the demands of the committee for a readjustment of excess baggage charges in the direction of uniformity. It was decided to submit the question to a joint committee of seven railway officers and seven representatives of the shippers, which will hold further conferences on the entire subject of excess baggage rules, with particular reference to the recent efforts of the roads to limit the size of trunks.

Export Rate Hearing.

The Interstate Commerce Commission continued at Washington, January 24, 25 and 26, the hearing on the complaint of the Merchants' Association of New York, regarding export and import freight rates. Representatives of Baltimore and Philadelphia complained that in spite of the differentials now in force, New York does 61 per cent. of the export and import business going through Atlantic ports. C. R. Lewis, agent of the Cleveland, Cincinnati, Chicago & St. Louis, at Indianapolis, said that in the last year the export grain shipped from Indianapolis, went, 23 per cent. to Philadelphia, 52 per cent. to Baltimore, 18 per cent. to Newport News, and 6.3 per cent. to New York.

D. L. Irwin, of Philadelphia, said that at Philadelphia there were three grain exporting firms, including his own, while in New York there were seven or eight times that number. Philadelphia has the disadvantage of not having regular steamship sailings. Evidence was produced to show that on iron and steel shipped from Pittsburgh to Atlantic ports, the rates are the same to all ports.

The counsel for the Merchants' Association thought that the way to eliminate the differentials would be to reduce the New York rate to the basis of the Baltimore; but the representative of the Pennsylvania Railroad thought that it would be better to advance the rates of the other ports to the level of New York.

The Pennsylvania Railroad introduced a statement to the effect that in 1898 New York had 66.35 per cent. of the total export and import business passing through the six principal Atlantic ports; from 1899 to 1903 it had 68 per cent.; from 1904 to 1908, 72.47 per cent.; in 1909, 75 per cent.; in 1910, 75 per cent.; and in 1911, 77.53 per cent.

Representatives of the Boston Chamber of Commerce presented evidence that, having rates the same as New York, Boston could not hold its export trade as against Baltimore and Philadelphia. Boston asks for rates the same as those through Baltimore. The export business through Boston is decreasing.

Controversy Over Revised Western Classification.

The suspension board of the Interstate Commerce Commission held a preliminary hearing at Chicago on Monday, January 29, for the purpose of receiving the testimony of shippers who have asked the suspension of Western Classification No. 51, which is effective February 15. Members or attorneys of nine state railway commissions presented petitions asking that the entire classification be suspended for 120 days, declaring that advances had been made on 850 articles and reductions in 680, and that they would require time to determine the effect of the changes and present formal complaints. G. N. Brown, chief examiner for the commission, made it clear at the start that this was simply a preliminary hearing for the purpose of enabling the commission to determine whether any part of the classification should be suspended and that he did not care to hear general arguments for the suspension of the entire classification, but would first hear from shippers who had complaints on specific items. The general complaints he said would be heard later. The state railway commissioners thereupon withdrew, and after conference gave to the newspapers a statement that the chief examiner had prejudged their case, and that the railways were seeking to secure advances in millions of rates "by subterfuge." A large propor-

tion of the changes made in the classification comprise the recommendations of the Uniform Classification Committee, adopted at the Milwaukee meeting of the Western Classification Committee last summer, and affect rules, minimum weights and descriptions of articles without directly changing the ratings of the commodities.

Representatives of agricultural implement dealers and manufacturers protested against rule 6 B of the classification, which contains a sliding scale of minimum weights on agricultural implements, declaring that on the average they could not load 24,000 lbs. in a 36-ft. car, as provided by the rule. R. C. Fyfe, chairman of the Western Classification Committee, replied with a long statement of car records secured both from shippers and railways, showing actual instances in which far greater weights had been loaded in cars of this size without filling the cars. A large number of dealers also objected strongly to the elimination of binder twine from the agricultural implement list, on the ground that to deny them the privilege of mixing twine with agricultural implements would work a great hardship and require them to pay less than carload rates on both agricultural implements and twine. Mr. Fyfe argued that binder twine is in no sense an agricultural implement and showed that the price of the twine in less-than-carload lots was usually made one-fourth of a cent a pound over the carload price, although the rate made practically no difference per pound. For example, he cited the rates from Chicago to St. Paul, 20 cents per 100 lbs. in carloads and 25 cents for less than carloads, a difference of one-twentieth of a cent a pound. After some discussion Mr. Fyfe agreed to a restoration of the mixing privilege, because many dealers had already made their contracts for a season's supply on the former basis. Various compromises were also made on other items.

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association in presenting statistical bulletin No. 111-A, giving a summary of car shortages and surpluses by groups from September 28, 1910, to January 17, 1912, says:

"The total car surplus for the period ended January 17, 1912, is 102,479 cars as against a total of 142,316 cars on January 3, 1912, a decrease of 39,837 cars. This decrease is obviously due to the cold weather. The total coal car surplus reported on January 3, 1912, was 64,719 cars, while the report of January 17, 1912, shows a total of 42,770 cars, a decrease of 21,949 cars or about 65 per cent. of the total decrease for the period covered by this report. There are also decreases reported in box and miscellaneous cars, the former decreasing 13,034 cars, and the latter 5,128 cars. Flat cars show an increase of 274 cars.

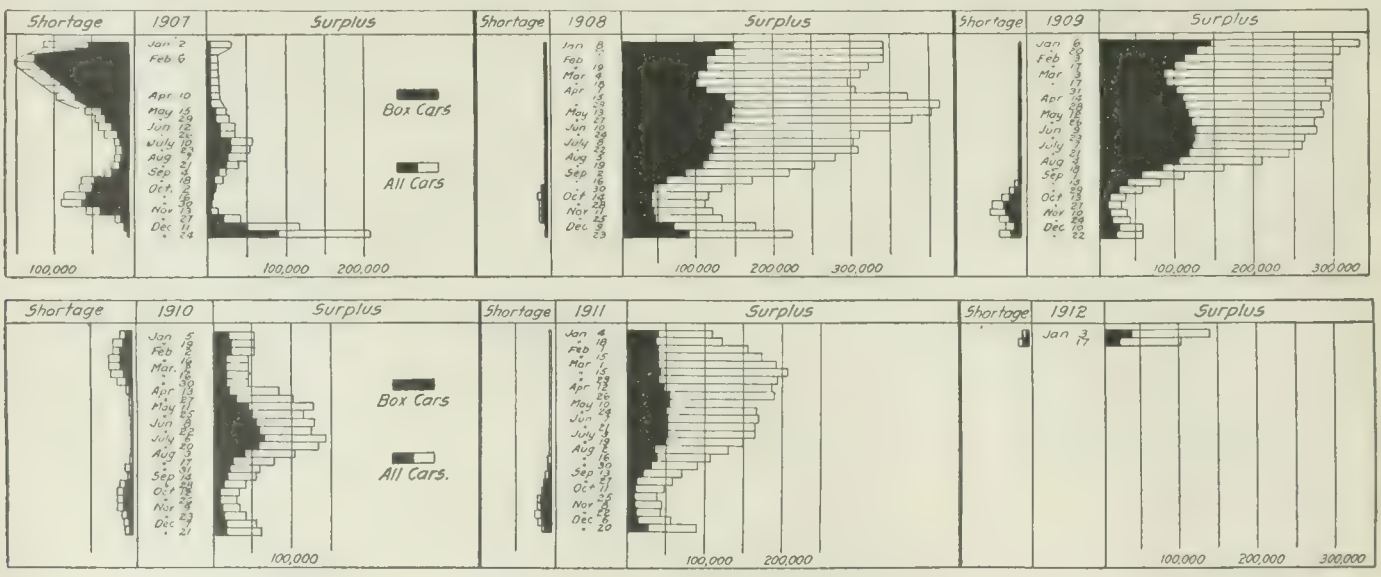
It will be noted that the total car surplus has not been reduced below the figures reported as of December 20, 1911—88,646 cars. The car shortage increased nearly 100 per cent., the total shortage for this report being 12,194 cars. The increase in shortage is chiefly in box and coal cars, these two classes increasing 2,917 cars and 2,487 cars respectively, while increases of 81 cars and 331 cars are reported in flat and miscellaneous cars."

The accompanying table gives car surplus and shortage figures by groups for the last period covered in the report, and the diagrams show total bi-weekly surpluses and shortages in the years from 1907 to 1911.

Car Surpluses and Shortages.

Date.	No. of roads.	Surpluses Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Shortages Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1. January 17, 1912	7	19	2,136	2,237	115	4,507	333	0	0	65	398
" 2. " 17, 1912	25	3,141	309	11,384	6,137	20,971	7	0	0	12	19
" 3. " 17, 1912	25	4,827	1,394	17,873	3,068	27,162	546	0	275	119	940
" 4. " 17, 1912	11	1,782	742	1,867	1,179	5,570	108	0	2,000	0	2,108
" 5. " 17, 1912	19	1,588	235	2,601	1,086	5,510	120	73	72	115	380
" 6. " 17, 1912	23	1,300	936	2,259	3,435	7,930	1,930	80	228	8	2,246
" 7. " 17, 1912	3	0	183	27	97	307	258	0	0	49	307
" 8. " 17, 1912	19	2,299	403	1,616	2,027	6,345	165	15	0	1	181
" 9. " 17, 1912	10	3,540	78	537	911	5,066	0	17	0	12	29
" 10. " 17, 1912	20	4,612	2,498	2,369	9,025	18,504	175	0	0	28	203
" 11. " 17, 1912	5	3	364	0	240	607	5,228	0	0	155	5,383
Total	167	23,111	9,278	42,770	27,320	102,479	8,870	185	2,575	564	12,194

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland, and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages in 1907 to 1912.

Total Railway Earnings.

The summary of revenues and expenses of steam roads in the United States for the month of November, 1911, prepared by Bureau of Railway Economics, shows that the railways whose

returns are included operate 222,900 miles of line, or about 90 per cent. of all the steam railway mileage in the United States. The total operating revenues for the month of November, 1911, amounted to $234,854,512. Compared with November, 1910, the total operating revenues of these railways show a decrease of $1,335,425. Operating revenues per mile of line amounted to $1,054 in November, 1911, and $1,071 in November, 1910, a decrease for 1911 of $18, or 1.6 per cent. This decrease in operating revenues resulted from decreases both in freight and in passenger revenues.

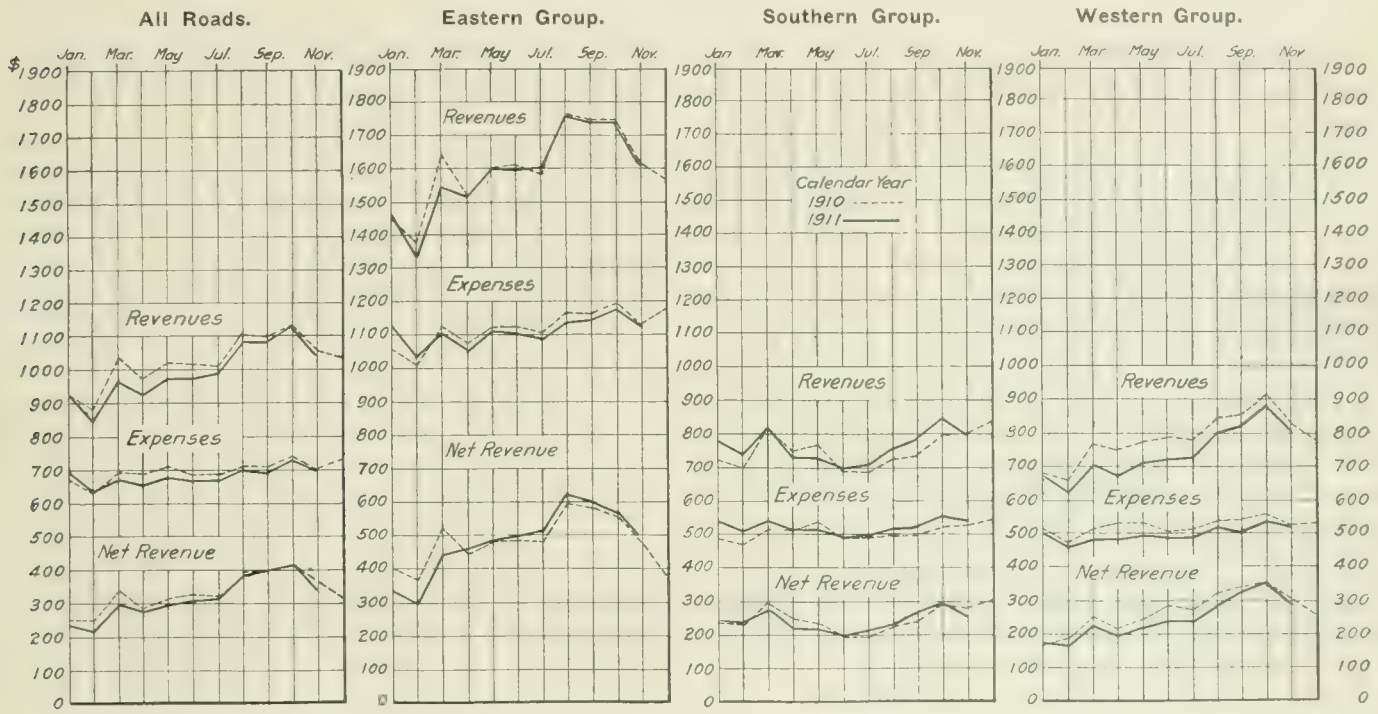
Operating expenses amounted to $157,591,429. This was $1,261,441 more than for November, 1910, but was due exclusively to the increase in mileage of roads in 1911. Operating expenses per mile of line amounted to $707 in November, 1911, and $709 in November, 1910, a decrease for 1911 of $2 per mile, or 0.3 per cent. In the cost of maintaining way and structures, there was a decrease compared with November, 1910, of $2.40 per mile, or 1.9 per cent.; in the cost of maintaining equipment an increase of 10 cents per mile; in traffic expenses an increase of 32 cents per mile, or 1.6 per cent.; in the cost of conducting transportation a decrease of 8 cents per mile; general expenses showed an increase per mile of 7 cents, or 0.3 per cent.

Net operating revenue shows a decrease as compared with November, 1910, of $16 per mile, or 4.3 per cent. The net revenue for each mile of line for each day in November averaged $11.55, as compared with $12.07 for November, 1910. Taxes for the month of November amounted to $9,676,976, or $43 per mile, an increase of 12.7 per cent. over November, 1910.

The operating ratio for November was 67.1 per cent., as compared with 63.9 in October, 1911, and 66.2 per cent. in November, 1910.

The eastern group of railways show a decrease in total operating revenues per mile as compared with November, 1910, of 0.3 per cent., and the western group a decrease of 3.9 per cent., while the operating revenues per mile of the southern group increased 1.1 per cent. over November, 1910. Operating expenses per mile decreased 0.1 per cent. on the eastern railways as compared with November, 1910, and on the western railways 2.0 per cent., but increased on the southern railways 4.8 per cent. On the eastern group there were slight increases in the cost of maintaining way and structures and of maintaining equipment, and a slight decrease in transportation expenses. Traffic expenses decreased 5.8 per cent., while general expenses increased 2.4 per cent. On the southern railways, there were increases in each primary operating expense account, as follows: maintenance of way and structures, 0.8 per cent.; maintenance of equipment, 4.0 per cent.; traffic expenses, 5.7 per cent.; transportation expenses, 6.9 per cent. general expenses, 5.9 per cent. On the western railways there were decreases as follows: maintenance of way and structures, 5.1 per cent.; maintenance of equipment, 2.0 per cent.; transportation expenses, 1.4 per cent.; general expenses, 3.8 per cent. Traffic expenses increased 8.1 per cent. All the groups show decreases in net operating revenue per mile. In the eastern group this net revenue per mile decreased 0.7 per cent. as compared with November, 1910; in the southern group there was a decrease of 5.8 per cent.; in the western group a decrease of 7.0 per cent. Taxes increased in all the groups as compared with November, 1910, the increase per mile amounting to 15.0 per cent. in the eastern group, 3.2 per cent. in the southern group, and 12.7 per cent. in the western group.

The accompanying diagram compares monthly earnings in 1910 and 1911. The following table shows what per cent. of total revenues is consumed by each class of expense.



Total Monthly Per Mile Earnings and Expenses of Railways.

Percentage of Total Operating Expenses.

	November, 1911.	November, 1910.	Fiscal year ended June 30, 1911.	Fiscal year ended June 30, 1910.
Maint. of way and structures.	11.9	11.9	13.1	13.4
Maint. of equipment.....	15.4	15.2	15.3	15.0
Traffic	2.0	1.9	2.1	2.0
Transportation expenses	35.4	34.8	35.5	33.4
General expenses	2.4	2.4	2.6	2.5
Total operating expenses.	67.1	66.2	68.6	66.3

INTERSTATE COMMERCE COMMISSION.

The Atlanta Freight Bureau has filed with the commission a complaint alleging excessive freight charges on many commodities from New York and other eastern cities to Atlanta.

Commissioner B. H. Meyer on January 26 conducted a hearing at Chicago on complaint of the Milwaukee brewing companies against the rates on return shipments of empty beer kegs from California and other western points to Milwaukee.

The commission resumed this week at Washington its general inquiry concerning the business and methods of the large express companies. Following the sittings at which the representatives of shippers were heard, the commission sent to each express company a long list of questions outlining the course which would be taken in the hearings at which the express companies will be heard. These questions go minutely into all features of the express companies' business.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF NOVEMBER, 1911.

Name of road.	Mileage operated at end of period.	Operating revenues: Freight.	Passenger.	Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Atlanta & West Point	92	$58,037	$39,415	$109,837	$14,652	$25,043	$4,590	$36,903	$3,825	$84,943	$24,894	$208	$5,189	$19,913	—$14,074
Atlanta, Birmingham & Atlantic	661	218,938	53,672	287,015	32,533	48,417	15,985	105,521	11,042	213,498	73,517	.....	15,750	57,767	4,138
Atlantic City	166	67,456	47,110	121,350	31,883	13,692	1,524	73,421	714	121,264	86	4,569	7,000	11,474	—2,966
Atlantic & St. Lawrence	166	90,116	22,598	122,389	28,675	18,077	4,418	54,378	3,052	108,600	13,789	.....	6,659	7,130	5,808
Belt Ry. Co. of Chicago	21	.....	.....	224,227	14,958	24,536	564	85,479	5,726	131,263	92,964	.....	5,500	87,464	17,641
Buffalo & Susquehanna R. R	90	146,747	8,500	160,020	28,322	27,678	1,364	60,394	5,911	123,669	36,351	.....	2,600	33,751	14,173
Buffalo & Susquehanna Ry.	7	43,470	7,841	53,470	6,166	26,875	442	23,093	2,508	59,084	—5,614	8	1,400	—7,006	—757
Canadian Pacific Lines in Maine	53	50,666	5,368	81,764	21,403	17,903	5,554	40,087	4,084	89,031	—7,277	.....	7,000	—14,277	—19,564
Central Vermont	411	230,567	76,778	335,469	41,747	62,718	8,786	165,467	8,561	288,279	47,190	38	12,200	35,028	—31,542
Denver & Rio Grande	1,588	1,601,883	404,187	2,090,417	316,219	351,377	52,146	732,298	50,706	1,502,946	587,671	—6,785	78,000	502,886	—172,783
Detroit, Grand Haven & Milwaukee	190	115,053	45,311	189,330	17,066	24,325	7,654	103,610	4,524	157,179	32,151	—16	2,879	29,256	—8,024
Georgia	307	217,693	79,096	317,245	19,626	39,149	11,066	131,540	8,107	209,488	107,757	.....	2,100	105,657	10,968
Georgia Southern & Florida	888	111,317	63,033	206,005	18,525	35,301	7,441	77,897	10,193	140,357	56,648	.....	12,532	44,116	2,010
Grand Trunk Western	347	329,434	161,940	523,648	55,489	84,610	20,730	219,944	12,264	392,977	130,671	1,448	31,635	97,588	8,041
International & Great Northern	1,189	851,243	215,475	1,158,624	92,883	110,296	28,346	393,064	30,385	654,974	473,650	138	33,000	440,512	.....
Indiana Harbor Belt	102	.....	.....	199,667	30,468	23,753	2,935	89,086	13,778	160,020	39,647	185	5,500	34,332	—782
Kanawha & Michigan	173	135,574	27,186	267,682	38,975	48,895	2,108	84,274	6,044	179,096	88,586	—4	8,715	79,817	- 9,641
Kansas City, Mexico & Orient	800	156,402	28,015	192,829	36,621	28,365	9,370	75,869	10,029	160,254	32,575	.....	3,239	29,336	7,560
Louisiana Western	207	98,229	54,735	162,624	13,699	33,698	7,850	55,998	6,381	117,626	44,998	55	6,402	38,651	—29,365
Minneapolis, St. Paul & S. Ste. Marie	3,766	1,670,313	478,465	2,283,762	216,529	279,854	42,507	758,026	41,655	1,338,571	944,191	5163	140,844	808,510	186,958
Missouri Pacific	3,935	1,532,647	385,789	2,072,089	366,398	366,375	59,682	947,626	67,240	1,857,321	214,868	4,687	82,600	127,586	—574
Morgan's La. & Tex. R. R. & S. S. Co.	404	405,548	97,293	533,570	55,644	62,583	13,646	211,688	12,053	355,014	178,556	—1,456	18,698	158,402	97,661
Nevada Northern	165	97,612	9,488	109,830	13,054	15,905	167	24,200	3,354	56,680	53,150	.....	4,743	48,407	—24,807
New Orleans, Texas & Mexico	264	131,158	18,514	156,999	26,286	12,936	4,037	60,115	7,614	110,988	46,011	.....	1,552	44,459	2,135
Northwestern Pacific	416	130,100	128,678	280,995	47,266	40,865	2,965	111,449	9,035	211,770	69,225	.....	12,855	56,370	25,365
Philadelphia & Reading	1,014	3,274,396	561,893	4,002,972	363,735	647,249	37,702	1,230,774	61,325	2,340,785	1,662,187	47,195	90,162	1,619,220	58,464
Port Reading	21	120,848	.....	121,726	6,871	1	30	26,772	86	33,760	87,966	8,500	3,800	92,366	—19,224
St. Louis, Iron Mountain & Southern	3,314	2,106,048	501,666	2,788,185	490,995	362,428	53,535	838,346	69,396	1,814,700	973,485	6,228	81,765	885,492	—21,481
Seaboard Air Line	3,053	1,400,159	385,500	1,983,637	295,540	267,573	59,783	696,761	61,335	1,380,992	602,645	2,746	75,000	524,899	—77,622
Spokane, Portland & Seattle	550	279,860	146,767	457,450	34,927	43,739	7,347	104,979	11,849	203,841	224,609	124	32,209	192,533	99,065
Texas & Pacific	1,884	1,403,373	334,458	1,855,503	152,656	170,578	31,463	708,942	40,810	1,105,449	750,054	3,819	124,872	591,363	20,119
Ulster & Delaware	178	67,046	16,308	87,527	10,385	11,697	1,001	39,546	2,355	64,984	22,543	216	3,300	19,459	—7,906
Wabash	2,514	1,683,060	560,216	2,434,307	301,488	404,163	75,644	1,055,570	73,803	1,910,668	523,639	—2,707	71,655	449,277	—176,723
Western Maryland	543	483,850	61,193	570,629	70,774	69,533	8,798	205,625	13,133	367,853	202,776	.....	21,000	181,776	—2,428
Western Pacific	934	435,286	92,816	541,928	88,514	45,538	25,292	207,586	23,606	390,536	151,392	- 4,193	14,550	132,649	.....
Western Ry. of Alabama	133	68,034	39,440	118,670	19,525	23,610	6,491	29,332	6,586	85,534	33,086	—158	4,612	28,316	220

FIVE MONTHS OF FISCAL YEAR, 1912.

Atlanta & West Point	92	$281,812	$209,444	$540,424	$64,888	$104,066	$24,521	$158,837	$24,313	$376,626	$163,798	$888	$25,946	$138,740	$6,296
Atlanta, Birmingham & Atlantic	661	1,005,205	306,434	1,379,099	143,635	219,214	81,263	489,460	47,279	980,851	398,248	.....	63,550	334,698	98,395
Atlantic City	166	349,693	739,189	1,143,668	125,845	65,692	15,482	494,163	7,322	708,504	435,164	—21,419	35,000	378,745	25,157
Atlantic & St. Lawrence	166	376,988	150,569	583,206	90,148	103,779	20,668	241,548	14,760	582,933	273	.....	33,293	—33,020	—10,024
Belt Ry. Co. of Chicago	21	.....	.....	1,129,402	75,337	137,887	3,192	396,981	30,164	633,561	495,841	.....	27,500	468,341	25,561
Buffalo & Susquehanna R. R	95	664,257	49,032	771,291	166,912	141,972	7,147	273,300	31,809	620,140	151,151	.....	13,000	138,151	9,770
Buffalo & Susquehanna Ry.	91	176,966	53,434	281,837	32,298	134,522	2,536	116,450	12,791	298,597	- 16,760	—274	7,000	—24,034	—31,533
Canadian Pacific Lines in Maine	53	237,016	103,784	369,164	123,699	69,744	25,798	161,884	17,470	398,595	- 29,431	.....	35,000	- 64,431	—18,270
Central Vermont	411	1,129,693	553,301	1,822,642	230,999	263,973	40,397	786,357	43,054	1,364,650	457,992	3,779	60,100	401,671	—2,740
Denver & Rio Grande	1,588	7,767,980	2,540,659	10,755,721	1,635,924	1,779,847	279,645	3,631,822	245,661	7,562,899	3,192,822	7,789	364,000	2,836,611	—598,933
Detroit, Grand Haven & Milwaukee	190	576,748	315,068	1,054,005	119,707	137,998	35,432	486,584	1,979	761,690	292,315	277	14,399	247,639	88,536
Georgia	307	972,747	403,377	1,468,769	122,884	204,128	55,664	600,781	40,050	1,023,107	445,162	.....	10,500	434,662	105,514
Georgia Southern & Florida	888	521,881	353,130	1,011,516	101,878	188,094	34,148	385,433	47,101	757,353	254,163	.....	50,160	204,003	—4,752
Grand Trunk Western	347	1,663,619	1,011,339	2,856,969	371,772	416,827	97,704	1,092,999	65,415	2,044,717	812,252	—3,312	158,176	650,764	193,716
International & Great Northern	1,189	2,128,888	814,101	3,795,505	290,651	282,625	53,958	906,837	74,686	1,538,757	1,256,748	670	82,500	1,173,578	.....
Indiana Harbor Belt	102	.....	.....	1,002,733	134,581	139,826	14,59	436,888	36,963	785,850	376,883	21,916	27,500	271,299	103,266
Kanawha & Michigan	173	1,296,091	157,197	1,480,035	180,679	228,766	11,799	424,925	32,894	878,493	601,542	38	45,266	556,314	—19,519
Kansas City, Mexico & Orient	800	593,630	160,136	795,440	193,905	161,794	43,000	350,695	43,471	793,565	1,875	.....	30,239	- 28,364	—62,054
Louisiana Western	207	486,387	265,701	793,527	85,316	144,947	37,539	249,735	33,382	550,909	242,618	4	31,762	210,860	—91,427
Minneapolis, St. Paul & S. Ste. Marie	3,766	8,301,196	2,676,248	11,693,418	1,173,855	1,398,125	214,555	3,495,578	227,891	6,519,994	5,173,494	83,670	770,995	4,536,169	1,114,594
Missouri Pacific	3,935	7,997,349	2,175,521	11,174,427	2,009,121	2,356,084	309,561	4,800,358	357,148	10,033,302	1,142,125	16,485	413,000	712,640	—879,322
Morgan's La. & Tex. R. R. & S. S. Co.	404	1,327,684	510,076	1,996,876	252,602	281,946	66,722	791,258	62,543	1,455,071	541,805	- 13,543	93,490	434,772	—165,583
Nevada Northern	165	519,776	53,815	588,172	65,270	73,819	1,876	121,313	18,607	279,085	309,087	.....	23,412	285,675	—36,758
New Orleans, Texas & Mexico	264	451,960	95,719	582,897	115,760	67,003	20,609	248,463	34,197	486,032	96,865	.....	6,207	90,658	11,036
Northwestern Pacific	416	711,071	913,004	1,736,898	249,265	205,206	17,056	564,300	45,870	1,081,697	655,201	.....	64,134	591,067	60,749
Philadelphia & Reading	1,014	14,851,281	3,107,655	18,804,503	1,876,803	3,450,881	209,830	5,872,701	830,736	11,740,451	7,064,052	140,637	451,968	6,752,721	90,260
Port Reading	21	476,170	.....	484,474	40,554	887	156	136,512	628	178,737	305,737	8,743	19,000	285,480	—58,490
St. Louis, Iron Mountain & Southern	3,314	9,403,430	2,638,981	12,604,113	2,364,991	2,116,118	264,747	4,004,290	346,169	9,096,295	3,807,888	—25,563	408,835	3,373,500	301,840
Seaboard Air Line	3,053	6,175,623	2,040,631	9,159,224	1,348,348	1,348,274	281,013	3,191,902	287,670	6,452,207	2,707,017	- 6,292	372,000	2,328,725	—20,675
Spokane, Portland & Seattle	550	1,266,266	815,365	2,201,928	219,220	193,002	36,772	535,709	53,850	1,038,643	1,163,285	8,931	201,000	971,216	—1,709
Texas & Pacific	1,884	5,077,637	1,841,012	7,397,763	762,364	988,714	143,475	2,847,355	208,616	4,950,524	2,447,239	—12,065	281,688	2,153,486	409,574
Ulster & Delaware	178	312,328	230,799	568,122	75,338	52,326	8,064	210,598	12,180	358,506	209,616	325	16,500	193,441	—16,888
Wabash	2,514	8,485,862	3,387,621	12,856,058	1,630,774	2,091,868	410,302	4,846,509	375,725	9,354,678	3,501,380	—3,131	350,041	3,148,408	—722,731
Western Maryland	543	2,492,227	470,857	3,095,308	422,706	364,732	54,162	1,033,910	62,033	1,937,543	1,157,765	790	105,000	1,153,555	—128,429
Western Pacific	934	1,943,978	524,199	2,532,017	447,206	214,567	137,029	934,943	109,183	1,842,928	689,089	—15,753	71,950	601,386	.....
Western Ry. of Alabama	133	332,372	206,935	586,093	93,354	108,556	27,088	151,531	31,565	412,094	173,999	—927	23,062	150,010	. 19,433

Mileage operated in 1911 [1] 2,553; [3] 113; [4] 740; [5] 3,525; [6] 3,919; [7] 348; [8] 376; [9] 1,022; [10] 3,316; [11] 3,027; [12] 432. — Indicates Deficits, Losses and Decreases.

[2] The figures shown here are for the period September 15 to November 30, 1911. On September 15 the International & Great Northern *Railroad* was reorganized as the International & Great Northern Railway.

Special Examiner Prouty, of the Interstate Commerce Commission, conducted a hearing in St. Louis last week on a complaint of the St. Louis lumber dealers that a recent advance in freight rates on lumber from points in the Southwest to St. Louis constitute a discrimination against St. Louis to the extent of one cent per 100 lbs.

Commissioner James S. Harlan began a hearing at Detroit, Mich., on January 24, on the complaint of the Duluth (Minn.) Commercial Club, that the present structure of lake-and-rail rates from eastern points is discriminatory against Duluth and unduly preferential to St. Paul, Minneapolis and Lake Michigan ports. The complaint also attacks the rates to Duluth as excessive in themselves, and alleges that the privilege of free storage in transit on through shipments at Duluth and lake ports for the purpose of reconsignment is discriminatory. G. Roy Hall, traffic commissioner of the Duluth Commercial Club, contended that rates through Duluth should be made to break at that point, and that a local rate should be charged between Duluth and the Twin Cities.

Refund Ordered.

Continental Iron & Steel Co. v. Louisville & Nashville. Opinion by the commission.

A rule in southern classification was wrongly interpreted to require bridge material to be broken in pieces before being given the scrap iron rate, with the resulting overcharge. (22 I. C. C., 281.)

Discrimination Against Cotton Waste.

South Atlantic Waste Co. v. Southern Railway et al. Opinion by the commission.

A C. L. rate of 46 cents per 100 lbs. on cotton waste from Charlotte, N. C., to New York, is found to be discriminatory as compared with the rate on cotton goods. (22 I. C. C., 293.)

Reparation Awarded.

Davis Sewing Machine Co. v. Pittsburgh, Cincinnati, Chicago & St. Louis. Opinion by the commission.

Bicycles were given the second-class rate in official classification up to July 1, 1910, and then given the first-class rate. The defendants failed to justify the advanced rating, and former rates were restored. (22 I. C. C., 291.)

Wells-Higman Co. v. St. Louis, Iron Mountain & Southern et al. Opinion by the commission.

The C. L. rate of 94 cents per 100 lbs. for fruit baskets from Wynne, Ark., to Horatio via Texarkana, Tex., should not have been advanced more than 50 cents per 100 lbs. (22 I. C. C., 288.)

Eldorado Oil Mills & Fertilizer Co. v. Chicago, Rock Island & Pacific. Opinion by the commission.

The C. L. rate of 7½ cents per 100 lbs. on acid phosphate from Ruston, La., to Eldorado, Ark., reduced to five cents. (22 I. C. C., 286.)

STATE COMMISSIONS.

The Washington state railway commission has issued an order permitting the Northern Pacific to disregard the state long-and-short law clause so far as it affects Puget Sound territory.

Tariffs of rates for switching freight cars promulgated by the New Hampshire Public Service Commission having been objected to, the commission has begun an inquiry and will take testimony as to the reasonableness of the rates.

The Illinois railway commission has issued an order extending for 90 days from January 1, the period within which the railways of the state may continue to disregard the state long-and-short haul law. At the end of that time the commission will enter an order.

At Berlin, N. H., the State public service commission, in recommending the installation of gates at a highway crossing, has called upon the railway and municipality to have the tracks of the railway fenced in, and to take such other measures as are practicable to keep people from walking on the tracks.

The Oregon railway commission has issued orders prescribing distance freight tariffs, reducing the class rates between points in the state on the Oregon-Washington Railroad & Navigation Company and the Southern Pacific. Also an order was issued reducing the passenger rate on the Corvallis & Eastern to 3 cents a mile. The reductions are made to correspond to similar reductions recently ordered by the Interstate Commerce Commission and the Washington railway commission in the distributive rates from the Pacific coast cities to interior points.

The long pending complaints of citizens of Yonkers, Mount Vernon and other cities near New York, relative to the increases in season ticket fares which were made by the New Haven and the New York Central last summer, have been made the subject of further hearings by the New York Public Service Commission, Second district, during the past week. When the lawyers for the complainants started to make comparisons with the fares charged by the New Haven road in the Boston suburban district, Chairman Stevens, of the commission, refused to admit the argument, declaring that there was danger that the inquiry would never come to an end. He desired to have the case settled before the commissioners who began the hearings should go out of office. "We are trying to keep the record down to reasonable size. The conditions are different in all large cities. You cannot compare Boston with San Francisco, or New York with Chicago. There may be a law in Boston which requires a low rate; many conditions are involved, and because one road voluntarily may establish a losing rate at one point is no reason why the New York Central should be made to conform to a losing rate."

COURT NEWS.

Justice Mack, of the Court of Commerce, has been designated to sit in that court for another term of five years, his first term (of one year) having just expired.

In the Federal court at Montgomery, Ala., a report presented by Special Master W. S. Thorington on the Central-of-Georgia passenger rate case holds that as regards that road the Alabama law, fixing passenger fares at 2.5 cents a mile and limiting freight rates on 116 commodities, is null and void. This conclusion is similar to that which was reached sometime since in regard to the Louisville & Nashville.

United States Commerce Court.

The February docket of the United States Commerce Court contains 22 cases. The cases in which the court is asked to set aside orders of the Interstate Commerce Commission are as follows: Rail and water rates on shoes between Boston, New York and Atlanta; rates from Rock Island, Ill., to Des Moines, Iowa; class rates from Sacramento, Cal., to Nevada and Utah points west of Ogden; fixing class rates to Reno from eastern points; class rates from Kansas City, etc., to Phoenix, Ariz.; C. L. rates on beer to Leadville, Col.; rates from the southwest to Omaha, etc., on lumber; lighterage charges on sugar at New York; distinction in rates between railway fuel coal and other coal; local class rates from Roanoke, Va., to Winston-Salem, N. C., etc.; reduction from $30 to $7.50 in the charge for refrigeration of citrus fruits when pre-cooled by the shipper; reparation to the St. Louis Blast Furnace Company; reshipping privileges of grain and hay at Nashville, Tenn; anthracite coal rates from Wyoming district of Pennsylvania to tidewater; rates between Salt Lake City, etc., and the Missouri river, etc.; no reparation to the Anaconda Copper Mining Company on coke shipped from West Virginia-Pennsylvania ovens to Chicago; the application of the Crane Railroad Company to be given the privileges of a common carrier [Tap line case]; the method of classification of expenditures for additions and betterments; rates on citrus fruits from gathering points in Florida to Jacksonville; rates on fir lumber from the Willamette valley to San Francisco; the Baltimore & Ohio's switch connections and traffic interchange with the Cincinnati & Columbus Traction. The other case is a petition for a writ of mandamus to compel the Louisville & Nashville and Southern Railway to furnish cars and move coal for the Stony Fork Coal Company.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

W. D. Tucker has been appointed auditor of the Kansas City Terminal, with office at Kansas City, Mo., succeeding C. C. Ripley; resigned.

F. L. Paetzold has been appointed assistant secretary and fiscal agent of the Colorado Midland, with office at New York, succeeding L. E. Katzenbach, resigned.

R. B. Smith, treasurer and auditor of the Texas City Terminal Company, has been appointed auditor of the Wolvin Steamship Line, with office at Texas City, Tex.

Alfred S. Dutton, assistant auditor of freight accounts of the Michigan Central at Detroit, Mich., has been appointed auditor of freight accounts, succeeding Thomas Eedson, retired under the pension rules of the company, and William J. Daeschner succeeds Mr. Dutton.

A. C. Ridgway, assistant to second vice-president of the Chicago, Rock Island & Pacific, has been appointed acting vice-president in charge of the operating department at Chicago, succeeding F. O. Melcher, deceased, and W. S. Tinsman, general manager of the First district, has been appointed assistant to president in charge of special work. See an item under Operating Officers.

Edward L. Brown, general superintendent of the Western district of the Great Northern at Spokane, Wash., has been elected vice-president and general manager of the Denver & Rio Grande, with office at Denver, Colo. Finley J. Shepard, assistant to the vice-president of the Missouri Pacific, has been appointed assistant to the president of the Denver & Rio Grande, with office at Denver.

Colonel Henry C. Hudgins, assistant to the president of the Norfolk Southern, with office at Norfolk, Va., was retired on February 1. Mr. Hudgins was born on September 19, 1841, in Matthews county, Va., and attended the Virginia Collegiate Institute at Portsmouth, Va., from 1855 to 1860. Six years later he entered the service of the Baltimore Steam Packet Company as receiving clerk, and was then successively delivery clerk, manifest clerk and chief clerk. In 1870, he was appointed sub-agent to subsidiary lines of the Old Dominion Steamship Company, and was also manifest and rate clerk in the office of the main line at Norfolk until June, 1881. He then went to the Elizabeth City & Norfolk, now a part of the Norfolk Southern as agent, and was later promoted to general freight and passenger agent of that company and its successors, which position he held until his appointment on September 1, 1910, as assistant to the president of the Norfolk Southern.



H. C. Hudgins.

Operating Officers.

Frank Waterhouse has been appointed manager of the Grand Trunk Pacific Dock, with office at Seattle, Wash.

The office of F. L. Sheppard, general superintendent of the New Jersey division of the Pennsylvania, has been transferred from Jersey City, N. J., to the Pennsylvania station, New York.

Jesse G. June, assistant superintendent of terminals of the Erie Railroad at Jersey City, N. J., has been appointed superintendent of terminals, with office at Jersey City, succeeding J. M. Barrett, assigned to other duties.

James Oborne, general superintendent of the Ontario division of the Canadian Pacific at Toronto, Ont., has been appointed general superintendent of the Pacific division, with office at Vancouver, B. C.

W. H. Foster, trainmaster of the New York, New Haven & Hartford, at Taunton, Mass., has been appointed superintendent of the Old Colony division, succeeding A. Ross, resigned to go to another company. Robert T. Cronin succeeds Mr. Foster; George P. Snow has been appointed chief train despatcher, and R. L. Stevens has been appointed night chief train despatcher, all with offices at Taunton, Mass.

C. L. Rupert, superintendent of the Amarillo division of the Chicago, Rock Island & Gulf, at Amarillo, Tex., has been appointed superintendent of the Southern division, with office at Fort Worth, succeeding J. McGie, transferred. A. E. Walker, trainmaster at El Reno, Okla., succeeds Mr. Rupert, and H. V. Bray has been appointed trainmaster of the Southern division, with office at Fort Worth, succeeding L. E. McClure, resigned.

W. M. Whitenton, general manager of the Third district of the Chicago, Rock Island & Pacific, at Fort Worth, Tex., has been appointed general manager of the First district, with office at Chicago, succeeding W. S. Tinsman, promoted. C. W. Jones, general superintendent of the First district at Davenport, Iowa, succeeds Mr. Whitenton. F. J. Easley, superintendent of the Illinois division at Rock Island, Ill., succeeds Mr. Jones. H. L. Reed succeeds Mr. Easley. M. J. Kennelly has been appointed superintendent of the Missouri division, with office at Trenton, Mo., succeeding Mr. Reed. A. B. Ramsdell has been appointed superintendent of the St. Louis division, with office at Eldon, Mo., succeeding Mr. Kennelly, and C. B. Pratt has been apopinted superintendent of the Chicago Terminal division, succeeding Mr. Ramsdell. See an item under Executive, Financial and Legal Officers.

J. F. Sheahan, master mechanic of the Georgia & Florida, at Douglas, Ga., who on January 1 was appointed assistant superintendent, began railway work in 1880, at the Renova shops of the Pennsylvania Railroad, and was later transferred to Camden, N. J. Previous to May, 1888, he held various positions, and was then appointed master mechanic of the Orange Belt Railway, now a part of the Atlantic Coast Line, and in July, 1895, became master mechanic of the Florida Southern at Palatka, Fla. He was then for eight months master mechanic on the Plant System. In June, 1897, he was made night roundhouse foreman of the Southern Railway. The following August he was appointed erecting shop foreman, and one month later became general foreman at Alexander, Va. He was promoted to master mechanic of the Southern Railway in January, 1900, at Selma, Ala., and then served in the same capacity consecutively at Columbia, S. C., Spencer, N. C., Atlanta, Ga., and Knoxville, Tenn. Mr. Sheahan left the service of the Southern Railway in January, 1910, and went to the International & Great Northern as master mechanic at Palestine, Tex. In December, 1911, he was appointed master mechanic of the Georgia & Florida, with office at Douglas, Ga., and on January 1, 1912, when the Hine system of organization was established by the Georgia & Florida, he became assistant superintendent, with office at Douglas.



J. F. Sheahan.

W. D. Scott, general superintendent of the Eastern district of the Great Northern at St. Paul, Minn., has been appointed general superintendent of the Western district, with office at Seattle, Wash., succeeding E. L. Brown, resigned to accept service with

another company. Frank Bell, assistant general superintendent of the Eastern district at St. Paul, succeeds Mr. Scott, and C. E. Leverich, superintendent of the Minot division at Minot, N. D., succeeds Mr. Bell, with office at Grand Forks, N. D. R. A. McCandless, assistant superintendent of the Minot division, succeeds Mr. Leverich, and J. S. Landis has been appointed trainmaster of the Minot division, with headquarters at Minot.

J. McGie, superintendent of the Chicago, Rock Island & Gulf, at Fort Worth, Tex., has been appointed superintendent of the Oklahoma division of the Rock Island Lines, with office at El Reno, Okla., succeeding H. M. Hallock, resigned. K. H. Hanger has been appointed trainmaster of the Oklahoma division, with office at El Reno, Okla., succeeding T. S. Barnes, resigned to go to another company. H. G. Clark, trainmaster at Little Rock, Ark., has been appointed trainmaster, with office at El Reno, succeeding A. E. Walker, promoted. H. Fairmon, trainmaster at Eldorado, Ark., succeeds Mr. Clark. The position of terminal trainmaster at Little Rock, Ark., has been abolished, and the jurisdiction of the general agent at that place is extended to include Little Rock terminals. The position of trainmaster and roadmaster for the territory from Winfield, La., to Eunice is also abolished, and H. F. Clark has been appointed trainmaster of the Louisiana division, with office at Eldorado, Ark., succeeding H. Fairmon, transferred.

Traffic Officers.

W. R. Miller, traveling freight agent of the Kanawha Despatch at St. Louis, Mo., has been transferred to Kansas City, Mo.

J. J. Carroll has been appointed agent of the Grand Trunk Pacific Coast Steamship Company, Ltd., with office at Seattle, Wash.

E. L. Harrington has been appointed traveling freight agent of the Baltimore & Ohio Southwestern, with office at Dallas, Tex., succeeding C. A. Waterman, resigned.

F. A. Nelson has been appointed traffic manager of the Kansas City, Mexico & Orient Railway of Texas, with office at Sweetwater, Tex., succeeding O. G. Burrows, resigned.

E. O. Dennedy has been appointed traveling freight agent of the Nashville, Chattanooga & St. Louis, with headquarters at Memphis, Tenn., succeeding Walter C. Young, resigned.

F. T. Rennie, assistant general freight agent of the Mallory Steamship Company at Galveston, Tex., has been appointed general agent, with office at Galveston, in charge of all the lines in Texas.

J. W. Orr has been appointed traveling passenger agent of the International & Great Northern, with headquarters at Houston, Tex., succeeding Garland Tobin, resigned over two months ago to go with another company.

C. E. Dempsey, westbound contracting agent of the New York, Chicago & St. Louis at Omaha, Neb., has been appointed traveling freight agent, with office at Omaha, succeeding J. E. Hanson, and A. N. Hanson succeeds Mr. Dempsey.

C. S. Franklin has been appointed traveling freight agent of the Atchison, Topeka & Santa Fe, with office at Cincinnati, Ohio, succeeding E. P. Fisher, who, with the same title, and with headquarters at the same place, succeeds L. L. Korn.

George W. Sargent, commercial agent of the Mobile & Ohio at Chicago, has been appointed general agent, with office at Minneapolis, Minn., a new position. A. S. Birchett, soliciting freight agent at St. Louis, Mo., succeeds Mr. Sargent, and W. M. Penick, soliciting freight agent at Chicago, has been appointed traveling freight agent at the same place, a new office.

D. R. Gray, district freight and passenger agent of the Oregon Short Line and the Union Pacific at Salt Lake City, Utah, has been appointed assistant general freight agent, with office at Salt Lake City, succeeding F. H. Plaisted, promoted. H. E. Godwin, contracting freight agent at Salt Lake City, has been appointed district freight agent, succeeding to part of the duties of Mr. Gray, and L. J. Kyes has been appointed district passenger agent, also succeeding Mr. Gray. E. J. Hanson succeeds Mr. Godwin.

R. J. Southworth has been appointed traveling passenger agent of the Lake Shore & Michigan Southern and the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at Cleveland, Ohio, succeeding W. R. Lynch, resigned. S. N. Behenna has been appointed traveling passenger agent of the C. C. C. & St. L., at Cincinnati, Ohio, succeeding C. B. Munyan, who has been appointed city passenger agent in place of Ernest R. Whelan, promoted.

Engineering and Rolling Stock Officers.

Charles C. Leech, foreman of the Pennsylvania Railroad shops at Buffalo, N. Y., has resigned to become general manager of the American Roller Bearing Company, Pittsburgh, Pa.

The offices of G. P. Miller, principal assistant engineer, and D. M. Perine, superintendent of motive power of the New Jersey division of the Pennsylvania Railroad, have been transferred from Jersey City, N. J., to the Pennsylvania station, New York.

D. W. Lum, who resigned about a year ago as chief engineer of maintenance of way and structures of the Southern Railway and the Northern Alabama Railroad, has been appointed consulting engineer of the Norfolk Southern, with office at Norfolk, Va.

T. Keaveny, roadmaster of the First Washington district of the Oregon-Washington Railroad & Navigation Company at Walla Walla, Wash., has been appointed roadmaster of the Third Washington district, with headquarters at Tekoa, Wash., succeeding F. W. Schultz, and D. O'Toole succeeds Mr. Keaveny.

George F. Tapp, assistant roadmaster of the Eastern division of the Texas & Pacific at Marshall, Tex., has been appointed assistant roadmaster of the Trans-Continental division, with headquarters at Bonham, Tex., and H. R. Merriwether, assistant roadmaster of the Louisiana division at Shreveport, La., succeeds Mr. Tapp. W. A. Brown succeeds Mr. Merriwether.

F. H. Hanson, division general foreman of the Lake Shore & Michigan Southern and the Lake Erie, Alliance & Wheeling at Collinwood, Ohio, has been appointed supervisor of materials of those lines, the Chicago, Indiana & Southern, the Lake Erie & Western, and the Indiana Harbor Belt, with office at Cleveland, Ohio, succeeding J. W. Senger, promoted. W. D. Mooney, foreman in the car department of the Lake Shore at Nottingham, Ohio, succeeds Mr. Hanson, and S. Lindman succeeds Mr. Mooney.

OBITUARY.

Edwin Hawley, chairman of the board of the Missouri, Kansas & Texas, Minneapolis & St. Louis, and vice-president of the Chicago & Alton, died suddenly on February 1.

W. F. Buck, superintendent of motive power of the Atchison, Topeka & Santa Fe, with office at Chicago, died early Wednesday morning, while being brought in a special train to Los Angeles, Cal., from a hospital at Albuquerque, where he had been ill with tonsilitis. Mr. Buck entered railway service as a machinist on the Northern Pacific. In 1893 he was made shop foreman on that road, and two years later general foreman of shops at Missoula, Mont. In 1899 he was transferred, with the same title, to Helena, Mont., and three years later was made master mechanic of the Rocky Mountain division. In 1904 he went to the Atchison, Topeka & Santa Fe as master mechanic at Needles, Cal. He was made mechanical superintendent of the Eastern Grand division of the same road in April, 1906, and was promoted to superintendent of motive power in January, 1908, with office at Chicago.



W. F. Buck.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Wabash receivers have been authorized by the court to buy 25 locomotives.

The Illinois Central is having 7 Forney suburban engines rebuilt by the Lima Locomotive & Machine Company.

The Barber Asphalt Paving Company, Philadelphia, Pa., has ordered one four-wheel switching locomotive from the Baldwin Locomotive Works.

The Chicago, Milwaukee & St. Paul, it is said, will build 125 locomotives at the Milwaukee shops, and will order 10 locomotives. This item has not been confirmed.

The Grand Trunk Pacific has ordered 25 consolidation locomotives from the Montreal Locomotive Works, and 15 consolidation locomotives from the Canadian Locomotive Company.

The Lowville & Beaver River has ordered one 10-wheel locomotive from the American Locomotive Company. The cylinders will be 18 in. x 26 in., the diameter of the driving wheels will be 50 in., and the total weight in working order will be 124,000 lbs.

The Buffalo Creek has ordered four six-wheel switching locomotives from the American Locomotive Company. The cylinders will be 20 in. x 24 in., the diameter of the driving wheels will be 51 in., and the total weight in working order will be 144,000 lbs.

The Catskill Mountain Railway has ordered one eight-wheel passenger locomotive from the American Locomotive Company. The cylinders will be 13 in. x 18 in., the diameter of the driving wheels will be 49 in., and the total weight in working order will be 57,000 lbs.

The Canadian Pacific is said to have ordered from its own shops 10 switching locomotives and 10 mikado locomotives, in addition to the 25 switching locomotives mentioned in the *Railway Age Gazette* of January 26. This is not yet confirmed. The 50 ten-wheel locomotives mentioned in our issue of last week as having been ordered from the company's shops, were instead ordered from the American Locomotive Company, making 83 locomotives in all ordered from the American Locomotive Company.

CAR BUILDING.

The Northern Pacific is in the market for 50 tank cars.

The Ulster & Delaware is in the market for 3 baggage and mail cars.

Swift & Company, Chicago, have ordered 500 steel underframes from the Whipple Car Company.

The Rock Island Lines are in the market for 20 combination passenger and baggage cars, 10 combination baggage and express cars, and 10 postal cars.

The Baltimore & Ohio is not making inquiries for 36 passenger cars, as was mentioned in the *Railway Age Gazette* of January 12.

The Chicago & North Western is said to have ordered 550 all-steel hopper cars from the Western Steel Car & Foundry Company. This item has not been confirmed.

The Northern Pacific has finally confirmed the order for 500 gondola cars from the Pressed Steel Car Company, reports regarding which have been circulating for some time.

The Buffalo, Rochester & Pittsburgh has ordered 17 all-steel passenger cars from the Pullman Company. These consist of four coaches, with seating capacity for 84 passengers; five combination passenger and smoking cars, with seating capacity for 82 passengers; five baggage cars; and three combination baggage and mail cars. All cars will be 66 ft. long over end framing; they will be of steel construction throughout and will have Commonwealth platforms and body bolsters and six-wheel trucks.

The Great Northern, mentioned in the *Railway Age Gazette* of December 29 as having ordered 1,500 refrigerator cars from the Haskell & Barker Car Company, only ordered 750 refrigerator cars from that company at that time. These cars will have a capacity of 60,000 lbs. and will weigh 42,700 lbs. The inside measurements will be 39 ft. 1 in. long; 8 ft. 1½ in. wide, and 7 ft. 4¾ in. high. The over all measurements will be 40 ft. long; 9 ft. 3 in. wide, and 12 ft. 4 in. high. Both the bodies and the underframes will be of wood The cars will be fitted with New York air brakes, Aurora brasses and Sharon couplers.

The Grand Trunk has ordered the 500 refrigerator cars and 500 automobile cars mentioned in the *Railway Age Gazette* of January 12. All cars will be 40 ft. long, of 30 tons capacity, and delivery is to begin in April. The order is divided as follows: 250 refrigerators from the Canadian Car & Foundry Company; 250 refrigerators from the American Car & Foundry Company; 250 automobile steel underframe cars from the American Car & Foundry Company, and 250 automobile steel underframe cars from the Western Steel Car & Foundry Company. The company is now in the market for 300 30-ton wood underframe flat cars, and 300 30-ton steel underframe flat cars.

IRON AND STEEL.

The Southern New England has ordered 6,500 tons of bridge steel from the American Bridge Company.

The Delaware & Hudson has ordered 5,000 tons of bridge material from the American Bridge Company.

The Erie has ordered 35,000 tons of rails, of which the majority will be rolled by the United States Steel Corporation.

The Grand Trunk is said to have ordered 10,000 tons of rails from the Illinois Steel Company. This item has not been confirmed.

The Chicago & North Western has ordered 845 tons of bridge material, dividing the order between the King Bridge Company, the Fort Pitt Bridge & Iron Works, the Wisconsin Bridge & Iron Company, and the Morave Construction Company.

The Pennsylvania Railroad is said to have placed an order for 150,000 tons of rails. It is understood that the Cambria Steel Company and the Pennsylvania Steel Company will receive the great majority of this order, and that the Steel Corporation will receive the balance. This item has not been confirmed.

General Conditions in Steel.—There has been but little change in the steel industry during the past week. The Steel Corporation continues to operate at about 90 per cent. of its capacity. Orders for new business are not as good at present as during December, but prices are better and the unfilled tonnage for this month is expected to show an increase. Prices have remained firm, and there is no prospect of an immediate change. Rail orders during January have been heavy and some large orders are still pending. An improvement in the volume of new business received is expected during the next two months.

In December, 1911, the Italian government granted a concession to the Societa L' Ausiliare di Milano for building a 30-mile railway between the cities of Arezzo and Sinalunga, both in the department of Tuscany. The concession is for 50 years, and carries a government subsidy of $2,162 per mile. The estimated cost of the new line is $1,254,500. The work is to be started as soon as possible and it is planned to have the road completed by the middle of 1914. The track is to be standard gage to correspond with the connecting lines. No particular engineering difficulties are encountered along the right of way. Starting from Arezzo the line will pass through the villages of Civitella, Monte Sansovino, Marciano, Lucignano, and Foiano. It will also traverse the entire length of the fertile Chiana valley. At Sinalunga it will connect with the Siena Railroad. This new road will facilitate travel between Florence and Siena by way of Arezzo, which will be a great accommodation to tourists visiting those cities. By the Arezzo-Sinalunga railway the distance between Arezzo and Sinalunga will be shortened 34 miles. An extension of this road from Sinalunga to Tequanda S. Giovanni d' Asso, which would further shorten the distance between Arezzo and Grosseto by 14 miles, is also talked of. This extension would connect Arezzo and the Appennine districts lying to the north of Arezzo with Grosseto, and also afford a direct line of communication between eastern Tuscany and the ports of S. Stefano and Talamone on the Mediterranean.

Supply Trade News.

James B. Brady has been elected vice-president of Manning, Maxwell & Moore, New York, succeeding W. O. Jacquette.

George C. Isbester, vice-president of the Q. & C. Company, Chicago, resigned on February 1, to engage in other business.

The general offices of the George M. Newhall Engineering Company have been moved to 1421 Chestnut street, Philadelphia, Pa.

Charles C. Leech, shop foreman of the Pennsylvania Railroad at Buffalo, N. Y., has resigned to become general manager of the American Roller Bearing Company, Pittsburgh, Pa.

F. M. Gilmore, formerly with the railway department of the H. W. Johns-Manville Company, New York, has taken a position with the Chicago Car Heating Company, with headquarters in the Railway Exchange Building, Chicago.

J. Warren Young, chief signal inspector of the Erie, has resigned to go to the Kerite Insulated Wire & Cable Company, New York. Mr. Young has been engaged in signal work since 1896 on the Central of New Jersey, the Delaware, Lackawanna & Western, the New York, Susquehanna & Western, and the Erie successively.

The Curtain Supply Company, Chicago, has received an order for ring curtain fixtures and Rex all-metal rollers for 550 cars being built by the J. G. Brill Company for the Philadelphia Rapid Transit Company; also an order for the same kind of fixtures and rollers for 100 cars being built by the same company for the Buffalo steel railways.

A voluntary petition in bankruptcy has been filed in the United States district court at Cincinnati, Ohio, by the Cincinnati Equipment Company, dealer in second-hand railway and contractors' supplies. The petition gives the liabilities of the company as $407,513 and its assets as $135,288. The largest unsecured creditor is the Isaac Joseph Iron Company, with claims of $44,771.

E. H. Baker, whose election to the second vice-presidency of the Galena-Signal Oil Company, Franklin, Pa., was mentioned in the *Railway Age Gazette* of January 19, was born on March 4, 1853, in Brooklyn, N. Y. He finished his schooling in the Polytechnic Institute of Brooklyn in 1870, and in the same year started in the oil business with S. T. Baker & Co., New York, his father's firm, which was established in 1849. Mr. Baker began at the bottom and in 1873 was given an interest in the company. In 1886 his father retired from the business, the firm name remaining the same, with E. H. Baker and F. B. Baker as partners. In 1894 E. H. Baker entered the sales department of the Galena company, with office in New York, which position he has held until his recent appointment to the second vice-presidency of that company.



E. H. Baker.

Isaac A. Sweigard, vice-president of the Johnston Railroad Frog & Switch Company, Chester, Pa., and formerly for 14 years general superintendent of the Philadelphia & Reading, died on January 24 at St. Lucie, Fla. Mr. Sweigard was born on July 23, 1843, in Dauphin county, Pa., and began railway work August 1, 1864, on the Reading at Dauphin. From May, 1865, to February, 1871, he was agent of the Reading at Pine Grove, and then for two years was train despatcher. On April 1, 1873, he was appointed superintendent of the Northern Pennsylvania and Bound Brook division and the Germantown and the Norristown branches, and from December, 1886, to March, 1892, he was general superintendent of the entire system. He was appointed assistant general manager in March, 1892, and the following August was made general manager. From June, 1893, to September, 1900, he was general superintendent of the main line division of the same system. In December, 1900, he left the road and went to the Johnston Railroad Frog & Switch Company. He was also interested in promoting electric railway lines in Pennsylvania and New Jersey.

Proposed Location of Western Plant of Baldwin Locomotive Works.

Considerable interest is attached to the proposed location of a western plant of the Baldwin Locomotive Works, Philadelphia, Pa., which recently bought land in the Chicago district near the great manufacturing plants in the vicinity of Gary, Ind. The Baldwin tract covers 370 acres, triangular in shape, with its eastern boundary on the line dividing the corporate limits of East Chicago and Gary. On the south line are the Elgin, Joliet & Eastern Railway, and the Chicago, Lake Shore & South Bend electric. On the north is the joint right-of-way of the Pennsylvania and the Baltimore & Ohio Chicago Terminal. The Pennsylvania is a switching track which connects with the main line of the Pittsburgh, Fort Wayne & Chicago a short distance east at Clark Junction. The property is well provided with transportation facilities and has the advantage of the electric line for workmen living in the vicinity.

S. M. Vauclain, vice-president of the Baldwin Locomotive Works, explains that when business conditions warrant it is the intention to start with the erection of a power house, foundry and forges for the manufacture of castings and forgings sufficient for ten locomotives of the largest type per week. When this portion of the plant is finished and in working order, the finishing departments, machine and erecting shops of proper size for ten locomotives a week will be erected and put in operation. Such a plant should furnish employment to about 5,000 men. It is regarded as one unit, and the completed plans should provide for three such units with an output of 30 locomotives a week.

Some of the principal manufacturing plants in the vicinity of the tract are: to the north, about 1½ miles, the American Steel Foundries, the Standard Forging Company, and the Midland Steel Company; to the northeast, one mile, the Universal Cement Company, and to the northwest one mile, the Buckeye Steel Castings Company. Three miles to the southeast is the new plant of the American Bridge Company, and adjoining it, to the east, the large tract owned by the American Car & Foundry Company. Five miles east by south is the large plant of the Indiana Steel Company at Gary, and seven miles to the southeast, within the corporate limits of Gary, is the tract bought by the American Locomotive Company.

TRADE PUBLICATIONS.

Valves.—The National Tube Company, Pittsburgh, Pa., has recently issued bulletin No. 7 on its regrinding valve, in which this valve is fully illustrated and the method of regrinding the valve seat is given.

Radiators.—The United States Radiator Company, Detroit, Mich., has issued the December number of *Radiation*, a magazine published occasionally, devoted to the interests of the hot water and steam heating industry.

Metallic Hose.—The American Metal Hose Company, Waterbury, Conn., has published a small illustrated folder on flexible metal hose for steam, oil, gas, suction, air or conduit, in which dimensions and prices are given.

Eave Trough Hangers.—The Crescent Specialty Company, Rochester, N. Y., has published a small folder on Crescent galvanized channel steel eave trough hangers, which tells of their simple construction and many advantages.

Lighting.—Bulletin No. 4907 of the General Electric Company, Schenectady, N. Y., gives data relative to the lighting of buildings by G. E. Edison Mazda lamps. Illustrations of numerous buildings lighted with these lamps are shown.

Electric Fans.—The General Electric Company, Schenectady, N. Y., has published a very full catalog of its electric fans for

ceilings, walls and desks. The catalog is illustrated and gives a list of supply parts for the fans and their prices.

Norfolk Southern.—The passenger department of this company has published a folder on hunting and fishing, giving game laws, a list of the guides, and information on where to go for the best sport in Virginia and North Carolina.

Furnaces.—Tate, Jones & Co., Inc., Pittsburgh, Pa., has published a very attractive 30-page catalog of its furnaces for heating, forging and welding. The catalog is well illustrated and gives full descriptions and dimension tables.

Recording Instruments.—The Uehling Instrument Company, Passaic, N. J., has recently issued bulletin No. 2, which is a condensed catalog of its recording instruments. The bulletin contains illustrations of pressure, vacuum, draft, revolutions and CO_2 recorders.

Feed Hammer Drills.—The Ingersoll-Rand Company, New York, has published form No. 4016 on Imperial valveless, telescope, feed hammer drills, giving detailed descriptions supplemented by illustrations and diagrams. Dimension and price tables are also included.

Thor Tools.—The Independent Pneumatic Tool Company, Chicago, has published a small illustrated folder giving the advantages and the dimensions of the various Thor pneumatic tools, including piston air drills, pneumatic hammers, staybolt drivers, air appliances, etc.

Concrete Posts.—The D. & A. Post Mold Company, Three Rivers, Mich., has published a 30-page pamphlet on Concrete Posts and How to Make Them, in which it tells of the durability and other advantages of these posts and describes the molds for their manufacture made by this company.

Locomotive Accessories.—The Lccomotive Improvement Company, Clinton, Ohio, has issued catalog No. 2, describing Markel's removable driving box brasses, lateral motion plates, flangeless shoes and wedges and solid head main rods. The recent improvements in these articles are included in the pamphlet.

San Pedro, Los Angeles & Salt Lake.—This company has published an unusually attractive booklet entitled The New High Line, describing the line which runs through the Meadow Valley Wash, in southeastern Nevada. The booklet includes many exceptionally well colored photographs of the scenes along this line.

Shop Heating.—The American Blower Company, Detroit, Mich., has published a 30-page illustrated booklet on shop heating, containing a treatise and some practical suggestions by F. R. Still; also, some good illustrations of typical heating and ventilating systems designed and installed by the American company.

Ventilators and Door Closers.—Burton W. Mudge & Company, Chicago, have issued two illustrated folders, one describing the Garland ventilator for passenger cars, which is now in use on about 6,000 cars of the Pullman Company, the other describing the Garland door closing and opening device for refrigerator cars.

Pennsylvania Railroad.—The industrial department of this company has published a useful 50-page booklet on Farming Possibilities of the Delaware-Maryland-Virginia-Peninsula, describing the great productivity and the resources of this region and telling of the work of this company in establishing experimental farms.

Carbonizing Coating.—The Goheen Manufacturing Company, Canton, Ohio, has published a very attractive pamphlet on corbonizing coating for preserving iron and steel construction. The pamphlet includes illustrations of many well-known structures on which this product has been used. Carbonizing coating is a protective paint and is applied in the same manner as other paints.

Chesapeake & Ohio.—The industrial department of this company has published a very full illustrated booklet on industrial sites along the lines of the C. & O. The booklet describes the markets and shipping facilities, the various industries, also the water power, the climate and the labor conditions. Facts for the manufacturer, the merchant and the workman are also included.

Grinding Wheel Safety.—The Norton Company, Worcester, Mass., has published an interesting booklet entitled Saftey as Applied to Grinding Wheels, describing modern preventive and protective safeguards which can be easily applied in the use of grinding wheels and machines. The booklet contains photographs and diagrams which serve to amplify the descriptions of these devices.

Northern Pacific.—The traffic department of this company has published two folders on Oregon, one called Oregon for the Home-Seeker, the other called Central Oregon, describing the great advantages that are to be found in this region, including the fertility of the soil and the diversity of resources. The booklets also give many facts on the climate, the population and the opportunities offered.

Compressors.—The Chicago Pneumatic Tool Company, Chicago, has published bulletins Nos. 34 A, 34 C, 34 E and 34 H on the different types of compressors, both steam driven and gasolene driven, made by this company. The bulletins are illustrated, and include detailed descriptions and diagrams. Bulletin No. 34 H is devoted to general instructions for installing and operating Chicago pneumatic compressors.

New York Central & Hudson River.—The farm bureau of this company has published a small illustrated booklet entitled America's Greatest Farming State, New York, in which some interesting figures are given of the crops and other farm products of that state. The booklet goes on to tell of what this road has done for the farmer and ends with brief comments on suburban homes on the New York Central Lines.

Sectional Conduit.—The H. W. Johns-Manville Company, New York, has published a 45-page illustrated booklet on J-M sectional conduit for steam and hot water lines. The booklet tells of the success this undeground pipe covering system has met with and gives specifications and methods of determining the size of conduit required. Maps of the various installations in the country are included to show the large area that may be heated by this system.

Brake Shoes.—The Allen & Morrison Brake Shoe & Manufacturing Company, Chicago, has issued an illustrated catalog describing the advantages of the Acme steel-back, locomotive-driver, brake shoe. The principal feature is the tire dressing obtained by hard metal inserts triangular in form and presenting an inclined shearing edge across the face of the shoe. The Acme brake shoe is made with a patented steel back extending over the whole length of the shoe. A full report of tests of this shoe in various classes of service, with illustrations showing the comparative tire wear, is included in the catalog.

FOREIGN RAILWAY NOTES.

Arthur Griffith, minister of public works of New South Wales, turned the first sod of the Glenreigh to Coff's Harbor railway line on November 25.

The report of the public works committee of New South Wales on the proposed railway from Galong to Burrowa has been tabled in the legislative assembly. The committee recommends the construction of a line about 17 miles long, at an estimated cost of $408,370, an average of $22,940 per mile. It is expected that for a time an annual loss of $15,130 will result from the operation of the line, based on a tri-weekly train service.

The total cost of building the proposed transcontinental railway through southern and western Australia, from Port Augusta to Kalgoorlie, is estimated by the Commonwealth consulting railway engineer to be $19,680,000; including bridges and culverts, $408,000; rails and fastenings, $4,925,000; ties and ballast, $5,050,000; water supply, $2,219,000; station yards, including telegraph equipment, terminal accommodation and workshops and machinery, $1,630,000; rolling stock, $1.582,000, etc. If internal combustion locomotives were employed, the cost would be reduced $1,864,000, owing to the saving to a large extent of the cost of providing water. It is recommended that an extension of the same gage as the transcontinental railway be built from Port Augusta southward to Brinkworth, a distance of 96 miles, at a cost of not more than $1,460,000. This would effect a saving in distance between Port Augusta and Adelaide of 58 miles.

Railway Construction.

New Incorporations, Surveys, Etc.

Alabama Roads.—Grading work is now under way on a 6-mile line from Fayette, Ala., south along Slippery river. The line is to be extended to a point about 35 miles from Fayette. Lee Baskett is building the line to reach timber lands. Woodson Hopkins is the engineer in charge, Henderson, Ky.

Altus, Roswell & El Paso.—The rights and property of this company have been bought it is said by W. W. West, of Houston, Tex. The plans call for building from Altus, Okla., southwest via Memphis, Tex., and Lubbock, thence via Roswell, N. M., to El Paso, Tex. Construction is now under way between Memphis and Lubbock, and it is announced that the section between these places, about 110 miles, will be finished and placed in operation within the next few months.

Asherton & Gulf.—The rights and property of this company operating a 32-mile line from Asherton, Tex., to Artesia Wells have been sold, it is said, to an English syndicate, represented by Edward Cowperthwaite, London, Eng. It is understood that the new owners will build an extension from Asherton, northwest via Eagle Pass to Del Rio, about 150 miles, and will also build from Artesia Wells northeast to Crowther, about 60 miles. R. S. Gresham, chief engineer, Asherton.

Bangor & Aroostook.—According to press reports, this company is making surveys for a 10-mile line from Caribou, Me., west to Washburn and Perham. M. Burpee, chief engineer, Houlton, Me.

Beaver, Meade & Engelwood.—Incorporated in Oklahoma with $25,000 capital to build a line to connect Beaver, Okla., Meade, Kan., and Engelwood, about 70 miles. The incorporators include F. C. Tracy, E. Clift, J. W. Webb and F. Laughrin, all of Beaver.

Canadian Pacific.—See New Brunswick Coal & Railway.

Canadian Roads.—A company has been organized in Canada to build a line from Hull, Que., northwest to James Bay, about 500 miles. A. N. Laredo, London, is said to be back of the project, and J. W. Paton is chief engineer.

Chicago, Burlington & Quincy.—According to press reports, work on the Hudson-Greely cut-off in Colorado will probably be started this coming summer. It is expected that track laying will be carried out on the grade already finished between Thermopolis, Wyo., and the Powder river this year. F. T. Darrow, engineer maintenance of way, Lincoln, Neb.

Chicago & Wabash Valley.—According to press reports, this company, which operates a line from McCoysburg, Ind., to Dinwiddie, 32 miles, is planning to build an extension to complete a short line from the Gary steel mills to the Indiana coal fields. The present northern terminus of the line is 16 miles southwest of Gary. C. J. Hobbs, chief engineer, Kersey.

Crystal City & Uvalde.—An officer is quoted as saying that an extension will be built from Fowlerton, Tex., the present eastern terminus to Port Aransas on the Gulf of Mexico, about 125 miles. E. Breaker, chief engineer, Crystal City.

Fairchild & North Eastern.—An officer writes that contracts are to be let about March 1, to build an extension from the present western terminus at Fairchild, Wis., west to Caryville on the Chicago, Milwaukee & St. Paul, about 40 miles. Maximum grades will be 2 per cent., maximum curvature 4 deg. There will be one 36-ft. steel bridge. Willard Foster, chief engineer, Fairchild.

Glenmora & Western.—Organized with $200,000 capital, it is said, to build from Glenmora, La., northwest to Shreveport, thence west of that place, also to build southeast from Glenmora to New Orleans. N. M. Cady, president; S. Lisso, vice-president, and B. E. Smith, treasurer.

Great Northern.—According to press reports a large amount of terminal improvements are to be carried out in Winnipeg, Man. This includes building large freight sheds and yards. A. H. Hogeland, chief engineer, St. Paul, Minn.

Hudson Bay Railway.—The original plans of this company have been adopted, it is said, to build from Pass Mission, Keewatin, to Port Nelson on Hudson Bay. A contract for the work has been let to J. D. McArthur, Winnipeg, Man., and it is said that construction work will be started soon.

Kansas City, Clay County & St. Joseph.—This company has increased its capital stock from $720,000 to $10,000,000. The company was incorporated March 22, 1911, by Kansas City and Chicago capitalists, to build a 72-mile line from Kansas City, Mo., north through Clay, Platte and Buchanan counties to St. Joseph. C. M. Hammond, president.

Kansas City & Memphis.—An officer writes that a contract has been given to the W. R. Felker Construction Company for work on the extension southeast via Fayetteville, Ark. Track has already been laid on 14 miles. M. Hays, chief engineer, Rogers. (November 17, p. 1037.)

Lake Erie & Northern (Electric).—This company, with headquarters at Brantford, Ont., has secured a right of way, and will begin construction work soon between Brantford and Port Dover. The city of Brantford has granted the company rights for a new entrance into the city with a terminus at the old Great Western Railway station.

Little Falls & Johnstown.—Application has been made to the New York Public Service Commission, Second district, for a certificate of convenience and necessity to build from Johnstown, N. Y., west via Ephratah, Palatine, St. Johnsville and Manheim to Little Falls in Herkimer county, about 28 miles, with an 8-mile extension through St. Johnsville, Palatine, Nellistion, Fort Plain and Minden to Canajoharies in Montgomery county.

Maine Central.—An officer of the Rangeley Lakes & Megantic writes that contracts will probably be let February 15, for construction work on about 11 miles from Oquossoc, Me., north along the east shore of the Kennebago river to Kennebago. The work involves excavating about 18,000 cu. yds. a mile and the construction of 18,000 cu. yds. of embankment a mile. Maximum grades will be 1 per cent. compensated, and maximum curvature will be 3 deg. 10 min. There will be one steel bridge, 25 ft. long, also a station building, engine house, coal shed and water tank. The line is being built to carry wood, logs and timber. M. McDonald, president; T. L. Dunn, chief engineer, Portland, Me. (January 19, p. 182.)

Work is now under way by Trites & Sargent, Bangor, Me., building a 2-mile extension of the Hartland branch from Mainstream, Me., to Harmony. T. L. Dunn, chief engineer, Portland, Me. (November 17, p. 1037.)

New Brunswick Coal & Railway.—This company, which operates 58 miles of road from Norton, N. B., to Minto, it is said, has arranged to build an extension west to Gibson, about 30 miles. The line is to be operated by the Canadian Pacific. The provincial government will guarantee bonds to the extent of $15,000 a mile, and it is understood that the dominion government has promised an additional grant of $6,400 a mile. A. Sherwood, manager, Norton.

New York Subways.—A contract has been given to the Degnon Construction Company, New York, at $2,335,830, for building section No. 2 of the Broadway subway, including a station at City Hall. The section extends from Park Place to Walker street, in the Borough of Manhattan, and connects with section No. 3, contract for which was recently let to the Underpinning & Foundation Company. (January 26, p. 176.)

Norfolk Southern.—This company is said to have made surveys for an extension from Beaufort, N. C., to Cape Lookout, about 8 miles. F. L. Nicholson, chief engineer, Norfolk.

Orange & Northwestern.—See St. Louis & San Francisco.

Rangeley Lakes & Megantic.—See Maine Central.

St. Louis & San Francisco.—According to press reports the Orange & Northwestern is to be extended north to a connection with the Marshall & East Texas at Elysian Fields, Tex., about 125 miles. This work is to be carried out during the present year. F. G. Jonah, chief engineer of construction, St. Louis, Mo.

Sandy Valley & Elkhorn.—An officer writes that this company is building from Shelby, Ky., south to Jenkins, about 30 miles, through a coal section belonging to the Consolidated Coal Company, in Letcher, Pine and Knott counties. The road is nearing completion and the company expects to begin the operation of trains about April 1, of this year. J. H. Wheelwright, president, Baltimore, Md.

Southwestern Traction & Power Company.—A contract is said to have been let to build from Jeanerette, La., northwest to a point beyond New Iberia. The work is to be started at once. The Chatham Construction Company has the contract to build the line, of which A. F. Jacobs is president; F. W. Crosby, second vice-president and general manager. The directors include J. Godchaux and A. G. Barrows, New Orleans.

Wenatchee Valley (Electric).—This company has secured funds, it is said, and will soon start work on an interurban electric line from Malaga, Wash., northwest via Wenatchee to Leavenworth, about 40 miles. E. J. Felt, Wenatchee, is said to be interested.

RAILWAY STRUCTURES.

Ada, Okla.—The St. Louis & San Francisco proposes to build a new passenger station.

Beaumont, Tex.—The Texas & New Orleans will shortly begin the erection of a new roundhouse.

Chapman, Ala.—The Louisville & Nashville will put up a new station, it is said, at Chapman.

Chehalis, Wash.—The Northern Pacific has selected a site for a new brick passenger station, which, it is reported, will cost $50,000.

DeQuincey, La.—It is reported that the Kansas City Southern will build a new roundhouse and shops.

Kingsville, Tex.—The St. Louis, Brownsville & Mexico has let the contract for a new tourist hotel and a new passenger station. Work is now in progress on the enlargement of the shops at this point.

Laredo, Tex.—The International & Great Northern is building a new $35,000 passenger station.

Omaha, Neb.—The Chicago, Rock Island & Pacific, and Union Pacific will reconstruct a viaduct at Eleventh street.

Perry, Ia.—The Chicago, Milwaukee & St. Paul proposes to enlarge its roundhouse and install a mechanical coaling station.

San Diego, Cal.—It is reported that the Atchison, Topeka & Santa Fe will shortly begin the construction of a reinforced concrete freight shed.

Tucson, Ariz.—Plans have been prepared by the El Paso & Southwestern for an 8-track yard, roundhouse, repair shops, freight warehouse, office building and passenger station.

Winnipeg, Man.—See Great Northern under Railway Construction.

Yardley, Wash.—Improvements to be made by the Northern Pacific this year in connection with its separation of grades through the business portion of Spokane, include the erection of a roundhouse, turntable, engine room, machine shop, storehouse, office, car shop, ice house and two coal decks.

FOREIGN RAILWAY NOTES.

For the development of the interior of Siciliy, the Italian government has decided in principle to grant subsidies for secondary railways of 3 ft. 3 in. gage to the extent of from $2,470 to $2,998 per mile a year. The length contemplated of these secondary lines is approximately 497 miles.

Authority has been given by the railway commissioners of Victoria for the provision of additional siding accommodation between Newport and North Williamstown in order to facilitate the handling of grain traffic. The work to be carried out will involve an expenditure of about $7,500.

Railway Financial News.

Arkansas, Oklahoma & Western.—This company, whose property was taken over by the Kansas City & Memphis, is to distribute to its stockholders Kansas City & Memphis stock at the ratio of five-eighths of a share of K. C. & M. stock for each share of A. O. & W. stock held. The stockholders are to vote on February 13, 1912, on the question of dissolving the old A. O. & W.

Asherton & Gulf.—A press report says that control of this line which runs from Asherton, Texas, to Artesian Wells, 32 miles, has been bought by English capitalists.

Canadian Pacific.—This company has taken over the Alberta Central.

Chicago, Milwaukee & St. Paul.—Directors have declared a semi-annual dividend of 2½ per cent. on the common stock, thus reducing the dividend on the common stock from an annual rate of 7 per cent. to an annual rate of 5 per cent. The 7 per cent. dividend in 1911 was shown as earned only by the inclusion in other income of a dividend on the St. Paul's Pacific coast extension subsidiary—the C. M. & P. S.—from the earnings of the two previous years. Current earnings of the St. Paul and the Puget Sound apparently did not show the 7 per cent. rate as being earned, so that if the 7 per cent. rate had been continued, as it is understood some of the directors were in favor of doing, surplus would have had to have been drawn on.

Delaware, Lackawanna & Western.—Stockholders are to vote on February 20 on the question of increasing the capital stock from $30,277,000 to $42,277,000. The proceeds from the sale of the additional $12,000,000 stock are to be used to pay for improvements to the line in the state of Pennsylvania. It it estimated that this work will cost $15,000,000. Lackawanna stock has a par value of $50 per share, but is, of course, quoted on the New York Stock Exchange on a per cent. basis, so that the price of 545-555, quoted for the end of last week, is the price of two $50 shares.

Minneapolis & St. Louis.—Stockholders of this company and of the Iowa Central have subscribed for between $900,000 and $950,000 of the new $2,500,000 5 per cent. extension and refunding bonds of the Minneapolis & St. Louis, which were issued in connection with the taking over the Iowa Central by the Minneapolis & St. Louis. The underwriting syndicate, headed by J. S. Bache & Co., New York, have taken the remainder of the bonds, but are not at present making a public offering. The bonds were offered to stockholders with a bonus of five shares of preferred stock of the M. & St. L., and at the present market price of the M. & St. L. preferred stock, the bonds were offered to stockholders at about 70.

National Railways of Mexico.—This company, whose earnings are not given in our tables of roads reporting to the Interstate Commerce Commission, earned gross in December, 1911, $5,384,568, as against $5,370,886 in December, 1910. Operating expenses in 1911 were $2,892,202, and in 1910, $3,143,655 leaving a net in 1911 of $2,493,366, or $265,135 more than in December, 1910. For the six months ending December 31, the National Railways of Mexico earned net $14,797,311, an increase over the same period of 1910 of $1,557,394.

Wabash.—Suit has been brought with the approval of the bondholders' protective committee, James N. Wallace, chairman, for foreclosure and sale of the property under the refunding mortgage. The United States district court at St. Louis has consolidated this suit with the original suit brought by the Westinghouse Air Brake Company for an $18,000 debt, and the same receivers, namely, President F. A. Delano, W. K. Bixby and Vice-President Edward B. Pryor are continued as receivers under the consolidated suit. The receivers are authorized to spend $8,306,816, and are authorized to issue receivers' certificates for amount spent in excess of the $1,600,000 now on deposit with the Equitable Trust Co., New York. The Wallace committee, in a statement, are quoted as telling President Delano that there would, so far as necessary, finance the program of improvements to the physical property of the Wabash. There are $41,921,000 of the first refunding and extension mortgage bonds outstanding.

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A GENEROUS and wealthy citizen of a city gives a half million dollars to erect, to endow and to supply artistic material for a local art gallery. The grateful city hails him as a benefactor, releases his gift from taxation and points to it with pride as an uplifting asset to the community. In the same city an old terminal railway station is outworn and outgrown by the demands of passenger traffic. Public sentiment instantly and urgently insists that the new station shall pay architectural tribute to the "city beautiful," as the local pride of phrase—if not of fact—runs. The typical civic attitude is that of Kansas City, where the authorities have insisted that $1,000,000 or so should be spent on architectural and other adornment of a new Union Station if the permit to erect it is yielded. Utilities, public convenience and comforts are not enough. There must be added the esthetic and artistic ministration to the popular vision. In greater or less degree this idea ranges from the city of 10,000 up to the city of millions, where it expresses itself in the hundreds of thousands of dollars that span the gap between a station's plain exterior and a frontage of pillared grandeur and costly carving. Moreover, this ornate feature is not only exacted, but taxed also. Even if not assessed locally it pays its tribute to Caesar in the tax on the new stock or bonds which the added cost connotes; and, under some of our systems of taxation, it is lucky if it escapes taxation twice over. It may be admired and praised as a "credit" both to the city and to the railway corporation, but the credit never reaches the tax books of state or municipality, and the decorative structure must take its place in the final assessment along with the most hideous and lucrative sky-scraper. But, turning to another aspect of the matter, where do the aggregated millions expended by our railways in such public art embellishment take their place in a theory of revaluation? Are they a normal part of "replacement," are they vested with earning power and, if so, how much? Are they to be charged up to Utility or exempted as fine Art? Are they to be capitalized in dollars or in the more nebulous units of public sentiment and good will? These are economic enigmas that would puzzle a new Hadley Commission.

THE Block Signal and Train Control Board, a body which, in its four years' service at Washington, has made for itself a reputation for conservatism, in its annual report, which was noticed in the *Railway Age Gazette* of February 2, comes out in favor of the use of automatic train stops "in a great many places" on American railways; and says that, although no apparatus of this class has yet been fully developed in such a way as to be thoroughly adapted to the needs of general railway service in the United States, still there is no reason why a satisfactory device cannot quickly be developed, when once the attempt is made. The grounds on which the board bases this radical conclusion are not given in much detail, but may be summed up in the declaration that satisfactory apparatus is available, or can be made so, and that the need is urgent. It refrains from recommending legislation to require the use of automatic stops, because there has not been enough experience with them under the varying conditions of steam railway operation to, in its opinion, justify such legislation. It does believe, however, that the roads should be expected and urged to develop the art of automatic train control, and that if this is not done with "a reasonable degree of expedition, steps should be taken by the government to stimulate action." The fundamental question to be considered is whether, under the ordinary conditions of railway operation, automatic train control, even if approximately perfect, would be desirable, either generally or, in the board's language, "in a great many places." Numerous railway operating men contend it would not be; but no American railway organization in this country has ever made a thorough study of the subject, although some have been urged to do so. The next question, in point of importance, is whether apparatus which will work satisfactorily under varying conditions exists; and the Block Signal and Train Control Board, whose members have investigated the subject more thoroughly than any other persons, whether in or out of railway service, answer substantially in the affirmative. It would seem, therefore, that the subject of automatic train control has reached a place where it is entitled to receive more intelligent and serious attention and investigation from individual railways and railway associations than it has heretofore. A swarm of experimenters having stop devices with stock jobbing appurtenances is trying to agitate the public; and unless the railways take steps which either will refute the contention of the Train Control Board that automatic train control is practicable and desirable, or will demonstrate its practicability and desirability and show a dispostion on the part of the roads to make use of it wherever expedient, they are in danger of becoming the victims of unwise, hasty and harmful legislation on the subject.

IN connection with the last report of the Southern Pacific Company, some of the analogies of electric extension of two large railway systems on the Pacific and Atlantic seaboards, respectively, deserve attention. The electric system of the Southern Pacific around Los Angeles and in other parts of California comprises approximately 1,065 single-track miles; and the company has in addition nearly completed electrification of former steam roads leading to its San Francisco ferries. Purchase of electric lines has accompanied the electrifying of old steam lines. Similarly, but beginning at an earlier date, on the Atlantic seaboard the New Haven has developed electric purchase and operation. It owns or controls some 1,300 miles of street railways, and operates by electricity about 200 miles formerly operated by steam. The only difference between the electric ventures of the two companies is that while the Southern Pacific has parted with some of its street railway investments, the New Haven has held its investments of this kind steadfastly; and, also, the New Haven has electrified part of its main line. While financial results thus far, in the absence of official returns, are somewhat obscure, they suggest the decided success of the electric investments of the two corporations. Thus, the returns of the Southern Pacific's holding corporation, the Pacific Electric Railway Company, operating 881 single track miles, indicate a return of probably about $600,000 over cost of operation and fixed charges. As contrasted with the Southern Pacific, the New Haven makes no returns for its street railways and, for legal reasons, does not openly concede ownership of some 400 miles in Massachusetts vested in a holding corporation. But it can be stated unofficially that, in spite of a very great percentage of water poured into the capitalization of the Connecticut and Rhode Island street railways before the New Haven bought control, the 1,300 miles of street railways as a whole are now practically liquidating the investment. The purchase of the electric properties by these two corporations, must not, however, be tested by the immediate investment and the returns alone. There must be counted in the tendency toward rapid increase of street railway earnings and, more important than that, the value of the control itself to the proprietor corporation in the profitable adjustment of traffic relations between the steam and electric lines. If to the electric investment of the Southern Pacific and the New Haven we add that of the New York Central and the Delaware & Hudson, we shall have about 3,000 single-track miles of electric roads operated directly or indirectly by four large steam railway corporations. So great an investment, and under somewhat diverse conditions of operation, forecast instructive results ere long when the proposition of steam railway purchase of electric lines is more fully worked out.

THE SHIPPERS AND UNIFORM CLASSIFICATION.

SOME of the reasons why railway traffic officers contended for years that a uniform classification of freight would be impracticable were given forcible illustration recently during the hearings in Chicago before the board of suspension of the Interstate Commerce Commission on the new issue of the Western Classification. The changes which aroused the railway commissions of nine states and numerous shippers to stormy protests and a demand for its suspension were largely the result of the work of the Uniform Classification Committee. This, in turn, has been largely due to protracted agitation for a unification of classifications on the part of shippers and the Interstate commission. Naturally, the railways have not sought to achieve uniformity by invariably making alterations that would entail a reduction of their revenue; and as they have taken advantage of the opportunity to eliminate many long-standing discriminations, the advances in the classification numerically exceed the reductions. The roads estimate, however, that the traffic affected by the reductions is 33⅓ per cent. greater than that affected by the advances. Naturally, also, human nature being constituted as it is, the large number of shippers who would be benefited by the changes were conspicuous by their absence, while those who feared they would be hurt were present, vigorously protesting. Thus far the Uniform Classification Committee has not tried to effect actual unification of the ratings in the three classifications by moving articles from one class to another. The committee has tried merely to make a beginning by commencing to establish uniform rules, descriptions of articles and minimum carload weights. If the storm of protest with which this first step toward unification is met is any indication of what the railways must face when the changes in the ratings themselves are undertaken, the former lack of enthusiasm on the part of the carriers toward all suggestions for uniform classification will appear to be justified.

The railway commissioners and the shippers practically ignored the fact that the committee's proposals expressed sincere effort to comply with the demand for uniformity. Instead, the burden of their protests, both at the hearing and in their newspaper interviews, was that the railways were seeking "by subterfuge" and by "juggling" to effect an advance in millions of freight rates, in contravention of the decisions of the Interstate Commerce Commission in the rate advance cases. Suspension of the classification for 120 days was demanded on the ground that the shippers had been given but a few days, since its publication on December 30, in which to examine it and determine its effect on their interests, although uniform classification has been agitated for over twenty years, and although the railways have been accused by the Interstate Commerce Commission and shippers themselves of dilatoriness in trying to effect it, and the complete docket of the Western Classification Committee was made public before its Milwaukee meeting last July, when the shippers were given a hearing in its provisions. A member of the Oklahoma commission almost in the same breath protested the impossibility of checking the classification in the time allowed and "estimated" that it would increase the revenues of the carriers by from $20,000,000 to $40,000,000!

Uniform classification has not been of the railways' seeking. One of the earliest demands of the Interstate Commerce Commission after its creation was that a single classification be substituted for the three then, as now, in effect in eastern, western and southern territory. The railways felt that they had accomplished a difficult task in reducing to three the multifarious classifications previously in effect; and traffic officers long contended that varying commercial and transportation conditions in different territories rendered complete unification neither practicable nor desirable. The agitation for it was continued by shippers, and carried to Congress, and in 1907, after the commission had intimated that unless the railways undertook the task it would do so itself, the roads appointed a committee to do the preliminary work and determine the principles on which a uniform classification should be framed. After a thorough study this committee reported, in 1908, that "while the establishment of a uniform classification is impracticable at this time it can ultimately be worked out along intelligent and satisfactory lines." It added:

> "It is evident that material advances and reductions would result from unifying ratings in the several territories, the effect of which on revenue cannot be determined until the new rate scales are made to conform to the ratings of a uniform classification, and applied to traffic moving during a representative period of time by individual carriers."

As to the effect on trade, the report said:

> "It must be apparent that the numerous advances and reductions in rates which would result from a uniform classification would not fail to have influence on the trade conditions of the country, the extent of which could not be determined until new rate scales are made to conform to the ratings of a uniform classification, and the mercantile and industrial interests of the country have applied them to their business."

In the same year an executive committee and a working committee were formed, the latter to undertake the unification of rules, descriptions of articles and minimum carload weights, which must under any plan of unification precede the making of uniform ratings. This committee has been at work in Chicago since the fall of 1908. It has secured detailed information re-

garding the character of traffic and transportation conditions from all classes of industries, has given hearings at various times to representatives of those industries, and has made frequent reports of its progress to the committee on uniform classification of the National Association of Railway Commissioners. This association is composed of the state and interstate commissioners. The agricultural implement manufacturers, so much in evidence at the Chicago hearing, were given a hearing by the uniform committee as long ago as July 27, 1909.

Although the railways' committee has been in continuous session, it frequently has been criticised by shippers for having made too little progress. The Interstate Commerce Commission in its last annual report to Congress expressed the opinion that there can be no permanent uniform freight classification without a law requiring the railways to adopt and maintain it, and recommended legislation requiring this within five years.

Last year the Uniform Classification Committee submitted the first part of its work in the form of recommendations to the three classification committees for adoption. It was deemed advisable to attempt the unification gradually, rather than to wait and try to bring about complete uniformity at once. In reaching this decision the carriers acted on the suggestion and had the approval of the committee of the railway commissioners' association. Approximately 50 per cent. of the recommendations of the Uniform committee were adopted by the Official Classification Committee, about 75 per cent. by the Southern Classification Committee, and about 90 per cent. by the Western Classification Committee.

Undoubtedly some of the more powerful shippers' organizations have been led to demand a uniform classification by the shrewd hope that such a readjustment would result in a general lowering of rates. In view of the fact that all the elaborate machinery of government regulation of rates, in this country, which was really called into existence mainly for the purpose of correcting discrimination, has not developed any more scientific method of removing discriminations than by the reduction of the higher to the level of the lower rate, this hope would seem not to have been entirely without foundation. The Interstate commission, however, and the more thoughtful of the traffic experts in the employ of the shippers, have advocated uniformity, not for the purpose of lowering rates, but to improve the conditions attendant upon the shipment of articles from one classification territory to another.

Railways have been charged with, and too frequently have been guilty of, making some rates unreasonably low, and some classification provisions with undue liberality, to favor particular persons or localities. In other instances persons or localities have been given more favorable rates or classifications than others, because of differences in geographical, commercial or transportation conditions without exposing the railways to any fair charge of unreasonable discrimination. Uniformity necessarily means removal of these discriminations, whether fair or unfair. If the carriers are not to bring about unification by the simple process of reducing all rates to the level of the lowest, which would bankrupt them, the framing of a uniform classification must be done with a give-and-take spirit, some rates being revised upward, and others downward.

Many discriminations formerly accomplished by rebates have been continued in the provisions of published tariffs and classifications, and many descriptions of analogous articles in the classifications have been so worded as to permit the evasion of their clear intent by slight misrepresentations in the billing practically impossible of detection. In adopting the recommendations of the Uniform committee the Western Classification Committee has included many provisions that will cost certain shippers more money, while putting all shippers on a more equal basis by removing discriminations that ought to have been eliminated long ago. At the same time, it has made many changes which will greatly benefit others. The number of items in the classification which represent advances exceeds the number of reductions, but the number of items has but little practical significance. No one will know how the actual movement of traffic will be effected until the classification has gone into effect. The purpose of the railways has not been to increase rates, but to correct discrimination, to effect uniformity and to increase traffic.

Some shippers and some industries are bound to be hurt in the process. In asking a suspension of the classification for the benefit of those who are adversely affected, the railway commissioners have also sought to delay the advantages that would be gained for others of their constituents. Commercial conditions undoubtedly will be disturbed by extensive changes in classification, as the railway committee predicted in 1907. But it is commonly understood that commercial conditions were considerably agitated over a somewhat wide area when rebates were abolished in 1906. In fact, they were so much disturbed that many of the former beneficiaries of illegal preferences in rates have not yet ceased to demand their continuation in the form of reduced rates. Even when the removal of discrimination is accomplished by the reduction of the higher rate to the level of the lower, the change is likely to arouse the criticism of the man who has benefited by the former discrimination and whose rate is not reduced also.

It was only to be expected that shippers whom a beneficial arrangement for mixed carload shipments has allowed to do a less-than-carload business at carload rates should "view with alarm" an effort toward the restriction of the mixing privilege which other interests have long demanded. For example, it is entirely natural that those who for years have had the advantage of a classification of binder twine with plows and harvesters instead of with ropes and cordage, and have thereby been permitted to pay carload rates on half a carload of agricultural machinery and half a carload of twine, should object to the abolition of the privilege. In this case, they objected so hard that the committee agreed to restore the privilege, on the showing that many small dealers had already made contracts for their season's supply. It was to be expected also that those who have been enabled to secure low rates by taking advantage of technicalities in the descriptions which were too refined to be efficient or fair should protest, because the committee has sought to remove the temptation to and opportunity for misbilling by grouping analogous articles under a single description. Candy, for example, has heretofore been given two ratings. If valued at less than 15 cents a pound it has been rated in the third class. If given a higher valuation it has been charged the first class rate. Quite naturally those who by the simple expedient of declaring their candy to be worth less than 15 cents a pound have had an advantage over those of their competitors whose honesty or fear of prosecution has restrained them from misbilling object when all candy is put in the second class.

Every point raised by the shippers or state commissioners at the hearing represented the view of local or particular interests. They were met by Robert C. Fyfe, chairman of the Western Classification Committee, with facts and figures showing the reasons for the changes over the entire territory involved. The representatives of the Interstate Commerce Commission also displayed a strong spirit of co-operation with the effort toward uniformity. But without the co-operation of the shippers who will benefit by the proposed changes a uniform classification seems far off, indeed. It might be a good idea to have a representative of the Interstate Commerce Commission sit with the Uniform committee hereafter to keep in close touch with the progress of its work. Such a plan would have the advantage of familiarizing the commission, and through it the shippers, with some of the difficulties that must be overcome and with the means adopted to overcome them, and the reasons for their adoption.

THE RAIL SITUATION ONCE MORE.

THE question whether the United States Steel Corporation, at least is making safe rails would seem to be no longer open to discussion. Complaints by railway managers regarding rail breakages recently have been widespread. This is the railway side of the case. On January 22, testifying before the Stanley committee, Mr. Farrell, president of the United States Steel Corporation, said:

"The carbon is so high that we get the brittle rail. It is true that many of these hard rails never break, but the liability to breakage is much greater than in the old time softer rails, and the influence of the unavoidable contingencies of manufacture, such as seams, pipes and segregation, is much greater. In many respects the steel is more doubtful, more dangerous and more treacherous. It is unquestionably, in my judgment, an unsafe grade of steel in view of the severe conditions of service."

This is the official view of the Steel Corporation. When the *Railway Age Gazette,* in an editorial in its issue of December 15, entitled "What Are the Railways Going to Do About Rails?" criticized the rails now in service and being put in service, its statements were challenged by railway men and persons connected with the steel companies. No one seems to challenge them now.

While there is agreement that the rails being made are unsatisfactory from the standpoint of safety, there is disagreement as to why this is so. Mr. Farrell puts all the blame on the roads. He says that commencing about 1890 they began to ask for higher carbon in rails in order to get greater wear, and that the rail makers, unwisely and many times under protest, made the quality of steel demanded. "Gradually the specifications called for still higher carbon until today I believe the steel is within the danger zone of brittleness." The steel manufacturers, he added, are now druggists; "they are dealing with prescriptions from the railway." The implication of all of which is that the steel companies are making rails just as the railways ask them to.

Now, the fact is that over three years ago, after much study and deliberation, the American Railway Engineering and Maintenance of Way Association drew up a specification according to which it believed good rails could be made, and submitted it to the representatives of the steel mills; and that the steel companies rejected it. The specifications under which rails are being made now differ in essential particulars from those according to which railway managers indicated to the steel companies they thought they should be made; and at this very time railway engineers are pressing for changes in the specifications—with what results remains to be seen. As to Mr. Farrell's assertion that the trouble is due to excessive carbon, only three or four large railway systems are having rails made according to specifications in which the carbon varies to any considerable extent from that in the steel companies' own specification. Among these are the Pennsylvania Railroad and the Harriman Lines. The Harriman Lines' specification calls for .07 more carbon than do those generally used, and the Harriman Lines are suffering a smaller proportion of rail breakages, according to the statistics on the subject, than most of the railways of the country. Prior to the organization of the United States Steel Corporation in 1901 the specifications in general use provided for .45 to .55 carbon. In 1904 the manufacturers voluntarily adopted a specification which raised the carbon content to .50 to .60. There followed in 1905 and 1906 a flood of bad rails; and it was after protests from the railways that the mills in 1907 adopted the drop test and restored the carbon content to what it was prior to 1904, and has been since.

The investigations and experience of railway engineers have led most of them to believe that the defects of rails which result in breakages are due in much smaller degree to shortcomings of the specifications and chemical composition than to bad mill practices. One road which recently made a careful analysis of over 500 rail failures found that 95 per cent. of them would have been prevented by good practice in manufacture. If the trouble is with the specifications it is inexplicable that under the same specifications, one of the Steel Corporation's own largest mills makes rails which break twice as often in proportion as do those made by another of its largest mills. If, on the contrary, rail failures are chiefly due to excessively fast rolling or other defects of mill practice, the fact that the record made by the rails from one of these mills is very much better than that made by those from the other is easily understood.

Mr. Farrell implied that one of the remedies for the situation is for the railways to buy heavier rails. But as the statistics we published in an editorial in our issue of January 12 show, breakages of 85, 90 and 100-lb. rails are more numerous in proportion than are breakages of 75 and 80-lb. rails. He also suggested that the carbon content be reduced, thereby producing a softer rail. He said that a softer rail would not break so easily, but conceded that, of course, it will wear out faster. He might have added that track laid with soft rails very much sooner becomes irregular, causing rough riding of trains, which necessitates frequent rail renewals. How much breakages would be reduced by the use of softer rails is uncertain; but that the softer rails would have to be renewed much faster, thereby increasing the operating expenses of the railways—and the earnings of the steel companies—is certain.

Mr. Farrell also said that to get satisfactory rails the roads probably must pay more than $28 a ton. He unquestionably was right in contending that safety of transportation is more important than cheap transportation, and if, as he asserted, it is necessary for the railways to pay more to get safer rails, they ought to do so. Before we conclude that the railways should pay more, however, a glance back into history is desirable. The average price of steel rails in the United States in the ten years from 1890 to 1899, inclusive, was $26.02. In 1894 and 1895 it was $24; in 1896 it was $28; in 1897 it was $18.75; in 1898 it was $17.62, and in 1901, the year the Steel Corporation was formed, it was $27.03. In those years the mills gave the railways a guarantee that rails would last at least five years. The roads, under the competitive conditions in the steel business then existing, could also buy from any mill they liked. Soon after the Steel Corporation was formed the price was fixed at $28, and it has stood there ever since, while the prices of other steel and iron products have fluctuated more or less in accordance with supply and demand. The railways were told that it was necessary to charge $28 to make good rails, the implication being that they would get good rails for this price. A little later the five-year guarantee was withdrawn. At about the same time the Steel Corporation put a provision in its contracts that orders for rails might be filled by it from any of its mills that it chose. Meantime, the railways and public were being assured that the union of numerous mills by the United States Steel Corporation, and its acquisition of railway lines, steamship lines, ore mine leases, etc., would effect economies in production that would benefit the public much more than did the competitive conditions existing previously in the steel business. Subsequently, also, Mr. Carnegie and Mr. Schwab, testifying before committees of Congress, have said that steel rails can be made cheaper in the United States than anywhere else on earth; and the commissioner of corporations, Herbert Knox Smith, in a recent report, says that the Corporation's "book cost" of making Bessemer rails is $21.27, that, excluding $2.47 inter-company profits, the revised cost is $18.80, and that the profit at $28 a ton is 11 to 17 per cent. on the investment.

And now, after all this, Mr. Farrell tells the Stanley committee that the price of $28 a ton is inadequate; that the cost of production has been steadily increasing for ten years, until rails can be produced more cheaply abroad than in the United States; and that if the railways are to get good rails they must pay more for them. In view of the foregoing facts we submit that the burden of proving that the price of $28 a ton is adequate is not on the railways; but that the burden of proving that it is not adequate is clearly on the Steel Corporation. If the cost of production has been constantly increasing, what has become of all the economies which were to result from the formation and operation of the Steel Corporation?

The only way to determine whether it is necessary for the

Steel Corporation to get more than, or even as much as, $28 a ton for safer rails, is for it to make them, and then open its books and show how much the making of them actually costs. The investigation should not be made by the commissioner of corporations or committees of Congress, who know nothing about rail-making, and in whose eyes it is easy to throw dust, but by experts. And it should include an inquiry into *all* the expenses involved. For example, the Steel Corporation owns in Minnesota two short ore-carrying railways, the Duluth & Iron Range, 168 miles long, and the Duluth, Missabe & Northern, 293 miles long. In the fiscal year 1910 the gross operating revenues per mile of the Duluth & Iron Range were $56,686; operating expenses, $20,720; net operating revenues, $35,966; operating ratio only 36.55 per cent. The gross operating revenues of the Duluth, Missabe & Northern per mile were $48,064; operating expenses, $14,402; net earnings, $33,662; operating ratio 29.96 per cent. In the same year the figures for the Pennsylvania Railroad in the east and the Union Pacific in the west—two of the greatest and most prosperous railways in the United States—were as follows: Pennsylvania, gross operating revenues per mile, $40,149.50; operating expenses, $27,582; net operating revenues, $12,567.50; operating ratio, $68.70 per cent.; Union Pacific, gross operating revenues per mile, $15,594; operating expenses, $7,936; net operating revenues, $7,658; operating ratio, 50.89 per cent. The figures for the railways of the United States as a whole were: Gross operating revenues per mile, $11,607; operating expenses, $7,691; net operating revenue, $3,916; operating ratio, 66.3 per cent. The figures for the Steel Corporation's railways are out of all proportion to those for the other railways of the country, although, like other railways, they are common carriers; and the rates on ore from which their earnings are derived enter into the figures on which Mr. Farrell bases his statement as to the cost of making rails in the United States, while the profits from them go into the Steel Corporation's treasury. These figures clearly indicate the need for "going back of the returns" of the Steel Corporation in investigating the price it is entitled to receive for rails.

Chairman Gary, in his testimony before the Stanley committee, as has been pointed out in past issues of this paper, conceded, in effect, that the Steel Corporation is essentially a concern engaged in rendering a public service and should be regulated like railways. On this theory, it owes the same public duty to make safe rails that the railways do to give safe transportation; and it is not entitled to get any larger profits from making them than the railways are from using them. Certainly its railways are not entitled to get any larger profits from carrying the ore going into rails than the railways are from using them. The Steel Corporation, by the admission of its president, has not been and is not now performing its public duty of making safe rails. His attempts to put the blame on the railways fail, for it was because the steel companies were making poor rails that the railways began insisting on improvements in specifications and mill practice—improvements they have as yet been unable, chiefly because of the monopoly conditions in the steel trade, to obtain—improvements which the steel companies, in view of their public duty, and of the fact that they are dominated financially by the same men who dominate in the financial affairs of many railways, ought voluntarily to make, but which all the pressure the executive and engineering officers of the railways can bring to bear has as yet been inadequate to secure. Any way, why should it be necessary for the railway to tell the steel companies how to make good rails, any more than it should be necessary for shippers to tell the railways how to furnish good transportation. By the attitude they have assumed and are maintaining on the rail question the steel companies, and especially the Steel Corporation, are playing directly into the hands of those who demand the complete destruction of practical monopoly in the steel business and of the close financial relations that exist between the steel companies and large railway systems.

THE ATTITUDE OF THE COMMISSION AND OF THE RAILWAYS.

THE comments of "Old Railroader" in another column on the proposition that the Interstate Commerce Commission be given power to fix minimum rates are interesting from several points of view. He contends that the railways do not want to discriminate in favor of the "big shipper," and asks why the commission does not help them. The tone of his letter is almost an answer to his question. The members of the commission are at least human. Are they very likely to help a man who follows his request with a denunciation? "Old Railroader" may not know it, but the reverse question has been put. More than one member of the Interstate Commerce Commission, in discussing questions of this kind, have asked "Why do not the railways help us more?" And they point to cases large and small involving questions of discrimination, where the railways have presented no testimony or have testified in favor of the "big shipper."

The best answer, however, to "Old Railroader's" letter is to say that the commission is helping as much as it knows how. The best instance of this is the recent decision in the case of the Durham & South Carolina. "Interstate Commerce Commission 1694. In the Matter of Division of Joint Rate for Transportation of Coal to points in North Carolina from points in other states." In this case the commission finds as follows:

"The Durham & South Carolina, being owned by a corporation which owns the main industry on that line, can not receive an allowance such as that here given without its being in effect a rebate on the traffic of the allied industry which moves over the Norfolk & Western for or to the Durham & South Carolina. . . . The Seaboard Air Line bought the business of an industry, or of a group of financiers having large traffic at their control, by allowing its traffic at one point to be taken away from it by a road under the management allied to that of the industry. Here then, at Durham, we have two great trunk-line railroads bidding for traffic into Durham by allowances to industrial roads. They voluntarily reduce their own revenue through divisions with these industrial roads for the sake of gaining traffic. . . . The large stockholders in the Durham & Southern by their control of industries induce the Seaboard Air Line to build up the traffic of a rival road, the Durham & Southern. If there is a dollar over and above the actual cost of transportation in the 40 per cent. division which the Durham & Southern gets it goes into the pockets of the Dukes; it is not a rebate given to the American Tobacco Company, but confessedly is an advantage growing out of the relation between the Dukes and the tobacco interests, for if the Dukes did not have freight to route the traffic manager of the Seaboard says that no such arrangement would have been made. There may be some doubt as to the power of the commission to correct a situation such as this, but whatever power the commission has it should exercise. An order will be issued against the Seaboard Air Line citing it to show cause why its rates into and out of Durham on all classes and commodities should not be reduced, and against the Norfolk & Western that it show cause why its rate on coal into Durham should not be reduced."

In accordance with this decision, the Norfolk & Western and the Seaboard Air Line were ordered by the commission to show cause before February why their Durham rates should not all be reduced, presumably by the amount of the allowances given to the "big fellows."

The allowances in question are considerable. The Durham & Southern, for instance, is receiving from the Norfolk & Western 69 cents to haul a ton of coal less than two miles; this is about 35 per cent. of the rate. The Durham & Southern is receiving from the Seaboard 40 per cent. of the rate for a twenty-mile haul. It was evidently the thought of the commission that this threat of a general reduction of the Durham rates, 35 or 40 per cent., would result in inducing the railways to withdraw the allowances in question, and thus eliminate what is considered a discrimination. Certainly the Durham rate could not be cut in this way without affecting the whole southern rates schedule most favorably, and a general reduction of anything like this percentage would spell bankruptcy. The remedy looks heroic, and whether it comes or not, the commission certainly has demonstrated that it desires to "help the railways" in this matter, even if it does not choose the exact method which the railways might desire.

This settled, the question arises—why should there be this

misunderstanding? Why should not "Old Railroader" appreciate that the commission wants to help him? Why should he couple his appeal with abuse? On the other hand, why does not the commission know that the railways want help, and why does it make the acceptance of its "help" so difficult? In fine, why are the commission and the railways so far apart?

One might as well ask why there are still in the South old ladies who hate a Yankee, and why the "bloody shirt" has been waved in the North within a few years. There was a state of war between the railways and the commission for twenty years, war in the courts, to be sure, but war all the same; and the early victories were with the railways. We are now in a period of reconstruction, and of rapid reconstruction. But there are so many old scars left on both sides, and there are many old wounds which re-open when the surgeon is rough—sometimes, indeed, when he means to be tender.

An unprejudiced person would probably say that, as conquerors go, the Interstate Commerce Commission is a very decent conqueror. Whatever its lapses in administration and legislation, it certainly has not been actively oppressive, despite quite a little provocation from the conquered. But the modern scale is high. A good deal is expected of conquerors nowadays. One of the members of the commission had some forty odd years ago a personal experience of "reconstruction." Will he not explain to his colleagues what qualities are most appreciated in conquerors?

One chief obstacle in the way of bringing the commission and the railways to a closer understanding is the fact that most of the strong men in the railways have, by their very quality of strength, been most deeply involved in the twenty-year war with the commission. They are the men who can help the commission most, and many of them consider themselves especially persona non grata. On the other hand, the clever men in the railways have many of them been engaged in putting the commission into one or another hole, and they feel—justly or not—that the commission does not trust them, and that it will take years of frank dealing before they can become useful.

The personnel of the commission, however, is not thoroughly committed. Many of the members have been appointed since the worst part of the war, and none of them served all through it. They are all politicians of one or another kind, and as such are all men of a good deal of tact. We can hardly conclude that the commission ought in every case to take the first steps to secure an understanding. There is plenty of room for both sides to make approaches. Doubtless such approaches are being made. It is to be hoped that they will be more frequent and will lead to a more perfect understanding.

NEW BOOKS.

Suspension Bridges and Cantilevers. By D. B. Steinman, C. E., Assistant Professor of Civil Engineering, University of Idaho. D. Van Nostrand Company, New York. 4 in. x 6 in. 185 pages. Price, 50 cents.

Engineering literature contains very little adequate data from which to determine the economic and limiting spans for cantilever and suspension bridges, although comparative designs of these two types of long-span bridges have been prepared in certain instances for particular local conditions. The treatment by Mr. Steinman is intended to make a general comparison for the purpose of establishing the relative economic or limiting span lengths. This comparison involved the determination of the maximum practicable spans for the suspension and cantilever types, the maximum economic spans for the suspension and cantilever types, and the span of equal cost for the two types. The method adopted was to compare existing and new designs and estimates covering a wide range of both types of bridges, from which to deduce empirical laws of the variation of weight and cost with the length of span. The determination of cost curves indicates the comparative economy at different spans as well as the critical span of equal cost.

Letters to the Editor.

"ABOLISH THE PRESENT GIVING."

Ottawa, Ont., January 17, 1912.

To the Editor of the Railway Age Gazette:

The discussion on the question of the supply men giving, and railway men receiving, gifts is fine. No one will for a moment claim that the practice is right. But it is amusing to see the fellows "hunt cover." "The wicked flee when no man pursueth." That one from the ex-purchasing agent reminds one of the fable about the fox and the tail he lost. The truth about the matter is that the small fry will now be largely cut out of the Christmas giving, but the big fellows will continue to get theirs just the same, or a little more. This is right and according to Scripture, for "to him that hath, to him shall be given." If we have been dishonest in this matter in the past, let us be honest now, and not play the hypocrite. The principle of the thing is wrong, always has been wrong, and can never be right. Some have accepted gifts, and reciprocated, knowing they were expected to do so. Some have received them, and did not reciprocate. Others have persuaded themselves that the gifts were a mark of personal regard. They were all dishonest. But let us be honest now, and cut it *all* out. It is a matter that rests with the supply people, not the railway men. There may be one or two men in the thousands of railway men who would try to "hold up" a supply man; but how long would it take that supply man to have such a man removed? It is up to the supply man. Let us see if they can trust each other enough to "cut it out."

E. J. M.

THE INTERSTATE COMMERCE COMMISSION AND UNFAIR DISCRIMINATION.

New York, January 20, 1912.

To the Editor of the Railway Age Gazette:

The editorial in your issue of January 12 proposing that the Interstate Commerce Commission be given the power to name a minimum rate is all right in theory. With such a power, the commission could increase discriminatory rates like those you cite, and could thus end such discriminations.

But there are practical difficulties. First, Congress is not at all likely to take action which would result in the increase of a single rate. Second, if the commission had this power it would not be at all likely to use it, as it could and should be used.

I take it there is no doubt as to the truth of my first proposition. In proof of the second, let me remind you that the commission has a great deal of power which it could use in this direction, which it is not exercising. Why should we expect it to exercise new powers any more diligently or intelligently?

The railways do not in general want to make such rates as those you allude to; certainly none of the railways involved want to maintain them now. Presumably the road which first cut the copper rate to the seaboard profited thereby, but now that all the other roads have met the rate, that advantage is gone. The same statement is true, or almost true, of the packing house rates from Kansas City. Certainly if the railways were not afraid of the big shippers the rates would go back to a reasonable point at once. Such discriminatory rates are excused as the "result of competition." In point of fact, they are largely the result of monopoly, only the monopoly is not with the railways. Every one knows that these rates were forced on one or another weak railway by a kind of persuasion that is now illegal.

The commission must know this, and it must know that the big shippers maintain their illegal advantage by illegal solicitation. Why doesn't the commission go ahead and encourage the railways to wipe out their illegal rates, instead of sitting back and doing nothing except jockey for more power, or at best secure indictments against railways, not shippers, on absurdly small and technical points?

OLD RAILROADER.

THE SUPPLY DEPARTMENT AS A MEANS OF ECONOMY.

Chicago, January 26, 1912.

To the Editor of the Railway Age Gazette:

The second article in the series of Opportunities for Economy on Railways, which appeared in the *Railway Age Gazette* of December 22, 1911, deals with a subject which has attracted the attention of railway managers more and more in recent years, but on the average railway there is still room for more real improvement and economy in the supply department than they seem to fully comprehend.

I am particularly pleased at the importance which Mr. Fritch attaches to this question, because it seems to show that good seed which falls by the wayside will sometimes bring forth a harvest. The writer, however, while he has touched upon a most important subject, has apparently not had either time or opportunity for more than a superficial study of the question. The views which he expresses in regard to the organization and the methods to be employed in promoting the efficiency of the supply department are not those of one who has had any very intimate experience with its operations. As one gentleman described it: "He has heard a bell ring, but has not located it." The bell was rung in an article on Suggested Possibilities of Supply Department Management, published in the *Railway Age Gazette* of July 30, 1909, and the reverberations are caught up and re-echoed in the introduction of Mr. Fritch's article.

What he says in that introduction cannot be gainsaid. The facts are apparent even to the casual eye. The method suggested for instituting a comparison between the operations of different roads with respect to their supply department performance is, perhaps, not as good a one as could be devised, but the idea sought to be conveyed is sound. The use of operating expense in the manner suggested, as a factor in determining the efficiency of the supply department, amounts to putting a premium on extravagance in management so far as that particular feature is concerned; for the higher the operating expense per mile the greater the divisor and the lower the ratio obtained, so that, other things being equal, the road having the highest operating costs would show the best performance in the supply department. The basis of any such comparison should not be money expended, but work performed or service rendered. Perhaps I should not question the manner in which this comparison is made, because the figures which he presents show that the performance of the Wabash Railroad ranks the highest of all the roads between which the comparisons are instituted, but it would be interesting to know why the Chicago Great Western does not appear in the list. Some data obtained from the same source from which Mr. Fritch took his figures, and which was worked out in the manner which he suggests, shows a ratio of 19 for the Chicago Great Western, which would make it a tie with road No. 27 for the twenty-eighth place in the list of 31 roads. Certainly Mr. Fritch has one of his opportunities for economy directly before him. All of this, however, is by the way.

The principal reason why greater advantage has not been taken of this opportunity for economy has been that the managers as a rule are graduates from the operating ranks, and, with some notable exceptions, men of brains and ability with any special training in the handling of supplies on a large scale have not been available for supply department work. This accounts for the retention of the prevalent idea that in order to carry on the work of the railway successfully the procuring and handling of the supplies must be supervised in considerable detail by officers of the transportation, mechanical or maintenance of way departments. Managers who have been convinced that certain economies can be effected by entrusting this work to a separate organization have in many cases established a supply or stores department, but also in many cases they have stopped short of giving the officer in charge of that department the necessary authority which would make him really independent of the supervision of the other branches of the service, and to that extent the opportunity for the greatest possible economy is lost.

The whole training is opposed to the idea that a man who does not participate directly in the use of the material can possibly know how much should properly be carried in stock, or how it can be most economically handled, and they often fear to make the experiment. This is brought out clearly in the article under consideration.

In one line the writer recommends that the stores department should be entirely independent of the operating department, and in the same paragraph he says that the division storekeeper should be responsible to the operating officials as to the disbursement of the stock. This is the operating theory, but it is not good practice; it introduces a divided responsibility at once.

To really get the best results, the supply department must be independent in toto and in reality. Under proper management this can easily be accomplished without taking from the operating officials, who must use the material, any of the choice which they should properly exercise with respect to the kind and quality of material best adapted for the purpose. It would, however, relieve them from the responsibility of deciding how much material should be carried in stock and place that responsibility, together with the more important and difficult duty of always having sufficient material on hand to supply the requirements of the service, upon the individual in charge of the supply department.

A properly organized and really independent supply department will act as a check on a number of the practices indulged in by operating officers and described in the article. The suggested report and the inventories and balance sheets indicated are somewhat crude, and it is evident that the writer is not very familiar with the work of the Railway Storekeepers' Association along this line, and with their published forms of material classification and recommended practices. These represent the last word up to this date in intelligent storekeeping, and have been framed by men who have made a thorough study of the actual working conditions.

The reports which the writer suggests should be made monthly by each department, through the auditor, are inconsistent with his argument for an independent store department. If that was an accomplished fact, none of the other departments would have any reason for making a monthly report touching on material matters, and in my judgment it is not consistent with the best methods to have such reports made through the auditing department unless the divisional accounting system is in effect on the road, in which case, it is not only proper, but desirable, that the division storekeeper's accounts should be handled by the divisional accounting officer; otherwise too many complications are introduced and too many delays encountered in securing the use of the figures to make them of real benefit in the administration of the department.

The thought which seems to run through the article is that operating officers should order the stocks of material and supervise their disbursement, and the supply and purchasing departments should merely supervise the purchasing and handling of the material which the operating officials order. The underlying idea of an independent supply department is contrary to this. The responsibility for having the necessary material on hand when it is needed, and for having no more than is necessary to meet the requirements of the service, should rest entirely upon the general storekeeper, and the operating officials should order from him by requisition only the material that they need for immediate use. While determining the kind and quality of the material which it is desired to use, they should not be permitted to dictate in any way the quantity to be carried in stock, the location of the stock or the methods of its distribution. Until this idea is fully recognized and put into actual practice, under the charge of competent men, the opportunity for economy which exists in this direction cannot be availed of to the fullest extent.

GEORGE G. YEOMANS,
Assistant to the President, Wabash Railroad.

"THE TRUTH ABOUT RAILWAY ACCIDENTS."

Chicago, December 20, 1911.

To the Editor of the Railway Age Gazette:

Relative to the article in the *Railway Age Gazette* of December 8 entitled "The Truth About Railway Accidents," in which you criticise Charles Edward Russell's article entitled "Speed" which appeared in *Hampton-Columbian Magazine* for October, that some of Mr. Russell's statements are "gratuitous guesses" and open to question and that his article, as a whole, is somewhat sensational and misleading, the writer will not attempt to controvert, but will be content with pointing out a few discrepancies in the statistics given in your article. In your first table you give the following statistics:

Railway Accident Statistics, 1908.

Accidents to passengers—	Killed.		Injured.	
	No.	No. per 1,000,000 Pass'r Miles.	No.	No. per 1,000,000 Pass'r Miles.
United States	381	.013	11,556	.40
U. S. Group 2....	80	.011	2,677	.38

In your comparisons there is no division of the roads into groups in any of the other countries, or in any portion of the United States except group 2 notwithstanding that the Interstate Commerce Commission divides the railways of this country into 10 groups. Why is group 2 only singled out? Why not give all statistics of this country by groups so that comparisons could be made? It is well known that the railways which comprise group 2 are, as a whole, the best block-signaled roads in the country, and the mileage in 1908 was about 10 per cent. of the total mileage of the United States. The tables given show the employees of group 2 to be 352,722; employees per one killed, 373; and per one injured, 15. Inasmuch as the number of employees given for group 2 is greater than the total trainmen in the United States it is evident that the total number of employees, which embraces all those employed in the railway's service, were taken to obtain this result, as the number of trainmen in group 2 was 68,898. While group 2, to be exact, had 9.9 per cent. of the mileage in the United States, 21 per cent. of the total passengers killed and 23.17 per cent. of the passengers injured were in that group and of employees, 27.75 per cent. of those killed and 27.67 per cent. of those injured were in that group. Not a very good showing.

The only available defense for the above is to attempt to argue on the basis of "passenger miles" and number of trains. A very large percentage of the excess "passenger miles" in group 2 over the balance of the country consists of a larger number of passengers per train, and to fill a train comfortably full of passengers does not increase the hazard to that train one iota over that of an empty train. Another large factor in this "passenger mile" total is the heavy suburban travel where the cars are crowded. There is only a few miles' travel for each passenger, but it swells the passenger-mile total enormously and the railways of group 2 have far more of this class of travel than any other group. In regard to the number of trains, as above stated, the railways of group 2 are more completely equipped with block signals than those of any other portion of the country, and if visual signals could perform the functions for which they were installed there would be no more hazard with trains in each and every block section than with a less number. It is a self-evident fact, which your article has emphasized to the analytical reader, that the visual signals do not and cannot provide the necessary train protection. Three factors intervene to prevent their doing so, viz., human fallibility, the elements, over which we have no control, and the demands of business for prompt and continuous transportation of both passengers and merchandise.

The question of properly safeguarding trains in this country cannot be solved by drawing comparisons between railway employees here and in England, because the conditions are in no way analogous. As Mr. Acworth aptly puts it in your quotation, "In England or on the continent the railway employee usually spends his entire working life in the service of one company, and to lose his job is a disaster." There is the vital difference, over there that once a servant, always a servant, and the highest ambition that a laborer's son can possibly have is to succeed his father in a position of servitude at a weekly stipend that would hardly keep an American in smoking tobacco. Under such conditions he does become less a man and more an automaton. That condition never can prevail in the United States, and it is idle to discuss it.

The elements—the second factor with which we have to deal—interfere with human vision to such an extent as to render practically impossible the observance of signals, and this interference English roads suffer from fully as much as ours. But in England in cases of severe fogs, all goods (freight) trains are stopped and nothing but passenger trains allowed on the road and the less important of these are sometimes abandoned. Each signal station has a fog pit, an army of fog men is placed in these pits, and the engineman gets his instructions, as to the signal indication from the man in the fog pit. Could our railways follow such a practice? The people would not submit to the delays incident thereto for either passenger or freight, not to mention the expense involved under our American rate of wages.

As this discussion should be confined, as closely as possible, to train accidents we will first consider trainmen, as given in your table. According to the figures given therein it would only take 150 years to kill all the trainmen employed, it is mighty hard to understand how "on the average an employee can work 637 years before being killed." If we take the total number of railway employees, which is unreasonable, as industrial accidents to railway employees have no connection with train accidents, still we are unable to reach the average of "637 years" because, according to the figures given in the tables, it would only take 421 years to kill them all.

Your statement in regard to an automatic stop, "such a device would only prevent collisions," is erroneous. The second annual report of the Block Signal and Train Control Board illustrates, describes and reports on a system of complete automatic control of trains which provides protection against "the inherent defects of the despatching system, the improper working of the block system and the failure of the engineman to observe, understand and obey signal indications." It is true that the report is so much involved as to excuse such oversight by those unfamiliar with the art. The disobedience of signals does not result only in causing collisions; it frequently causes derailments.

Any one familiar with the subject will agree that if all train accidents that are chargeable to the three causes above given were eliminated, there would be very few left, and American railways would be the safest in the world. Now, the modern automatic block signal system, if it were implicitly obeyed at all times, would protect against "the inherent defects of the despatching system" and, if implicitly obeyed, there would be no failure of the engineman, but it could not protect against its own improper working, such as the giving of a false clear indication. The automatic stop properly applied in connection with automatic signals compels implicit obedience, protects against the failure of the signal, and the failure of the man; in short, provides the required protection against accidents incident to train operation. What more is wanted? B. C. ROWELL.

[Regarding Mr. Rowell's inquiry as to why we singled out the figures for group 2 for inclusion in the table referred to, that group, in point of population, railway mileage, density of traffic, etc., is more similar to the European countries with whose statistics of railway accidents those of the United States were compared than is the United States as a whole or than any other group or groups in the United States. Mr. Rowell points out that more passengers were killed in proportion to railway mileage in group 2 than in the country as a whole, and says that this is "not a very good showing." He supplies the answer to his own statement, however, by referring to the fact that the density of passenger traffic is greater in group 2 than elsewhere. He

says that "a very large percentage of the excess passenger miles in group 2 over the balance of the country consists of a larger number of passengers per train, and to fill a train completely full of passengers does not increase the hazard to that train one iota over that of an empty train." Certainly not. But where there are the most passengers per train, there will the most passengers be killed in any given number of train accidents.

Mr. Rowell says, "if visual signals could perform the functions for which they were installed, etc." They do this very thing. They are installed to give indications, and they give them. They do not and cannot enforce obedience, but they are not installed to enforce obedience. Visual signals are performing their work in a creditable manner. They are not performing it perfectly, but most collisions on block signalled lines are due, not to signal failures, but to man failures—not to want of correct indications, but to want of obedience to them. An automatic stop would simply enforce the indications given, whether correct or not.

Mr. Rowell dismisses our showing that most railway accidents are due to shortcomings of the human element by saying, in effect, that we shall never have in this country railway employees who will do their duty as automatically as do those of the railways of England. This is saying, in substance, that we shall always continue to have almost as many accidents as we have now, unless the contention of the *Railway Age Gazette,* that no improvement in equipment, whether the installation of an automatic stop or any other, would prevent a great majority of the accidents that now occur, is incorrect. But Mr. Rowell controverts our statement that automatic stops would prevent only collisions. He calls attention to the Block Signal and Train Control Board's description of a system of automatic train control which provides protection against "the inherent defects of the despatching system, the improper working of the block system and the failure of the engineman to observe, understand and obey signal indications." But a system of automatic train control which would do all that is claimed for the one mentioned would do nothing more nor less than prevent collisions. Even if an automatic stop system had been adopted, and had abolished all collisions and derailments, it would have prevented only 785 out of the 10,396 fatalities on the railways of the United States in the year ending June 30, 1911, and only 11,793 out of 150,159 injuries.

Mr. Rowell says "this discussion should be confined as closely as possible to train accidents." Why? Most accidents are not train accidents; and the purpose of discussion should be to reduce all accidents. We contended in the original article on this subject that an automatic stop system would prevent only a small proportion of the total accidents on American railways even if it worked with approximate perfection, and Mr. Rowell's letter does not disprove this. This is not necessarily an argument against automatic stops; but it is a complete answer to arguments for it as a sovereign specific for accidents. Mr. Rowell criticises the statement which we quoted from Mr. Kruttschnitt that a railway employee, on the basis of the figures for 1909, could work 637 years without meeting with a fatal train accident, and says that according to his calculations all the railway employees would be killed in 421 years. It will be noted, however, that Mr. Rowell's calculation is based on the figures for the year 1908, while Mr. Kruttschnitt's calculation was based on the figures for 1909.—Editor.]

For the current fiscal year 159,377 tons of steel ties were bought for the Prussian State Railways, 265,771 tons of rails, and 118,822 tons of rail joints, bolts, spikes, etc. The proportion of steel to timber ties has not changed much of late. The prices paid were at the rate of $28.30 for 2,240 lbs. of rails, and $26.60 for ties—each about 50 cents per ton cheaper than the year before. Coal cost $2.86 per ton, which was 1 cent a ton less than the year before. Coal briquettes cost 15 cents per ton more than coal.

THE RAILWAYS' INTEREST IN FOREST FIRE PREVENTION.

BY E. A. STERLING,
Forester, Pennsylvania Railroad.

From the very nature of things, railways are bound to be the initial cause of many forest fires. They have no doubt frequently been held responsible for fires which they did not cause; but whenever forests and woodlands adjoin the right-of-way, sparks from the locomotives may fall in the leaves and litter during dry weather and start a fire. Spark arresters, which are intended to break up the live cinders and reduce their temperature below the combustion point, are almost universally used; but the fact remains that live cinders do reach the ground, and it appears that an arrester which will effectively stop sparks will also retard the draft. While most roads have been reluctant to admit this, the evidence seems to be against them. Rather strong proof of the danger from sparks thrown by coal-burning locomotives was furnished in New York state in 1903, when practically the whole Adirondack region adjacent to the railways, except along a branch to Raquette lake, where oil-burning engines were used, was burned over, and fires started behind nearly every day



Area Burned Along Both Sides of Track Where Railway Failed to Provide Fire Line.

train. A map of the burned district showed a broad fire-swept belt paralleling all the railways.

In addition to the fires which may be traced to sparks from locomotives, the very existence of a railway in a forest gives rise to fires which result from indirect causes for which the railways should not be held responsible. Passengers often throw burning cigars or other ignited material out of the car windows; while the great army of the unemployed and unwashed which moves constantly along the lines starts many forest fires through carelessness and indifference.

Whatever may be the cause of the many fires which originate on or near railway right-of-way, the attitude of the public, and even of the state and government officials, who should know better, has generally been unfair to the roads. It has been customary to picture the railways as forest-destroying monsters, roaring up and down the tracks, with grim satisfaction in the damage done. Scant consideration has been given the fact that it takes time and money to keep a right-of-way even reasonably clear of inflammable material, and that even if this is done, fires may start on private land outside the right-of-way, where the road has no power to prevent the accumulation of inflammable debris, yet is held responsible for damages. As a fundamental fire preventive measure, the best mechanical engineers in the country have been sparing no pains and expense to perfect spark

arresters which would be effective and practical. In some forested regions the states have been more remiss than the railways in having failed to provide adequate means or organization to cope with the fire danger; yet have blamed the railways for much of the damage without shouldering their own share of the burden. A more enlightened viewpoint is now being accepted.

As to a motive, or even an excuse, for indifference on the part of the railways, there is none, because they are often the heaviest losers in case of fire. They are, first of all, the constant prey of scheming land owners who place the liability on the railway and attempt to collect damages for every fire, no matter how it starts. An authentic story is told of a railway section gang going a quarter of a mile across the fields and helping a farmer put out a fire in his woodlot. A few days later, the company received a bill for the damage done. If an honest land owner gets damages for a fire, every man in the region whose conscience is a little rusty will promptly have a fire and start a damage suit.

The railways simply could not afford to be indifferent to the destruction of forest property by fire, as both passenger and freight business would suffer. Burn over a summer resort region like Maine or the Adirondacks, and the heavy passenger traffic would vanish with the forests. Timber and lumber in many forms constitute a large percentage of the freight tonnage on many roads. Railway extension in the Pacific Northwest is usually credited to agricultural development; but, despite the large output of grain, stock, fruit, and other products, fully 75 per cent. of all eastbound rail freight originating west of the Cascades, and 80 per cent. of the freight handled at Puget Sound ports, is composed of forest products. Not only do the railways derive a large revenue from the forests, but they are among the largest users of forest products. Exhaust the timber resources of a region, and the additional cost of cross-ties, posts, lumber, etc., very materially increases the maintenance charges.

As the railways cannot afford to add to the fire menace in the forested regions through which they operate, they should also be active in the prevention and suppression of fires. Unfortunately, they have been so only within the past few years. The conservation and development of local industries and resources has characterized the broad-gage management of most roads; but through lack of education on the subject, or failure to appreciate the importance of forest products as a source of tonnage and of the forests as a resource and asset, an effective policy regarding forest fires was of slow development. In the South Atlantic states, for example, we find the railways working constantly for agricultural development, while overlooking the fact that the large percentage of the land which is unsuited for farming would naturally reforest itself if fires were prevented, and constitute a permanent source of revenue. A railway company is a long-lived corporation, which can look far into the future and afford to wait a reasonable time for returns.

The active fire preventive work undertaken by roads falls under the three heads of compulsory, co-operative and voluntary.



Railway Fire Line in New Jersey.

... wide cleared. 100 ft. from outer rail; intervening space ... trees ... as fire screen.

In New York state an example of compulsory action is legislation enforced by the Public Service Commission, requiring all railways which traverse the Adirondack region to use oil-burning locomotives during the day time from April 15 to November 1. The same roads are also required to maintain a patrol during the summer, which they have attempted to do with varying degrees of success. Prior to the enactment of this law, some of the roads voluntarily maintained a patrol, provided water barrels at dangerous points, and operated special waste tank cars equipped with pumps for extinguishing fires set on the right-of-way. The voluntary work was not entirely effective, so the state has secured practical immunity from railway fires by putting a heavy burden on the roads. Oil as fuel in this region costs 30 to 50 per cent. more than coal. On the Chateaugay branch of the Delaware & Hudson, it costs about 10 cents per train mile

more to burn oil than coal, aside from the costs of changing the locomotive furnaces twice a year. It is probable that closer voluntary co-operation between the railways and the state would have saved expense and trouble.

In Massachusetts and New Jersey, the law permits the railways to make, at their own expense, protective clearings or fire lines outside of the right-of-way, without liability of trespass. In New Jersey, the law (Chapter 74, Laws of 1909) is very specific, and provides that the roads shall, within a stated time, construct through all forested land a safety belt 10 ft. wide, 100 ft. from the outer rail, and between this belt and the track cut out thick brush, trim the large trees to a height of 6 ft., and clear away all inflammable material. Up to January 1, 1912, about 235 miles of fire breaks had been built in accordance with the law. Although the Forest Commission was enjoined from enforcing the law, pending decision as to its constitutionality, most of the roads in the state continued the work because of its practical value in preventing fire and reducing liability. The authority given to remove debris and construct fire breaks on adjacent land, even though it is done at their own expense, gives the roads a freedom from damage suits which does not exist when such laws are not in effect. The New Jersey law, while originally a compulsory one, is working out on a co-operative basis. The cost of these fire lines varies from $125 to $500 per mile, with an average of about $180.

A comparatively new legislative feature affecting the railways is found in the new Minnesota law, which provides that "when, in the judgment of the state forester, there is danger of the setting and spreading of fires from locomotive engines, he shall order any railway company to provide patrolmen to follow each train throughout such fire patrol district or districts as he deems necessary to prevent fires." The same act also provides that the railways, independently of the state forester, shall patrol their right-of-way and take other steps to prevent the setting and spreading of fires. This last provision is similar to the New York state law, except that the latter permits the state to organize a patrol and charge the cost to the railways in case an adequate railway patrol is not provided. Just how a patrol system which is based largely on the judgment of a state official will work out remains to be seen, but it promises well if the states and the railways will work in harmony. In August of this year, State Forester Cox of Minnesota stated that "the railways have been brought to realize that a business-like system of fire protection is a paying proposition, and they have organized special forces of patrolmen on speeders and placed them where the district rangers feel that they will be most effective. The companies are also paying more attention than formerly to the question of spark arresters on their locomotives."



Turnwater Canyon, Near Wenatchee, Wash., on the Great Northern.

Clearing shown on right side of track.

It is believed that, under ordinary conditions, the best results will come from mutual co-operation between the railways and those interested in forest protection, and a combination of state and private patrol, which can be made more effective by keeping the right-of-way and adjacent land clear and by using improved spark arresters. A club, particularly a legal one, is usually not a welcome nor an effective incentive to good behavior. Where mutual interests are involved, all action taken by the responsible parties should be closely co-ordinated.

During the last year the state forester of Wisconsin called a meeting of railway officials, timberland owners and others, and together they discussed ways and means of curbing the fire evil. Fifteen railways were represented by prominent officials, and they all seemed awake to the seriousness of the problem and anxious to help in its solution. The railway representatives present agreed unanimously on the following measures, which they believed would practically eliminate fires from locomotives:



Railway Fire Line Through Pine Land in New Jersey; Tree Growth Entirely Cleared.

1. That the right-of-way be cleared of all combustible material under the direction of the fire wardens.
2. That the burning of debris on the right-of-way be controlled by the fire wardens.
3. That under special conditions there be a regular patrol, properly equipped with fire-fighting apparatus, following each train.
4. That all freight train crews keep a lookout from the top of the caboose, and that they be required to stop and put out fires when discovered.
5. That some means be devised to keep a strip 100 ft. wide adjacent to the right-of-way free from slashings.
6. That there be as much improvement as possible in the mechanical construction of locomotives.

Some of the co-operative and voluntary measures which are being carried out give promise of the ultimate solution of the railway forest fire problem. In the timbered belts of western Washington, two transcontinental lines are installing oil-burning locomotives; while the Great Northern has signified its intention of using Radley Hunter stacks on coal-burning engines on branch lines. The automatic self-dumping ash pan which the government has compelled some of the western railways to adopt, at heavy expense, has proved a prolific cause of fire. The Chicago & Northwestern, however, is overcoming this danger by equipping its locomotives with water jets to extinguish the live coals.

In Canada, the Canadian Pacific, which for years has been

active in developing the country's resources, now has a forestry department to look after the enormous areas of forest land along the lines of the railway. The company owns large tracts of forest land, and in connection with the definite system of forest management is giving particular attention to the work of forest protection.

Throughout the Northwest, protective forest fire associations made up of timberland owners are doing wonderfully effective work by education, patrol and mutual co-operation. During 1911 the Western Forestry and Conservation Association, through its affiliated associations, for which the parent organization acts as a clearing house, patrolled sixteen million acres of land containing four hundred billion feet of timber, and spent over $207,000 in fighting fire and maintaining 1,400 patrolmen. The protective fire associations throughout the country protect in the neighborhood of thirty million acres of timberland, and not a small part of their work is co-operation with and through the railways. The timberland-owning railways of the West contribute directly to the maintenance of the associations, the Northern Pacific during 1911 paying over $14,000 through assessments. As the fire interests of the timberland owners are closely allied with the forest service, the states, and the railways, we now find these four interests working in close harmony, and with excellent results.

The forest service, with nearly two hundred million acres of national forests, or an area seven times as large as the state of Pennsylvania, under its control, has the heaviest fire responsibility of any single organization. The existence of some 2,000 miles of railway in these forests calls for a definite system of fire protection, which involves both legal and co-operative arrangements. The federal act of March 3, 1875, contains certain stipulations under which right-of-way can be secured through public land. Grants or easements for any right-of-way crossing government land are issued by the secretary of the interior, but if national forest lands are involved they must be passed upon by the secretary of agriculture; and, as conditions vary greatly in different regions, the terms of the stipulations are modified to meet local conditions.

When the Chicago, Milwaukee & Puget Sound road was put through to the Pacific coast, the railway made a very thorough clearing on strips adjacent to the track on government forest land, but not upon patented lands within the national forest boundaries. When the Soo line was constructed across the Minnesota national forest, the railway plowed a strip of land 25 ft. wide, the inner edge of which was 100 ft. from the track, along both sides of the right-of-way throughout its entire length across the forest, except where natural fire barriers existed. The Spokane International, in building across the Pend Oreille national forest in Idaho, executed a supplementary agreement under which the railway maintains, during dry seasons, a patrol of the right-of-way in conjunction with the forest service patrol. Usually, however, the forest service maintains its own patrol along the railways, this being generally considered more effective, because it can be correlated with the patrol of adjacent areas.

It is illustrative of the present attitude of the railways that practically throughout the west they have been willing to go farther than the law requires in co-operating with the forest service for the reduction of fire losses. They have established voluntary patrols, furnished special trains for fire-fighting crews, taken their own men from construction or maintenance work to assist in fire fighting, and put on oil-burning locomotives through forested regions. The Chicago, Milwaukee & Puget Sound people were the first to test out oil burners thoroughly and to introduce them generally on divisions crossing the national forests.

The Great Northern and the Northern Pacific secured their right-of-way prior to the creation of the national forests; but notwithstanding the absence of legal necessity for action, they entered into co-operation of a very significant and assuring character. In April, 1910, these two roads made identical agreements with the United States Department of Agriculture, under which, very briefly summarized, they agree to clear and keep free of inflammable material the right-of-way and a strip of adjacent land not over 200 ft. wide; equip all locomotives so as to prevent the escape of sparks and fire as far as practicable; establish an effective system of reporting fires on or near the right-of-way; give the use of company poles for forest service telephone and telegraph lines; grant permission to forest officers to operate speeders on company tracks in connection with patrol; take all possible action towards the prompt extinguishment of any fire discovered by railway employees; and reimburse the forest service for extra labor in extinguishing fires which start within 200 ft. of the tracks. The forest service, representing the Department of Agriculture, in return patrols the railway right-of-way during the fire season; furnishes, without expense, the services of available forest service employees for fighting fires on or near the right-of-way; pays for extra labor hired by the railway in extinguishing fires which started more than 200 ft. from the track; supervises the clearing of the company's right-of-way and adjacent land; constructs telephone lines to connect the headquarters of the forest officers with points on the railway; stores at convenient points sufficient tool equipment for successful fire fighting; and requires its employees to report immediately to the nearest agent of the company any defect discovered in the track or roadbed which might constitute a menace to safety.

In addition to the formal agreements, many informal arrangements are in effect between local forest service officials and the railways. One of the encouraging features of all of these agreements is the remarkable absence of friction in carrying out the details, the importance of the work and the necessity for co-operation being so apparent that all the interests are more than willing to do their share.

W. B. Greeley, assistant forester of the forest service, who is thoroughly familiar with field conditions in the national forests of the west, sums up the railway situation by saying: "I think it is safe to say that the progress in co-operation along these various lines with the railway companies made during the past three years is one of the most significant and effective things that have ever been done towards reducing the fire danger in the heavily-timbered portions of the west."

The fire conferences, which have become annual affairs and national in scope, are representative of the spirit with which forest fire problems are now being approached. At these conferences unproductive generalizations and spread-eagle speeches on our terrible fire losses are eliminated, and the lumbermen, railway men, and forest officials present get down to practical details of fire prevention and control. R. H. Aishton, vice-president of the Chicago & North Western, made one of the principal addresses at the St. Paul conference in December, 1910. He pointed out that in the three states of Michigan, Wisconsin and Minnesota, there are 7,800,000 acres of forest land, traversed by 7,500 miles of railway, excluding sidings, logging roads, etc. On these roads there are operated daily nearly 600 passenger trains and 940 freight trains, requiring 1,800 locomotives. The interests of the railways and of the states are closely related, and the railways more than any other interest appreciate the importance of conserving the forests and other resources. Mr. Aishton mentioned the specific things the railways are doing to prevent forest fires, and asks what further they can do. He sums up their attitude by saying:

They believe that the protection of the forests now conserves the revenues of the railways in the future, and to many of the railways it means their future life and prosperity.

They believe that the protection of the forests may be bettered by more efficient control by the officers of the states over all the interests engaged in business in the timber areas.

They believe in taxation that will enable a well-trained and efficient force to be organized and maintained in each state and endowed with police powers for the protection of the forests.

They believe the interests are so great and so identical that

settlers, lumbermen, manufacturers, and railways and every other interest should unite in a plan to which all can work; which would be harmful to no interest and which would be beneficial to all.

Some of the recommendations passed at the St. Paul conference would have seemed very radical a few years ago, but now appear as belated means of attaining a much desired end. The resolution adopted concerning railways was: "That the burning of all debris on the rights-of-way of the various railways be under the control and direction of the state forester. Further, that under special conditions, as directed by the state forester, the railway companies maintain a patrol, properly equipped, following their trains; also, that all railway and logging locomotives and traction engines must be equipped with the most practical arresting devices (subject to inspection and approval of the commission)."

At Portland, Ore., in December, 1911, another fire conference was held under the auspices of the Western Forestry and Conservation Association. The western railways took an important part in the discussions. E. W. Osborne, of St. Paul, representing the Northern Pacific, stated that the use of oil-burning locomotives would impose a hardship on coal mining towns which depend for their support upon the sale of coal to railways. F. A. Silcox, United States district forester, spoke on railway fires, and showed that while American railways cause many fires, European roads seldom cause fires, because of the compulsory use of safety devices and the clearing and patrolling of the right-of-way. A novel educational feature of the western fire preventive campaign is the publication of fire association notices in the railway folders and pamphlets. The resolutions adopted regarding railway co-operation were essentially the same as those given in another part of this article as the recommendations of the Wisconsin conference. The preamble, however, is worthy of being quoted, as illustrating the importance of the forests to many interests. It reads:

"*Whereas,* The protection of the timber resources means the stumpage value to the timber owner of approximately $2.00 per M feet B. M., employment and remuneration to the wage earner of approximately $8.00, tonnage to the railways both in supplies, equipment, and forest products approximately $6.00 to $8.00 per M, benefits to the farmer and merchant through the use of supplies, an insurance of community prosperity and the general public welfare; and

"*Whereas,* It is recognized that the railways operating in forested regions are a source of fire danger, menacing the preservation of this resource for use; and

"*Whereas,* The danger from forest fires is common to all and co-operation is necessary to meet this danger; now, therefore, be it resolved, etc."

The forest fire problem will not be solved in a day, nor a year, nor by any one influence; its solution will come only by concerted action on the part of the interests most vitally affected, and they can achieve the desired ends most quickly if supported by public sentiment and helpful legislation. A summing up of the measures which the railway companies could logically and profitably put into effect as their part in the work would be as follows:

First. Voluntary action to remove causes of complaint and reduce fire liability. A clear right-of-way, efficient and carefully-inspected spark arresters, and patrol under conditions and in seasons which require it, would go far towards removing prejudice and keeping the railways' forest fire record clean.

Second. Co-operation with state and government officials and private land owners in preventing and controlling fires. This would include prompt reporting of fires by trainmen and other employees, assistance in fighting fires, and an understanding and co-operation in applying preventive measures.

Third. An educational campaign among employees and local residents, covering the danger and loss from forest fires and methods by which they can be controlled.

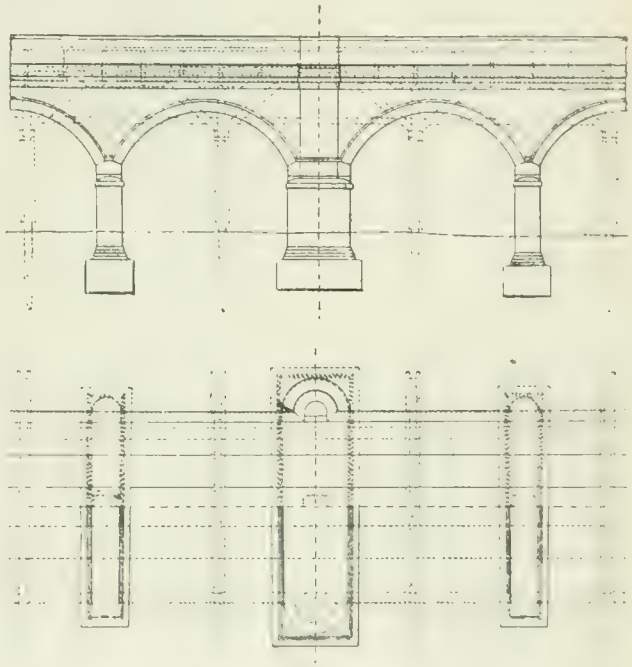
Fourth. Assistance, in so far as it can properly be rendered, in procuring helpful legislation and more liberal state and federal appropriations for forest protection.

NEW RADCLIFFE VIADUCT ON GREAT NORTHERN OF ENGLAND.

BY C. VAN LANGENDONCK.

During the past two years, the Radcliffe viaduct, on the Great Northern Railway of England, which was originally of timber, has been entirely rebuilt of brick. The total length of the viaduct, including a bridge over the River Trent, is 1,254 ft. It consists of 28 spans, eighteen of 24 ft. 11 in., and ten of 25 ft. 7 in. A double abutment on a bank in the center separates the 18 spans from the ten. The 18 spans are divided into three sets and the ten spans into two sets by stop piers 10 ft. wide, the intermediate piers being 4 ft. 1½ in. wide. The arches are five courses in thickness and are covered with blue brick paving. Cutwaters of brickwork were formed at each end of the piers, as the floods from the river run in both directions from the bridge. Manholes have been provided on the stop piers, and large circular recesses on the central bank for look-out men in times of flood.

The foundations of the piers average 10 ft. in depth, going through a bed of gravel to a bed of marl. As considerable difficulty was experienced at times with water in the foundations, which at the normal level of the river rose through the gravel to within an average of 6 ft. from the surface of the ground, the concrete in the foundations was made with six parts of broken slag and gravel obtained during the progress of the work and one part of cement. The viaduct was built of local bricks faced with Staffordshire brindled bricks, with cement mortar of one part cement to three of sand. The three stop piers were first built up to the springing line of the arches. A trestle was then fixed upon each of them up to the stringers of the old viaduct, and securely wedged to them, thus dividing the old structure into five parts, so as to minimize the risk during reconstruction. The work was then dealt with in sections between the stop piers. The intermediate piers were carried up to springing line and the centers fixed. As these had to be built between the timbers of the existing viaduct, it was necessary to erect each one in pieces in place. The lagging was then fixed for about 4 ft. on each side of the piers, and the piers built above the springing line, about 4 ft. of the arch being turned on each side. Trestles were then fixed on the top of each pier in a manner similar to that on the stop piers. The struts from the piles

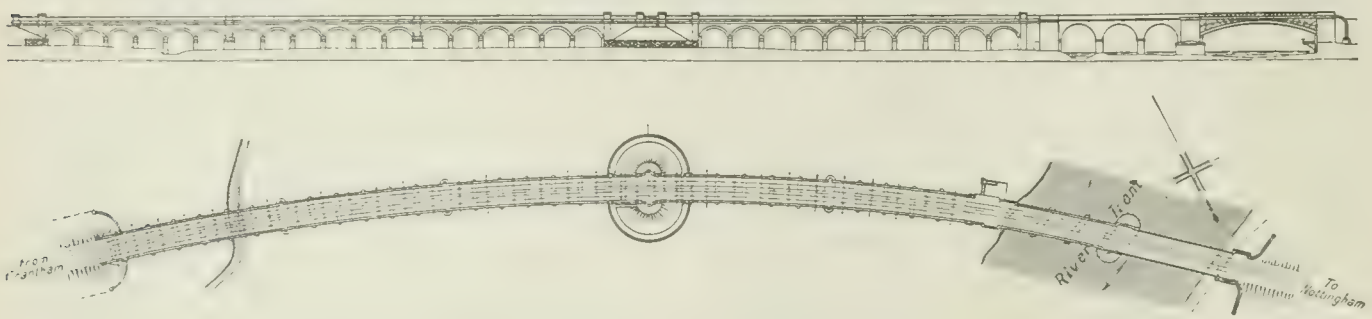


Plan and Elevation of New and Old Viaducts.

of the old viaduct parallel to the center line of track were then taken out and temporary struts fixed in the opposite direction connecting the trestles on the new brick piers to the stringers. This enabled the lagging to be put on over the rest of the centers, the only portion of the old viaduct coming through the lagging being the piles. The arches were then turned in the usual way, with the piles passing through them. As soon as the haunches were filled up and sufficiently set to bear the weight, the whole was paved with blue bricks, packings were then put under the stringers to bring the weight on the arches. The tops of the piles were sawed off underneath and withdrawn from the brick work, the holes they had occupied being filled up.

The parapets having been built, it was necessary to arrange to take out the old stringers, caps and struts, and the planking of the floor from the top of the arches, and to fill the space they occupied up to subgrade. As one track had to be kept open for traffic, it was necessary to arrange to fill half of the viaduct at one operation. A dry rubble stone wall was therefore built between tracks nearly up to the planking of the old viaduct. Holes were cut in the planking, and as much filling of rubble stone and worn out ballast as possible was unloaded, care being taken not to cover the old timbers so that they could not be readily removed. When this was completed one track was abandoned for traffic on a Sunday, the old timbers were taken out, and the remaining space filled up. The bottom ballast of broken slag was then laid and the new track laid in place.

The operations of taking out the old structure and filling up the arches, and laying in the new track occupied six Sundays. With these exceptions, traffic was not stopped over the viaduct during the period the work was in hand, beyond permanently reducing speed to 5 miles per hour, so that sufficient control might be retained over trains in case of accident. It was not found necessary to bring any train to a standstill during the progress of the work.



Plan and Elevation of New Radcliffe Viaduct.



New Radcliffe Viaduct, During Flood.

EDWIN HAWLEY.

Edwin Hawley, who died from a sudden attack of heart failure at his home in New York on February 1, has been connected with railway business for about 45 years, first as a traffic man and later as a financier. As a traffic man he was in the service of the Southern Pacific and was an associate of Collis P. Huntington; as a financier he negotiated the sale of the Huntington holdings of Southern Pacific to E. H. Harriman for the Union Pacific, gained control of the original group of Hawley roads—the Toledo, St. Louis & Western, the Chicago & Alton, the Minneapolis & St. Louis and the Iowa Central—and, associated with Frank Trumbull, had a considerable financial interest in the Colorado & Southern, which was sold to the Chicago, Burlington & Quincy in 1907.

It was after the sale of the Colorado & Southern in 1907 that one began to hear a good deal about Mr. Hawley's plans for a system of roads, which plans were sometimes compared with Mr. Harriman's plans for a Harriman system. This, however, is not an accurate comparison. Mr. Hawley and Mr. Trumbull, after selling their control of Colorado & Southern, bought from Kuhn, Loeb & Company control of the Chesapeake & Ohio, and Mr. Hawley negotiated the purchase of the Chicago, Cincinnati & Louisville for the Chesapeake & Ohio shortly after Mr. Trumbull negotiated for the purchase of the control of the Hocking Valley and a joint interest in the Kanawha & Michigan for the Chesapeake & Ohio. Shortly after this Mr. Hawley and two associates gained control of the Missouri, Kansas & Texas, and quite recently Mr. Hawley, associated with Newman Erb, announced plans for extending the two roads which they had just merged—the Minneapolis & St. Louis and the Iowa Central—to the Canadian border on the north, and connecting them with the Missouri, Kansas & Texas on the south. These later plans of a north and south system are more nearly comparable with the railway planning of E. H. Harriman than any of the financial schemes that Mr. Hawley carried out.



Edwin Hawley.

Mr. Hawley was a shrewd financier rather than a constructive railway owner. Of the properties with which the Hawley name has been associated, the two which have been managed with real success as railways are the Colorado & Southern and the Chesapeake & Ohio, and while Mr. Hawley had a considerable financial interest in both, the success of their management was due to Frank Trumbull, who was both financially interested in them and directly in charge of them.

The properties which may fairly be called Hawley properties, such as the Alton, the Clover Leaf, the Minneapolis & St. Louis and the Iowa Central, were not conspicuously well managed from a railway man's point of view. It was as a speculative banker that Mr. Hawley earned the position in both the railway world and the financial world which he occupied at the time of his death. Mr. Hawley was the senior member of Hawley & Davis, was a member of the New York Stock Exchange, although he had not been active on the Exchange for a number of years, and, as the recognized head of a certain group of capitalists, which included Theodore P. Shonts and some of the old Southern Pacific people, had a very important influence in the railway situation of the country.

He was born in Chatham, N. Y., in 1849, and began railway work as a clerk in the Erie freight office in New York in 1867. In 1870 he became a clerk in the offices maintained at New York by what was known as the Rock Island Route. In 1874 he was made contracting agent, and, in the following year, general eastern agent of the California Fast Freight Line. His connection with the Southern Pacific was begun in 1883, when he was made general eastern agent of the Galveston, Harrisburg & San Antonio and the Southern Pacific Company. Two years later he was made also general eastern agent of Morgan's Louisiana & Texas Railroad & Steamship Company, the Louisiana Western, the Texas & New Orleans, the Houston & Texas Central and the Mexican International. From March, 1890, to February, 1902, Mr. Hawley was assistant general traffic manager of the Southern Pacific, with office at New York. He had been president of the Minneapolis & St. Louis since 1896.

Mr. Hawley was unmarried. He was a silent and extraordinarily persistent worker. He had the reputation of being rather slow in his judgment, but was actually a careful man rather than a slow thinker. He was capable of making the most important decisions quickly and finally. His purchase for instance, into the Chesapeake & Ohio was decided on after a single short inspection trip over the property. A close friend of the late Edwin Hawley said that the will made in 1903 was subsequently destroyed and that it was Mr. Hawley's intention ultimately to have all his interests incorporated. It will be recalled that Mark Twain adopted this method of disposing of his property. It was also said that Mr. Hawley was prevented from carrying out his plan by his unexpected death.

The Belgian State Railways in the first 11 months of 1911 earned 6½ per cent. more from freight, but 6 per cent. less from passengers than in 1910, when the exposition in Brussels caused abnormal travel. There was a large increase in the movement of coal and iron ore. Although Belgium has important coal mines, last year it imported more coal than it exported. Its coal mines, apparently are being worked out, and their owners claim that their receipts per ton on the average are not more than 10 cents more than their expenses. The government has announced that it will advance rates on coal in February, and perhaps their estimate was affected by that announcement.

JOINT CAR INTERCHANGE BUREAU AT CHICAGO.

An exceedingly interesting experiment with a plan designed to improve and facilitate the interchange and reporting of cars at large terminal centers has been worked out in the Union Stock Yards district at Chicago during the past year and a half with such successful results that it is now proposed to extend its operation to other parts of the city.

In June, 1909, at the request of the American Railway Association, a joint committee of the Master Car Builders' Association and the Association of Transportation and Car Accounting Officers was appointed to investigate and report on conditions of car interchange and methods of reporting cars interchanged throughout the country. At a meeting of this joint committee on January 26, 1910, at Chicago, it was decided to make a practical test to ascertain whether a system could be devised to improve the accuracy of such reports, and to endeavor to ascertain what, if any, modifications should be made in the M. C. B. rules which would tend to expedite the movement of cars while conserving the safety of operation.

The joint Committee on Joint Interchange and Inspection Bureaus is composed of the following members: Master Car Builders' Association: J. J. Hennessey, chairman, Chicago, Milwaukee & St. Paul, Milwaukee, Wis.; T. W. Demarest, Pennsylvania Lines, Fort Wayne, Ind.; E. D. Bronner, Michigan Central, Detroit, Mich.; W. A. Nettleton, Chicago, Rock Island & Pacific, Chicago; J. S. Lentz, Lehigh Valley, South Bethlehem, Pa., and Joseph W. Taylor, secretary, Chicago. Association of Transportation and Car Accounting Officers: C. B. Strohm, chairman, Atchison, Topeka & Santa Fe, Chicago; J. R. Kearney, Baltimore & Ohio, Baltimore, Md.; W. T. Aylesbury, Terminal Railroad Association, St. Louis, Mo.; E. E. Betts, Chicago & North Western, Chicago; R. R. Harris, Cleveland, Cincinnati, Chicago & St. Louis, Indianapolis, Ind., and G. P. Conard, secretary, New York.

In view of Chicago's position as a railway center, where more cars are interchanged every 24 hours than at any other city in the world—approximately 14,000 a day—it was decided to make the test in Chicago, and the Union Stock Yards district was selected as the place to be covered by the trial. At the request of the Committee on Joint Interchange and Inspection Bureaus, the Joint Car Inspection and Interchange Bureau was established on July 1, 1910, with headquarters at the stock yards, under the auspices of the General Superintendents' Association of Chicago, to conduct a practical demonstration of the bureau plan of joint inspection and reporting. This bureau has now demonstrated the possibility of such an increase in efficiency that it was decided to extend the scope of the plan as far as possible to cover the entire city. For this purpose the Chicago Car Interchange Bureau was organized on January 1, 1912, with offices at 603 Grand Central Station.

Some of the features of the plan, as worked out by the stock yards bureau, with a history of the development of car interchange practice which led to the formation of the committtee, were described by T. W. Demarest, superintendent of motive power of the Pennsylvania Lines, in a paper presented before the Western Railway Club on February 21, 1911, of which an abstract was published in the *Railway Age Gazette* of March 3, 1911, page 414.

The essential feature was the combination of the mechanical inspection and carding of the physical condition of the cars at interchange points with the obtaining of records required by the transportation department. The work was done by inspectors employed by and reporting to the bureau direct instead of to the individual roads, and the reports were rendered to the roads by the bureau.

With the formation of the Chicago Car Interchange Bureau on January 1, the city has been divided into eight districts, of which the Union Stock Yards district, formerly covered by the Joint Car Inspection and Interchange Bureau, is one, and the work of that bureau has been transferred to the central bureau. While for the present no attempt has been made to apply at once to the entire city the entire system used in the stock yards district, it has been decided to establish joint supervision throughout the Chicago switching district by April 1, and it is the hope of those who have been most instrumental in the working out of the plans that ultimately interchange throughout the city will be reported through the bureau. In the meantime the extension will be a matter of gradual development, being carried forward as fast as the bureau is able to apply the joint methods to the districts found most adapted to the change, while gradually effecting improvements in present methods to pave the way for its introduction as a whole.

The bureau is in charge of a chief interchange inspector, F. C. Schultz, formerly chief car inspector of the Chicago, Burlington & Quincy at Chicago, who reports to an interchange committee of the General Superintendents' Association, of which Mr. Demarest is chairman. Reporting to Mr. Schultz are eight assistant chief

Form 152. Sheet No..... Sheet No.....

DAILY INTERCHANGE REPORT OF CARS.

From.....R. R. to.....R. R. at Union Stock Yards, CHICAGO Station.

From 12:01 A. M. to 11:59 P. M.,.....191

Marks.	Kind.	Number. Loaded.	Number. Empty.	Check.	Hour Delivered	Point of Shipment.	Final Destination.	Contents.	Seals. Right Side.	Seals. Left Side.
1	2	3	4		5	6	7	8	9	10

INSPECTOR'S

Name.	Sheet No.
.....	.....
.....	.....

PHYSICAL CONDITION.

11

I certify that these cars were interchanged as above.

F. C. SCHULTZ,
Chief Interchange Inspector,
600 Grand Central Station.

THE CHICAGO CAR INTERCHANGE BUREAU.
Chicago, Illinois.

Form Used by Bureau in Reporting Cars Interchanged.

inspectors, one for each district. Charles Bossert, the assistant for the stock yards district, has been the chief interchange inspector of the original joint bureau at the yards.

Under the former system three different men, or sets of men, were required to obtain the reports of an interchange movement, one to inspect the physical condition of the car for the mechanical department, another to obtain the data required by the car accountant's office, and a seal clerk to inspect the condition and record the numbers of the car seals. Some of these men performed other work, and they were also under the supervision of men charged with other and varied duties. At important interchange points in many cases each road was compelled to maintain its own inspector, although the work required of him might, and often did, take but a portion of his time. While the mechanical department inspector had the right to flag a cut of freight cars while inspecting it, in order to prevent its being moved while he was at work about the cars, the transportation department inspectors often were obliged to obtain their records while the cars were moving, and, as a consequence, the car accountant frequently found a car on his lines without a record of the time when it was received. This condition, requiring expensive and tedious tracing, led to the experiment of giving the transportation department the advantage of the more complete records kept by the mechanical department; and one of the primary features of the joint bureau plan of inspection was the placing of the point where the Chicago Junction delivers to 28 roads, 39 inspectors were formerly required, whereas now but 22 are required, and they take additional data.

The usual practice is for the inspectors to work in pairs, one taking one side of the car or cut of cars, and his partner taking the other side. The inspector who does the bookkeeping, on entering the initials, number, etc., from the car, calls them from his record to his partner on the other side, who replies as to whether or not the recorded data checks with his side. In a few cases inspectors work singly, inspecting one side of a car or cut of cars and returning along the other side to complete the inspection. At the beginning of his examination he records the car initials, number, etc., and in returning on the other side checks the initials and number with his record. In this way any errors are detected at once and corrected. In one case three inspectors constitute a team, one on each side of the cars and the third doing the bookkeeping, but whether the inspection is done by inspectors working singly or in teams of two or three, each car is carefully examined on both sides, and while the cars are standing rather than when they are in motion.

Inspectors at the stock yards are authorized to apply M. C. B. defect cards, in accordance with the M. C. B. rules, at the time of the interchange, and beginning April 1 inspectors will also do so elsewhere throughout the city. In the stock yards district it has been found that about 5 per cent. of the cars interchanged

Form 151.

THE CHICAGO CAR INTERCHANGE BUREAU
CHICAGO, ILLINOIS

From .....Ry. to .....Ry.

INSPECTOR'S Name.	Sheet No.	Month.	Day.	Year.
.....	.....	.....	.....	191....

Initials.	Kind.	Number. Loaded.	Number. Empty.	Hour inter-changed.	Destination or Consignee.	Contents.	Seals. Right Door.	Seals. Left Door.	Condition of Car.

In "Kind" of Car column use B for Box. S Stock. C Coal. F Flat. R Refrigerator. T Tank. Fn. Furniture.

Inspector's Report Sheet.

record taking for both the mechanical and transportation departments in the hands of the mechanical department inspector.

Considerable objection was voiced at first by the mechanical department officers against adding to the work of their inspectors the duty of obtaining records for the transportation department also. This objection is still made in some quarters, although it has been very largely overcome as the plan has demonstrated its advantage. Where the bureau plan has been adopted the expense has been pro-rated between the mechanical and transportation departments as well as between the roads involved.

The record taken by the stock yards bureau, besides covering the usual mechanical inspection required under the M. C. B. rules and the application to the cars of the M. C. B. defect cards when due under the rules, includes a record of the seals, contents of the car, point of shipment, destination and time of interchange; and the work done by the bureau includes settlements with private car owners whose cars are at home in the stock yards for damage to their equipment, and the preparation of the daily interchange reports, comprising data required by the car accountants, master mechanics and agents.

All inspectors for the stock yards district are hired by and are responsible only to the bureau instead of to the individual railways. This makes possible a reduction in the number of inspectors required, and also obviates any chance for a disagreement between the inspectors of the delivering and receiving roads, as the record of the bureau is the official record. At one are carded by bureau inspectors. The cards are made out in triplicate, the original being tacked to the car and the other two sent to the bureau office. Where seals are found broken or defective, a seal marked "Chicago Bureau" is applied by the inspector. It has been found that about 33 per cent. of the cars interchanged at the stock yards have seals and that resealing is necessary in the case of only about 2 per cent. of these.

Where formerly the inspectors recorded the results of their inspection in note books and wrote up their reports at the close of the day, they now complete their reports on form sheets while the cars are before them, and messengers take the sheets to the bureau office, where the requisite number of copies is made.

Objection was at first made that this plan increased the clerical work of the inspector, but while he is required to record additional data, once his record is made he is relieved of clerical work, whereas formerly he was required to prepare his report at the close of the day and retain records of the cars he had inspected for future reference.

To obviate the difficulty of handling the large sheet required (9½ in. x 13¾ in.), a pocket size holder was devised, consisting of a back cover with stiff center leaves over which the sheet can be folded so that it can be conveniently handled. About 2,600 interchanges a day are made in the stock yards district, which covers an area of about 6 sq, miles, with approximately 200 miles of track.

The force required to handle the reports for the stock yards

district includes 43 inspectors, three foremen, two of whom are almost entirely engaged in making settlements with private car owners; one chief clerk and one assistant chief clerk; three clerks on miscellaneous work; seven typists and two messenger boys.

The sheets and defect card stubs prepared by the inspector are collected by messengers and taken to the bureau office at intervals throughout the day. The same messengers also, twice daily, after the typewritten reports are prepared in the office, take them from the bureau office to the trains for roads having offices outside of the city and to the clearing house established by the local agents for the roads for local delivery.

Upon arrival in the office any apparent errors in the inspectors' sheets are detected at once. After being stamped to show the order of arrival, they are passed to the typists, who prepare seven copies at one writing—one copy for the permanent file and one each for the agent, master mechanic and car accountant of the delivering and receiving roads. When the typists have placed the information upon the standard form of interchange report they place their initials on the inspector's sheet, and, after the sheet is compared with the transcription, it is sent to the permanent file, each day's reports being carefully bound for future reference.

The bureau office, after issuing its reports, proceeds on the theory that they contain errors, although it has been found that corrections are required for only about 1 per cent. of the total cars interchanged. In the stock yards district an opportunity for checking the inspectors' reports is afforded by the fact that the Chicago Junction Railway, in order to make its track service bills to the trunk lines using its tracks, employs number takers, who record the initials and numbers of cars as the trains pass a given point. The bureau's typewritten reports are compared at once with this track service record, and if they do not agree an investigation is instituted and continued until the facts are ascertained. In this way errors are detected and corrections issued from one to two weeks after the interchange takes place. This close check on the reports spurs the office and the bureau inspectors to accurate work, and it is felt that the percentage of error can in time be considerably lowered.

Prior to the installation of the bureau each railway employed its own man to make settlements with the private car owners. Now settlements are made by two foremen of the bureau, with a great saving in expense and the advantage of uniformity of method.

The eight assistants in charge of the various districts are all mechanical men, thoroughly experienced in car inspection. They are now engaged in making a careful study of the conditions at various points of interchange in their district and in instructing the inspectors in the use of the M. C. B. rules, as the Chicago district has been operating under special rules. Except in the stock yards district, the inspectors are employed by the railways. A study of the situation thus far, however, has shown that there are several points where one road delivers to many others at which the delivering road has but one inspector, who is kept busy while each of the receiving roads has its own inspector, and some of the latter are idle most of the time.

In such cases the matter will be laid before the interchange committee of the General Superintendents' Association, and, with its approval, the joint inspection plan will be established. For example, since the organization of the bureau, Mr. Schultz has obtained authority from the interchange committee to take over on February 1 the inspection of outbound cars moving from the Chicago, Burlington & Quincy to connecting lines at Western avenue, the so-called Burlington lumber district. At present 15 of the 21 connecting roads have inspectors at this point, while six make the inspection at their home yards. The bureau will be able to handle the work there with a smaller number of inspectors while having a more flexible force, reducing the expense of the inspection at this point from $658 to $450 per month. It is believed that important economies can be effected in this way at other points.

One way in which the joint committee believes the bureau method of inspection and reporting will be valuable is that it will afford a uniform basis of comparison as to the cost of securing an interchange report. Under the old system any figures obtainable were very misleading, because many of the men employed were doing other work, and all the lesser items could not be included. When the work is handled through a bureau every item of expense is charged against the cost of interchanging cars, there being no other service performed by the bureau. At the stock yards in Chicago it has been found that the cost per car is 7 cents. It is to be noted that this figure includes the cost to both roads.

If this amount were borne equally by the delivering and receiving lines the cost to each would be 3½ cents. The cost, however, is not in all cases divided equally between the roads parties to the interchange, but on an agreed basis.

A summary of the cost per car interchanged, apportioned between the different items that go to make up the total, was reported by the Committee on Joint Interchange and Inspection at the December meeting of the Association of Transportation and Car Accounting Officers as follows:

	Cost in cents per interchange.	Per cent. of total cost per interchange.
Inspection	$4.50	64.29
Office force (including messengers)	1.15	16.43
Settlers	.25	3.57
Supervision	.50	7.14
Total	6.40	91.43
Supplies, etc.	.60	8.57
	$7.00	100.00

The expenses for the maintenance of the bureau are paid by the General Superintendents' Association, which collects the assessments from the individual roads.

One of the chief advantages of the bureau plan is in the promptness with which reports are rendered to the interested lines. Where formerly no records were obtained until the inspector made up his report at the close of the day, the reports are now rendered twice daily, by noon for cars interchanged between noon and midnight of the previous day and by 5 p. m. for cars interchanged between midnight and noon.

During the early stages of the experiment many railway men feared that with the increased data required of the inspectors they might be inclined to slight the mechanical inspection in favor of the work required by the transportation department. It has been demonstrated, on the contrary, that the physical inspection has by no means deteriorated, and that the added requirement of a complete record for the transportation department, with the assurance of a check against the records, has been an incentive to more careful work. It is also believed that the combination of mechanical and transportation training received by the inspectors will assist in developing valuable material for promotion.

The establishment of the bureau method of reporting interchange has not met with entirely smooth sailing, but has encountered and overcome a great deal of opposition, particularly in its early stages. A plan similar to that adopted in Chicago has been in operation for some time at Pueblo, Col., and Des Moines, Iowa. Negotiations are now under way for establishing the same system at several other large centers.

All matters pertaining to the interchange of cars at Chicago are in general charge of an interchange committee of seven members, of which five must be mechanical officers of the roads belonging to the bureau and two members of the General Superintendents' Association. Meetings must be held by the committee at least once each month. The committee is composed as follows:

T. W. Demarest, superintendent motive power Pennsylvania Lines, Ft. Wayne, Ind., chairman; T. R. Morris, general foreman Chicago, Milwaukee & St. Paul, Chicago; D. R. MacBain, superintendent motive power Lake Shore & Michigan Southern, Cleveland; H. F. Wardwell, superintendent motive power Chi-

cago & Western Indiana, Chicago; H. H. Harvey, general car foreman Chicago, Burlington & Quincy, Chicago; C. B. Strohm, superintendent of transportation Atchison, Topeka & Santa Fe, Chicago; N. D. Ballantine, superintendent car service, Chicago, Rock Island & Pacific, Chicago.

The joint committee of the Master Car Builders' Association and the Association of Railway Transportation and Car Accounting Officers has been materially assisted in bringing about a practical test of this plan by the members of the American Association of Railroad Superintendents both individually and as a body, and also by the American Association of Freight Agents in the Chief Interchange Inspectors' Association. The men in charge of the work invite railway men to visit the office when in Chicago and see for themselves how it is being handled.

MIKADO LOCOMOTIVES FOR THE ERIE.

The Erie Railroad has been reducing grades and providing additional tracks for several years. The grades are still high, however, on that part of the Cincinnati division between Marion, Ohio, and Kent, about 112 miles, of which a profile is shown herewith. There is now a second track on nearly all of that division, the terminal facilities have been enlarged, and, finally, heavier power has been bought. Consolidation engines of 42,500 lbs. tractive effort and of 200,700 lbs. weight in working order have heretofore been used for power on this division. In considering how this power should be increased the advantages of both the Mallet and mikado types were studied with respect to this particular division. As a result of this investigation, it was found that the mikado would be more practical in this specific case. The designs were made by the road and 35 locomotives were ordered, 20 from the Baldwin Locomotive Works and 15 from the American Locomotive Company.

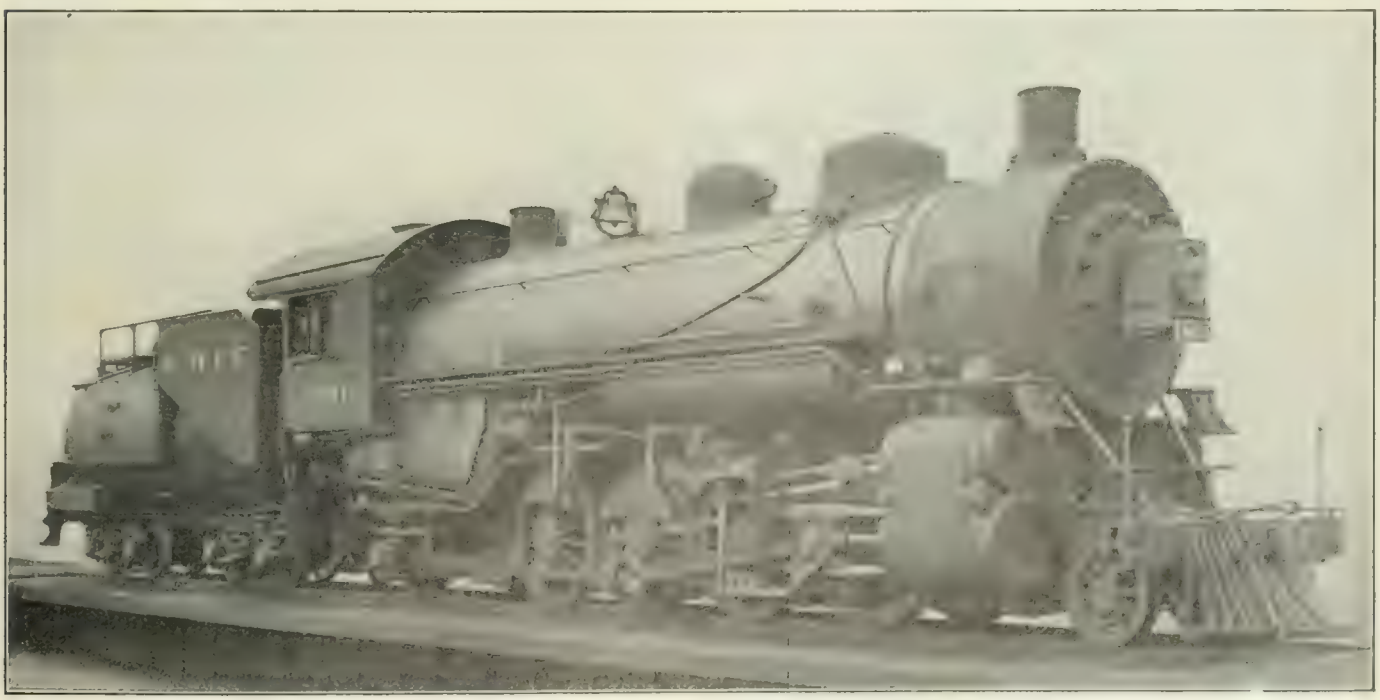
The locomotives are designed to haul 1,450 tons westbound and 1,520 tons eastbound, which is about 38 per cent. increase in tonnage. The Baldwin engines have been delivered and are performing satisfactory service. They are somewhat similar to those recently built for the Chesapeake & Ohio, described in the *Railway Age Gazette* of February 2, 1912, and the dimensions of which are shown in the accompanying table. These C. & O. engines have shown excellent results; in a recent test made with a dynamometer car they developed a draw bar pull of 27,000 lbs. at a speed of 33 m. p. h., which is equivalent to 2,390 h. p. at the draw bar. In comparing these locomotives with the new Erie engines, it is interesting to note that although they are a little different in their general dimensions, having a smaller driver and cylinders 1 in. larger in diameter, their ratios are very nearly alike, the greatest difference being in the per cent. of fire box heating surface to total heating surface, which is accounted for by the use of a combustion chamber in the Chesapeake & Ohio engines.

Comparative Dimensions of Recent Mikado Locomotives.				
Type	2-8-2	2-8-2	2-8-2	2-8-0
Road	Erie.	C. & O.	G. N.	Erie.
Total weight, lbs.	[illegible]	[illegible]	287,000	200,700
Weight on drivers, lbs.	[illegible]	[illegible]	220,000	176,100
Percentage of weight on drivers	74	78	76.5	88
Average weight per axle, lbs.	59,288	60,750	55,000	44,100
Tractive effort, lbs.	57,460	60,800	57,460	42,500
Cylinders, diameter and stroke, in.	[illegible]	[illegible]	[illegible]	22 x 32
Diameter drivers, in.	63	56	63	62
Boiler pressure, lbs.	170	170	170	200
Diameter of boiler, in.	84	83¼	82	..
Tubes, number	232	238	326	380
Tubes, number (superheater)	36	40	30	..
Tubes, diameter, in.	2¼	2¼	2	2
Tubes, length, ft.	21	19	21	16
Heating surface, evaporating, sq. ft.	4,155	4,051	4,720	3,340
Heating surface, superheating, sq. ft.	845	832	1,060†	..
Grate area, sq. ft.	70	66.7	78.2	54
Weight on drivers ÷ tractive effort.	4.13	4.00	3.84	4.15
Tractive effort × diameter of drivers ÷ *equivalent heating surface.	666	643	574†	789
Total heating surface ÷ grate surface	59.5	60.7	60.4	61.9
*Equivalent heating surface ÷ grate surface	77.5	79.4	80.7†	..
Firebox heating surface ÷ *equivalent heating surface, per cent.	4.03	5.35	3.94†	5.21
Total weight ÷ *equivalent heating surface	59.1	59.4	45.4†	60
*Equivalent heating surface ÷ volume of cylinders	238.4	248	277.8†	237
Grate area ÷ volume of cylinders	3.08	3.12	3.43	3.83

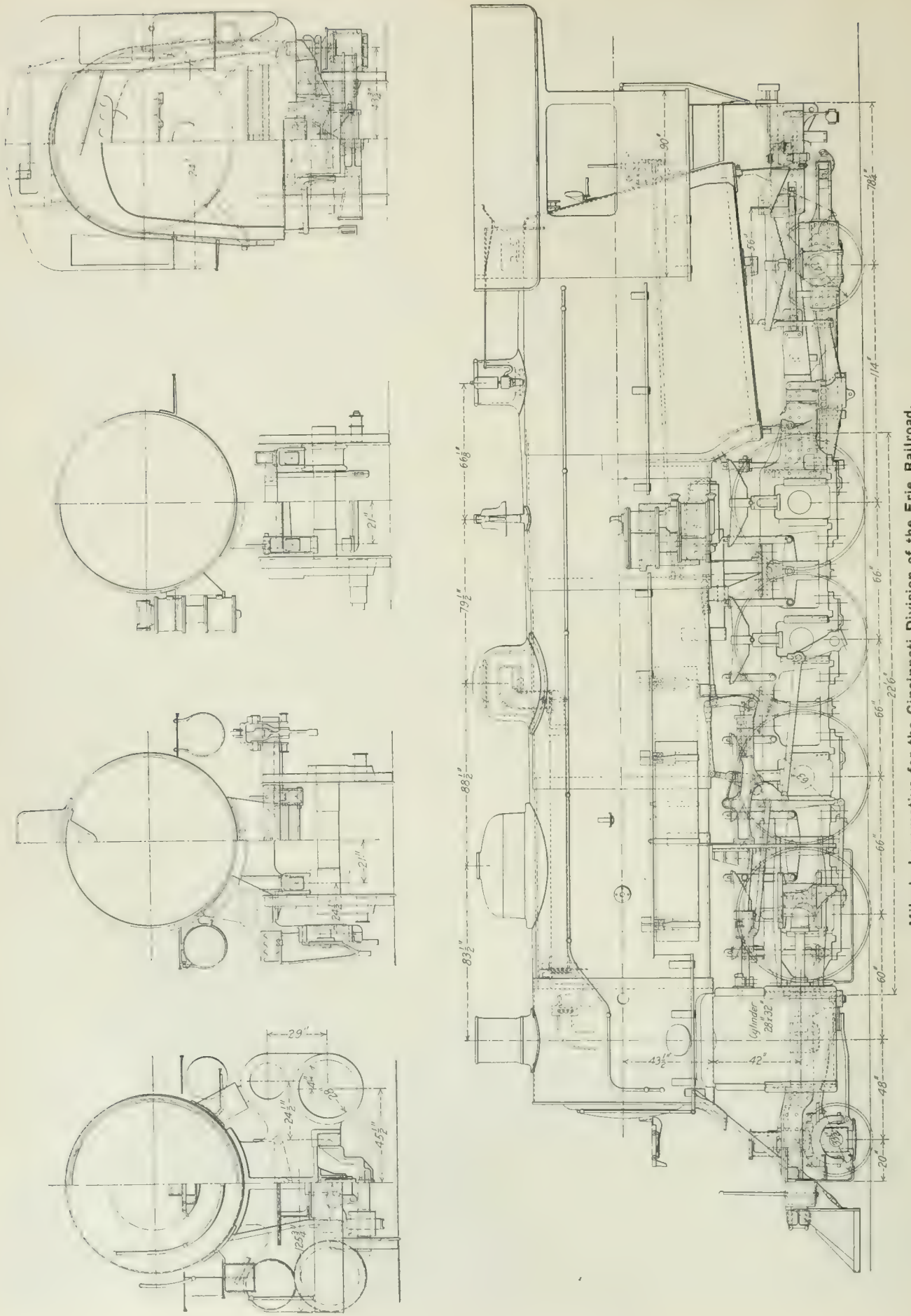
*Equivalent heating surface equals evaporating surface plus 1½ times superheating surface.

†Superheating surface was measured on outside of tubes.

Compared with the consolidation locomotives, the new Erie mikados show an increase in tractive effort of 35 per cent. and 31 per cent. increase in weight on driving wheels. The consolidations use saturated steam while the mikado engines are equipped with Schmidt superheaters. The water evaporating surface of these locomotives is greater than that of the consolidation engines, which with the superheating surface gives an increase of approximately 50 per cent. in rela-



160-Ton Mikado Locomotive for the Erie Railroad.

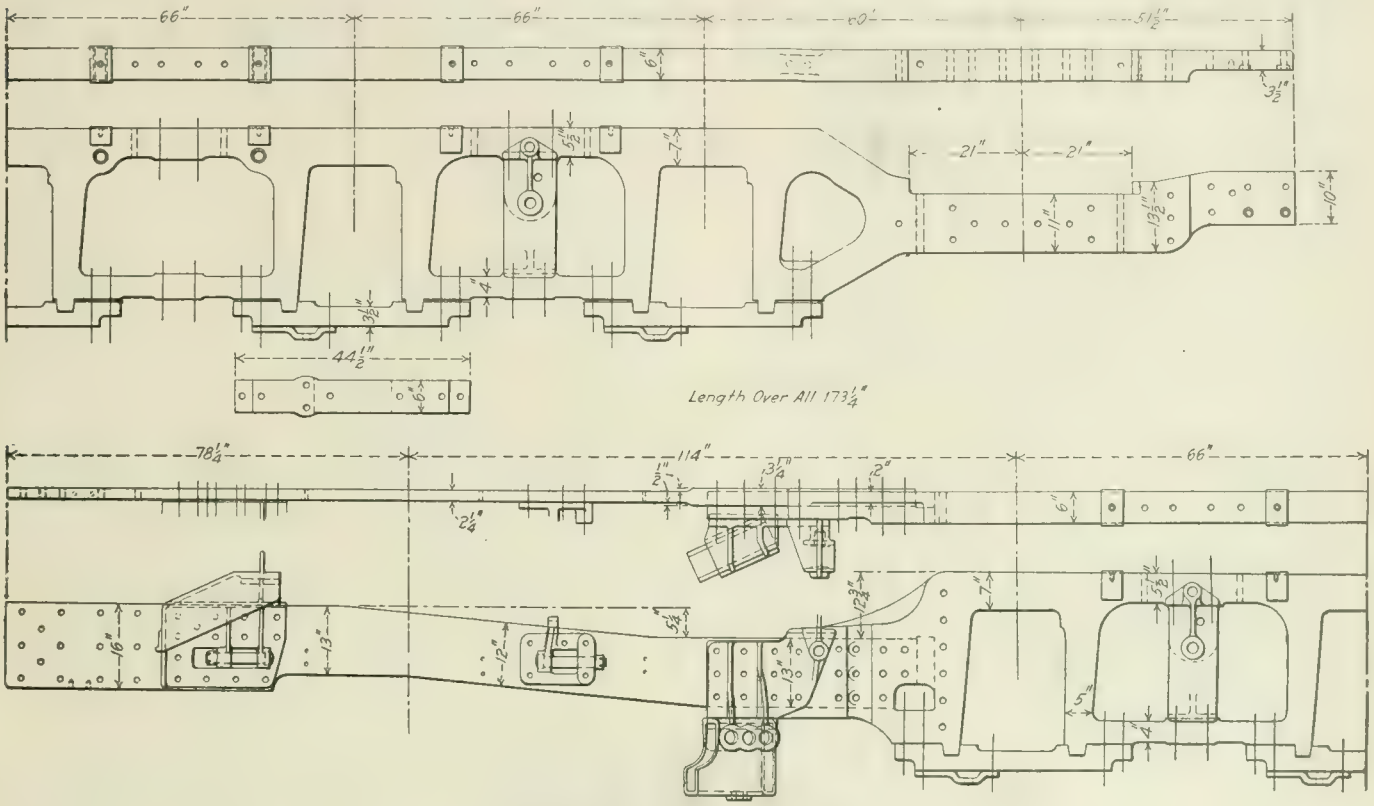


Mikado Locomotive for the Cincinnati Division of the Erie Railroad.

tive boiler capacity. This means increased hauling capacity for the new engines plus the added advantage of taking the larger tonnage at a higher speed than could be maintained by the consolidated locomotives.

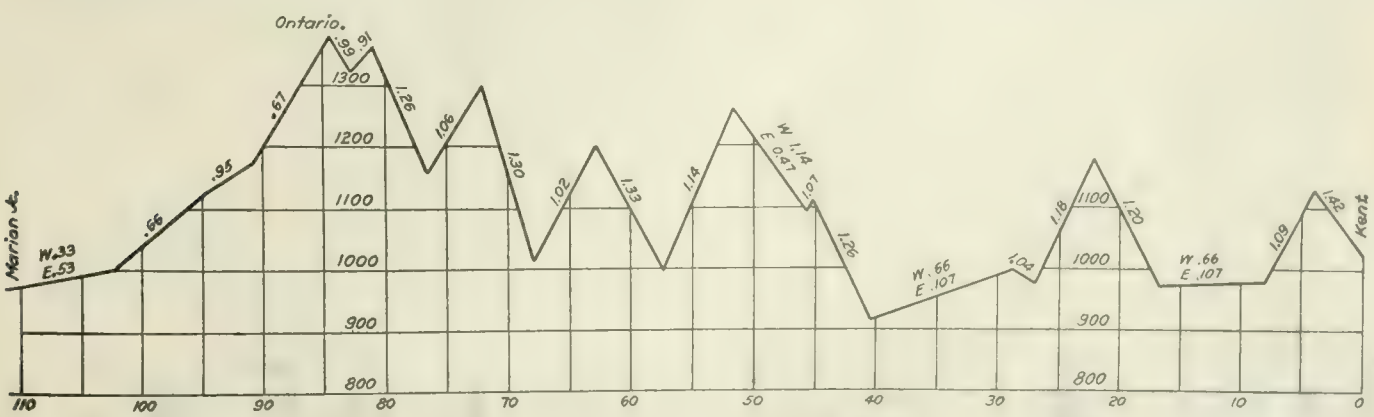
The table also includes a comparison with the mikado engines built for the Great Northern, described in the *Railway Age Gazette* of December 15, 1911, which when directly compared shows that the Erie engine is of considerably greater weight for practically the same power and, judged on the basis of heating surface, it has a smaller boiler. A more careful study of the details, however, shows that the greater total weight is largely accounted for in three features; first, the use of frames 6 in. in width as compared with 5 in. in the Great Northern; the 84 in. boiler has sheets 15/16 in. in thickness as compared with an 82 in. boiler with 7/8 in. sheets on the Great Northern; there is a smaller number of 2¼ in. tubes giving a considerably greater water capacity and hence increased weight in the boiler. The Erie superheater has 36 elements as compared with 30 in the Great Northern, but the tubes in the latter case are 1⅝ in. diam. as compared with 1 7/16 in. on the Erie. The ratio of superheating surface to evaporate surface, is considerably larger on the Great Northern, due to the larger number of boiler tubes. One very striking difference in the two designs is found in the 13 in. piston valves on the Great Northern as compared with 16 in. on the Erie.

The boilers of the mikado are 84 in. in diameter which increases to 87¾ in. at the firebox. The firebox is radially stayed, and the front end of the crown is supported by four transverse rows of flexible bolts, which are used instead of the customary arrangement of T-irons and expansion links. The depth of the throat, measured from the under side of the barrel to the bottom of the mud ring, is 25 in. This provides ample room for the Security brick arch, which is supported on four 3-in. water tubes. The superheater provides 845 sq. ft. of superheating surface, and the elements are located in 36 tubes each 5½ in. in diameter. The dome base and body are flanged from a single piece of steel plate. The longitudinal seams are all placed on the top center line, and are welded at the ends, having diamond shaped welt strips on the inside.



Heavy Vanadium Steel Frames for Mikado Locomotive.

The frames are of vanadium cast steel and the back sections are made of hammered iron. The front frames are single and are cast in one piece with the main frames, which are 6 in. wide, and 7 in. in depth over the pedestals. The rear frames are made in the form of slabs and are 2¼ in. wide. The equalization sys-



Profile of Cincinnati Division of the Erie Between Marion, Ohio, and Kent.

tem is divided between the second and third pairs of driving wheels and the spring links are here held by pins which pass through lugs cast in the frames.

The steam pipes in these locomotives pass out through the sides of the smoke box, and deliver steam directly to the steam chests, thus giving a less complicated and a stronger casting. The steam distribution is controlled by 16-in. piston valves which are driven by the Baker-Pilliod valve gear. The valves are set with a maximum travel of 6 in. and a constant lead of ¼ in. The steam lap is 1 in. and the exhaust clearance 1/16 in. The valve motions are controlled by the Ragonnet power gear. This gear was used as it provided a much more convenient cab arrangement than would the ordinary type lever and quadrant.

The tender is of the Vanderbilt type, having a capacity for 9,000 gallons of water and 16 tons of coal. The tank has a diameter of 8 ft. 9 in., and the frame is composed of 6 in. x 4 in. angles, with steel bumpers. The trunks have cast steel side frames and steel tired wheels. The following table contains the important dimensions and ratios of these engines:

General Data.

Type	2-8-2
Service	Freight
Fuel	Soft coal
Tractive effort	57,460 lbs.
Weight in working order	320,600 lbs.
Weight on drivers	237,150 lbs.
Weight of engine and tender in working order	483,000 lbs.
Wheel base, driving	16 ft. 6 in.
Wheel base, total	35 ft.
Wheel base, engine and tender	66 ft. 10½ in.

Ratios.

Total weight ÷ tractive effort	5.58
Weight on drivers ÷ tractive effort	4.13
Tractive effort × diam. drivers ÷ heating surface	870.
Tractive effort × diam. drivers ÷ *equivalent heating surface	666.
Total heating surface ÷ grate area	59.5
Total *equivalent heating surface ÷ grate area	77.5
Firebox heating surface ÷ total heating surface, per cent.	5.27
Firebox heating surface ÷ total *equivalent heating surface, per cent	4.03
Weight on drivers ÷ total heating surface	57.0
Weight on drivers ÷ total *equivalent heating surface	43.7
Total weight ÷ total heating surface	77.1
Total weight ÷ total *equivalent heating surface	59.1
Volume both cylinders, cu. ft.	22.78
Total heating surface ÷ vol. cylinders	182.7
Total *equivalent heating surface ÷ vol. cylinders	238.4
Grate area ÷ vol. cylinders	3.08

Cylinders.

Kind	Simple
Diameter	28 in.
Stroke	32 in.

Valves.

Kind	Piston
Diameter	16 in.
Travel	6 in.
Lead	¼ in.

Wheels.

Driving, diameter over tire	63 in.
Driving, thickness of tire	3½ in.
Driving journals, main, diam.	11 in. x 14 in.
Engine truck, diameter	33½ in.
Engine truck journals	6 in. x 12 in.
Trailing truck, diameter	42 in.
Trailing truck journals	8 in. x 14 in.

Boiler.

Style	Straight
Working pressure	170 lbs.
Outside diameter of first ring	84 in.
Firebox, width and length	84 in. x 120 in.
Firebox plates, thickness	⅜ in.
Firebox water space	6 in.
Tubes, number and diameter	232—2¼ in.
Tubes, number and diameter (superheater)	36—5½ in.
Tubes, length	21 ft.
Heating surface, tubes	3,936 sq. ft.
Heating surface, firebox	188 sq. ft.
Heating surface, arch tubes	31 sq. ft.
Heating surface, total	4,155 sq. ft.
Heating surface, superheating	845 sq. ft.
Heating surface, total equivalent	5,422.5 sq. ft.
Grate area	70 sq. ft.

Frame.

Over pedestal, width and depth	6 in x 7 in.
Top rail, width and depth	6 in. x 5½ in.
Bottom rail, width and depth	6 in. x 4 in.

Tender.

Tank, style	Vanderbilt
Frame	6 in. x 4 in. angles
Wheels, diameter	33 in.
Journals	6 in. x 11 in.
Water capacity	9,000 gals.
Coal capacity	16 tons

*Total equivalent heating surface equals total heating surface (4,155 sq. ft.) plus 1½ times superheating surface.

CANADIAN RAILWAYS IN 1911.

BY J. L. PAYNE,
Comptroller, Department of Railways and Canals.

An increase of 669 miles in the main track railway mileage of Canada during the year ended June 30, 1911, bringing the total up to 25,400, scarcely represents the real growth in that regard; for there were 1,600 additional miles in operation which were officially regarded as being still under construction. These figures leave the Dominion in the unique position of having the largest railway mileage per capita of population of any country in the world, despite the rapid peopling of the western provinces during the past ten years. At the same time, there were nearly 7,000 miles of line actually under construction; so that the year was marked by unprecedented activity in respect to railway building.

Probably 70 per cent. of the construction work under way at the close of the statistical year was located west of the great lakes, and all but two or three hundred miles of the remainder constitutes the eastern section of the new Grand Trunk Pacific. When all these projects are completed, Canada will have three lines extending across the continent—the Canadian Pacific, the Canadian Northern and the Grand Trunk Pacific—together with a network of branch roads running north and south. The fact that upwards of 3,000 miles of additional road was surveyed during the past year may be taken as indicating the unsatisfied and immediate transportation needs of the West. Canadians were undoubtedly disappointed when the census of 1911 revealed a population of only a little over seven millions; but they are inspired by a deep and abiding faith in their northern heritage, and this spirit of optimism will probably find its most striking demonstration during the next decade in the continued providing of these facilities which come under the comprehensive head of transportation.

No one is heard to complain because the aid given in one form and another to transportation projects by the federal and various provincial governments, as well as by municipalities, now foots up a total of fully a billion dollars. No other people on earth have made such large sacrifices in that regard. In the account is included cash subsidies to the extent of $202,179,254, government lines $119,615,000, canals $98,000,000, guarantees $148,336,357, and land grants of 55,256,429 acres. About 20,000,000 acres of these railway lands are still held for sale, and the fact that the price has gone up to from $10 to $30 an acre, and is rising rapidly, affords some notion of the value of the assistance given in this form. At least $100,000,000 might be added for harbor work, terminal equipment, the providing and maintenance of aids to navigation, and the upkeep of inland waterways.

The expansion of railway mileage during 1911 was reflected in an addition of $118,391,514 to capital liability. The total on June 30 amounted to $1,528,689,201, made up of stocks, $749,207,687, and funded debt, $779,481,514. This capitalization represents an average of $60,184 per mile of line; but, after deducting duplication and allowing for the situation with respect to government owned lines, the true average is shown to be $55,829 per mile. The dividends paid on share capital during the year aggregated $30,577,740. The rapidly growing financial strength of Canadian railway interests during the past five years is shown in the following statement:

	Dividends Paid.	Share Capital.	Per Cent.
1907	$12,760,435	$588,568,591	2.17
1908	12,955,423	607,891,349	2.11
1909	19,230,126	647,534,647	2.97
1910	21,747,414	687,557,387	3.16
1911	30,577,740	749,207,687	4.08

An increase of 141 per cent. in dividends paid is highly satisfactory. It indicates efficiency, swelling traffic and sound administration.

The public service of Canadian railways during the past year was shown in the carrying of 37,097,718 passengers and 79,884,28?

tons of freight—an increase, over 1910, of 1,203,143 passengers and 5,401,416 tons of freight. These results, having regard to all the conditions which obtained during the year, were satisfactory. Ten years ago the number of passengers carried was 20,679,974, and the volume of freight moved was 42,376,527 tons.

The number of passengers carried one mile was 2,605,968,924, representing an increase of 139,239,260 as compared with the preceding year. The passenger density was 102,597, which is rather low as compared with the United States; but it compares favorably with 90,921 four years ago. The average passenger journey was 70 miles, which I believe to be the highest in the world; but the average number of passengers per train was only 60. We have not in Canada the immense commutation business which so greatly fattens the passenger density of the United States, particularly in the eastern states. In fact, we have relatively little of that sort of traffic. This is why the average receipts per passenger of $1.360 is high, while the average of 1,460 passengers per mile of line is comparatively low. Yet in all these receipts there is a persistent tendency toward betterment and toward the conditions which prevail across the boundary. The average receipts per passenger per mile were 1.944 cents. It may be explained that we have in Canada an almost uniform rate of three cents per mile, and five cents per mile for a return ticket; but half fare for children and excursion rates bring the average below two cents.

The two cent agitation, it might be observed parenthetically, has never obtained a foothold in the Dominion, and one rarely hears the matter mentioned. Possibly our people are too glad to have the railways to think of crippling them with restrictive legislation. We have an exceedingly capable railway commission, possessed of wide jurisdiction and sustained not only by undisputed statutory powers, but by a vigorous public judgment. This board exercises full control over the rates of railway, express, telephone and telegraph companies, and the department of railways has jurisdiction with respect to location and statistics. In this situation there is not that disposition in Canada to tinker the laws relating to railways which is so observable in the United States.

The gain of 7.2 per cent. in the volume of freight handled in 1911 was the natural result of commercial and industrial prosperity. Incidentally, that very activity had something to do with the defeat of reciprocity in September last. Notwithstanding, however, the larger tonnage, the freight density of the Dominion declined from 635,321 ton miles to 631,829 during the year. On the other hand, the average receipts per ton per mile rose from .739 to .777 cent, due, among other causes, to a very substantial increase in the tonnage of manufactures. The average train load declined from 311 to 305 tons, and the average load per car from 17.13 tons to 16.91 tons. In the face of a steady increase in the capacity of freight cars, and a larger volume of traffic, this situation cannot be easily explained. The average freight haul also came down from 211 miles to 200 miles, although that figure still leaves Canada with the longest average haul. The number of tons hauled one mile was 16,048,478,295—a gain of 336,350,594 over the year 1910.

The following analytical statement of freight traffic in 1911 will be both interesting and illuminating:

	Tons.	Per Cent.
Products of agriculture	13,809,536	17.17
Products of animals	3,190,702	4.00
Products of mines	28,652,236	35.87
Products of forests	13,238,347	16.57
Manufactures	13,573,487	17.00
Merchandise	2,438,089	3.06
Miscellaneous	4,981,385	6.33

The increase in manufactures in 1911 over 1910 amounted to 3,559,708 tons, and brought the percentage up from 13.44 to 17.00.

Aggregate earnings were $188,733,494, showing $14,777,277 increase over 1910. The betterment was equal to 8.7 per cent. Operating expenses totaled $131,033,785, or 8.8 per cent. more than for the preceding year. The ratio of operating cost to earnings was 69.4 per cent., which was somewhat better than the average for the past five years. The difference between gross earnings and operating expenses, popularly spoken of as net income, was $57,698,709—an increase for the year of $4,147,932. After making deductions for dividends, taxes, etc., the amount carried forward to profit and loss was $14,150,465, which is quite the best result achieved in the history of Canadian railways. Gross earnings were equal to $7,430.45 per mile of line, which was $396.52 ahead of 1910. The gross earnings of 1910 and 1911 came from the following sources:

	1910.	1911.
Passengers	$46,018,880	$50,566,894
Mails	1,779,881	1,869,414
Express	4,143,838	4,674,135
Baggage, parlor cars, etc.	993,614	1,207,555
Freight	117,497,604	126,570,533
Station and train privileges	679,061	826,252
Telegraphs, rents, etc.	2,873,333	3,018,710
Total	$173,956,217	$188,333,494

Earnings from mails have increased 14.8 in four years, and from express 42.5.

Passenger trains earned $1.348 per train mile, and freight trains $2.376 per train mile. The average earnings per ton of freight were $1.561. Outside operations realized gross earnings of $19,444,893 during the year, with expenses attached of $14,150,465. These operations related largely to the steamship lines of the Canadian Pacific and Canadian Northern, as well as to the hotels of the same companies. The Grand Trunk has begun the erection of hotels; but has not thus far gone into the steamship business.

Operating expenses for the year amounted to $131,034,785, or $10,629,345 more than for 1910. The unproductive character of new mileage was mirrored in the fact that the cost of operation represented an increase of $290 per mile of line, bringing the total up to $5,159. As compared with four years ago, operating expenses per mile have swollen $538, and therein would seem to lie one of the gravest problems which just now confronts managers of railways on this continent. Another way of measuring the rising scale of operating cost, and perhaps the best way available, has reference to the expenses per train mile. Fifteen years ago it cost an average of .775 cent to run a train one mile; ten years ago the figures had risen to $1.117; five years ago to $1.381, and this year to $1.460. A three years' comparison of the five divisions of operating expenses gives the following result:

Operating Expenses.	1909.	Per Cent.	1910.	Per Cent.	1911.	Per Cent.
Way and structures	$21,153,274.46	20.22	$27,035,603.46	22.45	$29,245,093.22	22.32
Equipment	21,510,303.59	20.56	26,002,301.30	21.59	26,127.638.12	19.94
Traffic exp.	3,798,824.57	3.63	4,366,176.92	3.63	4,831,744.50	3.69
Transportation.	54,284,587.41	51.89	58,928,170.74	48.94	66,343,269.58	50.63
General exp.	3,853,094.40	3.70	4,073,188.00	3.39	4,487,039.53	3.42

It will be seen that the physical upkeep of Canadian railways was well maintained in 1911. The lower percentage for equipment, however, possibly had something to do with the abnormal shortage of cars which prevailed toward the end of the calendar year. Nevertheless, maintenance of equipment represented $1,024 per mile of line in 1911, as compared with $965 in 1907. A still higher ratio of increase for maintenance of way and structures was established, the figures being $930 per mile of line in 1907, and $1,151 in 1911—an increase of 23.6 per cent. in four years.

Turning to the matter of equipment, it is worthy of note that 140 locomotives, 193 passenger cars, 7,445 freight cars, and 930 cars in company's service were added in 1911. These additions brought the totals up as follows: Locomotives, 4,219; freight cars, 127,158, and passenger cars, 4,513. The tendency toward larger and heavier units is shown in the fact that while the average capacity of freight cars in service was 27.6 tons in 1907, it was 29.5 tons in 1911. There were, for example, 6,070 cars of 100,000 lbs. capacity in 1911, as against 3,448 in 1908. Cars of 80,000 lbs. capacity rose in number from 9,790 in 1908 to 14,075 in 1911. On the other hand, during the same period the old standard 40,000 lbs. cars decreased from 25,855 in 1908 to 18,899. Notwithstanding steady additions, the available supply

of rolling stock per 1,000 mills of line still falls considerably below the American standard. The Canadian figures are: Locomotives, 166; freight cars, 5,006, and passenger cars, 177. The process of betterment has been quite marked during the past five years in particular; but there is still room for improvement.

Revenue trains had a total mileage of 89,716,533, divided as follows: Passenger trains, 36,985,911; freight trains, 46,220,813; mixed trains, 6,277,468, and special trains, 232,341. Locomotives ran 111,975,176. Car mileage was distributed in this way: Loaded freight cars, 946,946,917; empty freight cars, 311,984,866, and caboose cars, 47,834,318. It might be observed at this point that all the statistics which appear in this article are directly comparable with those of the United States, since they are based upon classifications in all essential respects identical with the prescriptions of the Interstate Commerce Commission.

The fuel bill for 1911 of $20,182,103 was created by the consumption of 6,800,648 tons of coal at an average cost of $2.97. To run 100 miles the tons of fuel consumed by locomotives hauling the various classes of trains was as follows: Freight, 7.78; passenger, 4.91; mixed, 5.10; switching, 4.14, and construction, 4.48.

For the first time, official information was gathered in 1911 with regard to the despatching of trains by telephone instead of telegraph. It was found that 3,306.33 miles of line had been operated under the new system, or 13 per cent. of the whole. It may safely be assumed that this mileage will be largely increased during the current year. The telephone has been highly satisfactory.

An addition of 17,456 during the year brought the total number of railway employees up to 141,224, to whom $74,613,738 was paid in salaries and wages. Of this number, 19,118 were attached to outside operations, and their remuneration aggregated $6,976,208. The increase of total compensation over 1910 was equal to 11.08 per cent., and therein lies the chief reason for the ascending scale of operating expenses. Comparing 1911 with 1910 the distribution of salaries and wages was as follows:

	1910.	1911.
Way and structures	$16,502,902	$18,157,696
Equipment	14,775,782	15,544,057
Traffic expenses	1,313,980	1,564,399
Transportation expenses	32,091,952	36,832,034
General expenses	2,483,177	2,515,552
Total	$67,167,793	$74,613,738

Further information with regard to the wages situation will be found in the following table, showing the average rate of daily compensation to the various classes of employees in 1910 and 1911:

Employees.	1910.	1911.
General officers	$10.72	$11.72
Other officers	4.73	4.84
General office clerks	1.94	1.98
Station agents	2.16	2.28
Other stationmen	1.65	1.73
Enginemen	4.12	4.40
Firemen	2.53	2.78
Conductors	3.30	3.62
Other trainmen	2.12	2.44
Machinists	2.98	3.14
Carpenters	2.52	2.44
Other shopmen	2.19	2.22
Section foremen	2.18	2.32
Other trackmen	1.58	1.66
Switch tenders, etc.	1.57	1.98
Telegraph operators	2.20	2.28
Employees—floating equipment	2.19	1.11
All other employees	1.95	1.87

The distressing story of accidents during the year must be told. The number of persons killed was 495, and the number injured 3,329. Of these 28 were killed and 1,423 injured from other causes than the movement of trains. The accidents resulting from the movement of trains occurred to the following classes of persons:

	Killed.	Injured.
Passengers	28	288
Employees	202	1,314
Trespassers	185	154
Non-trespassers	48	135
Postal clerks, etc.	2	15
Total	465	1,906

This is a better record than for several years. One passenger in every 1,324,919 was killed, and one in every 124,489 was injured. The causes of death were: Collisions, 4; derailments, 1; falling from trains, 10; jumping on or off trains, 11; struck at highways, 1; struck at stations, 1, and other causes, 2. The injuries to passengers occurred from: Collisions, 43; derailments, 88; falling from trains, 34; jumping on or off trains, 67; struck at highways or stations, 6, and other causes, 50. Collisions accounted for the killing of 34 employees and the injuring of 119, while derailments caused the death of 10 and the maiming of 67.

Considerable interest attaches in Canada to those accidents which occur at highway crossings, because of the movement for the elimination of this menace to public safety. Thirty-six persons were killed and 108 injured at such intersections in 1911. This was the best showing in years, both actually and relatively, and it may have been due in large measure to the fact that the Board of Railway Commissioners has taken a firm stand in the matter of protective measures. The increase of overhead bridges and subways during the past three years, particularly in rural and semi-rural districts, has been large, in addition to which many electric bells and gates have been installed. Within two years 132 level crossings have been eliminated by this means, and the work may be regarded as having just begun. The expense is borne by the railway, the municipality and government.

It seems to me the statistical matter which unavoidably makes up the body of this contribution clearly points to a healthy and encouraging railway situation in Canada. The rapid settlement of the western provinces means the production of a swelling volume of grain for export, and this expansion has its reciprocal in a rising demand upon the industries and commerce of the east. All activity in the life of a nation produces traffic. This was the experience of the western states, and history is merely repeating itself north of the 49th parallel. The business of railways is increasing, and in return the public is being given a better service in all respects. The ambition and faith of our people are finding their most definite demonstration today in the planning and building of railways; and in these efforts they are merely showing a sane appreciation of the importance of transportation to a relatively new and developing nation.

FOREIGN RAILWAY NOTES.

The New South Wales public works committee is now considering the question of the construction of a railway from Henty to Daysdale, a distance of 46½ miles. The estimated cost of the line built with 80-lb rails is $1,070,655. It is anticipated that at first the revenue to be derived from the line will be $32,730 and the expenditure $56,895.

Construction on the proposed railway from Yunnanfu, China, to Lanchowfu, on the Yangtse river, in the province of Szechwan is being held up. The matter of freight rates over the French railway from Haifong, in French Indo-China, to Yunnanfu, is of such controlling importance that the projectors of the line are seriously considering the construction of a line from Yunnanfu to Nanning, on the Yoo river in the province of Quang Se, as a means of avoiding these excessive charges, as well as opening up the province of Yunnan and West China by the new route. This road would give communication by rail and water with Hongkong and Canton. This enterprise is not exactly an alternative of the construction of what is known as the Szechwan Railway but it seems to be generally understood that the construction of the railway to Nanning will postpone the construction of the line from Yunnanfu to the Yangtze. The survey work of the line to Nanning was newly completed last November, and the immediate construction of either the Szechwan Railway or the line to Nanning seems to depend entirely upon the early settlement of political disturbances in China generally. The detailed survey of the line from Yunnanfu to Lanchowfu, under the direction of two American engineers, was also nearly completed last November, and the preliminary work has been disposed of.

General News Section.

The Butte, Anaconda & Pacific, a 27-mile railway, operated by the Amalgamated Copper Company between Butte and Anaconda, Mont., is to be equipped for electrical operation.

Representative Berger, socialist, of Wisconsin, has introduced in Congress a bill to provide for government ownership of railways, telegraphs, telephone lines, and express companies.

Two suits for violation of the 28-hour law in the transportation of live stock have been filed in the United States district court at Chicago against the Lake Shore & Michigan Southern.

On the evening of February 5, Col. George A. Zinn of the United States Army addressed the Western Society of Engineers on "Chicago Waterways in Their Relation to Transportation."

Suit has been begun in the Federal Court at New York against the Erie to recover penalties for 51 alleged violations of the hours-of-service law. The charges relate to trips of trainmen made between April and September last.

The Canadian Society of Civil Engineers has authorized the expenditure of $100,000 for a new building for the society in Montreal. The present building of the society has been sold and a committee has been appointed to consider the selection of a new site.

Evidences that the present winter is one of the coldest for many years have been multiplied in many quarters. The latest news is from far off Saskatchewan, where the Grand Trunk Pacific, it is said, has shut off the free passes of the members of the provincial legislature.

James B. Hall of Chicago has brought suit in the Dane County Circuit Court, Wis., against the Chicago, Milwaukee & St. Paul, for violation of a law passed by the 1911 legislature which requires that the upper berth in sleeping car shall be closed unless occupied.

The voters of Seattle will be asked to approve at the March election the plan of the Seattle Port Commission, providing for an issue of $3,000,000 of bonds for the purpose of acquiring land and building six ocean piers as the initial step in building a $7,500,000 ocean terminal at Harbor Island.

Representatives of the firemen's brotherhood have asked the officers of the New York Central for a general conference looking to readjustment of wages and working conditions; and it appears that the firemen intend to follow the enginemen in a general movement for increased wages throughout the eastern states.

F. P. Gutelius, of Montreal, now general superintendent of the Eastern division of the Canadian Pacific, and George Lynch-Staunton, K. C., of Hamilton, have been appointed by the Canadian government to investigate the long series of transactions involved in the construction of the National Transcontinental Railway.

The Atchison, Topeka & Santa Fe has made a change in its pension rules so that an employee who has been continuously in the service of the company for 15 years or more may receive a pension, if permanently incapacitated, without the necessity for showing that the disability was caused by employment in the service of the company, provided it has not been due to misconduct.

The Chicago & North Western, in connection with the Union Pacific, will run special colonist trains from Chicago to San Francisco during the period of reduced colonist rates from March 1 to April 15. Last year the through trains ran only from Omaha westward, passengers from Chicago and the east being required to change cars there. Meals in dining cars at reduced rates will be a feature of the service.

A public utilities law is being agitated in Indiana. Governor Marshall proposes a plan to extend the powers of the railway commission as being less expensive and equally good. "We have rearranged things in the commission," says the Governor, "so that now we have expert subordinates doing much of the work formerly done by the commissioners or left undone. A new law should give the commission increased powers; power to employ experts to go into the questions involving public utilities control."

The Rock Island *Employees' Magazine* prints the names of the roadmasters and section foremen of the Rock Island system to whom have been awarded $3,825 in premiums for excellence in their work during the past season. There are 17 divisions, and on nearly every one of these divisions a roadmaster's prize of $100, and three or four prizes to section foremen of $50 each, were awarded. Of the total amount, $1,425 went to roadmasters and $2,400 to section foremen. Two of the foremen, one in Arkansas and one in Louisiana, were colored men.

The New York State Civil Service Commission, Albany, wants candidates for the position of examiner, division of statistics and accounts, Public Service Commission, Second district; salary $1,800. No written examination will be held, but candidates will be rated on submitted papers. Men of experience in corporation accounting are desired. Applications must be filed not later than February 24. Candidates are wanted also for the position of statistical clerk, salary $1,200 to $1,500; applications received till February 19.

Operating officers of the Texas railways held a conference with the state railway commission on January 30 to discuss methods of improving the train service in the state by stricter adherence to schedules. The commission has recently instituted several suits against the roads for violation of the state law requiring that an extra train be run whenever a train is 30 minutes late. Chairman Mayfield said that penalties had not produced results and suggested a lengthening of schedules. This was opposed by the railway men, who declared that the lateness of the trains recently had largely been caused by severe weather conditions and other circumstances beyond their control; but they agreed to consider the adoption of slower schedules during the winter months.

The committee of the Chicago city council on harbors, wharves and bridges, on February 5 decided not to approve the proposed contract between the Illinois Central and the Board of South Park Commissioners by which the railway was to exchange its riparian rights to the shore of Lake Michigan between Park Row and Fifty-first street, together with property now occupied by its passenger terminal, for a grant of additional land to widen and straighten its right of way. The plan was proposed by the park board to provide for making a municipal park on land to be filled in along the shore line, and also to provide for the erection of the Field Museum on the site of the present station, in accordance with the plans of the city plan commission. The railway was to have built a new passenger station at the corner of Twelfth street and Michigan avenue. The committee decided, instead of accepting the contract, to ask for a special session of the state legislature at which the city will ask for legislation giving the park board the power to condemn the riparian rights of the Illinois Central. The rejection of the plan, which had been approved by the park commissioners, by members of the city plan commission and by the mayor, as well as by the principal newspapers of the city, was the result of an agitation instituted by members of the City Club, who declared that the value of the land to be granted to the Illinois Central exceeded that of the riparian rights. Objections were also made by property holders along the line of the railway, who declared that it would allow the road to establish freight yards on the lake front and who thought the contract ought to have included a requirement that the railway adopt electric traction.

Southern Pacific Land Company.

President Sproule, Vice-president McCormick and other officers of the Southern Pacific have organized the Southern Pacific Land Company, with a capital of $5,000,000, the purpose of which is to simplify the land transactions of the road and obviate the necessity of referring everything to the general offices in New York. As soon as the preliminaries of organization have been completed 300 deeds of sale, involving large tracts, will be made. The move is solely for convenience and there is no new project in hand for exploitation.

Train Robbery on the Rock Island.

The Chicago, Rock Island & Pacific train 43 was held up by masked robbers on February 7 near Hurlburt, Ark. Train 43 left Memphis a few minutes after midnight. At Bridge Junction, where all trains stop for signals before starting out on the main line, the robbers boarded the train, crawled over the tender and covered the engine crew with their guns. After looting the combination mail and express car the robbers escaped. The passengers were not molested. The robbers detached the mail and express car and engine, and after binding and gagging the engineer and kicking him into a ditch forced the fireman to run them several miles down the track, where they blew up the safes.

In escaping the robbers cut the telegraph wires. When officers started on the trail this morning they found tracks of horses, and it is thought that the robbers escaped on horseback.

Agency for Railway Age Gazette Books.

The McGraw-Hill Book Company, New York, now has the exclusive sales agency for the technical books of the *Railway Age Gazette*, the *American Engineer* and *The Signal Engineer*. This makes the McGraw-Hill Book Company publishers and distributors of books for the three journals, but it does not affect the publication of the papers themselves in any way.

With the addition of these three papers in the railway field, the McGraw-Hill Company now publishes books for the twelve leading American engineering papers in the fields of civil, mechanical and electrical engineering, electric and steam railroading, machine tools, mining, metallurgy, chemical engineering, etc.

Missouri Pacific Mikado Locomotive.

In the description of the Missouri Pacific mikado locomotives in the *Railway Age Gazette* of January 12, the superheating surface shown in the table on page 57 was that given by the builders, but it has since been found that the superheating surface of the Illinois Central engines was figured on the outside of the tubes, while that of the Missouri Pacific was figured on the inside. The figures showing the superheating surface on the inside of the tubes are as follows:

Missouri Pacific	558 sq. ft.
Illinois Central	860 sq. ft.

Aileen Martin.

This is the name of a girl seven years old, daughter of the track foreman of the Southern Pacific at Alta, Cal., who on Saturday, January 13, discovered a broken rail and took action which led to the stopping of the Overland Limited express; and the Southern Pacific Company sent her a letter of thanks and a hundred dollars in money. A similar sum was given also to Alma Martin, sister of Aileen, and 14 years old, who assisted her.

The smaller girl, on discovering the rail, and knowing that the train would soon be due, ran into the section house and tried to telephone the information to the station agent; while doing so, the elder sister happened in, and told the agent of the child's story. The agent told Alma that the train had already entered the block section, and to flag it. The girls did this; and Superintendent H. W. Sheridan, on learning the facts, recommended the giving of a reward.

Alta is between Dutch Flat and Towle, 68 miles east of Sacramento. This is the section of line on which the electric train staff is in use, and therefore, presumably, there was no electric circuit in the track where the break occurred.

Improvements for the Wabash.

An extensive programme of improvements for the Wabash involving an expenditure of approximately $7,500,000 has been outlined by the receivers, F. A. Delano, W. K. Bixby and E. B. Pryor, to be carried out principally during the present year, and has been approved by the various courts having jurisdiction over the receivership. The plans are based on recommendations which were made by President Delano four years ago, and it is the belief of the receivers that the expenditure will bring a very handsome return either in increasing the capacity of the road or in diminishing the cost of operation, or both. The cost of the improvements has been provided for by the sale of $10,000,000 of 18-months receivers' certificates to Kuhn, Loeb & Company, under a plan by which $3,000,000 has been made available at once and the remainder will be paid in instalments during the year.

Approximately $3,525,000 of the amount authorized is to be expended for new equipment, which, it is expected, may be delivered in time for the road to have the benefit of it by July 1. This is in addition to an order for 25 locomotives placed last August and now being filled.

The programme also includes an expenditure of $2,954,500 for 180.8 miles of new second track. The proposed double-tracking will increase the capacity of the line in and out of all important terminals, and when it is completed will give the Wabash a double-track line from Lodge, Ill., to St. Louis, Mo., leaving only 116 miles of single track on the Chicago-St. Louis line. The double-track south of Chicago will be extended five miles from Worth to Orland, and east of Chicago five miles from Clarke Junction to Gary, Ind. The double-track work, with the exception of the section between Worth and Orland, which involves grade reduction and line revision, is expected to be completed during the coming summer.

A large amount of new rail is to be provided for renewals on the Chicago-St. Louis line for the purpose of bringing this line as rapidly as possible up to a standard of 100-lb. rail. On other portions of the line the double-tracking will be done with 90-lb. rail.

Most of the block signaling will be installed in Indiana to comply with the state law, and some additional installations will be made to protect short sections of the line in the vicinity of important terminals.

The complete list of expenditures authorized is as follows:

New Equipment.

	Estimated Cost.	
30 additional engines	$600,000	
1,000 steel underframe, 36-ft. and 40-ft., 80,000 lbs. capacity stock cars	850,000	
750 40-ft., 80,000 lbs. capacity automobile cars	675,000	
1,000 steel underframe, 36-ft., 40-ton box cars	900,000	
200 steel hopper cars, 50 tons capacity	200,000	
20 passenger train cars	300,000	
		$3,525,000

Second Track Work.

	Miles.	Estimated Cost.	
Oakwood to Romulus, Mich.	11	$134,000	
Montpelier to Alvordton, O.	11	146,000	
Decatur to Knights, Ill. (With gauntlet on bridge over Sangamon river.)	3	46,000	
Taylorville to Litchfield, Ill.	32.5	552,500	
Clarke Junction to Gary, Ind.	5	51,000	
Worth to Orland, Ill.	5	370,000	
Bement to Lodge, Ill.	13	208,000	
Bement to Tolono, Ill.	13	170,000	
Fairmont to Danville, Ill.	11	143,000	
Danville, Ill., to State Line, Ind.	5	65,000	
Poag to Worden, Ill.	15	210,000	
Moberly to Clark, Mo.	11.3	147,000	
Moberly to Huntsville, Mo.	6	84,000	
Brunswick to Salisbury, Mo.	18	288,000	
Excelsior Springs Jct. to Birmingham, Mo.	14	237,000	
Ft. Wayne to New Haven, Ind.	5	73,000	
Ft. Wayne to Hugo, Ind.	2	30,000	
Total miles of second track work proposed..	180.8		2,954,500

Miscellaneous Items.

	Estimated Cost.	
Track elevation work in Ft. Wayne, Ind., completing work already begun, and required by ordinance to be completed within two years	$125,000	
Block signaling and telephone despatching, part of which is required by law of Indiana	150,000	
Replacing bridges or strengthening existing bridges, first year	100,000	
Miscellaneous industry sidings and passing tracks	150,000	
Delray (Mich.) engine house—property, buildings and appurtenances	75,000	
On account of miscellaneous improvements already in course of progress, authorized under the old management, not completed or paid for	250,000	
Machine tools, various shops	100,000	
New rail for replacement on Chicago-St. Louis line, 100-lb. rail being suggested, in order to bring the track up to the condition of that of best competitors; 10,000 tons, or, say, $300,000. Of this amount, $60,000 will be chargeable as a betterment, and carried to capital account	60,000	
		1,010,000
Grand total		$7,489,500

It is understood that arrangements for beginning the work and purchasing the equipment will be made at once.

Committee on Railway Mail Pay.

The chairman of this committee is A. W. Sullivan, recently general manager of the Missouri-Pacific, who has been elected to that position by a unanimous vote of the committee. His office will be at 75 Church street, New York City. Mr. Sullivan will devote his time exclusively to this work, and will relieve Mr. Kruttschnitt, the former chairman, and Mr. Peters, the former vice-chairman, from the labors connected with the work; but they will continue to act as members of the committee. Mr. Sullivan is widely known, having served three terms as president of the American Railway Association. He was formerly general manager of the Illinois Central.

The committee on Railway Mail Pay represents more than 208,000 miles of road, and was organized for the purpose of bringing about a readjustment of the present basis of pay for the transportation of the mails, under which the carriers claim that they are heavy losers. In his last report the postmaster general submitted a tentative draft of a proposed law for the regulation of railway mail pay which the carriers considered so drastic that Mr. Kruttschnitt shortly before his retirement as chairman of this committee addressed a letter to the Speaker of the House at Washington, asking that ample time be given for a detailed analysis of the report, and asserting that the figures were distorted, the results illogical and unwarranted and that the principle adopted by the postmaster general, if applied to all the business of the railways, would reduce them to bankruptcy.

Mr. Sullivan will make his headquarters in New York, but a considerable part of his time will be spent in Washington.

The Cleveland Engineering Society.

At the regular meeting of the Cleveland Engineering Society, to be held on February 13, a paper on Public Utilities and Their Relation to the Public will be presented by Mortimer E. Cooley, chairman of the Block Signal and Train Control Board. At the special meeting of this society to be held February 27, an illustrated paper will be presented on Technical Education by Prof. F. J. Barker, principal of the Technical High School, Cleveland, Ohio.

American Society of Civil Engineers.

At the meeting of the American Society of Civil Engineers, to be held on February 7, a paper by Frederick C. Noble, M. Am. Soc. C. E., entitled Notes on a Tunnel Survey, will be presented for discussion and illustrated with lantern slides. This paper was printed in the *Proceedings* for December, 1911.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.; annual, May 7-10, Richmond, Va.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Boston, Mass.; annual, May 10-11, San Francisco, Cal.

AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York; next convention, Seattle, Wash.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Chicago.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September; annual, March 17, Chicago.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York.

AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOC.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOC.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—M. H. Bray, N. Y., N. H. & H., New Haven, Conn.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conrad, 75 Church St., New York.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago. Convention, May 22-25, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOC. OF U. S. AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Convention, 2d week in September.

NATIONAL RAILWAY APPLIANCES ASSOC.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

NORTHERN RAILROAD CLUB.—C. L. Kennedy, C., M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

OMAHA RAILWAY CLUB.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 2 Rector St., New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOC.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

RAILWAY GARDENING ASSOCIATION.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.

RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa. Next meeting, March 18, Chicago.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio. Convention, May 20-22, Buffalo, N. Y.

RAILWAY SUPPLY MANUFACTURERS' ASSOC.—J. D. Conway, 2135 Oliver Bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

RAILWAY TEL. & TEL. APPLIANCE ASSOC.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. Y., Sterling; September, 1912, Buffalo, N. Y.

ST. LOUIS RAILWAY CLUB.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; August, 1912.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except, June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month except July and August, Chicago.

Traffic News.

The Chicago Railroad Association, which compiles the Chicago joint passenger rate sheet, has elected J. D. Lanigan, assistant general passenger agent of the Illinois Central, as chairman for the ensuing year, and W. E. Cooper, as secretary and treasurer.

The Rock Island "cream and egg special" train recently completed a five days' trip from St. Louis to Kansas City, making stops at thirty towns. It is estimated that a total of 15,000 persons attended the lectures, which were given by H. M. Cottrell, agricultural commissioner of the Rock Island Lines, and by professors of the agricultural college of the University of Missouri and members of the state board of agriculture.

The agricultural activities of the Southern Railway have now been extended to the poultry department, and a circular has been issued showing the prospective profits waiting for anyone who will go into the business of raising chickens in the southern states. Every southern city of any size imports every year thousands of dollars worth of eggs and chickens; and the average price of eggs throughout the year is 5 cents a dozen more than in the north.

The fifth annual dinner of the Traffic Club of Chicago is to be held on Tuesday evening, February 20, in the banquet room of the Hotel LaSalle. John Barton Payne, general counsel of the Chicago Great Western, will be toastmaster, and the speakers will be: Orrin R. Carter, chief justice of the Supreme Court of Illinois, Dr. Emil G. Hirsch, Sinai Congregation, Chicago, and James Albert Green, president Mathew Addy Company, Cincinnati.

The Transcontinental Passenger Association has issued a joint passenger tariff containing second-class one-way colonist fares to points in Alberta, Arizona, British Columbia, California, Colorado, Idaho, Mexico, Montana, Nevada, New Mexico, Oregon, Saskatchewan, Texas, Utah, Washington and Wyoming. The rates will be in effect March 1 to April 15 inclusive. From Chicago the one-way fare is $33, from St. Louis, $32, and from Kansas City, $25.

The West Jersey & Seashore, acting on the dictum of the Interstate Commerce Commission that an undercharge is a violation of law, and that consignees must be sued, if necessary, to secure full legal payment of freight charges, has notified a large number of consignees that various sums, from 10 cents to 50 cents, must be paid, some of these notices having to do with transactions several years in the past. In one instance it is said a suit has been brought against a consignee for 30 cents—24 cents principal and 6 cents interest.

The Minister of Agriculture, Province of Saskatchewan, has telegraphed to Washington from Regina, stating that there are 20,000,000 bushels of unthreshed wheat, all tough, and 12,000,000 bushels, wet and tough, in that Province, which must be shipped at once or be a total loss; and, the Canadian railways refusing to send their cars across the line, he seeks the co-operation of our government in bringing to bear such influence as may be practicable to induce the railways to provide the needed cars. The Interstate Commerce Commission, some weeks since, authorized the establishment of special rates on wheat and oats from points in Canada to Duluth and Minneapolis, waiving the thirty-day requirement.

The elevated railways carrying passengers from Manhattan, New York City, over the Brooklyn Bridge and thence to Coney Island, about 9 miles, announce that, beginning March 1, round trip tickets will be sold for 10 cents, or one-half the regular rate, to passengers leaving Coney Island between 6 and 9 a. m., and returning from Manhattan between 4 and 7 p. m. A similar reduction will be made to school children, the tickets to be available at the hours before the beginning and after the ending of the school sessions. From May 15 to September 15, the 10-cent round-trip tickets will be available for women and children going from Manhattan to the seashore, the southward trip to be begun between 6 and 9 a. m., and the return between 2 and 4:30 p. m.; but these will not be available on holidays or Sundays. During the hours in which reduced rates are granted the elevated now has comparatively light traffic.

Panama Canal Problems.

Professor Emory R. Johnson, of the University of Pennsylvania, testifying before a congressional committee at Washington last week, gave his views as to probable changes in ocean freight routes after the opening of the Panama Canal. The price of coal at different seaports is an important element in the relative economy of transportation by different ocean routes, and Professor Johnson thinks that in this respect the Panama route will have a marked advantage over routes through the Suez Canal. He estimates that, at the Atlantic end of the Panama Canal, Pocahontas coal will cost about $4.50 a ton; at the Suez Canal at present coal costs from $5.10 to $5.35. A ship of 3,000 tons, going from New York to Japan and back through the Suez Canal, will use $20,868 worth of fuel; the same ship through the Panama Canal would have to use $18,222 worth. This gives the Panama Canal an advantage of about $1 per net ton of registered tonnage.

W. A. Ring, chairman of a special committee of the New York Chamber of Commerce, which has been investigating the probable conditions surrounding traffic through the Panama Canal, recommends that the Chamber favor one dollar a ton as the rate of toll to be charged on all tonnage passing through the canal. To comply with the Clayton-Bulwer treaty of 1850, and with the Panama treaty of 1903, the United States government must charge the same tolls on American vessels as on those of Great Britain. The Commissioner of Navigation has published this same conclusion. Mr. Ring further says:

"The question as to what would be a fair rate of toll is most difficult to determine. When the Suez Canal was first opened the rate was about $3 per registered ton, but with the constant increase in business it has been gradually reduced, until for 1912 it will be $1.30 per ton. As the cost of the Suez Canal was only $125,000,000, the yearly profit has been very large. It would be impossible to determine in advance at all closely the volume of tonnage that will pass through the Panama Canal. Trade conditions will no doubt be changed to a considerable extent, and possibly to a large degree after the canal is opened and in use. It is doubtful whether the Panama Canal will be used ultimately to as large an extent as the Suez Canal. It is a lock canal and its operation for large steamships is still a problem that will be solved only by actual experience. Trade for North American and South American ports will no doubt avail very largely of the Panama Canal. As regards trade for the Far East, it is somewhat problematical, as the distances across the Pacific are very great, necessitating a large portion of the steamship's room being taken for coal, there being so few coaling stations in the Pacific. This will add materially to the cost of Far East voyages to China, Japan, the Philippines, Australia and New Zealand.

"Professor Emory R. Johnson has, we understand, increased his estimate from 7,000,000 tons up to 8,000,000 tons, that will pass through the canal at an early period after its completion, and it is his opinion that a toll rate of $1 per ton would produce the largest revenue for the canal.

"The nearest estimates of cost of interest and operation the committee has been able to secure, and a portion of these are largely problematical, are as follows:

Yearly cost of interest on bonds issued for construction of the canal, about	$11,000,000
Yearly cost of upkeep of the canal for improvements, repairs, contingencies and labor for operation	3,500,000
Total cost per year, which does not include provision for amortization of bonds	$14,500,000

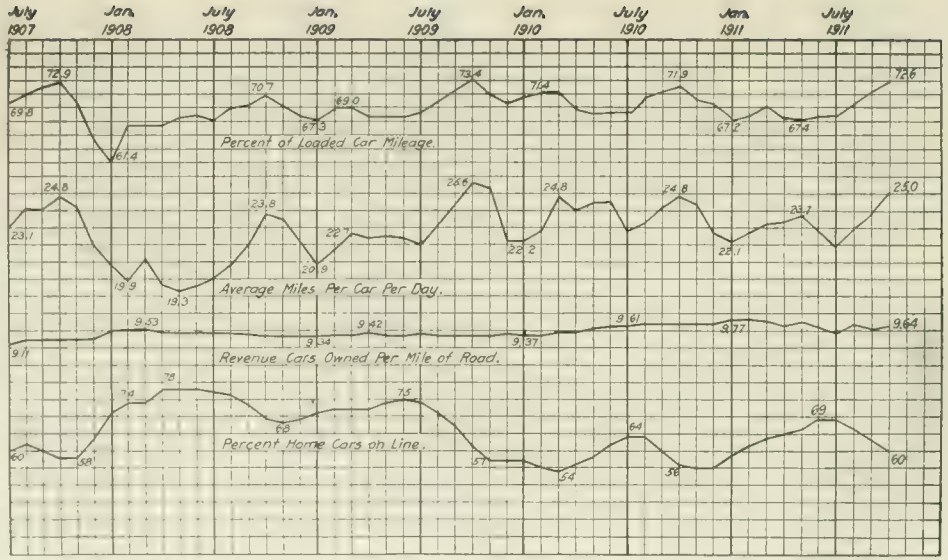
"On the basis cost per annum of $14,500,000 and tonnage carried of 8,000,000 tons, it would make the cost per ton $1.82. This cost is high and would no doubt be a handicap in making best and fullest use of the canal. Your committee is disposed to recommend a lower rate with the view of attracting a much larger volume of tonnage and thereby increasing the revenues of the canal."

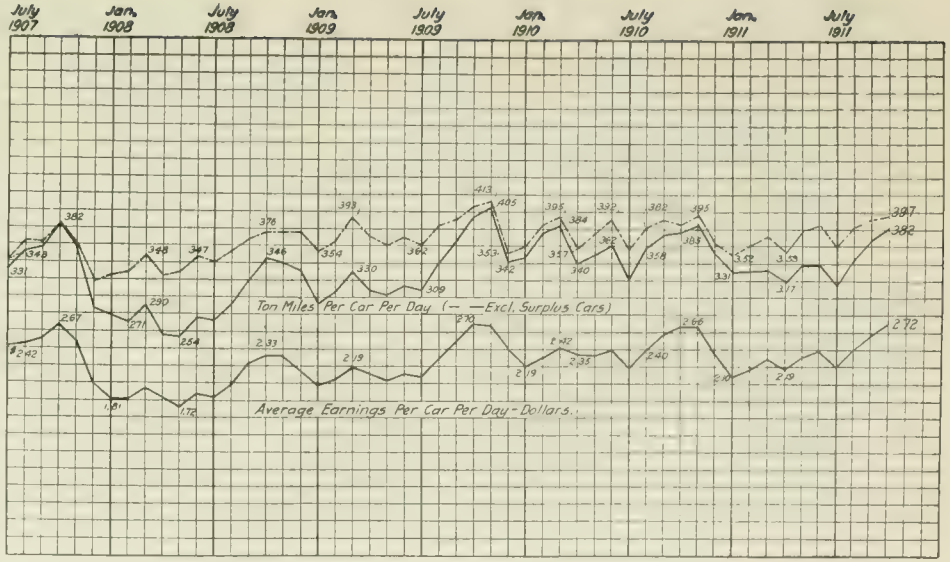
The toll of $1 a ton on all tonnage passing through the canal is the rate accordingly proposed.

Freight Car Balance and Performance.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association, in presenting statistical bulletin No. 114, covering car balance and performance for October, 1911, says:

"The majority of the performance averages show an improve-





Car Performances and Car Earnings and Mileage.

CAR BALANCE AND PERFORMANCE IN OCTOBER, 1911.

	New England.	N. Y., N. J., Del., Md., Eastern Pa.	Ohio, Ind., Mich., Western Pa.	Va., W. Va., No. and So. Carolina.	Ky., Tenn., Miss., Ala., Ga., Fla.	Iowa, Ill., Wis., Minn.	Mont., Wyo., Neb., Dakotas.	Kan., Colo., Okla., Mo., Ark.	Texas, La., New Mex.	Ore., Idaho, Nev., Cal., Ariz.	Canadian Lines.	Grand Total.
Revenue freight cars owned	87,304	498,605	213,585	185,245	173,101	393,580	18,553	135,603	30,257	144,117	110,255	1,990,205
Average number of system cars on line	44,923	291,248	122,565	106,227	97,419	253,716	6,898	78,150	22,823	62,534	73,510	1,163,013
Railway-owned cars: Average foreign on line	50,001	172,883	95,347	64,183	66,365	141,480	12,485	57,323	27,967	59,314	44,200	791,548
Total Railway-owned cars on line	94,924	464,131	217,912	170,410	163,784	398,196	19,383	135,473	50,790	121,848	117,710	1,954,561
Excess	7,620	.....	4,327	.....	.....	4,616	830	.....	20,533	.....	7,455	.....
Per cent. of cars on line to total owned;												
Home	52	58	57	57	56	65	37	58	75	43	67	58
Foreign	57	35	45	35	38	36	67	42	92	41	40	40
All railways	109	93	102	92	94	101	104	100	167	84	107	98
Private cars on line	3,990	27,652	12,165	3,117	7,286	14,770	2,440	9,268	4,257	11,580	2,673	99,198
Total, all cars on line	98,914	491,783	230,077	173,527	171,070	412,966	21,823	144,741	55,047	133,428	120,383	2,053,759
Per cent. of cars in shop	6.96	7.31	8.25	5.76	7.91	6.37	5.96	7.32	4.91	5.66	7.50	6.96
No. of freight engines owned	1,423	7,745	3,072	3,133	2,698	6,437	525	2,661	785	2,699	2,151	33,329
Average cars on line per freight engine owned	70	63	75	55	63	64	42	54	70	49	56	62
Total freight-car mileage	58,083,298	543,225,497	158,724,057	131,329,592	119,246,156	337,872,208	33,534,869	101,558,158	41,050,543	127,652,161	106,884,632	1,759,161,171
Average miles per car per day	18.9	24.1	22.2	24.4	22.5	26.4	49.6	23.9	24.1	30.9	28.6	25.0
Per cent. loaded mileage	74.6	71.1	71.8	69.1	73.7	72.7	69.8	73.6	73.0	74.9	80.8	72.6
Ton-miles of freight, including company freight	677,184,583	8,862,083,399	2,493,212,218	2,108,782,074	1,675,696,696	3,701,341,018	467,164,582	1,402,799,883	403,346,864	1,850,483,786	1,668,036,608	25,310,131,711
Average ton-miles, including company freight:												
Per car-mile	11.7	15.3	16.7	16.1	14.2	14.4	14.3	13.8	12.5	14.7	15.7	15.3
Per loaded car-mile	15.6	22.9	23.2	23.3	19.3	20.0	20.5	18.9	17.0	19.6	19.5	21.1
Per car per day	221	414	375	394	320	369	736	330	312	453	449	382
Gross freight earnings	$7,443,145	$37,813,308	$15,050,828	$13,070,467	$12,449,157	$36,122,752	$3,794,872	$12,944,663	$5,051,691	$18,132,561	$11,217,864	$173,094,308
Average daily earnings: Per car owned	$2.75	$2.45	$2.27	$2.28	$2.32	$2.96	$6.60	$3.08	$5.39	$4.06	$3.30	$2.81
Per railroad car on line	2.53	2.63	2.23	2.47	2.45	2.93	6.32	3.08	3.21	4.80	3.09	2.86
All cars on line	2.43	2.48	2.11	2.43	2.35	2.82	5.61	2.88	2.96	4.38	3.02	2.72

ment over the preceding month, and when compared with the averages of one year ago, show a typical October performance.

"There was a marked outward movement of cars during the month, the per cent. of cars on their home line falling from 64 in September, 1911, to 58 in October, 1911. As usual in such a movement, there was a decided increase in the loaded car mileage, the per cent. reaching 72.6, the highest since October, 1909.

"The tons per loaded car show a slight decrease, while the tons per car per day increased 14 tons for all cars and 5 tons excluding surplus cars. The earnings per car increased from $2.57 in September, 1911, to $2.72 in October, 1911, indicating the increased tons per car per day."

The accompanying table gives car balance and performance in the month covered by the report, and the two diagrams show car earnings and car mileage and certain car performance figures monthly from July, 1907.

Winter Experiences.

The Boston & Maine reports that more than 2,500 cars are overdue, some of them since January 6, at Rotterdam Junction, N. Y., its western terminus. The delays are largely due to the cold weather.

Hearing on the Western Classification.

A four-day hearing before G. N. Brown, chief examiner, and J. M. Jones, chief of the tariff bureau, of the board of suspension of the Interstate Commerce Commission, on the petition of the railway commissioners of nine states and a large number of shippers, for a suspension of Western Classification No. 51 for 120 days, was concluded at Chicago on January 29. After the hearing the commissioners and the National Industrial Traffic League sent a petition to Washington asking a hearing before the entire commission. The proceedings of the first two days of the hearing were reported in our last issue. Most of the complaints made by the shippers concerned advances in carload minimum weights and changes in descriptions of articles.

Walter E. McCormack, representing a number of machinery manufacturers, objected to a restriction of the mixing privileges on articles of machinery, contending that the new classification would prevent the mixing of woodworking and ironmaking machinery at carload rates. A representative of the Wisconsin paper makers objected to the classification on the ground that the mixing privilege was greatly restricted, and that advances were made in some paper items, while the reduction of the minimum weight on paper from 36,000 lbs. to 30,000 lbs., he said, was unimportant. R. C. Fyfe, chairman of the Western Classification Committee, explained that the reduction had been made for the sake of uniformity because in southern territory the higher minimum would be unreasonable, and that some of the paper items had been re-classified to prevent manipulation by shippers who had been billing finished stationery as flat paper. A manufacturer of wooden silos objected to an advance from class D to class B, declaring that silos represented little more than lumber, and that seven-eighths of the weight of the shipments would be lumber. Mr. Fyfe brought out that the addition of the hoops and doors made the difference between $250, the price for the size under discussion, and $40, the cost for carrying the lumber. It was agreed, however, in the interests of agriculture to restore the rating.

W. J. Evans, traffic manager of the National Association of Implement & Vehicle Manufacturers, objected to a rule cancelling the practice of advancing freight charges to jobbers of agricultural implements at distributing points, which, he said, had been a long-established custom. Chief Examiner Brown said the new rule had been inserted because the commission had held the advancing of charges to be a violation of law and subject to indictment. Several compromises were agreed to in the implement list.

After specific complaints had been presented on some 25 items, a number of the railway commissioners presented general arguments for a suspension of the entire classification. G. A. Henshaw, of the Oklahoma commission, protested because he had not received a copy of the classification until January 19. He said that the railways were trying to effect the advance in rates denied by the commission last year, and that the classification would increase their revenues by $20,000,000 to $40,000,000. Clifford Thorne, of the Iowa commission, acting as chairman of a committee of railway commissioners from Wisconsin, Minnesota, South Dakota, North Dakota, Missouri, Oklahoma, Iowa, Illinois and Kansas, declared that over 800 advances had been made, and that they should not be allowed to go into effect without a full hearing on each subject. He said the shippers had not been given sufficient notice and objected to the manner of hearing the shippers at the Milwaukee meeting of the Western Classification Committee last July, because it afforded no opportunity to cross-examine the representatives of the railways.

Examiner Brown said that the commission could only suspend for 10 months in any event, and that it desired evidence on particular items; but that if it were found that the railways were seeking to advance rates generally the commission would undoubtedly suspend the classification. He observed that thus far the commission has granted suspension in 74 cases and refused it in 200. He also said that some shippers had asked the commission not to suspend the classification.

Mr. Thorne introduced as a witness Rate Expert Bee of the Oklahoma commission, who said he had found 56 advances and 56 reductions in the first 38 pages of the classification. The advances, he said, were real, but he ridiculed the reductions as "paper." Mr. Fyfe in reply said that considering the entire volume of traffic affected, the reductions would far offset the advances, and showed by detailed statements that some of the reductions that did not affect Oklahoma affected an enormous volume of traffic elsewhere. He also showed that many of the changes in the classification are in the nature of requirements of proper packages and gave a physical demonstration in the case of a pail of fish, which had been submitted by a grocery firm, by breaking it with his fist. He said that the loss of brine would not affect either the shipper or the consignee of the fish, but would be reflected in claims for damage done to other articles in the car.

In the petition asking for a further hearing, complaint was made that the classification unduly favored the shippers of carload freight as against the small dealer.

Darius Miller, president of the Chicago, Burlington & Quincy, issued a statement explaining that the majority of the changes in the classification were due to the demand of the Interstate Commerce Commission for a uniform classification, and denying that it was the intent of the railways to effect an advance in rates.

On Monday the Western Classification Committee resumed its semi-annual meeting in Chicago pursuant to an adjournment at Galveston, Tex., on January 23, after having heard the shippers on the docket for the next issue of the Classification.

INTERSTATE COMMERCE COMMISSION.

The commission is to make a general investigation into alleged faulty and improper practices on the part of both railways and shippers in weighing freight, both carloads and less than carloads.

In connection with the general inquiry into the business of express companies, which was the subject of hearings at Washington last week, an examiner of the commission reported that in one month the Adams Express Company had imposed overcharges amounting to $67,000. Counsel for the express company explained that this sum was made up largely of "over prepayments," which were promptly adjusted, and that all employees were instructed to refund all discoverable overcharges. Commissioner Lane thought that the evidence showed the agents themselves to be very unfamiliar with the tariffs, 3,000 overcharges having been found in one day, and he said that the commission proposed to prosecute the company for making these overcharges, the same being clearly violations of the law. Evidence was submitted showing the great variations in the rates charged by express companies for different kinds of merchandise.

STATE COMMISSIONS.

The Pennsylvania commission has received from the Western Maryland a complaint against a new tariff which has been announced by the Philadelphia & Reading, making changes in freight rates from York, Hanover and Chambersburg to Philadelphia. It is declared that the new tariff will destroy legitimate competition.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF DECEMBER, 1911.

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Alabama & Vicksburg	142	$89,554	$49,289	$148,883	$17,773	$23,375	$3,285	$53,502	$4,896	$102,831	$46,052	—$727	$5,970	$39,355	—$25,013
Atchison, Topeka & Santa Fe	7,613	4,761,677	2,051,026	7,438,582	1,297,440	1,076,768	169,706	2,277,184	173,991	4,994,089	2,444,493	.....	259,696	2,184,797	—244,670
Atlanta, Birmingham & Atlantic	661	227,792	66,068	311,765	29,871	49,728	18,768	110,389	13,477	222,233	89,532	.....	15,750	73,782	2,888
Atlantic Coast Line	4,525	2,169,474	837,519	3,256,760	346,398	400,883	51,067	1,041,663	78,502	1,918,513	1,338,247	.....	107,000	123,247	37,627
Baltimore & Ohio—System	4,433	5,475,820	1,228,668	7,188,254	760,343	1,392,941	148,749	2,625,423	176,094	5,103,550	2,084,704	—55,739	221,495	1,807,470	536,154
Baltimore & Ohio Chicago Terminal	77	.....	1,745	110,301	22,792	16,479	909	64,983	3,659	108,822	1,479	872	18,206	- 15,855	—4,033
Bangor & Aroostook	627	185,725	46,716	246,052	36,358	28,330	3,951	86,308	12,129	167,076	78,976	.....	9,250	69,726	—14,767
Bessemer & Lake Erie	203	392,469	24,748	425,403	58,692	121,222	7,837	151,043	25,013	363,807	61,596	.....	32,474	29,122	151,979
Boston & Maine	2,242	2,259,840	1,212,143	3,763,842	419,056	548,396	36,455	1,981,725	96,755	3,082,387	681,455	13,503	166,910	528,048	408,371
Buffalo & Susquehanna R. R.	265	145,761	9,281	159,644	20,480	27,762	2,007	61,423	6,490	118,162	41,482	.....	2,600	38,882	11,527
Buffalo & Susquehanna Ry.	91	41,045	9,138	52,017	6,109	26,050	577	24,661	2,175	59,572	—7,555	—74	1,400	—9,029	9,739
Buffalo, Rochester & Pittsburgh	572	632,688	87,966	739,148	64,743	144,834	9,458	252,122	19,658	490,815	248,333	74	17,000	231,407	—40,751
Central of New Jersey	671	1,679,167	405,493	2,205,465	197,679	310,513	31,013	675,368	49,582	1,264,155	941,310	—7,940	102,651	830,719	62,562
Central New England	276	248,954	28,264	292,153	36,937	25,233	1,492	77,858	4,953	146,473	145,680	—345	9,000	136,335	14,976
Charleston & Western Carolina	340	128,034	38,201	175,973	28,957	24,661	3,178	65,760	6,091	128,647	47,326	.....	5,000	42,326	—31,570
Chesapeake & Ohio Lines	2,241	2,203,518	469,688	2,835,282	289,284	561,888	47,531	860,080	58,834	1,817,617	1,017,665	10,782	68,083	960,364	140,038
Chicago & Alton	1,025	727,708	352,525	1,175,881	125,340	261,661	39,976	474,397	36,098	937,472	238,409	—3,788	36,500	198,121	—61,582
Chicago & Eastern Illinois	1,275	995,048	256,125	1,354,080	109,903	271,900	30,722	526,711	41,437	980,673	373,407	- 4,399	18,093	350,915	—93,592
Chicago & Northwestern	7,905	3,513,085	1,623,709	5,815,766	633,766	897,634	110,227	2,597,434	121,253	4,360,314	1,455,452	- 10,233	275,000	1,170,219	—126,778
Chicago, Burlington & Quincy	9,074	4,552,930	1,735,315	6,942,257	581,505	1,187,738	128,934	2,286,977	188,748	4,373,902	2,568,355	- 13,584	264,412	2,290,359	—20,736
Chicago Great Western	1,496	769,597	233,180	1,086,534	73,709	184,294	44,851	468,044	32,581	803,479	283,055	- 114	33,038	249,903	- 5,154
Chicago, Indiana & Southern	359	328,627	26,179	379,345	54,540	72,257	6,703	152,286	9,298	268,084	111,261	115	5,598	105,778	18,327
Chicago, Milwaukee & Puget Sound	2,058	1,103,950	221,191	1,370,707	79,026	160,324	48,037	526,136	30,283	843,806	526,901	14,008	79,334	461,575	—52,218
Chicago, Milwaukee & St. Paul	7,511	3,607,979	1,154,623	5,298,579	390,170	799,346	109,157	2,180,181	125,758	3,604,612	1,693,967	- 2,721	243,674	1,447,572	458,172
Chicago, Peoria & St. Louis	255	94,498	28,697	130,048	17,623	27,127	6,933	62,502	6,665	120,850	9,198	.....	4,300	4,898	13,919
Chicago, Rock Island & Pacific	7,551	3,333,619	1,568,310	5,235,092	674,468	648,240	157,044	2,186,488	147,128	3,813,368	1,421,724	—30,529	232,981	1,158,214	—423,992
Chicago, St. Paul, Minneapolis & Omaha	1,743	806,148	379,087	1,283,189	88,489	147,733	30,048	545,028	28,824	840,122	443,067	—1,103	66,726	375,238	—17,793
Cincinnati, New Orleans & Texas Pacific	337	509,128	165,016	808,996	84,426	188,537	19,279	232,705	19,936	544,883	264,113	— 663	21,800	241,650	- 14,766
Cincinnati, Hamilton & Dayton	1,004	570,144	127,324	780,678	66,579	136,485	17,832	348,332	21,205	599,433	190,245	.....	45,285	144,960	15,160
Cleveland, Akron & Cincinnati	344	217,922	70,391	309,904	34,876	58,453	4,744	109,917	6,152	214,142	95,762	.....	18,000	77,762	2,985
Colorado Midland	337	99,247	16,354	133,973	14,972	31,792	7,449	63,855	5,379	123,447	10,526	- 158	8,000	2,368	- 12,210
Colorado & Southern	1,109	582,242	97,831	742,488	69,763	136,219	11,598	284,128	23,195	474,903	267,535	—1,042	29,100	237,293	81,071
Cumberland Valley	162	174,551	54,452	241,264	44,426	30,685	3,778	79,921	11,596	170,406	70,858	346	10,784	60,420	—19,140
Delaware & Hudson Co. R. R.	881	1,495,743	205,019	1,753,629	91,778	155,528	18,083	580,066	46,824	892,279	861,350	1,090	57,821	804,619	184,131
Delaware, Lackawanna & Western	958	2,574,689	636,537	3,027,925	191,045	500,381	66,690	945,105	67,856	1,771,077	1,256,848	30,340	178,500	1,108,988	—93,695
Denver & Rio Grande	2,575	1,448,739	329,700	1,863,536	158,791	343,690	50,990	719,168	47,448	1,320,087	543,449	—5,505	78,000	459,944	- 98,348
Denver, Northwestern & Pacific	214	88,103	10,785	97,566	11,092	20,517	1,854	46,099	3,116	82,678	14,888	.....	3,000	11,888	- 7,433
Detroit, Toledo & Ironton	441	110,407	13,962	141,897	31,384	15,624	2,706	75,581	5,286	130,581	11,316	—10	3,000	8,306	30,442
Duluth & Iron Range	200	64,107	23,830	92,436	32,538	33,825	642	59,653	21,930	148,588	—56,152	3,225	40,554	99,931	53,303
El Paso & Southwestern Co.	601	548,857	82,493	668,111	76,898	81,667	11,275	193,064	22,975	385,879	282,232	4,662	29,030	248,540	23,492
Elgin, Joliet & Eastern	841	771,714	1	814,992	79,467	158,428	4,362	260,801	30,457	533,515	281,477	.....	34,988	246,489	146,507
Fort Worth & Denver City	454	94,618	19,117	444,462	42,181	71,305	6,509	151,788	15,126	286,909	157,553	- 47	12,000	145,081	- 69,054
Grand Rapids & Indiana	587	47,68	127,608	407,024	35,676	69,943	11,242	176,928	16,786	310,575	96,449	76	22,787	73,768	50,964
Great Northern	7,344	3,519,981	1,074,481	4,984,306	413,496	632,827	85,970	1,497,647	98,691	2,728,631	2,255,675	5,933	312,130	1,949,478	185,242
Gulf & Ship Island	307	117,064	35,513	168,258	15,657	26,937	2,206	52,109	9,685	106,594	61,664	.....	4,425	57,239	—7,520
Gulf, Colorado & Santa Fe	1,603	845,053	280,271	1,199,587	124,866	158,243	25,844	447,079	33,300	789,332	410,255	....	39,055	371,200	—38,396
Illinois Central	4,735	3,147,765	1,148,965	4,975,001	505,062	1,298,548	121,358	2,065,498	132,818	4,123,284	851,717	—3,291	230,923	617,503	—987,674
Iowa Central	538	258,582	45,062	315,778	32,519	50,039	7,809	147,795	8,842	247,004	68,774	.....	9,635	59,139	- 8,863
Tampa Harbor Belt	104	...	...	206,301	27,491	—4,730	2,627	105,164	6,016	136,568	69,733	283	4,963	74,029	82,797
Kansas City Southern	867	555,639	140,680	787,722	76,931	125,310	26,348	271,431	31,820	531,840	255,882	....	34,612	221,270	—72,085
Lake Shore & Michigan Southern	1,775	3,733,780	965,443	4,165,654	388,349	433,559	83,027	1,463,280	87,878	2,456,093	1,709,561	—4,756	118,939	1,585,866	884,858
Lehigh & Hudson River	96	137,08	3,764	142,171	11,109	18,444	1,535	54,557	9,504	95,149	47,022	.....	3,500	43,522	—5,968
Lehigh Valley	1,434	3,619,852	385,735	3,116,124	376,323	559,928	77,227	1,077,773	78,539	2,169,790	946,334	- 59,379	124,600	762,355	—49,687
Long Island	398	257,977	439,718	737,549	93,411	103,591	14,187	395,401	25,340	631,930	105,619	49,350	53,554	101,415	102,456
Louisville & Nashville	4,704	3,230,367	1,112,126	4,655,837	654,396	794,468	106,299	1,534,686	90,394	3,180,243	1,475,594	1,806	148,950	1,328,450	—95,958

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF DECEMBER, 1911—(CONTINUED).

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Louisville, Henderson & St. Louis	199	$67,488	$32,389	$101,576	$18,335	$19,469	$4,342	$35,899	$2,992	$81,037	$20,539	$253	$3,000	$17,792	—$783
Maine Central	817	500,184	234,443	789,542	104,208	123,925	8,940	317,511	36,356	590,940	198,602	35,373	44,459	189,716	92,820
Michigan Central	1,804	1,746,070	654,453	2,695,982	495,317	283,646	61,984	1,065,615	51,461	1,958,023	737,959	2,048	134,322	605,685	113,151
Minneapolis & St. Louis	1,067	239,316	98,118	370,265	46,380	51,908	11,092	167,018	12,710	289,108	81,157	37	19,097	62,023	—38,222
Missouri, Kansas & Texas	1,741	912,944	414,904	1,401,317	82,248	185,668	36,644	476,536	39,766	820,862	580,455	—2,803	62,250	515,402	49,659
Missouri, Kansas & Texas of Texas	1,345	644,028	364,444	1,069,988	242,134	101,900	25,902	586,758	26,392	983,086	86,902	- 12	38,676	48,264	—210,965
Missouri Pacific	3,915	1,330,199	393,563	1,894,525	259,805	304,146	56,242	970,820	73,223	1,664,236	230,289	5,119	87,691	142,570	263,754
Mobile & Ohio	1,114	770,575	138,306	979,226	105,206	167,796	35,549	347,754	33,527	689,832	289,394	—971	26,130	262,293	—39,388
Monongahela	64	99,961	2,809	104,365	10,001	8,748	222	21,118	1,710	41,799	62,566	.....	3,730	58,836	11,672
Nashville, Chattanooga & St. Louis	1,455	630,378	258,113	959,195	138,589	191,404	34,800	356,976	26,086	747,855	211,340	—909	23,816	186,615	—70,519
New Orleans & North Eastern	195	247,627	59,823	330,980	26,952	63,120	8,216	125,646	11,346	235,280	95,700	—242	8,321	87,137	—28,650
New York Central & Hudson River	3,591	5,044,550	2,524,984	8,541,634	1,106,538	1,384,722	169,838	3,432,331	212,548	6,305,977	2,235,657	50,695	429,317	1,856,035	609,637
New York, Chicago & St. Louis	562	861,837	124,793	1,024,311	92,871	87,381	52,852	409,139	17,366	659,609	364,702	—2,089	88,875	371,488	109,068
New York, New Haven & Hartford	1,091	2,634,326	2,233,555	5,418,045	480,606	630,138	27,243	2,148,758	168,477	3,455,222	1,962,823	122,907	310,000	1,775,730	513,785
New York, Ontario & Western	565	568,845	96,126	690,422	90,568	133,888	9,913	286,260	22,600	543,229	147,193	—464	17,917	128,812	—20,209
New York, Philadelphia & Norfolk	112	199,014	41,643	261,980	26,645	45,026	4,455	113,725	12,881	202,732	59,248	.....	7,500	51,748	—16,861
Norfolk & Western	2,004	2,767,585	379,388	3,257,245	347,751	631,619	58,199	984,884	70,650	2,093,103	1,164,142	—4,754	115,000	1,044,388	228,726
Norfolk Southern	607	17?,050	79,701	270,251	26,088	33,671	5,482	90,755	13,868	169,864	100,387	— 60	7,500	92,827	—521
Northern Central	473	760,172	192,354	1,024,812	56,149	238,952	15,670	532,768	26,369	869,708	155,104	280	40,337	115,047	55,209
Northern Pacific	6,018	3,744,724	1,158,350	5,253,317	481,854	564,906	100,857	1,771,901	83,495	3,003,013	2,250,304	83,743	762,666	2,071,381	380,908
Oregon Short Line	1,761	1,356,815	352,036	1,813,693	142,036	215,612	31,621	488,553	38,947	916,769	896,924	482	247,659	648,783	—64,815
Oregon-Washington R. R. & Nav. Co.	1,919	808,335	378,063	1,283,994	136,725	160,455	41,845	504,065	47,163	892,253	393,741	6,001	165,000	234,742	.....
Pennsylvania Co.	1,415	2,825,580	735,737	3,945,120	562,315	728,708	73,087	1,519,889	94,400	2,978,400	966,720	2,397	260,588	703,735	81,978
Pennsylvania *Railroad*	3,980	9,916,658	2,828,215	13,746,379	1,864,204	2,741,957	202,243	5,071,281	366,824	10,246,509	3,499,870	—180,997	605,931	2,712,942	795,142
Peoria & Eastern	351	209,769	64,443	294,352	20,284	35,116	4,624	113,410	5,827	179,261	115,091	.....	5,703	109,388	24,437
Pere Marquette	2,331	1,055,024	339,668	1,520,680	178,502	249,874	30,941	671,831	36,234	1,167,382	353,298	1,180	59,666	294,812	38,462
Philadelphia & Reading	1,014	3,212,397	575,955	3,952,912	249,295	685,844	36,843	1,233,906	64,224	2,270,112	1,682,800	35,236	90,316	1,627,720	146,625
Philadelphia, Baltimore & Washington	713	694,419	699,035	1,581,121	266,259	280,138	28,762	688,987	44,524	1,308,670	272,451	.....	50,698	221,753	—31,709
Pittsburgh & Lake Erie	215	1,040,475	127,422	1,208,360	138,649	216,237	12,907	326,385	25,415	719,593	488,767	—226	25,799	462,742	42,337
Pittsburgh, Cincinnati, Chic. & St. L.	1,467	2,203,812	703,574	3,288,972	404,937	620,012	66,955	1,266,519	68,840	2,427,263	861,709	—477	136,427	724,805	131,632
Richmond, Fredericksburg & Potomac	83	103,706	80,022	210,213	18,695	20,366	3,075	78,033	6,220	126,389	83,824	.....	1,094	82,730	10,695
Rutland	468	144,903	89,909	264,966	23,936	48,300	6,095	99,542	9,261	187,134	77,832	.....	10,894	66,938	6,836
St. Joseph & Grand Island	319	66,560	36,415	114,063	21,736	29,225	4,415	64,267	6,771	126,414	—12,351	—100	13,927	—26,378	—32,446
St. Louis, Iron Mountain & Southern	3,314	1,940,622	585,333	2,694,251	423,278	305,399	51,666	844,062	71,471	1,695,876	998,375	—11,933	83,615	902,827	227,836
St. Louis Merchants' Bridge Terminal	9	.....	317	134,507	24,883	13,464	430	80,982	4,945	124,704	9,803	.....	6,382	3,421	519
St. Louis, San Francisco & Texas	243	92,904	28,751	128,512	16,092	12,207	2,819	56,715	4,797	92,630	35,882	.....	716	35,166	25,429
St. Louis Southwestern	796	558,950	138,834	730,247	58,965	95,634	31,999	168,850	22,595	378,043	352,204	—726	25,406	326,072	10,162
Santa Fe, Prescott & Phoenix	364	83,912	37,817	129,660	19,636	11,907	3,363	38,955	6,117	79,978	49,682	.....	3,743	45,939	—9,107
Southern	7,088	3,524,779	1,610,583	5,607,472	631,445	780,037	132,738	1,879,286	176,942	3,600,448	2,007,024	8,945	234,775	1,781,194	79,758
Southern in Mississippi	280	69,586	42,005	120,235	20,805	7,960	2,664	41,299	4,071	76,799	43,436	.....	5,217	38,219	—23,224
Syracuse, Binghamton & New York	80	47,143	33,589	92,316	3,712	6,514	2,824	34,375	2,562	49,987	42,329	.....	6,220	36,109	9,938
Tennessee Central	293	78,693	34,564	120,053	22,795	18,358	5,122	44,599	7,525	98,399	21,654	.....	4,184	17,470	—15,914
Terminal R. R. Ass'n of St. Louis	35	.....	233	230,158	39,583	30,472	654	85,892	7,367	163,968	66,190	9,312	29,989	45,513	—24,094
Toledo & Ohio Central	440	337,636	51,170	406,050	98,316	51,425	6,370	136,357	8,396	300,864	105,186	—1,376	+ 1,719	105,529	—8,622
Toledo, Peoria & Western	247	62,038	39,851	106,915	20,110	24,938	2,329	41,310	3,590	92,277	14,638	.....	4,800	9,838	—12,963
Toledo, St. Louis & Western	450	276,366	40,286	336,757	30,984	63,237	7,592	124,902	9,562	236,277	100,480	.....	14,500	85,980	4,361
Union Pacific	3,537	2,755,919	813,503	3,925,656	290,414	622,629	122,034	1,234,650	113,149	2,382,876	1,542,780	6,823	214,257	1,321,700	—450,087
Union R. R. of Baltimore	9	92,968	21,169	116,041	11,098	.....	1,049	5,346	2,869	20,362	95,679	.....	5,923	89,756	—13,176
Union R. R. of Pennsylvania	31	.....	.....	243,200	35,329	79,077	100	120,124	9,753	243,383	183	4,892	19,323	—14,614	—68,989
Vandalia	827	518,590	201,187	843,966	105,983	153,446	24,997	340,346	18,225	642,997	200,969	.....	28,718	172,251	6,768
Vicksburg, Shreveport & Pacific	171	78,839	50,717	141,996	23,871	19,217	2,723	42,621	4,672	93,104	48,892	94	10,971	38,015	—11,428
Virginian	474	335,902	23,884	371,781	49,426	68,502	4,783	110,230	8,154	241,095	130,686	6,329	13,000	124,015	7,230
Washington Southern	35	32,753	39,504	96,734	10,744	9,556	1,246	37,441	3,170	62,157	34,577	.....	3,245	31,332	4,656
West Jersey & Seashore	355	225,039	207,773	460,538	70,371	91,733	19,363	218,242	11,516	411,225	49,313	—4,423	23,473	21,417	61,959
Yazoo & Mississippi Valley	**1,371**	**733,488**	**276,315**	**1,073,550**	**131,311**	**147,558**	**16,517**	**402,377**	**25,775**	**723,538**	**350,012**	**1,719**	**37,982**	**313,749**	**—326,985**

REVENUES AND EXPENSES OF RAILWAYS.

SIX MONTHS OF FISCAL YEAR, 1912.

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Alabama & Vicksburg	142	$525,612	$271,609	$856,836	$127,306	$160,192	$22,386	$287,478	$31,062	$628,424	$228,412	—$1,124	$30,096	$197,192	—$80,476
Atchison, Topeka & Santa Fe	7,613[1]	29,763,511	11,599,906	44,888,410	7,418,772	6,856,328	952,321	12,927,371	960,255	29,115,047	15,773,363	.....	1,783,176	13,990,187	—2,052,822
Atlanta, Birmingham & Atlantic	661	1,232,997	372,503	1,690,864	173,506	268,942	100,031	599,849	60,755	1,203,083	487,781	.....	79,300	408,481	101,283
Atlantic Coast Line	4,525[2]	10,660,387	3,984,287	15,796,586	2,079,605	2,355,308	258,859	5,378,583	428,308	10,500,663	5,295,923	.....	642,000	4,653,923	209,612
Baltimore & Ohio—System	4,433[3]	35,981,558	8,122,895	46,922,384	5,901,911	8,367,277	967,304	15,839,874	982,424	32,058,790	14,863,594	—325,116	1,437,787	13,100,691	1,068,831
Baltimore & Ohio Chicago Terminal	77	.....	14,809	813,999	183,680	103,368	5,628	343,403	32,766	668,845	145,154	5,034	109,238	40,950	3,184
Bangor & Aroostook	627	1,221,257	356,060	1,669,486	279,455	191,963	24,185	497,014	70,135	1,062,752	606,734	.....	55,500	551,234	49,043
Bessemer & Lake Erie	203[4]	4,570,594	201,783	4,826,382	453,948	797,771	51,609	1,123,479	64,877	2,491,684	2,334,698	.....	67,474	2,267,224	529,933
Boston & Maine	2,244[5]	13,493,118	8,805,781	24,039,531	3,492,076	3,160,875	242,412	10,676,655	514,184	18,086,202	5,953,329	118,960	1,047,139	5,025,150	31,261
Buffalo & Susquehanna *R. R.*	265	840,748	58,313	930,934	181,393	169,733	9,155	339,722	38,298	738,301	192,633	.....	15,600	177,033	21,297
Buffalo & Susquehanna *Ry.*	91	258,011	63,072	383,854	38,407	160,572	3,113	141,111	14,966	358,169	—24,315	—348	8,400	—33,063	21,793
Buffalo, Rochester & Pittsburgh	572[6]	4,122,886	592,465	4,861,086	641,096	916,952	58,393	1,546,311	102,675	3,265,427	1,595,659	1,257	102,000	1,494,916	—278,983
Central of New Jersey	671[7]	9,730,724	3,011,046	13,435,430	1,373,611	1,859,173	191,528	3,815,934	244,453	7,484,699	5,950,731	134,281	574,070	5,510,942	890,689
Central New England	276	1,449,787	186,476	1,718,773	286,002	127,289	8,032	442,796	16,863	880,982	837,791	—244	54,000	783,547	191,385
Charleston & Western Carolina	340	741,855	201,616	994,692	177,742	135,430	17,820	343,097	26,187	700,276	294,416	.....	30,000	264,416	—3,014
Chesapeake & Ohio Lines	2,241[8]	13,399,943	2,995,611	17,083,916	2,179,116	3,223,145	306,914	5,000,696	369,763	11,079,634	6,004,282	24,393	508,567	5,520,108	27,250
Chicago & Alton	1,025	5,031,487	2,274,321	7,875,734	1,160,737	1,420,583	241,904	2,732,483	198,821	5,754,528	2,121,206	—18,436	219,000	1,883,770	—14,710
Chicago & Eastern Illinois	1,375	6,037,919	1,549,490	8,155,207	922,815	1,489,603	178,364	2,820,491	244,712	5,655,985	2,499,222	14,901	210,593	2,273,728	—131,019
Chicago & Northwestern	7,905[9]	24,599,242	10,856,757	39,260,058	5,172,978	5,021,993	713,315	15,265,422	731,168	26,904,876	12,355,182	—4,424	1,650,000	10,700,758	—185,252
Chicago, Burlington & Quincy	9,074[10]	30,155,293	11,768,903	45,970,699	5,607,695	7,580,491	783,728	14,131,515	1,122,982	29,226,411	16,744,288	—55,344	1,586,508	15,102,436	—460,720
Chicago Great Western	1,496[11]	4,654,993	1,611,675	6,779,651	776,494	964,280	279,950	2,633,256	209,034	4,863,014	1,916,637	457	198,222	1,718,872	59,588
Chicago, Indiana & Southern	350[12]	1,704,615	165,528	1,949,766	280,174	398,069	44,859	695,781	50,423	1,469,306	480,460	1,976	75,099	407,337	103,255
Chicago, Milwaukee & Puget Sound	2,085[13]	6,691,038	1,462,010	8,423,869	542,715	832,610	315,450	3,997,340	119,700	4,807,815	3,616,054	123,414	476,005	3,263,463	—172,028
Chicago, Milwaukee & St. Paul	7,511	22,332,489	7,770,415	33,344,555	5,019,291	4,680,896	645,129	13,070,250	581,570	23,997,136	9,347,419	16,112	1,441,503	7,922,028	—913,091
Chicago, Peoria & St. Louis	355	632,127	195,301	871,525	113,067	174,327	43,530	375,417	35,740	742,081	129,444	.....	25,800	103,644	13,674
Chicago, Rock Island & Pacific	7,551[14]	20,507,828	10,045,845	32,603,468	4,986,500	4,301,086	939,877	12,478,565	840,258	23,546,286	9,057,182	—92,500	1,315,888	7,648,793	—1,381,205
Chicago, St. Paul, Minneapolis & Omaha	1,743	4,964,381	2,520,953	8,060,178	1,061,631	909,424	162,849	3,071,982	179,354	5,385,240	2,674,938	4,746	399,067	2,280,617	—649,424
Cincinnati, New Orleans & Texas Pacific	337	3,785,985	908,227	4,838,755	485,435	999,085	118,603	1,353,999	108,409	3,065,531	1,773,224	—2,972	130,800	1,639,452	—115,784
Cincinnati, Hamilton & Dayton	1,014	3,833,507	921,585	5,335,918	544,598	839,947	115,220	2,152,493	115,404	3,767,662	1,568,256	.....	244,124	1,324,132	218,560
Cleveland, Akron & Cincinnati	344	1,360,019	451,565	1,938,613	287,623	323,980	25,379	640,530	32,208	1,309,720	628,893	.....	116,200	512,693	8,259
Colorado Midland	337	807,371	160,605	1,061,596	130,201	189,259	43,435	435,082	32,227	830,204	231,392	—1,272	48,000	182,120	21,657
Colorado & Southern	1,109[15]	3,267,729	815,093	4,369,031	504,468	822,757	66,937	1,330,245	139,231	2,863,638	1,505,393	—5,939	152,700	1,346,754	—238,362
Cumberland Valley	162	1,070,462	359,205	1,500,047	261,872	183,371	27,788	470,569	47,391	990,991	509,056	2,832	36,491	475,397	—147,962
Delaware & Hudson Co.—R. R. Dept.	851[16]	9,005,885	1,769,037	11,133,917	750,731	1,455,593	128,128	3,625,438	271,025	6,230,915	4,903,002	—5,760	302,789	4,594,453	349,694
Delaware, Lackawanna & Western	958[17]	13,828,829	4,161,104	19,174,316	2,331,288	2,948,193	392,709	5,521,045	390,479	11,583,714	7,590,602	239,252	1,001,000	6,828,854	—132,007
Denver & Rio Grande	2,555	9,216,639	2,870,359	12,619,258	1,794,714	2,123,538	330,635	4,340,990	293,109	8,882,986	3,736,272	2,284	442,000	3,296,556	—697,281
Denver, Northwestern & Pacific	214	440,763	208,373	677,783	84,202	94,272	14,803	219,324	18,875	432,476	245,307	.....	18,000	227,307	—824
Detroit, Toledo & Ironton	441	760,035	95,646	920,774	178,952	113,420	16,564	405,875	32,544	767,355	153,419	—23	37,584	116,812	64,112
Duluth & Iron Range	200[18]	4,232,502	134,079	4,423,402	555,994	330,826	5,313	749,804	74,177	1,716,114	2,707,288	14,668	215,070	2,506,886	—446,425
El Paso & Southwestern Co.	901	2,922,991	473,929	3,585,225	463,318	502,257	71,891	999,474	136,077	2,173,017	1,412,208	—12,409	144,409	1,255,390	—109,527
Elgin, Joliet & Eastern	841[19]	4,685,214	26	4,946,684	459,836	905,382	24,768	1,410,803	101,590	2,903,379	2,044,305	.....	118,613	1,925,692	662,286
Fort Worth & Denver City	454	1,706,302	841,094	2,673,478	209,885	375,544	43,818	832,332	81,367	1,542,946	1,130,532	—3,867	72,500	1,054,135	119,345
Grand Rapids & Indiana	587	1,460,972	1,018,541	2,686,505	261,722	421,880	68,020	1,065,619	89,150	1,906,391	780,114	—102	137,626	642,386	178,027
Great Northern	7,344[20]	26,636,717	7,607,056	36,618,076	3,927,882	3,756,946	551,453	9,227,782	604,409	18,068,472	18,549,604	116,378	1,686,821	16,979,161	2,788,948
Gulf & Ship Island	307	692,935	223,219	995,897	136,403	181,043	14,297	281,561	48,815	662,119	333,778	.....	27,312	306,466	—38,308
Gulf, Colorado & Santa Fe	1,603[21]	4,669,830	1,645,649	6,705,791	1,174,763	939,306	158,551	2,403,002	188,733	4,864,355	1,841,436	.....	217,862	1,623,574	—186,581
Illinois Central	4,755[22]	19,236,754	7,148,079	30,254,142	4,487,631	6,892,854	710,990	11,427,559	781,432	24,300,466	5,953,676	—55,530	1,385,170	4,512,976	3,416,584
Iowa Central	558	1,473,246	292,330	1,842,489	227,557	287,937	44,977	778,081	50,461	1,389,013	453,476	.....	57,904	395,572	6,104
Indiana Harbor Belt	104[23]	.....	.....	1,269,034	162,072	135,096	17,219	562,052	45,979	922,418	346,616	22,199	23,437	345,378	186,064
Kansas City Southern	827	3,432,549	854,847	4,821,271	483,424	691,820	159,199	1,627,042	180,420	3,141,905	1,679,366	.....	207,670	1,471,696	—377,784
Lake Shore & Michigan Southern	1,775[24]	16,265,893	6,298,918	25,615,954	2,681,270	3,095,819	525,465	7,932,735	442,495	14,677,784	10,938,170	725	863,940	10,074,955	3,626,872
Lehigh & Hudson River	96	759,598	27,215	798,810	101,490	109,337	7,413	263,207	30,842	512,289	286,521	.....	21,000	265,521	3,761
Lehigh Valley	1,434[25]	16,466,234	2,695,709	19,829,997	2,250,994	3,339,587	493,622	6,517,630	409,655	13,011,478	6,818,519	—140,283	671,700	6,006,536	—42,414
Long Island	398[26]	1,698,956	3,893,540	5,834,357	734,253	653,625	91,043	2,471,778	126,263	4,076,962	1,757,395	431,316	321,332	1,867,389	237,456
Louisville & Nashville	4,704[27]	20,282,109	6,360,509	28,323,140	4,235,254	4,911,756	567,271	8,808,208	521,050	19,043,539	9,279,601	—6,789	893,700	8,379,112	588,122

Operated in the previous year- [1] 7,546; [2] 4,493; [3] 4,434; [4] 204; [5] 2,242; [6] 573; [7] 631; [8] 2,224; [9] 7,743; [10] 9,091; [11] 1,489; [12] 340; [13] 1,974; [14] 7,395; [15] 1,180; [16] 819, [17] 930, [18] 190; [19] 808; [20] 7,274; [21] 1,518; [22] 4,552; [23] 113; [24] 1,662; [25] 1,433; [26] 389; [27] 4,591. — Indicates Deficits, Losses and Decreases.

REVENUES AND EXPENSES OF RAILWAYS.

SIX MONTHS OF FISCAL YEAR, 1912—(CONTINUED).

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.					
Louisville, Henderson & St. Louis	1[1]9	$[1]73,594	$[1]8,750	$651,507	$146,505	$80,449	$25,623	$208,783	$18,398	$479,758	$171,749	$2[1],00	$18,000	$155,949	$6,239
Maine Central	1,179	3,339,433	1,926,898	5,599,604	1,078,819	662,613	57,778	1,947,562	161,954	3,908,726	1,690,878	31,580	356,683	1,465,775	214,228
Michigan Central	1,804	10,166,946	4,362,870	16,105,076	1,895,870	1,709,886	403,433	5,914,229	267,178	10,190,596	5,914,480	25,814	704,322	5,235,972	1,840,949
Minneapolis & St. Louis	1,077	1,511,693	670,133	2,371,445	269,866	304,980	64,391	1,009,803	73,921	1,722,961	648,484	[1]221	118,477	529,786	—262,507
Missouri, Kansas & Texas	1,744[2]	5,871,098	2,346,604	8,727,369	1,274,965	1,241,365	211,184	2,717,128	245,445	5,690,087	3,037,282	—10,431	344,876	2,681,975	—101,796
Missouri, Kansas & Texas of Texas	1,348[3]	3,811,791	2,131,860	6,293,659	1,351,536	579,822	146,503	2,963,015	175,624	5,216,500	1,077,159	[1]3,137	178,626	895,396	—851,325
Missouri Pacific	3,918[4]	9,827,547	2,569,083	13,068,952	2,468,926	2,660,231	365,833	5,771,178	430,371	11,696,539	1,372,413	—21,604	495,600	855,209	—615,567
Mobile & Ohio	1,114	4,743,233	776,474	5,864,095	674,091	1,072,964	196,519	2,031,247	188,318	4,163,139	1,700,956	[1]6,190	149,105	1,545,661	16,985
Monongahela	64	579,354	14,383	602,429	90,950	43,516	1,885	126,829	11,519	274,699	327,730	.....	17,430	310,300	29,626
Nashville, Chattanooga & St. Louis	1,[1]88	4,119,946	1,549,427	6,083,109	927,691	1,127,158	220,139	2,208,368	151,398	4,634,754	1,448,355	6,491	142,896	1,298,968	—53,904
New Orleans & North Eastern	195	1,416,651	325,469	1,863,687	176,491	346,098	53,938	672,124	68,311	1,316,962	546,725	—4,521	53,571	488,633	[1]67,504
New York Central & Hudson River	3,591[42]	31,504,073	17,365,267	54,371,584	7,307,243	8,022,443	1,119,883	19,321,354	1,312,405	37,083,328	17,488,256	215,918	3,042,362	14,661,812	2,513,158
New York, Chicago & St. Louis	562[43]	4,731,147	905,130	5,866,203	688,999	586,975	278,589	2,273,904	100,550	3,929,017	1,937,186	—7,990	201,125	1,728,071	231,130
New York, New Haven & Hartford	2,094[44]	15,692,323	14,283,236	32,963,002	3,629,390	3,748,627	195,987	12,204,656	964,662	20,743,322	12,219,680	750,196	1,910,000	11,059,876	564,361
New York, Ontario & Western	565[45]	3,535,019	1,050,547	4,777,334	700,018	777,623	58,845	1,741,953	102,633	3,381,072	1,396,262	[1]3,071	107,500	1,285,691	—234,758
New York, Philadelphia & Norfolk	112	1,352,226	250,324	1,728,009	186,437	299,908	24,636	659,780	73,754	1,244,515	483,494	.....	45,000	438,494	—55,804
Norfolk & Western	2,004[46]	16,934,917	2,353,429	19,985,571	2,464,994	3,725,974	308,974	5,680,428	375,378	12,555,748	7,429,823	—14,696	690,000	6,725,127	519,519
Norfolk Southern	607[47]	997,978	465,252	1,594,283	179,770	193,460	35,484	513,115	79,571	1,000,500	593,783	[1]3,207	45,000	545,576	26,092
Northern Central	473[48]	4,916,713	1,241,113	6,538,064	604,290	1,321,823	91,580	3,200,816	142,573	5,361,082	1,176,982	4,166	242,020	939,128	146,820
Northern Pacific	6,018	23,631,307	8,648,156	34,479,770	4,314,128	3,556,355	594,497	10,421,367	485,536	19,371,883	15,107,887	291,567	1,723,979	13,675,475	—211,055
Oregon Short Line	1,761[49]	7,899,597	2,586,302	11,111,628	1,262,750	1,007,718	169,090	2,599,651	210,524	5,249,733	5,861,895	2,667	791,691	5,072,871	—131,638
Oregon-Washington R. R. & Nav. Co.	1,919	5,523,603	2,759,994	8,850,078	1,106,617	829,840	261,511	2,939,820	251,157	5,388,945	3,461,133	14,345	681,563	2,793,915	.....
Pennsylvania Co.	1,415	20,623,963	4,585,914	27,471,180	3,525,953	4,787,497	447,958	9,069,134	512,564	18,343,106	9,128,074	—7,865	1,124,035	7,996,174	[1]542,979
Pennsylvania R. R.	3,980[50]	58,640,266	18,109,825	82,161,731	9,158,131	15,822,896	1,126,493	29,417,919	2,037,459	57,562,978	24,598,753	—750,893	3,635,587	20,212,273	—576,667
Peoria & Eastern	351	1,141,286	390,193	1,654,005	218,552	227,678	33,332	650,253	35,183	1,164,998	489,007	.....	58,203	430,804	—59,125
Pere Marquette	2,331[51]	6,027,549	2,339,244	9,093,727	1,083,688	1,347,124	220,254	3,840,847	194,380	6,686,293	2,407,434	—12,444	341,011	2,053,979	238,185
Philadelphia & Reading	1,014[52]	18,063,678	3,683,610	22,757,415	2,126,098	4,136,725	246,674	7,106,107	394,960	14,010,564	8,746,851	175,874	542,285	8,380,440	236,886
Philadelphia, Baltimore & Washington	713[53]	4,757,423	4,066,459	9,794,906	1,327,182	1,637,267	156,552	3,899,457	221,350	7,243,808	2,551,098	.....	304,187	2,246,911	42,087
Pittsburgh & Lake Erie	215[54]	7,293,761	828,444	8,371,264	892,707	1,319,219	80,086	1,893,548	141,730	4,327,290	4,043,974	—1,524	177,389	3,865,061	—613,185
Pittsburgh, Cincinnati, Chic. & St. L.	1,467[55]	13,969,163	4,281,550	20,498,320	2,893,883	3,678,692	411,149	7,085,786	391,583	14,461,093	6,037,227	—5,235	770,397	5,261,595	222,002
Richmond, Fredericksburg & Potomac	83	594,549	428,337	1,169,402	123,413	153,384	17,206	429,831	34,894	758,728	410,674	.....	6,564	404,110	28,297
Rutland	468	955,182	680,136	1,842,885	216,359	253,300	45,629	691,626	41,211	1,248,125	594,760	.....	66,627	528,133	1,654
St. Joseph & Grand Island	319	535,667	235,931	843,166	153,509	114,042	30,641	360,999	33,323	692,514	150,652	76	42,483	108,245	15,439
St. Louis, Iron Mountain & Southern	3,314[56]	11,344,052	3,224,314	15,598,364	2,788,269	2,421,518	316,412	4,848,263	417,639	10,792,101	4,806,263	—37,496	492,440	4,276,327	529,676
St. Louis Merchants' Bridge Terminal	9	.....	1,812	847,687	148,397	61,810	2,611	453,613	30,906	697,337	150,350	.....	35,332	115,018	—147,152
St. Louis, San Francisco & Texas	243	460,068	179,642	683,120	110,608	94,031	18,239	293,886	27,380	544,144	138,976	.....	5,889	133,087	93,288
St. Louis Southwestern	796[57]	3,099,102	730,450	3,971,532	347,028	646,812	170,982	939,114	138,446	2,242,382	1,729,150	—6,141	123,225	1,599,784	4,872
Santa Fe, Prescott & Phoenix	364	554,296	221,219	825,292	124,184	77,244	18,438	240,831	33,160	493,857	331,435	.....	20,568	310,867	7,033
Southern	7,088[58]	20,711,538	9,087,031	32,347,237	3,748,739	5,113,112	813,013	10,778,506	926,587	21,379,957	10,967,280	38,677	1,218,652	9,787,305	285,664
Southern in Mississippi	280	364,999	214,309	624,649	136,936	52,228	14,221	226,564	22,210	452,159	172,490	.....	31,300	141,190	—3,241
Syracuse, Binghamton & New York	80	307,152	222,875	601,747	82,415	37,385	16,392	205,902	13,874	355,968	245,779	.....	37,320	208,459	—1,177
Tennessee Central	293	536,304	214,509	795,257	133,638	108,712	31,297	281,914	52,195	607,756	187,501	.....	25,243	162,258	—92,023
Terminal R. R. Ass'n of St. Louis	35[59]	.....	1,500	1,355,518	214,968	138,258	4,221	475,706	35,856	869,009	486,509	49,146	168,368	367,287	—109,379
Toledo & Ohio Central	440[60]	2,331,792	362,982	2,830,373	456,059	339,184	41,607	893,092	49,210	1,779,152	1,051,221	—5,812	122,538	922,871	—144,820
Toledo, Peoria & Western	247	371,398	245,930	656,079	107,799	142,526	13,996	242,753	20,355	527,429	128,650	.....	28,800	99,850	—30,614
Toledo, St. Louis & Western	450	1,678,901	255,784	2,061,080	255,594	378,982	49,416	735,181	52,744	1,471,917	589,163	.....	87,000	502,163	—92,317
Union Pacific	3,537[61]	18,191,636	5,672,268	26,086,325	2,390,408	2,924,563	655,245	6,961,464	622,332	13,554,012	12,532,313	[1]675	1,036,006	11,495,632	—2,317,851
Union R. R. of Pennsylvania	31	.....	.....	2,328,740	198,213	480,845	614	764,710	23,459	1,467,841	860,899	24,343	43,823	841,419	280,855
Union R. R. of Baltimore	9	626,556	126,034	762,325	64,975	.....	5,909	33,214	14,273	118,371	643,954	.....	35,537	608,417	—65,396
Vandalia	827	3,313,441	1,302,229	5,200,332	765,949	970,844	160,039	1,967,203	115,543	3,979,578	1,220,754	.....	169,323	1,051,431	—190,166
Vicksburg, Shreveport & Pacific	171	417,538	265,536	745,810	132,277	128,687	18,810	229,177	27,681	536,632	209,178	—1,448	42,472	165,258	—70,788
Virginian	474[62]	2,143,504	147,086	2,356,409	276,554	416,877	29,933	648,227	47,404	1,418,995	937,414	32,435	88,600	881,249	188,535
Washington Southern	35	196,961	214,583	545,753	65,948	58,655	7,276	209,512	16,244	357,635	188,118	.....	19,469	168,649	—18,640
West Jersey & Seashore	355[63]	998,229	2,430,445	3,660,282	504,591	609,562	85,928	1,443,952	62,762	2,706,795	953,487	—19,883	140,841	792,763	—133,464
Yazoo & Mississippi Valley	1,371	3,479,997	1,409,903	5,261,923	994,865	729,326	97,651	1,929,123	158,815	3,909,780	1,352,143	—2,007	227,982	122,154	—494,395

[1] Operated in the previous year—[2] 1,803; [3] 1,736; [4] 1,348; [5] 3,919; [6] 3,587; [7] 561; [8] 2,041; [9] 545; [10] 1,952; [11] 602; [12] 470; [13] 1,617; [14] 3,982; [15] 2,337; [16] 1,022; [17] 717; [18] 191; [19] 1,468; [20] 3,316; [21] 768; [22] 7,038; [23] 34; [24] 444; [25] 3,472; [26] 473; [27] 353. — Indicates Deficits, Losses and Decreases.

The commission of Indiana has announced a tariff of charges for the transportation of merchandise by express companies, to go into effect March 15, which it is said will make an average reduction of 15 per cent. The commission holds that the express companies have extorted from the public "unusual and tremendous profits." Further, the commission recommends that the railways take over the express business and devote the "immense profits" of the business to improving their railways and perfecting safety devices. The maximum merchandise rates prescribed in the new tariff (100 lb. shipments) are, for 30 miles, 40 cents; 60 miles, 50 cents; 150 miles, 90 cents, etc.

New York: Rutland and Ontario & Western Sales Held Up.

The New York Public Service Commission, Second District (up-state), has notified the New York Central & Hudson River and the New York, New Haven & Hartford that the proof submitted by these companies on applications asking that the New York Central be allowed to buy the majority stock of the New York, Ontario & Western, and the New Haven to purchase the stock of the Rutland Railroad, is not satisfactory to the commission, and that on its own motion a further hearing has been called. To cover the questions the commission deems it essential that the individuals, both those who directed and those who took part in the negotiations, should be produced as witnesses and full disclosure be made of the reasons and purposes of the contracting parties. The commission says that three important matters are involved in each of these applications:

(1) Protection of rights of minority stockholders.
(2) Control of comparatively small railways by great systems.
(3) Possible elimination of competition by absorption of a competing line.

It is said that in both applications the proposed purchases are at prices above the market value of the stocks; both are of a bare majority of the stock and apparently for the purpose of control only; the business prospects of neither road whose stock is being purchased are such as to warrant the purchase as an investment; neither of the purchasing roads is in financial situation to warrant the purchase simply as an investment; and the condition of both roads whose stock is sought to be transferred is such financially that the majority of control can easily and without such violation of law as could be prevented by the courts, oppress the minority in carrying out the plans of the majority owner as to its entire system.

It is further pointed out by the commission that the control of comparatively small roads by great trunk line systems has been a fruitful source of complaint in the past and that following such complaints and the general dissatisfaction the public service commission law provides that no transactions such as are contemplated shall take place in this state unless authorized by the commission. In the opinion of the commission, the purpose of this provision is to prevent the use of smaller roads as mere pawns in great games carried on by the trunk line systems. Such ownership is not forbidden by law. It must, however, be with the authorization of the commission so far as it relates to transfers made after the enactment of the statute.

The commission says that in the case of the Ontario & Western the evidence is more full than in the case of the Rutland, and that the proposed transfer would not affect competition injuriously. Substantially, 70 per cent. of the business of the Ontario & Western is the hauling of anthracite coal. The through freight is now handled jointly with the N. Y. C., and the competition between the N. Y. C. and the Ontario & Western seems to be of small extent, not likely to be impaired by a change of control, and very largely under the control of the commission. As to the Rutland, the evidence with reference to the possible elimination of competition between it and the Boston & Maine, now controlled by the New Haven, is not satisfactory.

COURT NEWS.

The Atchison, Topeka & Santa Fe and the Southern Pacific have filed a petition with the Commerce Court for an injunction restraining the Interstate Commerce Commission from enforcing its recent order reducing the rate on lemons from California to eastern points from $1.15 to $1 per 100 lbs. A similar order of the commission was reversed by the Commerce Court last year, and the commission after a rehearing substantially reaffirmed its previous order, to take effect February 15.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

J. M. Dewberry and E. H. Dulaney have been appointed assistants to the third vice-president of the Louisville & Nashville, and will perform such duties as may be assigned to them.

Frank H. Davis, treasurer of the Chicago & Alton, with office at New York, has been elected vice-president, succeeding Edwin Hawley, deceased.

R. B. Williams, auditor of freight accounts of the Oregon Short Line, with office at Salt Lake City, Utah, has been transferred to a position in the accounting department at Omaha, Neb., and his former office has been abolished.

A. W. Sullivan, who resigned on January 1 as general manager of the Missouri Pacific, as has already been announced in these columns, has been elected chairman of the Committee on Railway Mail Pay, with office at 75 Church street, New York.

A. C. Ridgway, whose appointment as acting vice-president in charge of the operating department of the Chicago, Rock Island & Pacific, with office at Chicago, was announced in these columns last week, has been elected second vice-president, succeeding F. O. Melcher, deceased.

J. S. Dennis, manager of the irrigation and land interests in Alberta and British Columbia of the Canadian Pacific, with office at Calgary, Alta., has been appointed assistant to the president in charge of the newly created natural resources department, with headquarters at Calgary.

A. E. H. Cheslay, assistant accountant of the Dominion Atlantic Railway, has been appointed general accountant, and is now chief of the accounting department, with office at Kentville, N. S., succeeding H. A. Prat, accountant, retired under the pension rules of the company. The office of accountant has been abolished.

W. S. Tinsman, whose appointment as assistant to the president of the Rock Island Lines, with office at Chicago, has been announced in these columns, was born September 8, 1867, at Berryville, N. Y. He was educated in the public schools, graduating in May, 1882, and in the same year began railway work as an office boy on the Rock Island, with which road he has been ever since. From 1885 Mr. Tinsman was consecutively telegraph operator, train despatcher and chief train despatcher, at Trenton, Mo.; and trainmaster and superintendent of terminals at Horton, Kan. He was made superintendent of the Oklahoma division in May, 1902; on February 20, 1904, was transferred to the Missouri division, and was general superintendent from June, 1905, to April, 1907. He was then promoted to assistant general manager, was manager from December, 1908, to December, 1909, and from December, 1909, to February 1, 1911, was general manager of the lines east of the Missouri river. From February 1, 1911, until his present appointment, he was general manager of the First district, with office at Chicago.



W. S. Tinsman.

William Frazer Owen, whose election as president and general manager of the New Orleans, Mobile & Chicago, with office at Mobile, Ala., has been announced in these columns, was born on March 31, 1856, at Mobile, Ala., and began railway work in

June, 1871, with the New Orleans, Mobile & Texas. From August, 1880, to June, 1905, he was in the service of Morgan's Louisiana & Texas Railroad & Steamship Company and the Louisiana Western, holding various positions until his promotion in June, 1885, from master of transportation to superintendent, which position he held for 20 years. In February, 1906, he became president of the New Orleans, Crowley & Western, a projected line, and in July, 1907, became assistant to the president of the Mobile, Jackson & Kansas City. In September of the same year he was appointed general manager of that road, and on December 1, 1909, at the time of the re-organization of that company he became vice-president and general manager of its successor, the New Orleans, Mobile & Chicago, which position he held at the time of his recent election as president and general manager of the same road.

N. M. Leach, traffic manager of the Texas & Pacific, who was recently appointed also assistant to the president of the International & Great Northern, as has been announced in these columns, was born near Maysville, Ky., September 14, 1869, and was educated in the public schools at Maysville and at Kentucky University. About 1887 he joined a corps of engineers running a preliminary survey on the Chesapeake & Ohio, and from 1888 until after 1897 he was with the Queen & Crescent, where he was consecutively clerk in the purchasing department; in charge of supply trains between Chattanooga, New Orleans and Shreveport; in the general freight office at Cincinnati; paymaster and supply agent of the New Orleans & Northeastern, the Alabama & Vicksburg and the Vicksburg, Shreveport & Pacific; and commercial agent of all the Q. & C. lines at New Orleans. He was appointed general agent of the Mobile & Ohio at New Orleans in 1902 and three years later was promoted to assistant general freight agent of the same road. In February, 1908, he went with the International & Great Northern as general freight agent at Palestine, Tex., and was promoted to traffic manager of that road and the Texas & Pacific in May, 1911. Following the reorganization of the International & Great Northern, he was appointed assistant to the president on January 1, 1912, and on the same date was made traffic manager also of the Opelousas, Gulf & Northeastern. Mr. Leach's office is at New Orleans.



N. M. Leach.

Operating Officers.

G. W. Murphy has been appointed trainmaster of the Delaware, Lackawanna & Western, with office at Binghamton, N. Y., succeeding R. M. Skeele, resigned.

E. W. Burgis, master mechanic of the New Orleans Southern & Grand Isle at Algiers, La., has been appointed superintendent, with office at Algiers, succeeding J. S. Landry, deceased.

Walter E. Knox has been appointed trainmaster of the Champaign district of the Illinois Central, with office at Champaign, Ill., succeeding William G. Tiley, assigned to other duties.

W. D. Beck, heretofore chief clerk to the president of the Chicago & Northwestern, has been appointed superintendent of dining and parlor cars, with office at Chicago, succeeding R. Matters, assigned to other duties.

G. D. Brooke has been appointed assistant superintendent of the Baltimore & Ohio, in charge of the East end of division, headquarters at Cumberland, Md., and J. W. Kelly, Jr., will have charge of the West end of division, with headquarters at Keyser, W. Va.

D. J. Murphy, Jr., assistant traffic superintendent, and trainmaster of the Dominion Atlantic Railway at Kentville, N. S., has been appointed superintendent of transportation, with office at Kentville. William Fraser, traffic superintendent, has been retired under the pension rules of the company, and his former position has been abolished.

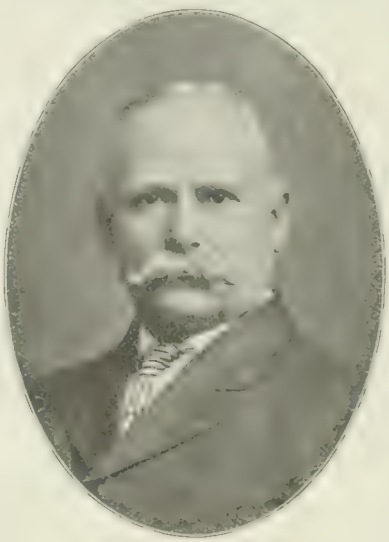
Andrew Ross, whose resignation as superintendent of the Old Colony division of the New York, New Haven & Hartford, was recently announced in these columns, has been appointed superintendent of the New Jersey & Lehigh division of the Lehigh Valley, with office at Easton, Pa., succeeding G. M. Harleman, who goes to the staff of the general manager.

F. P. Gutelius, general superintendent of the Eastern division of the Canadian Pacific at Montreal, Que., has resigned to accept a government position, as announced in General News. J. T. Arundel, general superintendent of the Manitoba division at Winnipeg, Man., has been transferred as general superintendent to Toronto, and D. C. Coleman, superintendent of car service at Winnipeg, succeeds Mr. Arundel.

H. B. Earling, general superintendent of the Chicago, Milwaukee & St. Paul at Chicago, has been appointed assistant general manager, with office at Chicago, a new position. W. S. Cooper, assistant general superintendent at Chicago, has been appointed general superintendent of the Southern district, with office at Chicago; J. H. Foster, assistant general superintendent at Minneapolis, Minn., has been appointed general superintendent of the Northern district, with headquarters at Minneapolis; and P. C. Eldredge, assistant general superintendent at Milwaukee, Wis., has been appointed general superintendent of the Middle district, with office at Milwaukee.

A change has been made in the division organization of the Union Pacific by which the line from Council Bluffs, Iowa, to Ogden, Utah—heretofore operated in three divisions as follows: Council Bluffs to North Platte, Neb.; North Platte to Rawlins, Wyo.; and Rawlins to Ogden—has been arranged in two divisions, the line from Council Bluffs to Cheyenne, Wyo., to be the Nebraska division; and that from Cheyenne to Ogden to be the Wyoming division. W. C. McKeown, superintendent of the former Wyoming division at Cheyenne, and H. J. Roth, assistant superintendent at the same place, have resigned; and W. B. Jeffers, superintendent of the former Utah division at Green River, Utah, has been appointed superintendent of the new Wyoming division, with office at Cheyenne.

Charles W. Jones, who has been appointed general manager of the Third district of the Rock Island Lines, with office at Fort Worth, Tex., as has been announced in these columns, was born November 6, 1860, at Milton, Ind. He was educated in the public schools at Des Moines and Mitchellville, Iowa, and at the Mitchell Seminary at the latter place, and on May 15, 1875, he began railway work with the Chicago, Rock Island & Pacific, with which road he has been ever since. From 1876 to 1892 he was consecutively station agent's helper, telegraph operator, station agent and operator, and train despatcher, and in the latter year was promoted to trainmaster. He was appointed assistant superintendent in February, 1895; in August of the same year was promoted to superintendent at Herington, Kan.; was transferred to the Eastern division at Horton, Kan., in October, 1897, to the Kansas division at Topeka, Kan., in May, 1902; and to the Iowa division at Des Moines in August, 1905. In February, 1909, he was appointed general superintendent, with office at Topeka, and a year later was transferred to Davenport, Iowa, as general superintendent of the Central district. When a change was made in the districts of the Rock Island Lines in February, 1911, Mr.



C. W. Jones.

Jones' title was made general superintendent of the First district, with office at Davenport, from which position he has just been promoted.

Traffic Officers.

E. A. Neil has been appointed coal freight agent of the Buffalo, Rochester & Pittsburgh, with office at Rochester, N. Y.

Charles H. Webb, commercial agent of the Texas & Pacific, with headquarters at Paris, Tex., has resigned to accept service with another company.

H. H. Smith, soliciting agent of the Louisville & Nashville at Chicago, has been appointed traveling freight agent of the Virginian Railway, with office at Cincinnati, Ohio.

C. E. Flandro has been appointed traveling freight agent of the Oregon Short Line, with office at Salt Lake City, Utah, succeeding E. J. Hanson, appointed contracting freight agent.

R. M. Langston has been appointed traveling freight agent of the Seaboard Air Line, with office at Atlanta, Ga., succeeding E. B. Rock, Jr., resigned to go to another company.

F. S. Sleight, soliciting freight agent of the International & Great Northern at Galveston, Tex., has been appointed traveling freight agent of the Missouri, Oklahoma & Gulf, with office at Dallas, Tex.

V. B. Sharritts, traveling freight agent of the Traders' Despatch at Indianapolis, Ind., has been appointed agent, with office at Indianapolis, and effective March 1. J. J. Klenke will succeed Mr. Sharritts.

W. A. Wayman, agent of the Erie Despatch at Kansas City, Mo., has been appointed assistant general manager, with office at Chicago, and E. R. Lauer, agent at St. Joseph, Mo., succeeds Mr. Wayman.

W. T. Labhart has been appointed soliciting freight agent of the St. Louis Southwestern, with headquarters at Fort Worth, Tex., succeeding E. L. Harrington, resigned to accept service with another company.

W. D. Jones, soliciting freight agent of the Tennessee Central, at Chicago, has been appointed traveling freight agent, with office at Chicago, succeeding W. G. Trapp, resigned to go to another company. George B. Hugel succeeds Mr. Jones.

John Paul, freight and passenger agent of the Niagara, St. Catharines & Toronto, at St. Catharines, Ont., has been appointed district freight agent of the Canadian Northern, with office at Winnipeg, Man., succeeding J. B. Sheppard, resigned.

E. E. Partridge, chief clerk to the general freight and passenger agent of the West Coast Route, which includes the Southern Pacific of Mexico and the Sonora Railway, has been appointed assistant general freight and passenger agent, with office at Guaymas, Sonora, Mex.

H. K. Lorraine, freight soliciting agent of the Southern Railway at Jacksonville, Fla., has been appointed commercial agent, with office at Jacksonville, and his former position has been abolished. E. L. Whitaker has been appointed freight soliciting agent, with office at Memphis, Tenn.

George B. Chapman, traveling freight and passenger agent of the Wabash at Des Moines, Iowa, has been appointed commercial agent, with office at Ottumwa, Iowa, succeeding S. Richardson, transferred. H. G. Brown, chief clerk to the district freight and passenger agent at Des Moines, succeeds Mr. Chapman.

J. T. Averitt, assistant general freight agent of the Chicago, Terre Haute & Southeastern at Chicago, has been appointed general freight and passenger agent, with office at Chicago, succeeding H. P. Radley, who had his office at Terre Haute, Ind., and who has been assigned to other duties. The office of assistant general freight agent has been abolished.

J. A. Brown, assistant general freight agent of the Trinity & Brazos Valley at Houston, Tex., has been appointed general freight agent of the New Orleans, Texas & Mexico and the Beaumont, Sour Lake & Western, and, also, assistant general freight agent of the St. Louis, Brownsville & Mexico and the Orange & Northwestern, with office at Houston.

Fred Geissler, traveling passenger agent of the Seaboard Air Line at Memphis, Tenn., has been appointed assistant general passenger agent, with office at Atlanta, Ga., succeeding C. D. Wayne, resigned to go into other business. W. A. Muse, traveling passenger agent at Atlanta, has been transferred to Memphis, and W. B. Gresham, city ticket agent at Birmingham, Ala., succeeds Mr. Muse.

W. P. Warner, district freight and passenger agent of the Chicago, Milwaukee & Puget Sound at Portland, Ore., has been appointed assistant general freight and passenger agent, with office at Spokane, Wash., a new position. R. L. Ford, commercial agent at the latter place, has resigned. E. K. Garrison, commercial agent at Los Angeles, Cal., succeeds Mr. Warner.

J. E. Crosland, chief clerk to the general freight agent of the Louisville & Nashville, at Louisville, Ky., has been appointed assistant general freight agent, with office at Louisville, succeeding E. H. Dulaney, appointed assistant to the third vice-president. L. A. Weaver has been appointed soliciting agent, with headquarters at Chicago, succeeding H. H. Smith, resigned to accept service with another company.

Frank Warfield, general freight agent of the Central Railroad of Pennsylvania, with office at Bellefonte, Pa., having died on January 18, the office of general freight agent has been abolished, and the general direction of the traffic department has been assumed by the president and the general manager. M. L. Altenderfer has been appointed general tariff agent, reporting to the president and general manager.

C. H. Green, contracting agent of the Canadian Northern at Hamilton, Ont., has been appointed contracting freight agent with office at Toronto. I. L. Healey, contracting freight agent at Hamilton, has been appointed traveling freight agent with office at Toronto, succeeding R. A. Lennox, transferred to Hamilton, and R. Logan, who has been in the general freight office at Toronto has been appointed contracting freight agent at Hamilton, succeeding Mr. Healey.

C. C. Taylor, commercial agent of the Mobile & Ohio, at Jackson, Tenn., has been transferred to Memphis, Tenn., and the office of commercial agent at Jackson has been abolished. W. S. Thompson has been appointed traveling freight agent, with headquarters at Jackson. J. A. Bolger has been appointed soliciting freight agent, with office at Chicago, succeeding W. M. Penick, promoted, and C. L. Voltz has been appointed soliciting freight agent, with headquarters at St. Louis, Mo., succeeding A. S. Birchett, promoted. C. R. Heyman succeeds Mr. Voltz.

R. F. Reynolds, assistant general freight agent of the Illinois Central and the Yazoo & Mississippi Valley at New Orleans, La., has been appointed foreign freight agent, with office at New Orleans, succeeding Henry Baldwin, appointed customs agent, in place of W. G. O'Connor, who has been assigned to other duties. R. D. Reeves, assistant general freight agent of the southern lines of the Illinois Central and of the Yazoo & Mississippi Valley at Memphis, succeeds Mr. Reynolds, and F. H. Law, commercial agent at Pittsburgh, Pa., succeeds Mr. Reeves. C. R. Phoenix, commercial agent at Minneapolis, Minn., succeeds Mr. Law, and C. S. Thompson, commercial agent at Milwaukee, Wis., succeeds Mr. Phoenix. C. C. Backus succeeds Mr. Thompson. A. E. Proctor has been appointed inspector of tariffs, with headquarters at New Orleans.

Engineering and Rolling Stock Officers.

Mortimer Silverman has been appointed electrical engineer of the Fort Dodge, Des Moines & Southern, with office at Boone, Iowa.

C. O. Busby has been appointed master of bridges and buildings of the Grand Trunk, with office at Durand, Mich., succeeding J. A. Sheedy, resigned.

F. M. Baumgardner has been appointed master mechanic of the Illinois Central, with headquarters at Clinton, Ill., succeeding L. E. Hassman, resigned.

T. A. Palmer, roadmaster of the Rock Island Lines at El Dorado, Ark., has had his jurisdiction extended to include Subdivision 55, from Packton, La., to Eunice, succeeding H. F. Clark, transferred.

J. T. Carroll, superintendent of motive power of the Baltimore & Ohio at Pittsburgh, Pa., has been appointed assistant general superintendent of motive power, with office at Baltimore, Md.,

and E. J. Searles, assistant to the general superintendent of motive power, has been promoted to superintendent of motive power at Pittsburgh, succeeding Mr. Carroll.

David Maulden Perine, whose appointment as superintendent of motive power of the New Jersey division of the Pennsylvania Railroad, with office at New York, has been announced in these columns, was born on February 13, 1869, at Baltimore, Md., and was educated in the schools of his native town, including a course in mechanical drawing and design at the Maryland Institute. He entered the service of the Pennsylvania Railroad on May 14, 1888, as an apprentice at the Mt. Vernon shops of the Northern Central, and three years later he was transferred to the Altoona shops. On April 1, 1894, he was appointed assistant road foreman of engines on the Pittsburgh division, and was promoted in August of the following year to assistant master mechanic of the Altoona machine shops. In March, 1899, he was made assistant engineer of motive power of the Northern Central and the Philadelphia & Erie, and in 1900 was transferred to Altoona as assistant engineer of motive power of the Pennsylvania Railroad division. From October, 1901, to August, 1903, he was master mechanic of the Pittsburgh division, and was then transferred as master mechanic to the West Philadelphia shops. Mr. Perine was promoted in April, 1906, to superintendent of motive power of the Northern Central and the Philadelphia & Erie; one year later he was transferred to Pittsburgh as superintendent of motive power of the Western Pennsylvania division, which position he held at the time of his recent appointment as above noted.



D. M. Perine.

OBITUARY.

Lewis Kingman, office engineer of the National Railways of Mexico, at Mexico City, died at that place on January 27. Mr. Kingman was born February 26, 1845, at Bridgewater, Mass., and began engineering work in Boston in 1862. Mr. Kingman held various railway positions, having been chief engineer of the Chihuahua division of the Mexican Central from 1883 to 1884, and again from 1895 until that road was taken over by the National Railways of Mexico, since which time he has been assistant chief engineer and then office engineer of the latter road. Mr. Kingman became a member of the American Society of Civil Engineers in 1885, and was a charter member of the American Railway Engineering and Maintenance of Way Association.

Beverly Welford Wrenn, formerly passenger traffic manager of the Plant System, died on February 6 in New York, at the age of 67. Mr. Wrenn was born at Culpeper, Va., and began railway work on November 1, 1868. He was general passenger and ticket agent of the Western & Atlantic until September, 1884, and from that time until August, 1894, was general passenger and ticket agent of the East Tennessee, Virginia & Georgia, in which position he had charge of the through passenger traffic of the Virginia, Tennessee & Georgia Air Line, which was composed of the East Tennessee, Virginia & Georgia, the Norfolk & Western, and the Shenandoah Valley railways. He remained with that company until it was absorbed by the Southern in August, 1894, and was general passenger agent of the Memphis & Charleston until January, 1895, when he was appointed passenger traffic manager of the Plant System of Railways and Steamships, which position he held until July 1, 1902, when it was absorbed by the Atlantic Coast Line. Mr. Wrenn had been in business for the past ten years in New York.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Nebraska Northwestern, Davenport, Iowa, is in the market for two locomotives.

The Wabash is in the market for 10 freight locomotives, 10 passenger locomotives and 10 switching locomotives. (See item under General News.)

The Lorain & West Virginia has ordered one consolidation locomotive from the American Locomotive Company. The dimensions of the cylinders will be 21 in. x 28 in.; the diameter of the driving wheels will be 51 in., and the total weight in working order will be 192,000 lbs.

CAR BUILDING.

The Southern is said to be in the market for 18 passenger cars. This item has not been confirmed.

The Canadian Pacific is taking prices on 600 side-dump ballast cars.

The Chicago, Rock Island & Pacific is in the market for 700 all-steel general service cars.

The Chilean State Railways have ordered 100 freight cars from the Middletown Car Works.

The Chicago, Milwaukee & St. Paul will build 1,000 box cars and 500 refrigerator cars at the company shops.

The Nebraska Northwestern, Davenport, Iowa, is in the market for 2 passenger coaches and 12 freight cars.

The Cudahy Packing Company, Chicago, has ordered 350 steel underframe, refrigerator cars from the Haskell & Barker Car Company.

The Erie, it is said, will have heavy repairs made to 1,000 box cars by the Central Locomotive & Car Works, and will have 300 refrigerator cars rebuilt by the Whipple Car Company. This item has not been confirmed.

The Pennsylvania System has ordered 75 passenger cars from the Pressed Steel Car Company, 75 passenger cars from the American Car & Foundry Company, and 50 passenger cars from the Standard Steel Car Company.

The Wabash is in the market for 1,000 40-ton steel underframe, 36-ft. and 40-ft. stock cars; 1,000 steel underframe, 36-ft., 40-ton box cars; 750 40-ft., 40-ton automobile cars; 200 50-ton, all-steel hopper cars and 20 passenger cars. (See item under General News).

The Western Maryland is now in the market for 1,000 forty-ton steel underframe box cars, 750 fifty-five-ton all-steel hopper cars, 500 fifty-ton gondola cars, 500 forty-ton gondola cars, 15 passenger coaches, 6 combination mail and express cars, and 5 baggage cars.

IRON AND STEEL.

The Wabash is figuring on from 15,000 to 20,000 tons of rails.

The Great Northern has increased its recent rail ore from 36,000 to 60,000 tons, of which 10,000 tons have been ordered from the Illinois Steel Company and 14,000 tons divided between the Lackawanna Steel Company and the Colorado Fuel & Iron Company.

The Pennsylvania Railroad has ordered 150,000 tons of rails. The order was divided as follows: Pennsylvania Steel Company, 33,000 tons; Cambria Steel Company, 32,000 tons; United States Steel Corporation, 66,000 tons; Lackawanna Steel Company, 12,000 tons; Bethlehem Steel Company, 7,000 tons.

SIGNALING.

(New Installations of Block Signals, Interlocking, Telephones for Train Despatching, Etc.)

In compliance with an order of the state railway commission the Southern Railway is preparing to install the manual block system on its St. Louis division through Indiana, the work to be completed by May 1. Stations will be about eight miles apart. From thirty-five to fifty signal men will be needed. It is understood that telephones will be used.

Supply Trade News.

The Standard Scale & Supply Company, Chicago, has changed the name of its Eclipse low charging concrete mixers to Standard low charging concrete mixers.

The office of E. A. Craig, southeastern manager of the Westinghouse Air Brake Company and the Westinghouse Traction Brake Company, has been moved from Wilmerding, Pa., to Pittsburgh.

W. V. Kelley, president of the American Steel Foundries, New York, has been made chairman of the board of directors, and R. P. Lamont, vice-president, has been made president, succeeding Mr. Kelley.

Howard W. Evans, formerly general sales manager of the Crane Company, Chicago, has been made general sales manager of the Best Manufacturing Company, Pittsburgh, Pa., makers of pipes and pipe fittings.

The H. W. Johns-Manville Company, New York, has acquired the sole selling agency for the entire products of I. P. Frink, New York, manufacturer of Frink reflectors and fixtures, and is now in a position to design and sell lighting systems for all forms of artificial illumination.

The Sargent Company, Chicago, has received orders for iron-clad water glass protectors and E. S. E. valves for 75 locomotives to be built for the Chicago & North Western, and for 16 locomotives to be built for the Chicago, St. Paul, Minneapolis & Omaha, by the American Locomotive Company, New York.

A. L. Whipple, for some years in the railway supply business, and for the last two years president and general manager of the Whipple Supply Company, New York, has resigned, and the company will be dissolved. Mr. Whipple's plans for the future are as yet uncertain; but for the present he will be located at the office heretofore occupied by the Whipple company.

Charles Booth, who has been connected with the Chicago Pneumatic Tool Company, Chicago, since its organization, has been made district manager of the company's New England territory, with office in Boston, Mass., succeeding J. M. Towle, resigned. Mr. Booth was a vice-president of the company until September 1, 1911, when he resigned that position on account of ill health.

L. A. Darling, formerly chief engineer of the R. G. Peters Manufacturing Company, Grand Rapids, Mich., has gone to the Remy Electric Company, Anderson, Ind., as engineer of the locomotive headlight department. Mr. Darling has been in the mechanical engineering and the designing departments of the Southern Pacific, and turbine designer for the General Electric Company, Schenectady, N. Y.

R. A. Ogle and C. F. Bledsoe, formerly connected with the Otto Gas Engine Company, Chicago, have organized the Ogle Construction Company, with office at 332 South Michigan avenue, Chicago, and will build water stations, water cranes, pipe lines, pumping stations, coaling stations, coal hoists, coal spouts and coal buckets and loaders. Mr. Ogle is president and treasurer of the company, and Mr. Bledsoe is vice-president and secretary.

J. Howard Mitchell, one of the founders of the William Butcher Steel Works, which was afterward the Midvale Steel Works, Nicetown, Pa., and senior member of the firm of Philip S. Justice & Company, Philadelphia, Pa., dealers in railway supplies, died on February 6 at his home at Hatboro, from a general breakdown, due to old age. For four weeks Mr. Mitchell, who was 79 years old, was confined to his house. Previous to that time, however, he took an active part in the business of the firm of which he was a member.

Thomas M. Gallagher, formerly a vice-president of the Scullin-Gallagher Iron & Steel Company, St. Louis, Mo., died at his home in St. Louis on February 1. Mr. Gallagher for a number of years was connected with the Mobile & Ohio, resigning in 1865, as foreman of the shops at Columbus, Ky. From 1867 to 1869 he was superintendent of the Southwestern Express Company, Cincinnati, Ohio. For several years he was connected with the Shickle, Harrison & Howard Iron Company as superintendent, general manager and vice-president, and from 1899 to 1910 he was a vice-president of the Scullin-Gallagher Iron & Steel Company.

The Eagan-Rogers Steel & Iron Company has just been incorporated in Pennsylvania, with $100,000 capital. It has acquired a five acre tract on the Pennsylvania Railroad between Crum Lynne, Pa., and Eddystone, and is now erecting steel buildings, the contract for which has been let to the McClintic-Marshall Construction Company, Pittsburgh, Pa. The company will make light steel castings weighing up to 200 lbs, in addition to grey iron castings and other specialties. Steel made by the electric process will be furnished, as the company has obtained American rights for a successful process now in use in England. The principals are Daniel C. Eagan and John I. Rogers. Mr. Eagan is a son of the late Daniel Eagan. Mr. Rogers is an engineer and was formerly with the Midvale Steel Company, Philadelphia, Pa., in charge of various departments; he has been in consulting practice for the last few years in New York and Philadelphia. The plant will be in active operation by March 1.

Charles B. Jenks, western sales manager of the Standard Coupler Company, New York, for several years with office in Chicago, has been made sales manager for Edwin S. Woods & Company, Chicago. Mr. Jenks has a wide acquaintance with both railway officers and supply men in all parts of the country. For eight years he was employed in the traffic department of the Pennsylvania Railroad, and for six years he was in the engineering and construction department of the Atlantic Refining Company, Philadelphia, Pa. In 1892 he went to the Pressed Steel Car Company, Pittsburgh, Pa., and for two years was in the operating department as assistant to the vice-president at Pittsburgh. For the next five years he was in the sales department at Chicago. In 1909 he resigned to go to the Standard Coupler Company as western sales manager.



Charles B. Jenks.

TRADE PUBLICATIONS.

Culverts.—The Canton Culvert Company, Canton, Ohio, has published a small illustrated folder describing and illustrating its Acme Nestable corrugated culverts. This folder is entirely in Spanish.

Automatic Time Switches.—The General Electric Company, Schenectady, N. Y., has devoted bulletin No. 4893 to a general description of two automatic time switches, types T 5 and T 6, for alternating and direct current circuits.

Boiler Tools.—The J. Faessler Manufacturing Company, Moberly, Mo., has published an illustrated folder describing Faessler octagonal sectional expanders, roller expanders and flue cutting machines, and pointing out their advantages.

Exhaust Fans.—The American Blower Company, Detroit, Mich., has published bulletin 323 on A B C steel plate exhaust fans, type E. This bulletin is fully illustrated and includes detailed descriptions, diagrams and dimension tables.

Drills.—The Ingersoll-Rand Company, New York, has published bulletin No. 4204 on Arc Valve tappet rock drills, telling of the efficiency of these drills equipped with Sergeant drill chucks. Illustrations of these drills in operation are given and a list of duplicate parts is included.

Southern Railway.—The land and industrial department of this company has published a useful little booklet entitled A Western North Carolina Opportunity, which gives many points on the growing of cabbages and potatoes in this region. Some figures are included on the yield, the cost of production and land values.

Automatic Starting Control.—The Reliance Electric & Engineering Company, Cleveland, Ohio, has published bulletin No. 7010 on automatic starting control, in which the advantages of this device as a power saver are pointed out. Illustrations are included of various machine tools on which this device has been applied.

Piping Materials.—The Best Manufacturing Company, Pittsburgh, Pa., has published a 400-page cloth-bound catalog of piping materials for steam, air and hydraulic high pressure piping systems, including valves, fittings, flanges, pipe and pipe bends, separators, etc. The list price and a brief description are given of each article.

Drills.—The Cleveland Twist Drill Company, New York, has published an effective folder on Paragon Flatwist drills. The special feature of this folder is the reprint of an article on tests made with this drill. This article appeared in 21 different trade journals and a fac-simile of each of the pages on which it appeared is given.

Pipe Protection.—The National Tube Company, Pittsburgh, Pa., has published bulletin No. 8 on National coating for protection against corrosion and electrolysis. This coating can be applied to pipe ranging from 3 in. to 18½ in. outside diameter. The bulletin describes the process of applying this coating, and gives suggestions regarding the laying of pipe covered with National coating.

Electric Hoists.—The Sprague Electric Works (New York) of the General Electric Company has devoted a small illustrated booklet to the advantages and illustrations of the various types of Sprague electric hoists for handling loads which, on account of their location, are inaccessible to the ordinary traveling crane, or which are too small to be economically handled by such a large and expensive machine.

Norfolk Southern.—The passenger department of this company has published a very attractive 70-page booklet entitled Corn, Cotton and Cash, telling of the advantages to be found in the Carolina coast country along this company's lines. The various localities are described and the products, industries and facilities are set down in an enticing manner. The booklet is well illustrated and includes a large map.

Locomotive Stokers.—Clement F. Street, Schenectady, N. Y., has issued publication No. 6 on the Street locomotive stoker, in which each function of this stoker is clearly and concisely described. Illustrations are given of each separate part, and also of the stoker applied to locomotives. Illustrations and the principal dimensions of five of the largest locomotives on which these stokers have been successfully used are given. The booklet also includes large diagrams.

Toncan Metal.—The Stark Rolling Mill Company, Canton, Ohio, has published a 36-page booklet on Toncan metal, pointing out its chief characteristics and advantages. The first part of the booklet deals with corrosion, telling what causes it and how it may be obviated. In the second part of the booklet some interesting results of tests are shown by photographs. The remainder is devoted to illustrations, descriptions and prices of the various products made of this metal.

Axle Car Lighting.—The United States Light & Heating Company, New York, has published three bulletins on the Bliss system of axle electric car lighting. Bulletin No. 207 is illustrated and gives detailed descriptions of this system. Bulletin No. 105 describes National storage batteries for electric lighting of railway cars which are used in connection with the Bliss system of axle car lighting. Bulletin No. 208 A is devoted to a list of spare parts for axle car lighting equipments.

Work on the railway extension from Lockhart, New South Wales, to Clear Hills, is progressing rapidly. The line is practically complete as far as Urana, and it is expected that this section will open for traffic shortly.

Railway Construction.

New Incorporations, Surveys, Etc.

Bamberg, Ehrhardt & Waterboro.—An officer writes that grading has been finished on 11 miles of the line now under construction from Bamberg, S. C., south to Ehrhardt, 14 miles. The Ajax Construction Company, Bamberg, and W. C. Wolfe, Orangeburg, are the contractors. J. A. Wyman, president, Bamberg; T. Black, vice-president, and W. D. Rhodes, secretary and treasurer.

Barre Granite.—See Central Vermont.

Beaver, Meade & Engelwood.—An officer writes that the projected route is from Beaver, Okla., north to Meade, Kan., about 40 miles, of which seven miles is to be finished within four months. The work on the heaviest mile involves the handling of about 20,000 cu. yds. The company expects to develop a traffic in wheat, broom corn and live stock, and contracts will be let to local contractors to carry out the work. T. C. Tracy, president, Beaver, Okla. (February 2, p. 221.)

Bruce Mines & Algoma.—This company, which operates a 17-mile line from Bruce Mines, Ont., to Rock Lake, has asked permission to build branch lines not to exceed 12 miles long. J. Knight, superintendent, Bruce Mines.

Canadian Eastern Construction Company.—Incorporated in Maine with $1,000,000 capital, to build railways. A. R. Gould, president of the St. John Valley Railway, which was recently granted a subsidy by the New Brunswick government to build from St. John, N. B., to Aroostook Falls and Grand Falls, N. B., 208 miles, is president of the new company.

Cary North & South.—An officer writes that a contract has been given to T. W. Ellis, Jr., Macon, Ga., for work on a 10-mile section from Cochran, Ga. The plans call for building from Cochran north via Cary to Danville, and the line will probably be extended to Toomsboro, about 21 miles, also to Milledgville or to Sandersville. The maximum grades will be 1 per cent., and maximum curvature 4 deg. The company expects to develop a traffic in lumber, cotton and products, also merchandise. D. B. Dunn, chief engineer, Macon, Ga.

Central Vermont.—Under the name of the Barre Granite Railway, a company has been incorporated in Vermont with $100,000 capital, to build a 10-mile line from Barre, Vt., to Williamstown, which is the present terminus of a branch of the Central Vermont. The incorporators of the new company include E. H. Fitzhugh, president, and other officials of the Central Vermont. The plans call for putting up several steel bridges on the branch of the Central Vermont and on the new line.

Chicago, Joliet & Kansas City.—This company has been given a charter in Illinois to build from Chicago, Ill., to Kirthsbury; also from Rockford to Peoria. The incorporators are all residents of Chicago.

Chicago, Paducah & Thebes.—Incorporated in Illinois, to build from Streator, in Lasalle county, south to Brookport, Massac county, connecting with a branch from a point in Clay county to Thebes. The incorporators include C. B. Long, W. E. Beckwith, F. W. Boekenkroeger, A. M. Beckwith and W. R. Brow, all of East St. Louis.

Chesapeake & Ohio.—On the Hinton division, the Winding Gulf extension of the Piney Creek branch has been extended from Sullivan, W. Va., to Tams, 11½ miles, and on the Huntington division of the Coal River district, the line from Sproule, W. Va., to Peytona has been extended from Peytona to Seth, seven miles. F. I. Cabell, chief engineer maintenance of way, Richmond, Va.

Delaware, Lackawanna & Western.—The plans for the proposed improvements to be carried out in Pennsylvania, for which bids are to be let about March 1, provide for the construction of a new roadbed for a double track from Clarks Summit, Pa., seven miles north of Scranton, north to New Milford, about 31 miles. This will reduce the distance three miles over the existing line. The new work is to be carried out to eliminate curves, heavy grades and crossings at grade. The maximum curvature on the new line will be 3 per cent. The grade for 18 miles will

be .2 per cent., and for seven miles .7 per cent. The plans call for piercing a tunnel 3,600 ft. long, near Nicholson, and at a point two miles north of the tunnel, constructing a viaduct 2,100 ft. long. Another viaduct 1,300 ft. long will also be put up at Martin's Creek, near Kingsley. The work will be let in ten sections. (January 12, p. 76.)

Fort Smith & Western.—An officer writes regarding the reports that this company expects to begin work on a branch to Oklahoma City, Okla., in the near future, that there is a probability that the line will be built. No action has yet been taken to carry out the work. W. M. Bushnell, general manager, Fort Smith, Ark.

Georgia, Alabama & Western.—Incorporated in Georgia with $200,000 capital, it is said, to build from Milltown, Ga., west to Blakely, about 125 miles. The incorporators include E. H. Beck, W. W. Webb and L. M. Stanfield, Hahira; R. Barfield and G. W. Dean, Waycross, and J. F. Harris.

Glengary & Stormont.—This company has asked for incorporation in Canada, to build from a point on the Canadian Pacific at the eastern boundary of the province of Ontario, in the township of Lancaster, county of Glengary, south, thence westerly through the township of Charlottenby to Cornwall. C. L. Hervey, Ottawa, Ont., is interested.

Great Northern.—An officer writes that the work on the new terminals of the Midland Railway of Manitoba, in Winnipeg, Man., is nearing completion. A. H. Hogeland, chief engineer, St. Paul, Minn.

Gulf Lines Connecting.—Incorporated in Illinois, to build from a point near Danville, Vermilion county, south through the counties of Edgar, Clark, Crawford, Lawrence, Wabash, Edwards, White, Gallatin, Hardin, Pope, and Massac, to a connection with the new bridge at Paducah, with a branch east to a point on the Wabash river opposite Mt. Vernon, Ind., and another branch west to Thebes and Cairo. The incorporators include P. A. Schlafly, W. S. Louden, E. P. Keshner, N. P. Murray, Jr., and H. J. Hornburg, all of East St. Louis.

Houston & Texas Central.—An officer writes that contracts are to be let early in February for work on a 10-mile section of the branch being built from Stone City, Tex., southwest via Caldwell to Giddings, 40 miles. A contract for work on 13 miles was let last fall to Owen, Levy & Owen, Giddings. The work involves the handling of an average of about 30,000 cu. yds. a mile. There will be five steel bridges, which have already been bought, varying in length from 60 to 500 ft. each, and a trestle over the Brazos river. E. B. Cushing, chief engineer, Houston. (December 1, p. 1148.)

Kansas City Terminal Railway.—See Kansas City, Mo., under Railway Structures.

Kissimmee, Narcoossee & East Coast.—Oragnized in Florida with $100,000 capital, it is said, to build a 10-mile line from Narcoossee, Fla. C. W. Ward, J. M. Lee, W. A. McCool and H. C. Stanford are said to be interested.

Lexington & Eastern.—See Louisville & Nashville.

Lindsay & Minden.—Application has been made for a charter in Canada to build from Lindsay, Ont., north via Minden to Mountain Lake. A. H. Delemere, Minden, is interested.

Louisiana Roads (Electric).—Surveys are now being made, it is said, for a line to connect Covington, La., Madisonville, Slidell and New Orleans. Franchises have been granted to W. J. Tracy, Cleveland, Ohio, and it is understood that W. P. Slifer, Pittsburgh, Pa., is the engineer.

Louisville & Nashville.—On the Lexington & Eastern the North Fork extension has been extended to Haddix, Ky., six miles from Jackson. W. H. Courtenay, chief engineer, Louisville, Ky.

The Wasioto & Black Mountain is to be extended about 15 miles, it is said, to new coal fields in Kentucky. W. H. Courtenay, chief engineer, Louisville, Ky.

Mexican Southern.—A new branch has been opened for business from Oaxaca, Mex., southwest to Tlacolula, 20 miles. S. W. Massey, superintendent, Oaxaca, Oax., Mex.

Midland of Manitoba.—See Great Northern.

Minneapolis, St. Paul & Sault Ste. Marie.—An officer is quoted as saying that this company intends to build, during 1912, a connecting line from Drake, N. D., northeast to Fordville, about 175 miles. T. Greene, chief engineer, Minneapolis, Minn.

Natchez Eastern.—This company was organized in August, 1911, and it is said that financial arrangements are being made by J. M. Sechrest & Company, Inc., Buffalo, N. Y., to build from Natchez, Miss., northeast to Meridian, about 200 miles.

Norfolk & Western.—An officer writes that the company proposes to build this year 3.3 miles of third track between Norfolk, Va., and Lambert Point; 16.4 miles of second track between Gilmerton and Suffolk; 11 miles of second track between Nottoway and Burkeville, and 13.2 miles of second track between Evergreen and Phoebe. Nearly all of this work will be carried out by the company's forces.

Northern Pacific.—The Ocosta branch of the Tacoma division has been extended from Ocosta, Wash., to Bay City, three miles. W. L. Darling, chief engineer, St. Paul, Minn.

Pacific, Trans-Canada & Hudson Bay.—This company has been incorporated in Canada to build from Edmonton, Alta., to Athabaska, thence to Port McMurray, and eventually west to Prince Rupert, B. C. Permission has also been granted to build easterly to Hudson Bay at either Fort Churchill, or Ft. Nelson. The names of the promoters are not given.

Port Boliver Iron Ore.—This company, which recently finished a line from Longview, Tex., to Ore City, 30 miles, is planning to build an extension, it is said, north to a point in Oklahoma, about 150 miles. A survey for the first section is now being made via Daingerfield to Clarksville, 70 miles, and construction work between Ore City and Clarksville will be started soon. L. L. Featherstone, secretary, Longview. (December 8, p. 1189.)

St. John Valley.—See Canadian Eastern Construction Company.

Salem, Falls City & Western.—This company, which operates a line from West Salem, Ore., to Black Rock, 27 miles, has under consideration the question of building an extension from Salem, northeast via Silverton, Molalla and Mulino, to Oregon City, about 50 miles, with a branch from this extension southeast to Stayton, about 20 miles. S. B. Taylor, chief engineer, Dallas, Ore.

Southern Pacific.—A new branch, called the Tulasco branch, has been opened for business on the Carlin sub-division of the Salt Lake division from Tulasco, Nev., to Metropolis, eight miles. W. Hood, chief engineer, San Francisco, Cal.

Southern Railway.—An officer writes that a contract has been given to M. M. Elkan, Macon, Ga., to build the belt line at High Point, N. C., connecting the main line with the Asheboro branch. The line will be about two miles long, and is to be built in a generally easterly direction to the Asheboro branch. Grading will be started early in February. The approximate excavation will average 36,000 cu. yds. a mile. W. H. Wells, chief engineer of construction, Washington, D. C. (December 22, p. 1301.)

Sudbury-Copper Cliff Suburban.—This company, with headquarters at Sudbury, Ont., has asked for a charter in Canada, to build from Sudbury westerly to Copper Cliff, also from Sudbury easterly to Coneston. Clary & Buchanan, Sudbury, are interested.

Tampa & Gulf Coast.—This company, which operates a 22-mile line from Tarpon Springs, Fla., east to Lutz Junction, is said to have under consideration the question of building an extension south to Tampa, about 12 miles. C. H. Brown, president, Tampa.

Utah Coal Railway.—Incorporated in Utah with $125,000 capital to build a nine-mile line from Provo, Utah, southeasterly to the mouth of Huntington canyon, also to build a branch from Nephi, about five miles. The directors include W. M. Bradley, president, W. Ashton, vice-president, S. J. Harkness, secretary and treasurer, R. B. Harkness and W. Pischel.

Valley & Siletz.—Incorporated in Oregon, with $300,000 capital, to build from Falls City, Ore., to Simpson. The incorporators include F. S. Velcher, H. A. Packard and T. V. Littlefield.

Virginia & Kentucky.—An officer writes that the plans call for building 44 miles of line, which have been under consideration for some time, in Virginia, to the Virginia-Kentucky state line. The company will not carry out any of the work during 1912. F. M. McClure, secretary and superintendent, Wise.

Wabash.—(See item under General News.)

Wasioto & Black Mountain.—See Louisville & Nashville.

Wichita Falls Route.—An officer writes that contracts have been let for the extension north of Hammond, Okla., via Moorwood, Trail, Camargo, Shanon, Woodward, Supply, May and Gate to Forgan in Beaver county, which is eight miles north of Beaver. Track has been laid from Hammond to a point south of the Canadian river crossing near Camargo, also from Shanon to May, a total of about 60 miles. There will be very little rock work, the grading work involves handling an average of about 20,000 cu. yds. a mile. M. M. Cooke, chief engineer, Wichita Falls. (January 26, p. 177.)

RAILWAY STRUCTURES.

Binghamton, N. Y.—The New York Public Service Commission, Second district, has ordered the elimination of the grade crossing on the Delaware, Lackawanna & Western, and the Delaware & Hudson at Robinson street in Binghamton. The grade of the street is to be carried under the grade of both railways by means of a subway.

Cincinnati, O.—The Norfolk & Western will enlare its yards at Clare.

Corning, N. Y.—The New York Public Service Commission, Second district, has ordered the eliminating of the First street and the Columbia street grade crossings of the Erie Railroad in Corning. The Columbia street crossing is to be entirely abandoned and the traffic carried under the railway by means of a subway at First street. The cost of the work will be $60,000.

Kansas City, Mo.—An officer of the Kansas City Terminal writes that a large number of contracts are still to be let for viaducts, subways and retaining walls, in addition to the contracts already let for the construction of the Burlington connection, estimated cost $400,000, the O. K. Creek sewer, estimated cost $900,000, the station building proper, estimated cost $5,750,000, and various subways, viaducts and returning walls amounting to over $1,000,000. The estimated cost of the entire improvements in connection with the Kansas City passenger terminal is $37,000,000. Contracts were let some time ago to the W. P. Carmichael Company, Kansas City, for building a retaining wall east of Brooklyn avenue, and to O'Hagen & Lake, Aurora, Ill., for the subway at Independent road. The Freeborn Engineering Company, Kansas City, has the contract for a concrete abutment over the viaduct at 18th street near Agnes avenue, and Bernard Corrigan, Kansas City, has the contract for building the Burlington connection, together with bridge abutment and retaining walls. A $500,000 contract has recently been let to John J. O'Heron & Company, Chicago, for concrete work in connection with the new union station. (November 10, p. 975D.)

Marquette, Mich.—The Duluth, South Shore & Atlantic will build a new brick freight station 126 ft. x 40 ft.

North Bay, Ont.—The Canadian Pacific has asked for waterfront lots on Lake Nipissing, fronting the company's property at North Bay for a distance of 3,000 ft. along the shore and extending 900 ft. into the lake. This is to be filled in and used as a site for new repair shops and extensions to the works and yards. The plans for a large repair shop, to cost $250,000, have been submitted to the town council.

Temple, Tex.—The blacksmith shop and roundhouse of the Atchison, Topeka & Santa Fe was destroyed by fire on January 30.

Trent., Wash.—The Northern Pacific has given a contract for building a steel bridge over the Spokane river, near Trent, to McCreary and Willard, Spokane, Wash.

Winnipeg, Man.—See Great Northern under Railway Construction.

Railway Financial News.

California Northeastern.—A press despatch from Yreka, Cal., says that the property of this company has been acquired by the Oregon Eastern Railway, a subsidiary of the Southern Pacific, for $5,200,000. The Northeastern runs from Weed, Cal., to Klamath Falls, Ore. The Northeastern was a company organized by the Southern Pacific.

Chicago & North Western.—This company has sold to Kuhn, Loeb & Company, New York, $15,000,000 Sparta & Northwestern first mortgage 4 per cent. bonds of 1912-1947 guaranteed principal and interest by the Chicago & North Western.

Chicago, St. Paul, Minneapolis & Omaha.—Having previously received permission from the railway commission of the state of Wisconsin, directors have authorized issuance of $5,000,000 debenture 5 per cent. bonds, $1,300,000 to pay for additions, betterments, and equipment already purchased, and the remaining $3,700,000 to be used for double tracking and additional equipment. The bonds will be dated March 1, and will mature in 1930.

International & Great Northern.—This company has notified the railway commission of Texas that it wishes to issue $3,000,000 bonds at the rate of $1,000,000 a year to pay for building a line from San Antonio to Laredo, 150 miles, and from Valley Junction to Spring, 99 miles.
See also an item in regard to this company in General News.

Kansas City, Mexico, & Orient.—This company, through its president, Arthur E. Stilwell, is offering to its stockholders $10,000,000 10-year 5 per cent. first mortgage collateral trust bonds at par. The proceeds of the sale of these bonds are to be used to pay for building the main line from its present terminus at San Angelo, Tex. to Chihuahua, Mex., where connection with the National Railways of Mexico is made. The company had outstanding at last report $12,500,000 preferred stock; $12,264,135 common stock and $18,199,000 first mortgage 4 per cent. bonds of February 1, 1901-1951.

New Orleans, Mobile & Chicago.—Douglas Fenwick & Co., New York, are offering $450,000 first and refunding mortgage 5 per cent. bonds at 95, yielding 5.25 per cent. income on the investment. Control of the N. O. M. & C. was recently acquired by the St. Louis & San Francisco and the Louisville & Nashville.

New York Central & Hudson River.—The New York Public Service Commission, Second district (up-state) has approved the lease to the New York Central & Hudson River of the New York & Ottawa for one year beginning February 1, 1912. The lease is made each year and has been approved each year previously by the commission.
See an item in regard to this company and its sale of Rutland and purchase of New York, Ontario & Western in State Commission news.

New York, Ontario & Western.—See item in General News.

New York & Ottawa.—See New York Central & Hudson River.

Oregon Eastern.—See California Northeastern.

Rutland.—See an item in General News.

Southern Pacific.—See California Northeastern.

Virginian.—Stockholders have voted to increase the capital stock from $36,000,000 to $65,000,000. (Jan. 26, page 178.)

Wabash.—Kuhn, Loeb & Co., New York, have been awarded the entire issue of $10,000,000 Wabash receiver's certificates. The certificates were sold to the highest bidder and Kuhn, Loeb & Company bid $1,002.50 per $1,000 certificate. Other bids were Francis Brothers and Bond & Goodwin, $1,001.50 per certificate; Lee, Higginson & Co., Boston, $1,000.79; White, Weld & Co., William A. Reed & Co. and A. G. Edwards & Sons, $1,000.37. It is presumed that Kuhn, Loeb & Company represented the refunding bondholders' committee, of which Winslow Pierce is chairman, and the White, Weld-Edwards bid represented the refunding bondholders' protective committee, of which J. N. Wallace is chairman.
(See also item in General News.)

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THE Public Utility Commissioners of New Jersey have made a vigorous report on the proposed full-crew law of that state, and on another page we give the substance of their views. This is the first thorough and lucid discussion of the subject that has come from any public authority, so far as we have observed, and it merits the attention of legislators and commissioners of other states—for the advocates of full-crew laws seem to have determined to present their measure to all of the legislatures. The Supreme Court of the United States has decided that any legislature may regulate the size of train crews if it see fit to do so; and it cannot be expected that the court will admonish legislatures to avoid stultifying themselves, at the request of the trainmen's brotherhood, by enacting laws with their eyes shut. An appeal to reason, therefore, is the only practicable measure. The New Jersey commissioners show most forcibly that reason is all against these laws. Such argument as the brakemen might adduce seems to have been overlooked. That an additional man might be useful, on a 60-car train, as a watchman to detect hot journals, or as a transmitter of hand signals, or as a policeman to eject tramps, would be at least a plausible argument; but while admitting that much, it would be necessary still to admit that the cost would be exorbitant, as compared with the value of the advantages. The commissioners, very naturally, turn first to that feature of the bill which does present some show of reason, the need of more men on local passenger trains; but they refer only incidentally to the fact that this need can be met by the employment of porters, willing to give efficient service at moderate wages, almost as well as by members of the trainmen's brotherhood, who demand and receive high pay. Indeed, there are many porters who afford the necessary assistance to passengers better than the same functions are performed by some brakemen. This phase of the question illustrates the difficulty of regulating this matter by specific statute; for the question whether a certain train needs a brakeman or a flagman or a porter, or a part of each kind of service, needs to be decided in each case by a competent railway man who is acquainted with the facts of that particular case. This illuminating report affords evidence that the New Jersey commission is composed of independent men, for the governor of that state, Woodrow Wilson, made a statement in his annual message to the legislature which indicated that he had accepted the claims of the trainmen concerning the need of a full-crew law.

THE Interstate Commerce Commission, in compliance with the demands of shippers and a number of state railway commissions, has suspended for 120 days the new issue of the Western Classification, No. 51, which embodies the recommendations of the Uniform Classification Committee. The *Railway Age Gazette* pointed out last week that the attempt of the railways to bring about uniformity of classification was begun only after repeated insistence by the Interstate Commerce Commission and shippers' organizations, and that the protests against allowing the results of their agitation to be put to a practical test seemed far from consistent with their former accusations of dilatoriness on the part of the railways. The commission, however, has doubtless acted wisely in suspending the classification until a complete investigation can be made by it of the new provisions, and all interests affected can be given a full hearing. As the railway traffic officials argued before undertaking the heavy task of unification, the commercial conditions that have developed under the existing classifications must necessarily be substantially altered by the proposed wholesale readjustment, and probably some interests, particularly those that have profited by former discriminations, will be adversely affected. Even the progress thus far made in the direction of a unification of rules, descriptions and carload minimums represents three years of work by the railway

committee, and perhaps a greater length of time than has been available since its results were made public should be allowed for their study and assimilation. Moreover, a full hearing will lead to a better general understanding of the scope and probable effect of the classification changes, as well as of the intentions of their framers, and by throwing light on the complex conditions that must be taken into consideration may have an important influence on the attitude of the shippers and the commission toward the even more difficult task of revising the actual ratings, which still confronts the classification committees, if the demand for a true uniform classification is to be complied with. Many shippers may object to the postponement of reductions which they have long sought, and which they would gain if the new classification should go into effect; and business conditions will not be helped by protracting the uncertainty as to what changes finally are to be made. It would seem, however, that a better understanding is desirable in the present instance; and that such an understanding can be secured only by delay.

ELSEWHERE in this issue is described a plan being worked out by the management of the Frisco on its Western division to increase the importance and efficiency of the station agent by enlarging his authority and responsibility. Through no other officer or employee does the railway come into closer contact with the public as a whole than through the local agent. For most people no more intimate knowledge of the personnel of railway management is possible than the impressions gained through their dealings with him. The idea of the Frisco management is that by making the agent in a broader sense its business representative in his territory, with the duty of and responsibility for correcting or adjusting the many minor conditions that create friction or cause dissatisfaction, the relations between the company and its patrons may be greatly improved, to their mutual benefit. All station agents on the Frisco have been given authority to settle direct small claims for visible loss or damage to freight; and on the Western division they recently have been charged with the duty of soliciting traffic and instructed to exercise their discretion in other respects in dealing with the public. All this is largely for the purpose of cultivating the good will of the public, and, especially, of promoting a better understanding with the small shipper and the occasional traveler whose experiences, thoughts and comments to so large an extent make up that intangible thing known as "public opinion." The interests of the large shippers and the more regular travelers have been able to claim forcibly the attention of the railway managers. The big shipper, especially, has shown himself entirely capable of taking care of himself; or, at least, of getting himself taken care of. If equivalent attention had been given to winning and keeping the favor of the less influential—individually—members of the general public their collective influence might not have been so easily won to the side of those who have had an interest in aligning themselves against the railways. The possibility of replacing a few traveling solicitors and claim adjusters, who at best must deal largely with strangers, with a body of several hundred bright young men with excellent opportunities for cultivating a wide acquaintanceship and keeping in touch with local conditions, is one that should appeal with force to a management that desires to co-operate to the fullest extent with all its patrons in removing the causes of friction between them. The officials of the Frisco also see in the plan another source of possible advantage. If every railway devoted more effort to securing the traffic naturally tributary to its own line, which could be carried the longest distance on its own line, instead of trying to participate in competitive traffic by moving it over an unnatural route subject to numerous transfers, earnings would be as large and operating expenses would be considerably reduced; and it is believed that this will tend to be the effect of the general solicitation of traffic by station agents instead of by special traveling traffic agents.

THE PROTECTION OF MINORITY STOCKHOLDERS.

ALMOST simultaneously there have arisen three questions affecting the rights of minority stockholders in railways and, by a singular coincidence, all three are connected with one corporation, the New York Central. One question has been the relation to that company of the minority stockholders of the Lake Shore, a subject to which we have recently alluded in a brief way. A second question has been raised by the suit against the New York Central by the Rutland minority, charging illegal practices in the past to the detriment of the minority interest, the charges including inequitable routing of business and unjust division of rates. Along with this has gone the Rutland minority's appeal to the New York Public Service Commission to secure to the minority the same price per share as that to be paid by the New Haven to the New York Central for the Rutland control. The third case is the demand before the same commission, of the minority holders of New York, Ontario & Western stock for a continuance of the old 2 per cent. dividend if control of that line passes to the New York Central—in other words, some sort of a guaranty that the minority will not hereafter be frozen out by the majority's depreciating a minority interest and later buying it in, a process of which there have geen a good many examples in our railway history.

By another coincidence, these New York Central cases illustrate the two leading phases of railway experiences in minority stockholding. On the one hand, the effort of a minority to obtain a great payment for its shares, as the price of letting the majority put through a large scheme of consolidation; and, on the other hand, the desire of two other minority bodies to prevent an apprehended freeze-out.

The history of almost any of the larger railway systems has supplied instances of one of these forms of injustice or the other or both. "Strike" and "freeze-out" are bracketed terms which long ago became familiar expressions. But, of the two, the last has had the more common place in railway annals. Majorities have squeezed minorities much more often than a minority has held up a majority. A majority *per se* is stronger. It can better afford to wait. It can easily starve a small controlled line whose business is in its hand. And, in any appeal to the courts, its legal resources are greater. Thus it has naturally come to pass that, except under a guaranteed dividend, the words "minority interest" have indicated a doubtful position. And, in less degree, minority interests in bonds, especially of weak lines, have been open to the same dangers as stocks. Indeed, by defaulting interest and subsequent reorganization, now happily much less common than in earlier times, majority control of the bonded debt of a road has been more effective for wrong than stock control, and farther in its reach, for it has sometimes wiped stock out altogether.

There has, however, been a slow but steady evolution upward. Fundamentally the minority stockholder has been shielded under the "due process of law" deprivation of property clause of the federal constitution. But for years it was, in the case of a weak minority, a theory of protection rather than a protection itself. In the case of a very few poor minority stockholders, or of a single poor stockholder unable to afford the expense of an appeal to the courts, it was no protection at all. The tendency of legislation in the states has, however, of late years much relieved the situation. It has followed the line of eminent domain, on the one hand, and the property clause of the federal constitution, on the other. A small minority must not be allowed to block an extensive scheme of railway improvement, or of refinancing, both likely to be in the public interest; and, therefore, especially if the public interest is clear, a strong controlling majority may condemn the few minority shares. But the property right of such a minority has been recognized by placing it under appraisal by a body, usually of three, in which both parties have representatives. There has thus, in most cases, been a short cut to the equities across the slow and costly litigation of the courts. Moreover, the appeals of the minorities to the New

York commission, which have had their precedents in other states, indicate yet another development in the direction of guarding minority interests in public service corporations. If it proves effective, it may partly compensate for some enlarged public service commission powers the usefulness of which is not so clear.

But for the real protection of railway minorities, as well as majorities, there is coming into play a force stronger than the courts or public service commissions. Full and accurate publicity is a restraint on corporation evils upon which there is general agreement, and which has had the emphatic approval of so authoritative and eminent a body as the Hadley commission. It is well to mention, however, that that same commission recommended specifically that a purchaser of the majority stock be compelled by law to buy the minority stock, and that a law be passed to give the majority right of eminent domain in cases of an attempted hold up. It has been the lack of publicity that has screened many wrongs of corporate minorities and, in less degree the "strikes" aimed at the controlling interests and not confined to state-house lobbies. Things could be done covertly a few years ago that would be impossible now. And public, as well as official, knowledge of facts concerning minority and majority equities will go far to restrict the evils which yet remain.

THE LEHIGH VALLEY RAIL.

A GREAT deal of discussion has been aroused by the Manchester wreck last July on the Lehigh Valley, which was caused by a broken rail. An elaborate report based on an extensive examination of this rail has been submitted to the Interstate Commerce Commission by James E. Howard of the United States Bureau of Standards; and an abstract of it appears in this issue.

Aside from the fact that it gave rise to a serious wreck, the great amount of attention given to this rail, as compared with that given to the hundreds of other rails which have broken recently, does not appear to be warranted. Mr. Howard reaches the very broad conclusion that "current railway practice in the use of hard steels and high wheel pressures has nearly or quite reached the limit of endurance of the metal of the roadway." The tendency in railway practice has been continually to increase wheel loads as the size of locomotives has been increased to handle heavier trains. Few railway men believe that the limit of this development has been reached, and if it should be found that the present rails will not withstand these heavy wheel loads, then some changes in the rails which will enable them to withstand these loads will become necessary. Mr. Howard's conclusions appear very general, in view of the fact that but one rail was under investigation, and this a rail which was defective as made and of a section which is being gradually discarded. General conclusions on which are based recommendations of as radical changes as are made in this report should be based on a large number of observations on the best material in common use. Such was not the case in this instance. The hundreds of other failed rails which have been studied from time to time by prominent engineers and metallurgists have not shown this alarming defect, but have rather shown that the large majority of failures is due to defects resulting from mill practice. The best published examples are given in the reports of the Rail committee of the American Railway Engineering Association for 1910 and 1911.

The effect of Mr. Howard's whole report is to throw the entire responsibility of rail fractures on the current railway specifications for open hearth rails. Some of the statements tending toward this view are as follows:

"The mills are making the steel which they are required to make under the specification given them.

"Current railway practice in the use of hard steel rails and high wheel pressures has nearly or quite reached the limit of endurance of the metal.

"The formation and development of internal fissures is due to the use of hard steel and high wheel pressures.

"The primary cause of the Manchester wreck was the formation of transverse fissures and longitudinal seams in the head of the rail, aided by defective metal in the web, which resulted in fracture."

If the theory of the development of internal fissures by excessive wheel pressure is correct it should be speedily demonstrated to be so beyond a doubt. The evidence, based on an examination of one rail which was manifestly defective in several respects before it left the mill, is not sufficient or of a character to be convincing or conclusive. Exception must first be taken to the broad statement that the mills are making the steel required under the specifications. The difficulties which the railways have encountered in securing the acceptance by the mills of specifications drawn by them have been discussed recently in these columns. Furthermore the effort to control those conditions which result in defective steel, seams, slag, etc., by specification, frequently fails. The railways are not able to secure the amount of discard necessary to exclude segregation, and pipes which cause seams in the finished rail, and the clause in the specifications which provides that discard shall be such that the sheared ingot shows solid steel is in its practical application entirely perfunctory. Mr. Howard's statement that rails having internal fissures in the head are not the result of mill and converter practice will be questioned by many who have evidence to the contrary, for it is well known that these same defects are often found in softer rails in which the carbon is only 0.40 to 0.60.

Most rails are made according to manufacturers' specifications, and it is difficult or impossible to get the mills to make steel such as the railways desire. They refuse to permit the drop test to be regularly carried to destruction. Such a test would doubtless have revealed the slag seam in the lot of rails which included the one under consideration. It is admitted that slag was rolled into the rail and that there was a large seam in the web: "the insidious character of pipe or slag fissures is a most disquieting feature of the case." Added to this, the section was A. S. C. E. 90-lb., with a thin base, which is not a favorable shape for hard steel rails, as it is difficult to roll it without small cracks, which open up under stress, and which with hard steel will soon lead to a fractured rail. The thicker base of the A. R. A. sections is undoubtedly better suited to the higher carbon rails.

The Lehigh Valley fractured rail had sufficient defects to cause its fracture without reference to the development of transverse fissures in the head by heavy wheel loads, which is the basis of the new theory now advanced by Mr. Howard. It is desirable, therefore, that the investigation be extended to an examination of rails which are made of sound steel. If it can be shown that hard rails which have been in the track two years, as many open hearth rails have been, develop under heavy wheel loads these dangerous cracks in clean steel in the head, then the railway specification as to carbon should be modified. According to this theory, no foreign substance in the steel is needed to account for the transverse fissures, but the fact that they are developed mechanically by excessive wheel pressure remains to be proven. The wheel loads imposed by the locomotives on the derailed train were not high, that on the Atlantic type drivers being about 28,000 lbs., and on the 10-wheel engine 25,000 lbs. per wheel, and the loads on car wheels much less. Wheel loads greater than these have been common practice for over five years, and there probably will be no tendency to reduce them. The rail must be made to endure such pressure without affecting its integrity, and must have sufficient hardness to render a reasonable service in wear, if needed economy in railway operation is to be secured. We believe this can be made and that hard rails will not be abandoned nor wheel loads reduced on account of an occasional fissure in rail heads. Undue importance has been given to this new fissure theory in the apparent attempt to throw the responsibility of rail failures on railway practice in wheel loads and on railway specification in requiring a high carbon content. The theory is not sustained by sufficient evidence, and it would be unfortunate if its presentation in such emphatic language should cause the rail maker to lessen his effort to produce sound rails.

THE RAILWAY LABOR SITUATION. II.

ON the threshold of any discussion of the labor situation on railways one is confronted by the question as to the proper relations between the managements of the railways and the labor unions. Those connected with the transportation industry, like those connected with every other one, hold widely varying and conflicting views on labor unionism. At the extremes of opinion are, on the one hand, those who believe employers should not recognize the unions or deal with them, and on the other hand, those who believe the employer should recognize and deal only with unions and union members; who, in other words, contend for "the closed shop." The *Railway Age Gazette* rejects both of these extreme views.

Considering the matter abstractly, employees, whether those of railways or any other industry, have a moral right to organize to further their interests and protect their rights in all ways that do not interfere with the moral and legal interests and rights of others. It is a question just what kinds of organizations working men may form and what objects their organizations may seek without violation of the Sherman anti-trust law, just as it is a question what kinds of organizations capitalists may form and what objects they may seek without colliding with that statute. The criterion adopted by the Supreme Court of the United States for deciding whether a combination of capital is legal is whether it squares with the "rule of reason"; and, doubtless, reasonableness is its measure of the legality of the form and objects of a labor combination. If a labor organization is in form and purposes reasonable it cannot be immoral or inimical to the best interests of society. Therefore, such an organization is both legally and morally justifiable, and there is no defensible ground on which a fair employer can object to its existence, or to recognizing and dealing with it.

Now, it is reasonable for employees to combine to get good wages and conditions of employment; and their concerted action is reasonable until they seek to so combine as to get an amount of power which would be dangerous to the interests and rights of others; or until they try to get excessive wages or unreasonable conditions of employment or other things they could not obtain without impairing the rights of others; or until in the attempt to attain their ends they use means that violate the rights of others. In the days of small industry, when the capital and number of employees of the largest employer were comparatively very small, the individual employee could, within narrow limits, dictate terms to his employer. Under modern conditions of large industry, the individual wage earner would be helpless in dealing with an employer who was disposed to be unfair, or, while disposed to be just, had wrong ideas as to what was just. Many think that working men, instead of resorting to collective bargaining, should put their trust in the employer's justice and generosity. Unfortunately, labor has no reason for believing in the unfailing justice and altruism of employers. Furthermore, the democratic fermentation which has revolutionized government, and to a considerable extent religious organizations, has extended to industry; and employees now prefer to participate actively in the determination of their wages and conditions of work rather than leave it to even the most generous and wise of employers. They want, not patronage, but to secure what they think they are entitled to in their own way.

Legally, the employer, being the owner, or the representative of the owner, of property, has a right to hire or discharge whom he pleases for good cause or none, and to fix such wages and conditions of employment as his reason, generosity or whim may suggest. Morally, his rights are narrower and his duty broader. They are the correlative and complement of the rights and duties of employees. The employer has a moral right to employ whom he pleases. He has a right to discharge any employee for good cause. He has a right to insist on reasonable wages and conditions of employment, and on efficient, loyal service, and to administer, without meddlesome interference, such discipline as may be necessary to secure such service. In brief, he has the same right to so manage his business—using that word in its broadest sense—as to further and protect all its legitimate interests that the employees have to so act as to further and protect their legitimate interests. He, or those he represents, own the business just as much, and in the same way, that workingmen own their labor or their deposits in the savings banks.

To prevent conflict between these interests, rights and duties of employers and employees, it would seem necessary, on the one hand, that employers shall recognize and deal with labor organizations that are reasonable in their form, methods and objects, and on the other hand, that employees shall concede the "open shop" principle. This principle, rightly understood, is that the employer shall not discourage organization of his employees, or discriminate against those who are organized, but shall, at the same time, be free, without opposition or interference, to employ non-union men whenever he may consider this necessary to the satisfactory conduct of his business.

Even though the correctness of the application of the "open shop" principle, as thus defined, to other businesses may be disputed, reasonable men can hardly question that it should be uncompromisingly applied to the businesses of railways and other concerns rendering a public service. For the managements of such concerns are required by the public to furnish satisfactory, continuous service. Under the "closed shop" system only members of the unions could be employed; and as the unions determine whom they will admit to membership, under the "closed shop" they would have, in effect, power to say whom the railways should employ; and, of course, on whom they employ depends the cost and kind of service they render. In other words, the managers, responsible to the public, would be delegating to organizations that are not legally responsible to the public, the performance of a task which it is the duty of the managers to the public to perform themselves. The managers have no moral right to thus delegate their duty, and employees have as little right to demand that they do so. Furthermore, for railways to adopt the "closed shop" would empower the unions to declare strikes that would withdraw all employees from service, and destroy the continuity of railway operation; and managers have no right to do that, nor employees to ask it.

The relations between the railways and their employees who are concerned in the operation of trains approximate in many important respects to what, on abstract principles, they ought to be. For example, the correctness of the "open shop" principle is tacitly recognized by these classes of employees; and from 90 to 95 per cent. of enginemen, firemen, conductors, etc., belong to the brotherhoods, and the roads seldom discriminate against men on that account. On the other hand, they sometimes employ non-union men, and while usually union members try to get them to join the brotherhoods, they do not object to their employment or retention because they are not union members. Other employees have been less reasonable. No one can have forgotten that last fall the shop employees of the Harriman lines, the Illinois Central and other western roads, through recently-formed federations, explicitly demanded and insisted on the closed shop.

The attitude and course of the shop employees were such that they may well be used as a shining example of the sort of unreasonableness on the part, sometimes of employers, sometimes of employees, that has created the railway labor problem. They sought, by including numerous crafts, to form federations which probably would be in violation of the Sherman law, and to dictate terms to the managers, the granting of which would have been incompatible with the duty of managers of public service corporations. They not only sought, by demanding the closed shop, to limit the supply of men on which the managers could draw, but also sought, by demanding the abolition of physical examinations and personal records, to disable the managers from finding out whether the union members who asked employment were desirable or not. They also attempted to impose many conditions of employment which seemed expressly designed to promote inefficiency in operation. Their attitude was just as unreasonable as would be that of an employer who should refuse to

deal with a reasonable organization of workingmen or to listen to its reasonable demands; was, in short, the sort of attitude which in some cases has caused and justified refusal by employers to deal with unions at all. For the only way employer or employees can meet persistent unreasonableness is first to argue with it and then to fight it; and if, in order effectively to resist it, it is necessary, on one hand, to strike, or, on the other, to adopt the non-union shop, such action becomes justifiable. Strikes and lockouts are war; but war is right and necessary when one of the parties closes his ears to common sense and refuses to heed the dictates of justice. Whether or not the Harriman lines and the Illinois Central will permanently adopt the non-union policy in their shops, we do not know. Perhaps it would not be expedient or reasonable to do so. But if they should, their former shop employees will have themselves and the short-sighted would-be dictators who officered their federation—blind leaders of the blind who led them into the ditch—to thank for it. The view that the course of the shop employees was unwise is not held merely by railway men and impartial observers and students. It was and is shared, we believe, by some of the principal officers of the machinists' union. It was and is shared also by the wiser heads both among the rank and file and among the officers of the brotherhoods whose members are concerned with train operation. The course of the shop employees was as extreme, unwise and iniquitous as the campaign being conducted by the National Association of Manufacturers entirely to destroy unionism.

Unreason frequently has cropped up on other occasions in the relations and negotiations of railway employers and employees. It will continue from time to time to be manifested. But if our views are not wholly wrong, there is no necessary incompatibility wnatever between unionism and efficient management and operation of railways. Such trouble as exists—and there is much of it, and it is serious—is due to the adoption of wrong or tactless policies by the unions, or the managers, or both, and can be remedied by proper co-operation between them. If the unsatisfactory conditions and their results which are complained of are to be remedied, they probably must be remedied by such co-operation. For there is not the slightest real ground for doubting that unionism in one form or another has come to stay. As well expect the modern corporation, which is a union of many capitals, to be abolished, as to expect the abolition of the union, which is a combination of the only form of capital that many possess—their labor.

NEW BOOKS.

Roofs and Bridges, Part III, Bridge Design. Fifth edition. By Mansfield Merriman and Henry S. Jacoby. John Wiley & Sons, New York. 6 in. x 9 in. 414 pages. 185 illustrations. Bound in cloth. Price, $2.50.

The first edition of Merriman and Jacoby's text book on Roofs and Bridges was published in 1894, and the fact that it has been standard in many institutions during the intervening years is evidence of its value. It has been revised four times—in 1896, in 1898, in 1902, and in 1912. The changes in bridge design and construction during the past 10 years have been very important and the present revision was made necessary in order to include practices which have become standard. The principal change in the new edition is the complete rewriting of the chapters on Fabrication and Erection, Highway Bridges, Railroad Riveted Bridges, and several other articles. The subject of erection is added in the first chapter mentioned, the matter being well covered by Warren B. Keim, assistant engineer of the Pennsylvania Steel Company. The chapter on highway bridges is entirely new, being written by F. O. Dufour, assistant professor of structural engineering, University of Illinois. While the new volume gives latest details of bridge practice, the matter is presented especially for students and young engineers, the experience of the authors qualifying them well for presenting the subject to this class of readers.

Letters to the Editor.

STEEL PASSENGER CARS IN COLLISION.

Yeadon, Pa.

To the Editor of the Railway Age Gazette:

The recent disastrous collision on a western railway in which a steel dining car was lifted up sufficiently high to permit of its being driven into and through the superstructure of a Pullman steel sleeping car for a distance of over 30 ft., and, if the report is correct, "shearing the steel of the sleeper off as if it had been cardboard," does not necessarily imply a weakness in steel construction of passenger cars, but only an unusual condition which caused the lifting of the diner and necessarily converted it into a huge shear.

In past years the writer has seen quite a number of locomotives at various times that have had the plates of the smokebox, both with and without extensions, torn for almost their full length by the endwise blows of the wooden sills of cars with which they had been in collision; and also in 1902 the boiler of a large Atlantic type passenger locomotive from which the 30 in. steel dome had been cleanly cut away close to the barrel, by coming in contact with a great boulder as the engine was hurled over a precipice while running at a high rate of speed.

Before anyone feels inclined to take a pessimistic view of the unfortunate accident to the steel Pullman car referred to, and imagine such cars to be very little safer than wooden ones, let him remember the numerous severe accidents through which many of the steel passenger cars have already passed, and also that this accident, with the deplorable loss of life, was not, nor could it under any conditions have been, attended with the added horrors of fire, as would almost certainly have been the case with wooden cars.

This accident only the more strongly emphasizes the necessity of good men in important positions, and the close attention of every man to the duties required of him.

C. H. CARUTHERS.

RAW!

St. Louis, Mo., February 10, 1912.

To the Editor of the Railway Age Gazette:

I quote as follows from the cross examination of George F. Moore, president of the Manufacturers' Railway Company of St. Louis, which is owned by the Anheuser-Busch Brewing Company, by Mr. Colston, assistant general attorney of the Louisville & Nashville, in a recent hearing before an examiner of the Interstate Commerce Commission, in the case of the Manufacturers' Railway Company of St. Louis against the various St. Louis railways:

"Mr. Colston: Do you speak as a traffic man, or are you qualified to speak in that regard, that one line could refrain from paying you $4.50 per car, if other lines published the rate, and hope to obtain any part of the business that you control?

"Mr. Moore: Well, there were other lines did obtain part of the business we control, and did not file the tariffs.

"Mr. Colston: Any substantial part of it?

"Mr. Moore: Yes, a very substantial part.

"Mr. Colston: Tell me which one?

"Mr. Moore: It is answered by this exhibit, if you would care to look at it. The L. & N. for instance, they were not punished because they were one of the last to file tariffs. The Southern Railway received quite a bit of business before the tariff was filed.

"Mr. Colston: You are disgressing from the question. I am not speaking of a punishment for taking any action or standing up for a principle, but I ask you, disregarding any hope you might have of securing a favorable determination of your controversy and collection from the line for not paying you, if there were no question of reparation involved, and the actions of the lines were final, could any line hope to obtain business which you controlled as against a competitor which would pay you $4.50 a car more than the other line would pay?

"Mr. Moore: That is a beautiful question, and I will answer that specifically. The line that paid the allowance would get the business if

there was not any hope for reparation. That is a good question. I like that; that is fair.

"Mr. Colston: Thank you. And that business that the lines did get that were tardy in putting in the allowance, was simply what they got during the suspension of the rate for the others, and pending this litigation, was it not?

"Mr. Moore: Let me hear that again.

"(Question read.)

"Mr. Moore: Yes, sir."

The industrial railway question is so involved and is surrounded by so many complications that almost all that has been said in regard to it has been correspondingly involved. When, therefore, a direct statement is made on this subject, one about which there can be no mistake, it gives one the same feeling that one experiences in a fog on the Atlantic coast when a raw east wind blows away the mist for a moment. It is raw, but it is refreshing. Such a direct statement was made by Mr. Moore in the foregoing testimony.

The first hearing on this subject did not tend to clarify the industrial situation, and the three opinions of the commission have, thus far, only added to the mistiness of the situation. The majority of the commission holds that the railway is a common carrier, but cautions the railways that they must make no allowances to it for work which is in the nature of the work of a "plant facility." This opinion has been variously interpreted, but there is only one interpretation which can be given to the testimony of the president of the Manufacturers' Railway when he said, "the line that made the allowance would get the business."

It is rather unusual for officers in charge of industrial railways to state so frankly that they give their business to the railways which make allowances to them. There has been a general feeling, indeed, that such a proceeding is illegal. There never would have been any Manufacturers' Railway case if the St. Louis railways had not been afraid of granting these allowances to the Anheuser-Busch Brewing Association through its railway. They thought the allowances were illegal. They withdrew them, for several months, and then in the uncertainty which prevailed after the commission's opinion appeared, they restored them.

The Manufacturers' Railway is asking that these back allowances be paid in the guise of "reparation," and they have been very careful to try to explain that there is no undue profit in the allowances involved.

Now their president says plainly that the traffic of the Anheuser-Busch Brewing Association is to be used to coerce the railways into paying allowances, and this in face of the views upon the subject very plainly expressed by the commission in its last annual report.*

There is no precedent for so frank a statement as this by the responsible officer of an industrial railway. The traffic managers of the industrial railways, who are usually also traffic managers of the industries which own them, are almost, without exception, gentlemen of traffic experience and of extreme tact. If one of them were asked the same question in an investigation of this kind, it is easy to predict the tortuous and unenlightening nature of his reply. Even when these gentlemen are "applying the club" to recalcitrant railways, they do it carefully and mildly. They never threaten even when they put their case most convincingly. It is probably on account of the peculiar experience of the gentleman in question that his testimony is of such a direct character. Controlling, as he assumes to do, the vast tonnage of the brewing corporation, which is estimated by the Interstate Commerce Commission as one-thirtieth of the total railway business of St. Louis, he appears to have encountered so little opposition in forcing his views that he has not found it necessary to beat about the bush.

It is almost a pity that the Manufacturers' Railway should have so given its case away, as there are many grave questions in connection with industrial railways for which we are looking to the Interstate Commerce Commission for guidance, and which it was hoped this case would settle.

The commission has pointed out plainly what shall be done in case an industrial railway serves only one industry, but it has not drawn the line in cases where an industrial railway serves more than one industry. Indeed, although the commission is in the habit of alluding to all of its decisions on this subject as if they were of a uniform tendency it is difficult to reconcile the old ones with the new, and the only attempt to lay down a rule which could apply to all such cases is the opinion of Commissioners Lane and Meyer in this very case. Although this opinion technically concurs with that majority opinion which has caused so much confusion it is very different from it, in that it suggests that all of the industrial cases could be settled if the railways were to so amend their tariffs that the terminal charge should in all cases be separated from the transportation charge. There are immense difficulties to be overcome before such a policy can be adopted by the railways of this country, but the suggestion is certainly a logical one and appears to be applicable to all cases.

It is to be hoped that this admission of the Manufacturers' Railway that it is doing what the commission itself says, "even if legal in form is illegal in fact," has not so prejudiced its case that the final decision, when it is handed down, will settle this case and no other. What the railways need to settle this industrial question is a broad indication of the policy of the commission.

RAILWAY MAN.

*"The evils most difficult to detect and to prove today are those arising out of the community of interest of certain carriers and industrial corporations. The ownership of industrial corporations by carriers and of carrier corporations by industrials is frequently taken advantage of to defeat that equality between shippers which the act contemplates. This is accomplished by unreasonable divisions of joint rates, forced upon the carrier by powerful shippers who control industrial railroads. Such arrangements may be legal in form, although certainly illegal in effect. We find that a certain number of large industrial concerns control tracks and terminal facilities nominally owned by small railroad corporations which do not rise to the dignity of common carriers, but which are treated as such by the connecting carriers. As a result, the connecting carriers make a switching allowance or a division of the joint rate to such terminal lines, which practice unquestionably results in discrimination and places the industrial at an advantage in the market. Another form of discrimination is found in the leasing of property by carriers to shippers for a nominal consideration with a further agreement that all shipments made by the lessee shall be routed over the lines of the lessor.

"It becomes increasingly evident that entire freedom from discrimination can be secured only by a complete separation of the business of transportation from every form of commercial or industrial enterprise."—Extract from twenty-fifth annual report of Interstate Commerce Commission.

RAILWAY ECONOMY AND EFFICIENCY.

Ennis, Tex., December 20, 1911.

To the Editor of the Railway Age Gazette:

Just at present everybody is engaged in regulating the railways, and many of our most ardent regulators are entirely too prolific in theories which are not evolved from actual experience.

The efficiency theorist showed conclusively that a million dollars a day could be saved by the adoption of Midvale shop methods. The theory was correct, but not even the man who advanced it would undertake to apply it in railway shops. The bemis and piecework plans have been on trial for years on various railways, but no advantage has been developed of sufficient magnitude to make the plans universally acceptable. Both schemes are strenuously opposed by organized labor and piecework cannot be supervised closely enough to make the work as safe for locomotives and cars as day work.

The Illinois Central's experience with piecework is an indication of what may be expected from piecework in car repairs. Piecework or contract work, which are almost identical on railways, has always offered too many opportunities for leakage.

After removing the halo from efficiency we are told that efficiency only means economy in an intensified form, and that

we are woefully wasteful, in face of the fact that we can and do haul a ton of freight ten miles for seven cents, pay good wages, use the best material obtainable, and make money at it. The cost of transportation was reduced almost every year while the railways were managed by railway men, but there has been no material reduction in the past few years, and there is likely to be none until conditions change.

We can legislate railways into bankruptcy or out of existence, but we can't legislate a mile of railway into existence, nor an existing bankrupt railway out of debt.

The high tide of prosperity which rolled over us in 1906 found every western and southern road unprepared, fully illustrating our need of more and better equipped railways. Another such year would find the same condition. Very little has been done, because very little could be done. Improvements could not be made from earnings because expenses have been heavily increased in a supreme effort to satisfy the laws, the public and the employees. The economy theorists who charge extravagance and seem to show by tests and diagrams that millions could be saved, apparently overlook the fact that economy has been the war cry on every railway since the wheels began to go round, and that every ounce of gray matter owned and operated by every railway official in the country is being exercised every day and a portion of every night in efforts to cut down expenses.

Economy has been carried to such an extreme on railways that it is positively dangerous to economize further. The need of the present is an intelligent expenditure of several hundred millions of dollars to bring our half-baked railways up to a state where they can be efficiently and economically operated. Outside of five or six of the very old eastern roads we are blocked, cramped or congested during every crop-moving season. Terminal facilities in all of our large cities are travesties, there are very few miles of double track, and still fewer miles of perfect single track, hundreds of miles of rickety wooden trestles and bridges, many obsolete engines and few properly equipped shops and roundhouses. In the meantime every business is growing except the railway business, and no hope can be entertained from increased revenue, nor can any inducement be offered for new capital to enter the field, either to improve existing lines or to build new ones.

Reverting to the economy theories, one writer suggests that the railways ascertain the lowest cost for putting in ties, and with that figure as a basis contract for putting in all ties needed. Theoretically, that would be economical. Practically, every well informed railway man knows what it costs to put in ties; he also knows that he can put in ties cheaper than any contractor can, and he also knows that all track built by contract has to be rebuilt before it is safe for trains. It requires close supervision by a competent foreman, who has the company's interest at heart and his job at stake in order to get ties properly applied.

Other theorists point to heavy losses in fuel consumption, and we all know that there are losses. The subject has had more study, perhaps, from the economy standpoint than any other. Every method known to theory or practice has been tried, even to reburning the smoke, and after all nothing better has been found than an intelligent fireman, who takes advantage of the particular conditions met with in the different trains, engines, coal, grades and weather that he may find necessary to know in order to get the best results. This knowledge he must gain by actual experience and practice.

Years ago many roads adopted the practice of keeping a record of the fuel oil used and wasted by each engineman during the month, compiling a list each month showing the amount of supplies used and the miles run by each man, and posting this list so that each could see where he stood. The practice has been to some extent discontinued, and it is safe to assume that this would not be the case if it had been found to effect a saving.

It is highly improbable that any two trains have ever run over any road under exactly the same conditions. No two engines steam exactly alike, no two tanks of coal and no two tanks of water will produce like results in steam, no two trains require exactly the same inertia to move them. Then, there are to be considered variations in drawbar slack, the adjustment of brakes, variations in journal friction, moisture on the rail, length of train, variations in friction of trucks in rounding curves, and the condition of the weather. The amount of fuel required depends on all of these and many more conditions, and it is a wise fireman who can take every advantage presented on a trip.

In a recent article by L. C. Fritch, published in the *Railway Age Gazette,* a table is presented showing the number of miles of railway operated and the total cost of fuel used each year for the past ten years. As an exhibit of the vast amount expended for fuel each year it is undoubtedly correct, but it does not show whether or not the railways are gaining in fuel economy.

Every division superintendent on every well organized road, as well as his subordinate officers, knows each month the exact cost of fuel on his division, not only for each month, but for the corresponding month in the preceding year, and also the cost of every other item of expense charged against his division. His fuel expense is shown in tons of coal or barrels of fuel oil, as the case may be, as well as in price per ton or per barrel, together with gross ton miles and net ton miles run per ton of fuel, locomotive miles and train miles per ton of fuel, and this expense is segregated as between passenger, freight and switching service. Explanations are in order to cover any unfavorable comparison, and in almost every instance an improvement is urged.

Practically all roads are using, or have tried every means known to science, theory and practice to reduce their fuel expense, and there are but few that have not in their service the best informed men that can be found, whose sole duty it is to reduce fuel consumption. In the article by Mr. Fritch above referred to, results of a very satisfactory fuel test are shown, but it does not follow that the same results could be obtained in ordinary practice, not that there was a real saving in dollars and cents in the actual test. In making the test the same locomotive and the same crew were used on a run of 446 miles on a passenger train. Such a performance could not be duplicated on half a dozen of our railways. Over half the trip a second crew was used, as pilots, and we may assume that this second crew was paid for 446 miles, as it undoubtedly had to deadhead back. The cost of an engine crew for that mileage under our western schedule of $4.40 per 100 miles for enginemen and $2.65 for firemen would amount to $31.44, and this amount would likely buy more coal than was saved. Besides, there was probably a high-priced expert or two at $8 or $10 per day; but of this we are not advised. So unless the test developed just how to fire an engine in order to save fuel, and this method can be applied under ordinary conditions, and railways can succeed in having firemen learn and use the method, we must conclude that the test was of little value.

Railways practice every economy that they have been able to devise that will save money. The practice of economy at any cost is an entirely different matter. The economy germ has been boring into the railway official since before the epizootic epidemic. One of our early childhood recollections is the story of the economical roadmaster who discharged his foreman if he found as much as a lost spike on his section. He often walked over sections on the look out for waste material, and one day found a spike on Hogan's section. When he got to Hogan's gang he called the boss and pulled out the spike; but before he could explode, Hogan jumped for the spike, yelling: "My God, did yuh find ut? I've had Casey out three days looking for ut. I knew we lost ut!"

J. F. SUGRUE,
Assistant Superintendent, Houston & Texas Central R. R.

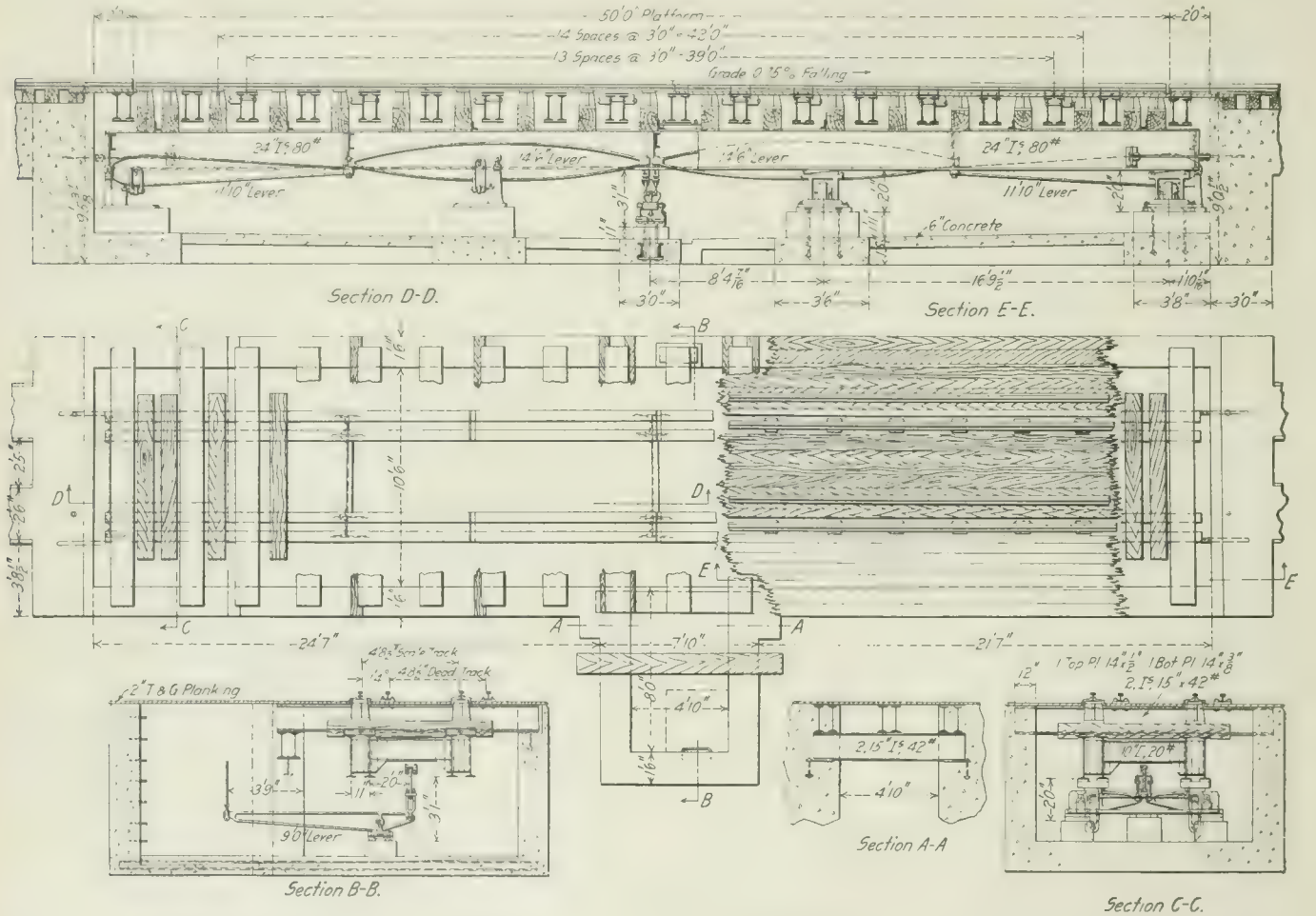
TRACK SCALE ON THE BALTIMORE & OHIO.

BY L. D. DAVIS,
Chief Scale Inspector, Baltimore & Ohio.

The Baltimore & Ohio organized a scale department in 1909, with a chief inspector in charge, to give general supervision to the installation, maintenance and testing of scales. In January, 1911, the duties of this department were extended to include all matters pertaining, in any way, to the subject of scales and weighing, and the former scale department was merged into a weighing bureau. One of the first things to be done, in 1909, was to adopt a track scale, which, in design and method of installation, would meet the requirements imposed on it. Although the Baltimore & Ohio, at one time, made all of its scales, it was decided not to manufacture these scales if suitable ones could be purchased at reasonable prices. Detailed drawings and specifications, covering a four-section, 300,000-lb. capacity, "pit-suspension-bearing" scale, were made, and the design and method of installation described herewith were finally adopted.

A scale of four sections was adopted for the following reasons:—First, it consists of only 14 levers up to the beam, while the general type of five and six section scales have 18 and 22 levers respectively, and accordingly a greater number of pivots, bearings and connections. Second, the decreased number of levers, pivots and bearings reduces the total amount of friction without materially limiting the strength or the life of the scale. The governing factor in a scale is the capacity per section, as the weight of half a car is practically concentrated successively on each section. Third, in a four-section scale the force applied at the load supporting stand (except at the fifth lever, which transfers the load to the scale beam) acts downward on the foundation and is controlled better than when acting upward, as in the general types of scales of more than four sections. Fourth, on account of the fewer number of parts, bearings and connections, the scale is more sensitive; its adjustment is better maintained and it is easier to repair.

All levers and other parts were designed to carry a load of 75,000 lbs. per section, allowance being made for dead-weight, and 100 per cent. for impact. The main and the fifth levers, the cross-bars and the rocker are made of cast steel, while all other levers are made of cast iron. Although it is intended that the scales shall be used for weighing cars, it is necessary that they be made of such capacity that any rolling stock may pass over them without danger of injuring them. They were not only designed for a safe working load, but also for keeping the deflections of the levers at a minimum. When a lever is deflected its two arms are liable to have different relative positions under different loads, and this interferes with its proper adjustment, making the scale more or less inaccurate.

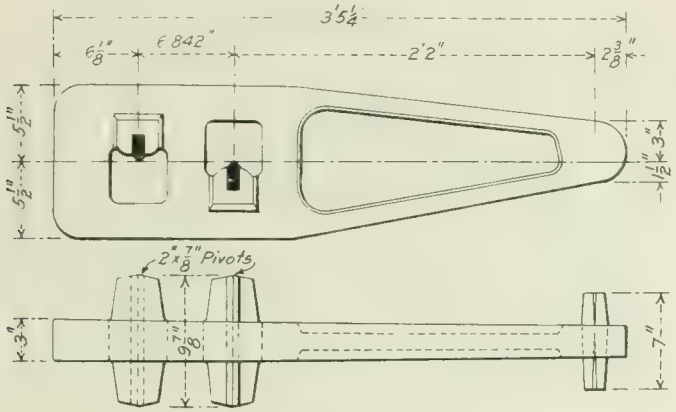


General Arrangement of Baltimore & Ohio Four-Section, 300,000-Lb. Capacity Track Scale.

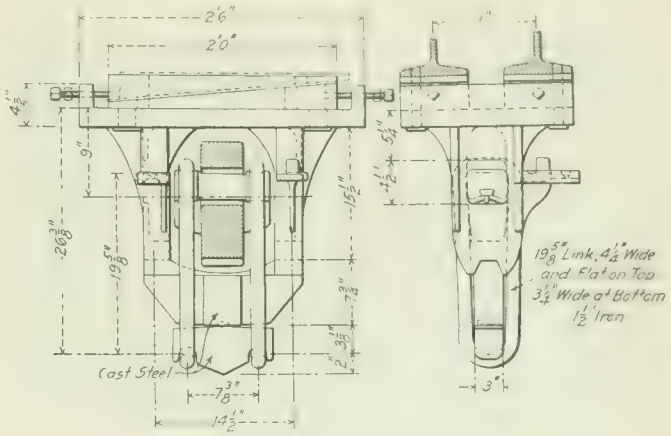
By referring to the drawing of the main or transverse lever it will be seen that it differs materially from the usual design. This lever permits a bearing on the entire length of both of the main supporting pivots, which are 9⅞ in. long, or an increase in length of about 70 per cent. over those used in the common 200,000-lb. capacity scales. Another feature of the design is that the pivot line is located in proper relation to the neutral axis, as it is in the other levers. The scale stands are rigidly supported by concrete foundations, and the load is supported at eight points on the middle pivots (commonly called the knife edges) of the main levers. From these the load is transmitted and reduced through the extension, fifth and shelf levers, to the beam, at which point a force of 1 lb. balances a weight of 800 lbs. on the scale.

The construction of the suspension bearing is shown in detail,

and, as shown in the section *CC* of the general arrangement of the scale, the load is transmitted from the rail through the scale stands, the ties, I-beams, or bridge, to the bearing yoke, and then to the cross bar and rocker. The rocker is suspended by two 1½-in. links, hung from a bearing block, which rests on the knife edge of the main lever. The arc of suspension from the base of the rail to the bottom of the rocker is 79 in., which gives the platform a freedom of action with sliding friction, longitudinally, between links, rockers and bearing blocks and a transverse pendulum motion on the main lever pivot. The rocker



Transverse Lever.



Suspension Bearing.

compensates for any deflection there may be in the bridge, and a uniform bearing on the knife edge is always secured.

The wedges, as shown on top of the bearing yoke, provide the means of securing a uniform distribution of the load on each section, which might otherwise be prevented through the unevenness of the I-beam, the installation, or the wear of the scale parts. The extension lever stands are provided with compensating steels. Another important detail in the construction of these levers is the accessibility of the nose iron pivots, and the means provided for proper alinement of these levers. They are also fitted with leveling tabs on the top of levers.

Two of the most important features given consideration in both the design and the installation of the scale were simplicity and accessibility. All pivots in the scale are accessible for inspection and cleaning. The scale pit is 54 ft. long by 10 ft. 6 in. wide and 7 ft. 3 in. deep, and is equipped with electric lights. In general, more scales rust out than wear out, and the short life and inaccuracy of many scales may be traced to lack of attention in the way of cleaning, inspection and testing.

The method of installation is shown in the various illustrations. The main lever stands rest on 2-in. bed plate castings, which are anchored to a concrete pier through slotted holes. The main lever stands have slotted holes in a direction at right angles to this, permitting some adjustment, lengthwise or crosswise, which may be found necessary in the installation. The bed plate castings are planed, as are the bases of all scale stands, so that a true seat on the foundation is secured. The bearing blocks, cross bars, rockers and bearing yokes are machined to exact dimensions, and all loops and links are not permitted to vary more than 1/16 in. In this way the parts of the scales are made interchangeable and repairs can be promptly made. The extra machine work throughout its construction undoubtedly compensates for the increased weight, as is shown by the sensitiveness of the scale.

The bridge is made up of two 24-in. 80-lb. I-beams under each scale rail, so as to provide the necessary rigidity and to better distribute the load over the bearings. The ties crossing the I-



Baltimore & Ohio Track Scale.

beams provide a cushion and protection to the scale, and, in addition, serve to brace it. The grade on hump scales is made with them, they being adjusted to 0.75 per cent. grade. The dead-rail and platform are carried on 15-in. 42-lb. box beams, which are supported by the side walls, entirely independent of the scale construction. The scale rails are carried on cast iron stands projecting through the platform, and the opening is protected by ¼-in. shields, bolted to the scale rails. The floor is not framed around the stands, but runs parallel with, and ¾ in. from them on each side. On the edge of the floor are placed 1½ in. x 1½ in. x ¼ in. angles, which keep the water from the opening and prevent dirt from getting into the pit. A 1⅞ in. x 6 in. tongue and grooved platform has been used; while it was not thought that this would make the pit waterproof, yet by the application of white lead to some joints, and pitch in others, a considerable amount of water and dirt is kept out, and experiments are being made with a view to getting a tighter deck.

It will be noted that the scale parts are 54 in. long, while the scale rails are but 50 in., which results in the load being applied to the scale inside of the first bearing, thereby distributing a part of the load to the second bearing and preventing a reflex action of the bridge. In order to further relieve impact on the scale, a buffer or transfer rail, made of manganese steel, is used to transfer the load from the approach to the scale rail. This is bolted to the approach rail and the box beams, and carries the outside tread of the car wheel. The buffer is in no way connected with the scale, plenty of clearance having been provided by cutting it out underneath and planing off the outside head of the scale rail.

The views, as shown, were taken in most cases before the forms were removed. The scale walls are built up to within an inch or two of the bottom of the floor beams, after which the scale and bridge are installed. The box beams are then set to the proper elevation and grade, and the walls finished flush with the top of these beams. The Baltimore & Ohio has just finished installing two of these scales in connection with improvements at Fairport, Ohio, on Lake Erie, which is its principal ore port. One view shows the scale located on the hump installed alongside of a street. An opening has been provided in the sidewall, which is done in all cases where possible, so as to light and ventilate the scale pit. There is no opening in the floor to the pit, but access is obtained through the basement of



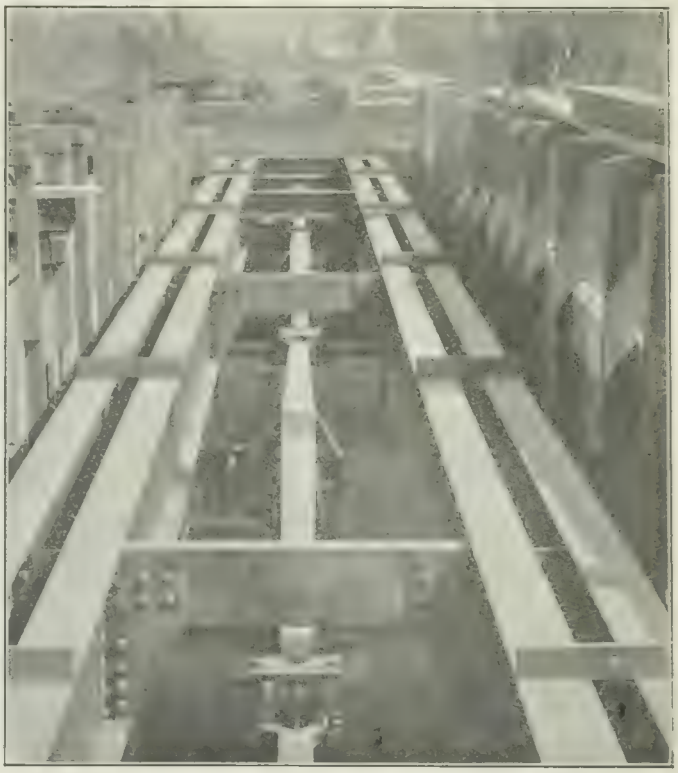
Scale Track Supports.



Location of Track Scale, with Door for Ventilation and Light.



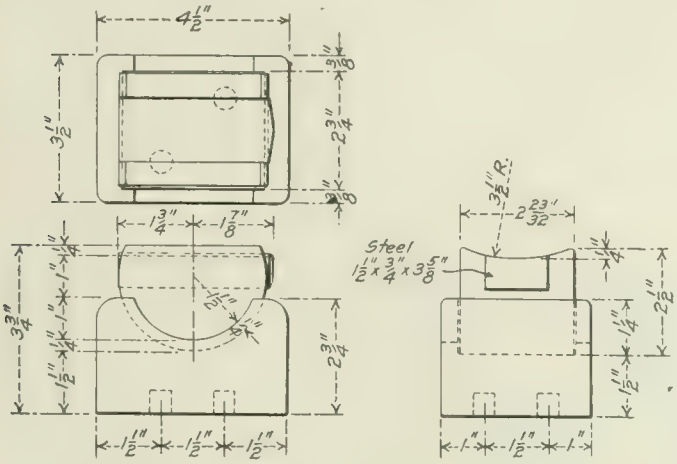
Lever Arrangement for Baltimore & Ohio Track Scale.



I-Beams for Bridge of Track Scale.

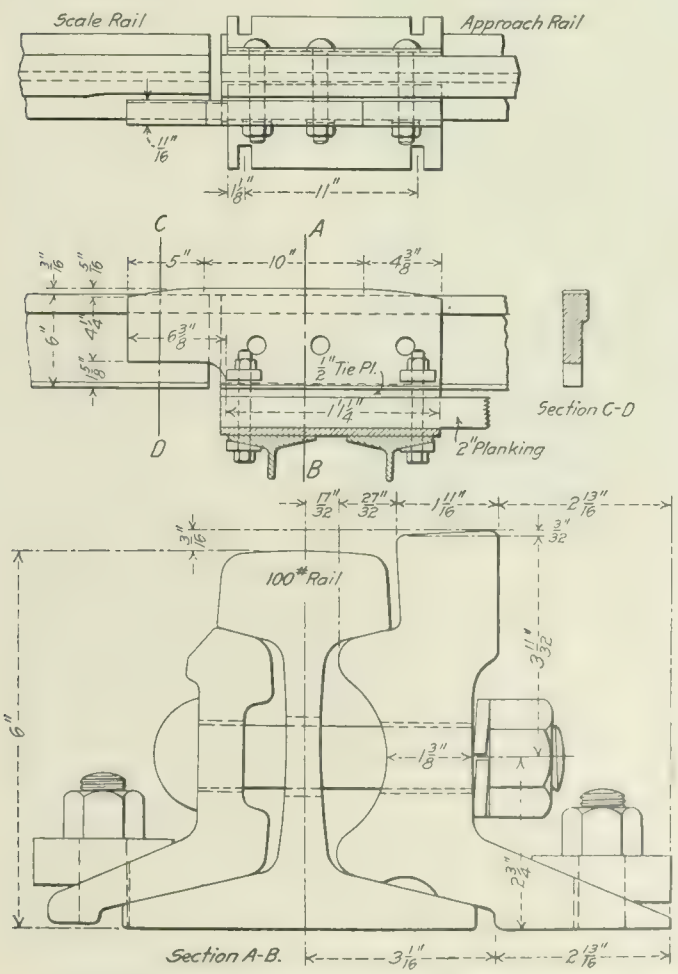
the scale house and the fifth lever outlet of the pit, which has been left open.

In addition to these two scales, 20 others of the same type have been installed at various points on the lines of the B. & O. since January, 1910, and eleven more have been authorized to be installed during the present year. The first of these scales, in-



Compensating Steels in Extension Lever Stands.

stalled in January, 1910, had weighed, up to the first of February, 1912, approximately 330,000 cars, or 14,000,000 tons, and another, installed in March, 1910, had weighed, up to February, 1912, approximately 213,000 cars, or 9,000,000 tons, without having been out of adjustment in that time, nor does inspection show perceptible wear. The scales are tested every 30 to 60 days, with a scale test car, and are cleaned at least once every week,



Buffer Rail for Easing Shock on Track Scale.

all the bearings being wiped with waste dipped in oil. This has prevented almost entirely the rusting of scale pivots, which is so destructive. Briefly stated, the results obtained from these scales are attributed:

To the suspension principle of design.

To the rigidity of the design and installation, which results in less deflection and movement of the levers, thereby reducing friction on the pivots.

To their accessibility.

To extra refinements in the way of compensating steels, interchangeable parts, lining wedges, and general machine work.

To the increased length of the pivot bearing, resulting in a smaller load per lineal inch of the bearing.

To the regular attention which they receive in the way of inspection, cleaning and oiling, which has prevented rust and accumulation of dirt and general deterioration.

NEW JERSEY REPORT ON FULL-CREW BILL.

The Public Utilities Commissioners of New Jersey, R. Williams, T. J. Hillery and W. M. Daniels, have issued a report on the proposition which was before the legislature of that state a year ago, to enact the full-crew law, having been requested by the Senate to investigate the subject. The board disapproves the bill on the ground that it was too rigid for general application. The bill was No. 83, introduced by Senator Leavitt. It is crudely drawn, but contains in substance the usual provisions; one flagman and two brakemen on a freight train; a conductor and a flagman on an engine without train; and one brakeman and one flagman on all passenger trains of five cars or more. Any corporation or individual operating a railway within the state would be liable, for each offense, of from $100 to $500 penalty. The commissioners held a hearing in Trenton on November 1, and in Newark on November 15. Following are the essential parts of the report:

There can, of course, be no denial of the proposition that the crews which operate trains should be adequate to afford safe, proper and adequate service. The provisions of Senate Bill No. 83, however, appear to us to be too rigid, mechanical and drastic, and not framed so as to insure the most economical attainment of the end in view. The bill is question makes the number of cars carried on a train the exclusive determinant of the size of the train crew. It is incontestable that there are other considerations which ought to be weighed in determining the size of a train crew. Among such considerations are the number of stops which a train is scheduled to make, the seasonal alterations of operating conditions, the difference between through and local service, both freight and passenger, the amount of switching required and the conditions under which it is performed, and the differences in grade over which trains are run. All of these factors, and possibly others, such as the number of porters on trains carrying chair-cars and sleeping-cars, are legitimate determinants of the proper size of a train crew, and are entitled to legitimate consideration no less than the number of cars carried.

An essential part of the service required of the trainmen of a passenger train is connected with supervising the embarkation and alighting of passengers. An immigrant train, for instance, scheduled to make a single stop in its journey through New Jersey would require a minimum of trainmen's service of this character. . . . Another train, carrying hundreds of commuters and making numerous stops, will involve a very considerable amount of work of the character described. To prescribe a sixth train hand on all passenger trains carrying five or more coaches, with no reference to other conditions, would quite ignore other valid considerations. The differences just illustrated exist in some degree when the requirements of through express trains are compared with the requirements of local or accommodation trains. Particularly marked, also, is the contrast between through freight service and local freight service.

The through freight may move across the state without taking on or putting off a car until tidewater is reached. The local freight may drop and pick up cars at every station. It is quite conceivable that a through freight train carrying 60 loaded cars in its journey through the state may require of the crew less work than a local freight train of 10 cars on a 10-mile trip. It seems therefore manifestly unreasonable to prescribe the extra trainman simply on the grounds that 30 or more freight cars are carried.

The totality of complex conditions under which trains are operated is the essential determinant of the size of the crew. . . . There is evidence that a heavy down-grade, especially in winter, necessitates a greater number of train hands to work the air-brake retainers, when necessary, than when the train is moving upon a general up-grade. . . . Another objection to the proposed measure is that it does not, with sufficient explicitness, provide for train movements within a yard as contrasted with runs upon the open line. Nor does it define in any way the length of run which might be permitted with a train crew of less than the designated size. Trains operated by electricity would have no use for the "fireman" named in the bill.

There is also to consider the questions how far the operation of trains with crews of the present size is safe, and how far the additional expense entailed by the proposed bill would add to safety. At the two public hearings the advocates of this measure were unable to cite any serious accident resulting from the employment of insufficient train crews. It is true that two or three minor accidents were cited where a passenger alighting tardily was not sighted by a trainman until the train was in motion, and where slight injuries resulted. But nothing like proof of frequent or serious accident resulting from too meagre provision of train hands was forthcoming. In our opinion this is significant; and while, as will be indicated later, a real shortage of trainmen's service is in some instances probable, the test of experience does not negative the allegation that train crews at present are on the whole competent to afford safe and adequate service, both passenger and freight. Statistics showing the general mortality among employees, or even the increase in such mortality, are not in point as evidencing accidents that have resulted from under-manned trains.

In case it is the fact that, barring some exceptional cases, the train crews as at present made up are able to afford fairly safe and adequate service, the cost entailed by Senate Bill No. 83 ought to militate against its enactment. One company estimates the added cost to it under the law would be one hundred thousand dollars per year, and an even larger estimate of the extra cost was presented by another carrier. The extra cost, if not compensated by solid advantage accruing to the patrons of the roads is a public and social waste. It will be recouped by the companies, if they can recoup it; and will not improbably lead to the postponement or abandonment of improvements, some of them already projected, whose advantages to both the companies and their patrons would be greater than the added advantage resulting from the automatically enlarged crews.

There is also some appreciable weight to be given to the view that a uniform enlargement of train crews, where such enlargement is demonstably unnecessary, will make against the maintenance of proper discipline in the service. . . . The general equipment of trains with automatic brakes has quite transformed the work of the brakeman.

We do not give unqualified assent to the contentions urged on us repeatedly by the railway companies that their corporate self-interest is a complete guarantee that adequate train crews will always and everywhere be provided on every train. This board's inspectors have discovered instances in the case of certain carriers where economy has been pushed beyond the limits consistent with safe service to the public. Thus, the withdrawal for a time of trackwalkers upon an important line was an instance of economy pushed to the verge of peril. One witness cited certain West Jersey & Seashore trains. On an electric train of five coaches and, carrying upwards of five hundred passengers, the train crew consisted of but three—the engineer, the conductor and one extra trainman. . . . Sometimes the rear trainman, by reason of collecting tickets or some other work, is found too far forward, occasionally in the fourth car from the rear. In case of a sudden stop, it is his place to protect the rear of the train with flag or lantern. It might happen that delay to reach the rear of the train promptly would result in accident. In all probability there are certain instances, perhaps not numerous, but nevertheless real and pressing, where train crews ought to be increased.

The companies have contended that under the Public Utilities Act this board has power to require the enlargement of train crews.

The board thinks that under the sections cited, it has the power to order an increase in the size of a train crew where such increase is necessary for the carrier to "furnish safe, proper and adequate service." But with a force of three, or at times of four, inspectors in the railway division, the board must provide for the inspection annually of some thousands of miles of track with their bridges. It must investigate every accident resulting in serious injury or in loss of life. It must inspect the locomotives and equipment of railways operating in the state. These tasks, with the investigation of manifold miscellaneous matters, fall primarily upon the inspectors. Nor is this a plea for more inspectors. The work which requires the entire time of hundreds of experienced railway officials cannot and ought not to be duplicated by the employees of a state board. . . . To correct the ordinary case where the crew is inadequate, the board would have to be apprised by a complaint lodged with it. The board is anxious to expedite hearings on complaints, but the interchange of pleadings, the frequent requests for adjournments, and the time required for the hearings themselves, often involve a period of some weeks before an order can issue. Some carriers have resorted to the courts for a stay of the board's order. This is, of course, their legal right and privilege. But the frequent demand for specific and mandatory statutes regulating railway operation is fomented by the feeling that obstructionist tactics may be resorted to when regulation is attempted by administrative orders. . . . While this board disapproves of Senate Bill No. 83, as defective and erroneous in principle, and while it believes that a preferable policy is to allow this board, under its present powers, to order an increase of a train crew, when found necessary, it suggests that a more expeditious procedure may have to be provided by statute, if experience demonstrates that administrative regulation is not effective.

Hongkong importers who expected a revolution in the trade of the Yunnan and Kwangsi provinces in South China as a result of the operation of the railway from Haifong to Yunnanfu, have come to the conclusion that under present conditions much of the expected expansion will prove impossible. There has been a considerable increase in some lines of trade into and from these provinces, but the increase has been due, to some extent at least, to generally improved conditions and internal development in the provinces, and in spite of drawbacks due to railway conditions. The usual direct results of railway service have been minimized by interrupted service, troublesome customs and other charges, and particularly by high freight rates. In spite of the opening of the railway, freight is still imported into Yunnan, Kweichow and West China by rail through Burma, thence by pack train to Bhamo and on to Tangyueh, in the province of Yunnan, and then to Batang, in the province of Szechwan, about 400 miles north, or to Talifu, and even to Yunnanfu, whence the goods are distributed all over that part of the country, as they have been since the beginning of the trade. These costly means and tedious routes are used in spite of what would seem to be the manifest advantages of the rail route to Yunnanfu or to intermediate points and thence by the natural caravan routes to various points in the West China. The expected change in the direction of imports has not been realized, and present indications are that the railway transportation charges over the line to Yunnanfu will have to be modified before any change can be expected.

FRANK TRUMBULL.

Frank Trumbull, chairman of the board of directors of the Chesapeake & Ohio and for some time one of the most active directors of the Missouri, Kansas & Texas, has been elected chairman of the board of directors of the Missouri, Kansas & Texas, succeeding Edwin Hawley.

Before buying, with Mr. Hawley, control of the Chesapeake & Ohio, Mr. Trumbull was president of the Colorado & Southern. Under his management the Colorado & Southern was built up physically and financially, starting with two bankrupt Colorado railways, to a railway tapping a good part of the richest sections of Colorado and running to the gulf of Mexico, and a property which the Chicago, Burlington & Quincy was glad to buy.

Sometimes a successful man has some one quality which may or may not have contributed to his success, but which is associated in the mind of everyone who knows him with the man himself as much as is his name. It is probably not an exaggeration to say that nearly everyone who has ever come in contact with Frank Trumbull has been impressed with the courteous consideration that forms so essential a part of his character. Not only those who have been associated with him in business but those who have worked for him as well have enjoyed and felt this considerateness This is true, despite the fact that Mr. Trumbull is a very rapid, nervous worker who has been in harness, with hardly an interruption, since he was a young boy.



Frank Trumbull.

As a railway man, he has been a real all-around railway man and not a speculator. His policy on coming to the Chesapeake & Ohio was one of expansion and aggressive progress. He realized the possibilities that lay in the development of a soft coal road, running with low grades far enough west so that it needed but a short link to connect it with the lakes and thus make it a trunk line. This connection Mr. Trumbull gave the property, first by the purchase of the Hocking Valley, and later by the purchase of the old Chicago, Cincinnati & Louisville. Personally owning a large block of stock of the Chesapeake & Ohio, Mr. Trumbull's aim has been to expand its property only as fast as it was financially feasible; to earn and pay an actual and not a nominal dividend to its stockholders, and to carry forward as rapidly as possible a very extensive policy of betterment and improvement. It is a fact well worthy of consideration that in neither the Colorado & Southern case nor with the Chesapeake & Ohio has a policy of expansion been allowed to interfere in any way with the upbuilding of the property and its continual betterment. The Missouri, Kansas & Texas needs such a policy.

Mr. Trumbull was born in Arcadia, Mo., in 1858, and began railway work when he was 16 as a clerk in the comptroller's office of the Missouri, Kansas & Texas at Sedalia, Mo. He had already been at work for four years as clerk in the post office and country store at Pleasant Hill. On the M. K. & T. he worked seemingly naturally into the accounting department and was at one time a traveling auditor. In 1881 he went to the Missouri Pacific, continuing chiefly interested in accounting, and in 1886 he was selected as an adviser for the receivers of the Texas & Pacific. In July, 1888, he gave up his direct connections with railway work and was interested in the coal industry being rapidly developed in Colorado. At this time, however, and at various times during the next five years, he was engaged by New York or London bankers to make reports on railways and other properties in the West. On December 18, 1893, he was apopinted receiver and general manager of the Union Pacific, Denver & Gulf, and in August of the following year was made also receiver of the Denver, Leadville & Gunnison. In 1899 the roads were reorganized as the Colorado & Southern and Mr. Trumbull was elected president of the new company. From 1899, when Mr. Trumbull became president, until 1908, when he sold his interest, which together with Edwin Hawley's constituted control to the Chicago, Burlington & Quincy, the net earnings of the C. & S. increased by ten times.

It is unusual for a man to work his way to the top through a railway accounting office, and yet it seems in a way rather surprising that it should be unusual. It is not at all unusual, or was not, for men to work their way from a bookkeeper's desk to membership in the firm in mercantile business. The reason that so few railway presidents have come through the accounting department is probably due to the fact that in a railway accountant's office the figures are so numerous and in such detail that a man, unless he has an extraordinary broad grasp of the meaning and relative importance of statistics, is swamped and loses all sense of the fact that his work is simply a translation of facts.

The Russian government has granted concessions to corporations to build a considerable system of railways in the territory south of the Siberian Railway in the valley of the upper Obi river, on the west shore of the Altai mountains. One line is to be built from the Siberian Railway south by west through Barnaul to Semipalatinsk and Bijsk, 505 miles, another line is to be built from Aris, a station on the Orenburg Railway, about a 100 miles north of Tashkent, eastward to Pishpek, and later to Wierng, 430 miles; while the government itself will build a line to connect these two. Only the mountains lie between this territory and Mongolia.

EXTENDING THE AUTHORITY OF THE STATION AGENT ON THE FRISCO.

The St. Louis & San Francisco is working out an interesting plan for enlarging the authority and responsibility of its station agents. The plan is based on the idea that this class of employees can be trained to do more useful work for the railway, while at the same time improving their own condition and opportunities for advancement, by making them the representatives of the company in all matters regarding which they may show themselves capable of acting for it.

At most railway stations the agent is the only resident representative of the company, and for that reason he frequently becomes charged with responsibilities beyond his power to act. It is the belief of the management of the Frisco that by making him in a larger sense a business man, with broad authority, in accordance with the practice of large business institutions in other lines, a good agent will be found capable of handling many matters that now require the attention of a superior office or a special representative.

The first part of the plan was put into effect last year, after the Frisco adopted the plan of transferring to the operating department the function of making settlements of claims. On August 1 the agents at all stations were authorized to pay from station funds claims for visible loss and damage in the case of both carload and less than carload freight, with certain exceptions, and within the limit of $50 for any one claim. This feature of the plan is no longer an experiment, but has so demonstrated its practicability and advantages that it is now regarded as a permanent arrangement, and at a recent conference of the heads of departments it was decided to extend its scope.

The Western division, comprising the lines from Tulsa to Avard, Okla., and from Beaumont Junction, Kan., to Vernon, Tex., including 62 stations, was selected for a further test of the plan of broadening the agent's authority beginning January 1. The station agents on this division were informed that they would be held responsible for all solicitation of traffic and for the proper handling of all claim matters, in addition to giving attention to other matters affecting the company's interests in their territory. Upon the success of the scheme on the Western division will depend whether it shall be extended to other parts of the line as well as how much its general scope shall be broadened in the direction of further increasing the agent's authority.

The purpose and scope of the plan were outlined in a letter by Vice-President W. C. Nixon, a copy of which was furnished to each station agent on the Western division, and the carrying out of the details was left to the superintendent of the division, who was authorized to increase the force at certain stations if necessary. The working of the entire scheme is under the general supervision of General Manager W. T. Tyler. The general superintendent and the divisoin superintendent made a trip over the division to explain the scheme to the agents and found that but a slight increase in force was necessary to enable them to perform the additional duties.

No changes in salaries were made at the start. The men were told that their salaries will depend on their own efforts, but that their condition as employees as well as their standing in the community will be materially improved, if they make the most of the opportunity, and that the company desires to make the importance of the position of agent greater than it has ever been before.

Attention was first given to the subject of securing business for the road. The territory of the different agents was clearly defined by the superintendent, special representatives of the traffic department, such as traveling freight and passenger agents were withdrawn and the agents were instructed to arrange their affairs so that they could do all the soliciting and other work necessary to secure the maximum amount of traffic tributary to the road in their territory. They were informed that they would be held responsible for securing a proper amount of this traffic as against competitors, and that they should not confine their solicitation of business to their own stations, but should visit inland towns and other points where there is a possibility of getting additional business without conflicting with adjoining agents. As an illustration, if an agent hears a neighbor or other member of the community is about to take a vacation or a business trip he is expected to call on him or meet him incidentally and urge him to travel by the Frisco, and assist him in planning the journey. If he hears that a merchant is planning to go to Chicago or St. Louis on a buying trip, he is expected to try to get the freight routed via the 'Frisco. He is expected to take time to scrutinize carefully the routing of all freight to see that the 'Frisco gets the long haul and the largest division of earnings.

In the handling of claim matters, it is believed that the station agents can perform a very useful function, as well as remove friction with local patrons of the road, by being empowered to settle small claims without delay and to expedite the settlement of all kinds of claims without tedious referring of papers from one office to another. They are given sufficient authority and facilities to enable them to settle with claimants for all stock killed on the right of way, and the claim adjusters that have heretofore handled such claims have been withdrawn. The agents are, therefore, the only ones left to handle this business, and will often be able to make a friend for the company of a farmer who might otherwise become permanently embittered against it by the delay and uncertainty in collecting the amount of his claim.

In settling claims on account of freight loss or damage, the agents conform to instructions which have now been in effect for six months, but which may be broadened in the future to cover kinds of claims which at first were considered too difficult for the agents to deal with. Agents are not charged with the duty of settling personal injury claims, except in specific cases under special instructions, but are expected to advise the proper office of developments in connection with such claims in their territory, and will be notified when they are expected to take action.

All claims on account of stock killed on the right of way, together with the reports of locomotive enginemen and section foremen in connection with them, are transmitted as heretofore to the district claim agent at Monett, Mo., who makes a record and a file of each claim and transmits the file to the proper station agent, who then endeavors to settle with the claimant in the same manner as did the stock claim adjuster. If the agent is able to come to an agreement for settlement with the claimant he immediately draws a draft on the treasurer, attaches it to the file, and sends the papers to the superintendent, who approves the draft and puts it in line for immediate payment. The file goes to the treasurer to support the draft when it reaches the treasurer through the agent's accounts. When the plan was first put into effect the agent filled out a form, had it signed by the claimant and witnessed, and sent it with all papers bearing on the claim to the district claim agent, who originated a voucher and passed the file to the claims' attorney for approval. The more direct method of allowing the superintendent to approve the draft at once was soon adopted to reduce red tape to a minimum and to carry out the company's purpose of completing the settlement with the claimant as quickly as possible. In case the agent is unable to reach a settlement with the claimant, or if the amount demanded by the claimant is higher than the agent thinks should be allowed, he sends the entire file to the superintendent with a full statement of the case. The superintendent may then use his discretion as to the settlement of the claim, and if in his judgment the amount demanded should be paid he returns the papers to the agent with authority for payment. If the superintendent deems the claim unreasonable, he refers the matter to the district claim agent, who either advises the agent that the claim should be declined or returns the file to the agent with instructions to have

the form filled out for payment. The instructions are that all stock claims should be settled as quickly as possible and with the least possible correspondence.

In addition to such regular functions as have been outlined, the superintendent is permitted to confer upon certain agents, within his discretion, such authority as he himself exercises in specific cases. For instance, if a community desires the opening of a highway across the right of way of the railway, an agent, who had shown himself capable, would be authorized to handle the negotiations to a conclusion without the delay of referring the case to the superintendent; and the same policy will be followed in other cases which a capable agent can handle as well as his superior.

The heads of the different departments, such as the traffic, auditing and claim departments, who have heretofore relied on special representatives for reports, now receive them direct from the agents, except in some instances in which it is deemed better to have the reports made through the superintendent.

Special attention has been given to impressing upon the agents that the company is depending upon them as its sole representatives in their respective localities, and that they have it in their power, in exerting a keen interest in the company's welfare, to better their own condition financially and otherwise. Mr. Nixon explained in his letter:

"The agents should understand that they are to handle the business of the company at their respective stations and in their territory as if they were the sole owners of the property, doing anything that, in their judgment, would be to the best interests of the company, not forgetting that courtesy and patience will be the largest factors in enabling them to establish themselves in a more important position than they have held in the past. They should be thoroughly impressed with the fact that they are now authorized and expected to take hold of any matter that needs attention, correcting anything that is wrong where it is possible for them to correct it, calling the attention of the head of the department in charge of the particular matter affected for assistance in making right that which is wrong, and they are to have no fear or hesitancy in criticising any action which works adversely to the interests of the company."

It is believed that the station agent, being a citizen, and frequently a prominent or well known member of his community, will be able to accomplish much better results both in soliciting business and in adjusting claims among his own acquaintances than a traveling solicitor or adjuster who is usually a stranger to those with whom he has to deal. It is also believed that giving the agent the authority to settle claims will give him an increased prestige among his fellow-citizens, and that the fact that he has been able to effect a satisfactory adjustment with an aggrieved patron of the road will frequently gain friends both for himself and for his company that will have its effect in assisting his efforts to get business.

The officers of the Frisco are enthusiastic over the success which has attended the plan of increasing the importance of the agent in the short time since its adoption, and especially over the interest manifested and the results accomplished by the agents. These have been particularly evident in the solicitation of traffic by the agents. There is no question in the minds of the officers that the plan will be extended as soon as possible over the entire system.

After a recent trip over the line by Vice-president W. C. Nixon and Vice-President W. B. Biddle, the latter in charge of the traffic department, the advantages of the scheme seemed to them so marked that instructions were given to the superintendents of other divisions to have their agents begin soliciting business even before the plan in its entirety is extended to their divisions. The superintendents were impressed with the fact that they have the same responsibility in connection with securing traffic as other officers, and that they are expected to see that the agents perform all duties required by the traffic department as well as by the auditing or transportation departments.

It has been found that requiring the agents to solicit traffic, interesting them in the work and giving them the time in which to do it, has an important effect in influencing the routing of freight in such a way as to give the local line the longest possible haul, thereby not only increasing earnings, but reducing the cost of handling by eliminating the transfers from car to car, or from train to train, which are incident to the handling of traffic by an unnatural route.

The Frisco has 20 or more traveling freight agents soliciting business along its lines. If the plan of making solicitors of the agents is carried out to its full extent these may be eliminated, and in their place the road will have 700 men soliciting freight and at the same time intensifying their efforts in their small territories in a way that would be impossible to the traveling solicitor.

Bringing the superintendents into closer touch with traffic and claim affairs is also said to have had beneficial effects, which have been manifested in an improvement in the condition in which freight is being delivered and a decrease in the number of freight claims, since the responsibility for the settlement of claims has been transferred to the operating department. A marked reduction has been noted in the number of claims for stock killed on the right-of-way, and inquiry elicited the information that fences are being kept in better repair and more care is being exercised by enginemen, section foremen and others since the matter has been brought to their attention.

The local newspapers have given wide publicity to the new departure, and patrons of the road are already becoming accustomed to taking up matters with the agents and having them promptly and satisfactorily adjusted, which formerly would have been taken up by correspondence or left unadjusted, with a consequent feeling of dissatisfaction on the part of the patrons. Many shippers along the line have expressed their approval of the plan which allows them to do business direct with those with whom they are acquainted.

The officers of the road have laid particular stress, in explaining to the agents the various features of the plan, on the importance of improving the relations between the company and the small or occasional shippers, pointing out that the agent is in most instances the only representative of the company with whom they come in contact and that on the courtesy and fairness which he displays in dealing with its patrons depends to a large extent the character of the public's attitude toward the railway.

FOREIGN RAILWAY NOTES.

The 24 o'clock system is to be adopted on the French railways for next summer's time tables. Inquiries as to the acceptability of the plan were sent to municipal bodies and chambers of commerce all over the country, and a great majority favored it. It has been in use in Italy for many years.

The Hungarian government recently granted to a London firm the preliminary concession for an important railway undertaking in Budapest. The line, which is of standard gage, and is known as the Szechenyi Railway, has a total length of about 40 miles, and traverses the mountainous district on the Buda side of the Danube river, which forms the principal summer resort for the inhabitants of Budapest. By a branch line the railway will connect with the state railways at Kelenfold, and by linking up with the existing Budapest-Estergon railway it will form a belt around the entire city. The passenger traffic is estimated at 15,000,000 per year, and it is stated that for the carriage of freight preliminary agreements have already been entered into which assure to the railway from its opening a minimum annual traffic of 400,000 tons. It is proposed to operate the line by electricity, and in this connection advantage will be taken of the opportunity to serve electric power to the villages served by the new line. While there are some very heavy cuts and viaducts, the line presents few engineering difficulties, and construction work will occupy a period of about 30 months. The total cost of the work, including rolling stock and equipment, is estimated at nearly $5,000,000, and it is expected that construction will be started some time during the summer of 1912.

THE BROKEN LEHIGH VALLEY RAIL.

The Interstate Commerce Commission has issued its report on the accident to a Lehigh Valley Railroad train at Manchester, N. J., on August 25, 1911, in which 29 people were killed and 62 injured, the accident having been caused by a broken rail. James E. Howard, of the Bureau of Standards at Washington, was engaged to investigate the cause of the rail failure, and his report is printed as an appendix to the report of the chief inspector for the commission, and from it the following abstract is made.

The rail was fractured on the north side of the track on which the train was running, abreast a crossover, a part of the train was precipitated from the opposite side of the track, the south side, to the bed of the creek, Canandaigua Outlet, from the plate-girder bridge spanning the creek. The fractured rail was several rail lengths east of Manchester station, the bridge several lengths east of the fractured rail in question.

ones in certain fresh fractures. The surfaces of those spots are normal to the length of the rail. The specifications under which this rail was rolled required not less than 20 per cent. discard from the top of the ingot in order to secure sound steel. Notwithstanding this requirement, nor the mill, nor the track inspection, this rail got into the track, where it remained for a period of 10 months, until the time of this disaster. The specifications require shearing to continue if, after 20 per cent. discard, the metal does not appear to be solid, until it does. If the shearsman could judge of the defect in the steel which, when rolled, caused this split web the entire length of the A rail, then that requirement of the specifications was not met. If, on the other hand, his opportunity is not adequate to allow of the discovery of such defective steel, then the requirement has a perfunctory character, so far as pertains to the rolling mill.

The split web was visible on the ends of the several fragments which were available and examined. The split was also visible



Fig. 1—End Views of One Fragment, Showing Appearance of Surfaces of Transverse Fissures.

The weights of the two locomotives which hauled the train were as follows:

Forward engine, No. 2476, Atlantic type, 196,500 lbs.

Second engine, No. 1804, ten-wheeler, 199,500 lbs.

The fractured rail was a 90-lb. American Society of Civil Engineers section, basic open-hearth steel, made by the Bethlehem Steel Company, 20 per cent. discard, rolled December 24, 1909. It was an A rail from the ingot. The steel was made on specifications calling for carbon content between 0.70 and 0.80 per cent. This rail was laid October 21, 1910, in the eastbound track, where it eventually fractured. Frogs were changed about April 20, 1911, at which time this rail was shortened by cutting off 6 ft. from its west end, reducing its length from 30 to 24 ft. Three new bolt holes for splice plates were drilled in the web at the time of cutting off.

This fractured rail exhibited two kinds of defects. It had a piped web, and in addition thereto it also displayed in the head a number of dark spots, which it should be said are light, silvery

in the new hole drilled through the web alongside of one of the holes understood to have been drilled through the web at the time of putting in the new frog.

Under direct compressive stress the web was very strong, notwithstanding the presence of the split. A section of this rail 1 in. long sustained a load of compression applied on the running surface of a head of 75,420 lbs. This piece which was tested came from a fragment less than 2 ft. distant from the west end of the rail, as it existed at the time of the wreck, and represented therefore an unfavorable part of the rail. It displayed some toughness and opened along the seam in the web before final rupture.

Concerning the defects witnessed in the head of the rail, some have attributed the cause of these so-called defects to some unidentified and unknown reason connected with the process of manufacture of the steel. Expert testimony taken before the coroner states that the dark spots in question "indicate a decided defect in mill practice, but can't say positively what may have

caused it, but we can say that something in connection with the manufacture of that rail caused a separation of the metal at that point, constituting that defect," and more to the same effect. The manufacturers of the steel clearly take the same view as expressed in the testimony before the coroner, since it is understood that the Bethlehem Steel Company is at present engaged in a very energetic inquiry into the physical condition of their rails, but its inquiry has up to the present time developed no information nor clue to the formation of these defects, nor have such defects been found in any of the new and unused rails of its current manufacture.

The accessible fragments of the rail aggregated a length of about 12½ ft., a little more than half of the rail being present. Some 200 lbs. were said to be in the possession of the New York Public Service Commission, while some pieces were not recovered from the wreck. Pieces lettered D, E. F and section sawed from B were made available for examination and test, while the length marked H was forwarded to the bureau to supply further investigative material of the rail.

Piece A was the west end of the 24-ft. rail and length H the east end. A short fragment had been knocked off the east end of length H, after nicking with a cold chisel to furnish a sample for the New York Public Service Commission.

These fragments, shown in Fig. 2, are viewed from the gage side of the rail. The outer flange of the base of length H was broken off for a distance of 33 in. beginning at the westerly end of the same.

The west end of fragment G had a semicircular indentation near the center of the running surface of the head, made by a wheel flange striking the end of the fragment. Similar marks are shown on other fragments. The full length of the gap was not at one instant formed. The battered west ends of fragments D and E furnish evidence that the pounding of several trucks was withstood before the webs succumbed and the head broke off in short pieces.

Two illustrations, Figs. 3 and 4, show the appearance of fragment D. The battered end, the left end in Fig. 3, indicates how severe were the blows received before it was detached from the

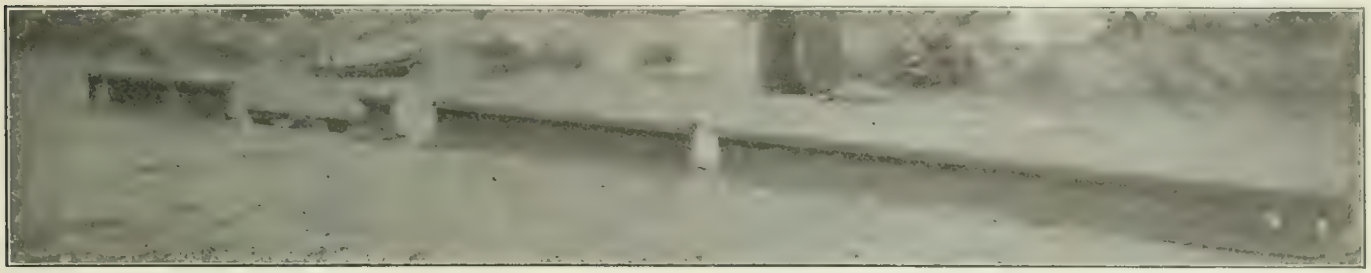


Fig. 2—Fragments of Rail.

In the report, these eight fragments are referred to by letter, A, B, C, etc., A being at the west end, i. e., at the left in the above view.

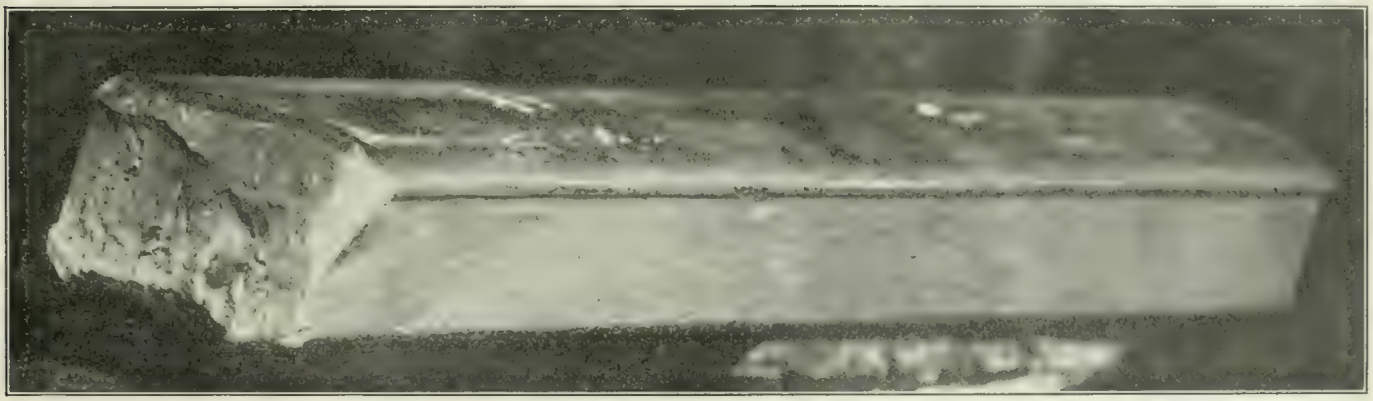


Fig. 3—Fragment D.

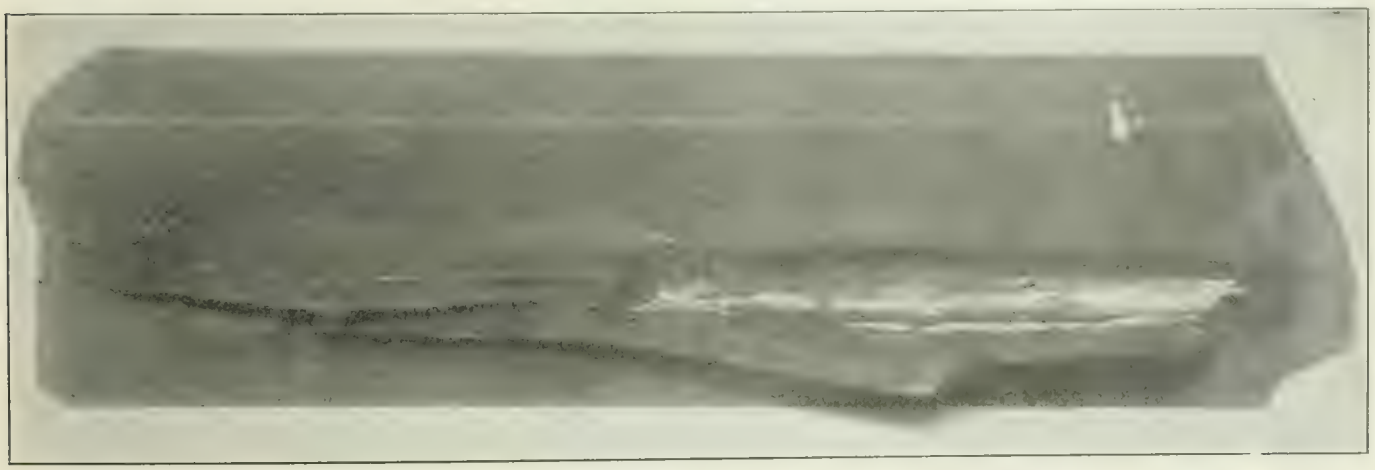


Fig. 4—Fragment D; Underside of Head; Lehigh Valley Rail.



Fig. 5—Location of Chips for Analysis; Fragment B.



Fig. 6—Fragment F.

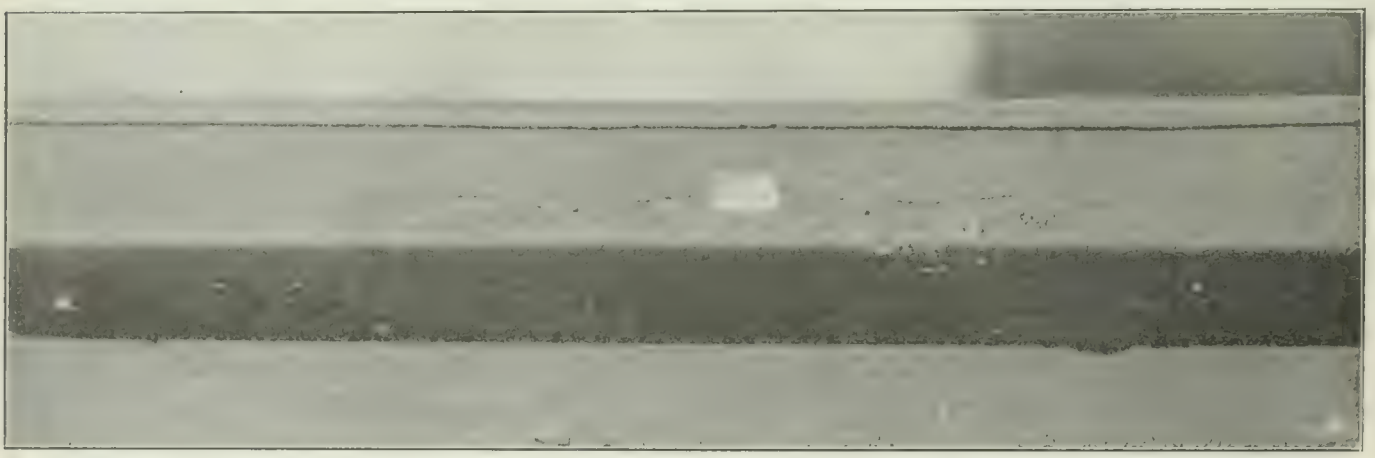


Fig. 7—Longitudinal Crack in Fragment H.

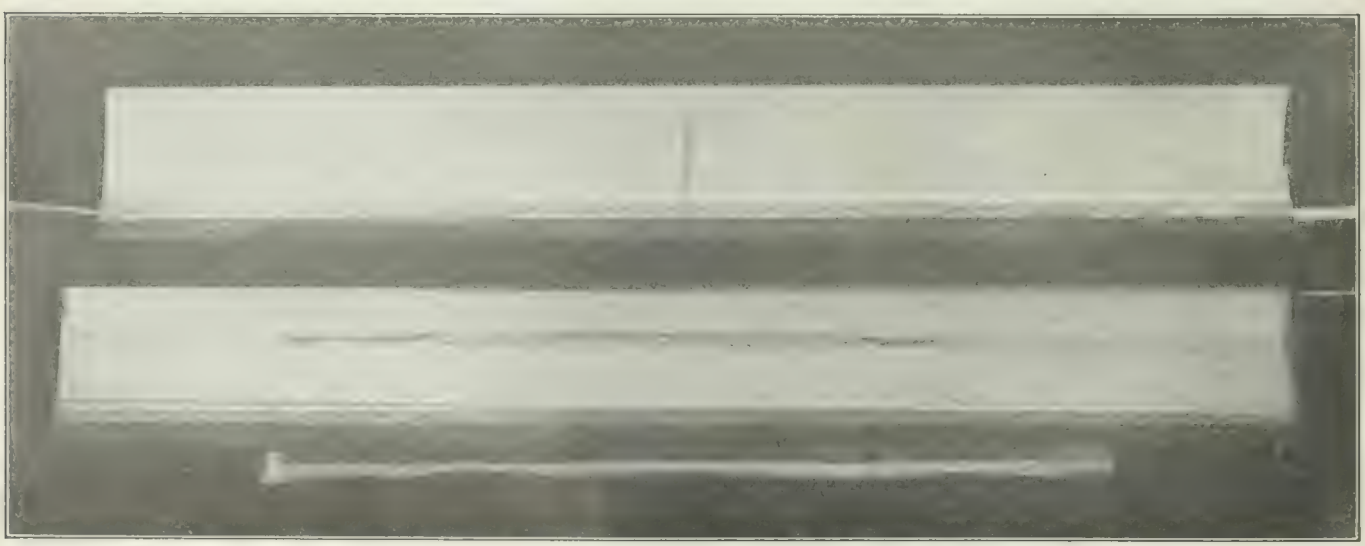


Fig. 8—Portions of Fragment H, Cut Apart Longitudinally by Vertical Cuts; Lehigh Valley Rail.

other part of the rail. Obviously this fragment could receive such a pounding only prior to its being detached from the part of the rail beyond. The fragment, as well as that marked E, was battered on its west end.

Fig. 4 shows fragment D from the underside of the head, and shows the split in the web in which was found a substance believed to be slag. It will be understood that this fragment was doubtless forced into the roadbed or against ties more or less covered with pieces of coal and other material. This remark is necessary to explain why material collected for chemical analysis from the web was in poor condition to show the original composition before the rail broke.

The analysis gave the following composition of this material in the split in the web:

SiO_2.	Al_2O_3.*	CaO.	MgO.	Not determined.†
Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
23.2	20.5	40.8	7.5	8.0

*Comprises Al_2O_3, Fe_2O_3, TiO_2, P_2O_5, Mn_3O_4.
†H_2O, CO_2, a little coal, perhaps SO_3 and alkalies.

From the above composition it is inferred that this slaglike material was rolled into the rail through the several passes down from the ingot, earlier coming from the ladle, and had its origin in the steel furnace.

Why there were a number of short fragments with ends very much battered and long fragments broken with less battered ends is a matter of speculative interest. The strength of the web, even with the split, was very great, as the test of a section 1 in. long showed. The heaviest wheel load is assumed to have been on the locomotives. It would seem to harmonize with the appearance of these short fragments to believe that the primitive fractures were caused by the locomotives; that one by one these short pieces were detached after some very severe pounding had been sustained; that the next in the order of events was the breaking of the longer pieces. Necessarily the spikes would in the meantime have been drawn more or less as the forward wheels of successive trucks struck these parts of the rails. The fissures existing in the head of the rail, as it is believed they did, and with loosened spikes would present a condition facilitating the further rupture of the rail in a brittle manner. It seems certain that no such resistance against the fracture of the rail was subsequently encountered by the train above that of the small fragments. The small fragments of the head being detached, as they were, from a middle part of the length of the rail, with a great display of resistance on their part against being detached from the web and base, called for a succession of heavy blows such as the locomotives would be capable of delivering rather than the coaches. It suggests that the destructiveness to the track was heightened by reason of there being two locomotives present.

When admitting steam, to get the train under headway would seem a critical period in regard to overstraining the track, more so in the case of a doubleheader and long train than in the case of a short one. Momentarily, the forward engineer being the one naturally first to admit steam or to accelerate the speed of the train, the train resistance would tend to overturn the forward locomotive, pull it over backward, relieve the pilot wheels of some load, and intensify the pressure on the drivers and therefore apply a maximum load to the rail.

As to the fiber stresses in the rail which would result from these two locomotives, coupled together in the usual manner, it cannot definitely be stated. Earlier tests of track have shown that the effect on the rail per ton of wheel load varies with different types of engine and with the different wheels of the same engine.

Those earlier tests showed still further that direct measurements in the track were essential for determining the fiber stresses in the rails—the wheel loads, tie spacing and moment of inertia of the rail section, constituting all the data available for such computation, not being adequate for the purpose. The depression of the roadbed so modifies the conditions that direct experiments in the track are required to furnish this information. The supply of information of this kind is very meager, and it is desirable that track tests be conducted to furnish data on present conditions, which may in some respects be more severe than those which pertained to track and equipment at the time the earlier tests were made.

The end of fragment B was drilled with groups of holes in six places, and the chips used for chemical analysis of the steel. The position of the holes are shown in Fig. 5, which is an end view of the rail after having been polished and etched with tincture of iodine.

The results of the chemical analysis were as follows:

Sample.	Carbon.	Sulphur.	Phosphorus.	Manganese.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
A (1)	0.843 }	0.030	0.042	1.20
A (2)	.829 }			
B	.831	.032	.044	....
C	.832	.035	.041	1.22
D	.867	.032	.044	....
E	.868	.035	.043	1.18
F	.829	.031	.040	....

It will be noted that samples D and E show the highest carbon to be located at the web and middle of the base.

There appears no material difference in the carbon content at



Fig. 9—Fragment H.

Showing longitudinal seam in head, made visible when rail was nicked with chisel and broken off.

A on the gage side of the head over that of C on the opposite side. While the metal at the running service of the head displayed greatest resistance against machine tools and sawing, it does not appear substantially different in carbon content than the sides of the head nor the metal near the edge of the flange. The markings of this etched section appear symmetrical in the metal of the head and show no characteristic difference between the two sides of the head. In this examination there is no evidence presented to show a difference between the metal on the gage side of the head, which, so far as observed, is the side which invariably displays the interior transverse fissures, and the opposite side of the head, which has not exhibited these fissures.

The dark streak at the middle of the web in Fig. 5 represents the slag streak. There appears a faint line about halfway down the depth of the head and on the half of the gage side, the location of which is indicated on the print by a star. This line, about ½ in. long, represents a crack or fissure in the head, viewed on end; that is, a longitudinal crack the surface of which inclines downward toward the gage side of the head. This longitudinal crack was visible at each end of fragment B. It therefore appears that in the head of this rail are witnessed

both transverse and longitudinal cracks or fissures, each kind being found in the metal of the gage side or half of the head.

Fig. 6 shows the east end of fragment F. The west end of this piece was a sawed end. The presence of the surface of a transverse fissure on the gage side of the head is shown, also the split web. From the middle of the length of this fragment was taken the section 1 in. long which was tested by a load being applied on the head. The ultimate strength was 75,420 lbs., as previously stated, on the section 1 in. long by 0.58 in. thickness of web, or 130,000 lbs. per square inch. After passing the maximum stress the load sustained fluctuated for a time between 72,000 and 74,800 lbs., then fell rapidly, and when it had dropped to 45,600 lbs. the cracks in the web were developed.

The broken flange of fragment H was caused, it is believed, by the truck wheels getting across to the outside of the rail and with their flanges breaking off pieces of the outer flange of the rail. A longitudinal crack was found in the head of this fragment, the crack making its appearance on the gage side. Fig. 7 shows this crack about full size. The size of the head had been spotted with a chisel at the middle of the length of this seam before the photograph for this illustration was made. It was found that this longitudinal seam extended across the full width of the head and that it was associated with an interior transverse fissure near its west end.

At a place near the middle of the width of the head this seam was longer than at the surface at the gage side of the head. It measured 7¼ in. long near the center of the head. Following the seam toward the outside of the head, it came to the surface near the outside edge of the running surface of the head. That is, the seam viewed on a cross section of the rail would present an oblique line dipping toward the gage side of the head, a shearing direction with reference to a downward load on the head.

The head of the rail was split along the middle in a planer, bringing to view the interior part of this seam. The lower illustration in Fig. 8 shows it. A transverse seam, or fissure, is seen at the right end of the longitudinal seam, this being the west end of the latter.

Another transverse fissure was found in this fragment of the rail, the fissure being on the gage side or half of the head, as usual. This second fissure was located about 40 in. from the first, toward the east end of the rail. The upper illustration in Fig. 8 shows it, and it will be noted that the upper end of the fissure branches off longitudinally in each direction.

This fissure extended to the gage side of the head and could be seen on the rolled surface. While this was the case, the line of fracture being visible to the eye, still it was not sufficiently pronounced to attract ordinary observation. Its vagueness in appearance would cast doubt upon its identity if perchance its discovery had been made in the track. The crack may be seen on the side of the head, but it would be unreasonable to expect its discovery in the track except by accident. The detection of such fissures, or rather all such fissures if of frequent occurrence, would be a task practically too great to accomplish under service conditions. The insidious character of these fissures is a most disquieting feature of the case. Here are fissures of the most dangerous character which embrittle the rail and lead to fracture without display of ductility in the steel and which are so hidden as to practically defy detection under ordinary close scrutiny.

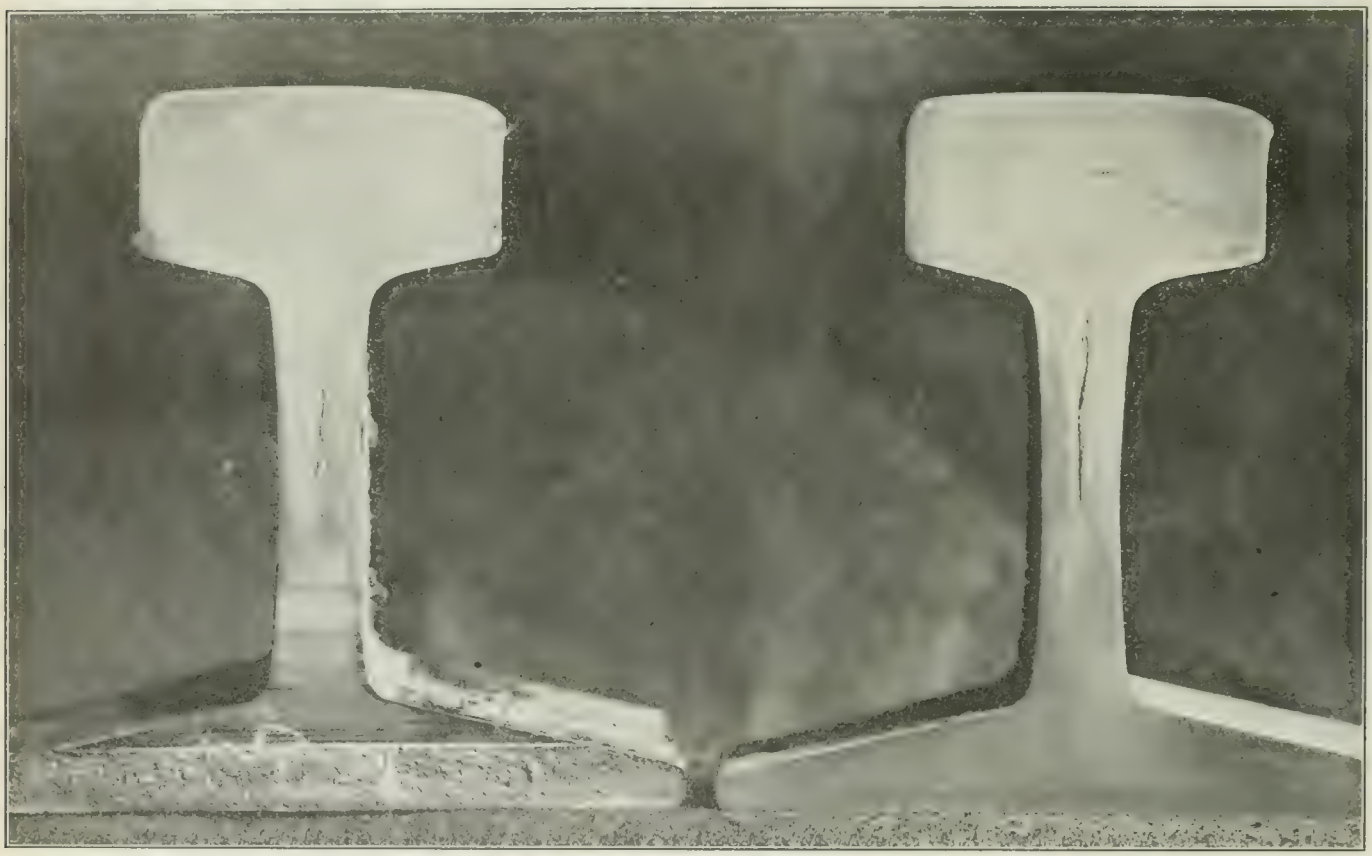


Fig. 10—Polished and Etched Cross Sections from Fragments B and F; Lehigh Valley Rail.

The obliquely inclined longitudinal seam at the east end of the rail in fragment H is shown in Fig. 9. A short section was sawed off the east end of this fragment, polished and etched with tincture of iodine. An obliquely inclined longitudinal seam was seen on end in the middle part of the gage side of the head, as well as the slag split, which was traced, so far as these fragments permitted, from end to end of this 24-ft. rail. On this and the other etched surfaces of this rail a satisfactory structure was exhibited and no indications were present of any material difference between the gage side and the outside of the head.

Fig. 10 shows two polished and etched cross sections of the rail in each of which appears an obliquely inclined longitudinal seam. The figure on the left is an end view of the piece from fragment B, while the figure on the right is from F, hence it appears that longitudinal seams as well as transverse fissures existed in several places in this rail.

Fig. 11 represents another rail, an E rail, it is said. This was a small triangular piece about 1½ in. long on the top of the head. The fracture was a fresh one and the fissure on the gage side of the head exhibited a silver luster. The oval boundary of the fissure is clearly shown by the illustration. The etched surface, only about 1 in. distant from the fissure, shows symmetrical markings and without suggestion of the development of a fissure so close at hand.

In cutting off the head from the web of fragment H in the planer the detached head sprung into a curved shape, with the running surface on the convex side. The deflection at the middle of the length of the piece, 5 ft. long, was 0.20 in. The deflection represented the release of internal strains of compression at the running surface of the head. This points out an important feature to consider in reference to the development of internal fissures such as were witnessed in this rail. The cold rolling of the running surface of the head of the rail by heavy wheel pressures has introduced internal strain in the steel at and for a short distance below the running surface. Those internal strains are of compression, and they reach their greatest intensity on the gage side of the head where flow of the steel takes place in a lateral direction. That lateral flow is shown by the ridge or fin of metal which was formed along the gage side of the head. When the rail is intact and the top surface or layer of metal of the head is in a state of initial compression, it follows that there must be an opposite strain of tension to balance it in some portion of the rail. The tensile component would be expected in the vicinity of and next below the part which was affected by compression strains, and this leads to an explanation of the presence of fissures in the head where they are being formed. No foreign substance in the steel is needed to account for the inception of those fissures. The introduction of internal strains in a hard and less ductile steel than heretofore used for rails, under excessive wheel pressures, seems adequate to explain the occurrence and frequency of these interior fissures.

The fissures, if this explanation of their origin is true, should not be found in new rails, unused, and it is understood that the steel company that rolled this particular rail has been unsuccessful in finding any such fissures in new rails, notwithstanding a very energetic effort has been made to discover them. These fissures are not held to be defects resulting from improper mill practice. They appear to be the result of excessive wheel pressures acting on a very hard steel, steel which is hard by reason of its chemical composition.

This development of internal fissures and seams, transverse and longitudinal, suggests that the limit of wheel pressures in conjunction with the bending and shearing stresses which occur simultaneously therewith has been reached and surpassed on rails of usual width and shape of head. The frequent occurrence of broken rails is a warning of this kind.

In the earlier days of steel rails softer and more ductile metal was used. The wheel pressures were lower then than they are at present. With increased wheel pressures harder steel was employed to give endurance to the rails. For a time it seemed that the metal of the rail was worn away by abrasive action about as fast as the immediate running surface of the head was affected by the cold rolling. The wheel pressures were not at that time so great as to disturb the steel in a serious manner at the head in the case of hard rails. Soft steel rails would flow under the increased wheel pressures and while the metal of the running surface of the head became very brittle in consequence of the cold flow, yet the ductility of the steel was adequate to prevent the formation of interior fissures in the zone of the head below the affected metal. Internal strains of compression were introduced the same then as now, but the toughness of the steel enabled it to endure such conditions without rupture.

There must be a limit in the combination of hard steel rails and high wheel pressures beyond which it is unsafe to go. Recent evidence indicates the approach to that limit in current railway practice, if it has not already been passed. It can hardly be a coincidence that all of the rails which are displaying these interior fissures have hidden structural defect on one side of the head and none on the other, and chance to be laid with the defective side on the gage side, where it is found. Evidence points to track conditions as accountable for the development of these fissures. They have been found as close together as 8 in. from one to another.

Progressive fractures have occurred in axles, but they started at the surface where the fiber stresses were greatest, and not at the interior where bending stresses would be very much less. The failure of axles by repeated stresses does not appear to furnish the same kind of an example as witnessed in the present rail fissures. The rail fissures have their origin or incipiency in the head at places where the stresses from bending loads on the rail would be not over 75 per cent. of the maximum fiber stress.

Some parts of the track are subjected to more severe conditions than other parts. Places where the stresses on the head from the wheel pressures are reversed in their direction would



Fig. 11—Transverse Fissure in Rail not Connected with Manchester Wreck.

afford examples of maximum severity. Such places are found where the trains stop and start at stations. It is important to ascertain what fiber stresses are developed in the rails under the wheels of locomotives of the present type. This part of the subject was experimentally inquired into some 15 years ago, since which the types of engines have greatly changed. It is quite important in view of these developments that information as to the fiber stresses be acquired for present track conditions, and such information can be acquired only on the rails when in the track, so materially does the depression of the roadbed affect the strains.

In conclusion, it is believed that present evidence points to the inference that the primary cause of the Manchester wreck was the formation and development of transverse fissures and longitudinal seams in the head of this rail which eventually fractured in the track, aided by the defective metal of the web. That the formation and development of the internal fissures is due to the

use of a hard steel and subjecting it to high-wheel pressures, wheel pressures which are excessive from a metallurgical point of view, thereby causing the development and introduction of internal strains, and those internal strains in turn together with the wheel loads caused the development of interior fissures, and their extension to a dangerous degree. That such interior and hidden fissures are a menace to the safety and lives of persons traveling over such rails.

That recent occurrences suggest the thought that current railway practice in the use of hard steel rails and high wheel pressures has nearly or quite reached the limit of endurance of the metal of the roadway.

That it is not a question of mill practice in the manufacture of the steel, further than that the mills are making the steel which they are required to make under the specifications given them.

That present developments are not inconsistent with what is known about the properties of steel in respect to the effects of intense local overstraining pressures of which high wheel pressures furnish one illustration, combined with high tensile, compressive and shearing stresses. In a way, it is a question of repeated stresses, but the number of repetitions of loading of this rail was comparatively small from its short time in service. It may be remarked that certain rail specifications require higher carbon steel as the weights of the sections increase, and also higher carbon steel for open-hearth rails than for Bessemer rails. In view of current developments, if the causes of formation of interior fissures are those herein described, then the employment of high-carbon metal is attended with dangers not apparently recognized in the drawing up of current specifications. It is desirable that measurements be made in the track of the fiber stresses which are caused by the new types and weights of locomotives in order to acquire necessary information to judge of the severity of the strains which the rails are being daily exposed to, information which is now lacking. Finally it may be said, referring specifically to the development of the short transverse fissures in the heads of the rails and which are found on the gage side of the head, that they are believed to constitute a grave danger. If, as now supposed, they are the direct result of high wheel pressures acting on hard steel, then the danger is widespread. The Manchester rail, omitting reference for the time being to the slag split in the web, was fissured in many places. Apparently a number of transverse seams and longitudinal fissures were developed in the track, as the result of a few months' service. The fissures occupied positions in harmony with the explanation of the cold rolling and shearing effect of high wheel pressures acting on a steel too hard to respond without the development of interior fractures. The effect was necessarily intensified by the bending stresses on the rail from the direct downward loads.

The limit of endurance of iron rails was reached long ago, Train loads and wheel pressures soon became too great for iron rails to stand up under and they were replaced by steel rails. There is undoubtedly a limit to the endurance of steel rails as well as in the case of iron. It is important to ascertain whether the great lesson of the Manchester disaster does not lie in the direction of signifying that the danger zone of steel rails has been reached and possibly entered into by current railroad practices. If the above explanation is found correct, then the remedy does not consist in increasing the weight of the rail, but in diminishing the intensity of the wheel pressures and lowering the direct compressive and the bending stresses.

While the Manchester rail was defective in the web the feature which seems most grave is the general shattering of the integrity of the rail, apparently coming from the combination of a hard steel and high wheel pressures.

Complete data is demanded by this inquiry into the causes which contribute toward this destruction of the structural integrity of the steel—data on track conditions, such as the actual fiber stresses which are realized under the weights of different types of locomotives and under the different wheels of those different engines in track in ordinary condition, and from the metallurgical end observations on steel of different degrees of hardness.

AGENTS' REQUISITIONS FOR STATIONERY.

BY A CLERK IN THE SUPERINTENDENT'S OFFICE.

Some kinds of material deteriorate if held for any length of time, or perhaps the material becomes obsolete and has to be scrapped with a great deal of loss. For stationery, there are much the same reasons for keeping down the stock that exist with respect to other kinds of material. While it "won't spoil," as an agent is quoted as saying in answer to a query about excess stock, at the same time the constant changing of forms often finds the agents with a large stock on hand of some form made obsolete, with a corresponding loss.

Some of the railways are now working for reform in handling stationery requisitions. One large road has devised a system by which the persons making requisitions first make up an estimate of their requirements. This estimate is then checked against by the offices through which the requisitions pass. If an item on the requisition is in excess of the amount called for on the estimate, the question is taken up as to the necessity for the increased amount. But this system is almost worthless for very obvious reasons. In the first place, the estimates are usually made rather high in order to avoid the trouble of constantly changing them. In many cases the estimate calls for twice the number of blanks normally consumed.

Restricting the subject to agents only, we find that the greatest cause of carrying excess stock of stationery is carelessness in ordering. Too many of the agents, instead of checking their stock carefully before making up their requisitions, place the estimate before them and make up their requisitions for the most part from it, occasionally looking at their stock, but making no careful check; for some items, in fact, not looking at their stock at all, but making a guess at it. In cases where a man is ordering double what he needs because it is on the estimate, the checking done in the various offices through which the requisition passes reveals nothing wrong. The result is that often there accumulates from two to four times as much of certain kinds of supplies as is needed. It would seem that some of the agents get into a habit of ordering a fixed amount of certain items each requisition period. For example, at one small agency, when inspection of supplies was made, there was found six quarts of ink, enough to last the agent for two years. He had been ordering a quart bottle of ink at each requisition period for some time.

What measures can be taken to improve conditions in regard to ordering of stationery by agents? I think a form could be made up for the use of agents in keeping a record of stock and ordering stationery which would give excellent results. This form should show the amount on hand of the different forms and supplies, and the amount ordered. The heading of the blank could be somewhat as follows:

Form number and description.	January 1.		April 1.		July 1.		October 1.	
	On hand.	Ordered.	On hand.	Ordered.	On hand.	Ordered.	On hand.	Ordered.

As was said before, carelessness in not properly checking the stock on hand before ordering is the greatest source of trouble. This form, properly followed out, would eliminate this source of trouble. Inspections could be made by division people to see that the record is properly kept up. There would be practically no additional labor by following this practice, as it is axiomatic that to do a thing right saves time in the end.

In regard to checking the agents' requisitions, a word may be said. On one large railway these requisitions are checked three times after being made. No doubt as good results could be obtained if the requisitions were checked once, properly, by division people acquainted with local conditions, and the expense and delay of checking the requisitions a second and third time could be eliminated.

EFFICIENCY COMMITTEES ON THE CHICAGO & NORTH WESTERN.

From time to time the *Railway Age Gazette* has described the organization and methods of the safety committees formed on the Chicago & North Western and other railways for the purpose of providing a means for obtaining better co-operation between managements and employees in reducing accidents. The North Western was the first railway to adopt the safety committee plan; and after this had been in use long enough to demonstrate its value it was decided early in 1911 to adopt similar measures in the effort to increase efficiency. The efficiency committee plan has now been in effect for several months, and it is believed a description of some features of its workings will be of interest.

One result of the safety campaign was to disclose the important part played in causing accidents by minor details, and to show the advantage of having a body of men constituted for the purpose of detecting and correcting the little things that cause trouble. The organization of the efficiency committees was suggested by the idea that a committee appointed for the purpose could find many ways in which efficiency could be increased in addition to providing a natural channel through which meritorious suggestions from all sources might be investigated and brought to the attention of the proper authority to secure the necessary action.

As in the safety committee plan, one of the chief objects was to enlist the interest and co-operation of the employees; and to this end the form of organization and the methods that had proved successful in the safety campaign were adopted. A central efficiency committee composed of general officers, and corresponding to the central safety committee, was appointed, and division efficiency committees consisting of both officers and employees were formed on every division.

The Central Efficiency Committee is composed of W. E. Morse, assistant general manager; S. G. Strickland, general superintendent; Robert Quayle, superintendent of motive power and machinery; C. A. Schroyer, superintendent of the car department; E. E. Betts, superintendent of transportation; W. J. Towne, engineer of maintenance; William Bennett, superintendent of telegraph; H. C. Howe, freight claim agent, and J. W. Branch, auditor of collection accounts; and the division committees include the superintendent, assistant superintendent, trainmaster, master mechanic, division engineer and a roadmaster, conductor, locomotive engineer, fireman, brakeman, switchman or yardmaster, and a station agent.

Under the direction of the division committees monthly division general meetings of the employees are held, at which subjects pertaining to efficiency, economy and the general betterment of the service are discussed. A record of the meetings is kept to be reviewed and considered at meetings held quarterly by the division committees. Such matters as pertain to a division itself and come within the jurisdiction of the superintendent are disposed of at these committee meetings, while those that involve questions of general policy and require authority or reference are submitted in a formal report to the central committee for disposition. All suggestions requiring central committee approval must be accompanied by the recommendation of the division committee; thus suggestions found to be impracticable or without merit are eliminated after having been considered from the point of view of the representatives of the various departments in the division meetings.

At the general meetings the attempt is made to obtain the attendance of as many employees from each department as possible and to induce them to present their views and any suggestions that occur to them. Every effort is made to impress upon employees the fact of their common interest with the management in the improvement of the service; that their ideas and suggestions are of the greatest value to the management in the efforts to reduce the difficulties met in rendering the service; and that by the development of observation and the cultivation of thought upon the subjects of efficiency and economy they may assist materially to operate the railway in the most efficient and satisfactory manner from the viewpoint of owners, patrons and employees.

Some of the topics to be discussed at the general meetings are referred to special sub-committees for investigation; and reports are made which are presented at the general meetings for free and full discussion before final action is taken by the division committee. From time to time the Central committee suggests subjects and presents statements and statistics to the division committees for consideration.

The Central committee meets quarterly to consider and take action on the recommendations of the division committees. Occasionally, a recommendation is referred back to the committee with which it originated, or to a special sub-committee for further investigation, while recommendations approved by the Central committee are referred to the management or ordered put into effect by the member of the committee having jurisdiction over the matter. As often as possible some member of the Central committee meets with the division committees.

Experience has shown that while many impracticable schemes are submitted to the committees by members or employees, many exceedingly valuable suggestions are made on matters which have heretofore been neglected, because no particular officer or employee was in a position to observe them or to take action regarding them in a comprehensive and effective manner. It is believed, however, that the plan has its most important result in stimulating in both officers and men a habit of constant watchfulness for methods of improving the efficiency of operation and maintenance.

As an example of some of the methods pursued and the results accomplished by the efficiency committees the work of a special committee appointed to make an investigation of the question of coal efficiency on the Galena division may be cited. At a recent meeting of this committee it was reported that not only had several conditions which had led to waste of fuel been discovered and overcome, but that more interest had been manifested on the part of men in all departments by reason of the concentrated efforts to reduce the consumption of coal and the expense of handling it, and that a saving of 10 to 15 per cent. had been made in December, 1911, as compared with December, 1910.

In December, 1911, as compared with November, 1911, there was an increase of 2,000,000 in tons hauled one mile on the Galena division, or 1 per cent., while the coal consumption was reduced 2,000 tons, or 7 per cent. There was an increase of 19,000 passenger car miles, or 1.6 per cent., while the coal consumption in passenger service was decreased 1,000 tons, or 7 per cent., making a total saving of 3,000 tons of coal in one month, with an increase of over 2 per cent. in freight ton and passenger car miles. For instance, it was discovered that the box front and spark arresters on the locomotives as applied were causing an excessive consumption of coal. After certain changes had been made by the mechanical department it was found that a saving of as much as one ton per 100 engine miles, had been secured.

By better supervision of the care of engines necessarily standing out of doors on account of inadequate roundhouse facilities, the mechanical department was enabled to effect a saving of about 8 tons every 24 hours, or 240 tons per month, in the coal necessary to keep these engines alive.

Experiments in the firing of engines at roundhouses made practicable a saving of 400 lbs. per engine for 92 engines per day, or a total saving of 18½ tons per day. This was accomplished by enlisting the interest of the roundhouse forces, by the use of a cover for the stack while the engine is in the roundhouse, thereby conserving the draft on the fire, and also by not having engines fired up until they were ordered, except in a few emergency cases, and by the exercise of more caution on the

part of the operating department to avoid ordering engines an unnecessary length of time before they were needed. The committee believes that as the work progresses a further economy can be effected in the consumption of coal required in firing up engines.

Especial attention was devoted to reducing the cost of handling coal at the coal houses. At one point this cost was reduced from 22 cents to 11 cents per ton by having the wiper instead of the section men coal the engines. At another coaling point where it had been costing 6½ cents per ton to handle coal, a bid was received from a contractor to do the work for 5½ cents a ton, which covers the cost of coaling engines and picking up the coal around the track. At another point it was found that because of the location of the pump and the coal shed it had been costing $75 a year to haul down to the pumping station. An investigation was ordered of the question of locating a pumping station near the coal shed.

The coal efficiency committee also came to the conclusion that continued progress in economy in fuel expenditures could be obtained by some expenditures for more adequate roundhouse facilities, for the installation of hot water plants with which to wash out locomotives, and for additional passing tracks to improve the train movement, and the management was informed that if desired the committee would prepare specific recommendations along these lines.

A further illustration of the character of subjects handled by the committees will be afforded by the following examples of recommendations passed on by the Central committee at a recent meeting.

One division committee recommended that rails be loaded in flat cars for transportation from the mills. The Central committee found that in a few instances rails had been loaded in steel gondolas of 100,000 lbs. capacity, and recommended that this be discontinued so far as possible, but decided it was impracticable to furnish flat cars invariably for this purpose, because it is impossible to provide sufficient flat cars, and because it was believed the empty car mileage that would result would more than offset the economy in unloading the rails.

Another division committee recommended that green lumber be not used in repairing cars, because when it dries out it leaves openings and makes the cars defective. The Central committee referred the matter to the management for investigation of the quality of flooring and siding now used. One division committee also recommended that only regular horse cars be used for handling horses. Recommendations were made to the management that a number of stock cars be provided with slats close together and more securely applied for a distance of about 4 ft. from the floor of the car. Another recommendation of the same division committee was adopted, that so far as possible stock cars be used for handling oil.

One division recommended that a merit system be established locally in each large freight house and that bulletins be posted showing the standing of employees as to efficiency, etc. The Central committee was not of the opinion that this plan would be practicable in general, but agreed to bring the matter to the attention of those in charge of some of the principal freight houses for consideration. The same division committee recommended that speed recorders be placed on all passenger engines. The Central committee rejected this recommendation on the ground that the company's experience with speed recorders had not demonstrated any marked increase in efficiency or economy.

A recommendation that more care be exercised in the loading of coal at the mines to avoid rubbish being mixed with the coal was referred to the superintendent of the mines for attention. It was the opinion of the Central committee that this was probably due to the rubbish not being cleaned out of the cars.

A division committee recommended a restriction of the practice of calling upon assistant superintendents, road foremen of engines and trainmasters, to ride on special trains or trains carrying extra equipment or business cars, saying that the practice has been carried to extremes and takes these officers away from their duties. The Central committee referred the recommendation, with approval, to the management, and orders were issued to minimize the practice as much as possible. A division committee found that the lack or the poor condition of water at several points on the division had been causing many delays. An investigation by the Central committee led to the remedying of the conditions. Another committee recommended that the rear trainman be designated as trainman instead of flagman. The Central committee after consideration decided that as the flagman's most important duty is to protect trains, both employees and the public should be allowed to recognize him as a flagman first, and a trainman afterward.

A division committee recommended that more attention be given to the question of properly repairing lanterns, because the men were inclined to be careless with repaired lanterns. As a result the practice was established of carefully overhauling all repaired lanterns, removing the dents and redipping the lantern frames, before redistributing them.

A division committee recommended the adoption of some methods of weighing and charging out coal to enginemen, and that statistical figures showing performance per unit be posted on bulletin boards. This matter was taken under advisement. The recommendation of another committee that more supervision be given to preventing theft of coal was returned to it with a request for specific recommendations as to the methods to be adopted.

A recommendation that time card folders be destroyed after the reprint of time cards was referred to the passenger department.

One of the division committees reported that placards on cars containing explosives were frequently being placed near the bottom of the door in violation of the rules, and that the practice was dangerous because boys often use the placards as targets, and in shooting low at the card near the bottom of the door are liable to hit a box of high explosives. The Central committee recommended that superintendents issue instructions to their agents to have the cards placed above the loading line of the cars.

Many other valuable suggestions have been made by the division committees, and either approved and acted on by the Central committee or referred for special investigation. In other instances plans that have been suggested will be tried out in an experimental way on a small scale.

An important feature of the plan is that by having employees as well as officers on the division committees other employees are encouraged to offer suggestions which may be valuable, as they feel more free to make such suggestions to their fellow employees than to their superior officers. The plan of holding general meetings of employees also brings out many ideas from the rank and file.

A great deal of construction work is under way and a large amount contemplated by the Prussian state railways. New stations are being erected, grade crossings being eliminated, new tracks being laid, etc., all over Germany. The government is laying new tracks and widening the right of way through the Rhine valley so as to shorten the route between Cologne and Berlin. This entails a tremendous amount of labor, owing to the numerous heavy cuts and fills. The valley is narrow, the sides comparatively steep, and no room can be wasted, as the towns and cities of Vohwinkle, Elberfeld, Barmen, Schwelm and Hagen lie close together in the valley. Drag scrapers are not adaptable to the work here on account of the rocky nature of the soil, but wheelbarrows and dump cars are extensively used. Near Cologne where a number of tracks are being raised for several miles, and where the soil is sandy so that drag and wheel scrapers could be used to advantage, none are to be seen. Small cars are being used which are either loaded by hand or by small steam shovels.

Maintenance of Way Section.

ELEVEN kinks were submitted by five contributors to the Track Kink Contest, which closed on January 25, eight of which have been accepted and will be published in this and succeeding issues. The judges of the contest were L. C. Hartley, chief engineer Chicago & Eastern Illinois; H. M. Eicholtz, assistant superintendent Chicago & North Western, and D. W. Thrower, roadmaster Illinois Central. They awarded first prize to A. M. Clough, supervisor New York Central & Hudson River, Batavia, N. Y., on his contribution on "Handling Snow and Ice with a Spreader," and second prize to P. H. Hamilton for a description of a method of squaring up the head of a spike maul. Other contributors were J. L. Taylor, assistant engineer Grand Rapids & Indiana, Ft. Wayne, Ind.; F. M. Patterson, assistant engineer Chicago, Burlington & Quincy, Chicago, and P. J. Keenan, supervisor Erie, Cuba, N. Y.

THE educational value of the annual exhibit of the Railway Appliances Association, which will be held at the Coliseum, Chicago, the week of the annual meeting of the American Railway Engineering Association, March 18-23, inclusive, is well recognized by those in charge of the maintenance departments, and their attendance in past years has been large. There is a rapidly growing realization of the value of this exhibit not only to the heads of maintenance departments, but to their subordinates; and the number of division engineers, roadmasters and supervisors attending is increasing each year. On most roads, the men near Chicago, at least, are urged to attend; and men are coming each year from greater distances. In many instances the section foreman can visit the exhibit to excellent advantage. One road sent all its supervisors and foremen to spend a half day each at the exhibit last year and plans to do so again this year. A roadmaster near Kansas City let two of his foremen attend the exhibit last year, and was so pleased with the results that he will send two other foremen this year. No other exhibit affords the same opportunity for railway maintenance men to study new and standard devices, and every one interested in this branch of work should visit it and take sufficient time to study those features of concern to him.

AT this season when estimates and allotments of ballast required for the coming season are being prepared the question of widening banks is most timely. The tendency in recent years has been to build wider banks on new lines, and a number of roads are also making a systematic effort to widen old banks. The heavy motive power now in use has made this necessary, and the saving in track labor that results justifies the expense. The width of the bank necessary varies with the kind of material of which it is composed, the character of the ground and the height of the fill, as well as with the weight of motive power. A phase of the bank widening problem not always considered is the saving made in the amount of ballast necessary as compared with that needed for a narrower bank. Some ballast rolls down the slope on a narrow bank and a larger amount is required to maintain the necessary shoulder. Also when ballast extends practically to the shoulder of the sub-grade it is less effective in distributing the pressure on the embankment proper. On track already ballasted the bank can be readily widened with small loss of ballast by casting the ballast from the shoulder into the center of the track before unloading any dirt. After the bank has been built up to the proper height and width the ballast can be replaced and will usually give a wider shoulder than before because some of this material previously formed a part of the sub-grade. When one considers that in most cases three or four yards of filling can be placed for the cost of one yard of common ballast, and five or six yards for one of rock or other more expensive material it is readily seen that a large amount of bank widening is economical when first cost alone is considered. In many cases the money now spent for ballast can be materially reduced and permanent benefits secured by doing more bank widening and using less ballast. In widening banks only sand, gravel or other porous material should be used. Any impervious material will hold water in the old bank, which must be carefully avoided. However, there are usually sand or gravel pits adjacent, from which material can be secured which would be satisfactory for bank widening, although not for ballast.

THE necessity for thorough drainage in a yard is well illustrated by a recent experience with the tiling in a large yard. This was a hump yard built within the past two years and had not previously been tiled. The bank became so saturated with water that it rose to the level of the bottom of the ties and drainage became absolutely necessary. Two lines of tile were laid across the yard at right angles to the tracks, the first of 8-in. tile near the foot of the grade, and the second of 12-in. tile about 1,000 ft. below the first. Practically no water entered the 8-in. tile at the upper end, but it ran full at the lower end for 36 hours continuously after installation and has since run partially full. A small amount of water entered the upper end of the 12-in. tile, while the lower end ran full for some time and has since run partially full. The water fell from the base of the ties until now the entire yard is comparatively dry. No further evidence is necessary to demonstrate the economy of this tiling. Although it is not known whether a drainage system was originally planned in this instance, such a system is generally included in the plans for large yards. Probably, however, there is no important feature which is so often omitted in the actual construction. Such omission is usually not made intentionally, but so many additional facilities not provided for in the original plans are considered necessary by different officers that the cost is materially increased and the engineer is forced to eliminate all expenses not absolutely necessary to keep within the authorized expenditure. After the yard is put in service the question of drainage is pushed aside from year to year by other demands which seem more urgent. In spite of the fact that it would be economy to put in a drainage system and thereby reduce maintenance cost, yards frequently go undrained for many years.

WHAT are you doing to provide a future supply of section foremen? Have you enough competent men in view to fill your vacancies within the next few years, and are you planning on allowing your successor to secure his men as best he can? These are questions that present themselves forcibly to roadmasters and supervisors; for the most serious problem in the track department is the foreman problem. That roadmasters and supervisors seldom know where they can secure foremen to fill vacancies is a universal complaint. Incidentally, how are the railways providing for their future supply of roadmasters? Instances frequently occur where men are promoted around a roadmaster because there seems to be no suitable man to replace him. What is the cause of this general condition? Is it an inevitable one, resulting from the rapid economic development of the country, or is it arising because of previous mismanagement and lack of foresight? If the result of economic changes, what measures must be taken to adjust matters properly to meet the new conditions? If caused by lack of foresight in the past, what is the best way to recover the ground already lost? Some men believe the foreign foreman is the only solution. Others believe the best results will be obtained by an increase in wages sufficient to attract sufficient men of American birth to fill the foremen's positions. Still others believe the best results can be obtained by training and educating the foreign and inferior native laborer until he shall become proficient enough to

properly perform the section foreman's duties. "The Foreman Problem—How to Provide a Supply for the Future," will be the subject of the next contest in this section, which will close March 25. The question is primarily an economic one, true efficiency requires that increased results shall be secured in proportion to any increase of expense due to raises of wages or the adoption of educational features. Only a few roads have attacked this problem in a systematic way, although many plans for its solution have been used locally on single divisions. If these local experiments have worked out successfully they may be capable of wider application. We desire that the contributions to this contest be as complete and representative as possible in order that the greatest benefit and the most practical results may be secured. Many have given the subject a great deal of careful study and the results of their study and experience should be valuable to others. A first prize of $25 and a second prize of $15 will be awarded for the two best papers received, and all others accepted and published will be paid for at our regular space rates. All contributions must be in the hands of the civil engineering editor of the *Railway Age Gazette*, 417 South Dearborn street, Chicago, not later than March 25.

CREOSOTE OIL SPECIFICATIONS.

At the convention of the Wood Preservers' Association in Chicago last month two papers on creosote oil specifications were read, which presented clearly the differences of opinion which exist on that subject. The paper by Hermann von Schrenck, published in the *Railway Age Gazette* of January 19, defends the American Railway Engineering Association specification as a high standard to which all consumers should strive to buy, making allowance for inferior grades by the use of larger quantities. This attitude is typical of a number of railway men and other consumers of creosote oil who are anxious to improve its quality. The paper by S. R. Church, published in this issue, advocates a modification of this specification on the ground, first, that consumers are not justified from a theoretical standpoint in demanding as high boiling an oil as it requires, and, second, that the requirements are unreasonably high from a commercial standpoint. This is the opinion of most of the American manufacturers of creosote oil and some of the consumers.

For the purpose of discussing the specification as intended for treating timber for railway companies, satisfactory creosote oil may be said to have two requisites; first, it must be antiseptic, and second, it must be stable, that is, evaporate slowly. Mr. von Schrenck admits that for practical purposes all parts of creosote oil may be considered antiseptic enough to prevent decay, and Mr. Church presents records of tests to prove that any difference in antiseptic value is in favor of the middle portions of the oil as compared with the high boiling fractions. Mr. Church admits that, other things being equal, the lower boiling fractions evaporate more rapidly, and Mr. von Schrenck cites considerable evidence to show the amount of this difference in rate of evaporation. Mr. von Schrenck recognizes the commercial difficulty which the producer has in controlling the composition of creosote oil, and Mr. Church characterizes it as a "by-product of a by-product," implying that it should not be subject to rigid specifications.

Since the beginning of timber treating on a commercial scale in this country the oil available from American producers has never equalled the demand, and this shortage has increased rapidly in recent years until at present more than 70 per cent. of the oil used is imported.

The production of coal tar from American beehive and by-product coke ovens is more than sufficient to supply all the creosote oil needed in the United States, but it cannot all be distilled, since the pitch so produced would not all be salable. The demand for pitch, therefore, limits the production of creosote. This economic condition is very important in considering methods of securing high grade oil. Theoretically, since the high boiling oils are the more stable, and therefore better suited for use in wood preservation, consumers should demand such oils and refuse to pay as high a rate for inferior grades. Practically, it is doubtful if the total production of oil meeting A. R. E. A. specifications in the United States, and the portion of that produced abroad which is available for export to the United States, are equal to the demand in this country. It is obvious that a producer of oil falling short of the requirements of the specification can market his product at the current price for the best grade if competition with that grade is eliminated by a shortage in its production. It has not been demonstrated that a consistent demand for standard A. R. E. A. specification creosote will not stimulate the production of such oil to an amount equal to the demand.

While the control of the composition of the oil to meet certain requirements may involve an added expense in its production by some companies, this added cost to American consumers should not be as great as the item of transportation cost on imported oils, and therefore no hardship would be worked on domestic producers in demanding a high boiling oil. If in the development of the industry it should become necessary to pay a premium for oil meeting the specifications it would be impossible to determine from existing data how much could economically be spent to secure such oil in preference to a slightly inferior grade. It is easy to show by pan tests and by examination of the oil remaining in treated timber that the lighter low boiling fractions evaporate more rapidly than the higher boiling fractions, but the extent to which evaporation of oil from a piece of timber decreases its life is not known. It would seem, then, that until more complete data on the life of timber treated with oil meeting A. R. E. A. specifications is available consumers should not be arbitrary in demanding a product which meets that specification exactly, but, on the other hand, considerable oil is now being sold containing such low boiling fractions that there is no doubt of its inferiority, and by taking such oil consumers are not doing what they can to improve the quality of the American product.

A COMBINED MAINTENANCE ORGANIZATION.

The experiment being made by the Union Pacific, of maintaining automatic signals on one double-track district in Nebraska by the regular track forces, which was described in the *Railway Age Gazette* of September 15, 1911, has brought out a good deal of discussion. The question has frequently been raised whether this combination of maintenance work cannot be carried still further with good results. It will readily be admitted that the present highly divided method of handling maintenance leaves much to be desired. Its defects are well known. Any means by which many of them can be remedied without causing others equally objectionable would be valuable.

The existing maintenance organization on nearly all roads is commonly divided between the track, bridge, signal and telegraph departments, and on some roads is divided still further. This division of forces, each portion of which reports at least partially to a different officer, has a tendency to create a departmental spirit, which results in loss of co-operation. The more highly specialized any department becomes the less is the degree of co-operation secured with other departments. Persons in such a department sometimes seem to forget that the main business of a railway is to produce transportation, and that all branches of the service exist to further this main purpose. While the field of maintenance has broadened rapidly within recent years to cover properly new and diversified duties, the work of the different branches is so closely related that the greatest co-operation possible between them is desirable.

On automatic signal territory a signal maintainer must be on hand to bond rails promptly when a track gang changes them out. A bridge gang must be on hand to raise a trestle when the track forces are ballasting on either side. The section men must help the telegraph linemen carry a pole to the place where it is

needed to replace a broken one. Again, much work is now being done by other branches of the service which could be done equally well and with a great saving in cost by the regular track forces already on the ground if they were properly instructed. A man from the building department is sent from distant headquarters to replace a plank in a depot platform or to put a pane of glass in a window. The bride gang is sent out to unload a car of material in advance of the actual construction work in order to release the car, and the telegraph line man comes out to repair a broken wire. A section foreman of ordinary intelligence can do these things as well as the men from the different branches of the service, and eliminate the time now lost by them in traveling to and from the work and waiting for trains, which very frequently much exceeds the amount of time that is actually spent on the work.

It will very probably not be possible or practical to combine all the work of the different maintenance branches into one department, but it would appear to be practical to so combine most of it. One would not expect any average foreman to direct the work of renewing a steel bridge or to rebuild an interlocking plant, for these would under any form of organization require the attention of an officer above the rank of foreman. Consolidation of much of the work would not interfere with the more complicated or technical work being done by the individual branches.

There is now a large amount of duplication in inspection. The track foreman goes over his track carefully every day; the signal maintainer does likewise, while the telegraph and bridge men make frequent trips over the territory. This frequent inspection could all be done by one force; in fact, often now the track and signal maintainer each inspects a portion of the line each day for the other.

The most common objection to the proposal to combine maintenance forces is doubt as to the ability of the average foreman of either branch to familiarize himself with the work of the other branches. The Union Pacific found that within a few months after signal and track maintenance were combined as satisfactory results were being secured as before with separate forces. Consolidation of forces would make it practicable to put the best men in each branch of the department in charge of gangs located where the work with which they were most familiar predominated; for example, to put the signal maintainer in charge of the gang where signal work was particularly important, etc. It would be necessary and possible to pay higher wages to these better foremen, which would make the work more attractive, enabling a still better class of foremen to be secured. The railways now find it necessary to pay relatively high wages to get enough competent men for their bridge and signal gangs; and one or two men of this higher-paid class could be given to each foreman with the idea that they would develop into capable assistants. On many roads the different branches of maintenance work are grouped under the supervision of the division engineer: and there seems no good reason why the same principle could not be extended lower down by grouping them all under the roadmaster, also.

NEW BOOKS.

Dredges and Dredging. By Charles Prelini, Professor of Civil Engineering, Manhattan College, New York. D. Van Nostrand Company, New York. 6 in. x 9 in. 279 pages. 82 illustrations. Cloth binding. Price, $3.

This treatment of dredges and dredging by Charles Prelini is intended to present in concrete form the accumulated experience of engineers on this very practical subject. The work of excavating either in the dry or under water is one which many men feel competent to handle, but the economical carrying out of such work is fully as difficult as the more technical phases of engineering construction. The description of dredges and organizations for handling dredging, together with the definite cost data which is included, should prove valuable to men interested in this work.

Letters to the Editor.

TURNOUTS.

Chicago, Ill., January 19, 1912.

To the Editor of the Railway Age Gazette:

The article in your issue of December 15 abstracted from Bulletin 139 of the American Railway Engineering Association, on "The Turnout," written by F. S. Stevens, is a very valuable contribution to the subject, and will be of much help in clearing the way for standard frog and switch practice.

The various features of a turnout are a matter of continual improvement. This improvement has been going on since the first railway was built, and will probably continue until we reach the maximum weight of rail that it is economical to roll and operate over. The necessity for improved turnouts becomes more manifest, as engines and cars are made heavier and as speed becomes faster. They must be made more substantial and be more firmly fastened in place. Because of their greater weight they must also be more pliable and more easily handled than in the past. Probably an ideal turnout would be a regular curve throughout the entire turnout with easement curves to reach the tangents at each end. This refinement has not even been attempted at the present time, but it would be unwise to say that it may not be attempted in the future, as will also other improvements and betterments of our switches, which are likely to develop through improvement in the quality of steel and the necessity occasioned by the operation of high speed trains.

With the present status of manufacture of frogs and switches Mr. Stevens' statement that a No. 15 frog can be operated with less discomfort than is caused by the change of direction at the point of switch is probably true. It does not necessarily follow, however, that the No. 15 frog is the sharpest frog which should be used. While the passing through a switch point may occasion a sudden jar, it would be logical to conclude that the quicker the train gets back to its normal condition, the better. It is not uncommon to see trains taking a switch at 35 to 40 miles an hour, and if they are to ride easy on the 3 deg. curve of a No. 15 frog, the lead rails must be elevated. Little elevation, however, would be necessary on the 1 deg. 49 min. curve of the No. 20 frog, as per Mr. Stevens' table, and it would certainly ride easier without elevation than the 3 deg. 12 min. curve of the No. 15 frog. As long as we cannot elevate the outer rail, the flatter the curve, and the shorter the sharp curve at the switch point, the easier will be the movement of trains at high speed through the turnout.

With this in mind, it would not appear to be the best policy to stop our improvement of frogs with a No. 15, but we should try to improve conditions still further and get a lighter curve, so that trains can go at higher speed. There is no reason why a sharp frog like the No. 20, or even sharper, should not be made perfectly safe as far as the frog and turnout leads are concerned, for they can be fastened as securely as any curve of the same radius. Necessarily they are more expensive, and for that reason are not acceptable for all places, but where it is not a matter of expense, but a matter of improved operation, it is fair to conclude that a No. 20 frog is better than a No. 15, even with the present switch points.

Concerning the switch point, there are many chances for improvement over its present usual construction. If found desirable, we can use longer rails, for the rails can readily be rolled double the present standard length if there is any advantage in it. It may also be desirable that special steel shall be made for switch points and frogs. With these two improvements, which are in use on a number of roads, it is not a very long step to make the switch points curved and of sufficient length to become equivalent to the 1 deg. 49 min. curve of the No. 20 frog lead, or even less if necessary.

There has been such marked improvement in the turnout in the past few years, so many frogs of higher number are being

used than formerly, and switch points are so much longer than they formerly were, that development is sure to continue and further improvements made over those of the past. I do not mean that Mr. Stevens indicated there would be no improvements in frogs and switches, but the conclusion which he reached in regard to frogs and the length of the switches might give that impression.

Mr. Stevens' interesting article and valuable table are a very complete and up-to-date outline of present conditions and methods of construction.

GEO. H. BREMNER,
Engineer, Illinois District, C. B. & Q.

PRELIMINARY STEAMING OF TIES.

Cleveland, Ohio, January 26, 1912.

To the Editor of the Railway Age Gazette:

Among the papers presented at the convention of the Wood Preservers' Association and printed in the *Railway Age Gazette* of January 19, is one by F. J. Angier, superintendent of timber preservation of the Baltimore & Ohio. Its title is "Treating Seasoned vs. Unseasoned Ties." While not specifically so stated, the impression left on my mind after reading this paper, and I think on that of most readers, is that no economy is effected or advantage derived by steaming timber prior to impregnation. Upon careful examination of the paper, and through correspondence with Mr. Angier, I learn that it was not his intention to convey that impression. He writes: "I am simply comparing air seasoned ties with absolutely green ties or fresh cut ties, that come to the plant, and which would have to be steamed in the same cylinder in which they were treated." Mr. Angier was discussing the question of steaming and treating ties in the same cylinder, and his conclusions, as I understand them, are not against the principle of steaming ties and timbers, but against the method of steaming and impregnating ties and timbers in the same cylinder. When the steaming and impregnating is done in separate cylinders it tells a very different story.

There is another clause in Mr. Angier's paper which might perhaps be misunderstood. He says, in discussing seasoned ties: "In addition there would be a better penetration of the preservative; therefore, a longer life obtained for the ties." By this I understand that he means that unless the ties are air dried after the steaming, so as to remove the condensed vapor and water in the pores and cells, the entrance of the chemical into the wood will be obstructed. That is quite correct. Experience has demonstrated that it is not feasible to impregnate timber with antiseptics immediately following the steaming, because the cells and pores are usually filled with water or condensed steam, which resists the entrance of the chemical. A fair penetration can be obtained with zinc chloride, because it is a water solution, but scarcely any can be obtained with creosote oil.

I grant that it is not economical or feasible to steam and impregnate ties and timbers in the same cylinder; but when this is done in separate cylinders the result is quite different. To illustrate, let us assume that the cost of treating ties by the Card process (zinc chloride combined with creosote oil) without preliminary steaming, is 20 cents, and the average life 12 years. Also, let us assume that the cost for steaming and treating ties by the Goltra and Card processes, is likewise 20 cents per tie, and that the life is thereby increased one year on account of the steam and subsequent air drying. The comparison would be as follows:

First Method.

Cost of ties	50 cents
Cost of treatment	20 "
Laying in track	15 "
Total	85 cents

Life 12 years. Annual charge (from published tables) .0901.

Second Method.

Cost of ties	50 cents
Cost of treatment	20 "
Laying in track	15 "
Total	85 cents

Life 13 years. Annual charge (from published tables) .0850.

The difference in the annual charge is .0051 cents per tie per year. Multiplying this by the average number of years, which in this case is 12½, gives .0637, or 6⅜ cents per tie, which represents the relative economy of the two methods. Should 1,800,000 ties be treated annually, this saving or gain by steaming ties and subsequent air drying, would amount to $115,000. To this should be added the interest on the net reduction of stock made possible by artificial seasoning, insurance, taxes, etc., which, I estimate amounts to no less than $35,000 in the case under consideration, making a total of $150,000 gained or saved by steaming of the ties, which is enough to build and equip a plant every year.

This is almost incredible, but becomes clear when figures and estimates are brought down to a measurable basis. If it be granted that steaming and subsequent air drying of ties will put them in better condition to absorb the antiseptic, and thereby cause a better penetration and dissemination of the chemical, and a consequent increase in the average life of the ties of one year only, the statements I have made above are correct. The definite amount gained or saved by steaming of ties is a simple arithmetical problem, after the premises have been agreed on. The cost of steaming and treating ties in the same cylinder is just about the same as that of doing the work in separate cylinders; in fact, by means of labor and time saving appliances, suitable yard arrangement, etc., the cost of handling the ties, which constitutes the bulk of the expense, can be actually lessened.

We should not lose sight of the fact that Mr. Angier is simply comparing ties steamed and treated in the same retort, which would, of course, reduce the output of a plant that treated ties in this manner. If the plant is suitably constructed and provided with separate steaming cylinders, ties can be steamed simultaneously with those that are undergoing treatment and the output of the plant, therefore, would not be curtailed.

I think it is generally conceded that the steaming of ties or timbers prior to impregnation is essential to secure good treatment. For 20 years after tie treating began to be practiced extensively by several railways in this country steaming was used invariably, and also very extensively, if not invariably, in foreign countries. Six or eight years ago the practice was discontinued in this country in some places, particularly where creosote treatment was employed, not because steaming was considered useless or ineffective, but mainly for other reasons, such as expense, probable injury to the timber, and difficulty of impregnating timber with creosote oil. All of these objections can be readily overcome by the application of proper methods of treating and with suitable facilities.

Finally, Mr. Angier says that the disposition of sewage is a difficult problem. This is perhaps true when the steaming and treating is done in the same cylinder, but it is not the case when the work is done in separate cylinders. By the former method the extracts from the woods are mixed with poisonous chemicals, and would pollute the streams if they were turned into them. On the other hand, saps and juices extracted by steaming of wood in separate cylinders would be free from poisonous substances, and therefore not objectionable, and could be turned into the streams like other sewage, provided no use could be made of the extracts. Perhaps it may be found that the extracts have some value as a by-product.

W. F. GOLTRA.

The Italian army in Tripoli laid a portable railway from that port to Ain Zara, and has already begun to build a permanent railway in its place. For this purpose it has adopted the narrow-gage system which is used in Sicily for local lines. The gage is 37½ in. The material and rolling stock originally destined for these Sicilian lines is thus immediately suitable in Tripoli. Sundry Italian corporations are already proposing to build railway lines on their own account in the newly conquered territory.

TRACK KINK CONTEST

FIRST PRIZE—HANDLING SNOW AND ICE WITH A SPREADER.

BY A. M. CLOUGH,
Supervisor, New York Central, Batavia, N. Y.

The weather conditions of the past month have taxed all the resources on our road to keep the ice down, especially at our track water pans. We have 54 regular trains on tracks Nos. 1 and 2 every 24 hours, scooping water, exclusive of second sections and extra trains also using those tracks. The accompanying photographs show the conditions at these points and the



Fig. 1—Ice Pushed over Shoulder of Embankment by the Spreader.

means used to handle the ice and to keep the pans, or troughs, in working condition.

Fig. 1 shows where the ice which has been loosened by pick and shovel has been pushed on to the shoulder with a roadbed spreader equipped with a special wing for the purpose and at a large saving of laborers and hand work.

Fig. 2 shows the spreader working on track No. 3, and putting the ice over track No. 4 out of the way over the shoulder,



Fig. 3—Showing Arrangement of Snow Fence on Narrow Right of Way.

a flanger being used to flange from between the rails. Snow can be handled in the same way, the flanger being run just ahead of the spreader. Each one of the operations handled in this way saves much labor and is well worth trying by any road having machines that can be equipped and used for the purpose.

Fig. 3 shows a way to place snow fences where the right of way is narrow and where if portable snow fences were placed parallel with the track the snow would settle directly on the nearest track. By placing them at an angle with half of each

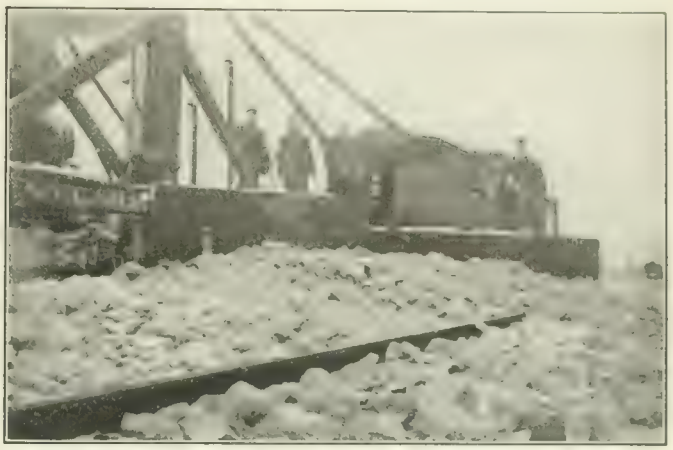


Fig. 2—Spreader Pushing Ice over Adjacent Track onto Shoulder.

section overlapping the other a double baffle for the snow is found and a drift or suction is created which keeps the snow entirely off the track.

SECOND PRIZE—SQUARING UP THE HEAD OF A SPIKE MAUL.

BY P. H. HAMILTON,
St. Louis & San Francisco, Pittsburg, Kan.

When returned from the shops after having been repaired, spike mauls generally appear to be in first class shape. But in a short time many of them chip off and become battered so that they are in poorer shape than when they were sent in for repairs. I find that in squaring up the head a blacksmith will frequently draw it out a little, making a cup in the striking face; then he will square up the corners with his hammer, and will smooth it up with a rasp or file while the metal is hot. In drawing out the battered end of the spike maul he will introduce flaws in the metal, and when it is used it will chip off again where these flaws were found. After drawing out the head the frog repairer on this division always cuts off about 3/16 in., with a hot cutting chisel. This removes most of the flaws and insures a good striking face. I have noticed that the tools repaired by the frog repairer are generally in service much longer than those repaired in the shops, simply because he is working for the interest of the trackmen. A few extra minutes that a blacksmith will use in shaping up a spike maul properly will probably lengthen its period of usefulness in the hands of the trackman several weeks.

SOCKET ON HAND CAR FOR FLAGS.

BY J. L. TAYLOR,
Assistant Engineer, Grand Rapids & Indiana, Fort Wayne, Ind.

A section foreman frequently needs his red or green flag on a moment's notice. Even if they are kept in the box formed by the uprights of the handle-frame, there is always a chance that tools, dinner buckets or coats are on top of them, causing confusion and delay. A piece of old air-hose nailed to one of the uprights of the handle frame makes an excellent socket to hold the flags, making them ready for use in case of necessity.

SOME MOTOR CAR KINKS.

BY P. H. HAMILTON,

St. Louis & San Francisco, Pittsburg, Kan.

The following suggestions regarding the operation of motor cars are not given in instruction pamphlets, and may be of value to those who have to handle such cars.

LUBRICATION.

One foreman on this road had a car on which each cylinder was lubricated from an oil cup on top of the cylinder. In the summer time he had trouble keeping the cylinders properly adjusted, for the heat from the cylinders would warm the oil and make it thin, and would allow too much oil to get into the cylinders. He overcame this by lengthening out the stems of the lubricators with a piece of copper tubing and raising them away from the heat from the cylinders. In the winter he removed the tubing and set the lubricators back on the cylinders.

A car on which the lubricating oil is taken into the cylinders through the carbureter with the gasolene should have the gasolene tank and feed pipe leading to the carbureter cleaned at least once a month. The gasolene is always evaporating while the lubricating oil is not, and as a foreman hardly ever uses his full tank of gasolene each day, the proportion of lubricating oil to the gasolene in the tank is ever increasing. If the tank is not occasionally drained and cleaned out the lubricating oil in the mixture will become too strong. The carbureter should be cleaned occasionally, but the inexperienced foreman had best not attempt this, for he may get it out of adjustment. The gasolene should always be run into the tank through a strainer, preferably a chamois skin, or some tightly woven cloth, to keep dirt out of the tank.

COOLING AND WARMING THE CYLINDERS.

The cylinders of cars which are air cooled are not supposed to get very hot, but in the summer time they sometimes do, and it is hard for a foreman to overcome this. One way of cooling the cylinders, when the foreman has not time to stop, is to shut off the gasolene, cut out the spark, then open up the priming and relief valves on top of the cylinders and let the car coast as far as possible. This draws cool air into the cylinders and aids in cooling them.

If the foreman is having trouble keeping the cylinders warm enough to "shoot" in the winter time, he should carry a blanket or several burlap sacks with him and wrap these around the cylinders when he stops. This will assist in keeping the cylinders warm. He should also have a tarpaulin to put over the car when it is out and exposed to the weather, as it is impossible to start a motor car if sleet and ice have been allowed to get on the cylinders. The car should be kept dry at all times if possible, as short circuits are apt to be formed if the woodwork is allowed to get water-soaked.

PRIMING.

Sometimes it is necessary to prime the cylinders before starting. A piece of small rubber tubing, attached to the gasolene feed pipe drain cock and long enough to reach the priming cups will come handy at such times. By opening the tank drain cock and then closing it quickly the tube will contain enough gasolene to prime both cylinders, as it takes but a few drops.

RELIEF WHEN CAR PLAYS OUT.

Whenever the car plays out and it is necessary to push it into headquarters, the foreman can take out the spark plugs in addition to opening the priming and relief valves, if there is no danger of anything getting into the cylinders. By taking out the spark plugs the greater part of the compression is eliminated and the car can be pushed as easily as a push car.

RUNNING BACKWARDS IN WINTER.

The end with the loose wheels is generally considered the front end of the car, and the car is generally run this way. This is all right in the summer time, and it is necessary that the cars be run this way as much as possible to get a strong breeze of cool air on the cylinder heads. But in the winter the car should be operated with the loose wheels to the rear so that the cold air will be kept from the cylinder heads. The cylinders will generally keep cool enough in winter without the current of air striking the cylinder heads.

TESTING BATTERIES.

Much trouble is experienced with section motor cars from weak or dead batteries. Sometimes new batteries are dead when received. Each foreman in charge of a motor car should be furnished with an ammeter, the cheapest of which cost about $1.50, with which to test batteries. If no ammeter is handy he can tell whether a battery is strong, weak or dead by placing the blade of a common pocket knife on the connection nut on the outer edge of the battery, and moving it slowly forward until the point barely touches the carbon post (not the nut on the carbon post) which extends from the center of the cell. If the carbon post gives off a small curl of smoke where the point of the knife blade comes into contact with it the battery is all right, but if it does not the battery is very weak, and probably no good at all. While this does not measure the strength of the battery it will give some idea as to its strength.

ABSTRACT OF ENGINEERING ARTICLES SINCE JANUARY 19.

The following articles of special interest to engineers and maintenance of way men to which readers of this section may wish to refer have appeared in the issues of the *Railway Age Gazette* since January 19:

Great Northern Ore Loading Dock at Allouez, Wis.—The details of construction of a new steel and reinforced concrete ore-loading dock which the Great Northern has recently built for handling its ore traffic were described in an illustrated article in the issue of January 26, page 145.

Ore-Loading Docks.—An editorial commenting on the three distinct types of ore-loading docks which have recently been built at the upper lake ports was published in the issue of January 26, page 136.

Reconstruction of Canadian Pacific Yard at Ft. William, Ont.—The replacing of the old Canadian Pacific poling yard at Ft. William, Ont., by a gravity yard was described and illustrated in the issue of January 26, page 153.

The closing sessions of the Wood Preservers' Convention were reported in the issue of January 26, page 165.

Construction of the Copper River & Northwestern.—The peculiar and interesting features of the construction work on the Copper River & Northwestern, one of the most important railway lines in Alaska, were described in an illustrated article in the issue of February 2, page 191.

Hard and Soft Rails.—The testimony of President Farrell of the Steel Corporation, before the congressional committee, was published in the issue of February 2, page 209.

The Rail Situation.—An editorial continuing the discussion on rails and commenting particularly on the testimony of President Farrell, of the Steel Corporation, appeared on page 226 of the issue of February 9. This is the third of a series of editorials on this subject, the others appearing in the issues of December 15 and January 12.

Suspension Bridges and Cantilevers.—The review of a book on this subject by D. B. Steinman was published on page 228 of the issue of February 9.

The Railways' Interest in Forest Fire Prevention.—The necessity for forest fire prevention, and methods which railways are adopting to aid in this work, were discussed in an illustrated article by E. A. Sterling, forester of the Pennsylvania Railroad, which was published in the issue of February 9, page 231.

New Radcliffe Viaduct on Great Northern of England.—The

old Radcliffe viaduct of the Great Northern of England, originally built of timber, has been entirely rebuilt of brick. It consists of 56 spans, and has a total length of 1,254 ft. The reconstruction of this viaduct was described in the issue of February 9, page 235.

GOLD HILL RELOCATION OF PANAMA RAILROAD.*

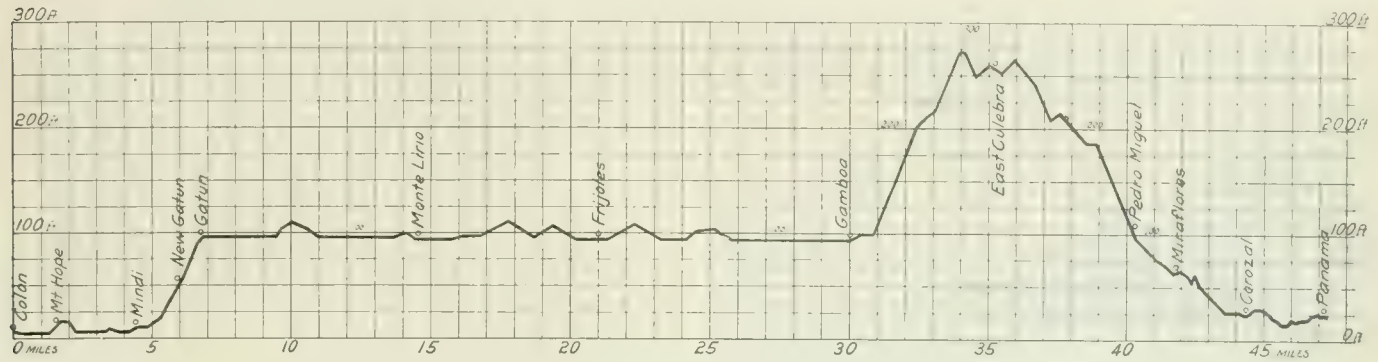
The relocation of the Panama Railroad was made necessary by the decision to adopt the 85-ft. level lock canal, which involved the building of a dam, converting the Chagres river valley into Lake Gatun and submerging the greater part of the present line. The general plan of the relocation and the work done in the early stages were described in the *Railway Age Gazette* of February 11, 1910. At that time the relocated line was projected through the Culebra cut on a 40-ft. berm at elevation 95. The numerous slides which developed along the east side of Culebra cut threatened this location, however, and upon the recommendation of a board, consisting of H. H. Rousseau, Major Chester Harding and Lieutenant Frederick Mears, this line was abandoned, and the so-called high line around Gold Hill was substituted. The reasons given by the committee for this recommendation are set forth in the report as follows:

"1. The disadvantages and inconveniences arising from the difficulty of access with such a 'berm-line' track so far below the level of the natural ground between Gamboa and Pedro Miguel have become more pronounced and have assumed much larger relative weight.

"2. During the present rainy season, as the excavation in the cut has gone deeper, the difficulty of keeping the berm-line road free from interruption before the banks have taken their final slope, which cannot be expected to occur until some time after the completion of the canal, has become more evident, and is now a potent factor in considering this question.

"3. With a high line for railway traffic and a berm line for construction and maintenance work only, the committee believes that the omission of the greater part, if not all, of the concrete retaining walls through the cut, the construction of which was originally contemplated, can be seriously considered. These retaining walls could only be built at a large expense, and there is some doubt as to their necessity and permanent value. The estimate of December, 1908, included an item of $4,000,000 for these retaining walls."

This report was approved July 26, 1910, and the necessary surveys were begun. The problem was to locate a line connecting the south end of Gamboa bridge over the Chagres river with the completed portion of the relocated line near Pedro Miguel. It was necessary to keep this location well away from the edge of the Culebra cut to eleminate danger from slides. Preliminary surveys showed three critical points: First, the section immediately south of Gamboa bridge involving the getting out of the canal section at the north end of the Culebra cut and reaching the high level of the natural ground along the east bank; second, crossing the LaPita divide which lies perpendicular to the general axis of the canal; and third, crossing a high divide near the town of Paraiso. It was decided soon after the locating party entered the field to adopt a 1¼ per cent. grade in order to secure a roadbed benched in the solid ground beyond



Profile of Relocated Line; Panama Railroad.

*Abstracted from the annual report of the Isthmian Canal Commission for the fiscal year ending June 30, 1911.



The Quebrada Baja Bottom, Showing Settlement of Fill.

the influence of slides. The line runs up the valley of the Pedro Miguel river, which is quite narrow with steep, rugged sides. About 4 miles from the station of Pedro Miguel it turns up a small tributary nearly at right angles to the main stream, and approaches the continental divide. This divide is crossed in a low saddle, after which the line continues over the valleys of the Rio Gamboa, Rio Obispo and Rio Mesambi.

This section was fairly easy country for railway construction, the first real difficulty coming in the crossing of the La Pita range. Lines were located through several saddles, the one finally adopted being about one mile east of the canal axis. The crest of the grade is on this LaPita divide, being reached from Gamboa by a practically continuous 1¼ per cent. grade. After crossing this divide the line skirts the base of a high range of hills for about a mile.

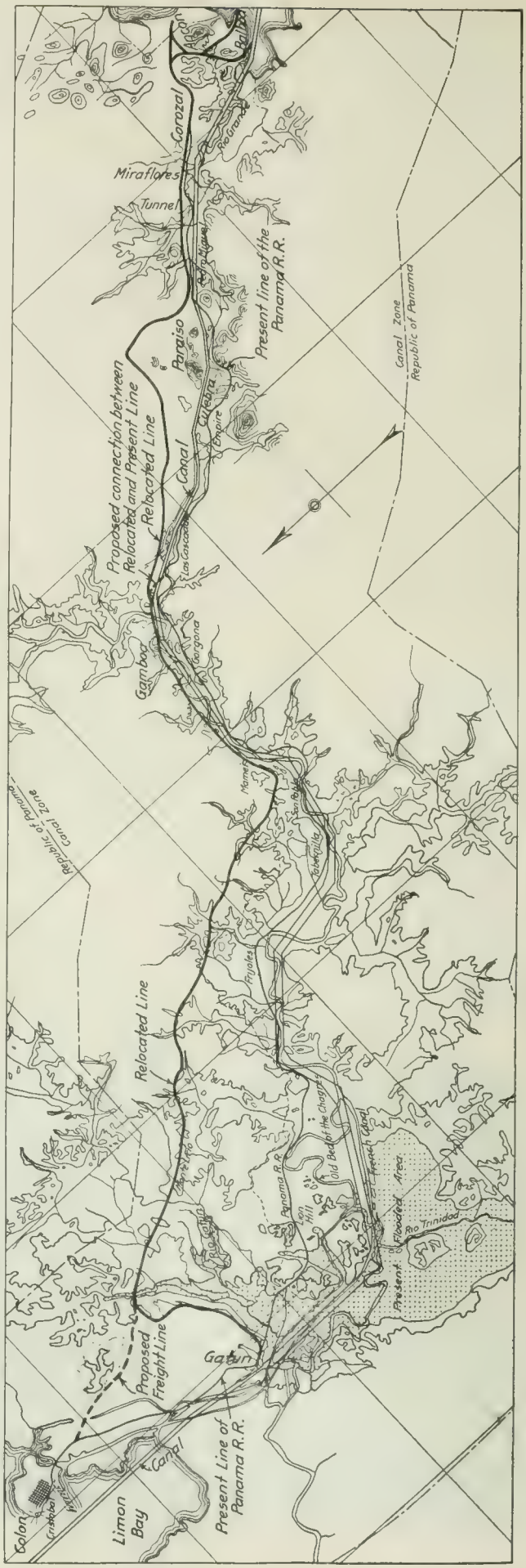
The usual difficulties incident to railway location in a tropical



Trestle Across Deep Valley Back of Paraiso.

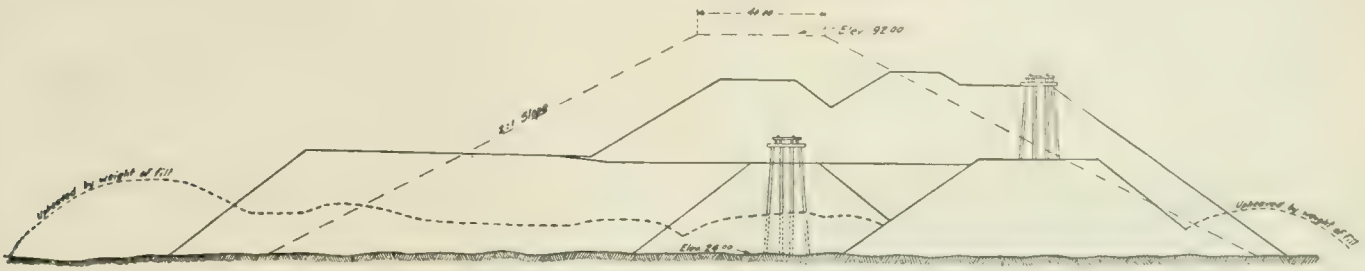
country were encountered in this work. The progress was limited by the amount of line the machete men could cut in one day, varying from 3,000 to 6,000 ft. All topography was taken by accurately locating contours on 10-ft. intervals. From the knowledge of the country gained during construction only minor changes in the alinement made on this location have been found necessary, and all of these were put in effect before construction work was started.

Construction work was begun January 1, 1911. The cut and fill on the whole line was about balanced, and totaled 1,125,000 yds. Concrete culverts required 9,000 yds. of concrete, and there was 2¼ miles of temporary trestle to be driven. About 275,000 yds. of the grade was hand work, the remainder steam shovel. On a short section, including about 75,000 yds. of hand work, a flat price of 47 cents per cu. yd. was paid, the railway furnishing tools and Decauville equipment. Trestles were driven across all deep valleys, untreated piles and second-hand decking being used. The work was so laid out that all available construction plants could be used continuously, and there were no delays on



Location of Relocated Line of the Panama Railroad.

account of grading or lack of material. Culverts were built where possible by hauling in gravel and cement over standard track. In a number of cases, however, grading would have been delayed by waiting for this method, and material was therefore hauled in by wagons and carts; and in some cases ruble masonry culverts were built of stone secured near the site. The culvert work was 85 per cent. complete and trestles were 95 per cent.



Typical Cross Section of Quebrada Baja Embankment.

complete at the end of the fiscal year. The following is a summary of work done on the Gold Hill line for the fiscal year:

Total excavation, cu. yds.	696,742
Concrete placed, cu. yds.	7,034.7
Trestle driven, linear ft.	11,446
Temporary track, linear ft.	53,639
Clearing done, acres	256.93
Total expenditures to July 1, 1911	$498,610.41

The work on the remainder of the line is rapidly nearing completion. On June 30, 1910, the line between Gatum and Gamboa was practically completed, excepting that portion across the main valley of the Gatun river and its tributaries. These valleys contain in the aggregate 4,000,000 cu. yds. of fill. This work was pushed during the past fiscal year, and there remained on June 30, 1911, only 850,000 cu. yds. to place. The principal excavation on the new line was from borrow pits in which steam shovels made very favorable showings. The grand average output of steam shovels in borrow pits for the fiscal year was 1,592 cu. yds. per day; the material handled being 60 per cent. rock.

A number of slides and settlements have been encountered in the work across the valleys of the Gatun river and tributaries, the most serious of which has been in the Baja bottom. It is about 60 ft. from top of ground to solid rock in this valley, the material intervening being of the softest clay, decomposed wood and vegetation. The weight of the filled-in earth and rock has pushed away the softer material and practically settled to bed rock. This embankment is now within 10 ft. of grade, with a heavy counterweight on either toe, and it is anticipated it can be completed within a short time. In the Quebrancha bottom rock is overlaid with a soft deposit of sandy clay and a harder stratum of clay and pure sand near the ground surface. The first deck of the embankment across this valley was put in to elevation 50 and filled well over the entire area out to the 2:1 slope stakes. A trestle was then driven to elevation 70, and filling through this level was started when a small settlement occurred on the line of the trestle with corresponding upheaval of the natural ground beyond the slope stakes. This ground was further counterweighted by filling in well beyond the slope on both sides and the work of raising the center line to permanent



Piers for Bascule Bridge Over Gatun River.

grade was continued. By keeping careful watch on settlement and upheaval the permanent embankment has been brought very close to proper grade. A small settlement occurred at the south end of Gatun river valley, where the embankment had been raised to elevation 97. The excessive weight of the fill caused a small slide to develop along the west toe, which pushed up the natural ground for a distance of 200 or 300 ft. This upheaval has now been filled over and counterweighted and no further trouble is anticipated.

The construction of a permanent telegraph and telephone line was undertaken during the last fiscal year. The line utilizes 56-lb. steel rails for poles, and is provided with four cross arms, 10 pins to the arm. No. 10 hard-drawn copper wire is used.



Heavy Pan Car Work on Gold Hill Line; Panama Railroad.

The line from Gatun to Gamboa was 50 per cent. complete on June 30. Ballasting operations were continued throughout the past year, Chagres river gravel from a pit at Gamboa being used for this purpose. About six miles of 90-lb. rails were laid on the completed section near Gatun, most of this length being laid on hard wood ties, with tieplates and screw spikes. The section of the relocated line from Paraiso Junction to Corozal Junction, 4.1 miles, was turned over for operation on September 4, 1910. Regular operation on the section of the line between Gatun and Gorgona was begun on February 15, and the tracks on that section of the old line will be removed in the near future in order that they may be entirely out of the way by April 1, when Gatun Lake will begin to rise to the 50-ft. level. Between Gorgona and Panama the present line will continue in service until the canal work is approximately completed. Trains cross from the present to the relocated line by tracks on top of the Gamboa dike, which separates the water of the Chagres river from the Gulebra cut. It is expected that the Gold Hill Line will be completed by April 1.

Lieutenant F. Mears is chief engineer in charge of this relocation, and is assisted by H. P. Warren, engineer of construction, and M. B. Connolly, superintendent of construction.

The earnings of all those railways in Germany whose fiscal year begins with April, about five-sixths of the total number, during the nine months ending with December last increased 7½ per cent. over the previous year—8.3 per cent. in freight tonnage and 5.2 per cent. in freight earnings. The increase in gross earnings was more than $25,000,000.

CREOSOTE SPECIFICATIONS AND ANALYSIS.*

BY S. R. CHURCH.

Creosote oil is a by-product of a by-product. On this account the tar distiller faces a somewhat difficult situation, for on the one hand, no one has ever succeeded in buying coal tar on specifications, except that excess of water can be deducted from the bill, and on the other hand, the pitch made from this coal tar must be of various grades to meet the requirements of the roofing trade, paving trade, briquetting industry, and all the other purposes for which pitch is used. In distilling these tars to pitch, creosote oil is obtained, and to market the oil, it must comply with certain specifications. The character of the oil—that is, its specific gravity and boiling point—depends more than anything else upon the grade of pitch that is being made; for instance, if you should make very hard pitch, and take off more oil to do so, then the oil as a whole will have higher boiling points.

Since the beginning of the tar industry in the United States, the largest single department has been the production of roofing materials. In the manufacture of tar roofing materials we are as far ahead of Germany today as Germany is ahead of us in the manufacture of coal tar colors. Therefore the American tar distillers try to produce the best possible grade of pitch for the roofers.

Meantime, on the Continent, and also to some extent in England, the tar distillers have comparatively little roofing business, and for many years their biggest demand for pitch has been for briquetting purposes, which requires a hard pitch. The development of the color industry brought European tar distillers their most profitable outlet for by-products and naturally the creosote oil was robbed of whatever constituents would be of value in the color industry. With characteristic far-sightedness, the German tar distillers, seeing what sort of oil they had after they had extracted everything they wanted, extolled the merits of this oil, and created a demand for it for creosoting purposes. This German oil is probably a highly desirable grade of cresote oil. It is a fact, however, that the longest records of service of creosoted timbers, both in England and America, are of timbers treated with oils very different in character, and containing much higher percentage of the napthalene and so-called low-boiling fractions than the German oils.

For some years the tar distillers in the United States have realized that conditions are changing. The roofing business, though still of tremendous proportions, no longer represents the only large outlets for pitch. Coal briquetting with pitch binder is already an industry of no mean proportions. In an endeavor to obtain as much creosote oil and as high boiling oils as possible, the use of hard pitch for various purposes is being actively promoted, and chemists are continually carrying on investigations looking toward new uses for coal tar pitch.

It is my purpose, without going very far into the merits of different grades of oil from a scientific standpoint, to briefly state and answer a few questions.

1. What are the principal specifications in use in the United States today?
2. How did these specifications come about?
3. Would any modification of them be desirable?

1. Without question, the creosote oil specification of the American Railway Engineering Association (as published in Bulletin 107, January, 1909, in the report of the Committee on Wood Preservation), is the most widely known and probably the most widely used of any. The railways consider this a standard for oil for tie treatment, to which they would like to adhere as closely as possible.

As ties constitute about two-thirds of the total timber treated in the United States, the importance and far-reaching effect of this specification, provided it were in actual use by all railways

*Abstract of an address before the eighth annual convention of the Wood Preservers' Association.

and companies treating for railways, can be readily seen. The specification is as follows:

The oil used shall be the best obtainable grade of coal tar creosote that is, it must be a pure product of coal tar distillation and must be free from admixture of oils, other tars or substances foreign to pure coal tar; it must be completely liquid at 38 deg. C., and must be free from suspended matter; the specific gravity of the oil at 38 deg. C. must be at least 1.03. When distilled according to the common method—that is, using an eight-ounce retort, asbestos covered, with standard thermometers, bulb one-half inch above the surface of the oil—the creosote, calculated on the basis of the dry oil, shall give no distillate below 200 deg. C., not more than 5 per cent. below 210 deg. C., not more than 25 per cent. below 235 deg. C., and the residue above 355 deg. C., if it exceeds 5 per cent. in quantity, must be soft. The oil shall not contain more than 3 per cent. water.

Next to crossties, the most important class of timbers is piling, including dock timbers. Undoubtedly the service requirements for this class are more severe than for any other. The mechanical life is unlimited, and the desired end of treatment is to add as many years as possible to the life of the wood. Yet, for this work there is today no oil specification recognized as "standard" to any such extent as the Maintenance of Way specification is for tie treatment. A typical specification for oil for piling is as follows:

Specific gravity, not less than 1.02.

The oil shall contain not less than 30 per cent. naphthalene (210-235 deg. fraction) and not over 10 per cent. of tar acids.

Poles and crossarms do not, as yet, constitute a very large class of treated timbers, one, however, that will no doubt become of much greater proportionate size. The National Electric Light Association, representing 90 per cent. of the light and power companies of the United States, has adopted the following specification for oil:

1. It shall have a specific gravity of at least 1.03 and not more than 1.08 at 38 deg. C. If the gravity is taken at a higher temperature, a correction of .0008 for each degree C. above 39 shall be made.

2. There shall not be over 1 per cent. of residue insoluble in hot benzol.

3. The original oil shall contain not over 2 per cent. water.

4. The oil shall be miscible in absolute alcohol, volume for volume.

5. The residue remaining upon sulphonating a portion of the total distillate shall not exceed 1 per cent.

6. The oil shall contain not more than 8 per cent. of tar acids.

7. When 200 grams of the oil are distilled in accordance with the requirements of the specifications for the analysis of coal tar dead oil or coal tar creosote, hereinafter referred to, and results calculated to water free oil: Not more than 5 per cent. of oil shall distil off up to 205 deg. C. Not more than 35 per cent. of oil shall distil off up to 235 deg. C. The percentage distilling to 245 and 270 deg. C. shall be noted. Not more than 80 per cent. shall distil off up to 315 deg. C. The coke residue shall not exceed 2 per cent. The distillate between 205 deg. C. and 235 deg. C. shall deposit naphthalene on cooling to 215 deg. C.

The Forest Service has recently put forward a tentative specification for creosote oil, which no doubt represents the best judgment of a very able group of investigators.

The creosote should be derived from the distillation of pure coal tar, free from any adulteration whatever or any mixture of undistilled tar. If it contain more than 3 per cent. of water, a deduction in price corresponding to the per cent. of water in excess of that amount will be made. It shall have a specific gravity at 60 deg. C. of not less than 1.04. When analyzed by the standard Forest Service method of analysis for coal tar creosote, it shall have the following fractions, calculated on a moisture free basis (when less than 3 per cent. water is present in the creosote it shall be considered moisture free):

Up to 205 deg. C., not more than 5 per cent. Up to 235 deg. C., not more than 40 per cent. nor less than 5 per cent. Up to 250 deg. C., not more than 50 per cent. nor less than 15 per cent. Up to 295 deg. C., not more than 65 per cent. nor less than 30 per cent. At 355 deg. C., the residue must be soft and not sticky.

On applying the sulphonation test to the fraction between 305 deg. C. and 320 deg. C. there shall be no oily residue insoluble in caustic alkalies.

The indices of refraction at 60 deg. C. shall be as follows for the following fractions:

At 250 deg. C., not less than 1.593 nor more than 1.602. At 290 deg. C., not less than 1.615 nor more than 1.622. At 300 deg. C., not less than 1.625 nor more than 1.632.

These represent typical American oil specifications, and, although there are a score or more of specifications in use, most of them are modifications of one of the foregoing.

For the purpose of comparison, a few modern European specifications are presented. Dr. Herman Von Schrenk quotes from a report by Mr. Henley on the treatment of poles by the British Post Office Department, as follows:

"To insist, however, upon a definite proportion of any particular constituent, except within fairly wide limits, would probably have the effect of raising the price of the oil to a prohibitive extent, and therefore the practice followed by the British Administration is to test each contractor's creosote, and if it be found to be a genuine commercial article, having a reasonable proporion of the desirable constituents, to allow it to be used for creosoting poles."

The limits which the Post Office Department regard as satisfactory are briefly as follows: To leave not less than 25 per cent, or more than 35 per cent. residue when distilled up to a temperature of 316 deg. C. To contain not less than 15 or more than 25 per cent, of naphthalene. To contain not less than 5 per cent. of phenol and other phenoloids. To be completely liquid at 38 deg. C. Not to contain more than 2 per cent. of matter volatile at 100 deg. C. In this connection it should be noted that the method of analysis used by the Post Office Department is that described as the standard method of analysis of the American Railway Engineering Association, with the exception that the thermometer bulb is placed in the oil.

The Austrian government specification for poles, according to Dr. Von Schrenk, is as follows:

Must have at least 10 per cent. tar acids. At 1 deg. C. must have a specific gravity of 1.04 to 1.10. At this temperature no naphthalene must deposit. It shall only contain constituents whose boiling points are between 200 and 350 deg. C. When distilled (thermometer in the vapors) not more than 2 per cent. shall come over up to 200 deg. C., not more than 35 per cent. up to 235 deg. C., and at 300 deg. C. at least 65 per cent. must have distilled over.

The Hungarian administration requires for pole treatment a creosote oil of a gravity of 1.04 to 1.10; 10 per cent. phenols and 12 per cent. naphthalene.

Through the kindness of E. A. Sterling, I have obtained the following specifications, representing modern European requirements for oil treatment of cross-ties:

Prussian State Railways

The creosote must be compounded in such a manner that not over 3 per cent. shall distil over up to 150 deg. C., not over 10 per cent. up to 200 deg. C., and not over 25 per cent. up to 235 deg. C. (Bulb of the thermometer to be in the vapor.) Specific gravity at 15 deg. C. must be between 1.04 and 1.1, and the oil must be perfectly clear at 40 deg. C. It must, when mixed with equal parts of benzol (capable of crystallization), remain clear without showing more than traces of undissolved bodies.

Great Western Railway (England):

The creosote is to be a pure coal tar distillate of the very best quality, free from all impurities, and on analysis must give the following results: To be entirely liquid at a temperature of 85 deg. F., and to remain so on cooling to 75 deg. F. To contain not less than 25 per cent, of constituents that do not distil over at a temperature of 600 deg. F. If any water is present, the total quantity yielded by distillation shall not exceed 3 per cent. To yield to a solution of caustic soda not less than 8 per cent. (by volume) of tar acids. The specific gravity of 60 deg. F. to range between 1.040 and 1.080, water being 1.000.

London and Southwestern Railway

The creosote shall be of the description known as "heavy oil of coal tar," of the very best quality. It shall be free from all admixture and impurities. It shall be perfectly fluid at 60 deg. F., and, while standing at that temperature, shall give no deposit. It shall contain at least 25 per cent. of constituents which do not distil over at a temperature of 600 deg. F., and shall also contain not less than 8 per cent. of tar acids.

London and Northwestern Railway

The creosote is to be a pure distillate of coal tar, to be entirely liquid at 90 deg. F., and to contain not more than 20 per cent. by volume of deposit at 60 deg. F. It must contain not less than 8 per cent. by volume of tar acids, and not less than 25 per cent. by volume of constituents which do not distil over at 600 deg. F. The boiling point is to be not less than 400 deg. F., and the first 25 per cent. of the distillate shall have a specific gravity greater than that of water. During the process of distillation the thermometer is to be immersed so that at the end of the distillation the bulb is just out of the oil; the retort to be heated by a naked flame.

Great Northern Railway (England):

The oil must come from gas works making bituminous coal gas, not water gas; it shall contain neither blast furnace nor coke oven creosote, and the company reserve to themselves the right to inspect the tar from which the creosote is made at the works. It must be wholly liquid at 95 deg. F. The specific gravity shall not be less than 1.025 nor more than

1.04[illegible] at [illegible] deg. F. The oil shall yield not less than 5 per cent. of tar acids to a solution of caustic soda of specific gravity 1.120. The oil shall yield not less than 30 per cent. by weight of pressed naphthalene after standing 12 hours, at or below 60 deg. F. When submitted to fractional distillation, the portion (inclusive of water) distilling below 170 deg. C. shall not be more than 4 per cent. by volume. The portion distilling between 170 deg. C. and 210 deg. C. shall not exceed 12 per cent. by volume. The portion distilling between 210 deg. and 270 deg. C. shall not be less than 50 per cent. nor more than 60 per cent. by volume. The portion distilling above 270 deg. C. shall not be less than 25 per cent. nor more than 30 per cent. by volume.

2. How did these specifications come about? I think it can be safely said that the European specifications are largely the result of the following condition: One railway, or government office, after years of experience with oil from some particular tar refinery, believing the results good, would draw a specification to cover (not too closely) oil of that character. No such widely adopted standard as the American Railway Engineering Association specification exists today in any European country. So far as I have been able to learn, they are not very particular as to exact compliance with the requirements of the specification, as long as they are satisfied as to the origin of the oil.

Our standard specification represents a general tendency in favor of what are known as "high boiling" oils—that is, oils containing as little as possible distilling below 235 deg. C. I think I can say, without fear of contradiction, that the sentiment in favor of this high distilling oil is not due to failures of timber preserved with oils of lower range. The new specification is rather a result of certain tests that have tended to show the volatility of the low distilling portions of the oil. Some of these tests were evaporation tests, made by placing oil in shallow pans, exposing them to the atmosphere and weighing them from time to time to determine the evaporative loss. Other tests were made by cutting sections from treated poles at the top, center and below the ground line, and comparing the distilling points of the oil extracted therefrom with the distilling points of the oil originally put into the poles. Some similar tests were made with treated ties.

3. Would any modification of the specifications be desirable? This question must be answered from two standpoints: Are the consumers of oil justified from a theoretical standpoint in demanding as "high boiling" an oil as required by the Maintenance of Way specification? Would a modified specification be desirable from a commercial standpoint?

In the first place, the Maintenance of Way specification is more rigid than the specifications governing oil used by the European countries in general, and by the railways of Great Britain particularly. It demands oil of higher boiling character than is used by the oldest commercial creosoting concerns in the country for general timber treatment, and higher than the National Electric Light Association's recently drawn specification for oil for poles and crossarms.

It seems perfectly rational to believe that, other things being equal, a high distilling oil is desirable from the standpoint of permanency.

However, from the standpoint of antiseptic efficiency the highest boiling portions of the coal tar creosote are not as effective as the middle portions of the oil. In a paper by J. M. Weiss, read before the Society of Chemical Industry on October 20, 1911, it was shown that the highest antiseptic efficiency is possessed by the oils distilling between 235 deg. and 270 deg. C., and that the fraction above 270 deg. was far less strongly antiseptic than the middle fraction or the fraction below 235 deg. By limiting the percentage distilling below 235 deg. to 25 per cent., the oil is thereby robbed of some of its most valuable antiseptic properties. In considering the evaporative loss of oils, it should be remembered that light oils, in volatilizing, carry with them fractions of higher boiling point. This is particularly true of naphthalene in the presence of light oils, when it is quite volatile at temperatures far below those at which it would normally volatilize. Hence, it is unquestionably good practice to limit the percentage of oil distilling below 205 deg. or 210 deg. C. to a minimum, as the light oil, which distils below that temperature, has no place in creosote, and hastens the evaporation of higher fractions. In a bulletin recently published by the Forest Products Laboratory a moderately high boiling creosote was shown to be practically as stable as the highest fractions distilled from it.

From a commercial standpoint, it is easy to show that the Maintenance of Way standard is unreasonably high. The only commercial creosote oil produced in large quantities that will meet these requirements is the German oil. A series of tests on 26 different tars produced in the United States was made in our laboratories recently, the oils obtained averaging as follows: Below 210 deg C., 11 per cent.; below 235 deg. C., 43 per cent.

Of these 26 oils only three could meet the Maintenance of Way specification. In order to make them meet it would be necessary to reject, by fractionation, at least one-third of the oil. The limitation of the 235 deg. fraction to 25 per cent. would, if rigidly enforced, eliminate over one-third of English and American oils.

ARRANGEMENTS FOR PILING TIES.*

BY J. H. WATERMAN,
Superintendent Timber Preservation, C. B. & Q.

I wish to call attention to the plan showing a proposed layout for a wood preserving plant. This is not a plan of the present yard at the Chicago, Burlington & Quincy treating plant at Galesburg, Ill., but it is an evolution of that yard. It has been designed with the assistance of an engineer, and all the curves, crossings, etc., shown are practical. This is an ideal layout designed for the piling of material only, and not for the location and arrangement of the plant. It can be shortened or brought closer together if desired without materially disarranging the



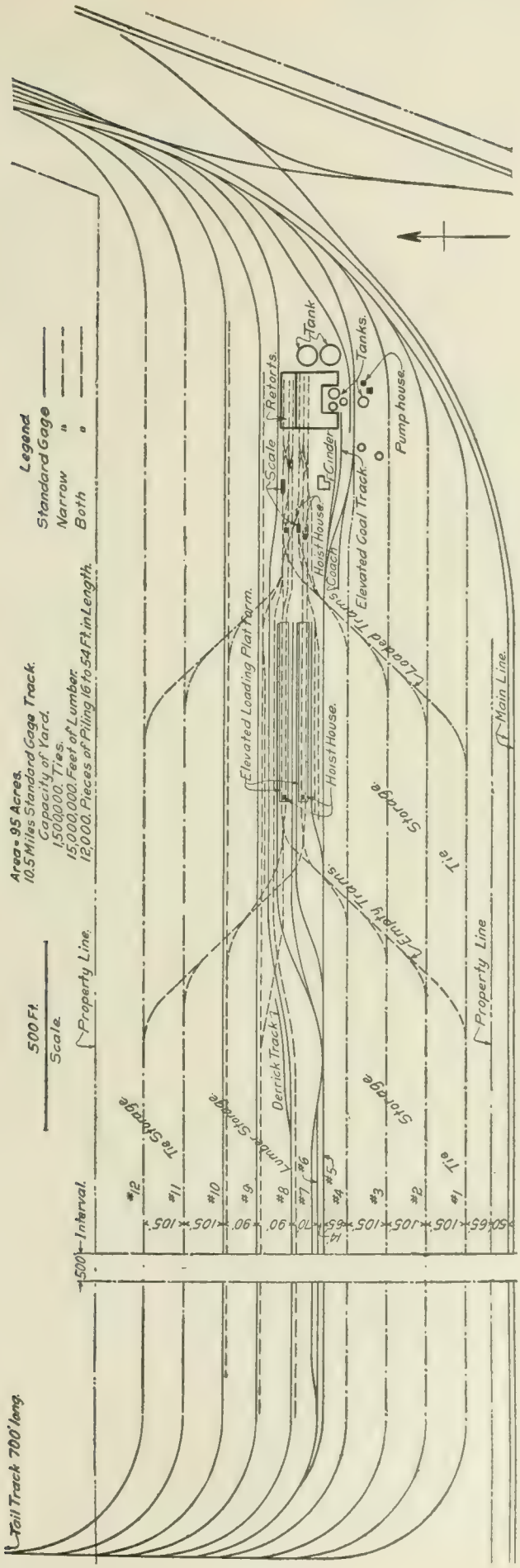
One to 8 Method of Piling Ties.

design. In other words, we have endeavored to make it so that it can be increased in either width or length, depending on the size one desires to make the yard.

This yard covers 95 acres, and has 10½ miles of standard gage track. Storage room is provided for 1,500,000 cross-ties, 15,000,000 board ft. of lumber and 12,000 pieces of piling, ranging from 16 to 54 ft. in length.

A switching lead independent of the adjacent yard is provided so that cars can be switched without interfering with the main yard. If this was not provided, when an engine came out on the main yard lead with a string of cars it would block all other movements on this lead. With this arrangement the tie yard is independent of every other yard. It will be noted that a lead is provided on the opposite end of the yard where from 25 to 30 cars can be switched. As an example of its use, consider 75 cars on No. 1 track, which is practically 4,500 ft. long. An en-

*Abstract of an address before the eighth annual convention of the Wood Preservers' Association.



Plan of Proposed Tie Yard.

gine might not be able to handle this number of cars at one pull, or it might be desired to cut the train in two and switch from either end. With this arrangement the engine could go down running track No. 5 and switch the cars on the west end from this ladder.

The sharpest curve is 16 deg. The frogs are all No. 7. The curves at the east end are lighter and are of course much easier to operate, but I do not think that a 16-deg. curve is a very difficult curve for a standard engine. From 20 to 25 cars can be switched on such a curve readily, and that is as many as one would care to switch in the average tie plant or material yard.

Special attention is called to the arrangement of platforms, to the standard gage tracks running on either side of them, and to the convenience in switching these tracks. No. 5 is the running track, and No. 6 and No. 7 are storage tracks for empty cars. Assume that the cars which have been set to the loading platforms are loaded and ready to be pulled out. The switch engine comes through track No. 5 and picks up the cars on the south side of the south platform. It then backs up, picks up the cars on the north side of the south platform, pulls down on No. 5 and cuts off. It then goes to the west end, and comes back through track No. 6, pushing the empty cars on this track ahead of it and setting them on the south and north sides of this south



Stacking of Piling.

platform. The engine then pulls the cars from the tracks on both sides of the north platform on to track No. 6, goes out through the west end of this track and shoves the cars which are on track No. 7 to the north platform. After this the engine takes the loads on tracks 6 and 5 out to the main yard.

The three-rail cross-over tracks in the yard should be noted. These tracks are designed so that a standard gage engine can push the loaded trams from either side of the yard to any one of the six retorts. It should also be noted that the platforms are intended to be elevated, hoisting engines being provided for filling the retorts and also for drawing the trams from the retorts on to the platforms for loading out. The design of the narrow gage tracks on the west end of each platform is worth special attention. An empty tram car can be dropped from either platform in either direction. I am not going into the question of the advantage of a standard or narrow gage engine for pushing the loaded trams, except to say that with a narrow gage engine the platforms would be built on the level and the other tracks would be depressed. With a standard gage engine the raised platform is preferred. However, this does not affect the general arrangement of the yard. I would call attention to three narrow gage tracks which I term hold-over tracks, two of which are south of the south platform and one north of the north platform. This will be discussed later.

In designing this yard it was desired to have a place for every-

thing. Any man connected with the handling of material yards knows that the expense of switching depends very largely on the number of times one has to move a car before releasing it. In this arrangement separate tracks are provided for creosote and zinc chloride, coal, cinders, derricks and coaches for the transportation of laborers.

For piling ties a three-rail track is provided which I think more practical than a narrow gage track on one side. In the first place, such an arrangement saves space. One does not have to carry the ties as far from the standard gage cars when unloading or to the tram cars when loading. With such a design a standard gage engine will push the trams to the retorts, where they can be reached with the cable of the hoisting engine.

In piling the ties in a new yard, I would first put them on track No. 1. When this was filled I would then go to track No. 2, then to No. 3, and so on, to No. 11 and No. 12. When I started to treat I would remove the ties from track No. 1 entirely before I went to track No. 2. While the ties on track No. 2 are being loaded I would begin to unload on track No. 1, and so on.

One will note that from 50 to 75 cars can be unloaded at one time on any of the tracks mentioned. The ideal way to unload is to begin, say, at the east end and unload to the center, then go to the west end and unload towards the center. While unloading on the west end, the empty cars on the east can be pulled out and other loads set in.

We pile the ties by what is known as the 1 to 8 method, shown in the accompanying illustration. They are piled four tiers back from the standard gage track. You will note that some of them are piled 20 high, and the question is raised whether they can be piled to this height all the time. In our practice, when we have a large number of ties and few men we let the men pile them low, but when we have few ties and plenty of men we let them pile them high.

In stacking lumber and piling a narrow gage track is provided to one side of the standard gage track for the use of a crane in loading trams. When using a crane the track needs to be clear. For this reason it is not practical to load piling and lumber on tram cars with a crane on a three-rail track. With a narrow gage track to one side the crane can move from one tram to another until they are all loaded.

The lumber is piled in the center of the yard instead of to one side. It often comes in long lengths, the piling ranging from 15 to 60 ft. long. By storing it here one avoids sharp curves in getting to and from the retorts. All piling, switch ties, and heavy lumber are handled with cranes.

The hold-over tracks for tram cars adjacent to the platforms were referred to. The question may be raised "what do we want with hold-over tracks?" One person may say that we cannot afford to have ties standing around on trams and not use the trams every day. We figured overhead charges on the plant at Galesburg for one year; that is, we took the total possible retort hours and divided it by the total overhead charges. We did not add anything for depreciation or interest on the plant, and we found that these overhead charges would average $1.50 per retort hour. On the Pennsylvania these overhead charges are figured at $3 an hour, or five cents per minute. From this it can be seen that one can afford to put a lot of money into trams to save delay at the retort. A few years ago in freight houses 10 freight handlers were provided with 10 freight trucks. Now in large freight houses they have 10 or 15 trucks for each man, and what is called the "drop truck" system is used. If one considers a plant with five retorts, the possible delays are 5 x 24, or 120 hours, for each 24 hours. If the retorts are idle one-fifth of the time, this amounts to $36 per day on the basis of $1.50 per retort hour, or $72 on the basis of the Pennsylvania figure. This will pay interest on a considerable number of tracks and trams. It means money every minute the retort is open. When studying the efficiency of a plant, I would first look to see if the retorts were working. When the retorts stop the plant is dead, while the overhead charges go on.

To further illustrate, let us consider one retort. The possible number of retort hours in a year on a 300-day basis is 7,200 hours, or 7,000 in round numbers. If the plant is delayed 10 per cent. of the time this would be a loss of 700 hours or $2,100.

One man will say that the yard arrangements appear to be ideal, but they require 10½ miles of track. This is a bugbear. I have estimated that this track, including laying and ballasting, but without grading, can be built for $100,000. The yard has a capacity of 1½ million ties, but we can treat from 2½ to 3 million annually. On the basis of 2½ million ties, the interest on this track cost is but two mills per tie. This is but a drop in the bucket. One can waste two mills per tie very easily. In the yard which is cramped a man can waste a cent a tie before he realizes it. We had such figures in view when I made this design. Some will say the company will not spend the money. They will spend the money if you can show them that it is practical.

My idea is to ask for what you want, and then stay with it until you get it. Never lay down. Never quit talking. Talk to everybody you meet about what you need. Talk to them until they are tired of you. You can get what you want if you stay with it.

It is not thought that this design cannot be improved. It is development of previous plans, and it is expected that these plans will be continually improved until we secure the ideal. The question of whether one would provide a raised platform or one on the level is optional. The use of a hoisting engine, a gasolene engine, an electric engine or a small locomotive, is also optional. This plan is simply submitted as a basis on which one can begin to work when designing a plant.

WINTER MAINTENANCE DIFFICULTIES ON NORTHERN RAILWAYS.

BY E. R. LEWIS,

Division Engineer, Michigan Central, Bay City, Mich.

The difficulties and the discomforts which beset the railway officers and employees of the northern railways in winter in the discharge of their duties can only be fully realized by those brought by chance or design into actual personal contact with the problem in all its phases. Long before the coming of winter, the snow equipment is examined to make sure that all is in good working order. Permanent snow sleds and tight board snow fences are repaired, altered or extended. Portable snow fence is shipped and placed where needed as indicated by past experience. Brush is cut and made to serve as a first line of defense against drifts. The rotary plow and its auxiliary, the snow crab, come out from the division shops in new coats of paint; and, let us hope, with every part in first class working order. They must be examined, tried out and supplied with the usual tools. The large push plows, equipped with air and with elevator wings, the hand worked winged plows, the smaller wingless flangers, the locomotive pilot plows and the truck flangers have all to be put in readiness for instant use, and tried out. Canvass tarpaulins for the locomotives and tanks, and rubber suits for the engine crews are overhauled and made ready at division points. Copies of the snow plow whistle signal code are distributed. Trainmen and operators report the weather from each station, and a record is kept on the train sheets by the despatcher. Reports on the weather and the condition of tracks are required each morning from roadmasters and certain of the section foremen. Government weather forecasts are also utilized at division points, and telegraphic warnings sent when and where it is deemed necessary. Rattan brooms, snow shovels, salt for switches, handcar brooms and broom holders, track shims, braces and second-hand spikes are stocked and distributed as necessities for winter use of the maintenance forces. All these preparations must antedate the coming of winter to combat successfully the obstacles to be surmounted.

The snow shed is, as the name indicates, a shed built over a track for protection against snow and snow slides, in a locality

where other methods of snow handling are more expensive.

The permanent snow fence may be tight or an open board fence. A tight board fence 8 ft. high forms a good protection against snow. The advantage of a portable snow fence, which is economical in panels 16 ft. long, is, of course, its portability. Snow does not always come with a wind from the same direction year after year. It is frequently necessary to alter the position of fences protecting a certain piece of track, until the best possible results are obtained. Portable fences may be set in fields parallel to the tracks, but off the company's land, and removed in summer. They may also be moved back away from the track in late winter to provide more room for late snows, or they may be set on top of earlier formed snow banks for additional protection.

A brush fence is made of large fagots laid on the ground or snow parallel with the track. Across these fagots and at right angles to the track, are placed other bundles of brush, 16 ft. long, with butts resting on the ground toward the track, and with tops in the air pointing away from the track. This brush fence is a splendid snow catcher, economical and effective for its purpose, but likely to catch and spread fire in summer.

The rotary snow plow and its uses are too familiar to every railway man to necessitate explanation here, but the less spectacular snow crab, a most useful piece of equipment for fighting hard snow in narrow cuts, is very little known. Those who have had experience in the handling of snow plows during the six or seven months of severe storms, which largely make up the far northern winter, are aware that the snow becomes packed so hard in every cut on each side of the track, that it can neither be moved back further by the wings of a push plow nor reached by a rotary. Each additional snow causes anxiety, for there is little or no room in the cut for it. The usual last resort in such cases is the extra gang, the pick and the shovel, the boarding train and—large expense. Blocks of hard snow, loosened from the slopes of the cut, may be utilized at the right of way boundary for snow fence building material.

This troublesome hard snow is easily handled by means of the crab, which was conceived as the result of the well-known difficulty of backing a wingless "V" shaped plow through a snow cut which it has just been pushed through nose first. There is a decided tendency for the snow just winged back to catch the spread of the plow and to roll onto the track under the wheels and derail or stall the plow. It is often necessary to go ahead a long distance to a turntable or wye where the plow may be turned for the return trip. The crab is constructed to pull this snow from the cut slopes into the center of the track where it may be handled by the rotary plow. Imagine a push plow with wide spread wings, and minus its nose. The inside surfaces of the wings are finished as working surfaces. The vertical heel edges of the wings are bevelled toward the track center and are steel shod. These wings converge only as far as the rails. The track space is clear, the nose of the plow being left out while the wings are joined with steel bars and braces. This crab is framed at the end of a flat car, each wing being preferably controlled by air independent of its fellow. The crab with wings extended is backed through a narrow, snow bound cut, the bevelled heel edges scraping the hard snow from the slopes toward the track center behind the car trucks, from which position it is picked up with the rotary.

The effectiveness of snow plows depends largely on the knowledge and application by the manipulator of those many small practicalities ordinarily learned by experience only. Many locomotives of northern railways are equipped in summer with hose to be used in fighting forest fires. This hose may be advantageously used, when attached to a valve placed on the steam dome of the snow plow engine, to thaw the ice from engine and plow, from trucks and frames and the cogs of gear wheels. All this may be done in the few minutes necessary to get orders and water or to take a sidetrack at a meeting point. If no steam hose is available and the gears are frozen and slipping a poker heated in the snow plow stove may be used in thawing ice from the cogs.

Great care should be exercised in backing winged plows around wyes and curves, to make sure that the shoes of the wings do not come in contact with high ice, hard snow or other obstacles alongside the track which will strain the hangings of the wings and put the plow out of commission. Supplies of good alcohol and waste are necessary to keep frost and snow from obscuring the vision of lookouts through the lenses of snow plow port holes. It requires concentration of mind, a quick eye, a sure hand, good judgment of speed and distance, and plain signals successfully to operate a snow plow. Plows and flangers should be carefully blocked up and the wings of plows locked or chained in the closed position before being moved by trainmen, when unattended by persons familiar with the handling of such equipment and specially detailed for the work.

The side leveller, such as is used to level earth in the construction of double track grade, is a great money saver where snow ridges exist between main and parallel side tracks, or even in yards, if it is possible to get the tracks clear of cars so that the snow may be removed successively from one to another and finally deposited beyond the outside track at one side of the yard. The only alternative is the road train.

The "V" shaped, air controlled, flat car flanger is really a wingless snow plow equipped with flanging shoes. This flanger is of especial benefit in keeping down the snow in the center of the track. Nothing is more feared by the snow handler than what is known as hard center. The sudden freezing of wet snow allowed to remain high in the middle of the track creates a condition which can only be remedied with the pick and shovel. Such a method of clearing all the tracks for 75 to 100 miles of the length of a railway means immense expenditures, and is to be avoided even if traffic must be impeded or suspended while flangers are sent over the line. Once frozen such track is beyond the control of any snow handling equipment. The Priest flanger and similar track flangers, which may be yoked over the rear wheels of the pony truck of a locomotive, or used under a special car, are valuable in light snow to keep the track clear between the rails for the space of about 12 in. adjacent to each rail. The flanger shoe is preferably made from soft, thin iron plates which will bend rather than break on contact with any immovable obstruction, such as a high tie or crossing plank spike, or flange rail. A bent shoe may be hammered back into place in a few minutes by the flanger attendant, while a broken or missing shoe puts the flanger out of service till repaired in the division shop. Engines equipped with flangers and good pilot plows will handle snow of considerable depth. Many branch lines and logging roads use this equipment exclusively in localities where the snow fall during the winter totals several feet.

Fast running is essential to the proper clearing of track of snow with winged push plows: that is, the speed should be 35 miles per hour or more, for medium to heavy snow. Very light snow, on the contrary, cannot be so handled. It will rise in clouds, swirl in behind a rapidly moving plow, covering the locomotive and caboose and finally settling on the track. A slowly moved "V" plow having old style, vertical, wide spread wings will often rid the track of very light snow to the best possible advantage. It is frequently advisable to send out extra gangs and boarding trains to stations where cars are buried badly in snow on sidings in order that the laborers may shovel snow from under cars to which the plow has approached, before the cars can be released one to four at a time. At such times, chains, cables, blocks, shovels, picks, brooms and wrecking lights are indispensable.

There is one really good, and many poor kinds of rattan brooms for railway use. The section man's best broom is short, thick and stout; made of whole round rattan only, the straws threaded together low down, with fine wire. The handle ends in a steel spud are useful for loosening hardened snow and ice from between rails and switch points. Without this spud the broom looses half its efficiency. The round rattan broom costs only 10 to 12 per cent. more than the split bamboo or

rattan, and the gain in efficiency is not less than 90 per cent.

Salt for railway use should be fresh, of good quality and strength, and free from large lumps.

Handcar brooms are fixed by holders in front of the handcar wheels and over the rail in such a way as to sweep the snow from the rails ahead of the wheels, and so prevent slipping.

Track shims are flat, rectangular blocks of hardwood, ordinarily 5 in. x 9 in. and from ⅛ in. to 1 in. thick. They are purchased in bundles of about 100 each, tightly pressed in bales some 30 in. in length. Shims are used to place on top of ties under the track rails to equalize temporarily differences in elevation due to expansion of ballast resulting from the action of frost. Rail braces of wood or iron are used in connection with shims to guard the safety of track, the rails of which have been blocked up off the ties as described. Second-hand spikes are again used to fasten braces to the ties.

The handling of snow and ice is the largest item of expense of the maintenance department of nearly every northern railway in winter. Directly and indirectly a large portion of the total expense of the whole road may then be charged to snow and ice.

Section gangs' duties include the track patrol, the care of outlying switch and semaphore lamps, the keeping clear of snow and ice of all switches and crossings, shovelling snow from such tracks and crossovers as cannot be plowed, shimming rails, and such other routine work as is expected of them the year round. In late winter and early spring, the brush is cut away from right of way fences and such fence repairs are made as are necessary and possible.

Continual vigilance is required to detect and repair and replace broken rails and splices; to keep snow off the lenses of semaphore and switch lamps; to keep ice from freezing too high between rails at standpipes and track tanks. With good tools and prompt tool repairs, an adequate force of section men well paid is a true economy. With indifferent tools or delayed repairs, reduced force or poor wages in winter, only the reverse is possible.

A condition peculiar to northern railways during severe winter weather is the backing up of water over the frozen track due to the freezing of rapid streams and the formation of ice gorges. The expansion of heavy ice in lakes or rivers has been known to push out of line railway tracks built close along the shore. The great force of expansion causes the ice to push the ballast to the tie ends and sometimes to actually push the whole track seriously out of line. The difficulty may be remedied by sawing a trench through the ice parallel to the roadbed and placing timber skids under the ice of the main ice field so that any further expansion occurring will cause the ice to rise on the skids over the shore ice. This overlapping will, of course, provide ample room for all future expansion.

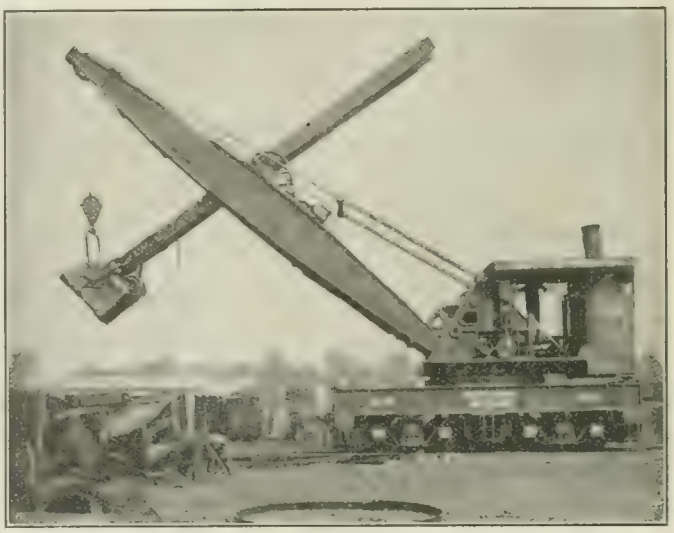
The prevention of trouble to a railway from snow should commence with the location survey. The grade should be so located that it will be at least two feet above the general ground level. Further immunity may be had by judicious widening of cuts, flattening of slopes and placing of spoil banks. When a storm does come, the road is best kept open by instant cessation of freight traffic of the class which can be safely sidetracked at the nearest station.

Snow plows and flangers must be run and kept running ahead of passenger trains until the storm abates, even though schedules are violated by waiting for the snow equipment, to precede the trains. It is best in severe snow storms to make haste slowly and surely. This procedure is admittedly expensive and regrettable. It is adopted with reluctance as the lesser of two evils. The inexperienced operating officer on a northern road will do well to accept the advice of the older men during his first winter season at least. There is much to learn about snow handling, which may be best learned by persistent inquiry, ready acquiescence, and constant observation. As there never are two wrecks precisely alike there are likewise no two storms exactly similar, and judgment is required to manage each battle along the proper strategic lines.

SELF-PROPELLING WRECKING CRANE AND STEAM SHOVEL.

A new self-propelling wrecking crane, with a steam shovel attachment, has recently been built by the Browning Engineering Company, Cleveland, Ohio. The first one of this type which was built for the National Railways of Mexico is shown in the accompanying photographs. The machine is of heavy construction, the main hoist having a capacity of 100 tons, and the auxiliary hoist a capacity of 25 tons.

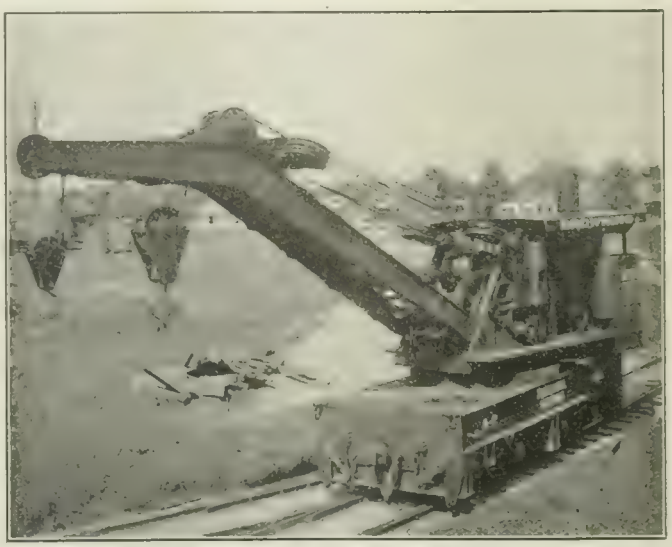
The steam shovel attachment is of special advantage on a single track road running through a mountainous country where



Wrecking Crane Equipped with Steam Shovel Attachment.

landslides are frequent. Owing to the wide radius of the shore it is well suited for such emergency work, as it can dig straight ahead and deposit the dirt in a car to the rear. Having a maximum radius of 45 ft., it is enabled to load a 42-ft. flat car without difficulty. The change from a wrecking crane to a steam shovel can be quickly made in the shop where handling equipment is available. The boom is fastened to the rotating base and side housings by a shaft held in place by cotter pins. One boom is disconnected, and the other substituted by simply taking out this shaft.

The rotating base is a single open-hearth steel casting, which supports the machinery and structural platform on each side of the crane, and the platform allows the operator to reach any part of the machinery without leaving the cab. All operations of the



Browning Wrecking Crane Equipped for Wrecking Work.

crane, as well as the firing and attendance of the boiler, are controlled by one man on this platform. Side bearing wedges of steel castings, operated by a handle, are pulled out, transmitting the side bearing pressure directly to the arch bar frames when the crane is in operation. When the crane is in transit these wedges are pushed inward to take the load from the body bolster and transmit it to the truck bolster springs. The propelling mechanism can be disconnected immediately by a jaw clutch when it is necessary to run the wrecker in a train.

In reaving up the steam shovel attachment, the hoisting line for the dipper is connected to the auxiliary hoist drum, which gives it a faster operation.

The truck is mounted on eight 33-in. wheels having M. C. B. tread. The width of the car frame and rotating frame is 9 ft. 6 in. The maximum height above the rail is 15 ft., and the length of boom is 28 ft.

The capacity of the main hoist with all outriggers is 100 tons at 17-ft. radius, and 70 tons at 20-ft. radius. The auxiliary hoist has a maximum capacity of 25 tons at a 25-ft. radius and 15 tons at a 15-ft. radius. The speed without load is as follows: main hoist, 10 ft. per minute; auxiliary hoist, 50 ft. per minute; rotating, one revolution per minute; traveling on level track, 400 ft. per minute. The wrecker is designed to travel around a curve of 75-ft. radius and to climb a 5 per cent. grade.

PRIZE SYSTEMS IN TRACK WORK.

The promotion of efficiency in track work by awarding prizes for the best maintained track, or for the greatest improvement made in a given period, is not new, but it is receiving more attention from year to year as operating men realize the necessity for encouraging proper interest in maintenance work. The Pennsylvania Railroad is the pioneer in this field, its thirty-ninth annual inspection having been made last fall. Among other roads, the Pennsylvania Lines West, Union Pacific, the Erie and the Rock Island have adopted similar plans.

PENNSYLVANIA RAILROAD.

The Pennsylvania Railroad offers more and larger prizes than the other roads. This year the prizes were awarded upon the basis of frequent inspections made during the year by a special committee, composed of Joseph T. Richards, chief engineer maintenance of way, chairman; L. R. Zollinger, engineer maintenance of way; Elisha Lee, assistant to general manager; L. B. Baker, superintendent Philadelphia terminal division, and E. B. John, superintendent Delaware division. This committee made trips every six weeks over the main line between Pittsburgh and New York, on which the principal prizes were awarded, and notes were taken on each trip of the condition of each section of track. In the fall the general manager and staff made an inspection trip over the main line, and while the prizes were awarded immediately after this trip, they were, in reality, based upon the records kept by the committee. On this general managers' inspection, all general superintendents and their staffs, including the superintendents, division engineers, supervisors and assistant supervisors, accompanied the party. Two days were consumed in the trip from Pittsburgh to New York, and the party of between 300 and 350 men was carried in six special trains. Three committees judged the conditions of the track and right of way. One committee marked on line and surface, one on spacing ties, ditching and drainage, and one on telegraph lines and signals. A new feature introduced was that of sending half the division engineers on the lines east of Pittsburgh on the inspection trip of the lines west and taking half of the western division engineers on the inspection east of Pittsburgh, in this way giving the men an idea of the conditions on other parts of the system. The largest prize consists of $800 for the supervisor and $400 for the assistant supervisor, and is awarded to those men on the sub-division maintaining the best line and surface during the year on the main line between Pittsburgh and New York. This prize was awarded last fall to C. M. Wisman and William F. Miller, respectively, in charge of track between Tullytown, Pa., and Deans, N. J. Four division prizes of $600 and $200 are awarded the supervisors and assistant supervisors having the best track on the four superintendents divisions. These prizes were awarded to John Schimmel, Jr., supervisor, and H. A. Gass, assistant supervisor, in charge of track from West Philadelphia to Coatesville; D. T. Easby, supervisor and R. S. Stewart, assistant supervisor, in charge of track from the east end of Rockville Bridge to Thompsontown, Pa.; George Ehrenfeld, supervisor, and G. W. Curtiss, assistant supervisor in charge of track from the west end of Altoona yard to Portage, and George Goldie, Jr., supervisor, and N. D. Vernon, assistant supervisor, in charge of track between West Philadelphia and Wilmington, Del. In addition, a special improvement prize of $700 and $300 is awarded the supervisor and assistant supervisor on the sub-division on which the greatest improvement was made during the year. The prize went to F. W. Schneider, supervisor, and F. M. Robb, assistant supervisor, between Huntingdon, Pa., and Altoona yard. Also, on each general superintendent's division a prize of $100 was awarded to the supervisor having the best track on branch lines, the reward being based on the result of the general superintendent's inspection.

PENNSYLVANIA LINES WEST.

The Pennsylvania Lines West have adopted a similar plan, although the prizes are smaller and are awarded entirely on the results of the general managers' annual fall inspection. Two committees were appointed by the general manager, each consisting of two superintendents, two division engineers and two supervisors, who mark the different sections for conditions of line and surface, right of way, etc. First and second prizes of $200 and $100 are awarded to the supervisor and the track foreman having the best sub-division, the award being based solely on line and surface. A third prize of $150 is awarded to the supervisor having the best sub-division, the award being based on all points, and a fourth prize of $50 is awarded to the track foreman on each supervisor's sub-division having the best section, considering all points. Twenty-three such prizes were awarded to foremen of the respective sub-divisions. The first prize of $200 was awarded to L. M. Berlin, supervisor of sub-division No. 3 of the Western division; the second prize of $100, to W. F. Rosenbaum, track foreman on sub-division No. 4 of the western division; and the third prize of $150 to D. Callahan, supervisor of sub-division No. 2 of the eastern division. During the past year this inspection covered the main line of the Southwest system from Pittsburgh to New York and the main lines of the Northwest system from Chicago to Pittsburgh.

ERIE.

The Erie awarded a first prize of $200 and a second prize of $100 to the supervisors on each of the two operating grand divisions for the best and second best maintained sub-divisions on the main line. The foreman having the best section on each superintendent's division was awarded a first prize of $100, with a prize of $50 for the second best section. Similar prizes were also awarded the supervisors and foremen on branch lines, but in some instances the branch line prizes for foremen were $50 and $25, respectively. In addition to this, the foremen having the best and second best sections in each grand operating division received prizes of $100 and $50, respectively. The award of these prizes is based largely on the result of trips made with a track inspection car over each section near the beginning and the end of the working season. The physical conditions surrounding the work, the cost of labor and the amount of material used, also enter into the making of the awards. The supervisors' prizes on the eastern grand division main line were awarded to W. J. Flynn, supervisor from Waverly, New York, to Corning, and W. J. Connelly, supervisor from Wellsville, New York, to Hinsdale, while the prizes on branch lines went to L. B. Shaffer, in charge of track from Plains Junction, Pa., to Jessup, the

second prize to E. Madill in charge of track between Avon, N. Y., and Mount Morris. On the western grand division the main line prizes were awarded to A. Burgett, Ohio City, Ohio, to Rochester, Ind., and J. E. Fletcher, Ashland, Ohio, to Marion. Branch line prizes were awarded to Charles Pierson, Salamanca, N. Y., to Union City, Pa., and Nathan Flack, Cleveland, Ohio, to Garrettsville.

ROCK ISLAND.

The Rock Island Lines inaugurated a system last year by which premiums were awarded to roadmasters and section foremen on certain main line districts and sections, on the basis of improvements made during the year. Certain definite weights were given to line and surface, drainage, etc., in the consideration of the awards. Committees were appointed from each of the general managers' districts, and inspections were made at the beginning of the season's work and again at the close. A prize was awarded to the roadmaster whose work showed the greatest improvement on a division or group of divisions, while a premium of $50 was given the foreman making the greatest improvement on each roadmaster's sub-division. A total of $3,825 was awarded in prizes, of which $1,485 went to roadmasters. The roadmasters to whom prizes were awarded were: J. L. Jensen, Bureau, Ill., to Davenport, Ia.; J. Hayes, Davenport, Ia., to Grinnell; A. Burke, Altamont, Mo., to Horton, Kan.; G. Tjaden, Cedar Rapids, Ia., to Estherville; G. Flora, Estherville, Ia., to Sioux Falls, S. D.; J. Dulin, Des Moines, Ia., to Keokuk; V. B. Simpson, Belle, Mo., to Windsor; Wm. Broddle, Herington, Kan., to Caldwell; C. B. Lane, Goodwell, Okla., to Texhoma; J. L. Hayes, Fairbury, Kan., to Phillipsburg; J. D. Sullivan, Goodland, Kan., to Colorado Springs, Colo.; J. H. Trainor, Little Rock, Ark., to Boonville; G. W. Woods, Eldorado, Ark., to Winfield, La.; F. E. Watson, Haileyville, Okla., to Ardmore, and W. H. Gruhlkey, Shawnee, Okla., to Sayre.

It is interesting to note that two of the section foremen's prizes on the southern divisions were awarded to colored foremen.

OTHER ROADS.

The Union Pacific has maintained the practice for several years of awarding a medal to the roadmaster, maintaining the best track on his sub-division of the system and another medal for the section foreman having the best track on each subdivision. Prize sections are also indicated by signs placed at the section houses.

Other roads have followed this premium plan, although the above-mentioned ones are the more important. The Bessemer & Lake Erie has adopted a plan of taking the section foremen over the road on the annual track inspection, so that they may see for themselves how the different sections compare. Two years ago an innovation was made when not only the track of the home road was inspected, but the party made a trip over the Pennsylvania main line between Pittsburgh and Altoona. The following year this trip was extended to Harrisburg. Last year after making the trip over its own line the party was taken over the main line of the Lake Shore between Erie and Buffalo.

All of these plans are of direct value to the track men, and the results are reflected in more intelligent work and greater interest. Any method which encourages a proper spirit of rivalry increases the output of work, and when this increased work is rewarded by cash prizes to the men these prizes stimulate them to increased output, because of this value as well as the honor. For this reason, cash prizes are generally believed to be more effective than medals. While it is true that good results are secured on the Union Pacific, and that the foremen who have won medals are very proud of them, the average native foreman prefers cash, which will meet some definite want, and the same honor can be secured by a small marker placed on the section.

One tendency noticeable in some instances where prizes are awarded on one fall inspection is that of speeding up the work shortly before the inspection and allowing it to go down after the inspection has been made. This is overcome by the plan adopted on the Pennsylvania Railroad of making periodical inspections through the season, which tend to maintain the standard of track work during the whole year. The practice of taking the foremen over the line is most commendable, because it broadens their view of track work. On the roads where this custom has been followed the men look forward with pleasure to the trips from one year to another. It is interesting to note that the roads on which these methods are in use are among those giving the most attention to track work, and, for this reason, their experience should be instructive.

MALLEABLE IRON TRACK FASTENINGS.

The economy in the use of tieplates is now generally recognized. There are many and varying opinions, however, regarding both the design and the material most suitable for tieplates. The greatest difference of opinion regarding design relates to the kind of projections, if any at all, to be placed on the bottom of the plate. As regards the kind of material, it is interesting to note the increase in the use of malleable iron. Extracts from letters on this subject from prominent railway engineers were published in the *Railway Age Gazette* of December 9, 1910.

This material has come into use rapidly in recent years, the first plates being made of malleable iron about ten years ago. From the nature of the material it must be cast instead of being rolled, and for this reason the malleable plate is more expensive than the rolled plate. An advantage, however, is its resistance to corrosion, which action takes place everywhere to a greater or less degree, and is a factor to be considered in all localities of normal rainfall. While perhaps slow, the corrosive action of moisture is nevertheless continuous, and its effects become evident in time, so that it must be given weight in the design of the plate either by the use of a heavier section or by the adoption of a material that resists corrosion. Corrosive action takes place in all degrees from that due to ordinary moisture to that due to brine drippings from refrigerator cars, which is the most severe action commonly met with. Corrosion resulting from brine drippings has become very serious in recent years on railways where the amount of refrigerator traffic is heavy, and has given rise to a great deal of discussion and study, especially on the part of the Master Car Builders' Association. The recommendation of this association that these drippings be collected in tanks will, if followed out, undoubtedly tend to reduce this damage substantially, but can hardly be expected to eliminate the trouble entirely. Even at best it will be several years before the necessary changes are made in all the cars.

With the constantly increasing tendency toward a more permanent track construction, evidenced in the use of treated ties with a life of from 12 to 15 or more years, the beginning of the use of screw spikes, etc., the use of malleable iron plates is increasing in proportion. A promising field for this material is developing in connection with the use of screw spikes, where the plate is largely cast rather than rolled to secure the irregular supporting lugs under the head of the spike, which some roads consider necessary.

Many malleable iron tieplates have now beeen in service from eight to nine years and are showing little signs of wear or deterioration. The Chicago, Milwaukee & St. Paul has been one of the largest users of them, and last summer removed over 100,000 from the track, repunched them for a different weight of rail, and put them back into service. The Chicago, Rock Island & Pacific and Atchison, Topeka & Santa Fe are among other roads which are using them extensively on lines of heavy traffic.

The work on the second section of the North Coast Railway, New South Wales, is proceeding satisfactorily. It is reported that the contractor expects to have a tunnel through Stroud Hill holed through shortly. Rails are now laid from Dungod to Washpool, near Stroud.

WATERPROOFING CONCRETE STRUCTURES ON C. B. & Q. TRACK ELEVATION.*

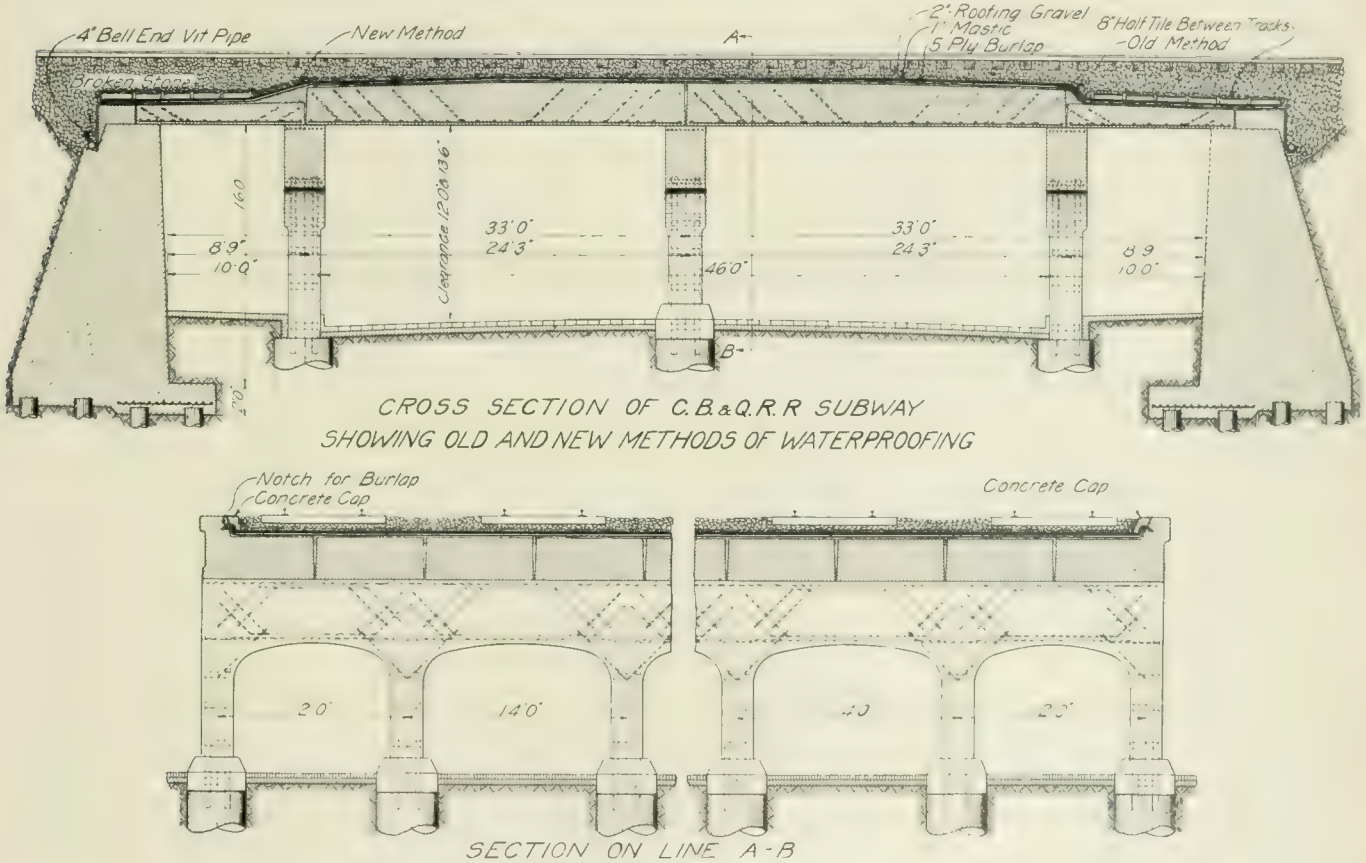
BY G. A. HAGGANDER,
Office Engineer, Bridge Department, C. B. & Q., Chicago.

One of the hardest problems presented in connection with the construction of the concrete subway track elevation of the Chicago, Burlington & Quincy in Chicago is the waterproofing. These subways are constructed with concrete slabs or girders 7 ft. wide, built away from the work, resting on concrete abutments at the street lines and on concrete columns and cross girders at the curb lines and center line of street. There is a joint between the slabs longitudinally across the bridge, also one over each cross girder and one at the bridge seat on top of the abutment. The slabs over the street are 2 ft. 9 in. thick over the street girder and 2 ft. 6 in. thick over the curb cross girder. The slabs over the sidewalk are 1 ft. 5½ in. thick over the curb cross girder and 1 ft. 2½ in. thick over the bridge seat.

The first waterproofing was done in 1906. The most natural method seemed to be the closing of the joints. In order to do this the first slabs were built with the sides offset as shown in Fig. 1. The open space between them after they were set was ¼ in. at the lower part and 1¼ in. at the upper part. A board was put under the joint where the bridge seats did not prevent the mortar from leaking through and the ¼-in. space was filled with cement grout to within 1½ in. of the offset. The next 3 in. was calked with oakum soaked with an asphaltic compound. The rest of the opening was filled with cement grout and over the entire joint were placed three layers of felt painted with this compound.

This method was not effective, the subways leaking very badly. It did not prevent the water behind the abutment from running through the mortar joint down the face, and the joints cracked open, letting the water through. It was thought best to fill the joints with some elastic material and six schemes were tried as shown in Figs. 2 to 7 inclusive. They consist of different arrangements of oakum, cement grout, tar or some asphaltic compound and sand. In every case the bottom of the crack was calked with oakum to prevent having to use boards under the joints. None of the methods were even partly successful until the sixth was tried. This one failed when the tar leaked out through the oakum, but this was prevented to a great extent by the use of sand above the oakum. At first the joints were water tight, but the jar and slight working about of the slabs loosened the oakum, letting the sand and tar escape. The joint at the abutment also leaked very badly. In addition to this the water found its way through two of the slabs themselves.

These methods had been tried during 1906 and 1907, and in 1908 it was thought best to waterproof the whole surface of the bridge and to lead the water in running off by a system of drain pipes.



Standard Method of Waterproofing Subways; C. B. & Q. Track Elevation Work, Chicago.

The method shown on the right-hand side of Fig. 8 was the one adopted. The slabs were built with a ½-in. batter on the sides instead of with an offset so that they could be calked from above. After calking the cracks with oakum they were filled with cement grout. The vertical offset of 12½ in. over the curb cross girder was rounded off by a fillet of concrete. The abutment back of the bridge seat was built up to the level of the top of the sidewalk slab. The lifting stirrups or hook bolts by means of which the slabs were placed were cut off at the top of the concrete and the surface of the bridge swept clean. As a rule only one track or a width of 14 ft. could be waterproofed at one time because of operating conditions and the fact that the force used was of such size that this was one day's work. A strip about 4 ft. wide was mopped with a coat of asphalt which had been heated to the melting point. Four kinds of asphalt were used at different times, Sarco No. 6 and No. 651, melting point 160 deg., Barber Asphalt Company's positive deal

*The Armour Engineer, January, 1912.

"A," melting points 140 deg., Texaco and Warren Chemical Company's asphalt cement. On this was put a strip of 8-oz. open-mesh, first quality burlap, 42 in. wide. This came in 2,000-yd. bundles and was made into rolls coiled on a 1½-in. gas pipe 7 ft. long. It was applied by starting at one end of the bridge and rolling it across. A man followed the roll and swept out any wrinkles so as to give a smooth surface and bond it to the asphalt below. The top of this burlap and a strip of concrete about 15 in. wide on one side of it was then painted with hot asphalt and another layer of burlap laid, covering two-thirds of the first layer, the rest lapping over on the concrete. This burlap and the adjacent concrete were then painted and another

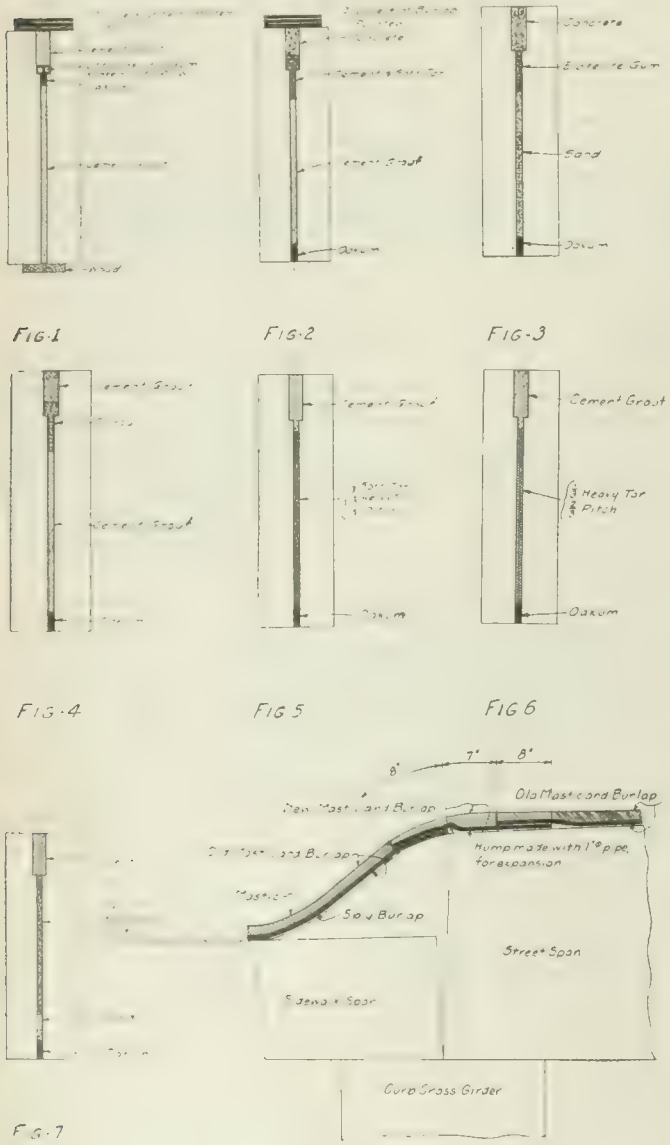


FIG. 1 FIG. 2 FIG. 3

FIG. 4 FIG. 5 FIG. 6

FIG. 7 FIG. 9

Methods of Waterproofing Joints in Subways.

strip laid covering one-third of the first and two-thirds of the second strip. In this way the burlap was made three-ply. Care had been taken that the temperature of the asphalt was not high enough to burn the burlap. A melting point of 160 deg. Fahrenheit gave the best results, as asphalt with a higher melting point burns the burlap and it becomes more brittle at low temperatures. After three-ply of burlap had been laid the whole surface was again mopped with asphalt and a protecting layer of mastic put on. This layer consisted of one part of asphalt and four parts of dry engine sand. The asphalt was heated to the melting point in one kettle and the engine sand heated over an iron plate. They were mixed and stirred in another kettle until of the right consistency, a slow fire under the kettle keeping the mixture plastic. This mastic was dipped into iron wheelbarrows, wheeled on broad runways laid on the burlap, dumped, and finished with wooden trowels to a thickness of 1 in. The top of this mastic was mopped with asphalt. This 1-in. layer was not intended to aid in waterproofing, but was put on to protect the burlap from the ballast and track tools.

The drainage system consisted of inverted 8-in. half-tiles laid between each track leading from the hump over the curb cross girder to the back of the abutment. Back of the abutment and about 1 ft. below the bridge seat a board was placed on which rested another 8-in. half-tile. The end of the burlap rested in this and another 4-in. tile was laid in it. The tiling was given a slope of about 1 per cent. toward down-pipes. These down-pipes were 50 ft. apart and ran down the back of the abutment to the sidewalk level, then through it and under the sidewalk to the gutter. The mastic was protected by ¾ in. of roofing gravel to keep the sharp edges of the crushed stone ballast from cutting into it. The crushed stone ranged from ½ in. to 2½ in. and was used to allow free movement of the water through it.

It was not long, however, before the boards and tiling crushed down into the newly made fill, giving no means of escape for the water which ran off the bridge, causing it to back up above the level of the bridge seat and find its way down the face of the abutment. This was prevented by building the concrete so as to overhang the back of the abutment about 1 ft. and letting it run down the back about the same distance. The top of the abutment was painted with a heavy coat of tar paint before setting the slabs. This effectually sealed the joint. In all abutments built after this experience a notch was left in the top, as shown on the left hand side of Fig. 8, in which to place the tile and prevent its crushing down.

After the first year's experience with this waterproofing, it was thought advisable to increase the thickness of burlap to five-ply. Many leaks had developed over the curb cross girder due to the tearing of the burlap over the hump at the cross girder joint. This seemed to be caused by a slight expansion and contraction of the slabs and tendency of the waterproofing to travel down the slope of the hump due to the load of an engine above it. The crack which opened up was sometimes as wide as ¼ in. Some method of allowing for this had to be used so a 1-in. pipe was laid over the joint, the burlap put on in the regular way, the pipe withdrawn, and the mastic applied. This scheme was used on all work during the year 1909 and thereafter. Another precaution was taken by putting a flatter slope on the hump, the concrete being run out about 3 ft. 6 in., so that the tendency of the waterproofing to slide down was diminished. The bridges waterproofed during 1909 are almost devoid of leaks.

The bridges which were waterproofed by filling the joints, in 1906 and 1907, have since been waterproofed by the latter method. Those which were waterproofed during 1908 developed leaks where the waterproofing cracked and repair work was started during the fall of 1911. In this repair work the mastic was chipped off for a distance of 8 in. each side of the crack. The burlap was cut away from the crack to the edge of the mastic on the street slab. A 1-in. pipe was then laid over the joint and the mastic and the burlap on the street slab lifted up so that a new strip of burlap could be inserted under it. It was lapped under about 9 in. and then laid over the old burlap on the slope. Five-ply were laid, each painted with asphalt, the pipe withdrawn (thus allowing for expansion), and new mastic put on.

Records have been kept of the dates when different portions of the bridges were waterproofed. This repair work has shown that during the cold weather the asphalt that is applied to the cold concrete becomes chilled and does not penetrate the burlap which is laid on it. If the weather was very cold, even the coat which was mopped on this first layer of burlap did not penetrate it, due to the fact that the cold concrete had chilled it. The second layer of burlap seemed to have been pretty well saturated

in all cases, while the third layer was thoroughly saturated. In waterproofing which was laid during warm weather all of the burlap was in a good state of preservation, having been well saturated with the asphalt. The mastic seemed to protect the burlap very well, although in some cases track tools had penetrated it, causing leaks. The smaller sizes of crushed stone of about ½ in. did not penetrate the mastic as much as the larger sizes on account of the more uniform bearing.

The average force used on this work consisted of:

1 foreman	at	$.33	per hour.
3 finishers	at	.25	per hour.
1 kettleman	at	.27½	per hour.
8 laborers	at	.20	per hour.

These men waterproofed a bridge 14 ft. wide and 75 ft. long, or 1,050 sq. ft. per ten-hour day. The average cost of the later waterproofing was a little less than 14 cents per sq. ft, for the burlap and the mastic, not counting the concreting over the hump and bridge seat and the filling of the joints with mortar. This work was done by another gang the day previous to the waterproofing. It added about three cents per sq. ft. to the cost, making a total of 17 cents.

This work was done under the direction of C. H. Cartlidge, bridge engineer, and L. J. Hotchkiss, assistant bridge engineer, and was directly in charge of F. H. Cramer, by whom much of the material in this article was furnished.

WINTER WORK ON TERMINALS.

BY F. E. CRABBS,
Roadmaster, Chicago & North Western, Chicago.

The largest individual terminal in the city of Chicago, and one of the largest in the country, is that of the Chicago & North Western. In order to handle trains promptly and keep them moving without delay it requires system and organization on the part of the roadmaster to handle a terminal of this size. The continued cold weather of the past month emphasized very strongly the necessity for having the tracks in excellent condition to maintain traffic regularly during such a cold snap. Because of the size of our terminals, the variety of problems presented and the intensity of traffic, our experience may be of value to others.

In order to go through a winter successfully it is necessary that the tracks be put in good condition before the ground freezes. All switch ties which it is necessary to renew are changed out early in the summer, and all parts of the track are put in good shape, so that after September 1 the attention of the track force can be devoted to preparing the track for the winter. All tracks, especially through leads, turnouts and switching ladders, are carefully surfaced and lined, all guard rails are adjusted, and debris is carefully cleaned out around all switch rods. All lead rails are tie-plated, for we have found that the tie plates not only hold the leads to gage and prevent the canting of the rail, but also render braces and tie rods unnecessary. Our terminal is laid with 90 and 100-lb. rails, and a large number of manganese frogs are used. We think the manganese frog has proved its efficiency, and can no longer be considered an experiment. We have manganese frogs which were installed in the old Wells street passenger yard three years ago, and which have not cost us a dollar for maintenance since that time, and now show very little wear. The life of Bessemer rail frogs in the same places was only four months. Owing to the rigidity of the manganese frogs the track forces must be very careful to see that the guard rails are placed the proper distance from the main rails when installing these frogs. This is especially true where the gage of the track is widened through the frogs, because of sharp curvature in the turnouts. If the guard rail spacing is not changed in this way the wheels will strike the wings of the frogs with severe injury to the wheel flanges.

In former days considerable trouble was experienced in holding to gage the curved rail of slip or puzzle switch which rest on the riser plates. This has been overcome by having the riser plates constructed with a shoulder similar to that on a tie plate.

When a large amount of emergency becomes necessary, as immediately following a heavy snowfall or during excessively cold weather, large forces of extra men must be put on. The men employed for this purpose are recruited largely from the ranks of those who have been on extra gang work during the summer and who spend their winters among the municipal lodging houses. Free employment offices are opened by the company when the need for men arises and are kept open both day and night. Gangs are recruited through these offices and from the municipal lodging houses and are put to work. A new departure was made this winter when timekeepers for these gangs were secured from the accounting department. These timekeepers distributed among the men buttons similar to the common extra gang buttons, except that they were marked "snow." When work is completed the timekeeper takes up the button and gives the laborer in exchange an identification card to take to the paymaster for his money. The buttons are used only once and are then destroyed. The practice of handling the timekeeping directly through the accounting department rather than through the office of the roadmaster, whose clerical force is limited, has been found to work very satisfactorily. As the men are "floaters" and have no regular place to eat the railway has found it necessary to feed them while they are working. Cars have been fitted up for a kitchen and diners, and are distributed through the various yards, where they are employed. By giving them hot meals much greater efficiency is secured.

Snow melters have been installed at various places in the new passenger terminals. These are constructed of concrete, and are about 4 ft. x 10 ft. in size and 18 in. deep. Perforated steam pipes leading directly from the power house are located in the bottom of these concrete boxes. During snow storms the snow can be melted in these melters as fast as a large gang of men can carry it to the pits. This saves much labor loading snow into cars, and the water is rapidly conducted from the melters into the sewers.

At the Western avenue crossing we are using hydro-carbon for melting the snow, and find that where there is proper drainage its use has proved successful. This fluid comes in 50-gal. tanks, and a rack set 2 ft. above the ground has been provided for four tanks. Special cans, holding two gallons each, are used in applying the liquid to the track. These cans have nozzles which are reduced to ⅛ in. and are opened and closed with a valve. When ready for use the valve is opened and the fluid lighted; and it starts melting the snow. Any section man of ordinary intelligence can handle this safely, and one man with a can of the fluid can accomplish more than ten men with brooms. It has been found that the heat from the fluid has no injurious effect on the rails.

An experiment last tried on our terminals this year was to dip the rattan snow brooms in common, hot, black oil before using. We have found that this results in from one-third to one-half greater wear from the brooms. The oil prevents the water from collecting on the broom and freezing, and makes the broom more pliable. By actual test we have found that a rattan broom costing $2.85 per dozen, if dipped in this oil before using, gives better results than one costing $4 per dozen, if not so treated. As our expense for snowbrooms alone exceeds $3,000 annually, this means a big saving.

One of our regular section men is assigned as night track walker at each interlocking tower during the winter. It is this man's duty to look after switches and to call the section men in case of an accident or a snow storm. This not only saves delay, but the one man can frequently repair a broken switch alone and save calling out several men.

One of the most respected and important committees on the Chicago & North Western today is the Safety Committee. During the past year there have been 32 per cent. less accidents to the section men alone than during the previous year. In order to interest the foremen and laborers on the terminals in this movement a Safety Committee has been appointed from the

track forces, and on various dates during the month these men make inspections over the entire terminal with a view to finding any defects and making a report to the roadmaster. Where any defects are found he goes on the ground immediately and sees that the foreman makes the necessary repairs. The report of this committee is not a criticism of the foremen for being able to see every defect, but rather an implied criticism of the roadmaster for not being able to see the defects which the individual foremen do not find. It is surprising to note the marked improvement made as a result of this committee's work.

HAND CAR BROOM HOLDERS.

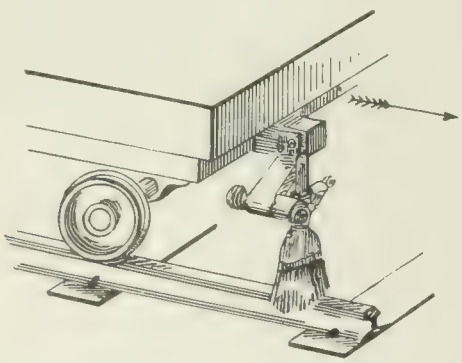
BY E. R. LEWIS.
Division Engineer, Michigan Central, Bay City, Mich.

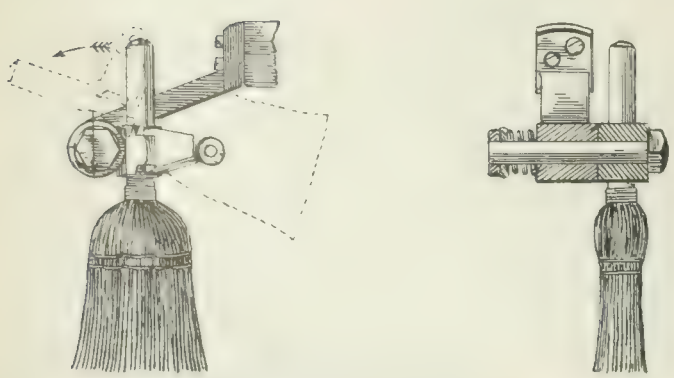
There are in use many kinds of holders for brooms, brushes or scrapers placed over the track rail, in front of the wheels of hand or motor car, to clear the running surface of obstacles



Broom Holder for Hand Car.

which might derail or impede the progress of the car. The widest use of such fixtures is the clearing of snow from the track rails. A hand car cannot make headway over a track when even a very little snow has fallen or is falling on the rails.





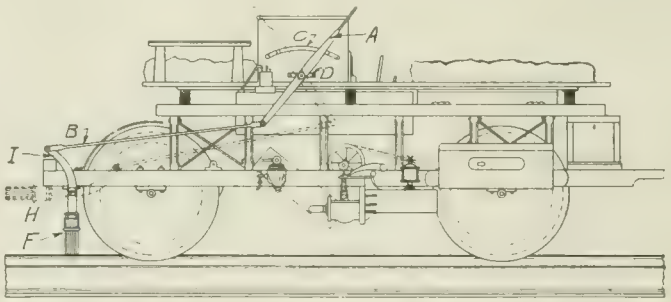
Broom Holder in Position.

Some such device as is here illustrated is therefore an absolute necessity to the use of hand cars in winter, where snow must be reckoned with. The usual fixture is a cast iron bracket with a set screw, wedge or peg to hold the broom handle in place. If the hand car has to be set off the track hurriedly these brooms and brackets are susceptible of displacement or breakage. The car brooms have to be shifted often in a day, and much time is lost in cutting and driving wedges, moving and readjusting the brooms to the exact necessary height.

The broom holder here illustrated may be put in the horizontal or imperative position by one pressure of the hand on the broom handle, and the car may be removed from the track from in front of an approaching train with almost no loss of time on account of the brooms. Also, the brooms are saved from dragging over the ground when the car is taken off the track on other than emergency occasions. This holder may be operated on motor cars by means of a level placed so as to be convenient to the operator's hand. It weighs about 5 lbs.

STEEL BRUSH PROTECTION FOR A MOTOR CAR.

A steel brush designed to sweep sticks, ballast and even torpedoes from the rail in advance of the wheels of a motor car, has been made by S. C. Tanner, master carpenter of the Baltimore & Ohio, and is illustrated herewith. The arrangement consists of two levers, A and I, pivoted at D and H, respectively, and connected by the rod B. By pulling the lever, A, backward



Steel Brush for Motor Car.

the brush is thrown from a horizontal position into place over the rail and sweeps the entire head of the rail clean of obstructions. When not in use it projects horizontally ahead of the car.

As a large proportion of the accidents to motor cars result from derailments caused by small obstructions on the track, a device such as this should be most useful.

DUMPING SCALE BOXES.

A contractor on a large job of rock excavation has found the use of scale boxes for handling material to be economical. The cut was comparatively short and very deep, the excavated material being wasted over the bank near one end of the cut. The scale boxes were loaded at the working face and were drawn down to a point opposite the waste bank on narrow gage flat cars. A stiff-leg derrick located on the top of the bank was used to pick up the boxes from the cars. The derrick hoisting line was attached to the box at four points by hooks located on the upper edge of the box near each corner. A separate dumping line was attached to a hook on the lower edge of the box near the center of one side and was carried over separate blocks on mast and boom to the operator's platform. To dump the box it was hoisted several feet above the level of the waste bank, the dumping line was snubbed around a block on the platform and the hoisting line was slacked. This allowed the dumping line to take the weight, which automatically tipped the box and dumped the material.

General News Section.

J. W. Cline, president of the International Association of Blacksmiths and Helpers, estimates that the strike last autumn on the Harriman Lines, exclusive of the Illinois Central, cost the men who struck about $9,000,000 in wages.

According to press reports, delegates representing the shop trades on all the railways west of Chicago will meet at Kansas City on March 4 for the purpose of organizing a federation to include all mechanical department employees.

The snow storm of February 9 and 10 was so severe in the region of Oswego, N. Y., that the New York Central had to use its two rotary snow plows to clear some parts of its lines. One passenger train was stalled ten miles east of Oswego for about 36 hours.

A second suit against the New York, New Haven & Hartford has been begun in the Federal court at Hartford, Conn., alleging violation of the hours-of-service law. The present suit and that begun in January together make demands for penalties aggregating $25,000.

There are now in service on the Pennsylvania Lines East 588 steel coaches, 58 steel dining cars, 99 steel passenger and baggage cars, 78 steel baggage cars, 94 steel postal cars and 710 steel Pullman cars. In addition, there are being built 251 steel coaches, 31 steel passenger and baggage cars and 194 steel Pullman cars.

A report issued by the Atchison, Topeka & Santa Fe, shows that in the six months ending January 31, 1912, during which the officers of the road have been conducting an active safety campaign, there were 36 employees killed and 3,608 injured, a decrease of ten killed and 447 injured, as compared with the corresponding period of the previous year.

Senator Gallinger, of New Hampshire, has introduced a bill in the United States Senate providing for protection of stockholders in corporations doing an interstate business. Among other things the bill would require a two-thirds vote of the directors to pass any measure and publicity of all minutes and records of both stockholders' and directors' meetings.

The Oriental Limited on the Great Northern from Seattle to Chicago on February 13 struck spreading rails near Doyon, 20 miles west of Devil's Lake, N. D., left the track and rolled into a ditch, fatally injuring two persons and seriously injuring a number of others. Every car with the locomotive left the track and turned over, piling up at the foot of the 20-ft. elevation of the tracks.

The Delaware, Lackawanna & Western has awarded its prizes to trackmen for the year 1911, first prizes aggregating $1,000, and second prizes $500. The section foreman on each division who shows the best alinement, surface and general conditions receives $100 in cash and a silver medal, and there is a second prize of $50 in cash and a silver medal. The winner of the first prize also has affixed to his toolhouse a sign reading "First Prize, 1911."

The Montauk Harbor Improvement Company has been incorporated at Brooklyn, N. Y., for the purpose of installing docks and shipping facilities at Fort Pond Bay, at the eastern end of Long Island. The principal promoter of the enterprise, so far as known, is W. E. C. Mayer, a lawyer. It is said that capitalists of Paris, Antwerp and other European cities are interested and that a large tract of land adjoining that owned by the Long Island Railroad Company at Fort Pond Bay has already been acquired. The Pennsylvania and the Long Island have discussed the establishment of a port at Fort Pond Bay for trans-Atlantic steamships, but no action has been taken.

The Brotherhood of Locomotive Engineers has submitted to Eastern roads a petition asking for increased pay and changes in the conditions of service. The railway managers will reply at a conference to be held at the end of the month. The petition was submitted to nearly every road in the East, and the most important feature of it is the effort to get uniform conditions of service. On Eastern roads these conditions now vary so much that, while the unit rates of pay are substantially the same, the actual wages received differ greatly. Differentials for heavy engines, double pay for overtime, switching and belt line increase to be based on the day, and a minimum day's pay for the completion of a run after being hung up under the 16-hour law (with additional pay for any further work done on that day) are among the points raised.

Department of Natural Resources.

This is the title of the new department which has been established by the Canadian Pacific to have charge of the land, irrigation, coal mining, and timber departments of the company's service. The headquarters will be at Calgary, and the department will be in charge of J. S. Dennis, recently appointed assistant to the president. The Canadian Pacific has large tracts of coal lands at Lethbridge, Bankhead and Hosmer, with mines already opened, and also large deposits of coal on Vancouver Island. Mr. Dennis reports that the "ready-made farm" policy of the company has become so popular that the number of desirable settlers is increasing.

Costly Refrigeration.

The San Antonio & Aransas Pass has been sued in the District Court at Austin, Tex., by the attorney general of the state for $35,000 penalties for failure to keep its passenger waiting room in Lincoln, Tex., heated for a period of 70 days this winter. Each day constituted a separate offense.

Frisco Line to New Orleans.

It is announced that the St. Louis & San Francisco has made a contract with the New Orleans & North Eastern for the use of the N. O. & N. E., from Laurel, Mississippi, to New Orleans, 146 miles, where a connection can be made with the New Orleans Terminal Company, which is owned jointly by the Frisco and the Southern. With an entrance into New Orleans from Laurel, the Frisco will be able to carry out its plan announced last summer (*Railway Age Gazette,* November 24, page 1073) to establish a through line from Chicago, St. Louis and Memphis to New Orleans, over the New Orleans, Mobile & Chicago. By this line the distance from St. Louis to New Orleans will be 744 miles (only 26 miles longer than the shortest line), and from Chicago to New Orleans, 1,015 miles. When the N. O. M. & C. shall have been extended northward to a connection with the Mobile & Ohio, the Frisco, it is claimed, will control a line shorter than any other to New Orleans from both Chicago and St. Louis.

Government Directors Proposed.

"As long as the public demand is for publicity and government regulation, how would you meet it?"

"By giving the government a representation in the directorate of all interstate companies commensurate with its interest. I realize what objection would be raised to this plan—that the Pacific Railway experiment in the same line had not proved a success. Well, if a government director fails to do his duty, does not the fault lie with him, rather than with the plan? Perhaps you will reason that a single director, however worthy personally, is quite overslaughed in a board comprised of several representatives of the stockholders. Then give him the right to call for assistance. Let the government put in as many directors as it needs to insure the company's doing what it ought, or being exposed if it doesn't. This power of exposure, at least, is one not to be lightly reckoned with. But no politicians are wanted for such places, or men who feel that they must shoot off skyrockets once in so often to convince the public that they are earning their salaries. Give the positions sufficient dignity, permanency, and compensation to attract competent business men with some knowledge of railroading.

"As to publicity, there is a distinct line to be drawn. Publicity in those matters which it is for the best interest of all concerned to have published is all right. But if you are going, let us say,

to build a spur of road from your main line to some point at a distance, and you advertise your projected route prematurely, every hamlet along some other potential route will rise and bombard the legislature with remonstrances, and you will have delays, and hold-ups, and all sorts of obstructions thrown in your way. That, surely, is not for the public interest, but it is what some of the critics of corporate rapacity would insist upon just as earnestly as on the publicity of your balance sheets."—*Charles S. Mellen; interview in The Outlook.*

What the Trainmen Want.

The legislative committee of the Brotherhood of Railroad Trainmen for the state of Indiana, 42 men, representing 42 lodges, held its regular meeting at Indianapolis last week and discussed the subjects on which legislation is to be sought. The law desired, as outlined by the chairman, Mr. Feick, are:

"To reduce to a reasonable standard the number of cars in any one train.

"To provide for a standard field examination upon the signals used.

"To hold the railway company liable for discriminating against men of experience seeking employment who are past the age of 35.

"To compel an engineer and conductor to have had at least two years' experience as a fireman or brakeman.

"To provide for an eight-hour work day for all men engaged in yard service.

"To prohibit, as far as practicable, the practice of double heading engines.

"To regulate the voluntary relief associations and a strong workman's compensation act.

"To provide for a semi-monthly pay day.

"To strengthen the block signal and safety appliance laws."

Mr. Feick added, "I believe that labor can secure many of the things for which they are contending through legislation. They have it in their power to make and unmake governors. senators and representatives."

Rumors of "Graft" in Puget Sound Extension.

Wide publicity has been given by the newspapers during the past week to indefinite rumors that an investigation by some stockholders of the Chicago, Milwaukee & St. Paul has indicated a large amount of "graft" in connection with the construction of and purchase of equipment for the Chicago, Milwaukee & Puget Sound. The papers have also asserted that suits were to be brought by these unnamed stockholders, but these have not yet materialized. The rumors were immediately and emphatically denied by officers of the St. Paul and the Puget Sound roads.

The rumors intimated that a relative of one of the St. Paul's officers had profited largely by contracts for equipment placed with supply concerns with which he was connected, and reference was made in the papers to the fact that Lawrence Fitch, a son-in-law of President Earling, and one of the trustees of the Puget Sound, is vice-president of the Beaver Dam Malleable Iron Company, which had large contracts for furnishing tie plates and castings to the road, and is also connected with several other railway supply concerns. Reference was also made to the fact that two brothers of President Earling—George P. Earling and Emil Earling—are officers of the Central Coal Company of Milwaukee, which sells coal to the St. Paul. They also referred to alleged connections of officers and employees of the St. Paul with the Western Land & Cattle Company, which operated in lands along the line of the Puget Sound.

President Earling, Vice-President E. W. McKenna, and other officers of the St. Paul asserted that all materials and supplies had been bought in the open market, and that they had been acquired at the lowest practicable prices. On Tuesday of this week President Earling gave out the following signed statement: "Certain sensational matter appeared in the press on Wednesday, the seventh instant, to the effect that an investigation by stockholders of the Chicago, Milwaukee & St. Paul Railway had disclosed grave irregularities in the construction and equipment of the Chicago, Milwaukee & Puget Sound Railway. These statements were promptly met with the following denial. 'The statement that the Chicago, Milwaukee & Puget Sound had been defrauded of the sum of a million dollars, or any other sum of money, in connection with the construction and equipment of that railway, is absolutely and unqualifiedly false.' Yesterday, the twelfth instant, a statement appeared in some of the newspapers to the effect that a conference had been held between alleged aggrieved persons and officers of the railway company, and that a compromise was reached, by which restitution was to be made. I desire to state that there has been no such conference, and any statement to the effect that there has been a compromise, or a necessity for a compromise, is entirely without foundation. I desire also to reaffirm that there has been no diversion or misuse of the funds of either corporation."

American Railway Engineering Association.

The thirteenth annual convention of the American Railway Engineering Association will be held at the Congress Hotel and Annex, Tuesday, Wednesday and Thursday, March 19-21, inclusive, at which time the annual election of officers will be held and the reports of twenty-one standing and special committees will be received. The annual dinner will be given in the Gold Room of the Congress Hotel and Annex at 7 p. m. the evening of March 20. At this banquet the speakers will be L. F. Loree, president Delaware & Hudson, and past president of the American Railway Association; Hon. F. D. Monk, K. C., M. P., Minister of Public Works of Canada, and Ray Morris, banker and formerly managing editor and now a director of the *Railway Age Gazette.*

International Safety Congress.

An International Safety Congress will be held in Milan, Italy, May 27-31. This congress, the first of its kind of international scope ever held, will be for the purpose of promoting a world wide movement for the conservation of human life in industry. The American Museum of Safety, New York, is making preparations to have the United States well represented. An American national committee has been selected by the museum to co-operate with the international body and to promote the American ideas and views at the congress. Dr. W. H. Tolman, director of the American Museum of Safety, and other members of the committee will attend the congress.

Among the papers which will be read at the congress are: The Safety Engineer on a Large Transportation System, by Dr. W. H. Tolman, and The Work of the Safety Committee of the United States Steel Corporation.

International Congress of Navigation.

The twelfth International Congress of Navigation will be held at the Metropolitan Opera House, Philadelphia, Pa., May 23-28. Bulletin No. 2 has been published, giving full information on the place and time of the congress, trans-Atlantic steamship offers, excursions arranged independent of official and local excursions, rates from the Isthmus of Panama, etc.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.; annual, May 7-10, Richmond, Va.

American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass.; annual, May 10-11, San Francisco, Cal.

American Association of General Passenger and Ticket Agents.—W. C. Hope, New York; next convention, Seattle, Wash.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Chicago.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September; annual, March 17, Chicago.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York.

American Electric Railway Manufacturers' Assoc.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

American Railway Association.—W. F. Allen, 75 Church St., New York.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

American Railway Master Mechanics' Assoc.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

American Railway Tool Foremen's Association.—M. H. Bray, N. Y., N. H. & H., New Haven, Conn.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.
American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.
American Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.
Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.
Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.
Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago.
Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.
Association of Transportation and Car Accounting Officers.—G. P. Conrad, 75 Church St., New York.
Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.
Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.
Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.
Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.
Civil Engineers' Society of St. Paul.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.
Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.
Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.
Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.
General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.
International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.
International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago. Convention, May 22-25, Chicago.
International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.
International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.
Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.
Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.
Master Car and Locomotive Painters' Assoc. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass. Convention, 2d week in September.
National Railway Appliances Assoc.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.
New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.
New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.
Northern Railroad Club.—C. L. Kennedy, C., M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.
Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.
Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.
Railway Business Association.—Frank W. Noxon, 2 Rector St., New York.
Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.
Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.
Railway Gardening Association.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.
Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.
Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa. Next meeting, March 18, Chicago.
Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio. Convention, May 20-22, Buffalo, N. Y.
Railway Supply Manufacturers' Assoc.—J. D. Conway, 2135 Oliver Bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.
Railway Tel. & Tel. Appliance Assoc.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.
Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.
Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. Y., Sterling; September, 1912, Buffalo, N. Y.
St. Louis Railway Club.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.
Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.
Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.
Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.
Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.
Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.
Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.
Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.
Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.
Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.
Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.
Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.
Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; August, 1912.
Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except, June, July and August, Winnipeg.
Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.
Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month except July and August, Chicago.

Traffic News.

The Panama road is now refusing large amounts of freight, the construction work on the canal in the region of Gatun Lake requiring that for a considerable distance the general traffic shall be moved over a single track, taxing the capacity of the line.

The traffic department of the Rock Island Lines has issued a circular letter to its station agents, asking them to investigate the seed corn situation in their respective territories. It is announced that the company proposes to buy seed corn in the localities where it is plentiful and distribute it in the sections where a scarcity is found.

The Baltimore & Ohio, at its shops in Baltimore, has fitted up a car for the use of the Maryland association for the prevention and relief of tuberculosis, and the car is to be used to carry lecturers and exhibits, illustrating that subject, over the lines of the road in Maryland and perhaps in other states. The car is enameled in white both inside and out.

Following the announcement from Washington that the Interstate Commerce Commission had suspended Western Classification No. 51 from February 15 to June 14, the Western Classification committee, which has been holding an executive session at Chicago to consider the arguments presented by shippers at the recent Galveston meeting on the proposed changes in the next issue of the classification, adjourned for the purpose of making a check of the changes effected by No. 51, which will be tabulated for presentation to the commission. One effect of the suspension will be to postpone the next meeting of the committee which had been called for July 16 at Mackinac Island.

Press reports of car shortage, and especially of delay in the movement of grain in the northwest, have been numerous in the past few days. The delay is especially pronounced in the movement of grain from the western Canadian provinces to Port Arthur, Ft. William and Duluth. George Bury, vice-president and general manager of the Canadian Pacific at Winnipeg, has given out a statement explaining that the delay has been due partly to the fact that the crop was late in maturing and that the coal strike in the west made necessary a heavy movement of cars westward, thereby interfering with the grain movement, but that the Canadian Pacific had at all times during the crop movement of the past season all the cars and locomotives its tracks would accommodate. The congestion, he said, was caused rather by lack of terminal room and of second tracks than by shortage of equipment, because the railways had been required to devote their attention to building new lines, and also because merchants and manufacturing companies have not been able to sufficiently increase their warehouse accommodations and their loading and unloading facilities, thereby throwing an additional strain on the railway terminals. He estimated that on February 6 sixty-one million bushels of wheat awaited shipment, and that it could all be handled by early summer. The complaints of car shortage have come largely from grain and lumber shippers in Minnesota, the Dakotas, Montana, northern Iowa and Wisconsin.

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association in presenting statistical bulletin No. 111-B, giving a summary of car shortages and surpluses by groups from September 28, 1910, to January 31, 1912, says:

"The zero weather recently experienced has resulted in a further decrease in car surplus. The total surplus on January 31, 1912, was 55,592 cars, a decrease of 46,887 cars as compared with the previous report and 100,763 cars as compared with February 1, 1911. The decrease is principally in coal cars and most noticeable in the coal producing section of the country. Of the total decrease of 46,887 cars, 28,728 are coal cars, of which 25,046 are shown in groups 2 (New York, New Jersey, Delaware, Maryland, Eastern Pennsylvania) and 3 (Ohio, Indiana, Michigan, Western Pennsylvania). Box cars show a universal decrease in surplus of 10,330 cars, groups 9 (Texas, Louisiana, New Mexico) and 11 (Canadian Lines) being the only groups reporting an increase. Flat and miscellaneous cars also show decreases in surplus of 1,153 cars and 6,676 cars respectively.

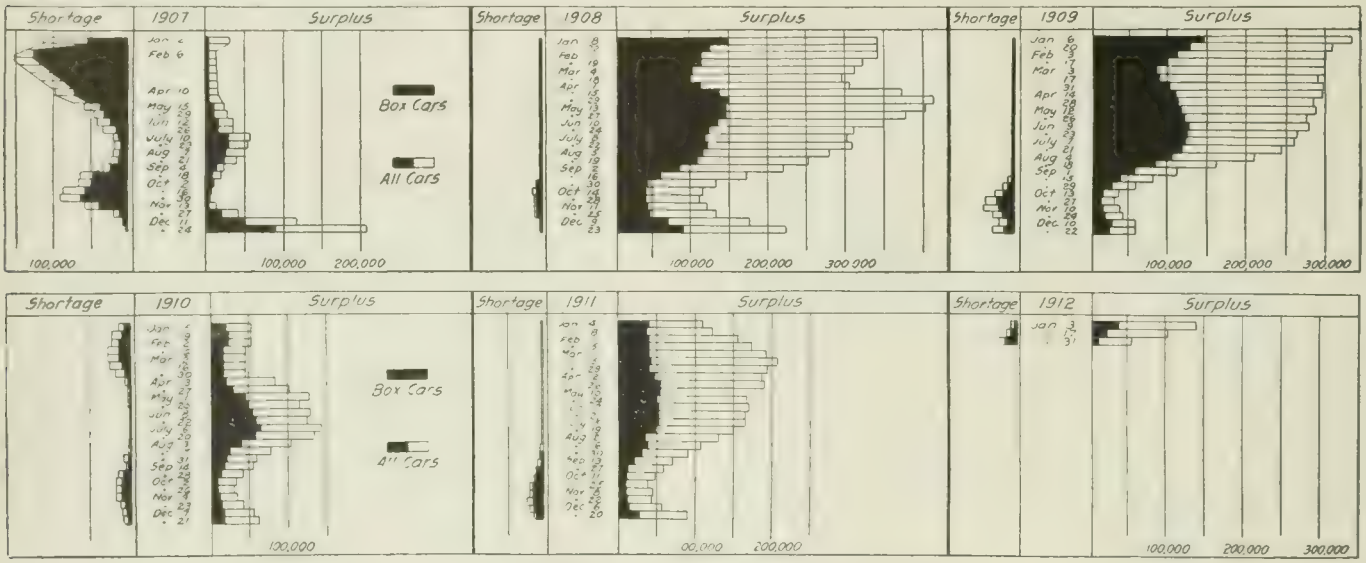
"There is a rather noticeable increase in the total car short--

age, the total shortage for the period covered by this report being 23,011 cars, an increase of 10,817 cars over the preceding period and the largest shortage reported since March 16, 1910. This is an indication of the difficulty of moving cars to fill orders in extremely cold weather. The shortage increase is shown to be in all classes of cars, but chiefly in box cars, which show an increase of 6,172 cars, and coal cars, which show an increase of 2,963 cars. Flat and miscellaneous cars show increases in

CAR SURPLUSES AND SHORTAGES.

Date.	No. of roads.	Surpluses Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Shortages Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1.—January 31, 191	7	0	2,001	1,323	147	3,481	1,404	0	0	237	1,641
" 2. " 31, 1912	25	1,282	129	2,075	746	4,232	40	0	2,214	105	2,359
" 3. " 31, 1912	25	775	1,236	2,136	2,002	6,149	2,498	25	550	747	3,820
" 4. " 31, 1912	11	440	423	388	646	1,897	892	0	1,895	0	2,787
" 5. " 31, 1912	19	1,084	221	2,262	1,110	4,677	506	66	322	115	1,009
" 6. " 31, 1912	23	796	623	1,910	3,228	6,557	4,360	259	250	121	4,990
" 7. " 31, 1912	8	0	159	20	358	537	513	0	61	2	576
" 8. " 31, 1912	15	167	192	900	1,320	2,579	889	56	231	0	1,176
" 9. " 31, 1912	11	3,655	89	541	915	5,200	50	32	15	12	109
" 10.— " 31, 1912	18	4,261	2,623	2,481	9,312	18,677	160	0	0	18	178
" 11 " 31, 191	5	321	419	6	860	1,606	3,730	100	0	536	4,366
Total ..	162	12,781	8,125	14,042	20,644	55,592	15,042	538	5,538	1,893	23,011

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland, and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines. Group 11—Canadian lines.



Car Surpluses and Shortages in 1907 to 1912.

shortage of 353 and 1,329 cars respectively. The severity of the weather has doubtless contributed to this showing."

The accompanying table gives car surplus and shortage figures by groups for the last period covered in the report, and the diagrams show total bi-weekly surpluses and shortages in 1907 to 1911.

INTERSTATE COMMERCE COMMISSION.

The commission, on Friday last, ordered a general investigation of the practice of all interstate carriers with respect to the issuance of passes. The commission hears that many carriers are violating the law.

The proposed new freight classification presented by the western railways and which was the subject of protracted hearings at Chicago, as reported in the *Railway Age Gazette* last week, has been suspended until June 14.

The commission has suspended until August 28 the proposed new freight tariffs presented by the transcontinental roads several months ago. These were first suspended until the 28th of this month and the further suspension now ordered has been made necessary by the improbability of finishing the inquiry.

Tariffs naming rates for icing refrigerator cars, which were filed by numerous railways several months ago and which were suspended until February 10, have been further suspended until June 1. Hearings will be held on this question at Washington within the next month.

STATE COMMISSIONS.

The End of One Experiment.

The New York Public Service Commission, Second district, has made an order allowing the Delaware & Hudson to discontinue the operation of two trains previously ordered run on its Saratoga division to accommodate traffic from Gansevoort. It was shown that public necessity did not require the continuance of these trains. The road provides for the afternoon traffic by stopping train No. 40 southbound at Gansevoort at 5:10 p. m.

COURT NEWS.

The supreme court of Ohio has reversed the circuit court of Franklin county, and has held that the circuit court has jurisdiction to hear the suit brought by the state to oust the Chesapeake & Ohio from Ohio, on the charge that it is a member of a trust and is operating against the law. The circuit court has held that it did not have jurisdiction, because the Chesapeake & Ohio was a foreign corporation.

The Supreme court of Missouri has dismissed the proceedings instituted by Attorney-General Major in 1909 against 16 railways, asking the forfeiture of their charters on account of alleged violations of the state anti-trust law in fixing rates. The court held that the Missouri statutes recognize the right of railways to enter into many kinds of agreements with reference to the transportation of freight and passenger without violating the laws.

The commerce court at Washington on Tuesday last heard the application of the Florida East Coast for an order to restrain the Interstate Commerce Commission from reducing freight rates on fruits and vegetables to Jacksonville and other basing points in Florida, and granted a temporary injunction, pending a final hearing. The road was required to give a bond of $100,000 to repay shippers in case the lower rates should finally be sustained.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF DECEMBER, 1911 (SEE ALSO LAST WEEK'S ISSUE.)

Name of road.	Mileage operated at end of period.	Operating revenues: Freight.	Passenger.	Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Alabama Great Southern	309	$293,321	$112,042	$443,532	$47,933	$93,063	$11,192	$133,381	$10,273	$295,842	$147,690	—$782	$15,048	$131,860	$12,747
Arizona Eastern	366	121,080	34,882	164,550	27,249	13,075	2,050	45,290	5,964	93,628	70,922	227	13,789	57,360	10,897
Atlantic City	166	59,165	45,720	110,875	36,832	13,352	1,173	64,773	670	116,800	5,925	4,580	7,000	17,505	3,555
Canadian Pacific Lines in Maine	233	103,853	40,356	151,879	14,315	14,469	5,223	70,952	6,625	111,584	40,295	.....	7,000	33,295	11,883
Carolina, Clinchfield & Ohio	238	155,473	12,516	171,151	9,800	19,915	8,070	34,898	8,032	77,715	93,436	.....	8,000	85,436	31,378
Carolina, Clinchfield & Ohio of S. C.	17	8,784	2,023	11,087	591	113	983	2,672	416	4,775	6,312	.....	500	5,812	1,170
Chicago, Rock Island & Gulf	476	245,540	55,214	317,220	11,261	20,471	10,270	92,579	8,863	143,444	173,776	167	2,523	171,086	73,055
Chicago, Terre Haute & Southeastern	351	138,532	19,337	161,868	20,392	23,259	2,657	52,735	8,321	106,864	55,004	353	8,700	45,951	.....
Cincinnati Northern	245	94,770	17,976	117,569	20,188	19,744	2,642	51,674	3,189	97,437	20,132	.....	7,591	12,541	1,345
Cleveland, Cincinnati, Chicago & St. L.	2,010	1,736,817	654,140	2,622,721	261,369	426,319	67,923	1,067,945	65,865	1,889,421	733,300	1,302	92,512	639,486	88,777
Duluth, South Shore & Atlantic	622	148,835	73,734	234,829	29,773	30,505	9,896	93,337	8,683	172,194	62,635	—85	15,666	46,884	—12,574
Georgia	307	196,134	91,797	307,853	23,182	44,562	9,826	118,592	7,492	203,654	104,199	.....	1,753	102,446	8,083
Georgia Southern & Florida	395	112,402	82,694	234,652	20,775	46,075	7,678	82,251	9,486	166,265	68,387	.....	12,532	55,855	3,225
Hocking Valley	382	430,097	74,121	547,718	57,613	90,122	9,355	177,430	17,850	352,370	195,348	.....	30,400	164,948	57,355
Houston, East & West Texas	190	72,765	32,700	110,172	16,280	12,093	1,812	41,015	4,512	75,712	34,460	.....	6,848	27,612	—15,846
Houston & Texas Central	789	333,061	170,011	541,530	71,251	111,053	16,614	227,946	22,129	448,993	92,537	1,338	29,102	62,097	—118,749
Kanawha & Michigan	175	214,839	30,385	280,822	22,634	48,733	2,062	80,779	6,941	161,149	89,673	10	8,808	80,855	2,406
Lake Erie & Western	886	357,553	72,728	457,163	64,163	76,617	12,964	184,121	11,266	349,131	108,032	.....	19,886	88,146	—2,307
Louisiana & Arkansas	255	91,274	20,783	116,889	15,550	18,684	2,298	34,676	4,539	75,747	41,142	.....	3,650	37,492	—8,349
Louisiana Ry. & Navigation	350	119,618	26,259	157,774	11,945	13,650	6,303	67,555	7,542	116,995	40,779	.....	4,900	35,879	3,729
Morgan's La. & Tex. R. R. & S. S. Co.	404	433,437	116,645	584,011	47,582	63,917	14,246	221,231	11,804	358,780	225,231	2,654	18,652	209,233	—82,063
Nevada Northern	165	93,813	11,408	107,984	11,787	14,084	517	26,991	3,648	57,027	50,957	.....	4,755	46,202	28,960
New Orleans Great Northern	282	88,319	32,389	131,544	19,974	16,998	2,002	45,035	7,963	91,972	39,572	63	2,250	37,259	—3,151
New York, Susquehanna & Western	152	176,628	54,173	259,960	19,343	22,371	2,096	100,210	4,515	148,535	111,425	11,195	17,874	82,356	—14,668
Pecos & Northern Texas	478	130,700	42,384	180,086	30,625	35,188	3,019	68,853	5,095	142,780	37,306	.....	+253	37,559	—11,385
Port Reading	21	117,151	.....	118,314	13,108	10	30	30,288	106	43,542	74,772	7,313	3,800	78,285	—18,161
St. Louis, Brownsville & Mexico	509	113,128	63,680	190,398	41,503	12,781	2,907	74,550	7,625	139,366	51,032	.....	11,134	39,898	14,828
St. Louis Southwestern of Texas	703	316,537	102,448	444,868	56,584	74,101	13,819	174,620	18,298	337,422	107,446	195	12,717	94,534	60,426
San Pedro, Los Angeles & Salt Lake	1,115	409,500	224,230	694,351	75,664	172,161	36,731	287,058	15,684	587,298	107,053	—3,001	24,710	79,342	—111,377
Southern Kansas of Texas	124	82,453	16,913	105,421	11,228	22,734	2,622	44,237	4,488	85,309	20,112	.....	2,745	17,367	—14,236
Texas & Pacific	1,884	1,291,262	426,500	1,807,910	148,712	174,584	30,870	744,171	56,460	1,154,797	653,113	11,341	137,213	504,559	—56,423
Trinity & Brazos Valley	462	242,382	38,632	289,288	54,992	38,711	9,659	137,735	12,700	253,797	35,491	.....	4,334	31,157	—29,910
Ulster & Delaware	128	43,552	17,474	65,080	9,327	11,430	942	31,935	2,811	56,445	8,635	182	3,300	5,517	6,470
Western Pacific	934	307,369	81,048	402,154	80,844	37,092	25,561	202,292	25,079	370,868	31,286	—3,479	14,550	13,257	.....
Wheeling & Lake Erie	457	451,662	51,554	538,234	57,040	107,162	6,704	198,411	13,947	383,264	154,970	1,606	28,586	127,990	26,587
SIX MONTHS OF FISCAL YEAR. 1912.															
Alabama Great Southern	309	$1,579,305	$628,442	$2,411,399	$258,149	$533,443	$64,697	$725,915	$56,875	$1,639,079	$772,320	—$2,158	$89,689	$680,473	$55,545
Arizona Eastern	366[1]	692,286	196,010	944,012	148,287	72,327	13,558	253,993	38,121	526,286	417,726	998	62,308	356,416	63,560
Atlantic City	166	408,789	784,909	1,254,543	162,677	79,044	16,655	558,936	7,992	825,304	429,239	—25,999	42,000	361,240	28,713
Canadian Pacific Lines in Maine	233	340,870	143,140	521,044	138,014	84,213	31,020	232,836	24,096	510,179	10,865	.....	42,000	—31,135	30,154
Carolina, Clinchfield & Ohio	238	943,399	83,417	1,053,198	68,246	129,610	31,010	209,296	46,781	484,743	568,455	1,138	46,000	523,593	213,908
Carolina, Clinchfield & Ohio of S. C.	17	52,087	9,582	63,887	3,323	519	5,658	15,545	2,669	27,714	36,173	.....	3,000	33,173	14,538
Chicago, Rock Island & Gulf	476	1,097,167	333,992	1,533,313	163,747	105,506	59,438	486,860	48,565	841,116	668,197	—1,357	35,951	630,889	111,198
Chicago, Terre Haute & Southeastern	351	874,184	112,017	958,206	144,252	150,441	16,407	283,652	44,489	639,241	318,965	677	52,500	266,088	.....
Cincinnati Northern	245	548,901	125,356	797,993	131,008	131,344	16,685	266,958	17,358	563,353	144,640	.....	35,091	109,549	—20,499
Cleveland, Cincinnati, Chicago & St. L.	2,010[2]	10,421,626	4,240,577	16,006,059	1,701,912	2,451,003	470,504	6,000,243	331,856	10,955,518	5,050,511	—9,883	582,512	4,458,116	1,290,987
Duluth, South Shore & Atlantic	622	1,054,677	539,214	1,658,966	256,559	167,763	61,342	605,668	52,793	1,144,125	514,841	9,473	105,666	418,648	—85,428
Georgia	307	1,175,876	495,174	1,776,122	145,566	248,790	65,490	719,373	47,542	1,226,761	549,361	.....	12,253	537,108	113,598
Georgia Southern & Florida	395	634,183	435,924	1,246,168	122,653	234,769	41,826	467,683	56,687	923,618	322,550	.....	62,693	259,857	7,977
Hocking Valley	382	3,146,811	492,169	3,886,203	500,298	603,341	50,339	1,131,305	96,245	2,381,528	1,504,675	.....	242,359	1,262,316	182,991
Houston, East & West Texas	190	455,148	181,431	672,190	117,433	67,429	11,061	212,456	22,238	430,617	241,573	.....	26,806	214,767	—26,845
Houston & Texas Central	789	1,845,659	1,122,742	3,389,303	427,466	521,109	112,471	1,257,258	124,406	2,442,710	946,593	7,477	139,693	799,423	—282,433
Kanawha & Michigan	175	1,540,981	187,58	1,730,857	203,314	277,499	13,360	505,703	39,765	1,039,641	691,216	28	54,075	637,169	—117,113
Lake Erie & Western	886	2,214,843	812,775	3,896,654	403,910	482,455	77,890	1,085,736	65,413	3,115,404	781,250	.....	119,296	661,954	110,280
Louisiana & Arkansas	255	538,886	113,419	681,119	125,995	106,569	14,048	187,651	28,436	462,699	218,420	.....	20,000	198,420	55,634
Louisiana Ry. & Navigation	350	771,972	147,858	994,255	124,054	89,361	35,749	366,282	39,385	654,831	337,424	.....	28,200	309,224	144,964
Morgan's La. & Tex. R. R. & S. S. Co.	404	1,811,171	626,921	2,580,886	300,183	345,863	80,969	1,012,489	74,347	1,813,851	767,035	10,889	112,141	644,005	247,646
Nevada Northern	165	613,590	65,223	696,156	77,057	87,904	2,392	148,304	20,455	336,112	360,044	.....	28,166	331,878	65,718
New Orleans Great Northern	282	596,343	183,960	839,232	127,039	107,999	15,617	265,565	43,272	559,492	280,240	496	12,250	267,494	34,853
New York, Susquehanna & Western	152	1,008,043	319,089	1,542,231	161,236	135,326	11,912	565,788	30,906	905,168	637,063	10,460	107,241	540,282	32,900
Pecos & Northern Texas	478	714,501	191,985	947,264	142,784	183,774	14,332	301,159	28,827	670,876	276,388	.....	22,795	253,593	29,226
Port Reading	21	593,321	.....	602,788	53,662	898	186	166,799	735	222,280	380,508	16,055	22,800	373,763	—76,651
St. Louis, Brownsville & Mexico	509	712,676	351,180	1,151,011	243,970	73,510	17,700	358,665	47,851	771,696	379,315	.....	33,634	345,681	206,122
St. Louis Southwestern of Texas	703	1,645,031	586,050	2,381,737	295,397	473,833	73,380	867,690	103,561	1,813,861	567,876	1,111	62,716	504,049	282,058
San Pedro, Los Angeles & Salt Lake	1,115[3]	2,574,609	1,513,984	4,382,428	785,229	947,610	193,967	1,699,280	102,706	3,728,792	653,636	22,900	148,761	481,975	—354,962
Southern Kansas of Texas	124	555,686	95,731	679,041	115,504	137,013	12,860	243,136	25,454	533,967	145,074	.....	15,757	129,317	—92,868
Texas & Pacific	1,884	6,368,298	2,267,512	9,105,674	911,077	1,163,298	174,346	3,591,525	265,075	6,105,321	3,100,353	—33,407	418,901	2,658,045	353,150
Trinity & Brazos Valley	462	1,125,633	235,833	1,405,147	211,713	172,493	58,678	609,424	68,485	1,140,793	264,354	.....	28,839	235,515	120,637
Ulster & Delaware	128	355,880	248,273	633,303	84,665	63,757	9,006	242,533	14,991	414,952	218,251	507	19,800	198,958	—10,417
Western Pacific	934	2,250,347	605,247	2,934,172	528,050	251,660	162,589	1,137,235	134,262	2,213,796	720,376	19,232	86,500	614,644	.....
Wheeling & Lake Erie	457	3,399,691	341,099	3,996,774	482,495	685,025	44,868	1,256,814	84,429	2,553,631	1,443,143	14,025	173,291	1,283,877	254,206

Operated at the previous year: 354, 1,36, 470, [4]1,982, [5]608, [6]350, [7]348, [8]296, [9]501, [10]1,105. Indicates Deficits, Losses and Decreases.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

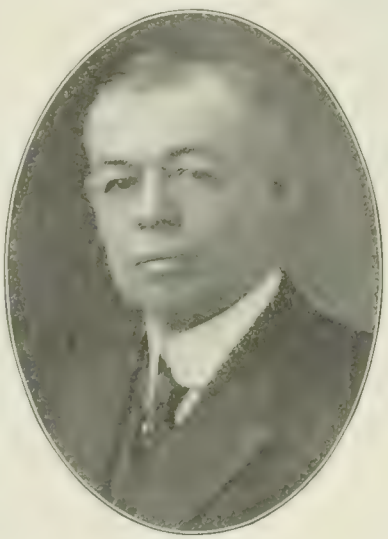
Stuart H. McIntosh, assistant general auditor of the Boston & Maine, has been appointed general auditor, with office at Boston, Mass.

J. A. Caviezel, general auditor of the Jonesboro, Lake City & Eastern at Jonesboro, Ark., has been appointed general auditor of the Alabama, Tennessee & Northern, with office at Mobile, Ala.

J. S. MacKie, secretary and treasurer of the Chesapeake & Ohio, the Toledo, St. Louis & Western, and the Hocking Valley, and secretary of the Chicago & Alton, has been elected vice-president of the Toledo, St. Louis & Western.

L. C. Gaty, assistant to the general manager of the Jonesboro, Lake City & Eastern at Jonesboro, Ark., has been appointed general auditor, with office at Jonesboro, succeeding J. A. Caviezel, resigned to accept service with another company.

Amos Caryl Ridgway, whose election as second vice-president of the Rock Island Lines, with office at Chicago, has been announced in these columns, was born April 16, 1860, at Delaware Water Gap, Pa., and began railway work in 1877 as roadmaster's clerk on the Kansas Pacific, now part of the Union Pacific. He was then consecutively freight brakeman, switchman and conductor on the Union Pacific; chief clerk to the engineer of the Missouri, Kansas & Texas; and general roadmaster's clerk and work conductor on the Denver & Rio Grande. For seven years from 1882 he was chief clerk on the Second and Third divisions of the latter road, and was then made assistant superintendent of the same divisions. He was with the Florence & Cripple Creek and associated companies from May, 1896, to December, 1899, first as superintendent and later as general superintendent, and he was then for three years general manager of the Colorado Springs & Cripple Creek District, becoming general manager of the Denver, Northwestern & Pacific in September, 1902. He was general manager of the Denver & Rio Grande from March, 1905, until 1909, and went to the Chicago, Rock Island & Pacific in January, 1910, as assistant to the second vice-president. From April, 1910, to February 1, 1911, he was assistant general manager, and from the latter date until his recent election as second vice-president, he was again assistant to the second vice-president.



A. C. Ridgway.

H. F. Whitcomb, president of the Wisconsin & Northern at Milwaukee, Wis., has been elected president of the Eastern Wisconsin Railway & Light Company, with office at Milwaukee, succeeding Clement C. Smith. Mr. Whitcomb was formerly president of the Wisconsin Central.

A. D. Lightner, general agent in the executive department of the St. Louis & San Francisco, and general manager of the Birmingham Belt Railroad at Birmingham, Ala., has been appointed general agent of the executive department of the St. Louis & San Francisco Lines, with office at New Orleans, La.

The officers of the Raleigh, Charlotte & Southern, a new line in North Carolina, are as follows: E. T. Lamb, president; E. C. Duncan, first vice-president; Frederick Hoff, second vice-president; Mathias Manly, treasurer; Morris S. Hawkins, secretary; N. M. Runnion, assistant secretary; W. L. Bird, auditor; J. H. Barrett, general claim agent; Chadbourne & Shores, general counsel, and W. B. Rodman, general solicitor. All of these officers hold similar positions on the Norfolk Southern, except E. C. Duncan. In addition to his duties as secretary, Mr. Hawkins will perform the duties of assistant to the president.

Edward L. Brown, whose election as vice-president and general manager of the Denver & Rio Grande, with office at Denver, Colo., has been announced in these columns, was born in Iowa on January 3, 1864, and began railway work in 1875, as a messenger on the Chicago, Rock Island & Pacific, with which road he was continuously until 1890. He was consecutively from 1877 telegraph operator, station agent and train despatcher, and for five years from 1883 was joint agent of the Rock Island, the Wabash and the Iowa Central. He went with the St. Paul & Duluth, now part of the Northern Pacific, as general agent at West Superior, Wis., in August, 1890, and was for eight months from April, 1891, commercial agent at St. Paul and Minneapolis. He was then transferred to the operating department, where he was consecutively chief despatcher and superintendent of telegraph, master of transportation and superintendent. In June, 1900, he was made superintendent of the Lake Superior division of the Northern Pacific at Duluth, and he was promoted to general superintendent of the Montana Central in February, 1902. In April, 1903, he went with the Great Northern as assistant general superintendent of the Eastern district at St. Paul; he was promoted to general superintendent of that district in March, 1907, and in October of the same year was transferred to the Western district as general superintendent, with headquarters at Spokane, which office he has just resigned to become vice-president and general manager of the Denver & Rio Grande.

Operating Officers.

The office of R. H. Howard, general manager of the New Orleans Great Northern, has been transferred from Bogalusa, La., to Jackson, Miss., and J. L. Gould has been appointed trainmaster, with office at Bogalusa, succeeding W. G. Mason, assigned to other duties.

Winfield S. Cooper, whose appointment as general superintendent of the Southern district of the Chicago, Milwaukee & St. Paul, with office at Chicago, has been announced in these columns, was born February 15, 1862, at Polk, Ohio. He attended the public schools at Ashland, Ohio, until May, 1877, when he began railway work as a telegraph operator on the Atlantic & Great Western, now the Erie. Subsequently he was consecutively operator and train despatcher on the Louisville & Nashville; train despatcher on the New York, Pennsylvania & Ohio, now the Erie; train despatcher on the Canadian Pacific, and from 1886 to 1895, he was train despatcher and chief despatcher on the Chicago, Milwaukee & St. Paul. In the latter year he was made trainmaster, and held that position until 1903, when he was promoted to superintendent. From 1906 until February 1, 1912, the date of his recent promotion, he was assistant general superintendent, with office at Chicago.



W. S. Cooper.

W. R. Hudson, general superintendent, C. P. Dugan, superintendent of transportation, and W. W. Morrison, chief special agent, of the Norfolk Southern, have been appointed to similar positions on the Raleigh, Charlotte & Southern, a new line in North Carolina, all with offices at Norfolk, Va.

C. O. Yoakum, assistant superintendent of the St. Louis & San Francisco at Springfield, Mo., has been appointed super-

intendent of the New Orleans, Texas & Mexico, with office at DeQuincy, La. C. T. Mason, assistant superintendent at Francis, Okla., succeeds Mr. Yoakum; and H. F. King, yardmaster at Sapulpa, Okla., succeeds Mr. Mason.

L. C. Gaty, assistant general manager of the Jonesboro, Lake City & Eastern at Jonesboro, Ark., having been appointed general auditor, the office of assistant general manager has been abolished; and C. C. Humber, chief despatcher and chief clerk to the superintendent, has been appointed chief clerk to the general manager. G. G. Fox succeeds Mr. Humber.

Andrew Ross, whose appointment as superintendent of the New Jersey & Lehigh division of the Lehigh Valley, with office at Easton, Pa., has been announced in these columns, was born on May 6, 1868, at Mauch Chunk, Pa., and was educated at the public schools. He began railway work in 1882 as a messenger on the Lehigh Valley. The following year he was made telegraph operator, and two years later he was promoted to train despatcher. In 1887 he was appointed yard master, and ten years later was made trainmaster, on the same road. Mr. Ross was appointed general yard master of the New York, New Haven & Hartford, at New Haven, Conn., in 1905, and the following year was promoted to assistant superintendent of the New York division. He was appointed superintendent of the Old Colony division of the same road in 1908, which position he held at the time of his recent appointment as superintendent of the New Jersey & Lehigh division of the Lehigh Valley.

Herman B. Earling, whose appointment as assistant general manager of the Chicago, Milwaukee & St. Paul, with office at Chicago, has been announced in these columns, was born October 30, 1862. He was educated in the public schools at Milwaukee, Wis., and began railway work in 1878 with the Chicago, Milwaukee & St. Paul, with which road and the Chicago, Milwaukee & Puget Sound he has been connected ever since. Until 1883 he was agent and operator; was then for five years assistant train despatcher; from 1887 to 1893, chief train despatcher; from 1893 to 1897, trainmaster, and then for a year superintendent of terminals. He was appointed division superintendent at Marion, Iowa, in 1898, and five years later became assistant general superintendent of the Middle district at Milwaukee. In 1906 he was transferred with the same title to the Northern district at Minneapolis, and later in that year was made general superintendent of the Puget Sound extension, in charge of construction between Mobridge, S. D., and Butte, Mont. On the opening of the Chicago, Milwaukee & Puget Sound, he was appointed general superintendent of that road in January, 1909, and in October of the same year was appointed general superintendent of the Chicago, Milwaukee & St. Paul, with office at Chicago, from which position he has just been promoted.



H. B. Earling.

Traffic Officers.

S. Van Auken, Jr., has been appointed commercial agent of the Seaboard Air Line, with office at Rochester, N. Y.

W. E. Gauvin, traveling freight agent of the Georgia Railroad at St. Louis, Mo., has been appointed commercial agent, with headquarters at St. Louis.

Erwin G. Koeneman has been appointed contracting freight agent of the Union Pacific, with office at St. Louis, Mo., succeeding Frank P. Mahoney, resigned.

W. E. Swain has been appointed general agent of the Northern Pacific, with office at Los Angeles, Cal., succeeding George W. McCaskey, deceased.

F. C. Herr, general agent of the New Orleans Great Northern, with office at Bogalusa, La., has resigned to go to another company, and his former position has been abolished.

James Gray, traveling passenger agent of the Boston & Albany, at Boston, Mass., has been appointed district passenger agent, with office at Springfield, succeeding G. S. Harner, resigned, and E. W. Goodwin succeeds Mr. Gray.

W. G. Trapp, traveling freight agent of the Tennessee Central at Chicago, has been appointed traveling freight agent of the Chicago, Indianapolis & Louisville, with office at Grand Rapids, Mich., succeeding Norman F. Crawford, resigned.

S. L. Rogers, general agent of the St. Louis & San Francisco at Nashville, Tenn., has been appointed district passenger agent at that place; and T. H. Glascock, traveling passenger agent at Nashville, has been transferred to Knoxville, Tenn.

B. L. Bugg, traffic manager, and W. W. Croxton, general passenger agent of the Norfolk Southern, both with offices at Norfolk, Va., have been appointed to similar positions on the Raleigh, Charlotte & Southern, a new line in North Carolina.

J. P. Fresenius, traveling freight agent of the St. Louis & San Francisco at New Orleans, La., has been appointed soliciting freight agent of the International & Great Northern, with office at Galveston, Tex., succeeding F. S. Sleight, resigned to accept service with another company.

J. W. Thomas, traveling freight agent of the Southern Railway at Chicago, has been appointed commercial agent, with office at Detroit, Mich. J. T. Mudd, also traveling freight agent at Chicago, has been appointed commercial agent, with office at Minneapolis, Minn. L. H. Mann, freight soliciting agent at Chicago, succeeds Mr. Mudd, and H. S. Knapp succeeds Mr. Mann. E. B. Ditto has been appointed a traveling freight agent, with headquarters at Lexington, Ky.

D. L. Ray, traveling freight agent of the Texas & Pacific at Fort Worth, Tex., has been appointed commercial agent, with office at Paris Tex., succeeding Charles H. Webb, resigned to accept service with another company, and A. B. Waldron succeeds Mr. Ray. A. L. Sarrels has been appointed commercial agent, with headquarters at Fort Worth, Tex., succeeding J. D. Healy, promoted to other duties. J. D. Webb, traveling freight agent at Dallas, Tex., has been appointed traveling freight agent in charge of New Orleans territory, with office at Alexandria, La., and W. R. Daniels succeeds Mr. Webb at Dallas.

W. A. Shropshire, formerly traveling freight agent of the Cleveland, Cincinnati, Chicago & St. Louis at Birmingham, Ala., has been appointed commercial agent of the New York Central Lines, with office at Jacksonville, Fla., succeeding E. L. Porter, transferred. C. B. Oakley has been appointed traveling freight agent at Richmond, Va., succeeding W. L. Dewey, promoted. J. H. Pepper has been appointed traveling freight agent, with office at Winston-Salem, N. C., and E. J. Dozier has been appointed a traveling freight agent, with office at Tampa, Fla. T. M. Devereaux, soliciting freight agent of the Cleveland, Cincinnati, Chicago & St. Louis at Cincinnati, Ohio, has been appointed dairy agent of the Merchants' Despatch Dairy Line, with office at Cincinnati. E. M. Snell, traveling freight agent at Cincinnati, succeeds Mr. Devereaux, and H. J. Gribling, also a soliciting freight agent, succeeds Mr. Snell.

Engineering and Rolling Stock Officers.

Fred M. Graham, division engineer of maintenance of way of the Pennsylvania lines at Fort Wayne, Ind., has been transferred to Chicago in a similar capacity, succeeding J. W. Barrie, resigned.

Guy Scott, division engineer of the Central system of the Pennsylvania Lines West at Toledo, Ohio, has been appointed division engineer on the Northwest system, with office at Fort Wayne, Ind., succeeding F. M. Graham, transferred.

H. F. Wardell, superintendent of power and equipment of the Chicago & Western Indiana and the Belt Railway of Chicago, with office at Chicago, has resigned to become assistant manager of the Central Locomotive & Car Works.

Henry Steele has been appointed roadmaster of the Bellingham Bay & British Columbia, with office at Bellingham, Wash., succeeding Charles Gilroy, assigned to other duties, and A. K.

Henderson, master carpenter at Bellingham, has resigned, and his former position has been abolished.

F. L. Nicholson, chief engineer, and D. W. Lum, consulting engineer, both with offices at Norfolk, Va., and J. E. Gould, superintendent of motive power, with office at Berkeley, Va., of the Norfolk Southern, have been appointed to similar positions on the Raleigh, Charlotte & Southern, a new line in North Carolina.

Purchasing Officers.

Ralph P. Moore has been appointed purchasing agent of the Duluth & Iron Range, with office at Duluth, Minn., succeeding Fred H. White, resigned to accept service with another company.

H. W. Davies, purchasing agent of the Norfolk & Southern, with office at Norfolk, Va., has been appointed purchasing agent also of the Raleigh, Charlotte & Southern, a new line in North Carolina.

Fred H. White, purchasing agent of the Duluth & Iron Range at Duluth, Minn., has been appointed purchasing agent of the Duluth, Missabe & Northern, with headquarters at Duluth, succeeding Sanford F. McLeod, resigned to engage in other business.

OBITUARY.

Robert B. Ways, foreign freight agent of the Baltimore & Ohio, at Baltimore, Md., died in that city on February 7, at the age of 48.

Albert H. Lander, for a number of years master of transportation of the Wabash and the Grand Trunk, and recently with the Missouri Pacific, died at his home at Sedalia, Mo., on January 20, 1912.

James R. Dunbar, general freight and passenger agent of the New York, Ontario & Western, at New York, died at his home at Valley Cottage, Rockland county, New York, on February 12, at the age of 51. Mr. Dunbar entered the service of the New York, Ontario & Western as general eastern agent, in 1890. He had been general freight and passenger agent since 1908.

FOREIGN RAILWAY NOTES.

The Argentine government has authorized the French Railway Co. of the province of Santa Fe to construct and operate a railway from some suitable point on the La Sabana to Barranqueras line of the same company, at or near the place called Presidente Roca, terminating on the Pilcomayo river, opposite Asuncion, Paraguay. The gage is to be 3 ft. 1 in., and plans and estimates must be submitted within eight months, and work commenced within six months thereafter.

The Chilean congress has before it a project which provides for a chain of railways connecting Cannavieras, in the state of Bahia, with Las Paz, Bolivia. It is planned that the railway should start at Cannavieras and run westward, crossing the north of Minas Geraes, the south of Goyaz and Matto Grosso, and end at La Paz, after crossing the frontier of Bolivia. The extent of the line is estimated as follows: 160 miles in the state of Bahia, 420 miles in the state of Minas Geraes, 310 miles for the state of Goyaz, and 465 miles for the state of Matto Grosso, making a total length of 1,345 miles.

A commission has been chosen to consider the organization of the Italian State Railways and to propose a plan for a reformed administration. This commission contains all those who have been ministers of public works, representatives of the army, of commerce, agriculture and of labor—many of the most eminent men in Italy. Sacchi, the present minister, in an address at the first meeting of this commission, said that since 1902, the train mileage of the system had increased 48 per cent., the gross earnings 52 per cent., and the operating force 37 per cent., while the office force had increased 54 per cent. The commission will consider what will be the most advantageous grouping of the lines, the number of subordinate administrations and the extent of their independent authority. It is possible that a separate railway ministry will be proposed. Ministers change quite frequently in Italy.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Ouachita & Northwestern has ordered one locomotive from the Baldwin Locomotive Works.

The Toledo, Peoria & Western has ordered two consolidation locomotives from the Baldwin Locomotive Works.

The Chicago, Rock Island & Pacific, mentioned in the *Railway Age Gazette* of January 5 as being in the market for 45 mikado locomotives, have withdrawn its inquiries.

CAR BUILDING.

The Birmingham Southern has ordered 60 steel cars from the Standard Steel Car Company.

The Middle Tennessee has purchased two 60-ft coaches from the Central Locomotive & Car Works.

The Norfolk & Western will build 500 hopper cars at the company shops on completion of the 500 cars now being built.

The Mobile & Ohio has ordered 200 steel underframe ventilated box cars from the Mt. Vernon Car Manufacturing Company.

The Birmingham & Northwestern has ordered fifty 35-ft. box cars of 60,000 lbs. capacity from the Central Locomotive & Car Works.

The Savannah Southern has ordered fifty 36-ft. flat cars of 60,000 lbs. capacity and fifteen 36-ft. box cars of 60,000 lbs. capacity from the Central Locomotive & Car Works.

The San Diego & Cuyamaca, mentined in the *Railway Age Gazette* of December 15, 1911, as in the market for passenger equipment, has ordered 1 coach, 1 combination passenger, baggage and mail car and 1 baggage car from the Central Locomotive & Car Works.

The Chicago, Rock Island & Pacific, in addition to the 20 steel baggage and mail cars, 10 steel passenger and baggage cars and 10 steel baggage cars mentioned in the *Railway Age Gazette* of February 2, are in the market for 6 steel dining cars and 2 gasolene electric motor cars.

The Pennsylvania System, mentioned in the *Railway Age Gazette* of February 9 as having ordered 200 passenger cars, has divided this order as follows: 65 suburban coaches and 10 combination passenger and baggage cars from the Pressed Steel Car Company; 75 suburban coaches from the American Car & Foundry Company; 15 suburban coaches and 35 combination passenger and baggage cars from the Standard Steel Car Company.

IRON AND STEEL.

The Lehigh Valley has ordered 10,000 rails from the Bethlehem Steel Company.

The Pittsburgh & Lake Erie has ordered 6,400 tons of rails from the Carnegie Steel Company.

The Northern Pacific has ordered 25,000 tons of open-hearth rails from the Maryland Steel Company.

The Atchison, Topeka & Santa Fe has ordered 5,000 tons of small bridge material from the American Bridge Company.

General Conditions in Steel.—During the past week there has been some price cutting by a few of the independent companies. The Steel corporation, however, has made no reductions. The Steel Corporation continues to operate at almost 90 per cent. of its capacity, and it is calculated that since January 1, 18 additional furnaces of that company were blown in. Orders booked during January averaged about 37,750 tons a day, as compared with almost 70,000 tons a day in December. The Steel Corporation is not very anxious to take new orders at current prices, as with its present unfilled orders it could operate its mills at the current percentages of capacity for four or five months. No price reductions by the larger steel companies are expected for a long time, if at all.

Supply Trade News.

Coleman B. Ross, formerly with the Linde Air Products Company, Buffalo, N. Y., has gone to the Independent Pneumatic Tool Company, Chicago, with office in Pittsburgh, Pa.

Edgar M. Smith, formerly for some years connected with the Q. & C. Company, New York, has returned to that company, and for the present will be located at its Chicago office.

The Crane Company, Chicago, has leased the northeast corner of Michigan boulevard and Eldredge place, 40 ft. x 160 ft., on which it will build a new office building of eight or ten stories.

Oscar R. Ford, general eastern manager of the Chicago Varnish Company, Chicago, with office in New York, died at his home in New York on February 8 at the age of 74. Mr. Ford was especially in charge of eastern railway business.

The Western Steel Car & Foundry Company, Chicago, has purchased the plant and property of the Illinois Car & Equipment Company, occupying about 100 acres at Hegewisch, Ill., for a stated consideration of $1,100,000. The company has occupied the property since 1902 under lease, and is now exercising its option to purchase.

Frank F. Coggin, for several years representative of the Chicago Car Heating Company in New England territory, who for the past six months has been connected with the Ward Equipment Company, New York, has returned to his former position with the Chicago Car Heating Company, with headquarters at 170 Broadway, New York.

Charles Haines Williams, of the Chicago Railway Equipment Company, Chicago, was elected third vice-president of the company at its recent annual meeting. Mr. Williams was educated in the public schools of Baltimore, Md., and at the Baltimore Polytechnic Institute, from which he graduated in 1893, and also took a special course in mechanical drawing and machine design at the Maryland Institute and several private courses in different branches of engineering. He spent four years as special apprentice in the Mount Clare shops of the Baltimore & Ohio, working in the machine and locomotive shops, the erecting shops and in the foundry, drawing room and test departments. He left the Baltimore & Ohio to become connected with the Chicago Railway Equipment Company as mechanical inspector, and has been with that company continuously since.



Charles Haines Williams.

The Industrial Works, Bay City, Mich., has moved into its new office building at the corner of Washington avenue and Eleventh street. The structure is 110 ft. x 95 ft. in dimensions and is constructed of reinforced concrete and brick. It is of two stories, the first containing the general offices and the second a drafting room and library. The company is also building a 60-ft. addition to its foundry.

H. F. Wardwell has resigned as superintendent of power and equipment of the Chicago & Western Indiana and the Belt Railway of Chicago to become assistant manager of the Central Locomotive & Car Works, with office at Chicago. Mr. Wardwell has had an extensive railway experience, and was formerly chief clerk to President F. A. Delano of the Wabash, and later chief clerk to President H. G. Hetzler of the Chicago & Western Indiana.

Plans are being made for a formal opening of the Permanent Manufacturers' Exhibit of Railway Supplies and Equipment in the Karpen building, 900 South Michigan boulevard, Chicago, during the week beginning March 16. Nearly 50,000 invitations will be sent out to railway and supply men, and admission tickets may be obtained from V. Courtright, secretary. The exhibit booths, occupying 36,000 sq. ft. of space, or the entire twelfth floor of the building, have been provided with furniture, including mahogany tables, desks and chairs and rugs and uniform signs, and several exhibits are already in place. A large assembly room and committee rooms, handsomely furnished, as well as a club room for the use of the exhibitors have been located on the eleventh floor. Invitations have been extended to a large number of railway associations to make use of the assembly and committee rooms free of charge for their meetings, and several organizations have the matter under consideration.

As announced last week, William V. Kelley has resigned as president of the American Steel Foundries, an office he has held since 1905, and has been elected chairman of the company, a newly-created position, with office at Chicago. Charles Miller retains the position of chairman of the board of directors. Robert P. Lamont, who has been first vice-president of the company also since 1905, was elected president in place of Mr. Kelley. Mr. Kelley's retirement as president was due to a desire to obtain relief from some of the responsibilities of active office in view of his extensive other interests. George H. Scott, second vice-president of the company, will be promoted to first vice-president, succeeding Mr. Lamont. R. H. Ripley, third vice-president, will be advanced to the second vice-presidency, and Warren J. Lynch, fourth vice-president, to the office of third vice-president. Mr. Kelley was born at Gratis, Ohio, February 13, 1861, received a high school and commercial education, and began his business career as clerk and bookkeeper in a hardware store at Springfield, Ohio, in 1883. From 1885 to 1888 he was sales agent of the Springfield Malleable Iron Company, and from 1888 to 1897 of the Charles Scott Spring Company, Philadelphia, Pa. In 1897 he organized the Simplex Railway Appliance Company, of which he became president and treasurer. In January, 1905, the stock of this company was sold to the American Steel Foundries, and in August Mr. Kelley was elected president of that company, holding the office until his recent election as chairman of the company. He is also a director of the Allis-Chalmers Company, the Continental and Commercial National Bank and the South Side Elevated Railroad, Chicago. Robert Patterson Lamont was born at Detroit, Mich., December 1, 1867, and graduated from the University of Michigan with the degrees of B. S. and C. E. in 1891. After



W. V. Kelley.



Robert P. Lamont.

leaving college he was employed at the World's Columbian Exposition in 1891 and 1892. From 1892 to 1897 he was secretary and engineer of Shailer & Schinglau, a contracting company. From 1897 to 1905 he was associated with Mr. Kelley as first vice-president and a director of the Simplex Railway Appliance Company, and in 1905, when Mr. Kelley became president, he was made first vice-president of the American Steel Foundries, with office at Chicago.

TRADE PUBLICATIONS.

Railway Supplies.—The M. Mitshkun Company, Detroit, Mich., has published catalog D of its large variety of new and second-hand railway equipment and supplies. The catalog is illustrated and gives net prices.

Norfolk Southern.—The passenger department of this company has published a small folder entitled Winter Homes in the Virginia-Carolina Coast Country. The attractive features of this region are briefly set forth, and illustrations of choice bits of scenery are given. A map and a list of hotels and boarding houses, with their respective rates, are included.

Turbo-Generator Sets.—The General Electric Company, Schenectady, N. Y., has published bulletin No. 4887 on Small Turbo-Generator Sets in capacities of from 5 to 300 k.w. All of these sets are of the horizontal type and can be arranged to operate either condensing or non-condensing and at any steam pressure above 80 lbs. for the smaller sizes and 100 lbs. for the larger.

Southern Railway.—The land and industrial department of this company has published a small illustrated booklet entitled Southern Georgia and Northern Florida, telling of the advantages, possibilities and climatic conditions in this region. Each county is discussed separately. A brief description of the soil is given, and the many and varied products are enumerated in an attractive manner. Manufactures, education and land values are also touched upon.

Concrete Reinforcement.—The Corrugated Bar Company, Buffalo, N. Y., has published four carefully prepared booklets entitled Useful Data on Corr Products, Corr-Mesh, Corr-Plate Floors, and Corr Tile Floor Construction. These booklets give descriptions, diagrams, tables, results of tests, and specifications. These products are used for the reinforcement of concrete for buildings, conduits, tanks, fences, etc. A number of illustrations of buildings in which these products have been installed are included.

FOREIGN RAILWAY NOTES.

The Western Buenos Aires Railway has been authorized by the Argentine congress to build a branch railway from kilometer 56½, of the La Zanja branch, to Gonzalez Moreno, in the Pampa territory.

The Germans have now completed a railway line in the interior of their southwest African colony nearly its entire length from north to south, from about latitude 19 deg. to latitude 28 deg. south, generally 150 miles or so from the coast, to which it has outlets at Luderitz Bay in latitude 26 deg. 30 sec., and at Whale Bay, 275 miles further north. The northern section carries considerable ore to Whale Bay.

The Australian parliament has authorized the construction of about a thousand miles of railway, which will complete a connection between the east and west coasts. By far the larger part of the population, and nearly all the fertile land is in the east coast colonies, extending also along the south coast some hundreds of miles. West, Australia, however, has valuable mines and has been growing rapidly. From its chief port, Perth, which is more than 150 miles north of what may be called the southwest corner of Australia, a narrow-gage railway has been built eastward 380 miles to the mining region about Kalgoorlie. Thence there is a gap of about a thousand miles before reaching Port Augusta, at the head of a bay in South Australia, from which lines extend, or may be made to extend by building not very long sections of railway, to all the chief ports—Melbourne on the south coast and Sidney and Brisbane on the east coast. The line between Kalgoorlie and Port Augusta runs through desert country, not very far from the south coast.

Railway Construction.

New Incorporations, Surveys, Etc.

Anderson & Saline River.—This company has under consideration the question of building a line, it is said, from Pine Bluff, Ark., west to Leola, about 40 miles. J. S. Bell, chief engineer, Pine Bluff.

Atlantic Coast Line.—According to press reports this company will build two connecting lines in west Florida. One is to be built from Dunnellon, northwest, to Old Town, about 42 miles, and the other between Perry and Monticello, 32 miles. E. B. Pleasants, chief engineer, Wilmington, N. C.

Arkansas Roads.—A company is being organized, and expects to begin work during February on a 25-mile line from Little Rock, Ark. C. C. Godman, Fort Smith, Ark., may be addressed.

Plans are being made, it is said, to build from Marianna, Ark., west via Moro, to Brinkley, about 25 miles. F. S. Yants, Paragould, may be addressed.

Bagoteville & St. Lawrence.—This company, which has a capital of $2,000,000, it is understood will build from St. Alphonse, Que., or Grande Baie, to Murray Bay. Preliminary surveys have already been made. H. Patton, Albany, N. Y.; G. Tanquay, Quebec; A. Lepage, Bagoteville, and J. Tremblay, Ste. Anne, are interested.

Cairo, Trumann & Southern.—Incorporated in Arkansas, to build from Trumann, Poinsett county, Ark., south to Earl, Crittenden county, 29 miles. V. W. Krafft, St. Louis, Mo., may be addressed.

Canadian Pacific.—The Dominion Railway Commission has approved the plans submitted by the Esquimalt & Nanaimo for the extension up the east coast of Vancouver Island from Union Bay to Duncan Bay. Grading work has already been started. H. J. Cambie, chief engineer, Victoria, B. C.

Surveys have been made, it is said, for double tracking work between Spences Bridge, B. C., and Hope, about 100 miles. J. G. Sullivan, chief engineer, Winnipeg, Man.

Central of Canada.—It is understood that construction work is to be started early this spring on a line from Montreal, Que., to Ottawa. It is said that double track will be laid from Montreal to St. Eustache, and that there will be three bridges, one at Back river, another at St. Eustache, and the third at St. Andrews. C. H. Wills & Sons, London, are the contractors. David Lyell is their representative at Montreal.

Clarksburg & Philippi Traction Company.—Incorporated in West Virginia, with $300,000 capital, to build from Clarksburg, W. Va., southeast via Philippi to a point near Belington, about 35 miles, with a branch south to Buckhannon, about 20 miles. The incorporators include T. L. Nutter, Clarksburg; J. C. Watson and R. J. Dunham, Philippi, and C. Robb, Fairmont.

Clinton & Oklahoma Western.—This company, which operates a 21½-mile line from Clinton, Okla., to Butler, has given a contract, it is said, to Maney Brothers, Oklahoma City, to build a 30-mile extension from Butler westerly up the Washita valley to a point near the center of Roger Mills county. The contract includes grading, the construction of 3,000 linear feet of bridge work, and putting up four new stations. Guy V. McClure, chief engineer, Clinton, Okla.

Crystal City & Uvalde.—See Mexico, San Antonio & Gulf.

Eastern Shore Power, Light & Railway Company.—This company is making plans, it is said, to build from Deal Island, Md., east via Princess Anne to Sinepuxent Bay, about 50 miles, also to build branch lines. The company has a capital of $500,000, and the incorporators include H. J. Waters, J. M. West, J. S. Noel and H. Riggin.

Esquimalt & Nanaimo.—See Canadian Pacific.

Fairmont & Clarksburg Traction Company.—According to press reports, this company is planning to build a line to connect Fairmont, W. Va., and Weston. S. B. Miller, chief engineer, Fairmont, W. Va.

Glenmora & Western.—An officer of this company, which was recently incorporated to build from Glenmora, La., north-

west to Shreveport, also from Glenmora southeast, writes that work is now under way and track has been laid on about three miles. The company is carrying out the work at present with its own men. N. M. Cady, McNary, may be addressed. (February 2, p. 221.)

Grand Trunk.—Bids are being asked for, it is said, to build the Southern New England from Palmer, Mass., to tidewater at Providence, R. I. The work must be finished before December, 1913. H. R. Safford, chief engineer, Montreal, Que. (Aug. 18, p. 357.)

Articles of incorporation of the Southern New England to build a Grand Trunk extension, were filed in New Hampshire recently. The plans call for a line from Lebanon, N. H., through from Vermont at Lebanon, Grafton, Sullivan and Merrimac counties to Concord, thence down the Merrimac river to the New Hampshire-Massachusetts state line.

Grand Trunk Pacific.—This company is planning to build a branch, it is said, from Napadoggan, the first divisional point west of Moncton, N. B., to Fredericton, 45 miles, to provide a more direct route to tidewater at St. John, N. B., through a connection with the St. John Valley. B. B. Kelliher, chief engineer, Winnipeg, Man.

Great Northern.—An officer writes that revision work is now being carried out on about six miles between Sandpoint, Ida., and the Washington-Idaho line. A. H. Hogeland, chief engineer, St. Paul, Minn.

International & Great Northern.—Surveys are now being made, it is said, for an extension from Laredo, Tex., down the valley of the Rio Grande, to a connection with the Harlingen branch of the St. Louis, Brownsville & Mexico at Sam Fordyce, about 125 miles.

Lake Erie & Northern (Electric).—An officer writes that contracts will be let about May 1, to build from Brantford, Ont., south via Waterford and Simcoe to Port Dover on Lake Erie. The work involves handling about 17,000 cu. yds. a mile. The maximum grade will be 1.25 per cent., and the maximum curvature 4 deg. There will be a 450 ft. steel bridge, and another steel bridge of 438 ft., also a 1,200 ft. timber trestle. John Muir, president, William P. Kellett, chief engineer, Brantford. (February 2, p. 221.)

Louisville & Nashville.—According to press reports, a contract has been given to the Leighton-Ambrose Construction Company, Knoxville, Tenn., for grading work on seven miles south of Lewisburg, Ala. Half of this work will be through rock. W. H. Courtenay, chief engineer, Louisville, Ky. (June 16, p. 1447.)

Contracts for double tracking work from Black Creek, Ala., to Cullman, 46 miles, it is said, have been given to the following contractors: The Asheville Construction Company, 10 miles; the Calahan Construction Company, six miles; Thrasther & Gunther, eight miles; Adams & Solomon, five miles, and J. C. Garland & Co., 17 miles. The work north of Cullman, and from that place to Decatur, and from Decatur north to Lewisburg has already been let. W. H. Courtenay, chief engineer, Louisville, Ky.

Mahoning & Schenango Railway & Light Company.—It is understood that definite steps are now being taken to build the proposed connections to complete a through route over electric lines from Cleveland, Ohio, to Pittsburgh, Pa. M. E. McCaskey, vice-president and general managers, Youngstown.

Mexico & North Western.—The new line from Madera, Mex., north to Pearson, 103 miles, is to be opened for business on February 20. This completes the through connection from El Paso, Tex., south to Chihuahua. F. S. Pearson, president, New York, N. Y.

Mexican Roads.—Surveys have been made to build a railway from the City of Mexico, Mex., to the summit of Popocatepetl, which is 17,500 ft. above the sea level. Dr. F. S. Pearson, president of the Mexico North Western, and associates are back of the project.

Mexico, San Antonio & Gulf.—Work has been started at San Antonio, Tex., on this line. The plans call for building from San Antonio to a point in the Rio Grande valley, about 260 miles, with a number of branch lines. The company will take over the rights and property, it is said, of the Crystal City & Uvalde, which now operates about 80 miles. J. E. Franklin, president of the Bankers' Trust Company, St. Louis, Mo., is back of the project.

Navajo Southern.—A company is to be organized under this name with $3,500,000 capital to build from Holbrook, Ariz., on the Santa Fe Coast Lines south to Snowflake, about 30 miles, thence via Pinetop, northeast, to St. Johns, about 40 miles. It is estimated that it will cost about $1,000,000 to build the line. F. H. Bowen, president; W. H. Clark, secretary; R. W. Hill, treasurer, and E. S. Clark, counsel, Prescott.

New Orleans, Natalbany & Natchez.—This road has been extended from Pine Grove, La., to Grangeville, six miles. F. C. Denkman, president, Rock Island, Ill.

Northwestern Pacific.—An officer writes that work is now under way by the Utah Construction Company, Ogden, Utah, on the connecting link between Willits, Cal., and Eureka. The company let a contract early in January for seven miles, and expects to let contracts for 40 miles additional to complete the line within four or five months. It is expected that all the work will be finished during 1913. The work is very heavy. F. T. Vanatta, chief engineer, Sausalito, Cal.

Northern Pacific.—A contract has been given to Porter Brothers, Portland, Ore., it is said, for double tracking work from Tacoma, Wash., southwest to Tenino, 30 miles. W. L. Darling, chief engineer, St. Paul, Minn.

Ohio & Kentucky.—This road has been extended from Liberty Road, Ky., to Licking River, three miles. G. Thompson, chief engineer, Springfield, Ohio.

Oklahoma & Golden City.—Surveys have been made, it is said, from Jefferson City, Mo., to Fairview, Okla., 385 miles. It is understood that the work will be started soon by William Love, Lafayette, Ind. C. E. Hagerty, New York; A. S. Vaughn, Boliver, Mo.; M. H. Cooper, Pittsburgh; D. E. Ketcham, Golden City, Mo., and E. C. Griesel, Muskogee, Okla., are interested.

Pecos Valley Southern.—According to press reports, this company is planning to build an extension from Pecos, Tex., northwest to Lamesa, about 130 miles. L. M. Schwab, assistant superintendent and division engineer, Pecos, Tex.

Rio Grande & Eagle Pass.—This company, which operates a line from Laredo, Tex., to Minera, 29 miles, it is said, will build an extension from Laredo south along the Rio Grande. R. W. Davis, chief engineer, Laredo.

St. John Valley.—This company, it is said, will ask for bids during February for work on the line projected from St. John, N. B., northwest to Grand Falls, 208 miles. The Victoria Construction Company, Ltd., has asked for incorporation to bid for work on this line. A. R. Gould, president, St. John Valley. (December 29, p. 1356.)

San Jose & Almaden (Electric).—An officer writes that this company will build a line from San Jose, Cal., south to Almaden, 12 miles. The maximum grade will be 10 per cent. There will be two steel and concrete bridges, each 50 ft. long. All the work except the bridge work is to be done by day's labor. D. B. Burnett, attorney, Safe Deposit building, San Jose, Cal.

Southern New England.—See Grand Trunk.

Southwestern Traction & Power Company.—An officer writes that contracts are let, and work is to be started at once on a line from New Iberia, La., southeast along the banks of the Bayou Teche, to Jeanerette, about 15 miles. A. F. Jacobs, president, L. Blum, treasurer. The directors include J. Godchaux and A. G. Barrows, New Orleans.

Springfield & Central Illinois Traction.—An officer writes that this company is planning to build from East St. Louis, Ill., east to Oskaloosa, about 80 miles. The route has been approved by the financial backers. It is undecided when contracts will be let for the work. Isaac A. Smith, president, St. Louis, and the East St. Louis Engineering Company are the engineers.

Utah Roads (Electric).—Plans are being made to organize a company to build from a connection with the Salt Lake & Ogden, at Salt Lake City, Utah, south to Nephi, about 90 miles. George Whitmore, Nephi, is to be president of the company.

RAILWAY STRUCTURES.

Abilene, Tex.—The Abilene & Southern will rebuild a roundhouse and machine shops 32 ft. x 138 ft., which were destroyed by fire.

Artesia, N. M.—The Atchison, Topeka & Santa Fe is building a new brick passenger station to cost about $15,000.

Baltimore, Md.—An officer of the Pennsylvania Railroad writes that bids have been asked for up to March 1, for putting up concrete bridges over the Back river, over Gunpowder river, and over Bush river, on the line between Baltimore, Md., and the Susquehanna river.

Butte, Mont.—The Great Northern, it is reported, will begin work in the spring on the construction of a new passenger station to cost $125,000.

Butler, Okla.—See Clinton & Oklahoma, Western under Railway Construction.

Calgary, Alb.—Westinghouse, Church, Kerr & Company, New York, have been retained by the Canadian Pacific as engineers and constructors for the shops and additions at Calgary. The work includes the design and building of shops, comprising locomotive erecting shop, machine shop, blacksmith shop, boiler shop, tender shop, foundry, planing mill, power house, pattern shop, coach repair and paint shop, freight car repair shop, storeroom and office building, oil house and numerous smaller buildings and structures, such as mess building, dry kiln, scrap docks and material bins. The erecting shop will be of the transverse lift-over type, and will contain 35 bays. The machine shop for heavy machine tools will be placed parallel to and adjoining the erecting shop on one side, and space will be provided alongside of this shop for another machine shop to contain lighter tools. The blacksmith shop will be parallel to and adjoining the erecting shop, on the opposite side to the machine shop. Adjoining the end of the blacksmith shop, and parallel to the erecting shop will be the boiler shop next to the high bay of which space is provided for flue shop, boiler shop tools and a flue rattler. In general the construction will be concrete steel brick or hollow tile, depending on conditions. The work will also include the design and installation. J. G. Sullivan, chief engineer western lines of the Canadian Pacific, is in charge.

Clarendon, Ark.—The St. Louis Southwestern has given a contract to the Wisconsin Bridge & Iron Company for a drawbridge requiring 700 tons of steel shapes.

Ft. William, Ont.—The Grand Trunk Pacific will enlarge its Ft. William elevators to bring the total capacity up to 6,000,000 bushels.

Garrett, Ind.—The Baltimore & Ohio has purchased land near Garrett on which to build new shops.

Helena, Mont.—The Great Northern, it is reported, will begin work in the spring on the construction of a new passenger station to cost $125,000.

Hillsboro, Tex.—The roundhouse of the Missouri, Kansas & Texas was destroyed by fire on February 10.

Paducah, Ky.—Negotiations have been in progress for some time between the Chicago, Burlington & Quincy, Illinois Central, Chicago & Eastern Illinois and Louisville & Nashville, for the construction of a double-track bridge across the Ohio river, 12 miles from Paducah. It is understood that the contract will be let shortly.

Pine Bluff, Ark.—The St. Louis Southwestern will erect a boiler and machine shop, 124 ft. x 320 ft., to replace the building burned on January 1.

Port Arthur, Ont.—The Canadian Northern will erect a dock to cost about $40,000.

St. Louis, Mo.—The Chicago, Burlington & Quincy has begun work on the erection of a new freight terminal.

San Diego, Cal.—The Atchison, Topeka & Santa Fe has plans for a large new freight house at this point, but its construction has not yet been authorized.

Winnipeg, Man.—The Canadian Northern will build a new yard about three miles east of the city.

Railway Financial News.

Atchison, Topeka & Santa Fe.—This company has filed an application with the Kansas railway commission for authority to issue $18,000,000 4½ per cent. 50-year bonds, secured by a mortgage on the California, Arizona & Santa Fe. This is the road which was recently incorporated in California with a capital stock of $50,000,000 and includes the lines from Needles, Cal., to Mojave, which the Atchison recently purchased from the Southern Pacific. It is part of the Atchison main line and before its acquisition was leased from the Southern Pacific for a long term. Company also includes other lines in California and Arizona.

The bonds will probably not be offered to Atchison security holders but will be sold to bankers. J. P. Morgan & Co. have always done Atchison's financing.

Boston & Albany.—The directors have approved an issue of $1,000,000 bonds, which presumably are not to be issued at once. Funds still in hand are understood to be ample to pay for all construction work up to January 1, 1913. The expenditures planned for the 1912 calendar year are about $1,465,000.

Chesapeake & Ohio.—See an article in regard to this company in Court News.

Chicago, St. Paul, Minneapolis & Omaha.—As mentioned in these columns last week, the directors authorized the immediate sale of $5,000,000 5 per cent debenture bonds, which were taken by Kuhn, Loeb & Co., New York. At the same time they authorized $10,000,000 additional debenture bonds to be issued after obtaining the permission of the railway commission of Wisconsin. Of the proceeds of the $5,000,000 sold, $3,700,000 is to be used for building and equipping 60 miles of double track between Eau Claire, Wisconsin, and Hudson.

Denver & Rio Grande.—E. L. Brown, vice-president, has been elected a director, succeeding Howard Gould, resigned.

Detroit, Toledo & Ironton.—*The Wall Street Journal* says that while definite plans for the reorganization have not been completed, tentative plans probably call for a new prior lien mortgage and an issue of short term 5 per cent. bonds to amount to about $15,000,000.

Grand Trunk.—The Massachusetts railway commission has approved the estimates of the Southern New England (the subsidiary of the Grand Trunk which is to build a line to Providence, R. I.) for its road through Hampdon and Worcester counties.

Grand Trunk Pacific—The judicial committee of the privy council of Canada has overruled the Supreme Court and has held that the Canadian government must pay the difference between the selling price of the 3 per cent. guaranteed bonds of the Grand Trunk Pacific and par. The decision has been accepted both by the government and railway company, and the legislature will be asked to appropriate the necessary amount of money.

St. Louis Southwestern.—The directors have authorized an issue of $100,000,000 first terminal and unifying 5 per cent. bonds of January 1, 1912-1952. Of this authorized issue, $7,500,000 have been sold to the Guaranty Trust Company, Rhoades & Co., and William Salomon & Co., all of New York. Of the proceeds of the bonds now sold, $2,100,000 will be used to retire about $2,100,000 equipment obligations and other immediate requirements, and the remainder for terminal facilities at St. Louis and elsewhere. A special meeting of stockholders is called for April 17 to ratify the action of the directors.

Southern Pacific.—A press despatch from San Francisco says that suit has been filed by the Southern Pacific against J. D. and A. B. Spreckels for about $3,220,000 advanced by the Southern Pacific for the building of the San Diego & Arizona.

Southern Railway.—The directors have declared a semi-annual dividend of 2 per cent. on the preferred stock. This places the preferred on a 4 per cent. annual basis as compared to a 2 per cent. annual, the rate in 1911. During the first six months of the fiscal year ending June 30, 1912, the Southern Railway earned apparently 7 per cent. on its $60,000,000 preferred stock.

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GENERAL NEWS SECTION 349

"A STEP in the right direction," is the way in which Commissioner Clements of the Interstate Commerce Commission dismisses the report of the Hadley securities commission. He is speaking before the house committee of interstate and foreign commerce favoring a bill to authorize the I. C. C. to make an investigation of the value of all stocks and bonds of all common carriers in the United States. We must assume that Commissioner Clements has not read the securities commission's report. If Mr. Clements had really read the report he could not have failed to follow the clear deductions made by five men, who certainly possess rather more than the average degree of intelligence, so entirely as to say that this report was a step in the right direction and in the same breath ask authority to do the very thing that the report showed conclusively that it was absolutely impossible to do. When Mr. Clements is asked if the Hadley commission did not investigate the same subject he now wants the I. C. C. to investigate, he answers, "Yes"; but apparently the trouble is that they did not definitely determine the value of all railway bonds and stock of all common carriers. If E. H. Harriman had been able to determine the value of all the stocks and bonds issued by all the common carriers in the United States, he might, we may be quite sure, have died worth $800,000,000 instead of $80,000,000.

IN arranging to take formal concerted action on the demands made by the locomotive enginemen, the Eastern railways are making a most important step. Heretofore there has not been in the East any such harmony of action between the different managers as there has been in the West when labor questions came up. Even in 1910 the managers did not work together when the conductors and trainmen virtually acted as a unit in negotiating for increased wages in Eastern territory. Such individual adjustments as have been made in the past have been not only less satisfactory to each railway at the time, but have resulted in variants of wage scales which now give any union a wide field from which to choose for each class of service the highest rate any road pays, and take these maxima as its basis in submitting a scale to apply to all roads. Something of this condition is evident in the demands which the enginemen have now presented. The committee of managers is collecting and tabulating in such form as to be accurately studied figures showing what on each road would be the result of the proposed scale. And, particularly, it is making public the facts of the questions at issue. The experience with the western shopmen has been a striking example of the value of publicity when relations between employees and managers are to be adjusted, and in this case the roads are determined that the public shall be accurately and promptly informed at each step in the negotiations.

OUT of 73,354 stockholders of the Pennsylvania Railroad, a return just made shows that 34,712—almost one-half—are women. The last returns of the kind, some two years ago, of the New York, New Haven & Hartford, closely correspond with those of the Pennsylvania, and show that out of approximately 16,000 stockholders 7,200, or 45 per cent., are women. The figures as they stand, which are more or less typical of the feminine stockholding in any steady railway dividend payer, especially in the older states, are striking as a proof of the extent to which a large dependent class holds interests in our conservative railways. And it is a dependent class in two senses: financial and mental. As a class it not only needs the dividend but must rely on the judgment of others in making an investment as well as in selling it out. Where there is one woman who watches her stocks and bonds herself there are probably 20 who rely on the advice of others. Woman, moreover, as a stock owner, has temperamentally a trait that exposes her to the larger investment risk. In her is peculiarly developed that psychological tendency that prompts her to "hold on" to an investment by the mere force of habit. It is hard for her—much harder than for a man—to realize that a regular dividend payer, often inherited with a parental stamp of confidence, has become a speculative risk. That such a class, largely outside of self-protection, has acquired so great holdings in railways is surely a fact that ought to make the man who attacks railway revenues stop and think. Nor are the returns that are cited complete. They do not include railway bonds, in which women have interests probably larger in proportion than in stocks; they do not include the trusteeships holding railway securities and so often appointed for women exclusively; and they

do not include the minor males under guardians and trustees, who in the protective relation are obviously to be classed with women. If such could be grouped with the women stockholders in such a corporation as the Pennsylvania, the exhibit would be yet more impressive.

THE development in railway terminal facilities for handling iron ore on the Great Lakes, referred to in an editorial in the *Railway Age Gazette* of January 26, in connection with a description of a large loading dock, is still further emphasized by the description of the largest unloading dock ever built on the lakes, which is given elsewhere in this issue. The load for which this structure was designed and the condition encountered in the filled land on which the dock was located made it necessary to support the substructure on piles. The problem presented in this work is comparable to that met constantly in the construction of heavy bridge abutments, piers and similar structures requiring pile support. The use of concrete piles for such foundations seems to be growing in favor as satisfactory methods of constructing, handling and driving them are worked out and become more widely understood. The advantage of greatly increased life under adverse conditions which concrete piles possess in comparison with wooden ones has been recognized for some time, but the problems involved in their use, such as the design of reinforcement to prevent shattering during handling and driving, and the securing of a suitable cushion or driving block to prevent serious battering of the pile head, have deterred some engineers from using concrete. The engineers in charge of the Cleveland dock both for the railway and for the contractor planned the details of this work very carefully and conducted a number of tests during its progress to confirm their judgment and experience. A very complete casting and curing plant was laid out, a satisfactory driving block was found after a number of trials, and the tests for shattering showed that the reinforcement was serving its purpose well. The methods used and the results secured should be of considerable interest to engineers interested in foundation work.

EXPERIENCE with steel passenger cars in accidents is accumulating rapidly, and the conclusion must be that their construction is well justified. Their behavior in severe collisions shows them to be not invulnerable; but their resistance under such destructive impacts has not been a disappointment to the builders, who understand the limitations of the strength due to shape and to materials. A correspondent in our issue of February 16 refers to the failure of the steel sleeper in the Chicago, Milwaukee & St. Paul accident at Odessa, and aptly remarks that this does not necessarily imply weakness in steel construction of passenger cars, but that the superstructure was sheared off because the strong steel underframe of the dining car was lifted above that of the sleeper and was necessarily converted into a huge shear. He also refers to the familiar examples where the front ends of locomotives (which represent a form of very strong steel construction which we can hardly hope to attain in the upper frame of passenger cars) have been sheared off by collision with other engines, or by rocks, and even by the wooden sills of freight cars. If passenger cars are made very strong by the use of steel construction they become a valuable protection to the passenger in many forms of accidents like those due to derailments, and when cars are rolled over, as in a recent accident on the Pennsylvania. When account is taken of the relative protection afforded by steel and wooden cars during the period in which the former have been in use it will doubtless be found that the steel car has demonstrated its valuable qualities; and unquestionably its construction will be continued in universal numbers. The federal requirement of steel postal cars for the protection of the mail clerks at the head of fast trains is of itself a strong recognition of the superiority and safety of steel construction.

REPORTS ABOUT RAILWAY "GRAFTING."

THE reports of alleged grafting in connection with the construction of and the purchase of equipment for the Chicago, Milwaukee & Puget Sound, which have been given such widespread publicity recently, suggest two reflections. One is that railway officers should at all times be frank and candid in giving to the public facts about their business which can properly be made public. The second is that they should reduce to a minimum the number of facts about their business which they do not feel can properly and safely be made public.

The reports regarding the Chicago, Milwaukee & Puget Sound were very indefinite. They merely indicated that the road had bought supplies from concerns with which relatives of officers of the Chicago, Milwaukee & St. Paul, the parent line, were connected. Now, that a railway officer has relatives in the railway supply business, and that supplies for his road are bought from them, is, in itself, of no consequence or significance whatever. Grafting in connection with purchases consists in so making them as to defraud the road; and there is no graft in purchases made without fraud, whether from a relative or anybody else.

In the circumstances, the wise course for the management of the Chicago, Milwaukee & St. Paul to have taken would have been to have bluntly and candidly told all of the facts. President Earling did not do this. The first report said that he had a relative who was the head of a railway "equipment" company. Mr. Earling denied this, using the word "equipment" as it is technically understood by railway men; that is, as applying only to cars and locomotives. The fact was promptly published—a fact which was widely known—that he has a son-in-law who is prominently connected with railway supply concerns with which the St. Paul and its subsidiary, the Puget Sound, have done business. The newspapers and their readers promptly jumped to the conclusion that Mr. Earling had not been candid, and, putting, of course, the worst possible construction on this, have since discounted every statement he has made; and not only the St. Paul but all railways have been injured by the reports. Some day, let us hope and pray, all prominent railway men will learn, as many have learned, that the best way to create a favorable public opinion regarding railways is to deal frankly and courageously with the public, and that the very best way to create a suspicious and hostile public opinion is to deal with the public in a different way.

Rumors about railway grafting are constantly in circulation, and relate to more roads than one. Whence and why do they originate? The *Railway Age Gazette* believes that railway managements and railway officers in general are as honest and honorable as the managements and officers of other business concerns. Never was a more powerful searchlight of publicity turned on any other business than has poured its rays on that of American railways during the last ten years; and that so few facts seriously reflecting on the honor and honesty of managements and officers have been disclosed is a tribute to the integrity of the great majority. Could any other business, manufacturing, mercantile or newspaper, or any profession, have stood such a crucial test equally well?

Yet these reports about grafting persist, and the reasons for them deserve serious consideration. In the first place, not a few prominent railway officers have relatives in the railway supply business. The relatives of railway men, like other people, have a right to engage in any business that they like; and there are so many high railway officers whose honesty makes them "lean backward," as the saying is, in dealing with supply houses with which their relatives are connected that this condition, which is always public, probably exerts comparatively little improper influence on purchases. But doubtless it does sometimes influence purchases; and when two or more supply houses compete for an order, and one with whom some relative of one of the road's officers is identified gets it, it is apt to be said by representatives of the rival concerns that the purchases were not made on a business basis, whether there is any ground for the charge or not. This is one of the sources of grafting reports.

Again, a considerable sprinkling of railway officers own stock in railway supply concerns. This does not necessarily lead to the giving of orders to these supply concerns on improper or dishonest terms; but there is no doubt that, being usually secret, it does sometimes have this effect. The notorious frauds in the Illinois Central began in exactly this way. Those concerned in them finally became so reckless, and so hungry for dishonest gain, that they organized a car repair concern of their own, so that they might not have to divide the graft with outside stockholders. The reputations of railway officers generally would be safer, and those who now own stock in supply concerns would subject themselves to less temptation, if those who own such sock would get rid of it. It is hard for any man to serve two masters, and one who holds a railway office which gives him influence over purchases, and owns stock in a supply concern, is bound to be under more or less temptation to serve himself at the expense of the railway which is paying him a salary to serve it only. Even if he does not yield to the temptation his dual connection is likely to give rise to evil and injurious reports about him.

Then, again, there are a few railway officers here and there who accept expensive presents from railway supply men, such as gold watches, automobiles, gowns for their wives, etc., which they know are not given solely out of love and affection, or for philanthropic reasons. And there are even some who buy supplies at excessive prices and divide the excessive part of the prices with the supply concerns from which they are bought, or who accept cash for exercising favoritism in placing orders. Also, there are one or two supply men who get considerable business through habitually losing at poker when playing with railway men. Railway men and supply men assert that these things occur, and give the names of the men and even the amounts involved. They also tell us in circumstantial detail of attempts at blackmail and bribery in connection with the purchase and sale of supplies. The supply men that give the graft and the railway men that receive it usually think that no one suspects them. If a number of them were aware of the detail in which their dishonest transactions are bruited about, and of the evil reputations that they bear where they think they stand best, they would be very much surprised and pained, if not alarmed.

The foregoing indicates clearly enough why reports regarding grafting are constantly in circulation—reports often false, but sometimes true, which hurt the innocent, who are in the great majority, as well as involve the guilty.

It would be a work of supererogation to point out wherein the evil of actual grafting consists. It is simply one form of stealing; and stealing is just stealing, no matter what form it takes. While comment on the morals of such dealings is superfluous, some suggestions as to why it is expedient to stop them will not be amiss. Because of the prevalent attitude of public opinion toward railways, it is more than ever necessary that, if the roads are to get fair treatment from the public, they must be able to convince the public that they are honestly and economically managed. Every disclosure of wholesale grafting, such as those in the comparatively recent Illinois Central and Chicago & Western Indiana cases, and every such report, whether false or true, which appears to have some foundation, tend to make the public believe that the roads are neither economically nor honestly managed—an opinion which as to most of them is very unjust. Most executive officers feel more keenly every day the need for getting and maintaining the management and operation of the properties above suspicion, and are, therefore, making ever greater efforts to keep out dishonesty and to detect and stop it wherever it is found. In consequence, if the grafters will not heed the voice of morals, which tells them that grafting is wrong, they should heed the voice of expediency, which is constantly telling them in louder and louder tones that the danger of getting caught and exposed, and perhaps prosecuted criminally, is steadily increasing.

One of the worst effects of transactions in connection with the buying and selling of supplies which are actually fraudulent, or which are open to misconstruction, is one to which we have alluded already, viz., that when reports about them get into circulation, instead of hurting the reputations merely of those who are dishonest, they create the impression that crooked transactions are common and general, thereby besmirching the names of that great majority of railway men and supply men who are honest.

In view of existing conditions, and of the reports that constantly are getting into circulation, it would seem that the need for greater efforts to avoid not only evil, but the appearance of evil, should be clear to every railway man and supply man. That the conditions that cannot be defended shall be cleaned up, and that those that can be defended shall be defended candidly, courageously and incessantly—these are the two things it is necessary to do in order to create a favorable public opinion regarding railways. As long as either of them is not done by the responsible managements, the agitation and public animosity against them will be constantly reviving, and if they do continue to revive it will be mainly the managements' own fault.

THE INDUSTRIAL RAILWAY SITUATION.

THE attention of railway executive and traffic officers and of regulating authorities is particularly called to the extracts from the testimony of Milton H. Smith, president of the Louisville & Nashville, in the case of the Manufacturers' Railway of St. Louis, against the St. Louis, Iron Mountain & Southern, et al, which are published elsewhere in this issue. It is not practicable to print the whole of Mr. Smith's testimony, for it fills 160 pages of stenographer's notes. His observations on railway conditions, the relation of rates to competition and rates for the development of industries are of great interest, but we have been obliged to confine our extracts to those relating directly to the important question of allowances to industrial railways and their bearing on unfair discrimination.

The *Railway Age Gazette* repeatedly during recent years has called attention to the fact that unfair discrimination is not dead, nor even sleeping, but is still alive and very much awake, numerous evidences of which may be found by those who will seek them in the published tariffs. Mr. Smith has candidly and forcibly called attention to one existing form of discrimination. He pronounces many of the allowances now made to industrial railways illegal, and declares the continuance of many unfair arrangements is due to the use of the boycott by large shippers to whip into line railways that do not give them the unfair concessions that they demand; to excessive competition between the roads themselves, and to "incompetent management of railways." In an editorial in our issue of February 9, page 227, we mentioned the heroic means the Interstate Commerce Commission has adopted in one case to put a stop to the giving of excessive divisions of rates to an industrial road in the Southeast, as an example of the way in which the commission sometimes tries to help the roads free themselves from certain of their embarrassments. The testimony of Mr. Smith is a good example of what railway men may do to help the commission to remedy bad existing conditions.

At the first hearing in the Manufacturers' Railway case, after testimony had been given for that railway, counsel for the trunk lines let the case go to the commission without testimony from their side. Perhaps this was because officers of the individual roads feared to tell what they thought and knew lest the result would be retaliation by the Anheuser-Busch Brewing Association in the giving of its traffic; and the explicit statement by George F. Moore, president of the Manufacturers' Railway, in his recent testimony (See *Railway Age Gazette,* February 16, page 269), that "the line that paid the allowance would get the business if there was not any hope for reparation," shows that such fears were not without justification. The course of the railways at the previous hearing was a mistake—an indefensible, but not unprecedented, mistake. Their officers not infrequently have shown similar pusillanimity in dealing with big shippers. The error made at the former hearing has not been repeated at

the second one. No one can read Mr. Smith's testimony without learning that here is a railway executive officer who has the courage and wisdom to tell the truth as he sees it about the existing relations between the trunk lines and industrial railways, even when his conception of what is the truth makes it necessary for him to say that some of these relations are criminal. It is to be hoped that the Louisville & Nashville is not the only road which dares introduce testimony in this proceeding, but that, on the contrary, all the railways concerned will do so and will seek to get a decision from the Interstate Commerce Commission which will establish correct principles regarding the allowances which the railways may and may not pay to industrial railways. And it is to be further hoped that when the commission has established these principles the railways all over the country will have the good sense to live up to them.

THE INTIMATE STORY OF A STRIKE BILL.

AT Trenton, N. J., on Tuesday last, there was a public hearing before the Senate Judiciary Committee on two bills introduced by State Senator Fitzherbert "by request." The exposure of the crudely attempted hold up in connection with these bills should be of widespread interest to railway men, notwithstanding the fact that the bills themselves had almost no chance of passing and in any case affected only a comparatively few roads.

At the judiciary hearing it was claimed a representative of the Commercial Acetylene Company was approached by a Dr. Ridner and told that certain legislation would shortly be introduced in the New Jersey legislature that would very much hurt the acetylene company. Ridner offered to put a stop to anything that might be done. When pressed for details he later showed a typewritten copy of a bill which would prohibit railways from using acetylene on any of their trains in New Jersey, and apparently would forbid its use even for lighting stations. The acetylene company refused to do anything until the bill was actually introduced, and shortly after this a bill claimed to be identical with the one shown by Dr. Ridner was introduced. A typewritten draft of a second bill was brought to the same representative of the acetylene company which prohibited the manufacture of acetylene within 2,000 ft. of any building, road, factory, etc. Some of the provisions were so absurd as to make its passage in any legislature wholly unlikely. Later, however, a modified form of this second draft was introduced as Senate Bill 110 by the same senator who had introduced the other acetylene bill.

Both bills were referred to the Judiciary Committee and a public hearing was given on Tuesday. Senator Fitzherbert claimed that he had known nothing of the hearing until Tuesday morning. Attorneys for the Central of New Jersey and the Delaware, Lackawanna & Western were there as was also Mr. Ostby of the acetylene company. Senator Fitzherbert said the bills had been given him by someone, and made a mumbled explanation that he had heard somewhere that acetylene might be dangerous in railway wrecks. When asked for details he confessed to knowing nothing. He was the only advocate of the bill.

Mr. Ostby then told of the visits of Dr. Ridner and of how, eventually, he had named a price of $1,500 to kill both bills. Two witnesses and a stenographer were secretly present at this interview and the stenographer had taken down parts of the conversation. This was on February 13.

On Saturday, February 17, a New York *Evening Sun* reporter got an appointment with Senator Fitzherbert himself, claiming that he was a friend of Mr. Ostby. The interview was at Fitzherbert's house at Dover, and the *Sun* reporter told Fitzherbert that while the Commercial Acetylene people were willing to pay to have the legislation stopped, they wanted to deal with someone more reliable than Dr. Ridner. He asked Fitzherbert if he himself would not take $5,000 and divide it up so that the legislation would be stopped. Fitzherbert said that Ridner was a good man, and at first refused to handle the money himself. Later, however, the *Sun* reporter claims that he agreed to do it for $5,000.

Mr. Ostby then told the committee that on the night before the hearing he and the same *Sun* reporter saw Fitzherbert in Trenton on the pretext that Mr. Ostby wanted to try and beat him down from the $5,000 to something nearer the original $1,500 mentioned by Ridner. Failing to do this, Mr. Ostby said that he promised to get the $5,000, and that Fitzherbert agreed to accept it and kill the bill.

Fitzherbert in "defending" himself, after Mr. Ostby had told his story, acknowledged that both the Dover and Trenton interviews took place in substance as described *except* that he (Fitzherbert) did not agree at either time to accept any money himself, but that he simply told the reporter or Ostby to go to the backers of the bill and offer them the money, and that he said he thought they would accept it. He acknowledged, however, that the sum of $5,000 had been mentioned.

This case is flagrant, but in its underlying essentials not unlike many which railway officers are confronted with. A few such cases publicly exposed would clear the atmosphere and teach the constituents of legislators something. A railway officer can make out a case as strong as the one we have described if he will follow it through, and he should do so, not only in the immediate interest of his company, but for the sake of his own self respect and the health of the body politic.

IMPORTANT BRIDGE DEVELOPMENT IN THE SOUTH.

THE construction of a bridge across as large a river as the Mississippi or Ohio is of interest at any time, and especially so when across the lower Ohio, or the Mississippi below Cairo. The statement was given out during the past week that negotiations are practically completed for a bridge to be built across the Ohio river near Paducah by the Chicago, Burlington & Quincy, the Louisville & Nashville, the Chicago & Eastern Illinois and the Illinois Central. This followed closely the announcement that the Chicago, Rock Island & Pacific plans to construct a bridge across the Mississippi at Memphis. These announcements indicate the importance of the development promised in north and south routes in connection with the completion of the Panama canal. The small number of such important routes at present and the difficulties of such bridge construction across the lower Mississippi are indicated by the absence of such structures. The Cairo bridge of the Illinois Central is the only crossing over the Ohio river below Evansville, Ind. The present Frisco bridge at Memphis is the only structure now crossing the Mississippi river south of Cairo, and, with the exception of the Thebes bridge, completed seven years ago, is the only bridge crossing the river in the 800 miles south of St. Louis, in marked contrast to the number of crossings north of this point. Because of the heavy outlay required in the construction of such a bridge, car ferries are operated on the lower Mississippi at several important points where a large amount of traffic is handled, as at Vicksburg, Baton Rouge and New Orleans.

One of the conditions imposed by the government for bridges crossing these rivers is a long channel span averaging about 700 ft. in length. The principal traffic on the lower Ohio and Mississippi consists of fleets of coal barges from the Pittsburgh district. These fleets are hard to manage, and even with long spans across the channel accidents frequently occur, resulting in the fleet breaking up. For this reason the navigation interests are insistent in demanding long spans. Also because of the volume of navigation on the Ohio and lower Mississippi all bridges are built enough above high water to pass the largest steamers in order to eliminate draw spans. As the variation in level between high and low water is great, especially on the Ohio, a high and expensive substructure and expensive approaches are required. South of Cairo the annual flood period is prolonged, as the Ohio floods occur earlier than the upper Mississippi and Missouri floods, thus introducing their special construction difficulties below Cairo.

One of the serious difficulties encountered on bridge work on the lower river is the absence of the rock foundations found further north, making it necessary to base the structure on the alluvial strata. The Frisco bridge at Memphis rests on water tight clay 150 ft. deep, underlaid with an indefinite depth of saturated sand and gravel. The piers for this bridge extend 96 ft. below low water line, while the foundations of the Cairo bridge extend 75 ft. below low water.

The present Frisco bridge was built by the Kansas City, Ft. Scott & Memphis in 1882, and affords entrance into Memphis for all the roads coming from the Arkansas side, including the Frisco, the Rock Island, the Iron Mountain and the Cotton Belt. The demand for the construction of the Paducah bridge originated with the extension of the Burlington to Metropolis, Ill., two years ago, and the inauguration of through freight service between St. Louis and southern points by way of Metropolis and the Louisville & Nashville. The Illinois Central has maintained a car ferry at this point a number of years. It is understood that this road has now become a party to the construction of the bridge, and will do away with the ferry. The construction of these new bridges across the Mississippi and Ohio will be watched with much interest by railway men because of their part in the opening of new southern routes, and also because of the engineering difficulties which will be encountered.

PERE MARQUETTE.

THE difficulties of making a good financial showing for the Pere Marquette in the fiscal year ended June 30, 1911, were, apparently, insurmountable. These difficulties are the result of the past history and financing of the road and of its physical location, and to the fact that, competing with other roads on through traffic, notably the Michigan Central, it is at a great disadvantage. In 1907 the road was put into the hands of a receiver, after the breakdown of its affiliation with the Cincinnati, Hamilton & Dayton. Quite inadequate sums had been spent for upkeep, and the receiver found it necessary to make considerably larger expenditures for maintenance. The company was reorganized in December, 1907, under the direction of J. P. Morgan & Co., and put directly in charge of William Cotter, who had been the road's general manager under the receiver.

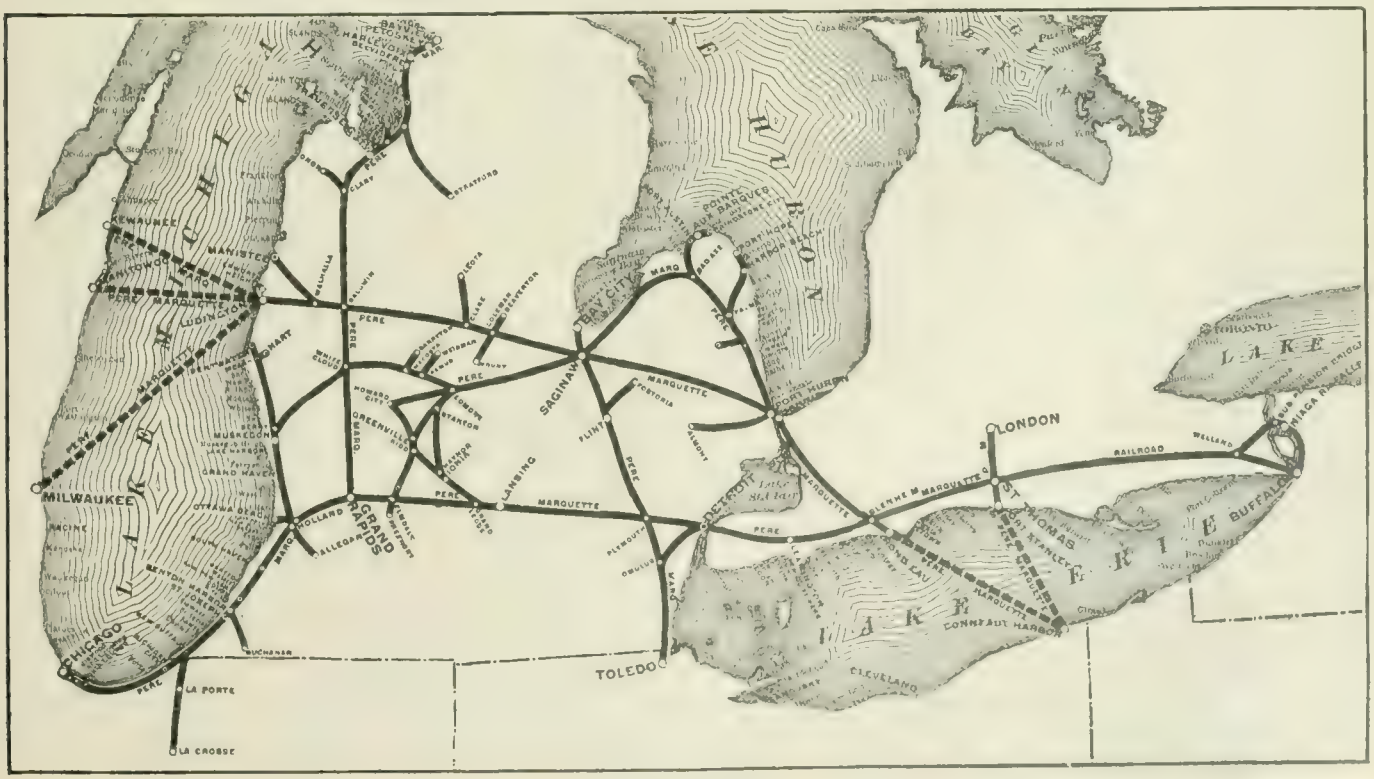
While the property had been improved physically, and important operating economies had been carried out, the reorganization, from the financial standpoint, was not drastic and the company was left badly in need of money.

The Pere Marquette operates over 2,000 miles of line in Michigan and has trackage rights which give it a connection both with Buffalo and with Chicago. For through traffic, however, between these points, it has to compete not only with the Michigan Central and the Lake Shore and other roads, but labors under the disadvantage of having no eastern connections nor any western connections. To have the faintest hope of competing for through business, service must be high class and, therefore, expensive. On the other hand, the Pere Marquette has a very considerable mileage in Michigan through thinly populated territory where, although it has no competition, it has such a light traffic that the operating ratio on these lines is high.

As an independent and competing road, with its present capitalization, it is not at all surprising that in the fiscal year ended June 30, 1911, the company showed a deficit, after the payment of interest and rentals, of $1,800,000. This deficit was due to very slightly smaller gross revenues, an increase of $1,770,000 in operating expenses, an increase of $194,000 in interest and rentals, and an increase of $427,000 in the net cost of hire of equipment.

Freight revenue in 1911 was less by $366,000 than in the year before and totaled $10,766,000. Passenger revenue, on the other hand, was greater in 1911 than in 1910 by $232,000, and totaled $3,939,000.

While the average length of haul per ton of freight remained almost the same in 1911 as in the previous year, and the average revenue per ton per mile decreased only from 5.91 mills in 1910 to 5.79 mills in 1911, the number of tons of revenue freight carried was less by 181,000 tons and totaled 10,346,000 tons. The two most important decreases in tonnage of freight were due to a falling off of 105,000 tons in the tonnage of products of forests and to a falling off of 133,000 tons in the tonnage of manufactures carried. Of the total tonnage of the Pere Marquette products of mines in 1911 furnished 39.31 per cent.; products of agriculture, 17.79 per cent.; products of forests, 14.59 per cent.; manufactures, 10.74 per cent.; merchandise, L. C. L., 7.99 per



Pere Marquette.

cent.; miscellaneous, C. L., 7.20 per cent., and products of animals, 2.38 per cent.

Mileage and traffic statistics show that it was through no fault of the operating department that a deficit was shown in 1911 as compared with a small surplus in 1910. The number of tons of revenue freight per loaded car was 17.84 in 1911, as against 17.83 in 1910. The average revenue train load was 320 tons in 1911, as against 323 tons in 1910. With a decrease in tonnage carried, there was a corresponding decrease in the miles run by loaded freight cars, but a rather large increase in empty freight car mileage, due presumably to traffic conditions and the falling off in tonnage of commodities, the tonnage of which commodities had heretofore helped to balance traffic.

Figures for passenger business bear out the comments of Mr. Cotter that the passenger business in Michigan has been increased on the Pere Marquette not because of any stimulus given it by the Michigan two-cent fare law, but by additional service put on by the road. Passenger revenue totaled $3,939,000, an increase of $232,000; and the number of passengers carried amounted to 5,745,000, an increase of 112,000; the average haul remaining about the same in 1911 as in 1910. The mileage run by passenger cars, however, totaled 17,632,000, or 987,000 miles more in 1911 than in 1910.

The increase in passenger car and train mileage, together with the wage increases for trainmen, etc., explains the considerable increase in cost of transportation. In 1911 transportation expenses totaled $7,292,000, an increase of $921,000 over 1910. Despite, however, the increases in these expenses, apparently no attempt was made to make a good showing at the expense of proper upkeep. Maintenance of way and structures cost $2,123,000 last year, an increase of $191,000; and maintenance of equipment cost $2,551,000, an increase of $433,000. Even now the standard of maintenance is not high on the Pere Marquette, although as is quite evident, fully as high as the earning power of the road will at present justify. About 108 miles of main track were laid with new rails, mostly 75-lb. section. There were a little over 200 ties used in renewals per mile of main track.

The annual report of the company gives a very straightforward, simple statement of what has been done in the way of improvements, too numerous to go into here, but which show that very careful attention is being given to increasing the efficiency of the plant.

The Pere Marquette has put in telephone circuits for train despatching between Detroit and Grand Rapids, Ludington and Saginaw, and Grand Rapids and Porter. This, together with the mileage heretofore equipped with telephones for train despatching, makes a total of 562 miles so operated.

At the beginning of the year the company was badly in need of money. During the year $8,000,000 5-year 6 per cent. collateral trust notes of March 1, 1911, were sold at a discount of 5 per cent. The company used $4,549,000 of the proceeds of this note sale to pay maturing obligations and to pay off its floating debt which, at the beginning of the year, amounted to $1,550,000. It also spent $1,900,000 for improvements, among which may be mentioned 37 miles of double track between Alexis and Romulus; change of line between Alfred and Union Pier, about six miles, which eliminated 360 deg. of curvature and reduced the grade from 0.9 per cent. to 0.5 per cent.; began work on a new 43-stall roundhouse at Grand Rapids and a 20-stall roundhouse at Saginaw, converting the old roundhouse at Grand Rapids into a boiler, tank and blacksmith shop.

At the end of the year the company had on hand $1,915,000 cash working capital and no loans and bills payable. However, on July 1, 1912, there are $5,000,000 Pere Marquette debentures due, and on March 1, $650,000 equipment notes due. The debentures are provided for under the $60,000,000 improvement and general refunding mortgage, but the company would still have to find a market for the improvement bonds, of course.

It would seem that the solution of the Pere Marquette's difficulties would probably be worked out by its becoming affiliated with some other railway company. At present its control, it is understood, is held either by J. P. Morgan & Co. directly, or by George W. Perkins, who is chairman of the board, and who was until recently a member of the Morgan firm. It has been rumored that Newman Erb has been negotiating for its purchase with the object of consolidating it with some of the other lines in which he is interested. Whether or not these negotiations have been carried out it is not definitely known. A study of the map of the property readily suggests that while, as an independent line, without adequate credit, it could not be considered a very valuable property, it might be for some other connecting road a quite valuable investment.

The principal figures for operation in 1911 as compared with 1910 are as follows:

	1911.	1910.
Mileage operated	2,368	2,365
Freight revenue	$10,765,545	$11,131,076
Passenger revenue	3,939,391	3,707,311
Total operating revenue	16,523,762	16,542,271
Maint. of way and structures	2,123,297	1,932,437
Maint. of equipment	2,550,859	2,117,700
Traffic expenses	467,790	420,298
Transportation expenses	7,292,092	6,370,632
Total operating expenses	13,470,965	11,698,842
Taxes	664,770	755,641
Operating income	2,388,027	4,087,788
*Gross corporate income	1,981,927	4,070,968
Net corporate income	†1,813,761	‡469,713

*In both 1911 and 1910 hire of equipment debt more than offset other corporate income.

†Deficit.

‡Surplus.

NEW BOOKS.

Electric Traction and Transmission Engineering. By Samuel Sheldon and Erich Hausmann. New York: D. Van Nostrand & Company. Illustrated. Cloth, 307 pages, 5½ in. x 7¾ in. Price, $2.50.

Professor Sheldon is well known as the author of two books on Dynamo Electric Machinery, which have been so well received that an eighth edition has been found necessary. The present volume has equal merit, being one of the best books on the engineering of electric traction thus far published. While intended primarily for the university student, it will be found useful to the practicing engineer who is well grounded in the mathematics relating to his profession. The treatment is remarkably concise, and this feature has been carried to such an extreme limit that it will bear some amplification in future editions. This could be accomplished without increasing the size of the volume by the use of smaller type, a slightly closer spacing and, perhaps thinner paper. The portion relating to electric locomotives is, perhaps, too brief. The author has wisely avoided any suggestion of bias in favor of any particular system of electric traction, but has clearly described the characteristic of each, leaving the reader to select that which seems best adapted to his purpose. The use of hyperbolic functions in connection with problems relating to transmission lines is clearly explained and their application illustrated by examples. The book attempts to present a perspective view of the design of a complete railway installation from the cars to the power station, to indicate the nature and sequence of the various problems thus involved, and to suggest and illustrate methods for their solution. It is unusually well printed, and the numerous diagrams are remarkably clear and satisfactory in every way.

The first six chapters relate to cars and their equipment, tractive effort and train resistance, motor characteristics, speed curves and motor control. There are three chapters on the distributing system, substations and transmission lines, and the concluding chapters relate to power stations, steam and hydraulic. There is little descriptive treatment of specific forms of apparatus or structures, as the aim has been to explain principles and laws, and to illustrate them by numerical problems.

Letters to the Editor.

RAIL FAILURES AND CAR TRUCK DESIGNS.

Pittsburgh, Pa., February 19, 1912.

To the Editor of the Railway Age Gazette:

Much has been said lately in newspapers and technical journals regarding the character of rails and the reason for rail failures. In an editorial on page 267 of the *Railway Age Gazette* of February 16, 1912, it was stated that the Lehigh Valley rail was not subjected to excessive wheel loads, citing 28,000 lbs. as the maximum engine wheel load, and loads on car wheels much less than that. With no apology for defective rails, such as the Lehigh Valley rail was found to be, the writer would like to call attention to conditions that exist today on all railways having modern freight equipment.

A 50-ton capacity car weighing 45,000 lbs., carrying a load of 110,000 lbs. has a total weight of 155,000 lbs. on the wheels, or 77,500 lbs. on each truck. Such a car carried on the usual center bearing truck with side-bearings located about in line with the wheels is often seen rocking from side to side after having passed over a rough place in the track, such as a high or low joint or a frost heaved section. This rocking or rolling is very noticeable in a train of cars having high bodies with their consequent high centers of gravity, each car rocking in the opposite direction from the one next to it. The rocking is produced by a change in elevation of the wheels on one side of one truck, relative to the plane of the track under the remainder of the wheels. Such a change causes the load to be transferred from the center plate to the side-bearing on the high side of the track, compressing the truck springs by the excessive load. The spring recoil throws the car body back and over to the other side bearing, compressing the truck spring underneath it. Such a motion when it has been started is at times accelerated by unavoidable track conditions until derailment occurs; but, disregarding such extreme cases an analysis of the stresses set up by the alternate transfer of the load from side to side shows very heavy wheel loads.

The 77,500 lb. truck load referred to above is the static load, which when thrown from side to side places the whole of it alternately on each side bearing and on the two wheels in line with the side bearing. The M. C. B. class D group of springs is compressed solid with a load of 64,000 lbs., and the impact due to solid contact may double or quadruple the static load and cause each wheel to strike the rail with a blow of from 75,000 to 150,000 lbs. Nor is this all—a train of 50 cars repeats this blow 200 times in passing a given point. Should we marvel then that rails break, or that wheel flanges fail?

The railways and car builders have gone on year after year increasing the load in the car, from a 10-ton car of a few years ago until now 50 tons is the common load, and 60, 70, and in some cases 100 tons are handled with the consequent increase in the height of its center of gravity. What have we done with the car truck to take care of the changed conditions? It is a Chinese copy, in principle, of the trucks for 10-ton cars, increased in weight but disregarding the effect of tossing such loads from side to side.

We want rails made of the best material, and every care taken to discard defective ones, but the chief fault is in the rolling stock. The hammering blows from side to side are wholly unnecessary and can be prevented by a truck design which will carry the car over our worst twisted and uneven track without rocking the car, and without concentrating its load on half of the wheels. It can be done. It is done in a simple and effective manner. There are trucks in use under rigid body construction carrying 50-ton loads and distributing the load over all of the wheels all of the time. Why not relieve the cause instead of attempting to "strengthen up" in an endeavor to take care of the effect? Change truck specifications. E. W. SUMMERS.

SUGGESTED MODIFICATION OF RULE NO. 210.

San Francisco, Cal., January 30, 1912.

To the Editor of the Railway Age Gazette:

It is generally admitted that the present method of handling trains by telegraph is cumbersome, and, with the increase of traffic, a cause of serious delay. The train wire is so congested that considerable of the time of operators is lost watching for a chance to report trains, and frequently reports are held back until the despatcher calls for them. It is impossible for a despatcher to do good work unless his record of trains is kept close up. Otherwise he must work without information that would be valuable to him in making meeting points.

Rule No. 210 reads:

"When a 31 order has been transmitted, operator must (unless otherwise instructed), repeat it from the manifold copy, in the succession in which the several offices have been addressed, and then write the time of repetition on the order. Each operator receiving the order should observe whether the others repeat correctly."

I suggest that the rule be modified to read as follows:

"When a 31 train order has been transmitted, operator designated by the despatcher will repeat it at once from the manifold copy. Other operators receiving the order will closely observe the repetition, so as to detect any error. When the order has been repeated by the operator designated, each operator, who has been required to copy the order, shall, in the succession in which the several offices have been addressed, give the train or trains to which the order is addressed at their station, and give O. K. with name of operator copying the order."

The same modification would also apply to Rule No. 211. The advantages to be derived would be very considerable. At present when an order is sent to four offices, each operator is required to repeat it; which in the case of a schedule order frequently requires twenty to thirty minutes and in many cases longer. All other work on the train wire is at a stand still, the despatcher loses close touch with trains and a congestion results that it frequently requires hours to relieve.

I do not think we would sacrifice any element of safety by adopting the modification suggested, but on the contrary would add to it; and I feel sure that we would increase the efficiency of the despatcher 100 per cent.

Under Rule No. 210 as it now reads it is expected that all operators to whom the order is sent will listen to the various repetitions for the purpose of noticing any errors. It is well known to most of us that very little attention is given to the repetition of orders by others, each operator depending on the despatcher to insure correctness in his copy. When the responsibility is put on an operator he will know his copy is correct before signing and giving O. K. for an order.

I do not know that I would recommend this modification of rules except on track equipped with automatic block signals. The railways of this country have spent millions of dollars in the construction and maintenance of block signals, and while great benefits have been derived from them I feel we have not made as much use of signals as we are justified in doing in the operating of trains. DESPATCHER,

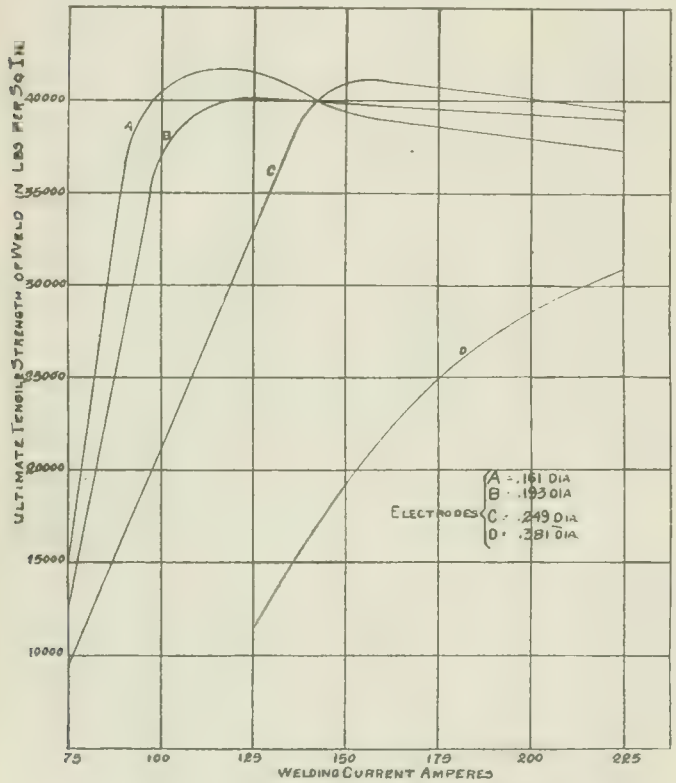
Southern Pacific Company.

A supplementary contract has been made to the original Avalos-Keilhauer Railway contract of June 3, 1908, which provided for the construction of a railway from La Union, in Salvador, to connect with the Guatemala Railway, at some point on the Guatemalan frontier. It is understood that the arrangements entered into by this supplementary contract have eliminated certain objectionable features which the contract of 1908 was considered to contain. The new contract provides a new method of meeting the payments of the subvention of $11,000 per mile, which was granted in the original contract, and makes various modifications regarding the collection of wharfage by the contractor, and the construction of fences along the railway.

ELECTRIC WELDING.

In a paper presented before the New York Railroad Club, Friday, February 16, O. S. Beyer, Jr., of the mechanical department of the Erie Railroad, spoke of the uses of electric welding in railway work. The resistance type of electric welding has its greatest application in the industrial field, but may be used to good advantage in certain cases of railway work. It consists of clamping the two pieces firmly together and passing an electric current through the joint, the resistance of the joint creating sufficient heat to do the welding. This system is used in railway work for welding rails together by means of two fish plates located one on each side of the web at the joint, and in welding certain parts of steel passenger cars. It could also be successfully used in spot welding the Russia iron engine jackets on locomotives.

The arc type of welding uses the electric arc for the heating. There are three methods used in this system; one of them consists of jumping an arc between two carbon electrodes and pull-



Curves Showing the Effect of Current on Strength of Weld.

ing the arc to the portion to be welded by a magnetic flux which acts similar to an ordinary blow pipe. The repair material is placed in the weld as chips and fillings, or is applied with a metal pencil, the heat of the arc melting and fusing it to the object to be welded. The second method is drawing an arc between the material to be repaired and a carbon electrode, fusing the materials as in the first case. This latter method, however, tends to make the weld hard and brittle, on account of the carbon that is carried into it from the carbon electrode. This method has been used in steel mills and foundries to some extent, but has not been found very practical in railway work. The third method in arc welding is that of making the repair material the electrode. In this way particles of the electrode are fused and carried to the part to be welded and by hammering intermittently a good solid weld is procured.

This new method was first introduced by Slavinoff, whose system required large current, reaching in some cases as high as 4,000 amperes. A modification of this system was perfected by Siemund in Germany and is known as the Siemund-Wenzel electric welding process. The current never exceeds 150 amperes and usually ranges between 120 and 130. This tends to make the melted particles very small, detaching themselves in a rapid stream and following the arc and adhering to the spot on the work over which the arc comes. This method of electric welding has found very successful application in the repair of locomotive fireboxes, mud rings, machinery parts, wheel centers, tires, iron and steel castings, and many similar parts. Broken flue sheet bridges and complete sets of flues have been welded with success. The following table gives the comparative costs of working with this system and by following the usual methods of making the repairs:

Locomotive Parts Repaired.	Cost by Electric Welding.	Cost of Usual Method.
Two locomotive frames	$11.80	$56.20
Driving wheel tire gouged to a depth of 3/16 in.	.72	8.00
*Cracks in side sheets of firebox	66.51	342.62
Hole in knuckle joint of parallel rod	.75	7.50
*Cylinder casting	22.65	367.15
Spoke in driving wheel	3.38	4.58
Mud ring as shown in illustration, 74 cu. in. of metal added	32.07	118.06
*Side sheet seams in firebox	56.40	777.18
*Cracks in firebox	22.11	800.68
*Valve rod guide key-way	.83	5.53
Rocker arm crack at bosses	2.93	6.13
Cracks in cylinders	2.90	3.50

*These parts would have had to be replaced.

NOTE.—The last five items were taken from an article on Electric Welding in Railway Shops by Mr. Beyer in the February issue of the *American Engineer*.

A claim that the saving on boiler work for this process or any other process of autogenous welding is the difference between the cost to renew the sheets and the cost to do the welding is not just. At best the welding has prolonged the life of the sheets a year or two, possibly. The repaired parts are not equal to brand new parts.

Complete sets of flues have been welded to the back flue sheets of several engines and the engines have been returned to service. Close observation of these engines indicates that the work in the engine house to keep the flues tight is considerably reduced. Three months' service of a few engines is too short to look for ultimate results. The indications, however, are that by the use of electric welding in flue applications, a step in advance in boiler construction and maintenance has been made. Add to this what will be gained by electrically welding all firebox and mud-ring seams, while the boiler is being built, and the proper maintenance of locomotive boilers may be considerably simplified from its present perplexing state.

DESCRIPTION OF PROCESS.

The following description of the Siemund-Wenzel process is taken from the February issue of the *American Engineer* in preference to the one used in the Railroad Club paper.

"It employs direct current supplied at potentials of 20 to 30 volts at the arc and 50 to 80 volts at the generator terminals. One lead of the welding circuit is attached to the welding clamp which holds the welding material—pencil or electrode. The current is furnished by a generator usually direct connected to a motor, properly wound for the current and line voltage available at the place of installation.

"An electric arc about 3-16 in. to ¼ in. long is sprung between the welding material or pencil and the object to be repaired. The voltage is regulated until the current is of the proper amount to suit the work in hand. The spot on the surface of the object being welded, where the electric arc strikes, is instantly brought up to a state of incipient fusion, and minute molten particles of the pencil or electrode detach themselves progressively in a continuous rapid stream, and, following the arc, attach themselves securely at the spot where the arc strikes. This proceeds very uniformly until either the arc is interrupted or a sharp fluctuation in current takes place.

"About every minute or so the actual welding operation is stopped while the operator subjects the local heated area of the

weld which he is making to rapid blows from a small hand hammer. The object of this is primarily to force out any minute portions of oxide or slag that may have formed due to the presence of impurities or improper manipulation. It is also done with the object of working the metal of the weld, and to close up any small pin holes that may have formed. The repairing material is applied until the chipped and V'd out portion is entirely filled up, and then an additional amount is applied for reinforcement. This works out very satisfactorily since the additional material added adheres as securely as the material which is part of the direct weld, and thus serves to reinforce in direct proportion to the section of the material added. Consequently there is no reason why a weld thus reinforced cannot be made as strong, or even stronger, than the original material. In practice it is found desirable to reinforce welds of this nature sufficiently to make their tensile strength about equal to the tensile strength of the original material.

"The arc and the molten particles of material are guided by a magnetic flux which originates in the electrode holder. The welding current is led around the handle of the holder through a heavy series coil in such a way that a strong magnetic current is set up which travels through the pencil and in the direction of the arc. The presence of this magnetic current assists greatly in causing a very rapid deposition of the repairing material and makes overhead welding possible and perfectly practical. Without this magnetic current, overhead welding could not be done with any degree of certainty as to the results. The magnetic current also increases the strength of the weld owing to its concentrating influence and the cooling effect on the arc. It prevents oxidization of the molten particles while in transit and the formation of slag and pin holes that sometimes form in the weld.



Mud Ring Defect Repaired with 74 Cu. In. of Material.

"The welding pencil consists of a very pure grade of Swedish iron of a definite cross sectional area. It has been determined by careful laboratory research that the quality of the repairing material and the pencil diameter have a decided influence on the properties of the weld. A definite relation exists between the size of the pencil, the amount of the current, and the tensile strength of the weld. Hence the quality of the material and the size of the pencil must be carefully selected."

The curves *A, B, C* and *D,* which are reproduced from Mr. Beyer's paper before the New York Railroad Club, shows the effect of the current on the strength of the weld made with electrodes 0.161 in., 0.193 in., 0.249 in., and 0.38 in., in diameter. The current must be just right for each size of electrode, for if too great it will over heat both the particles and the work and burn them. If it is too small the particles and the work will not be hot enough to make a good weld. The operator will find it easy to determine the proper current.

Mr. Beyer in the *American Engineer* article stated that:

"In order to prevent oxidation and the consequent formation of slag, and also to provide certain ingredients which affect the welding material chemically and so benefit it physically by making it soft and ductile, the welding pencil or electrode is covered with a flux. When the welding operation is carried on, the flux melts and vaporizes, enclosing the molten particles and the arc to the exclusion of atmospheric oxygen which attacks the repairing material in its fused state, and thus improves the quality of the weld."

Description of Apparatus.

The following description of the apparatus is taken from the *American Engineer* article:

"The electric welding installation consists of a motor generator set, the necessary control apparatus, measuring instruments and protective and steadying resistance. The motor generator is provided to convert the standard current available into direct current at voltage suitable for welding. Hence the motor may be either of the direct or the alternating current type. The generator is wound to furnish a maximum constant output of 200 amperes direct current at a range in potential of 50 to 80 volts. This range in voltage is secured by varying a resistance in series with the field circuit. A variable rheostat for this purpose is mounted on the slate switchboard so that it may be conveniently manipulated by the operator.

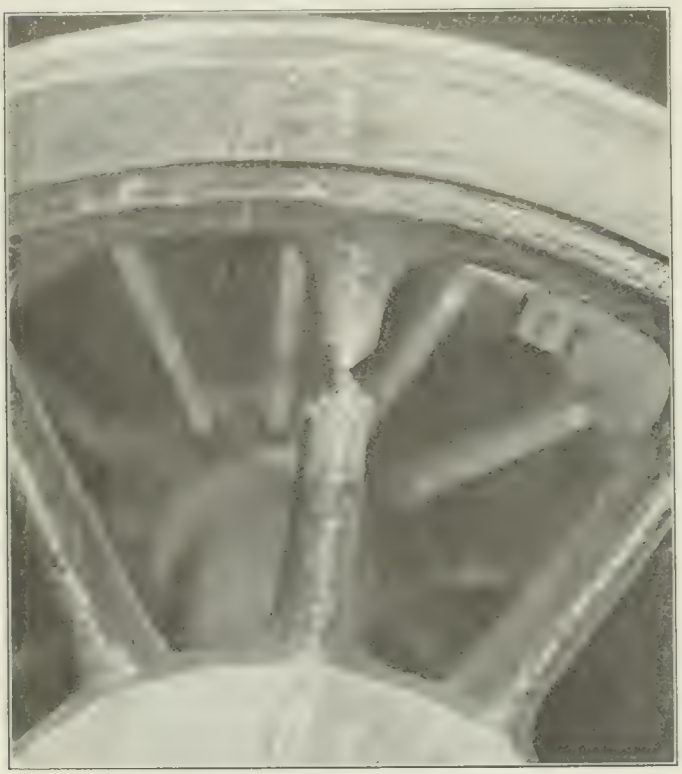
"A second resistance is placed in one leg of the welding circuit in such a position that when the generator is short circuited at the instant of striking the arc the resistance acts as a protection to the armature and commutator of the generator by limiting the maximum current possible at a maximum voltage to the greatest permissible instantaneous overload capacity of the generator. Another resistance is provided which is automatically thrown in series with the above resistance and across the terminals of the generator the instant the welding arc is interrupted. Together these two resistances serve as a secondary or temporary load on the generator when the welding operation has ceased. The instant the welding is started again, this latter resistance is automatically cut out. These two resistances are so proportioned that the load which they impose upon the generator equals the load imposed upon the generator when the welding operation is under way. In this way violent fluctuations of the load on the motor generator are avoided. Furthermore, this particular arrangement results in the best welding work. The closer the regulation is maintained and the more constant the generator voltage is, the less the likelihood of pin holes and defects being found in the weld.

"An ammeter and a voltmeter, which are both connected to the welding circuit, are mounted on the switchboard. These instruments serve the purpose of indicating the amount of current and the voltage of the welding circuit. The welding clamp or holder consists of a wrought iron handle, properly insulated, around which is wound a coil. This coil in turn is insulated from the hand by a leather covering. To one end of the coil is attached one of the leads of the welding circuit; the other end of the coil is attached to the holder near the base of the clamp. The clamp consists of a projection from the holder and a piece of spring steel, so fastened together that the combination serves to hold the welding pencil or electrode rigidly. The entire welding outfit is mounted on a substantial base, which is made up of standard rolled steel sections. For the machines now being built, this base is of cast iron with suitable projections on the back to which are fastened the banks of resistance which are part of the installation. The slate switchboard with its terminal lugs, fuses, switches, motor starting box, electrical measuring instruments, contactors and relay, is mounted on an angle

iron frame securely fastened to the bed of the motor generator set and the machine housings. In this way a firm and compact arrangement is secured. The outfit should be surrounded by a rail to prevent accidents.

"An electric welding installation, such as described above, is capable of furnishing sufficient electricity for one welder at a time. The welding lines are brought from the switchboard to any place desired in the shop. In fact, a main, or several main welding circuits may be installed throughout the shops with occasional taps so arranged that it is only necessary to attach limited lengths of flexible welding cables to the main circuit at the taps and run these to the places where the welding work is to be done."

Discussion.—The discussion at the New York Railroad Club's meeting was rather brief and was opened by a statement covering the wide range of the work that can be done by electric welding and the savings effected by it. In general terms it was claimed that where the apparatus could be kept busy all of the time the saving would average at least $500 a month. In the use



Cracked Driver Spoke Ready for Welding.

of the resistance system of welding, its value as a means of welding girder rails in street railways was commended. The joints so produced generally are impossible to detect. Welds were made in rails where the flanges were broken away from the end of the rails and the tops were so closely drawn and held together that the actual joints could not be found. The work held until the rails were so worn that they were renewed. The formation of the joint is such that the only essential point in making it is to have the heads of the abutting rails in contact. Under working conditions these points are in compression and the welding bar is in tension and this has ample strength to sustain the imposed stress.

Information was asked regarding the methods to be used in welding locomotive frames. Attempts at this kind of welding had been generally unsatisfactory although some claim it can be done successfully. In this work the frames are subject to intense heat for a long time which burns and oxydizes the metal and though the outer surface may seem sound and in first-class condition, the interior is generally rotten. It would be interesting to have some of the locomotive frame welds cut up to determine the condition of the interior. It has been found that where large sections are handled the metal was sound and homogeneous to a depth of an inch or so, but that below it was bad. This flowing-in process, however, could probably be successfully used to build out flat spots on steel wheels and thus avoid the expense and loss of metal due to turning.

Attention was called to the character of the metal which was cast. It could not be called cast iron because it lacked the amount of carbon characteristic of that metal. Nor could it be classified as cast steel as ordinarily known because it did not have the same structure and yet its structure was that of a cast metal and any work put on it in the way of hammering would be for its improvement. It was claimed that by using an electrode of high carbon steel that strength of the weld would be increased. The method of welding tubes in the sheet shown by the author was criticised. He showed a bead built up about the projecting end of the tube and serving to fasten that projection to the tube sheet, a ferrule being used as usual. It is well known that the bead on a tube is the most troublesome part of its anatomy, and, so why perpetuate it where it is unnecessary? It was suggested that a better plan would be to set the tubes with their ends flush with the face of the tube sheet, dispense with the ferrule and weld direct to the sheet. This had been done with notable success on some Mallets for western roads.

The question was asked as to the method of consecutive procedure necessary for the welding-in of tubes in order to avoid a distortion of the sheet by expansion, whether it were best to work from the center outward, or from the outside circle in towards the center or in vertical or horizontal lines. The author stated, in reply, that owing to the localization of the heat no trouble was experienced from expansion and that no special order of procedure was necessary in order to insure success. It was acknowledged that the electric arc could not compete with the oxy-acetylene flame for neatness of the work of cutting or the speed with which it could be executed.

The railway from Arica, Chile, to La Paz, Bolivia, is nearing completion. This is the third railway connecting La Paz to the coast, and it will probably be completed in about five or six months. It was planned to open the road in November, but the construction work was seriously interfered with by unusually heavy rains, which washed away two large bridges and several miles of embankments. The road in operation will place La Paz within 12 miles of Arica, which is considered one of the finest and safest ports on the western coast of South America. The other two routes, Mollendo and Antofagasta, take 32 and 40 hours, respectively, to reach the coast from La Paz. The direct route from Arica to La Paz has made it necessary to use the cog system for several miles where the grade is steepest, and also to go to an altitude of 14,105 ft., making it one of the highest railways in the world. The effect of the quick ascent and great altitude on people having weak or abnormal hearts is to be counteracted by having oxygen compartments in the passenger cars. Passengers subject to mountain sickness or heart weakness may occupy the oxygen compartments, in which they will have in the air they breathe the same proportions of oxygen as at sea level. It is expected that the new line will be more popular for passenger than for freight service. It is said that the excessively steep grades will make the transportation of freight very expensive, considerably more so than by either of the other two lines, notwithstanding their much greater length. In connection with the Arica-La Paz line there is now before the Bolivian congress a proposition to construct a line 150 miles from Cochabamba to the Chimore river, which is a tributary of the Amazon. From the terminal point on the Chimore steamers will ply to Guayaramerin, a distance of about 600 miles, which can be made in 72 daylight hours. Guayaramerin is a port on the Mamore river in eastern Bolivia, and from that point is now being constructed and nearly completed a railway of 180 miles to Puerto Viejo.

RAILWAY REGULATION.*

BY WALTER L. ROSS,

Vice-President, Chicago & Alton and Toledo, St. Louis & Western.

There has been less wrongdoing on both sides of this question of equitable regulation of traffic than there has been a muddying of the water, brought about by selfish desire of each of us to bring our own particular interest to the top.

Not such a long time ago I attended a gathering of a national organization that is handling, or attempting to handle, some of these great problems, in which we are all so vitally interested.

Through all the meeting there ran this one note: Railway men, representatives of the great transportation interests, should be more friendly. They should get closer together. Now, that is something that I have always preached. In my own poor, weak way I have tried to practice it as well. And sometimes we railway men have gotten so close together that it has required the crowbar of a national or state board of railway commissioners to pry us loose. But this is another story.

This body did not adjourn without passing resolutions. No perfectly organized body of American citizens, no matter for what purpose organized or assembled, does that. In substance, this particular set of resolutions called upon each member of this particular organization to go home and petition his congressman and his senators for the passage of a proposed federal law. This law in substance was to prevent the appeal to the interstate commerce commission of any rate or traffic problem until it had first been passed upon by the state railway commission and the supreme court of the state in which the legal question had arisen. Another fine example of merely muddying the water, instead of looking for a clear and definite solution.

We should have regulation. And that regulation cannot be too rigid or exacting. But there should be some central point where the men whose money and energy is tied up in transportation can get final decisions, that "will stay put." We should be relieved of the cross-fire from a multiplicity of state boards. This is the age of the wireless telegraph, the hogless lard and the cowless butter. If we could only have a politicianless regulation of the transportation business most of us would heave a sigh of profound relief.

Hampered as it has been I believe that our interstate commission has done much effective and beneficial work. And because of the honest and efficient work of present and past members of that board we are today much nearer a permanent solution of these questions than we have ever been before. But the final and definite solution of all these matters would be expedited by the complete cutting off from the regulation of all traffic problems of the politicians.

Adequate regulation is a fine thing, and much to be desired. But with a political bias it is dangerous to the business of the country. In the first place, the politician, pure and simple—if any of them are pure and simple—does not know anything about the actual, practical elements of the business with which he is trying to deal. And in the second place, his mind is generally fixed upon re-election.

What we want is not less regulation, but more. But it should be along much broader lines than ever before. The commission represents all the people. The government should be in a position to get the very best expert knowledge that is to be found in the transportation, legal and business circles of the country. To that end the appointments should be substantially for life, and the salary should be fixed at such a point that the men holding them would feel free to make a lifelong study of the question. Transportation, legal and business experts should all have a place on this commission.

So far as possible I believe in the elimination of state boards, so far as rates and classification, and rules and orders affecting the same are concerned. Cut out the sentiment, and substitute clear cut business sense. Behind the establishment of most of these state boards there have been more of state pride and state sentiment, than of reason and logic. Within proper limitations, "state rights" is a most excellent thing. Carried to an extreme, at one time, it threatened the life of this nation itself. As it operates in the establishment of state regulating boards for the transportation industry it too often leads to confusion, bad feeling and lack of confidence, rather than to the permanent settlement of any question.

The absolute control of transportation by state boards in any equitable and substantial manner is impossible, because the authority of such boards is confined within arbitrary and artificial boundaries. The development of business and traffic in this country has given absolutely no recognition to state lines. And because of that very fact this country has continued to grow rich and great.

The broadened and strengthened national commission might carry with it recognition of the various states in its makeup. Or more logically in the geographical distribution of its membership it might recognize the natural great trade territories and sections of the country. The natural development of the country has clearly marked out what these trade territories, having common trade and traffic interests, really are. And the transportation industry of the country has attempted to serve these territories justly and equitably, by the establishment of voluntary associations, covering the scope of country that is naturally united by the trade and traffic of the country. These voluntary associations you will recall as including the Central Freight Association, the Trunk Line Association, the Western Trunk Line Association, the South Eastern Association and the Transcontinental Association. And these associations have served not only the interested lines, but they have done great and substantial service to the territories traversed by those interested lines. Such divisions are the natural result of traffic and trade following the lines of density of traffic. Any regulation which seeks to ignore them, as state regulating boards must do, will fail to meet the actual necessities of the case.

But one central, national commission, on the broad lines that I have so briefly sketched, could unify the rates and classifications, and establish one set of rules and regulations and orders for all.

In all this, let me emphatically repeat that there is neither criticism nor fault finding with the commission as at present organized. It is my firm belief that they are doing great and good work, and should have the hearty support and commendation of shippers and railways alike. It is a herculean task at best, and I have no sympathy with the shipping organizations, the state commissions, the industrial shippers or the railways, that try to block progress, and muddy the waters by a cry of state's rights.

It really matters but little where, or upon whom, the authority or responsibility finally rests for the solution of these great questions, coming up from day to day. But, wherever that authority is placed, it must be concentrated in one body, protecting state and national interests alike. Personally I favor the centralization of all this power to decide matters in the hands of a national or interstate commission, so organized as to assume such responsibility. Then the working out of a fixed policy, free from politics.

This would produce more stability and an absolute knowledge of "where we are at." We do not need more laws, or more legal advice half as much as we do the uniform enforcement of such laws as we already have. In spite of all the confusion, good has come in a large measure from such regulation as we have had in the past. I have always been taught to believe that it is never wise to destroy, or tear down, until we can suggest something better.

And even then we should use judgment and common sense in the introduction of the new. There should be no haphazard work. On a western school board a member one time solemnly introduced the following resolution: "Resolved, That we build

*Abstract of an address before the Traffic Club of Philadelphia, February 17.

a new school house; and resolved that we use the material out of the old house to build the new one, as far as it will go; and be it further resolved, that we continue to use the old school house until the new one is completed and ready for occupancy."

We can hardly be as conservative as that, but in the construction of a new and central regulating authority let us hold on to every good thing in our present methods that our experience has demonstrated to be productive of the best results.

In common with the majority of practical railway men I have never looked with favor upon the proposition of government ownership of railways. And yet, after a recent visit to the government owned and operated road in the Panama canal zone, my belief along those lines was jolted just a little. Our government owns a railway there that is fifty miles in length. It is a profitable road. It cleared one and one-half millions last year.

And I found that it had a blanket freight rate of $2.25 per ton, without regard to distance carried, or classification of commodity. Lumber and silk, one mile or ten, it is all the same; the uniform rate of $2.25 per ton applies to all. Not so bad, at that. I doubt whether there is any privately owned road in this country that would seriously object to the establishment of such a rate by our interstate commission. Which incidentally has nothing to do with the road on the canal zone.

Along various lines, here and there, legislation might be strengthened to advantage. I believe that too many safeguards to life and property cannot be thrown about the proper, speedy and safe transportation of both persons and property. And among other things, legislation everywhere should more clearly define the criminal responsibility of employees who fail to carry out orders. The recent tragic wreck on the Illinois Central, and other unfortunate occurences of recent date, only too strongly emphasize this necessity. The laws on this point should be both plain and stringent.

Conditions must be maintained and created that will give the railways the money to carry on this development. There is only one source where they may obtain that money—it is from the people. The great capitalists are really the people. No dollar is so timid, however, as that of the great body of the people in time of panic or unrest. There must be no regulation that will discourage the dollar from doing its duty in the development of this common country of ours. Idle capital and silent industries mean idleness for all the nation. The people's money is willing to assist in the vitally essential upbuilding of our increasing requirements. It depends upon us to encourage or discourage our neighbors to invest, for new investment means new business and added activities. They create for us national facilities, absolutely essential for our future development.

In anything that I have here given utterance to, there has not been the slightest desire to criticize our government in its efforts to bring about an equitable regulation of the transportation problem. My only desire has been to point out these conditions for consideration and thought. And to them to add the further consideration that our honorable commissioners should be continued as regulating body.

The reports of the last year filed with the Interstate Commerce Commission I think clearly indicate that there is a necessity for greater earnings upon the part of the railways. The actual conditions support the contentions that the roads have been making for better earning power.

Upon the prosperity of the roads, upon their ability to meet conditions in the coming years, depends the further development and expansion of this country. It is a great problem. But the same forces that have made the American railway what it is today, are still on the job. We have made mistakes in the past. We need not repeat them in the future. The regulation of this great industry is necessary. It should be as broad and far-reaching as the industry itself. The genius of the American people is ample to evolve the proper regulation and control. Such regulation and control must fail if it is based upon *my* interests. It will succeed if it be based upon a just consideration of *our* interests—all of us.

SIBLEY (MO.) BRIDGE OF THE SANTA FE.

A bill has just been passed through both houses of Congress and approved by the President permitting the lowering of the clearance line 2 ft. under the three main channel spans of the new bridge which the Atchison, Topeka & Santa Fe is now constructing across the Missouri river at Sibley, Mo. This revised clearance line gives 48 ft. clear head room above the record high water of 1844 and a greater clearance than this above the standard high water line adopted by the United States Army Engineering department.

Beginning at the west end, the present bridge consists of one 80-ft. deck girder span, one 200-ft. deck truss span, three through truss spans, 396 ft. center to center of end pins, one 247-ft. deck truss span, two 172-ft. 6 in. deck truss spans and about 2,000 lineal feet of steel viaduct composed of 30-ft. towers and 60-ft. intermediate spans. In the reconstruction work the west abutment and pier No. 1 will be remodeled and the 80-ft. deck girder will be renewed. The 200-ft. deck truss span will be replaced with two 100-ft. deck girder spans resting on a new center pier and the three 396-ft. through truss spans will be replaced with spans of the same length. From 8 to 20 ft. of the masonry will be removed from the tops of the piers of these spans and replaced with concrete. The three deck truss spans and the 2,000 ft. of steel viaduct will be renewed, the piers under the spans being remodeled, as necessary, to fit the new steel work. All piers in the main channel of the river rest on bed rock, while the piers under the east approach viaduct will be based on reinforced concrete piles, the tops of which will stand about 12 ft. above the extreme low water line.

The new structure is designed for Cooper's E-60 loading. The entire bridge will have a ballast deck with a foot-walk and hand-railing on one side. All telegraph, telephone and signal wires will be carried across the bridge on steel brackets placed on the down stream side.

While the bridge is being rebuilt as a single track, gauntlet tracks will be laid, the rails in each pair being placed 7 in. apart on centers. The 0.8 per cent. grade now existing on the east approach viaduct and for about two miles further east will be reduced to 0.5 per cent. by raising the shore end of the viaduct and the fill beyond.

In designing the viaduct it was necessary to adopt span lengths such that the new piers would in all cases miss the old ones, the masonry in these old piers being badly shattered and worn out, due both to faulty design in the bottom of the metal columns and to the lack of pile supports. One interesting feature in connection with the new viaduct is the placing of genuine expansion bearings on one bent in each tower, this bearing being made of four 12-in. segmental rockers. The work of replacing the 396-ft. spans is now well under way. Somewhat over half of the steel work for these spans is already on the ground at the bridge site and it is planned to begin the erection of the west span early in February.

The steel work is being furnished by the American Bridge Company, while the Missouri Valley Bridge & Iron Co., of Leavenworth, Kan., has the contract for remodeling the four large piers, building the false work, taking down the old spans and erecting the three new ones. It is planned to contract the sub-structure work for the approach viaducts, while the steel work will be erected by company forces.

The cost of this rebuilding is estimated at about $1,300,000. It is expected that the bridge will be finished by the end of the present year, although high water or other unfavorable conditions may delay this somewhat. This work is being done under the supervision of A. F. Robinson, bridge engineer of the system, and C. F. W. Felt, chief engineer.

A concession to build and operate a railway from Embarcacion, Argentina, to Yacuiba has been granted. The gage on this line is to be 3 ft. 1 in.

PENNSYLVANIA ORE UNLOADING DOCK AT CLEVELAND.

The present ore handling facilities of the Pennsylvania Company in the city of Cleveland are located on a branch of the Cuyahoga river on what is known as Whiskey island. This property is south of the main line of the Lake Shore & Michigan Southern, which parallels the lake, the channel from the lake to the docks being very crooked and being spanned by three bridges, one of which is the single track swing bridge carrying all the main line traffic of the Lake Shore & Michigan Southern and the dock business of the Pennsylvania. This condition has made the movement of boats to the dock very tedious, requiring the services of one or two tugs. The track facilities were so limited that a very large amount of switching was necessary in order to handle the business.

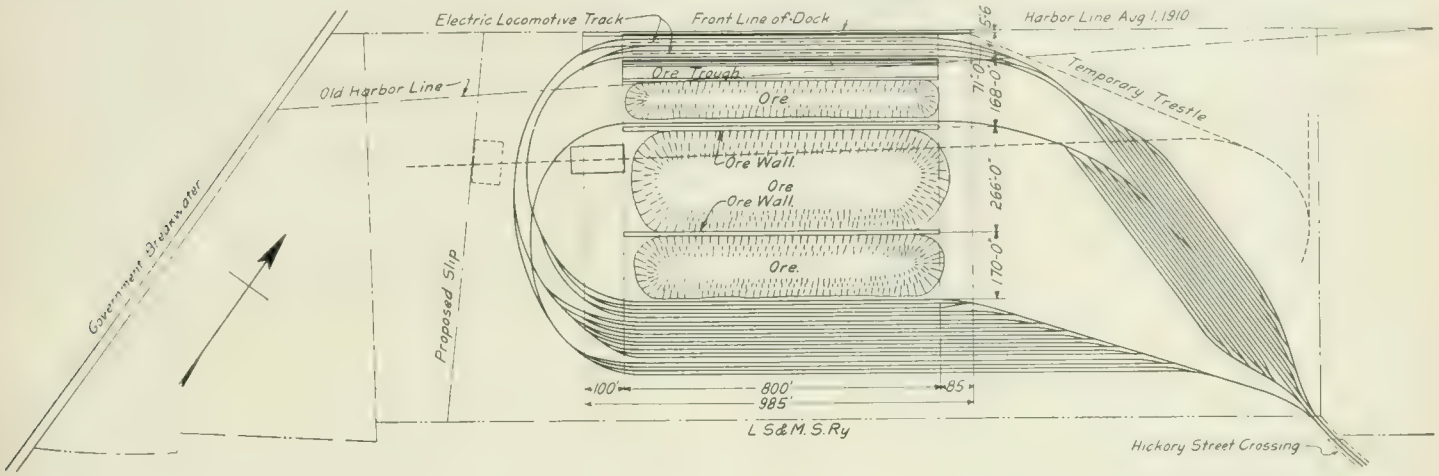
For the above reasons the Pennsylvania decided to develop property which it owned on the lake front, known as the west breakwater. It was necessary to reclaim about 40 acres of land by filling with slag and other refuse collected on the Cleveland and Pittsburgh division and to build a dock, foundations for ore unloaders, and bridge, power house, a complete yard and a double track subway under the line of the Lake Shore & Michigan Southern.

FILLING FOR THE DOCK SITE.

To protect the government channel during the progress of the filling, and also to facilitate the work, a temporary wooden pile trestle, filled with riprap, was built on the lines indicated in the plan of the property reproduced herewith. The trestle parallel with the shore was located a considerable distance back from the established harbor line, so as not to interfere with the construction of the dock and machinery foundations. The fill was carried outward from the shore and inward from this trestle, the material being brought out in cars and leveled by a track spreader. Experiments were made with a locomotive crane equipped with a grab bucket for handling this material, but it was found that it was more economical to use hand labor in the method described above. Approximately 1,000,000 yds. of filling material was deposited, the made land being 1,850 ft. long and 850 ft. wide.

DOCK FOUNDATION.

The dock proper is supported on a double row of 40-ft. reinforced concrete piles, spaced 3 ft. center to center, supporting a concrete superstructure heavily reinforced with 85-lb. rails. Reinforced concrete struts spaced 30 ft. center to center and supported on single rows of reinforced concrete piles 30 ft. long, connect the dock face with the foundation wall supporting the rear leg of the unloaders. This wall, which is parallel to, and approximately 75 ft. from, the face of the dock, is supported on three rows of reinforced concrete piles 30 ft. long, driven on 4-ft. centers. Small riprap stone was placed around these piles upon which the concrete was laid. Reinforced concrete sheet piles 10 in. x 12 in. in section were laid horizontally between the two rows of piles supporting the dock, and the space between the rear walls and the face of the dock was filled with riprap stone, varying from shovel to derrick size, a wooden trestle being built from which to handle the stone with a locomotive crane. The riprap was carried up to lake level, and the whole mass pumped



Yard and Dock Arrangement; Pennsylvania Ore Unloading Dock, Cleveland, Ohio.

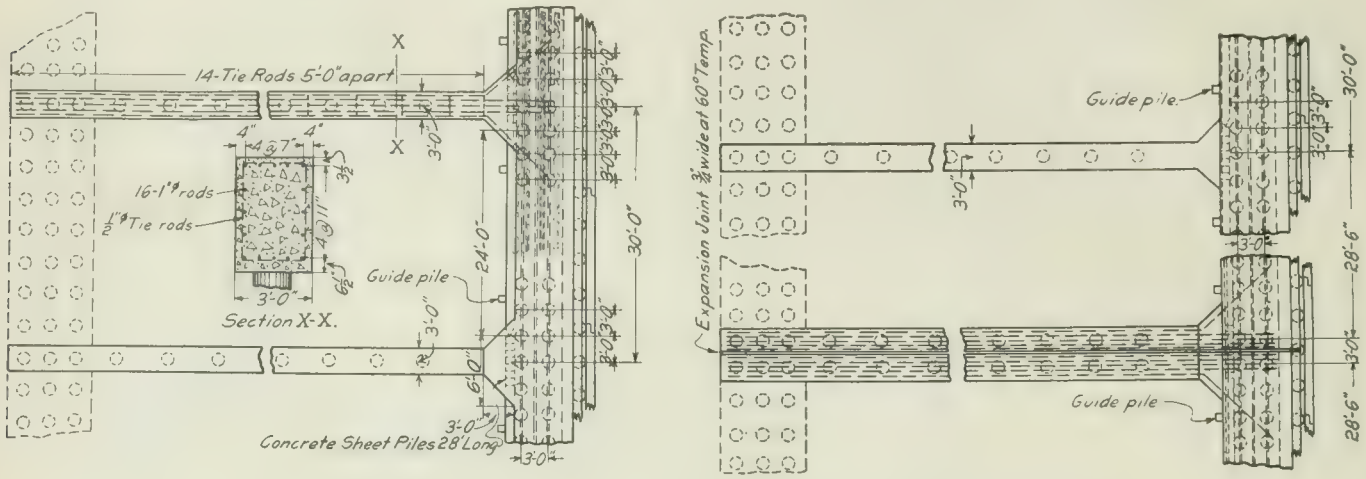


Contractor's Concrete Pile Plant, Shops and Yard.

full of lake sand by an hydraulic dredge. A mass of riprap filled with sand was also placed immediately back of the rear wall to form a support for the U-shaped concrete ore trough.

DOCK SUPERSTRUCTURE.

The dock is 985 ft. long over all, consisting of 32 spans between concrete struts. The reinforcement in the superstructure, with the exception of three spans at the west end, consists of nine 85-lb. rails, joined with angle bars fully bolted. The transverse struts, which are 3 ft. wide and 4 ft. 6 in. deep, are reinforced with 16 one-in. round rods looped over the reinforcing rails, as



Typical Plans of Dock, Showing Concrete Tie Rods and Expansion Joint.

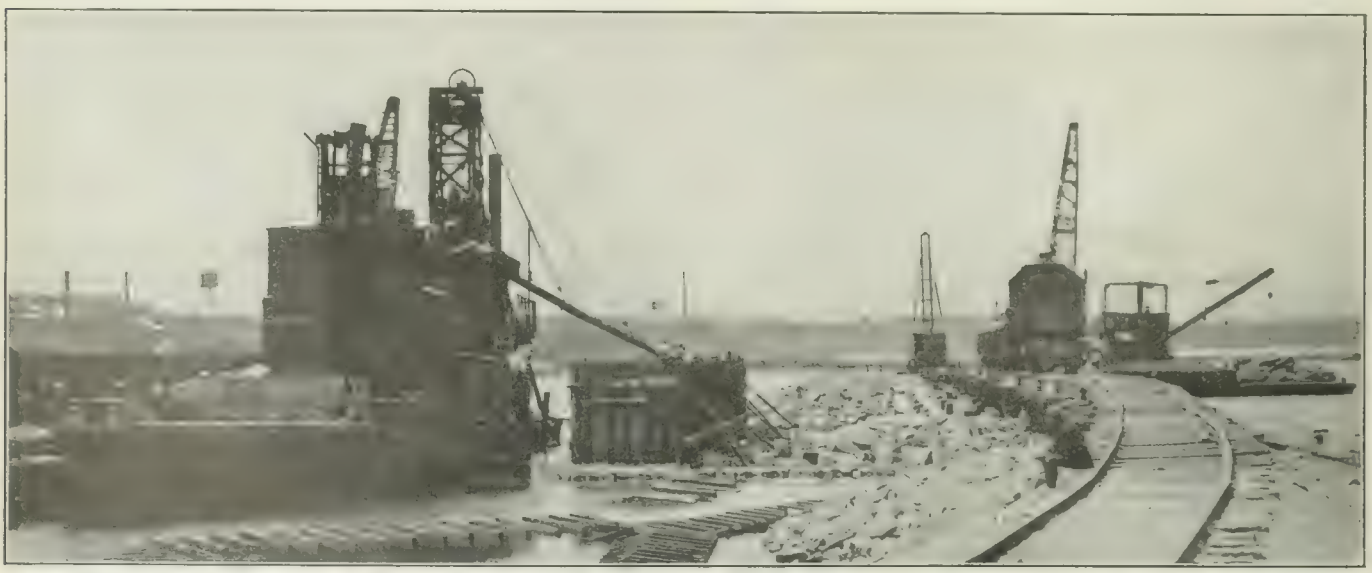
shown in one of the accompanying cross sections. These rods are held in place by ½-in. round tie rods at intervals of 5 ft. Each mooring post along the face of the dock is anchored by a vertical bolt 1¾ in. in diameter and 2 ft. 6 in. long, and an inclined bolt 2¼ in. in diameter and 6 ft. 6 in. long. A 12-in. by 12-in. oak waling strip protects the face of the dock from injury by ore boats. The superstructure in the three spans at the west end is reinforced by seven 1-in. round rods placed as shown in the accompanying cross section. The struts for those spans are T-shaped, being 3 ft. wide on top and 1 ft. 6 in. wide at the bottom. They are reinforced by nine 1-in. round rods near the bottom of the section which are bent up in the superstructure of the dock and the foundation wall to form a bond with those members.

The ore trough which adjoins the foundation wall under the back leg of the unloaders is 44 ft. wide over all, the flat inner surface being 28 ft. wide. The walls of the trough are 16 ft. 6 in high. The bottom of this trough, which is 2 ft. thick, is reinforced by six rails, spaced 4 ft. center to center, laid with the head flush with the surface of the concrete. The foundations for the ore bridge are 266 ft. apart center to center, the nearest one being 168 ft. from the foundation wall supporting the unloader track and 144 ft. 6 in. from the face of the dock. The footing for these walls is 10 ft. wide, the wall proper being battered to a thickness of 5 ft. at a point 4 ft. above the surface of the ground. The total height to the bottom of ties is 16 ft. These walls are not reinforced. Expansion joints ¾-in. wide at a temperature of 60 deg. F. are provided in the dock at intervals of 150 ft.

About 3,500 cu. yds. of concrete were placed in the dock struts and unloader walls, 5,900 cu. yds. in the bridge walls and 9,000 cu. yds. in the ore trough. The concrete mixture in the superstructure was 1:3:6. The concrete in the dock wall was placed from a floating plant, as shown in one of the photographs, and the ore trough and bridge walls were placed from a mixer car on a construction track, material being supplied to the mixer by wheelbarrows from cars on the same track. The concrete was hoisted to the top of a tower and deposited in the wall through a chute.

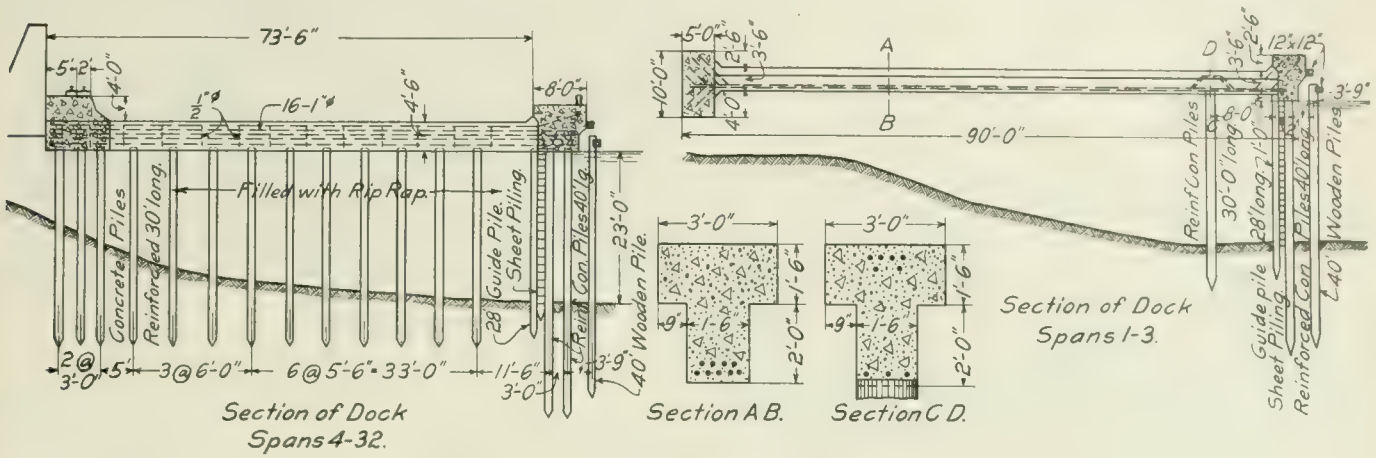
CONCRETE PILES.

The concrete piles used on this work are octagonal in shape, reinforced with eight 1-in. steel rods spaced longitudinally, and securely bound by ⅜-in. tie rods. These rods are spirally



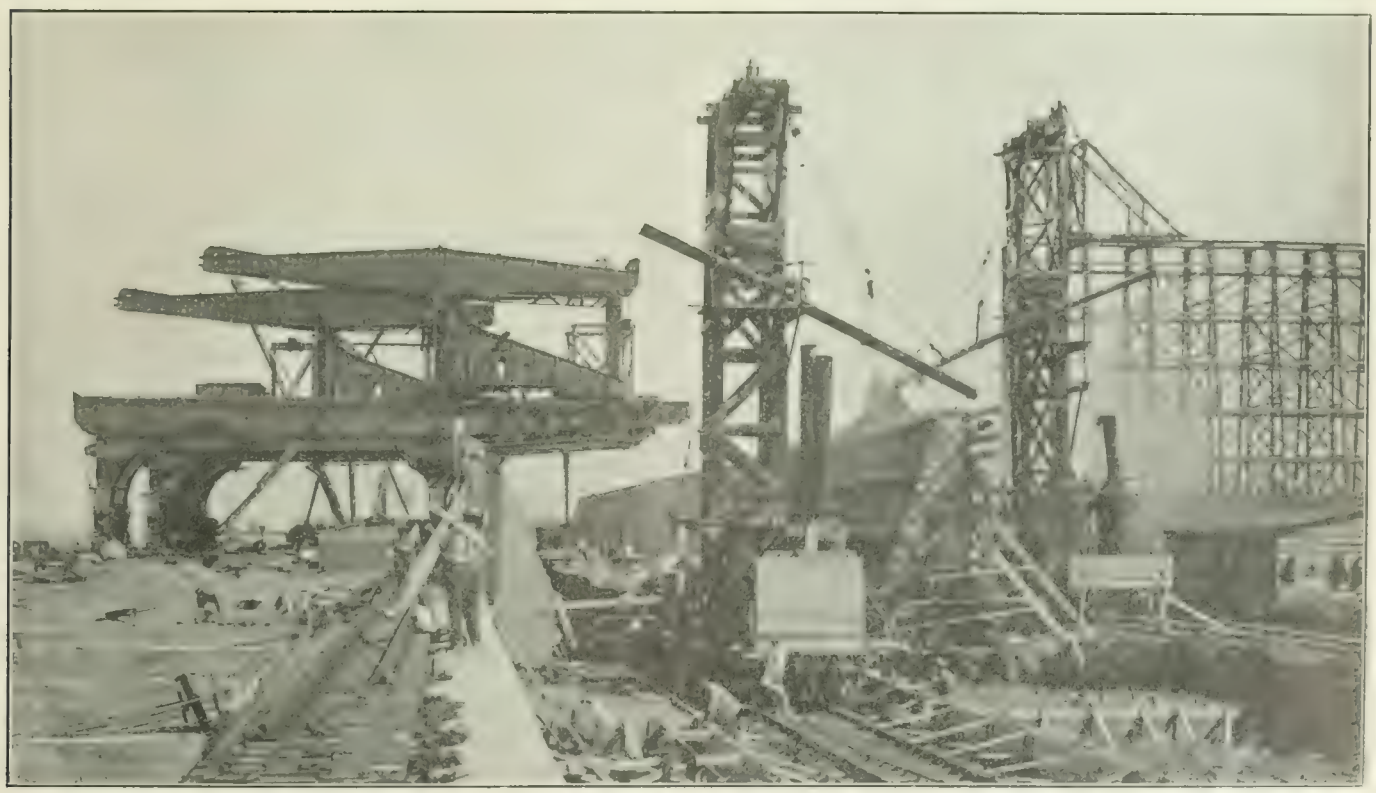
View of Floating Mixer Plant and Pile Driver; also Showing Locomotive Crane Placing Rip Rap in Dock Foundation.

wrapped for a distance of 4 ft. from the top and 3 ft. 6 in. from the point. Single tie rods are spaced 2 ft. apart through the body of the pile. A cast iron shoe was fitted into each form to cover the point, becoming an integral part of the finished pile. A 1:2:4 mixture, using ¾-in. screened limestone, was used in the body of the pile, one ¼-yd. batch of 1:1 cement mortar being placed in the point. The piles were made at the plant of the Great Lakes Dredge & Dock Company, which adjoined the site of the work. The material was received in cars and handled by hoisted to an elevation from which it could be dropped into the upper end of the piling form. A steel cap was then placed on the form and the pile and form were placed in a curing bed of live steam for about 18 hours. The forms were removed in from 12 to 24 hours after pouring. When the piles were removed from the hot beds they were piled in storage and allowed to season thirty days before driving. The manufacturing plant included a large cement warehouse, storage yard, curing beds, heating plant for concrete materials, mixing and casting



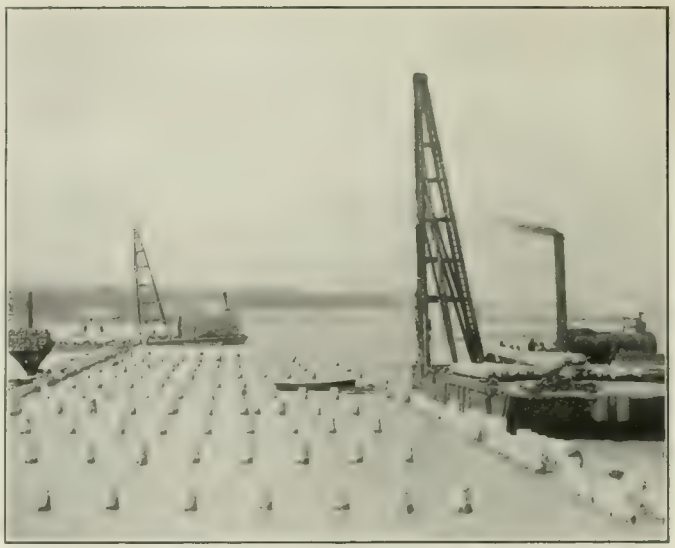
Typical Cross Sections of Ore Unloading Dock.

a locomotive crane. As most of the piles were made in January, February and March, it was necessary to heat all materials by steam pipes placed in tunnels formed by interlocking steel sheet piling under the piles of sand, gravel and broken stone. The water was kept heated in a similar way. The rings that were used in the reinforcement were made in the company's shop by a specially designed machine, and were taken to the assembling yard and laid in steel forms. These forms were picked up by a locomotive crane and placed on end alongside the casting tower. The concrete was mixed at the base of this tower and tower, and ample switching facilities. The ties were loaded from the storage pile at the edge of the water on to scows which were towed to the side of the dock, the piles being driven by floating pile drivers. Each one was numbered and a record kept of the date of its manufacture to guard against driving within 30 days after casting. As the driving was somewhat delayed, however, no trouble was experienced with green piles. Several forms of driving caps were experimented with, but it was found that the ordinary cast iron hood, about 3 ft. long, with a hard wood filler block covered by a few coils of rope, was the most



Ore Unloaders in Position and Ore Trough Under Construction.

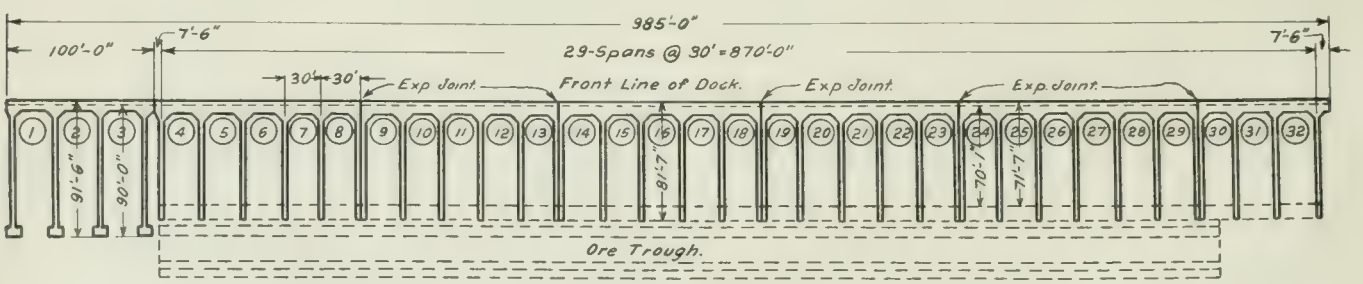
satisfactory. Most of the piles were driven without excessive hammering, but in some individual cases they showed remarkable ability to stand punishment. For instance, a 30-ft. pile required 111 blows of a 5,000-lb. hammer falling 3 ft. 6 in. to secure the last foot of penetration. Another 30-ft. pile required 840 blows of a 3,000-lb. hammer falling 3 ft. These piles suffered no appreciable damage except battering of the head, which was later buried in the concrete superstructure. The piles drove to a very good line, as shown in one of the accompanying photographs. The number of piles made was as follows: Octagonal, 625 40 ft. long, 2,647 30 ft. long, 120 24 ft. long, 120 20 ft. long; sheet piles, 932 24 ft. long, 210 28 ft. long.



Driving Piles Under Dock and Transverse Ties.

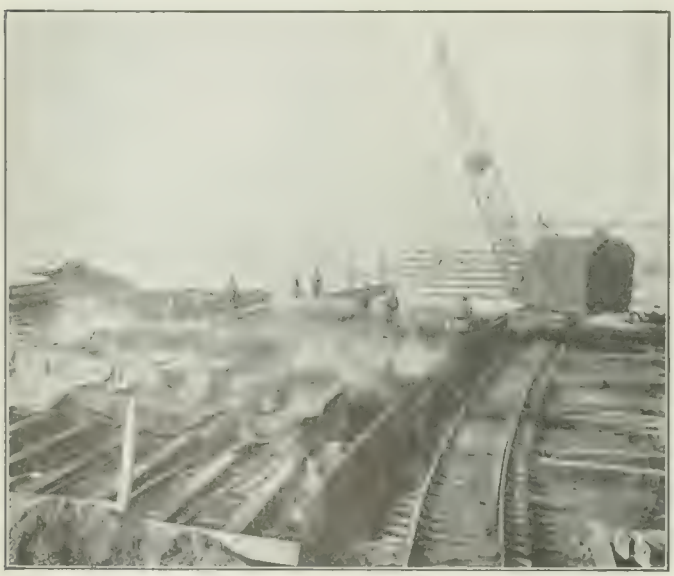
DOCK MACHINERY AND POWER EQUIPMENT.

The unloading equipment consists of four 17-ton Hulett unloaders and one 15-ton ore bridge built and erected by the Wellman-Seaver-Morgan Company, Cleveland, Ohio. The unloaders are electrically-operated, 220-volt d. c., current being supplied. They have sufficient reach to unload boats of 65-ft. beam, and are equipped with a 70-ton receiving hopper and 50-ton larry arranged to load ore into cars standing on any one of four loading tracks or into the ore trough, from which it can be placed in stock piles by the bridge. Each machine is equipped with scales for weighing the ore before loading into cars, the scales being a part of the larry car equipment. The capacities of the motors are as follows: 300 h. p. for beam hoist, 100 h. p. for trolley, 100 h. p. for bucket closing, 150 h. p. for ore gate and travel motor, 150 h. p. for larry car haulage, 35 h. p. for rotating bucket and 35 h. p. for larry gates. These machines are the largest ore unloaders ever built, and it is expected that they will handle an average of 600 tons per hour, to do which their capacity during the early stages of unloading must reach a rate of 1,000 to 1,200 tons per hour for each leg.



General Plan of Pennsylvania Ore Unloading Dock and Ore Trough.

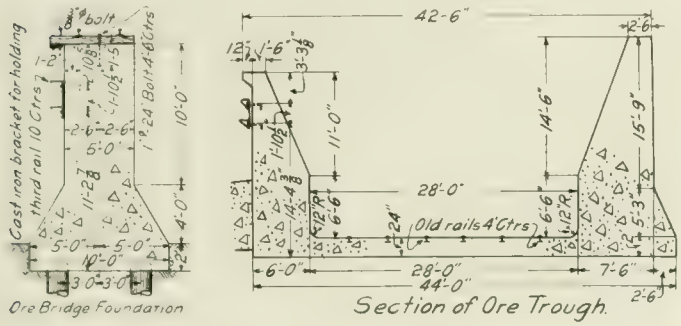
The bridge has a central span of 266 ft., with two cantilever arms 173 ft. long to the extreme position of the bucket. This provides a total length of 612 ft. In rehandling ore from the stock piles the bridge bucket discharges into a 75-ton receiving hopper built into the framework of the main tower. This hopper discharges into a scale hopper located over a loading track adjacent to the bridge foundation wall so that ore can be discharged directly from scale hopper to cars. The bridge is moved along its tracks by 75 h. p. motors connected by gearing and shafting to driving trucks under the tower and shear leg, these motors being controlled from the operator's house suspended from the main bridge tower. The bridge runs on 3-ft gage tracks laid with 100-lb. rails on oak ties 3 and 4 ft. long spaced 1 ft. 6 in. center to center, every third tie being drift bolted to the foundation, and all ties being connected by a 2-in. by 12-in. plank outside the track. Special tie plates, clips and screw spikes are used on all ties.



Hot Storage Bed for Concrete Piles.

The power for operating the plant is secured from a power house 150 ft. by 60 ft., located at the west end of the property, the floors and columns being of reinforced concrete, the frame of steel, and the walls of brick. Coal for this plant is received in hopper cars over a wooden trestle approach to the bunkers, which are built entirely of concrete and located outside the building. A grab bucket operating on an elevated track carries the coal from the bunkers to the crusher located over steel hoppers, through which the coal passes to the stokers. The ashes are dropped from the grates through a chute into standard gage cars running on tracks on the first floor. The equipment of the power house includes three 600-h. p. Babcock & Wilcox Stirling boilers equipped with Roney stokers and individual steel stacks 66 in. in diameter and 125 ft. high; two Dravo & Doyle centrifugal boiler feed pumps, three Allis-Chalmers non-condensing turbine-driven jet condensers, one 2,500-h. p. Cochrane water heater, one 800-k.w. Westinghouse generator, three 750-k.w. Allis-Chalmers turbo-generators, three 500-k.w. Westinghouse

rotary converters, two 50-light General Electric arc lamp tubs, and two 500-gal. Watson-Stillman general service pumps. Water is taken directly from the lake through a 30-in. pipe to an intake well located under the turbines. The hot well is located above the intake well, and overflow is discharged into the lake through a 30-in. pipe. Power for the machinery on the dock is carried by cable through underground ducts to the forward bridge and trough walls, along which it is distributed through 85-lb. rail



Cross Sections of Ore Bridge Foundation and Ore Trough.

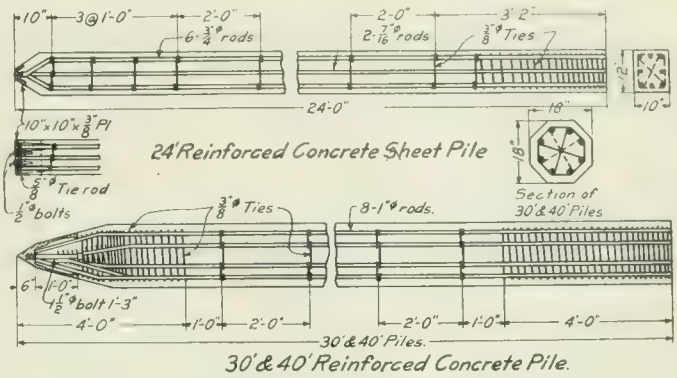
supported on cast iron brackets bolted to the walls. Electric locomotives are used for shifting cars beneath the unloaders, power being supplied by rails between the rails of the narrow gage running track. These locomotives are of 25 tons weight, 3 ft. 6 in. gage, and are provided with side pusher arms designed to handle the standard gage cars on adjacent tracks. The spacing of 18 ft. 6 in. between outside loading tracks provides room for a narrow gage track between each of these pairs of loading tracks, allowing the electric locomotives to reach cars standing on any track under the unloader.

A machine shop 60 ft. x 70 ft. at the west end of the property will handle repair work necessary on the ore handling machinery, and will be provided with a 25-ton crane, the runways of which will extend across the tracks in front of the building so that repair parts can be handled direct from cars to the shop. This crane will also be used for handling the electric locomotives, An office building 25 ft. x 40 ft. will be provided, fitted with office rooms, locker rooms and toilet facilities for the use of the operating forces.

YARD AND SUBWAYS.

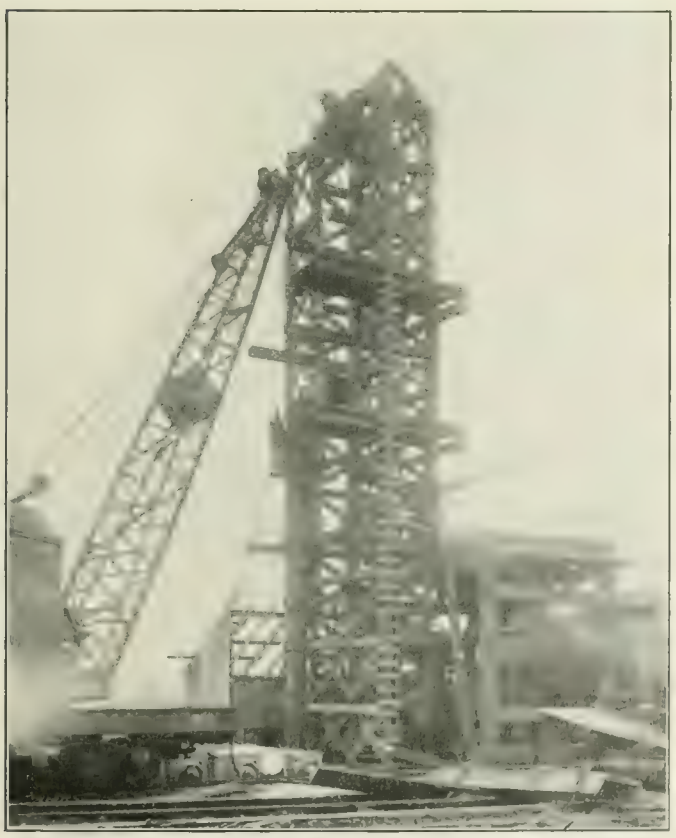
The track development is shown in the accompanying plan. Empty cars coming to the plant are stored in the yard at the east end, from which they can be switched directly to the four tracks under the unloader or to the single track along the bridge. Loaded cars are stored in the large yard south of the stock piles. This arrangement of tracks makes the movement of cars at the dock continuous.

In order to reach the property it was necessary to build a

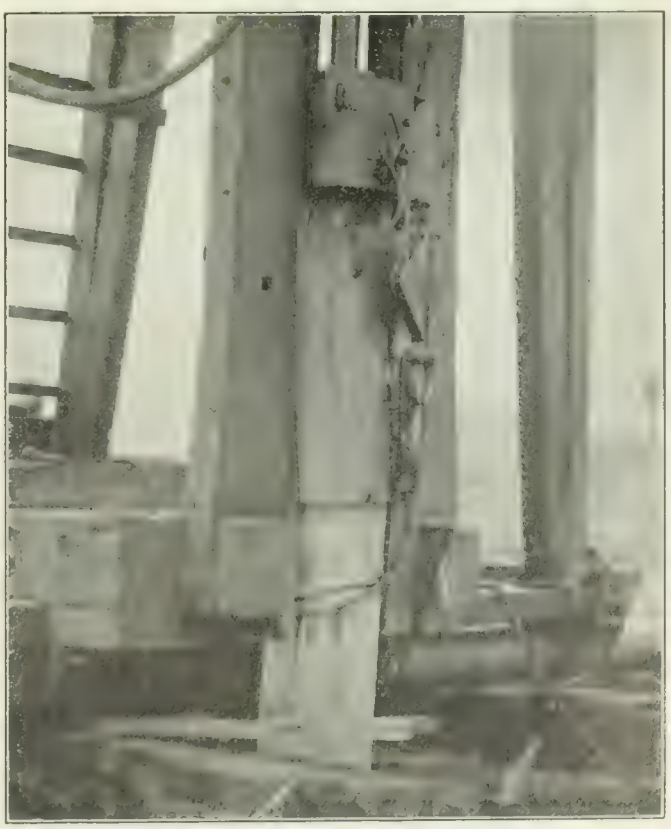


Details of Reinforced Concrete Piles Used in Foundations of Dock and Walls.

double-track undergrade crossing with the Lake Shore & Michigan Southern at Hickory street. The structure has very heavy reinforced concrete walls supported on concrete piles. The floor under the Lake Shore tracks is of heavy I-beams encased in concrete with a supporting row of columns at the center of the span. The Lake Shore at this point has seven tracks, only two



Casting Tower, Mixing Plant and Locomotive Crane.



Cast Iron Hood Over Head of Piles.

of which could be abandoned at a time, making it necessary to build the structure in short sections, working from south to north, the overhead tracks being carried on pile trestles during the progress of the work.

This unloading dock was designed and its complete development carried out under the direction of R. Trimble, chief engineer maintenance of way Northwest System. The Great Lakes Dredge & Dock Company had the contract for making and driving all concrete piles, and for building the foundations for the power house and the substructure for the Hickory street subway. The Drava Contracting Company built the concrete ore trough.

PRESIDENT MILTON H. SMITH ON INDUSTRIAL RAILWAYS AND UNFAIR DISCRIMINATION.

The following are verbatim extracts from the testimony on the subject of industrial railway and unfair discrimination recently given at St. Louis by Milton H. Smith, president of the Louisville & Nashville, before an examiner of the Interstate Commerce Commission in the hearing of the case of the Manufacturers' Railway Company of St. Louis vs. St. Louis, Iron Mountain & Southern Railway Company et al:

DIRECT EXAMINATION.

Mr. Stone (counsel, L. & N. R. R.): Can you explain why it is that so few breweries are located on tracks of steam railways? . .

Mr. Smith (president, L. & N. R. R.): . . . It is, I think, a fact that, with few exceptions, all of the existing brewery plants were originally located at points without track connection; and I think the reason therefor is that they were first created to supply the local demand for their product; that shipment to other points was not at the time given much if any consideration; and the further fact that the incoming freight, or the material from which the liquors are manufactured, forms a small part of the tonnage of the output. I believe it is a fact that the original Anheuser-Busch brewing plant was located without rail connections, and was operated without such rail connections until that company built tracks connecting its plant with the tracks of the St. Louis, Iron Mountain & Southern.

. . . . . .

Mr. Stone: Do you know, Mr. Smith, in what way the Anheuser-Busch Brewing Association got its product to the railway before the construction of the Manufacturers' Railway tracks?

Mr. Smith: I assume they must necessarily have moved it between the plants and the various shipping points or receiving points by street vehicles.

Mr. Stone: Do you know whether the present method of moving its product over the tracks of what is called the Manufacturers' Railway is more economical to the brewing association than it was before?

Mr. Smith: Well, I must assume that the management of that plant when it created these facilities believed that it would be more economical or it would not have made the investment.

. . . . . .

Mr. Stone: . . . State in your own way the view you have of the reasonableness of this allowance ($4.50 per car) and the effect it has upon the carriers in the shipments made for the Anheuser-Busch Brewing Association. If you can state any facts or give any illustration showing that effect and what the carriers by reason of it realize out of the shipments of the product of that brewing association, please state.

Mr. Smith: Any allowance to the Anheuser-Busch Company through the Manufacturers' Railway, whereby the rail lines transport property shipped to or shipped by the brewing company at a less rate than the current tariff rates is an unjust, illegal and criminal reduction in the rates, prohibited by the Act to Regulate Commerce. . . . To illustrate, during the month of October, 1911, . . . (ten) cars of beer were shipped by the Anheuser-Busch Company via the Louisville & Nashville to Memphis, Tenn; . . . average weight per car 24,475 lbs.; through rate 16 cents per 100 lbs.; total revenue $391.60, of which $4.50 per car or $45 was rebated to the Anheuser-Busch Brewing Company through the Manufacturers' Railway Company for alleged services in delivering the loaded cars to the tracks of the Wiggins Ferry Company. It will be seen, therefore, that the rebate amounted to about 11.5 per cent. of the total revenue for which the brewing company moved the cars over its main line, a distance of something less than 4,000 ft., while the Louisville & Nashville assumed the cost of moving the traffic between the point of interchange with the Wiggins Ferry and Memphis, 477 miles, including the crossing of the Mississippi river at St. Louis, the Ohio river at Evansville, the Cumberland at Clarksville, Tenn., the Tennessee river at Danville, Tenn., and also furnished the terminal facilities at Memphis. The property was moved in refrigerator cars, for which the Louisville & Nashville paid the owners ¾ of a cent per mile going and returning, or $7.16. . . .

Under an arrangement between the Manufacturers' Railway and numerous connecting railways whereby the Manufacturers' is practically made a party, so far as these roads can do so, to the per diem rules agreement, had the shipments been moved in refrigerator cars not belonging to private lines, or, say, in refrigerator cars of the Louisville & Nashville or Illinois Central, some benefit would have been derived by the owners of the Manufacturers' Railway, growing out of the fact that it is allowed what is designated as six days' reclaim. That is, at this season of the year the per diem charge on such cars would have been 35 cents per day; and should an L. & N. refrigerator car have been delivered to the Manufacturers' Railway and loaded and returned the same day, it would have received as six days' reclaim $2.10. The Louisville & Nashville is not at present a party to this arrangement.

Another concession made to the Anheuser-Busch Brewing Association through the Manufacturers' Railway is the issue of passes to the officers of that company, including August A. Busch, chairman of the board; G. F. Moore, president and general manager; Adolphus Busch, vice-president; R. Muehlberg, traffic manager, and their families, and including in some instances transportation for private car, for what is known as pass for car and party. Such issue of passes does not seem to be authorized by the act to regulate commerce. It is supposedly done under the provision of section one of the act, reading as follows: "Provided, that this provision shall not be construed to prohibit the interchange of passes for the officers, agents and employees of common carriers and their families." There cannot be an interchange of passes between the various steam carriers, extending from the Atlantic to the Pacific, and the Manufacturers' Railway.

. . . . . .

Mr. Stone: Should any allowance be made by the steam railway carriers to cover the cost or the charge that may be made by the Manufacturers' Railway for moving empty and loaded cars between the plants or warehouses of industries, other than those of the brewing company, located on the Manufacturers' Railway? . . .

Mr. Smith: In my opinion no allowance is reasonable or can be legally made. If the carriers transport property shipped by or received by the so-called independent industries located on or near the tracks of the Manufacturers' Railway, from point of interchange, for less than the current tariff rates, it would be an unjust discrimination against similar industries located at points where their property must be moved by street vehicles between the plants and point of delivery or receipt by the steam railways. I am informed that practically all of the industries now located on the Manufacturers' Railway were in existence before the railway was built, and necessarily had to bear the cost of moving property between their plants and the railways. They are entitled to any advantage that may accrue to them resulting from the difference in the charge of the Manufacturers' Railway for moving property between their plants and point of

interchange with the railways—say the St. Louis, Iron Mountain & Southern and Wiggins Ferry—and what it had heretofore cost them to handle their traffic by street vehicles. Any concession that is made from the established tariff rates, from point of interchange, is an unjust discrimination against similar industries located without track connection

. . . . . .

Mr. Stone: Upon what basis is the charge by the various railways for switching for each other in St. Louis and East St. Louis fixed, if you are familiar with that subject?

Mr. Smith: Upon a reciprocal basis. The railways switch for each other, and if it is approximately reciprocal—that is, if what one does for the other is approximately reciprocated by return switching, it makes very little difference what the charge is, whether it is $1 per car or $5 per car. . . .

Where reciprocity is not equal the railways do refuse to switch for each other. As an illustration: The Louisville & Nashville does not switch competitive traffic for competing lines on shipments to and from Louisville, because up to this time the industries located on its lines in the city of Louisville are largely in excess of those located on competing lines for which it may desire to compete; and the Southern Railway refuses to switch competitive traffic for the Louisville & Nashville at Knoxville, Tenn., and other points. . . .

As the Manufacturers' Railway cannot reciprocate—cannot furnish transportation facilities for which the various steam railways may compete—the charge for interchange or reciprocal switching between the various railways competing for traffic to and from the city of St. Louis and East St. Louis has no bearing whatever upon the charge to be made by the Manufacturers' Railway for non-reciprocal switching, for which, as heretofore stated, no allowance should be made. The cost of moving traffic between the various industries reached by the tracks of the Manufacturers' Railway and point of interchange with the steam railways, should be borne by the owners of the property, and should not be made the basis of making unjustly discriminating rates by the steam carriers.

The Terminal Railroad Association and its affiliated lines about St. Louis are owned by the various steam railways having terminals in St. Louis and East St. Louis. Each of the proprietary lines, therefore, treats these Terminal Association lines as part of its system, and the Association renders services for each of the proprietary lines upon the same terms and conditions. The division of the revenues accruing to the Association and its proprietary lines upon traffic moved is a matter of interest only to the parties directly interested, and is no criterion for a basis of a division of revenue between switching lines, or plant facility tracks like the Manufacturers' Railway, and the steam roads.

. . . . . .

Mr. Stone: A good deal has been said in this record in regard to the allowance of $4.50 to the Manufacturers' Railway by the connecting lines, placing that allowance in their tariff filed during the last year. Will you please state the grounds or causes which led to the putting of this allowance in the tariffs of the several defendant railways in this case?

Mr. Smith: The cause is incompetent management of railways—the same cause that for years disgraced the managements of the railways of the country in the conduct of their traffic, resulting in unjust discriminations between large and small shippers. Unregulated and ruinous competition, resulting in the bankruptcy of many of the railways of the country; in dissatisfaction of the people of the country, which eventuated in legislation whereby the United States government, through the Interstate Commerce Commission and the courts, has assumed responsibility, prohibiting unjust discrimination and requiring the maintenance of established rates. The disgraceful concessions that have been made by the various railways to the Manufacturers' Railway, since the decision of the Interstate Commerce Commission that it was a common carrier, are conclusive evidence that were it not for the restraining power of the United States government, chaotic conditions would again be created by the inability of the railway managements to adopt and maintain reasonable and just tariffs, intended to put all shippers and patrons of the railways upon the same basis.

The concessions made to the Manufacturers' Railway are disgraceful. It shows that by the skillful playing of one road against the other, the big shipper has succeeded in enmeshing all.

It has been accomplished, mainly through the weakness of the railway managements, by the use of the boycott. An officer of the St. Louis Southwestern recently admitted to me that that company was the first to make the concession, or, as he expressed it, that company was "the goat." When asked what compensation or reward that company received, he said they were receiving about 20 carloads per day of shipments from the Anheuser-Busch Brewing Company.

. . . . . .

CROSS EXAMINATION.

Mr. Schnurmacher (counsel for Manufacturers' Railway): I observe that your answers have been read from a typewritten statement in your hands. Who prepared that?

Mr. Smith: I did.

Mr. Schnurmacher: Were you assisted by anyone in the preparation of the paper?

Mr. Smith: I was not: . . I have necessarily to assume the entire responsibility of it, and do so. . . .

Mr. Schnurmacher: Who prepared the interrogatories; counsel?

Mr. Smith: I did. . . .

Mr. Schnurmacher: You prepared the questions to be propounded to you?

Mr. Smith: And the answers.

. . . . . .

Mr. Smith: Interrogatory No. 12 (omitted in direct examination) reads as follows: "Does the fact that the Interstate Commerce Commission decided that the Manufacturers' Railway was a common carrier justify the concessions that have been made by the steam carriers to the Manufacturers Railway . . . ?" . . .

(The answer is): The Interstate Commerce Commission decided that the Manufacturers' Railway was a common carrier, subject to the act to regulate commerce. All corporations or persons that transport property for hire are common carriers. The Interstate Commerce Commission has, however, distinguished the Manufacturers' Railway from other similar common carriers, as being subject to the act to regulate commerce. This decision did not justify the railways in making the concessions that have been made. It does not follow that the commission will, after due consideration, decide that the Manufacturers' Railway is entitled to any concession or to participate in the through rate. . . .

Mr. Schnurmacher: What working arrangement, what traffic arrangement is there at this time between the Louisville & Nashville and the Manufacturers' Railway in force?

Mr. Smith: I am not accurately informed, but I believe that with the exception of one or two matters like the per diem rules agreement which Mr. Moore testified to yesterday the Louisville & Nashville is in the same category as the other railways, and is therefore subject to the same criticisms I made on incompetent management of the railways.

Mr. Schnurmacher: It is equally criminal then, in your opinion, with all the other railways?

Mr. Smith: Certainly.

. . . . . .

Mr. Schnurmacher: . . . When did you learn that some tariff had been filed whereby the charges of the Manufacturers' Railway were being absorbed by your company?

Mr. Smith: I don't recall that I ever saw the tariff or that I was ever consulted. I was brought into the contention . . . in connection with another somewhat similar contention that the so-called Birmingham Southern had made, which if (this) contention was granted, very seriously affected or would very seriously affect the interests of the Louisville & Nashville; and that it based its tariff largely upon the decision of the Interstate Commerce Commission in the Manufacturers' Railway case. If its

contention was granted it meant a similar allowance to numerous other industries similarly situated performing somewhat similar although a less expensive service on various parts of the Louisville & Nashville system. The revenues involved or the cost involved was so great that my efforts necessarily were called into action to prevent this imminent disaster to the Louisville & Nashville. . . .

Mr. Schnurmacher: With respect to these other cases which you have referred to, you are making the contention that they are mere tap lines or industrial railways and not common carriers, are you not, Mr. Smith? . . .

Mr. Smith: There are numerous other industries besides the Anheuser-Busch Brewing Association in and around St. Louis as well as other parts of the country that have constructed and maintain tracks and operate them and are entitled to the same concessions that may be allowed the Manufacturers' Railway. . . .

If the conditions that now exist are to continue you will breed industrial railways or railways of a similar character as you might breed rabbits. There are probably a dozen in and around St. Louis with their mouths open and their teeth sharpened to receive similar concessions. Some are already being built. . . .

Now, I do not believe the United States government has created a commission and enacted laws to give undue advantage and require unjust discrimination in favor of such subterfuges, because it is nothing but a subterfuge. The Anheuser-Busch Company, in addition to the profits of its regular business, is endeavoring to secure additional profits and additional advantages over its competitors through this Manufacturers' Railway, which is owned by the same interests that own the brewing company.

. . . . . .

Mr. Schnurmacher: What steps have you taken to cancel those absorptions and prevent the payment of criminal and illegal rebates in your opinion, under the tariffs in force between you and the Manufacturers' Railway Company?

Mr. Smith: I have not taken any and . . . I am therefore running the risk of being sent to the penitentiary, I suppose.

Mr. Schnurmacher: Why are you taking that risk if in your opinion the absorption of those charges is illegal and criminal? . . .

Mr. Smith: Because, as I have already explained, there is a division of duties, and the traffic officials assumed the responsibility, and they did it because of the Big Stick, the boycott, and in my opinion they acted unwisely and also illegally. . . .

Mr. Schnurmacher: Is there not another reason; is not the revenue the principal reason why you have not ordered the cancellation of that arrangement?

Mr. Smith: The matter of revenue derived from transportation of malt liquors did not, I confess, receive my personal attention until recently, or until I commenced looking into this matter; in view of this possible hearing I directed the auditor of receipts of the Louisville & Nashville to prepare a statement of the shipment of malt liquors from St. Louis and East St. Louis and some other points during the month of October. And I also undertook to advise myself of the tariff rates we were receiving for the transportation of such property, and I was greatly surprised to find that we were transporting a large part of the traffic under rates and conditions, conditions being exceedingly onerous, that in my opinion rendered the business unremunerative. So that I have not as yet had an opportunity to make up my mind what was best to be done in the future. But much, of course, will depend upon the final adjudication of this contention by the Interstate Commerce Commission and possibly by the courts of the United States, and if the decision is finally against the railways and what I deem against the interests of the railways, then I shall be prepared to take up with the officials of the Louisville & Nashville the question of quietly withdrawing from competition for traffic that I believe to be unremunerative.

. . . . . .

Examiner Mackley: The Commission did not condemn the allowance or divisions outright in its report, did it?

Mr. Smith: As I understand, the commission merely decided that under the act to regulate commerce the Manufacturers' Railway was a common carrier and that, therefore, an allowance might be legally made; or, to put it another way, that through rates might be established between points on the Manufacturers' Railway and points on the steam road; but they did reserve the question of what the allowance should be, cautioning as I think, the steam railways against allowing too much or possibly against allowing anything, or so far as it related to property shipped by or received by the independent industries, and reserving, however, the right to decide what portion or part of the Manufacturers' Railway was a plant facility.

. . . . . .

Examiner Mackley: You constructed that opinion to mean that that referred only to independent shippers; is that your idea?

Mr. Smith: Well, not necessarily, although the Commission in that opinion did reserve the question as to what part of the Manufacturers' Railway was a plant facility, the inference being that should they decide that the tracks serving the Anheuser-Busch Brewing Association were a plant facility no allowance could be legally made to the Anheuser-Busch Company.

Examiner Mackley: They did not find in there or make any statement that these allowances as a whole were unlawful in their opinion; that is, whether the Anheuser-Busch Brewing Association or to independents?

Mr. Smith: They seem to have left the question of allowance to the judgment of the parties directly interested, the steam railways and the Manufacturers' Railway, at the same time cautioning them that they must not make an undue allowance that could be construed as being excessive and possibly an unjust discrimination. In other words, the question was left open.

Examiner Mackley: What I mean is, did you construe that to mean that they were not to make any allowances at all to the Anheuser-Busch people, and that the allowances to them were unlawful, but they might not be lawful to the independent shippers?

Mr. Smith: Does not that depend on whether they decide that the tracks of the Manufacturers' Railway in the Anheuser-Busch Brewing Association's plant are plant facilities, and that therefore the services rendered by the Manufacturers' Railway to the Anheuser-Busch Association is a plant facility service?

. . . . . .

Mr. Schnurmacher: Did you have . . . the opinion (of the Commission) in mind when you prepared your statement that you read here today? . . .

Mr. Smith: The United States government through Congress did not enact the Act to Regulate Commerce and create a commission charged with the responsibility of securing to the people of the United States equal and just treatment on the part of the carriers and then in addition or contrary to that purpose, or you might say cancelling that purpose, turn around and require the steam railways to discriminate in favor of this larger shipper as shown in that statement there—what was it, 30 per cent. of the total?

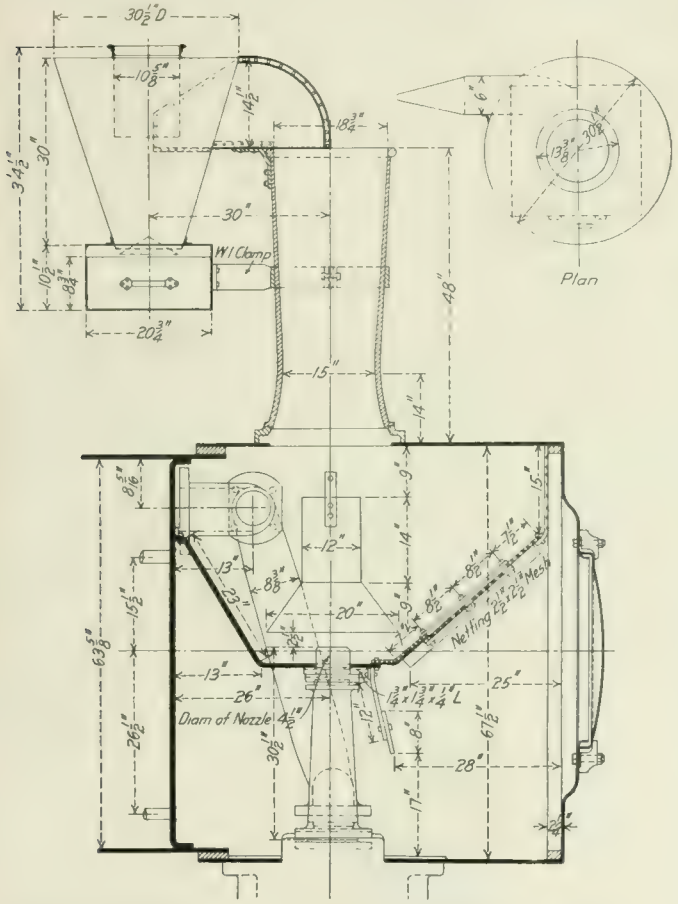
Mr. Schnurmacher: No, one-thirtieth of all the tonnage handled in St. Louis, they say, is this brewery product.

Mr. Smith: They cannot decide that the steam railways must make to that big shipper already controlling such a large part of the traffic of the city of St. Louis, undue concessions or make discriminations and transport the property of that concern for less than it does for similar industries, although they may be much smaller.

No figures as to tonnage over the Madeira-Mamore Railway, Chile, have as yet been received, but a statement has been made showing that the gross earnings from provisional operation up to mile 140, from January 1, 1911, to November 30, 1911, were $600,785. This is from provisional operation only, as the line is not yet open for commercial operation for fear of interfering with construction. Commercial operation will be inaugurated early this year as far as the mouth of the Abuna river.

TESTS IN SMOKE ABATEMENT ON SANTA FE SWITCHING LOCOMOTIVES.

The committee on Investigation on Smoke Abatement and Electrification of Railway Terminals, Chicago, which is working under the Chicago Association of Commerce, has issued six bulletins on various phases of the subject. Bulletin 6 is a report of tests made by the Santa Fe in smoke abatement and an analysis of smoke gases from switch engines in the Chicago yards. The report shows encouraging results from the use of Pocahontas coal, the brick arch and steam jets with 2-in. ferrules in the side of the firebox. It includes also one of the most thorough analyses of locomotive smoke gas that has ever been made. The pamphlet covers 32 pages and contains four large charts which give a continuous graphic record of the principal data. Six pages of the bulletin contain a detailed report on the analysis of locomotive smoke gases, which is not here included. The tests were made under the direction of H. B. McFarland, engineer of tests of Santa Fe.



Cinder Catcher Used on Santa Fe Switching Locomotive.

During the past eight or nine years a great many smoke preventers have been applied to locomotives in Chicago, and some of the appliances thus tried have been on the engines for several years. Few have had any value in reducing the total amount of smoke delivered from the stack. For the most part they were simply aids for the dilution of the smoke made in the firebox.

The most important apparatus applied to the locomotive for the reduction of smoke is the brick arch. It is of value in this direction, because it aids in maintaining uniformity of temperature of the gases in the firebox, even though there is great irregularity in conditions of operation of the locomotive. When the products of combustion contain free carbon, to any extent, as well as a quantity of tarry or hydro-carbon vapors, the resultant mixture is usually recognized as smoke. The degree or grade of smoke depends on the quantity of tarry vapors present in the mixture.

If, in the burning of coal containing a large percentage of volatile matter, the temperature of the resultant gases can be maintained sufficiently high and uniform for a considerable period of time, then the tarry vapors in the smoke will be greatly reduced. Unfortunately, however, the construction of our locomotives is such that the process of ignition and combustion of gases is accompanied with the extraction of heat from the gases in the same chamber or firebox, so that a uniformity in the temperature of the gases is not maintained.

Arrangements were made about two years ago to supplement these smoke-reducing devices by changing the grade of coal and the results of tests made at that time were so favorable that a change was made from Illinois to Pocahontas coal for switch engines in Chicago, even though the cost for the Pocahontas coal was 75 per cent. greater than for the Illinois coal.

OBJECT OF TESTS.

The object of the tests was to obtain an exact record of the smoke issuing from a locomotive in regular switching service in and around the Eighteenth street yards, Chicago, and to determine, if possible, the total amount and the size of the cinders thrown out by the switch locomotives. It was also desired to establish a comparison of the results now being obtained, with the percentage of smoke and cinders that would issue from a locomotive in regular and ordinary service if Illinois coal were used as formerly, instead of Pocahontas. Santa Fe switch engine 2024, in regular switching service in the passenger coach yards at Eighteenth street, Chicago, was equipped for comparative tests. It has a brick arch, 20 in. x 26 in. cylinders, six drivers 51 in. in diameter, and weighs 144,600 lbs. on drivers. The firebox is 41¼ x 102⅛ in., and the grate area is 29.2 sq. ft. Test runs were made with this engine using both Pocahontas coal and Illinois coal. The tank was calibrated and fitted with water gages so that the water consumption could be determined. A record was kept of the number of scoops of coal fired and an average weight per scoop was determined, so that the coal consumption could be calculated. Connections were tapped into the smokebox, so that samples of the flue gas could be drawn off for analysis.

It was found desirable to determine the character and the amount of the cinders thrown out of the stack. A specially designed cinder catcher was used for this purpose, a drawing of which is shown herewith. A portion of the stack area, in the form of a sector of a circle, laid off to be a definite percentage of the total stack area, is covered with a special hood. This hood conducts all of the smoke and cinders entering this known area into a sheet iron hopper, where the solid matter is separated and collected at the bottom, and the smoke is liberated to the atmosphere. The hood was shifted about the stack during the tests in order to collect an average sample of exhaust products.

All observations were made on a time basis. A continuous log showing the density of the smoke, the coal fired, the use of the injector, the use of the blower, and the steam jet operation, was recorded, as well as the number of cars handled at any given time, starts, stops, periods of standing, and any other data bearing on the general performance of the engine. These data have been plotted in chart form for a portion of a one-day test and are shown herewith. The charts give opportunity for a thorough study of the bearing the various operations in locomotive performance have toward one another in the production or abatement of smoke.

Smoke observations were based on a comparison with the Ringelmann smoke chart. No attempt was made to determine intermediate densities between 20, 40, 60 and 80 per cent., as the transition from one grade to another was accomplished too quickly to record. Samples of flue gases were drawn every hour during an interval of approximately 10 minutes, regardless of conditions of operation, so that the results give an average for the entire day's run.

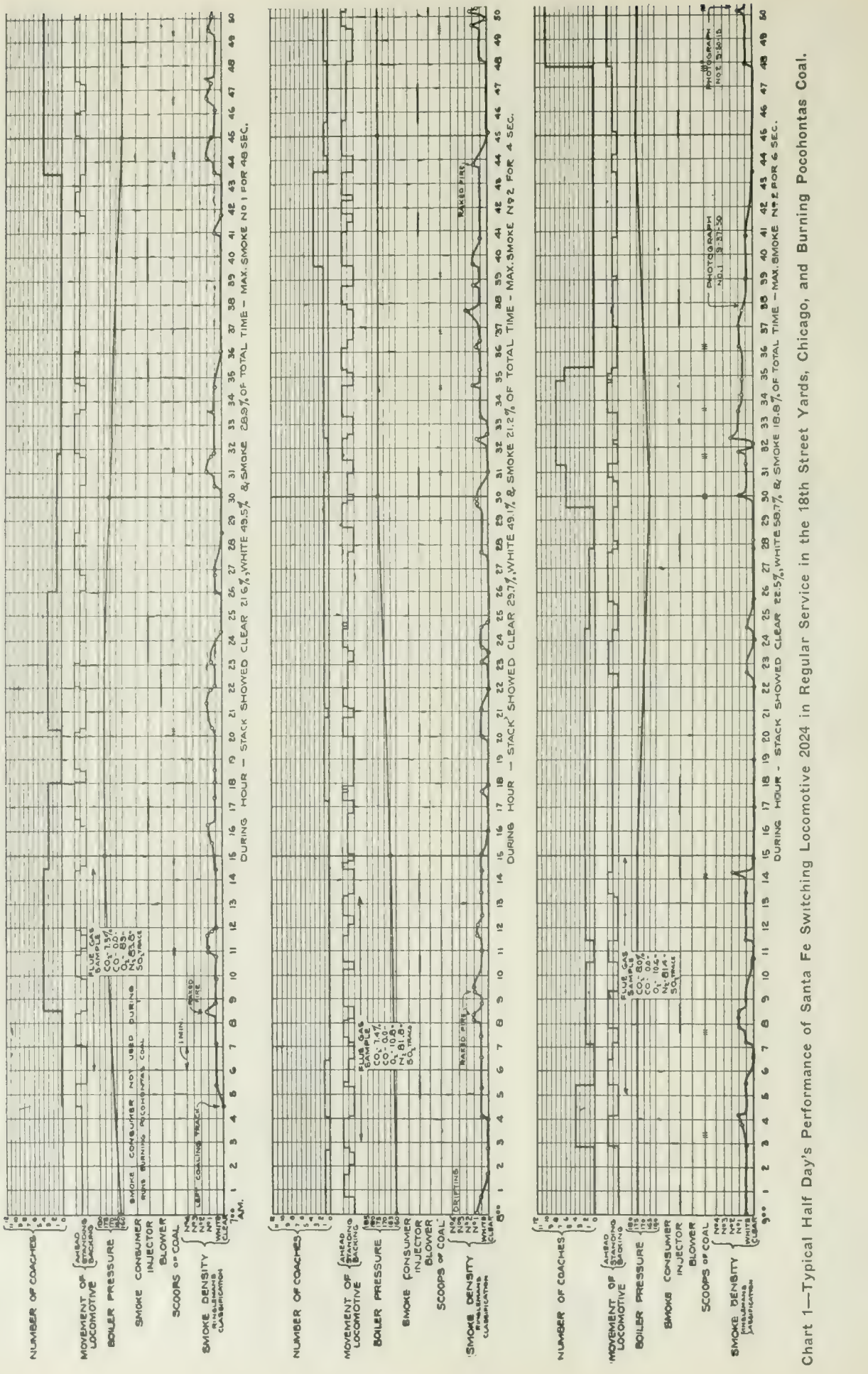


Chart 1—Typical Half Day's Performance of Santa Fe Switching Locomotive 2024 in Regular Service in the 18th Street Yards, Chicago, and Burning Pocohontas Coal.

RESULTS OF TESTS.

Smoke.—In making a general study of the smoke density for the period shown in the typical day's test, three classifications are made, viz., "smoke," "white," and "clear." The term "smoke" includes all grades from vapor to the maximum. By "white" is meant the absence of any color to the exhaust at time of observations. When "clear' neither smoke nor exhaust could be seen, nothing but a colorless heat vapor being driven off.

Pocahontas Coal.—The stack gases for the day's test with Pocahontas coal, based on the above classification, shows as follows: The division is based on the percentage of total elapsed time. Stack gases: White, 34 per cent.; clear, 42 per cent.; smoke, 24 per cent. During the test with this coal no smoke above the grade of No. 4 was observed. The average duration of smoke was from three to eight seconds, the smoke lasting only from four to eight exhausts after a given firing period; the stack then cleared up and showed white. The extreme periods of smoking occurred at the times the fire was raked or just after the engineer had shut off the steam and the locomotive was allowed to drift.

Illinois Coal.—A classification of the stack gases when burning Illinois coal, on the same basis as that used for the Pocahontas coal and divided according to the total elapsed time, is as follows: White, 18 per cent.; clear, 2 per cent.; smoke, 80 per cent. During this day's test, the maximum grade of smoke observed was No. 4, no dense black smoke being observed at any time. Not only was the duration of the smoking periods greater than with the Pocahontas coal, but the average density of the smoke was much higher.

Coal Consumption.—During a period of nine hours and forty-seven minutes, 251 scoops of Pocahontas coal were fired. This equals 3,765 lbs., or 386 lbs. per hour. The rate of evaporation was 9 lbs. of water per pound of coal fired. During a period of nine hours and twenty-seven minutes, 283 scoops of Illinois coal were fired. This equals 4,320 lbs., or 457 lbs. per hour. The rate of evaporation with the coal was 7.6 lbs. water per pound of coal fired.

A composite sample of each of the different coals was obtained in accordance with standards outlined by the American Society of Mechanical Engineers. The heating value of the coals was determined by the use of Mahler bomb calorimeter. The volatile matter, fixed carbon, ash, etc., were determined in accordance with standard methods of the American Chemical Society. The proximate analysis follows:

	Pocahontas.	Illinois.
Moisture, per cent.	1.76	0.45
Volatile matter, per cent	17.21	30.87
Fixed carbon, per cent	74.08	60.99
Ash, per cent.	6.91	7.69
Sulphur, per cent	1.06	2.34
Heating value, B. t. u. per pound	14,085	13,331

Analysis of Ash.—A composite sample of ash taken from the ash pan during each day's test analyzed with results as follows:

	Pocahontas.	Illinois.
Moisture, per cent.	0.59	0.61
Volatile matter, per cent	7.85	3.97
Fixed carbon, per cent	43.90	48.17
Ash, per cent.	47.65	48.25
Sulphur, per cent.	0.17	0.15
Heating value, B. t. u. per pound	8,241	5,266

Cinders from Stack.—The special cinder hopper was used throughout each day's test. This device served to divert 10.87 per cent. of the total amount of exhaust gases passing out of the stack. The solid matter was separated and retained; the smoke was liberated. The position of the hopper inlet in relation to the stack was changed from time to time to obtain results that would reflect an average condition. Knowing the relation of the area of the hopper inlet to the area of the stack, the entire amount of cinders passing out of the stack could be estimated from the amount caught and retained by the hopper. The results for the Pocahontas coal were as follows:

Total elapsed time	9 hrs. 47 min.
Dry weight of cinders caught	2.75 lbs.
Estimated total weight of cinders thrown from stack	29.88 lbs.
Estimated total weight of cinders thrown from stack per hour	3.17 lbs.

The ratio of pounds of coal fired to pounds of cinders thrown from the stack is 1 to 0.0082. This ratio gives 16.4 lbs. of cinders passing from the stack per ton of coal fired, or only .82 of 1 per cent. of the coal fired goes from the stack in the form of cinders. In 1910, 22,608 tons of Pocahontas coal were fired in Santa Fe switch locomotives in Chicago. At the ratio of 16.4 lbs. of cinders per ton of coal fired, 185 tons of cinders were thrown from these locomotives in that year.

The following data covers the cinders thrown from the stack when using Illinois coal:

Total elapsed time	9 hrs. 27 min.
Dry weight of cinders caught	3.06 lbs.
Estimated total weight of cinders thrown from stack for entire day	32.65 lbs.
Estimated total weight of cinders thrown from stack per hour	3.46 lbs.

The ratio of pounds of coal fired to pounds of cinders from the stack is 1. to 0.0076. This ratio gives 15.2 lbs. of cinders passing out of the stack per ton of coal fired, or only 0.76 of 1 per cent. of the coal fired goes out of the stack in the form of cinders. In 1909, 24,714 tons of Illinois coal were fired in Santa Fe switch locomotives in Chicago. At the ratio of 15.2 lbs. of cinders per ton of coal fired, 188 tons of cinders were thrown from locomotives in Chicago during that year.

A proximate analysis of the cinders gave the following results:

	Pocahontas.	Illinois.
Moisture, per cent	1.38	1.34
Volatile matter, per cent	11.73	6.95
Fixed carbon, per cent	27.40	39.41
Ash, per cent	59.49	52.30
Sulphur, per cent	0.59	0.26
Heating value, B. t. u. per pound	4,362	6,103

These figures as to the cinders thrown from the stack in switching service discredit the popular theory of great heat losses due to cinders passing out of the stack. In Goss's "Locomotive Performance," figures are given for laboratory tests under various working conditions showing losses in the form of cinders passing out of the stack varying from 2.8 per cent. to 10 per cent. of the total coal fired. The results of the tests on engine 2024 in the Chicago yards, show but 0.82 of 1 per cent. of the total Pocahontas coal fired passing out of the stack in the form of cinders. These cinders contained but 4,362 heat units to the pound, whereas the coal initially contained 14,085 heat units to the pound, so that the loss in cinders passing out of the stack, expressed in heat units, is but 0.25 of 1 per cent. of the total coal fired. When firing Illinois coal the total cinders amounted to 0.76 of 1 per cent. of the total coal fired. These cinders contained 6,103 heat units to the pound, whereas the coal initially contained 13,331 heat units to the pound, so that the loss in cinders passing out of the stack, expressed in heat units, was but 0.35 of 1 per cent. of the total coal fired.

Flue Gas Analysis.—Samples of flue gas were drawn every hour over a period of approximately ten minutes. No consideration was given to the conditions of operation at the time samples were taken, so that the results obtained reflect average conditions for the day. Following are the average results of hourly analyses made during each day's test:

	Pocahontas.	Illinois.
Carbon dioxide, per cent	8.0	6.8
Carbon monoxide, per cent	0.0	0.0
Oxygen, per cent.	9.6	11.9
Nitrogen, per cent	82.4	81.3
Sulphur dioxide, per cent	Trace	Trace

There was a considerable variation in the per cent. of carbon dioxide as well as the per cent. of excess of oxygen for different samples taken at different times. At no time, however, did analyses show any per cent. of the poisonous carbon monoxide gases indicating incomplete combustion. Moreover, none of the samples taken during the day showed more than a trace of sulphur dioxide in the flue gases.

DISCUSSION OF RESULTS.

Chart 1 shows a typical day's run and may be studied as representative of the performance of all switch engines around the Eighteenth street yards burning Pocahontas coal. Chart 2 shows

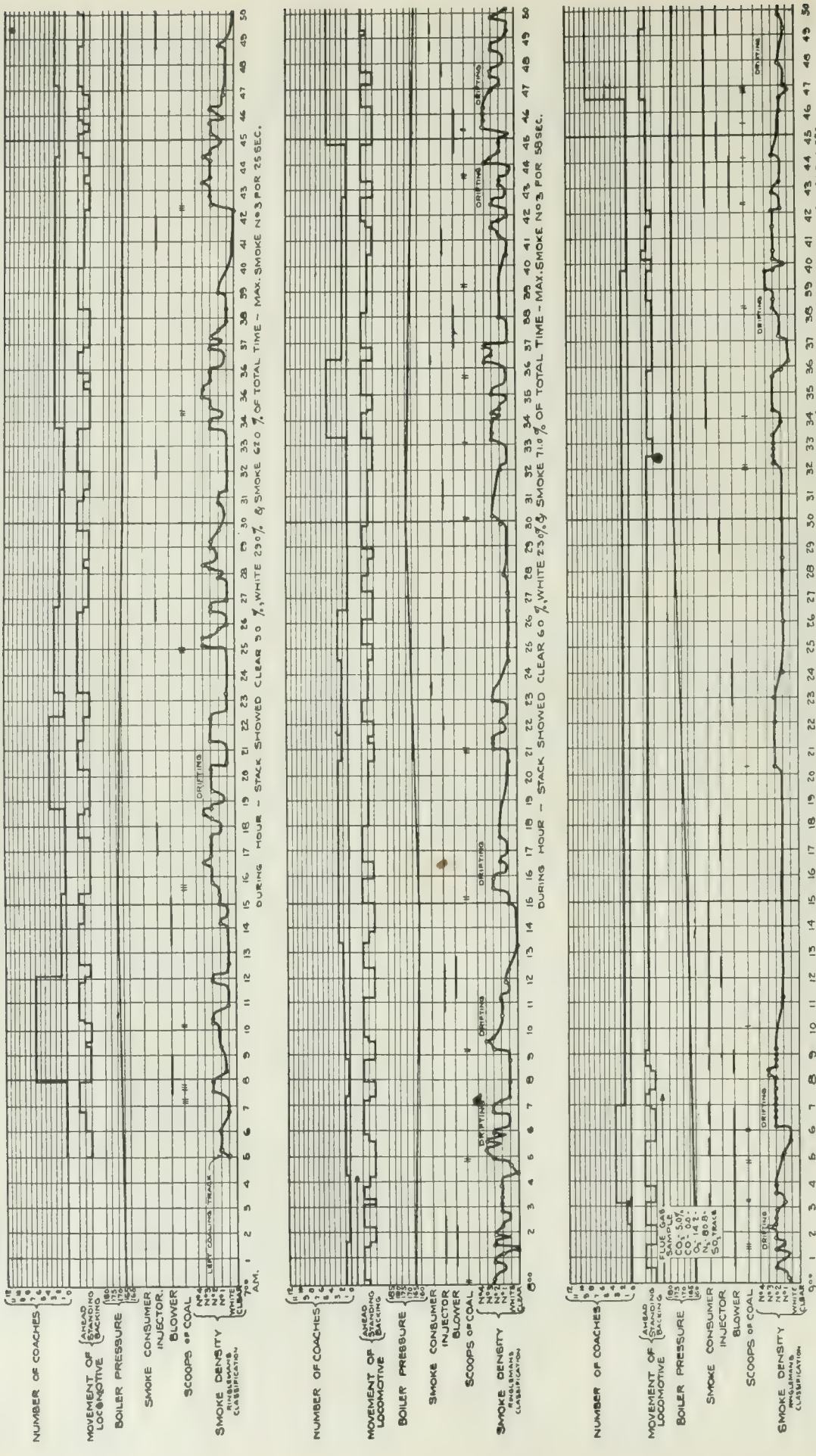


Chart 2—Typical Half Day's Performance of Santa Fe Switching Locomotive 2024 in Regular Service in the 18th Street Yards, Chicago, and Burning Illinois Coal.

a typical day's run with the same engine, but burning Illinois coal. The advance made by the Santa Fe in smoke abatement, since the introduction of Pocahontas coal as regular fuel, on all engines in Chicago, two years ago, may be readily noted by a study of Chart 1 in comparison with Chart 2.

The short duration of smoke when Pocahontas coal was used is particularly noticeable, owing to the rapid transition of smoke density from a condition of "smoke" to "clear" or "white." The analysis of the flue gases shows very complete combustion of gases for both fuels. This condition is to be expected on locomotives in this class of service, where the work is comparatively light and it is not necessary to force the fire at any time during the day. The large percentage of oxygen present in the flue gases, shows that a large excess of air was admitted so that the gases are highly diluted. This condition accounts for the low percentage of carbon dioxide.

The recorded results show that the total smoke from switch engines is much less in intensity from the use of Pocahontas than from the use of Illinois coal, and the duration of the maximum density period of smoke is much shorter. The stack showed "white" for 34 per cent. of the time with Pocahontas coal, as against 18 per cent. of the time with Illinois coal. The stack showed "clear" 42 per cent. of the time with Pocahontas coal and only 2 per cent. of the time with Illinois coal. It showed "smoke" 24 per cent. of the time with Pocahontas coal as against 80 per cent. of the time with Illinois coal.

The analysis of the gases showed no poisonous carbon monoxide gas present at any time for either of the coals. A large per cent. of excess air insuring complete combustion was present at all times. There were traces only of sulphur dioxide in all samples of gases from both coals.

The evaporation per pound of fuel was greater for Pocahontas than for Illinois coal, being only 85 per cent. as much for the latter as for the former coal. The fuel consumption per hour was light, averaging 386 lbs. for the Pocahontas and 457 lbs. for Illinois coal. The amount of cinders thrown from the stack was small, being only about 16 lbs. per ton of coal fired.

The steam jets were rarely used when burning Pocahontas coal; they were frequently used in order to hold down the density of the smoke when burning Illinois coal. In general the results of the test indicate a very decided reduction in total amount of smoke from the use of Pocahontas instead of Illinois coal.

The permanent survey of the North Coast Railway, New South Wales, has been completed from Maitland to South Grafton.

DERAILMENT AT WARRIOR RIDGE, PA.

At Warrior Ridge, Pa., four miles west of Huntingdon, on the middle division of the Pennsylvania, on Thursday, February 15, at 11:52 a. m., an eastbound express train, the "Pennsylvania Limited," No. 2, was derailed by the breaking of a truck, and five persons were killed or fatally injured. There were about 100 passengers on the train, of whom about half were injured. The passenger cars were all overturned and the escape of such a large proportion of the passengers is attributed to the strength of the cars, which were of steel.

The train consisted of two locomotives, a postal car, a combination baggage and smoking car, two dining cars, three sleeping cars and a compartment observation car.

The part that failed was a broken lower arch bar of the right hand side of the forward truck of the tender of the second locomotive of the train, engine number 3350. The breaking of the arch bar caused the column bolt to break and allowed the arch bar to fall below the level of the rail. It wedged itself between the switch and stock rail at the Warrior Ridge water station, breaking five feet off the switch rail and canting the stock rail outward. This caused all the wheels back of this truck to be derailed, and the train left the track, with the exception of the postal car next to the engine, which with the rear truck of the tender re-railed themselves a short distance east of the derailment. The cars which left the track fell down a slope at the right of the tracks, some thirty feet.



Wreck on Pennsylvania Train No. 2 at Warrior Ridge, Pa., February 15.

Two passengers and three employees were killed or fatally injured and about sixty passengers and employees were injured, these employees being nearly all cooks and waiters in the dining cars. The train was running about fifty miles an hour. All of the derailed cars were of steel and while not much broken, parts of them were bent and badly damaged.

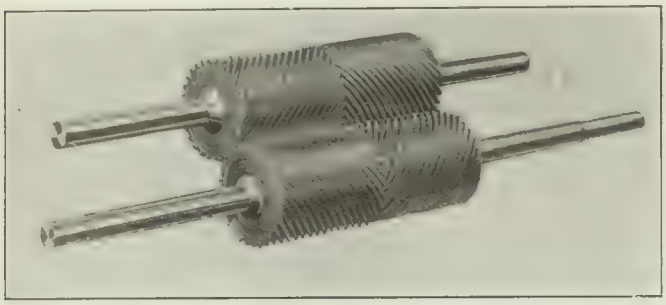
A picture of the wreck, taken from the high bluff at the left of the roadway, is reproduced herewith. Some of the cars lodged on the ice in what was formerly a lock of the old Pennsylvania canal. In the cars worst wrecked, the dining car and one other, much damage was done by one or more trucks being forced through the floor. It appears that all of the killed were in these two cars.

The official inauguration of the Treinta y Tres eastern extension of the Central Uruguayan Railway took place early in November, in the presence of the ministers of the interior and public works. The completion of this railway will greatly assist in the development of the town of Treinta y Tres and the rich cattle and agricultural region tributary to the railway line.

A NEW TYPE OF STEAM TURBINE.

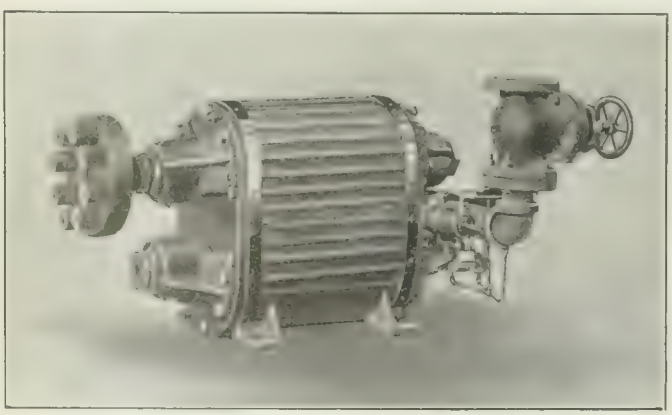
A new type of steam turbine, called the Spiro, has recently been placed on the market by the Buffalo Forge Company, Buffalo, N. Y. This turbine was invented by John H. Van Deventer, superintendent of the Buffalo Forge Company, who has been developing and perfecting it for the past three years, until now the Buffalo Forge Company is making it as a commercial product. Although small in size it has a large range of power, the one illustrated herewith being 185 h. p. At the present time, however, the commercial sizes range only from 1 to 50 h. p., non-condensing, but patterns are being completed to run these sizes up to 300 h. p.

The construction of the turbine is very simple, it consisting of two runners with herringbone teeth or vanes, the case of



Runners for Spiro Steam Turbine.

the turbine and the two heads which hold the runners. The vanes of the runner are cut from a solid cylindrical piece of steel with a special tool, which does away with all inserted vanes. The steam is applied at the center of the runner at the apex of the vanes being deflected so as to strike the vanes in the angle. As the vanes revolve the steam is pocketed between them and the casing, and in this pocket the steam expends and drives the runners. The maintenance of the whole outfit is slight, as the steam forms an elastic cushion between the vanes of the runners, which tends to decrease the wear. The leakage will be small between the vanes, as the difference in pressure between them will be small. The runner bearings, being in the heads of the turbine, will need no extensive packing, as they are surrounded with the exhaust steam. The lubricating system of the bearings is so designed that each bearing acts as an individual oil pump, cir-



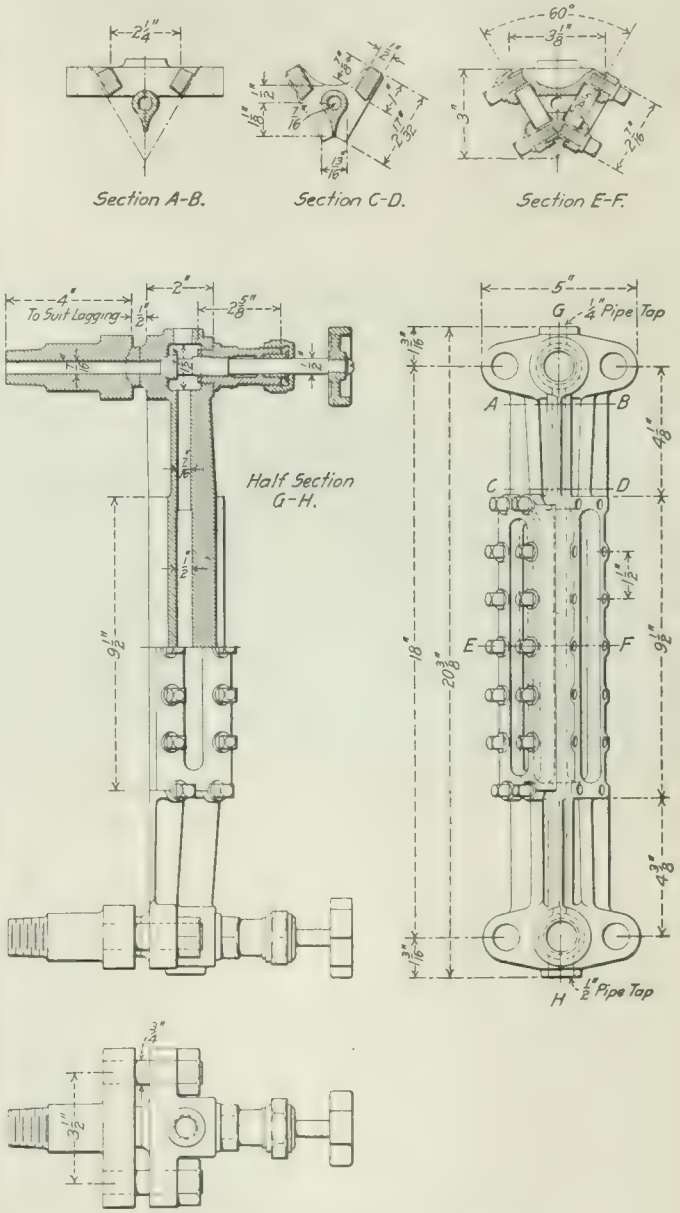
Spiro Steam Turbine, Rated at 185 H. P.

culating the oil through the bearing between the shaft and the bushing with a positive pressure. In this way an oil film is maintained as long as there is any oil in the reservoirs.

Tests which have been made on this type of turbine show that, with an initial pressure of 101.5 lbs., 25.3 h. p. was obtained at a speed of 2,450 r. p. m. The water used per brake horse power was 53.2 lbs. Another test, at an initial pressure of 115 lbs., showed 151 h. p. at a speed of 2,710 r. p. m., with a water consumption of 31.8 lbs. per brake horse power. Both of these tests were made non-condensing. The special uses for this turbine are the driving of fans and other similar machinery, for the larger sizes, and the operation of small hand drilling machines for the smaller sizes. The great power that is obtained from such a small machine is the chief advantage of this turbine.

GOODWIN DUPLEX WATER GLASS.

A high pressure water glass arranged so that both members of the locomotive crew can see the water level from any point in the cab without the use of mirrors, has been applied to the Pacific type locomotives recently built for the San Pedro, Los Angeles & Salt Lake. This water glass was designed and is being manufactured at the Los Angeles shops of the Southern Pacific. It has a number of advan-



Goodwin Duplex Water Glass.

tages in addition to its range of visibility. Plain glass, 5/8 in. in thickness, is secured in place in the same manner that the reflex glass usually is. The connection to the boiler fittings is made with ground joints, each end of the frame holding the glass being secured by two studs, eliminating the necessity of using any gaskets or nipples. A special ball washer is provided for the joint which can be easily ground in place. The material throughout, except the small studs, is of brass.

General News Section.

The Chicago, Milwaukee & Puget Sound has announced its intention of erecting two hotels for the accommodation of tourists, one on Mount Tacoma and another at a point on Puget Sound not yet announced.

F. A. Delano addressed the Chicago Real Estate Board on February 15 on the subject of Chicago railway terminals, with particular reference to the proposed plans for a passenger station at Twelfth street.

An attempt was made to hold up Vandalia train No. 11 near Liggett, Ind., on the night of February 17 by men who flagged the train and shot at the engineman and fireman. When the former escaped they left without robbing the train.

During the year 1911 the Pacific Fruit Express Company used in refrigerator car service on the Southern Pacific 1,467,433 cakes of ice, each 39 in. long, 22 in. wide and 11 in. in thickness, the whole weighing 220,115 tons. This quantity would make 11,006 carloads of 20 tons each.

The Bessemer & Lake Erie, having a light freight business because of the suspension of lake ore traffic, has lent ten freight engines to the Erie, for use on the line between Marion and Chicago; and 15 enginemen and 15 firemen of the B. & L. E. are serving temporarily on the Erie.

A bill has been introduced in the lower house of Congress to establish an Alaska railway commission, of three members, to carry out the recent recommendation of President Taft that the government undertake surveys looking to the construction of a railway to develop the coal and other resources of Alaska.

John W. Skeele, vice-president of the old Lehigh Valley Coal Company, has been elected president of the new Lehigh Valley Coal Sales Company, which was recently organized, as noted in these columns under Financial News; this to comply with the commodities clause as interpreted in recent court decisions.

C. C. Tegethoff, J. W. Harriman, A. G. Hackstaff, and W. H. Averill have been elected directors of the United States Express Company, representing the interests of the estate of the late E. H. Harriman who, about four years ago, bought 22,000 shares of the company's stock from the Adams and American Express companies.

C. H. Middleton, formerly assistant to the vice-president of the Missouri Pacific, has been engaged by the Colorado state board of equalization to make an appraisal of the value of the Atchison, Topeka & Santa Fe in the state, to be used as evidence in suits brought by the Santa Fe contesting the correctness of appraisals made by the board.

The Employers' Liability Commission has completed its report and submitted it to the president, who, on Tuesday last, sent it to Congress with the recommendation that the bill proposed by the commission be enacted. The tentative proposals of the commission were noticed in the *Railway Age Gazette* of December 15 last, page 1201.

The Pere Marquette has reduced the working time in its shops at St. Thomas, Saginaw, Grand Rapids and Ionia from six 9-hour days a week to five 8-hour days a week. The company has also withdrawn from service one passenger train between Lansing, Mich., and Grand Rapids, and two trains between Grand Rapids and Detroit, in the interest of economy.

The Saginaw (Mich.) board of trade has addressed a protest to the attorney-general of the state asserting that the service rendered by the Pere Marquette is inadequate and that its financial condition is such that it is impossible for it to provide needed improvements. The attorney-general was asked and has promised to make an investigation of the expenditure of the proceeds of recent bond issues.

Verdicts against the Canadian Pacific for damages done in Maine in the year 1898 by forest fires set by sparks from locomotives, and which have just been made public, will aggregate $139,400. The cases have been a long time in trial in the United States district court at Portland, Me. The damages awarded are about 50 per cent. of the amounts claimed, and about twice as much as the railway asserted the damage to be. These were test cases representing perhaps half of the losses from the fires in question.

The number of fires on the property of the Pennsylvania Railroad system during 1911, as reported by an officer of the company, was 891, from which the loss was $304.975. The measures taken by the company to prevent fires and to reduce the loss therefrom have been very successful, and there has been a steady increase year by year in the number of fires extinguished by employees. During the past year 43 fires were put out by the apparatus carried on yard locomotives. A circular has been issued for the information of the employees giving the causes of fires during the past years.

In accordance with a resolution passed at the annual meeting of the National Association of Railway Commissioners, President C. F. Staples has appointed a committee to make an investigation of rails and railway equipment used in the United States and to report whether or not the quality may be improved. The committee is composed of James E. Sague of the Public Service Commission of New York, Second district, chairman; W. J. Wood, chairman Indiana railway commission, and Charles Elmquist of the Minnesota commission. The committee intends to hold several hearings in different cities.

The westbound Pennsylvania Limited ran into the rear of a preceding work train near Larwill, Ind., on the Pittsburgh, Fort Wayne & Chicago, early on the morning of February 17, and five track employees were killed and 10 injured. The work train had been stopped because of a broken rail in the track ahead of it and the workmen were eating their breakfast in the caboose. There was a dense fog at the time and it is said that the passenger train had run past a block signal set against it and also past a flag sent back from the work train. The passenger train was made up of steel cars, and the baggageman was the only person on it who was injured. The wreck took fire and the bodies of two of the dead were badly burned.

In the Penobscot County Supreme Court at Bangor, Me., former conductor H. G. Dibblee has been fined $500 and sentenced to 60 days in jail, for the crime of manslaughter in connection with the collision of July 28, last, on the Bangor & Aroostook, near Grindstone, Me. As conductor of an excursion train, he ran his train past a meeting point designated by the despatcher. The first attempt at indictment proved abortive, but Dibblee was indicted at the next term. There have been several other attempts to punish railway men in Maine for manslaughter, but this is said to be the first case in which a sentence has been secured.

The Grand Trunk Pacific has "train agents" to collect fares, and the conductor keeps his hands off. According to a correspondent of a Montreal paper the G. T. P. train agent is notable for his extreme politeness to and consideration for his passengers. This correspondent says "In the West today, the 'train agent' steps up to you and makes a pleasant remark upon the weather, or bids you 'the time of the day,' and concludes with 'your ticket, please.' He waits patiently till he gets it, and then invariably says: 'Thank you.' If you are going far on the train, he will tell you about the hour you will get to your journey's end. If your trip is short he will tell you two, three, or four stations, as the case may be, and hand you a hat check. I watched the first 'train agent' I traveled with and he treated every passenger in the car in the same courteous manner. It was pleasing to see it, and I tell you it pleased the travelers a mighty sight better than the old-time poke in the ribs."

Railway Presidents Not Mouthpieces of Wall Street.

Darius Miller, president of the Burlington, in a recent newspaper interview, gave emphatic denial to an assertion by former Senator Flint of California, that railway presidents are mere mouthpieces for Wall street. Mr. Miller said:

"The stock ticker does not form a part of the furniture of a

great railway office, and the presidents of the roads do not serve as mouthpieces for Wall street.

"It is a mistake for anybody to assume that railway presidents are mere clerks for Wall street interests. The railway president of today is just as much a president de facto as he ever was. He is elected to operate a railway in all its branches and in the interests of the public and of the stockholders.

"It is a mistake to presume that because one is president of a railway he is also the financial controller. The actual operation of a big system comes ahead of all else. By operation I mean not only the running of trains but the solicitation of traffic and the manifold duties to the public. The president is elected to represent the stockholders, as a senator or congressman is elected to represent his constituents. The financial interests back of a road must necessarily rely for results on those actually managing the property.

"Railway managers are not guilty of running their systems to suit the stock market. I do not think you will find in any of the great Chicago railway offices a ticker or other paraphernalia of the stock market. The financial gambling element in this country works night and day, and the rumors and reports created and circulated by it to boost or injure a railway are not the least of the troubles of those in charge of our transportation interests."

Unfilled Tonnage of the Steel Corporation.

The report of the United States Steel Corporation shows that the unfilled tonnage on January 31 was 5,379,721 tons, an increase of 294,960 tons over the previous month. Shipments during the month were a little over 875,000 tons, or at the rate of 28,227 tons a day. The unfilled tonnage of January is the highest since March 31, 1910, when it was 5,402,514.

Proposal for a Government Railway in Alaska.

President Taft, in a special message sent to Congress Feb 2, recommending the leasing of mineral lands in Alaska, expresses the opinion that the government should build a railway to open the mineral treasures of Alaska to the people who live along the Pacific coast. The message says in part:

"The construction of a railway and ownership of the fee do not necessitate government operation. Pursuant, however, to the recommendation of the Secretary of the Interior, I suggest to Congress the wisdom of providing that the President may appoint a commission of competent persons, including two army engineers, to examine and report upon the available routes from Seward to the Matanuska coal fields [150 to 200 miles], and into the Tanana and Yukon valleys, with an estimate of the value of the existing partly constructed railway and of the cost of continuing it to the proper points in the valleys named. This proposal is further justified by the need that the navy of the United States has for a secure coaling base in the North Pacific. The commission ought to make a full report also as to the character of the coal fields at Matanuska, and the problem of furnishing coal from that source for mercantile purposes after reserving for government mining a sufficient quantity for the navy."

The President is not in favor of government ownership where the same certainty and efficiency can be had by private enterprise, but he regards the situation in Alaska as exceptional; and a railway owned by the government can be leased on terms to be changed, as the territory is developed. The bondholders of the Alaska Central (now built over a part of the route), who are the real owners of that road, are willing to sell to the government.

The Value of Great Northern Ore Properties Estimated.

James J. Hill, in testifying before the Stanley steel committee, estimated that the Great Northern Ore properties were worth in the neighborhood of $500,000,000. He arrived at his estimate by the following method: There are 69,000 acres held by the Great Northern Ore trustees, of which only 39,000 acres have so far been worked, and Mr. Hill puts the amount of ore that can still be taken out at 500,000,000 tons. The ore can be sold at $3.40 a ton. Supposing it costs 60 cents a ton to mine, 60 cents a ton for rail transportation and 65 cents a ton for lake transportation; this would make the cost $1.85, leaving a profit of $1.55 a ton. The rail rate, however, is now 80 cents a ton, but is to be reduced to 60 cents in the near future. Mr. Hill estimated, therefore, that a dollar a ton for the 500,000,000 tons is a conservative estimate of what the property is worth. Mr. Hill testified that he paid $4,050,000 for the property and turned it over to the trustees of the Great Northern Ore for the same price, and these trustees issued certificates of participation to holders of Great Northern railway stock pro rata.

A Cool Porter.

"It was just like Dante's inferno," declared Milton Epstein of Fort Worth. "Everybody around me seemed to have cut faces. I had never seen so many bleeding people before. I saw one woman, a negress, lying dead beside the overturned dining car. She had been thrown through a window."

"In the third car of those that overturned," said E. E. Rogers, of Chicago, "we had a porter that was a brick. As we tilted over to one side he grabbed an end door and forced it open. 'Bad thing if the door should jam,' he said to us.

"I went down on the floor and I saw a woman lying near me, too much hurt to get up. After we quit rolling we were on our side. There was a row of seats, all on edge, leading from me to the door. 'This way out,' called the porter, 'step lively, please,' and that started a laugh in the car. Everybody got his wits together, and the women even quit crying to laugh. One little boy trilled out a treble cry, and that was all. I packed my suitcase and walked down the line of seats and out of the door. I believe if that porter had had a brush he would have brushed us off. He offered to take my grip."—*Report of Wreck at Warrior Ridge.*

Elimination of Grade Crossings at Wilkinsburg.

It is announced that the dangerous grade crossings on the main line of the Pennsylvania at Wilkinsburg, Pa., seven miles east of Pittsburgh, are to be done away with by changes of grade involving the construction of several overhead bridges and a short tunnel, the total expenditure to be about $1,000,000. It is said that the railway company will bear four-fifths of the cost and the borough one-fifth. This improvement has been the subject of negotiations for several years.

Disastrous Collision in Hoosac Tunnel.

The Hoosac tunnel of the Boston & Maine (five miles long) was blocked on February 20 by a rear collision, followed by a fire, which killed four men and filled the east half of the tunnel with smoke so dense and heat so intense as to prevent any attempt at immediate clearing of the tunnel. A freight train of 32 cars was stopped about 2,500 ft. from the east portal, and the rear brakeman went back and flagged a following passenger train. The brakeman got aboard the electric locomotive of the passenger train, but for some unexplained reason the train was not controlled and crashed into the freight train. Fire immediately broke out and the engineman of the steam engine of the passenger train had to back away immediately to save his train. The engineman of the electric locomotive and his assistant, an apprentice and the brakeman of the freight train were killed. Passenger trains are run through the Hoosac tunnel by having an electric locomotive coupled on in front of the steam locomotive of the train. No passengers were seriously injured. The collision occurred on a descending grade.

Disk Signals.

Many roads are still installing the enclosed disk signal. The enclosed disk signal has done very good work in the past, and continuing to do good work. Many roads prefer it to the semaphore as a distinctive block signal. The record of the enclosed disk signal is one that I venture to say will never be equalled. It is a wonderful record, and I have every belief that it will continue. It is simplicity itself.

I do not believe it necessary to indicate or mark an automatic signal by a marker light. The staggered light, that is, the red marker light, as an identification for an automatic signal is not always a necessity.—*H. S. Balliet,* at N. E. R. R. Club, Boston.

Remarking on Mr. Balliet's favorable mention of the enclosed disk signal, the president of the club, J. A. Droege, superintendent of the New York, New Haven & Hartford, at Providence, and formerly on the Lehigh Valley, observed that in his opinion this

type of signal was more reliable than the motor-operated semaphore; it could be installed for 40 per cent. less, and could be maintained for 40 per cent. less.

Accident Record—Correction.

In the derailment at Kissimmee, Fla., December 1, reported in the *Railway Age Gazette* of January 26, page 154, no person was killed and the injuries of the baggage man, the only person who suffered anything more than a trifling injury, were not serious. The accident was due to a broken rail. An officer of the company informs us that no passenger has been killed while riding in his proper place on any train of the Atlantic Coast Line in the state of Florida since the A. C. L. absorbed the Plant System, July 1, 1902. The length of the company's lines in Florida is about 1,500 miles, and the passenger business is heavy.

Frost on Signal Apparatus.

As far back as 1903, on the Lehigh Valley, we went through some severe sieges of frost. Great bonfires were built alongside of signal masts to try to fry out the frost. Alcohol was burned and other chemicals used to keep frost away. You can do nothing to beat frost unless you get on the right side of nature. Every piece of apparatus that we have on a railway, I am convinced, the more we try to seal it, close it up and stop it from breathing, as I call it, in other words, keep it air tight and thereby, as we believe, moisture proof, the more clearly does it appear that our efforts are of no avail. If the sun's rays get at that piece of mechanism at the right slant you will have frost and your relay armature will be frozen regardless. There is no way of getting away from the sun's rays, it can be on a cloudy day as well as on a clear day; the only way to get away from it is to study your local condition and move your apparatus away from those direct rays.—*H. S. Balliet.*

Signaling at the Grand Central Terminal.

The subject of the January meeting of the New England Railroad Club, at Boston, January 9, was railway signaling. The principal paper was by J. M. FitzGerald, engineer of maintenance of signals of the New York Central. Mr. FitzGerald gave a very full description of the elementary features of block and interlocking signals, and illustrated his paper with stereopticon views, a feature of these being a comprehensive exhibit of the aspects, old and new, now in use on the New York Central. These aspects are set forth in detail in a new book of rules on the operation and use of signals which has just gone into effect.

In the discussion of the paper the principal speaker was H. S. Balliet, signal engineer of the Electric division of the New York Central. Answering a question as to what, if any, difficulties were experienced in training enginemen in quick reading of the new and old aspects, Mr. Balliet said:

We have not one employee on the electric division of the New York Central who cannot stand right up and explain every one of those cuts to you offhand. It has not been a hard job. It is not difficult. There are only a few things to remember. Top arm always the main line. Middle arm always a diverging route at medium speed. Lower arm all other diverging routes. It doesn't matter where he sees the picture, be it day, be it night, he can always knows what it means.

Answering a question as to the cost of the elaborate protection provided at the new Grand Central terminal, Mr. Balliet said:

A track circuit in the simplest form—that is, a track circuit controlling one of these electric locks for an interlocking plant, will cost approximately $50. Those track circuits with the electric locks are giving us a great deal more protection than all the interlocking or so-called detector bars that we ever had. In other words, they are great long detector bars. . . . At the Grand Central Terminal we have perhaps found the hardest job of signaling that has been undertaken in the United States, because we have to handle all that big traffic, and keep the trains going. We have now in service the two largest electric interlocking machines in the world, one 360 levers, and the other 400 levers. The 400 lever machine is going to control ultimately twenty-three acres of tracks, all as dark as night—in other words, all covered up on the lowest level that we have in that station. We do not have in that terminal one frill. We have removed all detector bars from our switches and substituted therefor electric switch locking, with which switch locking we give the indications to the man who operates the levers. There is a light over the lever which gives him the information that the lever is free to be operated. The director sits on a chair at a table; he doesn't run round the building like a wild man, as he used to, or hang out of the window and holler to the trainmen, but he sits down like a quiet, decent person and looks at a picture which has a lot of lights on it. This says, "Mr. Director, the route from this track to the station track is clear—move your trains." That track circuit does three things: it ensures the switches being thrown properly, *i. e.*, it protects the lever man from operating his lever incorrectly, in addition to locking it, and it tells the director that the way is clear or occupied; so that whatever it costs us for track circuit we can divide by three.

Of course this is in electrified territory, and the devices are pretty complicated. Mott Haven Junction, which was shown on the screen, is an electro-pneumatic plant. That plant was left in its original condition, except that bars were removed and detector circuits substituted at a cost not to exceed $125 per circuit. And the number of circuits is very limited, so that we won't have much trouble in earning the interest on the investment at that point.

The B. L. W. Loyal Legion.

The Baldwin Locomotive Works, Philadelphia, Pa., has instituted the B. L. W. Loyal Legion as a form of recognition of the loyal and faithful service of all its employees who continued in the active service of the company during the strike last June in spite of the extreme pressure that was brought to bear to make them become disloyal, including intimidation and personal violence. Each member has been given a solid gold button containing in the outer rim the words "B. L. W. Loyal Legion," and in the center, in gold figures on black enamel, the number of years of faithful service rendered by the recipient. The accompanying illustration shows this button, actual size. These tokens of appreciation and good will by the employers have been highly appreciated by those entitled to them and have served to create a certain rank based upon loyalty and service. The numbers are to be changed each year, as the center of the button is removable. The total force at work on February 13, 1912, was 8,543 men, and the number enrolled in the legion was 3,562, or 42 per cent. of the total force. This enrollment includes commercial and engineering officers and technical staff, as well as the workmen employed in the shops. It comprises 2,055 men who have served faithfully and continuously for from one to 10 years; 936 men from 11 to 20 years; 390 men from 21 to 30 years; 132 men from 31 to 40 years, and 49 men from 41 to 50 years. There are 11 men who have been employed upwards of 50 years, the senior in point of employment being George Johnson, a traveling engineer, who has been continuously in the service of the company for 62 years, and is still at work. The percentage of the members of the legion to the total number of employees is, of course, subject to fluctuation, as the working force is continually changing. Men who enter the service of the company in future will not be eligible to the legion unless a similar emergency should test their faithfulness and loyalty.



Rail Hearing at Indianapolis.

The Indiana State Railway Commission held the first of a series of hearings on the rail situation at Indianapolis, on Tuesday, February 20. About twenty prominent railway operating officers and engineers, together with representatives of the large steel companies, were present, on the invitation of the chairman of the commission. At this hearing, testimony general in nature was offered by the representatives of railways and manufacturers regarding investigation work already done. Chairman Wood of the commission was explicit in his statement of the desire of the commission to assist in the work now being done by the American Railway Engineering Association, and urged the greatest co-operation between manufacturers and railways in view of the large number of rail breakages during the past two months. Papers prepared by Dr. Dudley, of the New York Central Lines, and Thomas Johnson and W. C. Cushing, of the Pennsylvania

Lines, outlining the early history of rails, the American Society of Civil Engineers' investigations, and the work of the American Railway Engineering Association, respectively, were read. Mr. Cushing emphasized the fact that study of chemical properties was not conclusive regarding the quality of rails and favored leaving the chemical properties to manufacturers, because of their greater experience; but railways should emphasize physical tests. Mr. Cushing also urged that an indefinite per cent. of discard is ample in one case, while 50 per cent. is not sufficient in another case. He believes it would be better for railways to test the finished product then to specify methods of manufacture.

F. A. Delano, of the Wabash, urged great care in reaching conclusions and outlined past experiences in the development up to conditions of today.

E. J. Buffington, president of the Illinois and Indiana Steel Companies, denied that the quality of steel made in this country today had deteriorated, and stated that manufacturers are making better steel than ever before, because of more scientific management. He urged great co-operation between manufacturers and railways, and realized that the manufacturer as well as the railway has a responsibility to the public. In reply to questions of the commisison, Mr. Buffington stated that the cost of manufacture of rails was $22.30, and the selling price $28. He also stated the manufacturer replaces broken rails whenever a fault is proved in manufacture. He said that Mr. Farrell's testimony before the Congressional committee was personal opinion and that he did not agree with Mr. Farrell. He would not recommend a change to heavier section or a change in carbon content with present information. He believed more failures are reported today because railways are watching the subject more closely and not because of poorer material.

The commission is preparing blanks to be sent to railways in the state for data on broken rails, and will compile its own information. The hearing was adjourned until Tuesday, April 2, at Indianapolis.

Motive Power on the Chesapeake & Ohio.

A striking example of the tendency to reduce operating costs by taking advantage of the latest improvements in locomotive design is furnished in the development of motive power on the Chesapeake & Ohio during the past two years. With the recent order from the American Locomotive Company, noted elsewhere in this issue, of 24 mikados and 25 Mallets of the 2-6-6-2 type, this road has, during the above period, adopted three new and interesting types of motive power for freight and passenger service. The mikados are duplicates in design of the single trial engine described in the *Railway Age Gazette* of February 2, 1912, page 201, while the Mallets are the same as the previous design, described in the *Railway Age Gazette* of December 16, 1910, page 1144, except for an increase of 20,000 lbs. in weight. Traversing low-grade districts along the river bottoms and heavy grade districts over the Blue Mountain ranges, the operation of this road presents diversified and difficult problems. The Mallets of the 2-6-6-2 wheel arrangement are equipped with superheaters and have a total weight of 400,000 lbs. and a normal tractive effort of 73,200 lbs. Twenty-five of these have replaced 44 consolidations, having a tractive effort of 41,140 lbs. each, in road service on the Allegheny district. This section includes a 12-mile, 30-ft. grade in one direction and a 60-ft., 15-mile grade in the other, in addition to sustained grades averaging 21 ft. to the mile.

The new mountain type locomotive described in the *Railway Age Gazette* of September 22, 1911, page 555, was designed to meet the difficult requirements of passenger service on the Mountain District between Clifton Forge and Charlottesville. On this section, long ascents of 75 and 80 ft. to the mile are encountered in both directions. These locomotives weigh 330,000 lbs., have a tractive effort of 58,000 lbs. and are equipped with superheaters, brick arches and mechanical stokers. For road freight service on the low grade divisions the mikado has been designed to haul 4,000 tons on a .3 per cent. grade at 15 miles an hour and is the most powerful locomotive of its type yet developed. It is practically a conversion of the mountain type into a mikado by the substitution of a 2-wheel for a 4-wheel leading truck, thereby giving a wide interchangeability of parts between the two. In each case thorough analysis of the operating and physical conditions of the division on which the locomotives were to be used has been made by the motive power officers in conjunction with the builders prior to developing the design, and only one or two locomotives have been ordered for trial purposes; and these have been thoroughly tried out before any large amount of money has been invested. It is significant that additional locomotives have been subsequently ordered in each instance. Records for eight months' service of the Mallets show that they are saving 5.7 cents per 1,000 ton-miles in the cost of handling the traffic. The mountain type locomotives are handling 600- and 700-ton trains on the same schedule that the Pacific type could barely make with a 350 ton-train, thereby saving double-heading always expensive. In recent dynamometer tests, the mikado type has developed a maximum draw bar pull of 27,000 lbs. at a speed of 33 miles an hour. The aim has been to secure the greatest possible economy in operation, not only or primarily through the application of approved fuel-saving devices, but also from the elimination of double-heading, pusher service and from the operation of fewer and heavier trains.

Charles Schwab's Rules for Depreciation.

Charles M. Schwab in addressing the Easton (Pa.) board of trade, talked of the development of the steel business, the economies of production, the necessity for cheap, transportation and the control of ore supplies. He said the actual return over five years for the capital invested in the Bethlehem plant was 4.60 per cent., and that in view of depreciation, maintenance, necessary expansion and the replacement of obsolete machinery, a steel company which was earning from 15 per cent. to 20 per cent. had no right to pay more than a third of it in dividends. He added that a company which paid up to the hilt was already on the down grade. He told how only twenty-four years ago he persuaded Mr. Carnegie to let him build a rail mill at Braddock, and that he wrote to his employer enthusiastically of an output of 1,000 tons of rails a day, for that $1,000,000 investment. Mr. Carnegie wrote saying he would have been allowed no rest if the mill had not been built, but that he would not like people to think that he contemplated a day when the United States would require 1,000 tons of rails a day. The capacity of 1911 was 15,000 tons a day.

Mr. Schwab said that something like $38,000,000 had been put in the Bethlehem Steel plant, of his own and other people's money, and that he found nothing he had done in the steel business was so laborious as financing it; and then he made about as frank a statement as any great captain of industry has put before a public audience with reporters in the room He said that practically all he had was in the property; and that in the five years he had been intimately associated with it, living with it and working for it all the time, he had never taken from it one penny in fees, personal expenses or dividends.

He claimed that with an average wage of $788 a year, taking the men and boys together, and excluding the office staff, the Bethlehem Steel Co. was paying the highest wages of any industry with which he was acquainted, and that he hoped and expected to see the wages increase as prosperity broadened. He expected to pay higher wages, and thought that the upbuilding of the property came far ahead of dividends.—*Wall Street Journal.*

Enginemen's Demands in Eastern Territory.

A committee of thirteen has been appointed by the eastern railways to meet representatives of the Brotherhood of Locomotive Engineers to discuss the requests for higher wages. The committee is as follows: J. C. Stuart (Erie), chairman, A. W. Thompson (B. & O.), W. G. Besler (C. of N. J.), C. S. Sims (D. & H.), M. S. Conners (H. V.), C. E. Schaff (L. S. & M. S.), A. H. Smith (N. Y. C. & H. R.), H. J. Horn (N. Y., N. H. & H.), J. A. Shepard (West. Md.), B. A. Worthington (W. & L. E.), S. C. Long (Penna. Lines East), G. L. Peck (Penna. Lines West), J. A. McCrea (Long Island), A. W. Sullivan, chairman of the Committee on Railway Mail Pay, is secretary of the conference committee.

The enginemen submitted uniform wage scales to each of the 49 roads east of Chicago and north of the Norfolk & Western, which road has just increased the pay of its enginemen. In transmitting a copy to Mr. Stuart, as chairman of the eastern General Managers' Association, Grand Chief Stone of the brotherhood said:

"We believe that the engineers are entitled to an increase of wages at this time owing to the constantly increasing demands

being made upon them. It is true they were granted an increase of from seven to ten per cent. at the time the conductors and trainmen received their increase of 18 to 51 per cent., but this being the case you can readily understand why the engineers are not satisfied with their present wage condition. The conductors and trainmen have a standard wage throughout the eastern territory, and in many cases are paid a higher wage than the engineer.

"We are taking up this wage movement with a desire to standardize the wages of the engineers, and in doing so we desire to handle same in a concerted movement and address this to you as chairman, asking that you take this question up with the roads named on the enclosed list and ask them to select a committee of managers to handle the question.

"We do this believing a concerted action is best for all parties concerned, as it saves time and makes a standardization of wage scale. In dealing with the operating officials of each individual road it takes far more of their time and in the end the results are practically the same."

The committee has called on the roads concerned to prepare figures showing what would be the results of putting the proposed scale in effect. Roughly, it is estimated that the aggregate increase would be $10,000,000 a year. The percentages of increase vary from 15 to 50 per cent. in different classes of work.

The proposed scale is as follows:

PASSENGER RATES.

Engines with cylinder of 20 in. or less in diameter, $4.40 per 100 miles or less. Engines with cylinders over 20 in. in diameter, $4.60 per 100 miles or less. Miles made in excess of 100, pro rata. Overtime in through passenger service to be computed on a basis of 20 miles per hour. Overtime to be paid for at 70 cents per hour.

ELECTRIC SERVICE.

Wherever electric service is installed or now in operation locomotive engineers will take the positions on electric locomotives or multiple unit trains under the prevailing schedules governing rates of pay and conditions in steam service. In any change from steam to electricity or other motive power in any form at any point on the system such power will be manned by engineers and paid according to the service for the territory affected, or where electric multiple unit trains enter upon steam tracks or tracks formerly operated by steam or where trackage rights are leased to holding companies they shall be operated by engineers operating steam trains on said tracks.

FREIGHT RATES.

Engines with cylinders of 20 in. in diameter or less, $5.25. Engines with cylinders over 20 in. in diameter and less than 24 in. in diameter, $5.50. Engines with cylinders 24 in. in diameter and over except Mallets, $5.75. Mallets, $7.

One hundred miles or less, 10 hours or less, to constitute a day's work. All over 100 miles to be paid pro rata. Overtime to be computed on a basis of 10 miles per hour, and paid for pro rata. Through freight rates to apply to all mine runs, work, wreck, pusher, or helper, milk, roustabout, and circus trains, according to class of engines. Overtime to be computed on minute basis. Engineers will be paid at overtime rate for all time over 15 hours held away from other than their home terminal. Twenty-five cents per 100 miles or less additional to be added to through freight rates for local freight service according to class of engines.

SWITCHING ENGINES.

Rates for engines in switching service, $4.50 per day. Ten hours or less to constitute a day's work. All over 10 hours to be paid pro rata. Overtime to be computed on minute basis.

BELT LINE SERVICE.

Engineers in belt line service will be paid $5 per day, 10 hours or less to constitute a day. All over 10 hours, 50 cents per hour. Overtime to be computed on minute basis. Engineers of single crew yard and belt line engines will report for duty at the appointed time and will receive one-half hour's pay in addition to the regular day's pay for reporting 30 minutes in advance of the commencement of the day's work. In case of double crew engines, if engineers do not relieve each other at the appointed time and the engineer of the next crew is required to prepare his engine, 30 minutes' pay will be allowed for same.

BEGINNING AND ENDING OF DAY.

In all classes of road service an engineer's time will commence 30 minutes before leaving roundhouse or designated track and will conclude at the time the engine is placed on the designated track or relieved by hostler at terminal.

INITIAL TERMINAL DELAY.

When delayed within the terminal as much as one hour beyond the time set to leave, engineers will be paid one hour's overtime at overtime rates according to class of engine. One hour and thirty minutes to constitute two hours, etc. If road overtime is made on same trip, initial overtime will be deducted.

FINAL TERMINAL DELAY.

Final terminal delay will be paid for at the end of the trip when delayed more than 30 minutes between yard limit boards governing yard to which train is to be delivered and the point of final relief, and to be paid for at the overtime rate according to the class of engine on the minute basis.

HOURS OF SERVICE LAW.

Amendment of Section E of the application of the sixteen hour law. Engineers in train service tied up under the law will be paid continuous time from initial point to tie-up point. When they resume duty on continuous trip they will be paid from the tie-up point to the next tie-up point, or to the terminal on the basis of a minimum day. It is understood that this does not permit running engines through terminals or around other crews at terminals unless such practice is permitted under the pay schedule.

It is understood that existing rates of pay or better working conditions shall not be reduced by the rates or rules hereby agreed upon, nor shall general committee of adjustment be debarred from taking up with their respective managers matters not decided at this conference.

New Officers of the Guantanamo & Western.

A syndicate made up of a number of the larger American stockholders of the Guantanamo & Western Railroad, Cuba, has secured a majority of the stock of that corporation, and has elected an entire new board of directors. This board has elected officers as follows: M. H. Lewis, president; G. St. L. Abbott, treasurer; I. McD. Garfield, vice-president, and D. H. Thomas, secretary. The Guantanamo & Western is a standard gage line 81 miles long, with an ocean terminal at Boqueron on the southern coast of the eastern end of the island. It connects at San Luis with the Cuba Railroad, exchanging traffic at that point to and from Santiago, Nipe and Havana. The territory between San Luis and Boqueron is a very fertile sugar cane district, and while only about 15 per cent. of it is under development the gross earnings of the railway during the fiscal year ended June 30, 1911, were more than $4,000 per mile.

Progress on the New Canadian Grand Trunk.

Frank Cochrane, minister of railways of Canada, has compiled a report of the progress of the National Transcontinental Railway, which estimates the capital cost of the road to January 1, 1914, as $187,781,128. Including the interest for the seven years during which the Grand Trunk Pacific is not required to pay interest, the cost is estimated at $236,000,000, or $140,800 per mile. Of the 1,804 miles from Moncton to Winnipeg grading has been completed on 1,587 miles, track-laying on 1,378 miles of main line and 278 miles of siding, 928 miles of telegraph line has been constructed and 82.75 per cent. of the bridges have been erected.

International Railway Fuel Association.

The fourth annual meeting of the International Railway Fuel Association will be held at the Hotel Sherman, Chicago, on May 22-25. The program, as announced, includes the following papers: "Standard Locomotive Performance Sheet," by R. Collett, superintendent locomotive fuel service, Frisco Lines; "The Use of Anthracite for Locomotive Fuel," by T. S. Lloyd, formerly general superintendent motive power and equipment of the

Delaware, Lackawana & Western; "Drafting of Locomotives to Obtain Maximum Fuel Efficiency," by H. B. McFarland, engineer of tests, Atchison, Topeka & Santa Fe; "Proper Method of Firing Locomotives" (illustrated with motion pictures and colored slides), by D. C. Buell, chief of educational bureaus, Union Pacific and Illinois Central; "Inspection of Fuel from the Standpoint of the Producer and Consumer," by J. E. Hitt and Glenn Warner, representing Burnwell Coal Company and Cincinnati, Hamilton & Dayton Railway, respectively; special paper by Prof. W. F. M. Goss, University of Illinois.

International Safety Congress.

The honorary committee which will represent the United States at the International Safety Congress in Milan, Italy, May 27-31, will be composed of James McCrea, president of the Pennsylvania Railroad; E. A. S. Clarke, George B. Cortelyou, Philip T. Dodge, S. C. Dunham, Elbert H. Gary, chairman of the Finance Committee of the United States Steel Corporation; John Hayes Hammond, A. Barton Hepburn, Seth Low, Charles Nagel and James Speyer. On the national committee 38 representatives of various industries and other interests will serve.

American Society of Civil Engineers.

At the meeting of the American Society of Civil Engineers, held on February 21, a paper by B. F. Cresson, Jr., M. Am. Soc. C. E., entitled The Problem of the Lower West Side Manhattan Water-Front of the Port of New York, was presented for discussion and illustrated with lantern slides. This paper was printed in the *Proceedings* for January, 1912.

American Association of Freight Agents.

The next annual meeting of the American Association of Freight Agents will be held on June 18 in Detroit, Mich., instead of in Chicago as was at first planned. This change has been made because the Republican National Convention will be held in Chicago on that date.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.; annual, May 7-10, Richmond, Va.

American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass.; annual, May 10-11, San Francisco, Cal.

American Association of General Passenger and Ticket Agents.—W. C. Hope, New York; next convention, Seattle, Wash.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Chicago.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September; annual, March 17, Chicago.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York.

American Electric Railway Manufacturers' Assoc.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

American Railway Association.—W. F. Allen, 75 Church St., New York.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

American Railway Master Mechanics' Assoc.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

American Railway Tool Foremen's Association.—M. H. Bray, N. Y. N. H. & H., New Haven, Conn.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

American Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Car Accounting Officers.—G. P. Conrad, 75 Church St., New York.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago. Convention, May 22-25, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

Master Car and Locomotive Painters' Assoc. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass. Convention, 2d week in September.

National Railway Appliances Assoc.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railroad Club.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Business Association.—Frank W. Noxon, 2 Rector St., New York.

Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

Railway Gardening Association.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.

Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa. Next meeting, March 18, Chicago.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio. Convention, May 20-22, Buffalo, N. Y.

Railway Supply Manufacturers' Assoc.—J. D. Conway, 2135 Oliver Bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

Railway Tel. & Tel. Appliance Assoc.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. Y., Sterling; September, 1912, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; August, 1912.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The latest agricultural pamphlet of the Pennsylvania Railroad consists of a reprint of bulletin No. 112, of the Pennsylvania State College, on beef production in Pennsylvania.

The "alfalfa special" is the latest agricultural enterprise of the Erie. A special train carrying professors from the agricultural department of Purdue University, who will lecture on the best methods of growing alfalfa, will be run over the lines of the Erie in Indiana on March 27, 28 and 29.

The Illinois Central has made a contract with the Central Fruit Despatch whereby the latter will exercise general supervision over and handle the perishable freight service of the company, including refrigeration, ventilation, heating, reconsignments, tracing, and the operation of scheduled refrigerator cars.

The senate committee on interstate commerce gave hearings at Washington last week on a proposed law to make carriers unconditionally liable on bills of lading. Arguments were presented by the bankers and by cotton dealers; by F. B. James of Cincinnati, Professor Williston of Harvard University, and others.

The Louisville & Nashville and the Seaboard Air Line, which jointly run a through train nightly each way between Pensacola, Fla., and Jacksonville, 369 miles, have announced that they will comply with the order of the Florida State Railway Commission directing them to discontinue hauling freight cars on these trains. The schedule speed of the trains, according to the present time-tables, is about 20 miles an hour.

In the Federal Court at Chicago on Tuesday of this week the grand jury returned a number of indictments charging violation of the law in giving rebates on passenger fares by paying excessive rates for advertising in theatrical publications. The parties indicted are the Cleveland, Cincinnati, Chicago & St. Louis Railway and H. J. Rhein, general passenger agent; the Michigan Central Railroad and W. H. Underwood, assistant general passenger agent; the Lake Shore & Michigan Southern Railway, and several theatrical companies and their officers.

In connection with the disintegration of the Standard Oil Company of New Jersey, announcement was made in behalf of the company that thereafter all of the former subsidiaries would have to stand on their own feet. In this line it is said now that the Union Tank Line Company has entered into new contracts with the former subsidiary companies, as well as with independent concerns, for the use of its cars in the transportation of oil. The terms of these new contracts are much more favorable to the Union company than formerly. When the money was going into a common treasury the precise proportion of earnings going to any one company was immaterial.

Traffic Club of New York.

The regular meeting of the Traffic Club of New York will be held on February 28. The entertainment committee has secured "Buffalo Jones," in his motion picture lecture, Lassoing Wild Animals in Africa.

Indiana Commission Report.

The Indiana commission in its annual report recounts the following things accomplished by the department during the year, which the commissioners believe to be their most notable achievements:

Denial of the right of steam roads arbitrarily to increase freight rates; ordering of a reduction in express rates; supervision of movement of coal during extreme cold weather; ordering in of numerous block and interlocking signals; use of the commission's power to advance shipments of food, fuel, grain, etc., in times when extraordinary demands existed; requiring the construction of better station facilities (including twenty-five new passenger stations); adjustment of shippers' claims; prevention of unjust rate discrimination; proper disposition of 4,080 cases involving improper physical condition of railway property; causing the removal of scores of unsatisfactory safety appliances; enforcement of orders for greater safety and comfort to passengers on trains and in waiting rooms.

At the close of the year the commission had seventy-nine suits pending in the courts, nine of which were in the federal courts.

The commission reports that the interurban roads have prepared to supply trailers for rush hours as rapidly as possible, but it is not likely that the additional cars can be provided for some time yet. There are many other things which should be demanded of the interurban companies before the commission would be warranted in ordering additional cars and crews. The crowding is merely a matter of inconvenience, while the other matters that require attention are such as involve the safety, health, etc., of the passengers.

Block signals, precautions for protection in cases of high speed, more nearly perfect systems of despatching and increasing efficiency in train crews are things the commission believes should receive attention at the hands of the interurban owners before the demands of the public for more cars during the rush hours are granted. The interurban companies are not making enough money to warrant the commission's ordering all improvements which the public would like to have put in. The development of the interurban properties has been very rapid and the commission holds that the companies must have time to meet naturally the requirements of their increasing traffic.

During last year some of the important interurban lines have installed automatic block systems and others are preparing for their installation. All the companies have complied with the commission's order concerning experienced motormen, and there are now very few, if any, motormen on interurban cars in the state who have not had at least one year's experience. A further safeguard has been provided at the order of the commission by installing separate compartments for motormen.

The total capitalization of all the electric roads in the state, as shown by the report, is $17,895,000 for a total of 2,601 miles.

Our Obsolete Sherman Law.

Imagine two armies marching in parallel columns; not hostile armies, but supporting armies, and you will have a picture of the life of a people as it ought to move forward, and the law of the land as it ought to move forward also. But often in the history of men it has been the column of the law of the land that has fallen behind. When more than two centuries ago our ancestors ripened into capacity for full personal freedom, it was the law of the land that had to be brought up by the Bill of Rights. When more than a century ago our ancestors ripened into capacity for full self-government, it was the law of the land that had to be brought up by our constitution. When in 1896, turning from the field of personal freedom to economic conditions, we ripened into a commercial world power, it was the law of the land that had again to be brought up in the adoption of the world's monetary standard. And here we are again in the midst of another period when the law of the land is again behind, in both its human and its economic aspects, the moving column of the nation's life. . . .

Laws so illegible (as the Sherman law) should be no part of the jurisprudence of a free country. And on this account it is easy enough before an audience, made up of business men, to say—repeal the Sherman act. But would that bring up, abreast the moving column of our national life, the belated column of the law as a whole? Would it not be merely stopping the column altogether?—*Judge Grosscup before the New York Traffic Club.*

INTERSTATE COMMERCE COMMISSION.

The commission has suspended until June 12 proposed increased rates on coal on the Chicago, Burlington & Quincy from Crosby, Wyo., to Butte, Mont.

W. P. Borland, for the last five years secretary of the Block Signal and Train Control Board, has been transferred to the division of safety appliances, where he will be assistant chief inspector of safety appliances. Mr. Borland was an employee of the commission for several years before the establishment of the Block Signal Board. He was formerly a locomotive runner, and has had experience in numerous other positions in the operating department.

The Interstate Commerce Commission has notified shippers and others interested that briefs setting forth their objections to provisions of Western Classification No. 51 must be filed by April 10. Oral arguments will begin at Washington on April 15. Several petitions have been sent to the commission asking that some of the hearings be held in Chicago. Representatives of the state railway commissioners, whose protests led to the suspension of the classification, held a meeting at St. Louis on Tuesday, to check the classification and prepare their case for the hearings.

Poles Given the Lumber Rate.

National Pole v. Chicago, St. Paul, Minneapolis & Omaha et al. Opinion by the commission.

Following the case of MacGillis & Gibbs v. C. & E. I., 16 I. C. C., 40, the rate on cedar poles from Wisconsin and Michigan points to Texas is found unreasonable, insofar as it exceeds the rate on lumber between the same places. (22 I. C. C., 378.)

Milk Rates in New England.

George Albree v. Boston & Maine. Opinion by Commissioner Prouty:

In this case the plaintiff asked that the leased-car system be abolished, and the attorney general of Massachusetts intervened, making the same demand in behalf of the state. The decision holds that the leased-car system is not unlawful, if the tariffs are properly framed; that there should be a rate by the can, bearing a proper relation to the carload rate; and that icing facilities should be provided when shipments at the per-can rate are offered from a given section equaling 600 cans a day (cans holding 8½ quarts). No order is issued, but the case is held open pending possible further complications in the application of the principles laid down. (22 I. C. C. 303.)

Sacramento Gateway Remains Closed.

H. S. Gile & Co. et al. v. Southern Pacific et al. Opinion by Commissioner Lane.

This is an application that the Sacramento gateway be reopened on traffic moving from the eastern states to the cities of Oregon. Two routes, which were formerly under separate managements, have now been merged and the traffic for which there was formerly competition is now forced by the rate adjustment to move over the more direct line. So long as the public secure reasonable rates and prompt service by the direct line, there is no substantial reason why the traffic should not follow the line of least resistance. There lies behind this complaint, however, the belief that there are benefits to be had from competition between genuinely rival carriers which cannot be gained when such competition ceases, even under government regulation. The petition is brought in the mistaken belief that the commission has power to order railways to compete with each other. The petition for opening the Sacramento gateway is refused, but the question of reparation on transcontinental shipments to Willamette valley points will be reserved for a later case now on the commission's docket. (22 I. C. C., 298.)

Demurrage on Embargoed Cars.

Brooklyn Cooperage Co. v. Illinois Central. Opinion by the commission.

In this case demurrage charges were made on cars being held for delivery to the Illinois Central, the Illinois Central having at various times issued temporary embargoes, and the demurrage was collected by the lines holding the cars for delivery to the I. C. There was no negligence or fault shown on the part of the I. C., the embargoes being necessitated by unusually heavy business. The demurrage charges are therefore found to be reasonable. (22 I. C. C., 358.)

Commission Refuses to Enforce Contract.

Ralston Townsite Co. et al. v. Missouri Pacific. Opinion by the commission.

The complainant says that it has a contract with the railway which provides for the building of a sidetrack and the connection of this sidetrack with the line of the M. P. The commission is without jurisdiction to compel a railway to specifically perform a contract or to award damages for breach of contract. The power of the commission to order a track connection with a private sidetrack is limited to cases in which the sidetrack is already built and in which it is physically practicable to make such connection. In this case the sidetrack has not been built, and the commission has no power to order such a track built by the railway company. The complaint is therefore dismissed. (22 I. C. C., 354.)

Advance in Minimum L. C. L. Rate Refused.

In re suspension of advances in rates on single packages and small lots. Opinion by Commissioner Clark.

The railways advanced the minimum rate on L. C. L. shipments in official classification territory from 25 cents to 35 cents. An attempt was made to get at the station cost of handling average minimum shipments. Certain roads estimated the cost of handling such shipments from large to small stations as follows: Pennsylvania Railroad, 23.70 cents; New York Central, 17.46; Cleveland, Cincinnati, Chicago & St. Louis, 15.49; Boston & Albany, 15.70; Baltimore & Ohio, 16.04. Very wide differences were found in the estimates of the costs at different stations on the same road, and as between different roads. The cost figures are not sufficiently reliable, the commission finds, to represent the real conditions, and they do not sustain the burden of proof which the statute puts on the railway. The carriers are expected, therefore, to cancel their advances.

Rate on Hardwood Lumber Reduced.

McLean Lumber Co. v. Louisville & Nashville et al. Opinion by the commission.

The complainant shipped hardwood lumber to Philadelphia, specifying on the bill of lading both the route and the rate. There was no such rate applying by the route specified, and the delivering railway charged the rate applying under existing tariffs on the specified route. The commission holds that there is nothing wrong in such a charge, since specific routing instructions were given. On the other hand, the rate on hardwood lumber via the L. & N. is too high, and, even making the modifications suggested by the L. & N., it is still higher by eight cents per 100 lbs. than the rate on yellow pine lumber. This the commission finds to be unreasonable and orders the rate on hardwood lumber reduced to not more than two cents per 100 lbs. higher than the yellow pine rate. Reparation is awarded on the basis of the rates now established. (22 I. C. C., 349.)

Reparation Awarded.

Humboldt Refining Co. v. Missouri, Kansas & Texas et al. Opinion by the commission.

A rate of 36 cents per 100 lbs. on crude petroleum in tank cars from Sapulpa, Okla., to Humboldt, Kan., found unreasonable. (22 I. C. C., 363.)

Swift & Co. v. Missouri Pacific et. al. Opinion by the commission.

The Missouri Pacific absorbed switching charges on L. C. L. freight destined to Missouri Pacific freight houses when it received the freight from connecting roads within the switching limits of Kansas City, Mo., but did not absorb switching charges on freight moved through its train yards. The handling of freight through the train yards was apparently done only for the convenience of the Missouri Pacific. The commission, therefore, finds that the practice of not absorbing switching charges on cars handled through the train yards results in an unfair discrimination. (22 I. C. C., 385.)

STATE COMMISSIONS.

The Minnesota railway commission has ordered officers of all the steam railways operating in the state to appear before it March 5 for consideration of a schedule of freight rates on logs. In 1907 the commission established certain rates on logs which were operative for only two years. Since the expiration of the order some of the railways have increased the rates.

The Michigan railway commission has prohibited the railways of the State from exceeding certain prescribed rates of speed during the winter at several points which the commission considers

dangerous. The order also prohibits making up lost time. It is said to have been suggested by a report to the commission that on one night last week 250 broken rails were found in the tracks of the Michigan Central between Detroit and Chicago and 174 on the Pere Marquette between Detroit and Grand Rapids.

The Mississippi railway commission has rescinded the action of its predecessors in adopting the Southern classification for intrastate business, and has substituted the old Mississippi state classification which was formulated in 1895. The action was taken in response to protests from certain shippers against some advances in the new Southern classification. Railway officials contended that the old state classification is obsolete and that the Southern classification, which is in effect in neighboring states, lists 2,000 articles not included in the state classification, that 60 per cent. of the ratings are the same in both, and that of the changes made in the recent reissue of the Southern classification 21 per cent. were in the nature of reductions, and 19 per cent. in the nature of advances.

The New York Public Service Commission, Second district, has given the Lehigh Valley permission to charge less for a long haul for passengers than for a shorter haul, in a case where the railway company has no station facilities at a junction on its main line where the branch line to Spencer and Van Etten leaves it. Passengers are therefore carried on to the next station and beyond Lockwood to a station where they change, taking a train going back through the junction to Spencer, etc. The one-way tickets, therefore, are lower to Van Etten and Spencer than from the same points to Lockwood, although the Spencer passengers are actually carried through Lockwood. The commission holds that in such a case the railway may properly be relieved from the long and short haul provision of the New York law.

COURT NEWS.

The commerce court has denied the application of the railways for a temporary injunction restraining the Interstate Commerce Commission from enforcing the rate of $1 per 100 lbs. on lemons from California to eastern cities as recently fixed by the commission.

The United States Commerce Court, in the complaint of the Kansas City Southern against the Interstate Commerce Commission's classification of expenditures for additions and betterments, has overruled the motion to dismiss and the case is to be tried on its merits.

The United States Court of Appeals at San Francisco has sustained the demurrers of the state railway commission and dismissed the Southern Pacific's bill of complaint in the San Pedro rate case, in which the railways sought to prevent the commission from enforcing its order reducing rates between Los Angeles and the port of San Pedro. It is estimated that the reductions which now become effective will reduce the revenues of the Southern Pacific by $112,000, and of the Santa Fe and the San Pedro, Los Angeles & Salt Lake together by $200,000 annually.

The Supreme Court of the United States this week, for the second time, has sustained the "Carmack amendment" to the Interstate Commerce law passed by Congress in 1906, and making carriers on whose road shipments originate liable for loss or damage incurred at any point on the route to a destination beyond its own line. The present decision concerned a shipment of mohair from Uvalde, Tex., to Lowell, Mass., over the Galveston, Harrisburg & San Antonio. The Texas State courts not only upheld the law, but declared that state courts as well as federal courts would enforce it.

The Supreme Court of the United States in the case of the United States Express Company against the state of Minnesota, has sustained the tax law of the state. The statute imposed a tax on gross receipts. The express companies resisted the tax in so far as it was based on shipments originating in the state and destined to a point in the state, passing out of the state and returning to the state again in transit. The companies contended that this was interstate commerce; but the court held that it was not. Another point made by the express company was that inasmuch as part of its gross receipts was from interstate commerce, it could not be taxed by the state. This claim was also denied by the court.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

J. W. Newlean, general auditor of the Illinois Central at Chicago, has been appointed comptroller, with office at Chicago.

L. J. Hensley has been appointed assistant auditor of the Kansas City Southern, with office at Kansas City, Mo., succeeding F. W. Meyer, resigned.

W. J. Bienemann, secretary and auditor of the Kanawha & Michigan, with office at Charleston, W. Va., has resigned to go to a New York corporation.

E. E. Honn, general auditor of Wells, Fargo & Company, with office at Chicago, has been transferred at his own request to the operating department, and his former position has been abolished.

J. H. Doughty, general agent in the freight department of the Chicago & Eastern Illinois at Chicago, has been appointed general agent in the executive department of all St. Louis & San Francisco lines, with office at Birmingham, Ala, succeeding A. D. Lightner, promoted.

A. D. Lightner, whose recent appointment as general agent in the executive department of the St. Louis & San Francisco lines at New Orleans, La., has been announced in these columns, has been elected also president of the New Orleans Terminal Company, succeeding D. D. Curran.

J. I. Morrison, auditor of the Lehigh Valley at Philadelphia, Pa., has been appointed general auditor, succeeding G. N. Wilson, resigned to engage in other business, and the title of auditor has been abolished. E. C. Mann has been appointed auditor of disbursements, with office at Philadelphia, Pa.

Stuart H. McIntosh, whose appointment as general auditor of the Boston & Maine, with office at Boston, Mass., has been announced in these columns, was born in 1872 at London, Eng., and was educated at King's College, London. In 1889 he entered the service of the Northern (N. H.) Railroad, which was subsequently leased to the Boston & Maine, and he has remained in the continuous service of the Boston & Maine since that time. Mr. McIntosh was appointed assistant general auditor in 1902, which position he held at the time of his recent appointment as general auditor.

Operating Officers.

B. Casey has been appointed assistant superintendent of the St. Louis & San Francisco, with office at Enid, Okla.

A. Hatton has been appointed acting superintendent of car service of the Canadian Pacific, with office at Winnipeg, Man., succeeding D. C. Coleman, promoted.

George Hodge, superintendent of the Canadian Pacific at London, Ont., has been appointed general superintendent of the Eastern division, with office at Montreal, Que., succeeding F. P. Gutelius, resigned.

A. Mortiz, trainmaster of the Atlanta & West Point at Montgomery, Ala., has been appointed superintendent of the Brunswick division of the Atlanta, Birmingham & Atlantic, and the Fitzgerald, Ocilla & Broxton, with office at Fitzgerald, Ga., succeeding G. C. Smith, resigned.

J. V. Clifford, chief train despatcher of the Gulf, Colorado & Santa Fe at Cleburne, Tex., has been appointed trainmaster, with office at Cleburne, succeeding E. C. Lilley, resigned to accept service with another company. E. B. Fry, night train despatcher, succeeds Mr. Clifford.

R. A. Crofton has been appointed assistant general manager in charge of motive power of the Galveston, Harrisburg & San Antonio, the Houston, East & West Texas, the Houston & Shreveport, the Houston & Texas Central and Texas & New Orleans, with office at Houston, Tex., succeeding J. T. Connor, granted indefinite leave of absence.

Traffic Officers.

H. B. Johnston has been appointed traveling passenger agent of the Canadian Pacific, with headquarters at Portland, Ore.

W. M. Biggerstaff has been appointed acting agent of the Erie Despatch, with office at St. Joseph, Mo., succeeding E. R. Lauer, promoted.

J. A. McDonald has been appointed district passenger agent of the Canadian Pacific, with office at Nelson, B. C., succeeding W. J. Wells, resigned.

H. C. Hallmark and E. J. Fenchurch have been appointed assistant general freight and passenger agents of the Arizona Eastern, with office at Tucson, Ariz.

H. A. Slagle has been appointed district passenger agent of the Missouri, Kansas & Texas, with office at Detroit, Mich., succeeding W. P. Overbay, transferred.

E. A. Wilson has been appointed general freight and passenger agent of the Port Bolivar Iron Ore Railway, a line from Longview, Tex., to Ore City, which was recently opened to traffic.

W. H. Bennett, commercial agent of the Southern Railway at Knoxville, Tenn., has been appointed district freight agent at Chattanooga, succeeding E. C. Morgan, transferred. J. W. Bray succeeds Mr. Bennett.

W. O. Monroe, chief clerk in the passenger department of the International & Great Northern, at Houston, Tex., has been appointed assistant general passenger and ticket agent, with office at Houston, succeeding W. C. Knowles, resigned.

J. B. Stewart, general eastern agent of the New York, Ontario & Western, at New York, has been appointed general freight and passenger agent, with office at New York, succeeding J. R. Dunbar, deceased. C. B. McManus, Jr., contracting agent at New York, succeeds Mr. Stewart.

George H. Kummer, division freight agent of the Chicago & Eastern Illinois at Salem, Ill., has been appointed general agent in the freight department, with office at Chicago, succeeding J. H. Doughty, promoted. (See item under Executive, Financial and Legal Officers.) L. G. Lucia, division freight agent at Danville, Ill., succeeds Mr. Kummer, and M. V. Bowman, agent at Tuscola, Ill., succeeds Mr. Lucia.

Engineering and Rolling Stock Officers.

J. T. Carroll, whose appointment as assistant general superintendent of motive power of the Baltimore & Ohio, with office at Baltimore, Md., has been announced in these columns, was born on June 12, 1875, at Cassadaga, N. Y., and graduated from Purdue University, Lafayette, Ind. Mr. Carroll entered the service of the Brooks Locomotive Works as draftsman in September, 1891, remaining with that company until January 1, 1896, and was then consecutively draftsman on the Erie, the Chicago, Rock Island & Pacific, and the Chicago & North Western. In August, 1899, he was appointed mechanical engineer of the New York, Chicago & St. Louis, and until May, 1910, was in the service of the New York Central Lines West of Buffalo, N. Y. He was then appointed superintendent of motive power of the Baltimore & Ohio, with office at Pittsburgh, Pa., which position he held at the time of his recent appointment as assistant general superintendent of motive power.



J. T. Carroll.

O. A. McCombs has been appointed roadmaster of the Texas & Pacific, with headquarters at Dallas, Tex.

E. F. McCrea has been appointed division engineer of the Central system of the Pennsylvania Lines West, with office at Toledo, Ohio, succeeding Guy Scott, transferred.

P. H. McFadden, division roadmaster of the Great Northern at Everett, Wash., has been appointed assistant engineer maintenance of way of the Western district and the Butte and Montana divisions of the Central district, with headquarters at Seattle, Wash., and the jurisdiction of John Sesser, assistant engineer maintenance of way at St. Paul, Minn., is limited to the Lake and Eastern districts and the Minot division of the Central district.

Edward S. FitzSimmons, whose appointment as mechanical superintendent of the Erie Railroad, with office at Cleveland, Ohio, has been announced in these columns, was born in April, 1876, at Columbus, Ohio, and was educated at the high school and the night business school at Horton, Kan. He also took a mechanical engineering course through a correspondence school, and began railway work on August 6, 1890, with the Chicago, Rock Island & Pacific at Horton. He remained with that company until May, 1899, and then went to the Delaware, Lackawanna & Western as foreman boiler maker at Scranton, Pa. In February, 1904, he was sent by the same company to the Baldwin Locomotive Works as inspector of new equipment. Mr. FitzSimmons went to the New York, New Haven & Hartford in August, 1904, as general boiler inspector, with headquarters at New Haven, Conn., and in February of the following year he was appointed general foreman boiler maker of the Erie, with office at Meadville, Pa. He was promoted to master mechanic of the Cincinnati division in August, 1907, with office at Galion, Ohio, and the following February was transferred in the same capacity to the Allegheny and Bradford divisions, with office at Hornell, N. Y., which position he held at the time of his recent appointment as mechanical superintendent of the same road.



E. S. FitzSimmons.

Special Officers.

Ernest A. Sterling, forester of the Pennsylvania Railroad at Philadelphia, Pa., has resigned to open an office as consulting forester and timber engineer at 1331-32 Real Estate Trust building, Philadelphia. Mr. Sterling was elected president of the American Wood Preservers' Association at the annual meeting held in Chicago last month.

OBITUARY.

Clarence Wells, secretary of the Mexico North Western, with office at New York, died at his home at Mt. Vernon, N. Y., of pneumonia on February 1. Mr. Wells was 51 years old. The greater part of his railway life was spent under A. A. Robinson. He started work in 1876 as stenographer to Mr. Robinson when the latter was chief engineer of the Santa Fe, and was later his chief clerk. After 16 years he left railway work, but a few years later became traveling secretary and then secretary of the Mexican Central, of which Mr. Robinson was then president. Mr. Wells later became secretary to the president of the Rio Grande, Sierra Madre & Pacific and subsidiary companies, and he was also secretary of several of the subsidiaries. When the Mexico North Western was organized he was made secretary, which position he held at the time of his death. Mr. Wells was a brother of A. G. Wells, general manager of the Santa Fe Coast Lines, also R. E. Wells, general manager of the San Pedro, Los Angeles & Salt Lake, and of R. R. Wells, connected with the engineering department of the Santa Fe.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Pennsylvania Railroad will build 42 locomotives at its Altoona shops.

The Chicago, Rock Island & Pacific has ordered 40 mikado locomotives from the Baldwin Locomotive Works, and 10 mikado locomotives from the American Locomotive Company.

O'Brien, McDougall & O'Gorman, Ottawa, Ont., have ordered seven 10-wheel locomotives from the Montreal Locomotive Works. The dimensions of the cylinders will be 18 in. x 24 in., the diameter of the driving wheels will be 50 in., and the total weight in working order will be 109,000 lbs.

The Chesapeake & Ohio has ordered 25 Mallet locomotives and 24 mikado locomotives from the American Locomotive Company. The Mallet locomotives are duplicates of those previously ordered from the American company, with the exception that in working order they will weigh 20,000 lbs. more. The mikado locomotives are duplicates of those described in the *Railway Age Gazette* of February 2.

The Oahu Railway & Land Company, Honolulu, Hawaii, has ordered 1 consolidation locomotive and 1 six-wheel switching locomotive from the American Locomotive Company. The consolidation locomotive will have 16 in. x 20 in. cylinders, 38 in. driving wheels, and in working order will weigh 94,000 lbs. The switching locomotive will have 14 in. x 20 in. cylinders, 38-in. driving wheels, and in working order will weigh 64,000 lbs.

CAR BUILDING.

The Twin Mountain & Potomac has ordered 18 box cars from the American Car & Foundry Company.

The Great Northern is said to be asking prices on 100 forty-ton ballast cars. This item has not been confirmed.

The Nashville, Chattanooga & St. Louis is said to be in the market for 150 box cars. This item has not been confirmed.

The Cudahy Packing Company, Chicago, has not ordered 350 refrigerator cars, as reported in the *Railway Age Gazette* of February 9.

The Louisiana Railway & Navigation Company is said to have ordered 200 coal cars and one chair car. This item has not been confirmed.

The Duluth, South Shore & Atlantic has ordered two observation-cafe cars and two dining cars from the Barney & Smith Car Company.

The Bethlehem Steel Company, South Bethlehem, Pa., is said to be in the market for 100 sixty-ton all-steel coal cars. This item has not been confirmed.

The Grand Rapids & Indiana is said to be in the market for 300 fifty-ton gondolas and 50 thirty-ton steel-underframe automobile cars. This item has not been confirmed.

The Pennsylvania Lines West have ordered 54 all-steel passenger cars. This order comprises 29 coaches, 2 baggage cars, 8 combination baggage and mail cars, 4 passenger and baggage cars and 11 dining cars.

The Chicago, Rock Island & Pacific has ordered 20 sixty-foot all-steel combination baggage and mail cars, and 10 sixty-foot all-steel combination passenger and baggage cars from the Pullman Company and 10 sixty-foot all-steel baggage cars from the American Car & Foundry Company.

IRON AND STEEL.

The Norfolk & Western has ordered 12,000 tons of rails from the Carnegie Steel Company.

The Kansas City Terminal has ordered 2,000 tons of rails from the Illinois Steel Company.

The Tennessee Central has ordered 2,000 tons of rails from the Tennessee Coal, Iron & Railroad Company.

Supply Trade News.

The Jones Car Door Company, Chicago, has been incorporated in Maine, with $50,000 authorized capital stock. Charles L. Andrews of Augusta is clerk of the corporation.

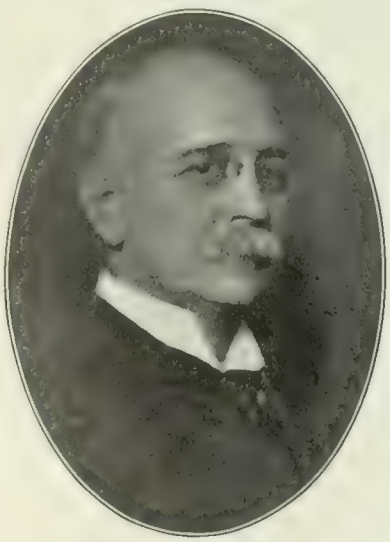
O. W. Youngquist, who for a number of years has been with the H. Channon Company as railway sales manager, has been made manager of the Chicago office of Hubbard & Company, Pittsburgh, Pa.

The Smith Locomotive Adjustable Hub Plate Company of Pittsburg, Kan., is equipping two engines for the Missouri, Kansas & Texas at the company's shops at Parsons, Kan., with the Smith hub plate.

William B. Hall, superintendent of equipment of the Mather Horse & Stock Car Company, Chicago, has been made vice-president and general manager of the Illinois Car & Manufacturing Company and the Illinois Bolt Nut & Forging Company, both of Chicago, with office in the Great Northern building, Chicago.

The Bucyrus Company, South Milwaukee, Wis., announces the opening of an office at Duluth, Minn., under the management of E. C. Hingston, who will have general charge of the sale of steam shovels, dredges, drag line excavators and the company's other products in the vicinity of Duluth and the iron ranges. Mr. Carl Horix has been appointed central sales manager of the company and will be in charge of the new Chicago office, 622 McCormick building, the old office in the Monadnock block being discontinued. Mr. Horix will have general charge of the sale of steam shovels, dredges, general excavating machinery, railway cranes and pile drivers, in the central states.

Francis H. Stillman, president of The Watson-Stillman Company, New York, died suddenly on February 18 of intestinal hemorrhage at his home in Brooklyn, N. Y. Mr. Stillman was born in New York on February 20, 1850, and was graduated from the Sheffield Scientific School, Yale University, in the class of 1874. In 1883 he organized and became president of the firm of Watson & Stillman. The firm was incorporated in 1904 as The Watson-Stillman Company, Mr. Stillman remaining its president up to the time of his death. Mr. Stillman was a member of the Hanover Club of Brooklyn, the Engineers' Club, the American Society of Mechanical Engineers, and treasurer and, continuously throughout its existence, a director of the National Association of Manufacturers. He organized and was first president of the Machinery Club of New York, and was also first president of the National Metal Trades' Association. In addition to being president of The Watson-Stillman Company at the time of his death, he was also president of the Bridgeport Motor Company, Bridgeport, Conn., and of the Pequannock Commercial Company, and a director in other manufacturing firms.



Francis H. Stillman.

George A. Post, Jr., has been made western sales manager of the Standard Coupler Company, New York, with office in Chicago, succeeding Charles D. Jenks, resigned to engage in another business. Mr. Post graduated from Cornell University with the degree of M. E. in 1905. He began work in the Westinghouse Machine Company's works in Wilmerding, Pa., and then was in its New York sales office for a year and a half, after which he entered the employ of the Standard Coupler Company in its sales department. Upon the organization of the Railway Business Association he was appointed assistant to the president, which posi-

tion he held for two years, and has had personal charge of the business details of the dinners of that association. A year ago he returned to the service of the Standard Coupler Company as eastern sales manager.

TRADE PUBLICATIONS.

Fans.—The Sprague Electric Works, New York, of the General Electric Company, has published catalog No. 325 on ceiling, wall and desk fans, illustrating the various types and giving specifications, dimensions and prices.

Chicago, Burlington & Quincy.—The passenger department of this company has published an illustrated folder called California Excursions Personally Conducted, telling of many of the most picturesque trips that may be made in California, and illustrating some of the choice bits of scenery. The folder includes a large map and furnishes information on the trains and their equipment.

Tube Corrosion.—The National Tube Company, Pittsburgh, Pa., has published in bulletin No. 4 an article entitled Corrosion of Boiler Tubes, by Rear Admiral John D. Ford, U. S. N. This is an abstract of an article from the Journal of the American Society of Naval Engineers of May, 1904. The results of a number of tests are described and illustrations are included of tubes after they have been submitted to various tests.

Friction Clutches.—The Carlyle Johnson Machine Company, Manchester, Conn., has published a booklet entitled The Johnson Friction Clutch as Applied in Machine Building, in which the fac-similes of a number of letters from different machine companies are given, telling of the success with which these clutches have met. The booklet also includes illustrations of machine tools of various makes which have been equipped with these clutches.

Pennsylvania Railroad.—The freight department of this company has published a 25-page illustrated booklett on Beef Production in Pennsylvania, which is the reprint of an article by W. A. Cochel, which appeared in Bulletin No. 112 of the Pennsylvania State College Agricultural Experiment Station. This booklet gives many interesting and useful facts on breeding and feeding steers, and shows that they return large profits over a period of years, as well as build up the fertility of the soil, so that greater crops may be produced.

FOREIGN RAILWAY NOTES.

The public works committee of New South Wales has recommended the construction of the proposed line from Barellan towards Mirool, a distance of 32 miles. The estimated cost of the line is $480,000, or at the rate of $15,000 per mile. It is anticipated that there will be a loss of $12,020 a year in the operation of the line at first, but that when the irrigation area is populated a large volume of traffic will be developed and the present estimated revenue many times exceeded.

It is expected that preliminary work in connection with the duplication and regrading of the Caulfield line, Victoria, from South Yarra to Caulfield, will be begun shortly. Plans have been prepared and the department of public works is now making the necessary arrangements for the commencement of actual work. The estimated cost of the duplication work is $935,000, and of regrading the lines so as to abolish all grade crossings between South Yarra and Caulfield, $620,000.

The German railways had a favorable year in 1911. For 11 months there was an increase of about 5 per cent. in passenger earnings, and 9 per cent. in freight earnings. The extraordinary drought which was calamitous to the agricultural interests, actually increased, for the time, the railway traffic, the water being so low in nearly all rivers that their traffic was turned to the railways; though the latter suffered a notable decrease in earnings by a general reduction of rates after September, in rates on forage and especially potatoes, amounting to about 50 per cent., partly made up in gross, probably, by an increase in long hauls. Industries have been thriving; the production of iron was the largest ever known, and the coal shipments much larger than in 1910.

Railway Construction.

New Incorporations, Surveys, Etc.

Bassano (Electric).—Incorporated in Canada with $250,000 capital to build a 40-mile line in the province of Alberta. S. E. Whitney, C. Harris, Z. C. Ingram, F. Murcheson and W. Robinson are interested.

California Air Line.—Incorporated in California, with $20,000,000 capital, to build a line to Los Angeles. The incorporators are C. E. Craig, G. Behymer and V. L. Gelffrion, Los Angeles, and R. S. Twomby, Pasadena.

Canadian Northern.—According to press reports, a contract has been given recently to J. P. Mullarkey to build a 90-mile section between Ottawa, Ont., and Pembroke. This contractor already has contracts for two other sections on the Toronto-Ottawa line. T. Turnbull, assistant chief engineer, Winnipeg, Man.

Crows Nest Pass (Electric).—This company, with a capital of $500,000, has applied for a charter in Canada to build from Cowley, Alta., west via Lundbrek, Burmis, Passburg, Bellevue, Frank, Blairmore and Coleman, to a point near Crows Nest lake. The incorporators include W. A. Beede, R. Coulthard and T. B. George, all of Blairmore, Alta.

Greenville & Whitewright Northern Traction.—Incorporated in Texas with $210,000 capital, to build a line to connect Greenville, Tex., Merit, Blueridge, Westminster and Whitewright, about 25 miles. The directors include A. R. Nicholson, H. A. Barsun, J. E. Morris and W. H. James, Greenville, and S. M. Dickins, Merit.

Gulf, Texas & Western.—According to press reports this company will build a 25-mile extension from Jacksboro, Tex., southeast to a connection with the Weatherford, Mineral Wells & Northwestern at Salesville, or at Oran. J. J. Jermyn, president, Scranton, Pa.

Hudson Bay Railway.—The Dominion government will build from LePas, Northwest territory, Canada, northeast to Port Nelson, or Fort Churchill on Hudson Bay, about 400 miles. It has not yet been decided which of these two places will be the northern terminus. A contract was given to J. D. McArthur, Winnipeg, for work on the first 185 miles, and work was started on this section last fall. No track has yet been laid. The work is light, being principally through muskeg, and involves handling an average of about 18,000 cu. yds. a mile. The maximum grade will be .4 per cent., and maximum curvature 3 deg. The line is being built to carry wheat to tidewater at Hudson Bay, and the traffic from Hudson Bay will consist of general merchandise. The minister of railways and canals will have charge of the work. John Armstrong is chief engineer, with principal office at Winnipeg, Man. (February 2, p. 221.)

Iowa Short Line.—Incorporated in Delaware, with $5,000,000 capital, and main office at Philadelphia, Pa., to build a railway in Iowa. T. G. Hunter, vice-president; Andrew Luffberry, secretary. J. G. Hess, Council Bluffs, Iowa, is interested.

Mahar (Electric).—Incorporated in Canada with $250,000 capital to build electric railways in the province of Alberta. The incorporators include C. E. Owens, E. M. Adams, G. O'Grady, J. Huse and F. W. Phillips, all of Alberta.

Minneapolis & St. Louis.—According to press reports this company has plans made to build an extension from Minneapolis, Minn., to the Canadian border. It is said that an extension will also be built to Omaha, Neb. R. G. Kenly, chief engineer, Minneapolis, Minn.

National Railways of Mexico.—According to press reports work is to be started soon on a line from Allende, Mex., north to Las Vacas on the Rio Grande, opposite Del Rio, about 80 miles. A connection is to be made with the Kansas City, Mexico & Orient. James M. Reid, chief engineer, Mexico City.

Nebraska Roads.—Incorporation has been asked for by a company with $300,000 capital, to build from Springview, Neb., southwest to Spaulding, about 125 miles. The incorporators in-

clude C. F. Lear, C. A. Ripley, C. E. Coon, J. F. Carr, and J. N. Cassidy, Jr.

Northern Pacific.—According to press reports, a contract has been given to Nelson Bennett, Tacoma, Wash., to construct the Point Defiance tunnel. A contract for work on the Point Defiance line, from the south end of the tunnel to Tenino, it is said, has been let to Porter Brothers, and to Grant, Smith & Company, both of Spokane. The work includes the grading, the construction of a sea-wall, and all necessary bridges. W. L. Darling, chief engineer, St. Paul, Minn. (January 12, p. 76.)

Oregon Electric.—This company has given a contract to Copenhagen Brothers, Salem, Ore., to build a 2-mile section from Albany, Ore. L. B. Wickersham, chief engineer, Portland, Ore.

Oregon Short Line.—An officer writes that this company does not expect to build the Central Idaho through Boise, Idaho, during 1912. The present plans only contemplate building the line to Taft, about 58 miles, from Richfield, on which work is expected to be finished this year. The question of extending the branch further west will be taken up later. W. H. Bancroft, general manager, Salt Lake City, Utah.

St. Louis, Brownsville & Mexico.—An officer writes that a contract has been given to P. G. Burns, Houston, Tex., to build from Bloomington to Victoria, 13 miles. The company expects to have all the work finished by May. F. G. Jonah, chief engineer, St. Louis. (January 5, p. 37.)

San Francisco & Northern (Electric).—Incorporated in California with $2,500,000 capital, to build from Santa Rosa, Cal., south to San Quentin, 42 miles. The incorporators include A. J. and J. C. Kittle, Ross; A. Forland, Oakland; F. A. Branch, Santa Rosa, and W. L. Jackson.

Temiskaming & Northern Ontario.—Bids are to be asked for soon, it is said, to build the 30-mile extension to Elk Lake, Ont. S. B. Clement, chief engineer and superintendent maintenance, North Bay, Ont. (December 22, p. 1301.)

RAILWAY STRUCTURES.

Cumberland, Md.—An officer of the Baltimore & Ohio writes that the company expects to start work this spring on new shops at Cumberland, Md. The plans have not yet been completed. The cost of the work will be between $300,000 and $400,000.

Duluth, Minn.—It is reported that the Great Northern will build a large freight house at Duluth sometime this year.

East Waco, Tex.—The Missouri, Kansas & Texas is reported as about to begin work on terminal improvements, including the construction of shops, roundhouse, turntable and a water-softening plant.

Lambert's Point, Va.—The Norfolk & Western is expected to begin shortly the construction of a large coal pier, together with a new roundhouse, shops and freight houses, in addition to increasing its yard trackage.

Los Angeles, Cal.—The Southern Pacific and the San Pedro, Los Angeles & Salt Lake have prepared plans for a joint passenger station. The Atchison, Topeka & Santa Fe will build a separate station of its own.

New Orleans, La.—It is reported that the St. Louis & San Francisco is negotiating for 1,600 ft. of wharf space along the river front.

St. John, N. B.—According to press reports, a contract has been given to Norton, Griffiths & Company, for railway terminal improvements to be carried out at Courtenay Bay, at a cost of about $7,500,000. The work is to be completed within four years. The plans call for the construction of a breakwater, dredging work in the harbor, reclaiming a site for railway terminals, and constructing about 4,890 ft. of wharves.

Toledo, Ohio.—The Lake Shore & Michigan Southern has submitted to the mayor and the board of public works of Toledo plans for the extension of its yard at Air Line Junction, representing an outlay of approximately $2,000,000.

Railway Financial News.

Chesapeake & Ohio.—H. E. Huntington, already a director of the C. & O., has been elected a member of the executive committee, succeeding Theodore P. Shonts, who remains a director.

Chicago & Northwestern.—This company has filed applications with the railway commissions of Nebraska and Wisconsin for permission to issue $10,000,000 equipment notes. The securities, however, will not be put out for some months yet. Directors have not yet authorized the issue but will do so when permission is granted to put them out.

Dayton, Lebanon & Cincinnati.—See Pennsylvania Company.

Lake Shore & Michigan Southern.—The 60,000,000 francs ($12,000,000) one-year notes falling due in March have been renewed for another year. Of these notes, 25,000,000 francs ($5,000,000) were renewed in Paris and 35,000,000 francs ($7,000,000) were renewed in London.

Lehigh Valley.—See an item in regard to the L. V. Coal Sales Company in General News.

Minneapolis & St. Louis.—W. M. Wadden, of F. H. Prince & Co., Boston, was elected a director, succeeding Edwin Hawley, deceased, and W. J. Woolman, of J. S. Bache & Co., New York, was elected a director, succeeding F. M. Tompkins, resigned.

Missouri, Kansas & Texas.—W. S. Crandall, nephew of the late Edwin Hawley, has been elected a director and a member of the executive committee, succeeding Mr. Hawley, and H. E. Huntington has been elected a director, succeeding H. J. de Marez Oyens, deceased. Mr. Oyens represented Dutch holdings.

Pascagoula Northern.—The entire property of this railway and of W. Denny & Co., Moss Point, Miss., consisting of saw mills, mill sites and improvements at Moss Point, is to be sold at public auction at Pascagoula on March 5, 1912. The property will be sold as a whole or in parcels. The road runs from Pascagoula, on the L. & N., to Evanston, on the New Orleans, Mobile & Chicago, 41 miles.

Pennsylvania Company.—A press report from Dayton, Ohio, says that one of the Pennsylvania Lines West has taken over the Dayton, Lebanon & Cincinnati, thus giving the Pennsylvania an additional entrance into Cincinnati.

St. Louis Southwestern.—See Stephenville North & South Texas.

Stephenville North & South Texas.—The Texas Railway Commission has authorized the S. N. & S. T. to issue $2,423,000 first mortgage 5 per cent. bonds, guaranteed by the St. Louis Southwestern, the proceeds to be used to reimburse the company for the cost of building 105 miles of line to connect with the St. Louis Southwestern.

Terminal Railroad Association of St. Louis.—A. E. Sweet, general manager of the second district of the Chicago, Rock Island & Pacific, has been elected a member of the association, succeeding F. O. Melcher, deceased. The roads represented in this association are as follows: Missouri Pacific; Missouri, Kansas & Texas; Wabash; Cleveland, Cincinnati, Chicago & St. Louis; Louisville & Nashville; Vandalia; Baltimore & Ohio Southwestern; Southern; Chicago & Alton.

Wabash.—The $10,000,000 5 per cent. receivers' certificates which Kuhn, Loeb & Co., New York, bought from the receivers at $1,002.50 per $1,000 bond, are being sold to the public at $1,008.75 per $1,000 bond. It is understood that over 75 per cent. of the total issue has been sold by the bankers.

Wellsburg & State Line Railroad.—The property of this projected and partly built railway and of the Wellsburg Coal Company has been ordered sold to meet the claims of contractors and laborers. The right of way of the railway was abandoned in 1905.

A concession has been obtained to build and operate a railway from the city of Santa Fe, Argentina, to a point on the Bermejo river, within 40 miles of Presidente Roca. The gage will be 3 ft. 1 in.

ANNUAL REPORT

PERE MARQUETTE RAILROAD COMPANY.

Detroit, Mich., October 19, 1911.

To the Stockholders:

The Board of Directors respectfully submit herewith their Report of the operations and affairs of the Pere Marquette Railroad Company for the fiscal year ended June 30, 1911.

MILEAGE.

	June 30, '11.	June 30, '10.	Increase.	Decrease.
Miles of Road Owned	1,804.65	1,807.26		2.61
Miles of Road Controlled	249.96	253.00		3.04
Leased and Trackage Rights	313.40	304.62	8.78	
	2,368.01	2,364.88	3.13	
Less South Haven and Lawton Branch Leased to Kalamazoo, Lake Shore & Chicago Ry.	33.82	33.82		
Less Paw Paw Lake Branch leased to Benton Harbor & St. Joe Railway and Light Co.	2.72	2.72		
Total Mileage Operated	2,331.47	2,328.34	3.13	

The increase of 3.13 miles as compared with June 30, 1910, is made up as follows:

Increase—		
Alexis, O., to Toledo, O., L. S. & M. S. Ry.		8.70
Ann Arbor R. R. tracks at Alexis, Ohio		.09
Romulus, Mich., P. M. R. R. "Y." connection with Wabash R. R.		.06
		8.85
Decrease—		
Stratford Spur Track taken up	3.04	
Wells Spur Track taken up	2.67	
Delray, Mich., to Romulus, Mich., Wabash R. R. Corrected	.01	5.72
Total Increase in mileage operated		3.13

The statistics and tables shown throughout this report include the operations of,

Pere Marquette Railroad Company,
The Lake Erie and Detroit River Railway Company.

REVENUES AND EXPENSES.

Operating Revenues		$16,523,762.24
Operating Expenses	$13,470,965.07	
Taxes	664,770.22	14,135,735.29
		$2,388,026.95
Interest	$3,074,499.96	
Rentals	721,188.07	3,795,688.03
		$1,407,661.08
Other Income	$164,132.55	
Hire of Equipment (Debit)	570,232.50	406,099.95
	Deficit	$1,813,761.03

COMPARATIVE STATEMENT OF REVENUES AND EXPENSES.

For the Fiscal Year ended June 30, 1911, and June 30, 1910.

	1911.	1910.	Increase or Decrease.
Operating Revenues	$16,523,762.24	$16,542,271.49	—$18,509.25
Operating Expenses	13,470,965.07	11,698,842.16	1,772,122.91
Net Operating Revenues	3,052,797.17	4,843,429.33	—1,790,632.16
Taxes	664,770.22	755,641.37	—90,871.15
Net Operating Income	2,388,026.95	4,087,787.96	—1,699,761.01
Other Income	164,132.55	126,393.08	37,739.47
Hire of Equipment....(Debit)	570,232.50	143,213.40	—427,019.10
Total Net Income	1,981,927.00	4,070,967.64	—2,089,040.64
Interest	3,074,499.96	2,924,665.06	149,834.90
Rentals	721,188.07	676,588.89	44,599.18
Total Interest and Rentals	3,795,688.03	3,601,253.95	194,434.08
Surplus	.....	$469,713.69	.....
Deficit	$1,813,761.03	.....	$2,283,474.72

	1911.	1910.	Increase.	Decrease.
Percentage of Expenses to Operating Revenues	81.52	70.72	10.80	
Percentage of Taxes to Operating Revenues	4.02	4.57		.55
Total	85.54	75.29	10.25	

Note.—The Revenues and Expenses covering Outside Operations are included in the figures shown above.

CAPITAL STOCK AND BONDED DEBT.

During the fiscal year ended June 30, 1911, there was no increase in the Capital Stock of the Pere Marquette Railroad Company, but the Bonded Debt was increased $24,186,280.00,—$16,706,000.00 of this additional debt being owned by the Company and under pledge—making net increase of Funded Debt in hands of Public $7,480,280.00, as follows:

Bonds and Equipment Notes Issued:

Pere Marquette 5% Improvement and Refunding General Mortgage Bonds to the amount of $16,000,000.00 were issued March 1st, 1911, and deposited with the Guaranty Trust Co. of New York, Trustee, as collateral securing $8,000,000.00 Five Year 6% Gold Notes		$16,000,000.00
Pere Marquette Five Year 6% Collateral Trust Notes to the amount of $8,000,000.00 were issued under Indenture with Guaranty Trust Co. of New York, Trustee, dated March 1st, 1911, to retire various outstanding obligations, including short term notes, and for additions and betterments, cash payment on new equipment purchased, etc., etc.		8,000,000.00
Pere Marquette 4% Refunding Bonds were issued as follows		706,000.00
In exchange for Robert Winthrop & Co. 4½% Equipment Trust Notes retired in October, 1910, and April, 1911	$152,000.00	
In exchange for Marquette Equipment Company, Ltd., 5% Bonds retired in October, 1909, and October, 1910	88,000.00	
In exchange for Lake Erie & Detroit River Ry. Co. 5% Equipment Bonds retired in September, 1910	8,000.00	
Account of Additions and Betterments during 1909 and 1910	458,000.00	
5% Equipment Notes were issued under agreement between American Locomotive Co. and Pere Marquette Railroad Company, dated July 1st, 1910, covering purchase of 15 Locomotives		177,956.25
5% Equipment Notes were issued under agreement between Pere Marquette Railroad Company and The Equitable Trust Company, New York, dated November 15th, 1910, covering purchase of 10 Locomotives		168,500.00
5% Equipment Notes were issued under Equipment Trust Agreement with the Bankers Trust Company, Trustee, dated April 1st, 1911, covering extension of Pullman Co. 5% Equipment Warrants, Series "A" and "B" for a like amount, secured on 4,000 Box Cars		2,112,000.00
5% Equipment Notes were issued under agreement with Bankers Trust Company, Trustee, dated June 1st, 1911, covering purchase of 50 Locomotives and 14 Passenger Cars		870,000.00
Total Bonds Issued		$28,034,456.25
Less—Improvement and Refunding Bonds issued March 1st, 1911, and pledged as collateral for 5 Year Gold Notes	$16,000,000.00	
Refunding Mortgage 4% Bonds issued during year and pledged with Trustee of Improvement and Refunding General Mortgage of March 1st, 1911	706,000.00	16,706,000.00
		$11,328,456.25

Bonds and Equipment Notes Retired:

Lake Erie & Detroit River Ry. 5% Equipment Bonds retired September 1st, 1910, and March 1st, 1911	$16,000.00	
Marquette Equipment Co. 5% Bonds retired October 1, 1910	89,000.00	
Robt. Winthrop & Co. 4½% Equipment Notes, retired October 1, 1910, and April 1, 1911	152,000.00	
American Car & Foundry Co. 6% Equipment Notes retired October 1, 1910, and April 1, 1911	80,000.00	
Pere Marquette 6% Equipment Gold Notes (Eastern Equipment Co. extension) retired March 1, 1911	650,000.00	
American Locomotive Co. 5% Equipment Notes (Series A) retired July 3, 1910, October 3, 1910, January 3, 1911, and April 3, 1911	40,000.00	
American Locomotive Co. 5% Equipment Notes (Series B) retired October 1, 1910, January 1, 1911, April 1, 1911, and July 1, 1911	57,956.25	
Pullman Co. 5% Equipment Notes (Series A and B) retired by monthly payments during fiscal year, last payment March 15th, 1911	$507,653.68	
Extended under agreement with the Bankers Trust Co. dated April 1, 1911, whereby 5% Equipment Notes maturing semi-annually to April 1, 1919, were issued	2,112,000.00	2,619,653.68
Pullman Co. 5% Equipment Notes (Series C) retired September 15, 1910, December 15, 1910, March 15, 1911, and June 15, 1911		42,042.78
C. H. & D. Ry. Co. Kleybolte Equipment Notes retired October 1, 1910, and April 1, 1911		68,743.54
Equitable Trust Co. 5% Equipment Notes retired by monthly payments beginning December 15, 1910		32,780.00
Total Bonds Retired		3,848,176,25
Increase in Bonded Debt in hands of Public		$7,480,280.00

Payments have been made for sundry equipment obligations, for the purchase of new equipment and for the retirement of short term notes as follows:

Paid Pullman Company for notes maturing during this fiscal year and issued during the Receivership period for the purchase of 4,000 Box Cars.	$507,653.68

Paid The Cincinnati, Hamilton & Dayton Railway Company, on account of equipment purchased under what is known as the Kleybolte Equipment Trust Agreement in 1905 and turned over to the Pere Marquette while that property was under lease to the C. H. & D. This payment was made in accordance with award of arbitrators.		$8,743.54
Paid holders of Marquette Equipment Company, Ltd., 5% Bonds, issued October 1, 1900, for the purchase of 17 Locomotives and 1,110 Freight Cars and called for payment October 1, 1910....		89,000.00
Paid holders of Lake Erie & Detroit River Railway 5% Equipment Bonds, issued March 1, 1904, for the purchase of 3 Locomotives and 210 Coal Cars and maturing September 1, 1910, and March 1, 1911		16,000.00
Paid Robert Winthrop & Company, for notes maturing October 1, 1910, and April 1, 1911, and issued October 1, 1904, for the purchase of 20 Locomotives and 2,350 Freight Cars.....		152,000.00
Paid holders of Pere Marquette 6% Equipment Gold Notes, maturing March 1, 1911, which were issued for extension of Eastern Equipment Co. 5% Bonds for like amount covering 65 Locomotives, 4,832 Freight Cars, 1 Wrecking Crane and 3 Car Ferries		650,000.00
Paid American Car & Foundry Company 6% Notes, maturing October 1, 1910, and April 1, 1911, issued August 1, 1908, for the purchase of 750 Gondola Cars		80,000.00
Paid American Locomotive Co. 5% Equipment Notes, Series "A", maturing July 3, 1910, October 3, 1910, January 3, 1911, and April 3, 1911, issued January 3, 1910, for purchase of 12 Locomotives		40,000.00
Paid American Locomotive Co. for 25% of total cost of 15 Locomotives purchased July 1, 1910..	$59,318.75	
For 4% Equipment Notes, Series "B", issued July 1, 1910, for balance of purchase price of said Locomotives and maturing October 1, 1910, January 1, 1911, April 1, 1911, and July 1, 1911...	57,956.25	117,275.00
Paid Pullman Company for 20% of total cost of 20 Passenger Coaches, 8 Baggage Cars and 2 Baggage and Mail Cars purchased June 15, 1910	$58,188.00	
For 5% Equipment Notes, Series "C", issued June 15, 1910, for balance of purchase price of said equipment, and maturing September 15, 1910, December 15, 1910, March 15, 1911, and June 15, 1911	42,042.78	100,230.78
Paid Equitable Trust Co. 5% Equipment Notes maturing monthly, beginning December 15, 1910, issued November 15, 1910, for purchase of 10 Locomotives		32,780.00
Paid Bankers Trust Co. for 15% of total cost of 50 Locomotives and 14 Passenger Cars purchased June 1, 1911		153,913.00
Paid Industrial Iron Works, Bay City, Mich., for 1 Locomotive Crane		5,150.00
Paid McMyler Interstate Co. for 90% of purchase price of one Locomotive Crane		6,300.00
Paid American Shipbuilding Co. for cost of new Steamer No. 18, which was built to replace the No. 18 sunk in Lake Michigan, September 9, 1910	$297,500.00	
Paid to cover cost of furniture and fixtures.....	7,612.64	
	$305,112.64	
Less—Amount received from the Insurance Company covering loss of Steamer 18.....	275,000.00	30,112.64
Paid to retire various short term notes.....		2,500,000.00
		$4,549,158.64

The proceeds of $8,000,000 Pere Marquette five year six per cent. Collateral Trust Indenture Notes dated March 1, 1911, were used in part in making the above payments.

IMPROVEMENTS.

During the fiscal year ended June 30th, 1911, improvements to cost approximately $1,900,000.00 were authorized, as follows:

Double Track.

Alexis to Romulus	36.50 miles
Hoyt to Bridgeport	4.10 "
LaMar to Grandville	2.46 "

The double track from Alexis to Romulus is necessary to take care of the business offering at Toledo.

The double tracks between Hoyt and Bridgeport and between LaMar and Grandville are the entrances to our large yards, the former at Saginaw and the latter at Grand Rapids. These tracks will facilitate the handling of the heavy business at above terminals.

Change of Line.

Alfred to Union Pier	5.64 miles

Provision has been made for the construction of a new line from Alfred to Union Pier, a distance of 5.64 miles, which eliminates approximately 360 degrees of curvature and makes a five-tenths instead of a nine-tenths grade line.

Grade Revision and Double Track.

St. Joseph to Riverside	7.59 miles

A sraight line with five-tenths grade is under construction, northbound out of Benton Harbor. The present line has a nine-tenths grade and heavy curvature. There is also under construction a double track from St. Joseph through Benton Harbor to Riverside, which, when completed, will facilitate the movement of trains through these two important points.

Passing Tracks.

Saginaw District	32 passing tracks	70,873	ft. of track
Grand Rapids "	14 " "	33,840	" " "
Detroit "	11 " "	28,300	" " "

This provision embraces additional passing tracks on the Chicago, Toledo, Grand Rapids, Ludington, Port Huron, Saginaw, Petoskey, S. T. & H., and Port Austin Divisions. These tracks are necessary to properly handle the business on above divisions.

Engine Terminals.

Provision has been made for a new forty-three stall roundhouse complete, at Grand Rapids. The present engine house is inadequate for that purpose, and will be added to the erecting shop, thereby increasing the capacity of the shop 75 per cent.

Twenty stalls are being added to the present twelve-stall roundhouse at Saginaw. This addition will take the place of two small roundhouses which were built prior to 1874 and are not large enough to accommodate the present class of power.

Shops and Machinery.

The construction of the new 43-stall roundhouse at Grand Rapids will enable us to convert the 24-stall longitudinal house, which has been used as a roundhouse, into a boiler, tank and blacksmith shop, thereby increasing the working space in the erecting shop from ten to eighteen stalls, eight of the stalls having been heretofore used for the boiler, tank and blacksmith work.

At Saginaw: The new boiler and tank shop and addition to erecting shop provided for last year are practically completed. A new power-house is under construction and two additional water tube boilers are being installed to complete battery of four boilers to take care of power necessities economically. The boilers now in use are over thirty years old and worn out.

New shop machinery and tools, to cost approximately $63,000.00, have been ordered and are now being installed.

Terminal Yards.

Grand Rapids yard tracks to accommodate 740 additional cars.
Detroit yard tracks to accommodate 500 additional cars.
Ludington yard tracks to accommodate 700 additional cars.
Saginaw yard tracks to accommodate 450 additional cars.
Toledo yard tracks to accommodate 600 additional cars.

The additional yard room at the above points is necessary to accommodate the increased business.

Telephone and Telegraph Lines.

Reconstruction of telegraph line and installing telephone dispatching circuits between:

Detroit and Grand Rapids.
Ludington and Saginaw.
Grand Rapids and Porter.

The reconstruction of our telegraph lines as outlined above and the installation of train dispatching circuit will increase the efficiency of our service and facilitate the movement of trains through the territory above mentioned; this, with the one hundred thirty-five miles of telephone train dispatching circuit already constructed, will give a total of five hundred and sixty-one and fifty-eight hundredths miles of copper wire telephone train dispatching circuit on our main line, as follows:

	Miles	
Saginaw to Ludington	137.60	
Detroit to Grand Rapids	152.00	
Grand Rapids to Porter	136.98	
Saginaw to Toledo	135.00	561.58 miles

New Passenger Stations.

Provision has been made for new passenger stations at Ludington and St. Joseph. Both of these stations are very important from a passenger standpoint. The station at Ludington burned some time ago and has not been repaired. The building at St. Joseph is thirty years old and wholly inadequate.

New Freight Station.

A new freight station is under construction at Saginaw. The present station, constructed in 1869, is too small to properly handle the business at this important point.

ROADWAY AND TRACK.

During the year there were 31.78 miles of side and yard tracks constructed and 8.47 miles of unproductive tracks taken up. A net increase of 23.31 miles.

There were 665,562 cross ties used during the year, 472,322 being used in main track renewals, 101,844 in side track renewals and 91,396 used for new work.

315,124 tie plates were put in.

531 sets of switch ties were used, 240 sets being placed in main track renewals, 112 sets in side track renewals and 179 sets in new work.

78.21 miles of track were ballasted with gravel and cinders.

The grade between Lansing and Trowbridge, 2.08 miles, was reduced to a .5 per cent. grade by cutting down the hill and raising depression at Cedar River.

At Plymouth additions were made to our yard facilities which increased the capacity to accommodate 340 additional cars.

New passing tracks were constructed at Ensel, and between Ann Pere and Howell.

STEEL RAIL.

During the year there were 564,291 track feet of new 75-lb. rail, and 5,280 track feet of new 70-lb. rail laid on Main Line, as follows:

75-lb. rail	Chicago Division	59,616	track feet
	Grand Rapids Division	262,728	" "
	Toledo Division	183,912	" "
	Ludington Division	58,035	" "
		564,291	" "
70-lb. rail	Buffalo Division	5,280	" "
	Total	569,571	" "

The relaying of the above mileage with 75-lb. and 70-lb. rail released 85-lb., 75-lb., 70-lb., 67-lb., 60-lb., 56-lb. and 50-lb. rail, which with 25,343 track feet second-hand rail on hand from last year was used as follows:

RELAID ON MAIN LINE.

Petoskey Division	247,413	track feet
Chicago Division	6,640	" "
Muskegon Division	142,080	" "
Detroit Division	3,960	" "
Toledo Division	86,302	" "
Saginaw Division	2,116	" "
Ludington Division	6,694	" "
S. T. & H. Division	77,205	" "
Kalkaska Branch	5,280	" "
Almont Branch	12,667	" "
	590,357	" "
Relay rail laid	590,357	track feet
New rail laid	569,571	" "
Used in side tracks	4,557	" "

FENCES.

During the year there were 1.24 miles new fence built, 131.06 miles rebuilt and 109.54 miles repaired.

TELEGRAPH DEPARTMENT.

During the year 19.88 miles of telegraph line were reconstructed, and telephone dispatching circuit between Saginaw and Toledo (274.00 miles of copper wire) was installed and 35 stations equipped with telephones.

BRIDGES AND CULVERTS.

New steel bridges on concrete abutments and piers were constructed at Hartford, Jenison, Sparta, Lansing, Berkshire, Greenville, Mayville, Northville, Mich., Leamington, New Canaan and Whitebread, Ont., replacing wooden structures.

Wooden overhead bridge at Leamington, Ont., has been replaced by steel bridge on pile foundations. One hundred foot wood truss bridge at Memphis, Mich., has been replaced by steel truss bridge on pile foundations.

Twenty-five concrete culverts were constructed, replacing wooden, cast iron pipe and open culverts.

Wooden bridges were constructed on Branch lines at Barryton, Grawn, Canton, Harbor Beach, Port Austin and Ubly, Mich., replacing bridges destroyed by fire and washouts. Seven small wooden pile bridges were renewed, account age.

Extensive repairs were made to bridges at Northville, Plymouth, Reed City, Saginaw and What Cheer, Mich., and Wallaceburg, Ont.

Wooden bridge at Michigan City, Ind., was replaced by double box culvert.

One hundred and three cast iron pipe culverts were put in during the year and twenty cast iron pipe culverts were extended.

BUILDINGS, FUEL AND WATER STATIONS.

A new brick pump house was erected at Plaster Creek to supply Wyoming shops with water.

New freight houses were erected at North Grand Rapids and at Godfrey Avenue, Grand Rapids.

Freight house at Detroit extended 105 feet. (Steel structure on concrete foundation with corrugated iron siding).

New depot constructed at Watson, Ont.

New frame freight and transfer house (joint with D. T. & I.) was constructed at Carleton, Mich.

At Plymouth, new yard office and engine house were constructed, also new turn-table and cinder pit installed.

Extensive repairs were made to 17th street engine house, Detroit.

At Saginaw an addition of 100 x 100 feet was made to machine shop; new boiler shop (100 x 58 feet) and new boiler house were erected; two 250 H. P. boilers were installed, transfer table was extended and new office, tool room and toilet rooms for machine shop and new frame office and oil house for engine house were constructed.

New 50 foot, 100 ton track scale installed at Ionia.

New water tanks were erected at following points: Fairgrove, Howard City, Ludington, New Boston, Yale and Zion, Mich.

New wells for water supply were installed at Bay Port, Elkton and Zion, Mich., and reservoir built at Edmore, Mich.

EQUIPMENT.

During the year contracts were let for the construction of:

10 consolidation freight engines, cylinders 22 x 30, weight on drivers 193,500 pounds.
10 consolidation freight engines, cylinders 22 x 30, weight on drivers 193,500 pounds.
25 consolidation freight engines, cylinders 25 x 30, weight on drivers 210,500 pounds, equipped with superheaters and Franklin doors.
10 switch engines, cylinders 20 x 26, weight on drivers 134,500 pounds.
5 Pacific type passenger engines, cylinders 22 x 28, weight on drivers 139,500 pounds, equipped with superheaters and Franklin doors.
12 first-class coaches.
2 combination baggage and mail cars.

Of the above, the first ten consolidation freight engines, cylinder 22 x 30, were received in December, 1910.

The ten switch engines, five Pacific type passenger engines, eleven first-class coaches and two combination baggage and mail cars, were received during June, 1911.

The remainder of the equipment (35 consolidation freight engines and one first-class coach) to be delivered during the months of July and August, 1911.

There were also purchased during the year one locomotive coaling crane and one locomotive crane equipped with forty-three inch lifting magnet for use in handling heavy materials.

Nine eight-wheel engines and two small switch engines were scrapped during the year on account of their age and being too light to justify extensive repairs.

During the year there were received on contract previously let, seven first-class coaches, eight baggage cars and two combination baggage and mail cars; three first-class coaches were built at Ionia shop to replace cars of the same class burned at the time of Muskegon shop fire, June 20th, 1909.

The old parlor cars were converted into coaches on account of not being suitable for further use as parlor cars, and three second-class coaches and two baggage cars were destroyed by fire or accidents.

Ten box cars were converted into cabooses and nine box, three flat and three coal cars converted into work service cars. Seventy-eight box, three stock, twenty coal, thirty flat, four caboose and two work service cars were destroyed by fire or accident on lines of this Company or on foreign lines. Twenty-three box, ten flat and seven work cars were retired from service during the year on account of age and being of too small capacity to justify extensive repairs necessary to put them in serviceable condition.

SUMMARY OF CHARGES AND CREDITS TO ADDITIONS AND BETTERMENTS DURING FISCAL YEAR ENDED JUNE 30, 1911.

Description.	Debits.	Credits.	Net.
Right of Way and Station Grounds	$54,743.68	$600.00	$54,143.68
Real Estate		350.00	350.00 Cr.
Widening Cuts and Fills	3,299.37		3,299.37
Grade Reductions and Changes of Line	1,766.65	18,700.00	20,066.65
Bridges, Trestles and Culverts	92,571.63	23,481.25	69,090.38
Increased Weight of Rail	57,657.07		57,657.07
Improved Frogs and Switches	879.24		879.24
Track Fastenings and Appurtenances	35,846.92		35,846.92
Additional Main Tracks	52,681.58		52,681.58
Sidings and Spur Tracks	103,505.39	56,287.53	47,217.86
Terminal Yards	155,003.91	1,590.00	153,413.91
Fencing Right of Way	839.55		839.55
Improvement of Crossings Under or Over Grade	5,414.86		5,414.86
Interlocking Apparatus	7,023.85		7,023.85
Block and Other Signal Apparatus	706.98	975.00	268.02 Cr.
Telegraph and Telephone Lines	13,489.42		13,489.42
Station Buildings and Fixtures	22,251.19	8,371.29	13,879.90
Roadway Machinery and Tools	2,887.25		2,887.25
Shops, Engine Houses and Turntables	145,538.83	8,395.34	137,143.49
Shop Machinery and Tools	36,894.26	250.00	36,644.26
Water and Fuel Stations	22,137.23	13,100.00	9,037.23
Dock and Wharf Property		250.00	250.00 Cr.
Electric Light and Power Plants	1,100.22		1,100.22
Equipment	877,170.49	711,529.02	165,641.47
Interest and Commissions	1,522.64		1,522.64
Other Additions and Betterments	2,344.63	4,150.00	1,805.37 Cr.
Total	$1,743,276.84	$848,029.43	$895,247.41

The gross revenues of the Pere Marquette Railroad Company for the fiscal year ended June 30, 1911, were $16,523,762.24, a decrease of $18,509.25 as compared with the gross revenues of preceding year.

Of the loss in revenues during the year, $365,530.37 was in freight traffic, with a decreased tonnage carried of 180,979 tons, and a decrease of 26,232,324 tons carried one mile. The average rate per ton per mile was .579 cents, as compared with .591 cents in 1910. The most important losses in freight traffic can be accounted for by decreased shipments of the following commodities: Bituminous Coal, 139,002 tons; Corn, 36,120 tons; Hay, 21,570 tons; Fruits and Vegetables, 67,859 tons; Dressed Meats, 33,438 tons; Plaster, 23,076 tons; Lumber, Lath and Shingles, 29,209 tons; Staves, Headings and Hoops, 22,737 tons; Logs, 35,052 tons; Other Iron and Steel Products, 55,728 tons; Bar and Sheet Metal, 31,714 tons; Merchandise, 96,991 tons. The principal increase in tonnage carried was as follows: Oats, 99,542 tons; Potatoes, 98,270 tons; Sugar Beets, 93,374 tons; Anthracite Coal, 139,991 tons; Stone, Sand, etc., 48,913 tons; Miscellaneous Carload Shipments, 21,728 tons. The statement of commodities carried, page 27, shows the above and other fluctuations in the various commodities.

The passenger revenues show an increase of $232,079.56, with an average rate per passenger per mile of 1.774 cents, as against 1.770 cents in 1910. The number of passengers carried increased 111,829. The increase in the number of passengers carried one mile was 12,591,981. This represents an increase in passengers carried one mile over the preceding year of 6.01%, which is slightly less than the normal increase per year during the past ten years. This increase is largely accounted for by additional passenger trains being placed in service on our main lines, which increased our total passenger train mileage 164,265 miles, or 4.02% as compared with year ending June 30, 1910.

The Michigan two cent fare law (effective September 28th, 1907) continues to be a serious handicap to the profitable operation of passenger service on a very considerable portion of our mileage. The passenger train mileage for the year was 4,248,371 miles; of this 2,484,284, or 58.48%, was mileage of main line trains and 1,764,087, or 41.52%, was mileage of branch line trains. The approximate passenger revenue per train mile on the branch lines was 49 cents. The increase of $232,079.56 in the gross passenger revenues for the year was contributed entirely by the main line trains, and this increase is very largely accounted for by the fact of our having added 230,844 additional main line passenger train miles. At the time this legislation was under discussion, its advocates claimed that two cent fares would be very profitable to the railroads on account of the stimulating effect it would have on travel. Our experience shows conclusively that it has not stimulated travel in the thinly settled districts of Michigan, and that the operation of this law is a serious burden to the Pere Marquette Railroad Company on account of being required to operate a large percentage of its passenger train mileage at a loss.

The revenues from outside operations decreased $9,694.48. The revenue from express traffic increased $83,570.89, and the mail revenue increased $596.21.

The expenses of operation show increases aggregating $1,772,122.91, of which amount $190,859.12 was in maintenance of way and structures; $433,159.53 in maintenance of equipment; $47,491.58 in traffic expenses; $921,460.06 in transportation expenses; $62,199.31 in general expenses and $116,953.31 in outside operations. The percentage of expenses to gross revenues was 81.52%, as against 70.72% in 1910, an increase of 10.80%. The distribution of operating expenses, found on pages 25 and 26, sets forth the comparative increases and decreases in the several accounts.

The taxes for the year were $664,770.22, as comared with $755,641.37 paid in 1910, a decrease of $90,871.15.

The general income account of the Company shows a deficit for the year of $1,813,761.03, as against a surplus of $469,713.69 for 1910.

The charges to operating expenses, as per tabulated statements on pages 25 and 26, have been made in accordance with classification of expenses adopted by Interstate Commerce Commission, which provides for maintenance and operation only, and does not permit of any charge that is in the nature of an addition or betterment to the property, such charges being provided for under their classification of additions and betterments, as shown on page 12 of this report. The general balance sheet on page 19 is also in the form prescribed by the Commission.

The Profit and Loss debit as of June 30, 1910, was $156,456.56. This account was debited during the year with $515,778.84 account of charges for discounts on bonds sold; $286,705.32 account of depreciation prior to July 1, 1907, on equipment, tracks and structures destroyed, removed or sold; $16,192.27 account of sundry adjustments during the year, and the balance from income account of $1,813,761.03. The account was credited during the year with $8,581.35, leaving the debit to Profit and Loss account June 30, 1911, $2,780,312.67.

By order of the Board of Directors.

WILLIAM COTTER,
President.

Railway Age Gazette

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E. A. Simmons, *President.*

L. B. Sherman, *Vice President.* Henry Lee, *Sec'y & Treas.*

The address of the company is the address of the officers.

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An important point in regard to the wear of solid steel wheels was made in the discussion on the proposed specification for steel wheels by the American Society for Testing Materials at its last convention. The limits for chemical composition are rather wide, allowing carbon .60 to .85 per cent.; manganese .50 to .80 per cent., and phosphorus and sulphur as high as .06 per cent. It was explained that these limits were made to admit either basic or acid open hearth steel, but there are objections to such a wide variation in the elements which affect the hardness and wear of wheels. Steel wheel records must take account of the two wheels on one axle, as it is desirable to have wheel mates as near the same hardness as possible, since the service of the softer wheel will determine the time when the pair must be removed for turning. If a .60 per cent. carbon wheel is mated with one containing .80 or .85 per cent., after about 10,000 miles service the soft wheel will show wear in the throat. This production of a sharp flange on the softer wheel will cause the harder wheel to crowd it to the rail, and in time the flange on the soft wheel will reach the prescribed limit for wear and require the removal of the pair for re-turning before the hard wheel has shown much wear. Some of the larger roads require the carbon content to be stamped on the wheel, and the two wheels on one axle are so mated that the carbon does not differ more than .05 per cent.; but it is probable that the carbon in different parts of the same wheel varies more than that amount. While it may be possible for manufacturers to furnish fairly accurate records of carbon for individual passenger and engine truck wheels, it is not to be expected that this will be forthcoming for freight car wheels, which will be ordered in as large lots as from 5,000 to 10,000. On account of the importance of mating wheels which are similar in hardness, and the wide range allowed by the proposed specification, the subject was referred back to the committee for a revised report next year.

The Long Island Railroad's order requiring conductors, trainmen and station agents to make every effort to ascertain the cause of any sudden interruption of train service, and answer questions freely and courteously, is quoted elsewhere in this issue. This is highly commendable, especially the clause addressed to station agents. To advise prospective passengers "properly" means, among other things, to advise them promptly. And the agent is not to wait to be asked. This circular should be made permanent in some way, perhaps as a part of the rule book, for it is a good thing to have these instructions in black and white, even though the agents and conductors may already be doing pretty well. Long Island passengers should specially appreciate this courtesy, as they make many thousands of trips which, though short, are important; but the rule is well worth imitation on all railways, whether the suburban business is heavy or not. It is well for all grades of employees to be reminded of the duty not only to be ready to meet passengers' expressed wants, but to anticipate their wants. Much has been said about courtesy. Thoughtfulness and politeness go together. No railway officer makes persistent efforts to inculcate politeness and courtesy, but that he finds a need for stimulating intelligence also. Courtesy to a passenger implies, if it does not include, telling him what he wants to know; or at least what he needs to know to enable him to make his journey with all reasonable expedition and convenience. Politeness and ignorance make an exasperating combination. If, now, the Long Island plan, with its enlightened treatment of passengers, could be combined with the Frisco plan for improving relations with freight patrons, we should have an "uplift" of station agents that would surely be notable. It is to be hoped that both roads will have many imitators; these new plans being so promising that the experiments ought to be greatly extended. Many small stations are manned by agents far less competent than ought to be provided, while at many larger ones the agent's enthusiasm may have been pretty well killed out. In this situation any move to make the agents more efficient is to be commended, for if the men have not the capacity to improve themselves, the plan logically will compel the employment of better men.

The construction of the Milwaukee, Sparta & Northwestern, described elsewhere in this issue, is an illustration of a type of railway building which, although not uncommon in the East, is still essentially new on Central and Western lines. It was built by the Chicago & North Western primarily as a long low grade cut-off to provide added facilities and improved operating conditions for handling an already very heavy traffic. Although not a feeder for the system of which it is a part, its opening should result in a material increase in traffic since it

forms a part of a through low grade route from Chicago to the Northwest by way of Milwaukee, which allows the North Western to compete much more actively for the heavy tonnage originating in the industrial and manufacturing territory adjacent to Milwaukee. The most interesting feature of the construction to engineers is the bridge work. The tendency to avoid highly reinforced concrete piers and abutments is in keeping with the policies of several other prominent roads. The Cushing cylinder pier bridges which were used in two cases have been developed in this country principally by the engineering department of the North Western, and used on some of the most important structures that this road has built. This type of pier is by no means new, as it has been widely applied in England and on the continent of Europe, and, to a limited extent, on other roads in this country. The usual practice among English engineers is to use cast iron cylinders, but owing to the unreliability of this metal for constructive purposes it has never been adopted in the North Western's work. The economy of this design for the two locations where it is used on the new road seems unquestionable as compared with cofferdam or caisson work. Although it has been the policy of the North Western to build temporary structures on new lines and replace them later in permanent form as the earnings of the line warranted the expenditure, the traffic to be handled on this line immediately upon its completion made it advisable to build it to a standard equal to the best of the company's old lines. The single track section is provided with double track substructures in all permanent bridges, indicating that the traffic is expected to grow to an extent requiring double track throughout in the not very distant future. The fast through passenger and freight service inaugurated immediately after the opening of the line is an indication of the traffic now handled.

ONLY once since 1907 has the report of the American Railway Association shown such a large car shortage as is shown for the two weeks ended February 14. The total car shortage for this period was 36,928, of which 24,094 were box cars. In the two weeks ended November 10, 1909, there was a shortage of 39,902 cars, but of these only about half were box cars, and the increase over the previous two weeks was almost entirely accounted for by a very large increase in the demand for coal cars. It is probable that weather conditions are in good part the cause of the showing made in the first half of February, 1912, the demand for coal cars being abnormal and the supply of box cars being below normal because of delayed movement. The chart published in our news columns showing car surpluses and shortages in 1907 to 1912, inclusive, shows a curve for the present calendar year unlike any year since 1907. In 1908, 1909 and 1911 the car shortage remained at a minimum figure from the first of the year till at least August. In 1910 there was a slight bulge in January culminating in the middle of February, but it was by no means as sharp as that shown this year, nor did box car shortage play any noticeable part in it. Weather conditions in that year in the Northwest were especially severe. In that year also, however, there was general activity in business throughout the country, and the *calendar* year was a generally prosperous one for the railways, in volume of traffic handled. While trade has not been active since 1910, neither have railways been buying or building a normal supply of cars. Trade reports at the present time indicate a slow but apparently healthy increase in orders for dry goods and other commodities; it is generally acknowledged that retail dealers have very small stocks on hand. It may well be, therefore, that, instead of showing a sharp reduction in shortage, as in 1907 after the middle of February, and a very large increase in surplus cars after the first of April, as in 1910, the shortage may continue to grow well into March, with a continued comparatively small surplus thereafter. In an item printed in our traffic news columns the Grand Trunk Pacific says that it is moving all the grain which the farmers are offering to it. The report of the American Railway Association shows, however, that the total shortage on all Canadian lines increased from 4,366 at the end of January to 8,146 in the first two weeks in February.

THE general efficiency of the postal service is often used as an argument for government ownership and operation of railways and other public utilities. It was largely on this argument that the postmaster-general recently founded his recommendation that the telegraph service be nationalized and operated by the postoffice. Some interesting side-lights are thrown on this subject by the flood of complaints of extraordinary delays in the delivery of newspapers and other second-class mail which it is reported has been raining on the postoffice department and members of Congress for several weeks. Second-class mail is said to have been commonly delayed from 6 to 72 hours, and in many cases equal tardiness has been noted in the delivery of first-class and even special delivery mail. The matter has been brought forcibly to our attention by subscribers of the *Railway Age Gazette,* who have not been receiving their copies of the paper regularly. Without casting unjust aspersions on the postoffice department for delays due to weather and transportation conditions, which our readers are in a position to appreciate—but which do not explain why some people receive mail 48 hours later than others from the same train—the fact that the postoffice department has for some time been undergoing a spasm of economy immediately suggests itself, together with the question as to how such methods of economizing would appeal to the patrons of a government-operated railway system. The postoffice department, like the railways, has been criticised as wasteful, and, like the railways, it has been charged with discrimination in rates on the ground that the first-class rate of postage has borne a large part of the cost of handling second-class matter. The department was prevented by the united opposition of the periodical publishers from advancing the second-class rate, which was alleged to be unreasonably low, just as the railways have generally been prevented from removing discriminations by advancing the lower instead of reducing the higher rates. The postoffice department has sought to reduce the expense of handling second-class mail by sending monthly periodicals by freight instead of on passenger trains, and it has recently been brought to our attention that the entire issue of a monthly periodical was held at the Chicago postoffice for three days to complete a carload. In another instance periodical mail was held at Kansas City for a week while the department was endeavoring to get a full carload before moving it to the Pacific coast contract zone for distribution. Railways have been criticised when in their efforts toward economy and efficiency they have held freight trains in order to approximate the rated tonnage of their locomotives. They could save a great deal of money if they could hold their passenger trains for a full load, or even if they could curtail the number of unprofitable trains. The postoffice department encountered the same obstacle in its effort to readjust its rates as do the railways. Could a governmental service that will delay mail a week in the interest of economy give satisfaction by applying the same methods to freight or passenger trains?

SOME pertinent suggestions regarding uniform classification of freight are made in another column in a letter from a shipper who believes that the recent proceedings before the Interstate Commerce Commission which led to the suspension of Western Classification No. 51 have shown that instead of there being a demand on the part of the public for a unification of classifications, a very strong hostility to the plan exists. The railways have always contended that complete unification probably is impracticable, if not undesirable, and have been induced to make a beginning of the work by constant pressure on the part of the Interstate Commerce Commission, the National Association of Railway Commissioners and some shippers' organizations. They have realized from the first that the adoption of complete uniformity of classification provisions, or even a sincere effort to remove some of the differences which frequently cause trouble to shippers handling business in more than one classification territory, must necessarily have an important influence on commercial conditions and in many cases must affect some shippers adversely.

In any attempt to equalize classification requirements in the three territories whose local conditions have caused differences in classification the railways must seek to protect their own interests by offsetting changes that will reduce their revenues by changes that will increase them. Although the state commissioners who have been most active in inducing a suspension of the Western classification have made much of the "millions of rates" that would be affected, thus far it appears their more specific protests have been directed mainly against changes proposed by the railway to correct actual discriminations rather than to affect revenue. In an editorial published on September 8, 1911, the *Railway Age Gazette* said that "if shippers do not want such disturbance of business conditions as will inevitably result their proper course is to oppose a uniform classification at all, rather than to wait until the railways have gone to the trouble and expense of framing it, and then denounce them for proposing such changes as they must propose if they are to propose a true uniform classification." In the course of the hearings before the Interstate Commerce Commission during its investigation of the Western classification the shippers will be given ample opportunity to make known whether they desire the railways to continue their work toward unification, and if so, whether they are willing to accept the necessary consequences. Many believe that the commission may find that it has made an erroneous estimate of the shippers' wishes in this respect.

THE RAILWAY LABOR SITUATION. III.

WHEN Mr. Brandeis attacked the efficiency of American railway operation, and advocated the adoption of "scientific management," it was not railway managers who in reply attacked scientific management. They denied that railway operation was as inefficient as he implied, or that as large savings as he asserted could be made by the methods he suggested. But they conceded that there were methods of employing, training and compensating labor, which would increase efficiency and which, therefore, were desirable.

The most vigorous and direct attacks on efficiency methods came from spokesmen of the railway brotherhoods. They not only attacked scientific management as understood by Mr. Brandeis, and by Harrington Emerson and other efficiency engineers, but also other methods for increasing railway efficiency. A characteristic utterance was an article in the *Railroad Trainman*. Expressing, no doubt, the views of many leaders and of many of the rank and file of labor organizations, it attacked the large engine, the big car and the increases in train tonnage which they are used to bring about; and piecework, bonus and premium wage systems. In many cases the railways have had strikes when they have tried to introduce in their shops wage schemes under which the compensation of individual employees would vary with the amount of their work. Methods to increase train tonnage have also been not only criticised, but often actively opposed by employees.

Because of the views that have been expressed and of the difficulties railway managers have often met in adopting methods to promote efficiency, it is perhaps just to say that the brotherhoods are opposed to many, if not all, such methods. The *Railway Age Gazette* would not say this lightly; and its columns are open to any spokesman of the brotherhoods who may believe that their attitude is unfairly stated and will correctly define it.

The brotherhoods' opposition to efficiency methods have been based on several grounds. Among them are that, by "speeding up" the men, they cause over work and accidents; that they tend to increase unemployment, and that the employees do not benefit by them. Methods which cause over work or accidents may be dismissed from consideration, for any means which cannot be used without causing over work or accidents is incurably objectionable, and, indeed, cannot be called a true efficiency method. However, whether any particular method or device does cause over work or accidents is a question of fact. There are many by which the product of each worker may be increased without either over work or accidents resulting. Are the other objections to these methods, namely, that they increase unemployment and that employees do not get their fair share of the benefits of them, valid?

The argument that if the amount of work done by each is increased there will not be enough to go around, and that some will be deprived of employment, must be based on the theory that the amount to be done in the world, and therefore, the amount of wages that can be earned, are limited. But the real wages of labor are the products of labor. The more each produces, the more products there will be to divide, and, other things being equal, the more real wages each will receive. Suppose the workers of the world should carry out to its logical conclusion the theory that each should limit the amount he did, so there would be something for each to do. It is doubtful if, under any practicable organization of industry, the supply of every product could be so nicely adjusted to the demand that all producers would have employment. The fact that some are now out of employment is not because others are working too much, but because there is a mal-adjustment of the supply of and demand for the products of labor, in consequence of which, while the demand for some products is such that more of them than are being produced could be disposed of, the supply of others is so large relatively to the demand that there is no work at all for part of those who are adapted and used to supplying them. If on account of the unemployment of some those who are now employed reduced the amount of work that they do, this would not correct the mal-adjustment between demand and supply which has been referred to. It would merely reduce the total amount of production.

Suppose that by successive stages working men reduced the amount that they did until almost nothing was produced. When the process was completed there would still be unemployed men unless the mal-adjustment between supply and demand had been completely remedied, and society would be without food and clothes because of the cessation of production. If the process were reversed and production were increased those who were out of employment would not be hurt, while all the rest would be helped. Indeed, those who were out of work might be helped because if they could not get employment they would at least stand a better chance of being the beneficiaries of a generous charity. It is obvious that the increase of production could be carried to the limit of healthy human activity and to the confines of ingenuity and skill in inventing and developing labor-saving machinery and devices to the benefit of all.

The introduction of labor-saving methods and devices often does temporarily throw out of employment workers directly affected by them. But to refrain from introducing improvements on this account would be to put the temporary interests of the relatively very few who would thus be unfavorably affected above the permanent interests of the many who would be directly or indirectly benefited. It is also true that a marked increase in the supply of a particular commodity or service may result in throwing some of its producers out of employment. But industrial history shows this condition is only temporary. Increased efficiency in production is usually accompanied by decreased cost of production and by an increase in the demand for the product, which means an increase in the demand for the labor of those who produce it. It is significant that in spite of all the labor-saving devices and methods that have been introduced in the railway business in recent years, the number of railway employees in the fiscal year 1910 was 1,699,420, which is 27,346 more than in any previous year.

It is a just conclusion, therefore, that ordinarily improvements in devices or methods which increase the efficiency of labor do not tend to increase unemployment, and that if the increased product or income be equitably divided the increased production is of benefit to all. But, it is contended, labor will not get a share, or its fair share, of the results of increased production. Why not? Are there any greater difficulties in the way of getting a fair division of a large product than of a small one? The

answer must be in the negative. Certainly it cannot be said that employees of railways have not benefited by the economies made in recent years in railway operation, for their wages have been raised repeatedly. If these economies had not been introduced, often over the opposition of the labor unions, it would have been impossible for the railways to have granted the increases in wages that they have without making extensive increases in passenger and freight rates. Recent experience shows this is not easy to do.

The conclusion cannot be escaped that increases in the efficiency of machinery, methods or men cannot injure employees themselves and are almost certain, in the long run, to benefit them. How, then, are the desired increases in efficiency to be secured? The Chicago & North Western and its employees are trying to put the idea of co-operation into practical use by the organization and work of efficiency committees. The plan and its operation have been described in the *Railway Age Gazette.* It is an interesting and vitally important question as to how far such co-operation can be carried. Probably the best means for getting the maximum efficiency from each employee is a wages scheme under which each worker is paid approximately in proportion to the quantity and quality of his work. Such wage schemes are the most direct and certain means of enabling employees to share in the results of increased efficiency. The labor organizations are usually opposed to piece work, premium or bonus wage systems. They favor flat scales. So far as the attitude is one of opposition to the payment of men in proportion to their deserts it is unreasonable. Sometimes, on the other hand, employers seek to introduce such wage schemes, not merely to increase efficiency, but to break down the unions. If the breaking down of unionism is a necessary means to securing reasonable efficiency such attempts are justified, but attempts by any means to break down unions merely because they are unions are unreasonable and unfair.

It does seem that a clear recognition of the fact that efficiency is just as desirable from the standpoint of the employee as from that of the employer, accompanied by a disposition on the part of each to show a decent and reasonable regard for the rights and interests of the other, might be made the basis for co-operation in working out and adopting, not only mechanism and methods, but also wage scales, that would increase efficiency to the benefit of both. In some cases differentials in wages for doing the same work under different conditions have been adopted. Oftentimes, as for running locomotives of varying power, they are based hardly at all on what the men do and almost entirely on what their machines do; and railway officers charge that such differentials sometimes have been insisted on by the employees, not in recognition of the principle that labor shall be rewarded in proportion to what it does, but for the purpose of penalizing the use of more efficient machinery. Perhaps, however, if railway managers proceeded about the matter firmly but tactfully they would be able to get the unions themselves, through their leaders, to co-operate with them in formulating schedules of wages and conditions of employment which would tend as certainly to promote efficiency as some schedules now in effect tend to promote inefficiency.

INDIANA COMMISSION INVESTIGATION OF RAILS.

THE hearing conducted by the Indiana Railroad Commission at Indianapolis on February 20 marked the entrance of a third factor in the controversy between the railways and the steel makers regarding the rail question. In view of the widespread complaint concerning the quality of rails now in track, a complaint which has increased largely within the past few months, and in view of the publicity given the report of the Interstate Commerce Commission regarding the investigation of the Lehigh Valley rail, action by regulating authorities was not altogether unexpected. The Indiana commission is the first regulating body to undertake an investigation of the general subject of rails, and its progress will be watched with great interest by both railway men and steel manufacturers.

If properly conducted the inquiry, by giving publicity to the actual facts and conditions, may be of much assistance in the solution of this difficult problem. The papers presented at the hearing by Messrs. Johnson, Dudley and Cushing are an excellent start toward a satisfactory presentation of the entire situation. Mr. Cushing's paper is given elsewhere in this issue. The attention of those interested in the rail situation is particularly called to it. Probably the territory of no other state is better located for such an inquiry than Indiana. Heavy traffic main lines of several of the larger systems cross it to reach Chicago and St. Louis from the East. A number of these main lines are double-tracked and equipped with heavy rail, automatic signals, etc., bringing them up to the standard of the best railways of the country. Other main lines traverse the state north and south between Chicago and Louisville and Cincinnati. Between these lines are many branches of all variations of density of traffic and standards of roadway and maintenance. There are about 7,500 miles of main track in the state, while the mileage of roads represented by lines within its limits is several times this amount. The climatic conditions are fairly representative of average conditions throughout the more northerly part of the United States. The newest and most modern rail mill in the country is located at Gary, Ind., while another large mill is situated close by at Chicago, giving opportunity to study mill practice at close range.

Now that the Indiana commission has definitely undertaken this work it is to be hoped that other commissions will devote their energies in this direction to assisting it, rather than to making independent investigations, for such additional inquiries would only result in duplication of work; and the amount of labor involved in a proper inquiry is so great that it is doubtful if the Indiana commission realizes the task it has undertaken. To go into this subject thoroughly—and this is the only way that satisfactory results can be secured—will require much time. The most important study of the rail question heretofore undertaken is that of the American Railway Engineering Association, and it covers the entire country, and is being conducted by a committee of 22 chief engineers, railway operating officers and rail experts, who are devoting a large part of their time to this work. In addition, this committee has found it necessary to employ an experienced metallurgist, who is giving his entire time to its investigation. In spite of all this, the Rail committee does not hope to complete its task for some time.

The attitude of the representatives of the roads, arrangements for whom were made by the Special Committee on Relations of Railway Operation to Legislation, and of the rail makers at the hearing at Indianapolis was gratifying. They expressed and manifested entire willingness to assist the commission in every way possible, in the hope that information of value will be brought out. From its disinterested position it is probable that the commission may be able to see facts bearing vitally on this question, which neither the railway men nor the steel manufacturers have noticed, because of their close proximity to the subject.

The commission assumes heavy responsibility by entering on this investigation, for while the possibilities for doing good are great, an unwise decision backed by its authority would muddy the waters, postpone a fair solution of the problem and harm the railways of the entire country. Because of the commission's jurisdiction over the roads within the state, and its entire lack of jurisdiction over the rail mills, any order it might make would necessarily be binding only on the former. For example, an order requiring the roads to buy better rails might be most unwise. The commission might be able to enforce such an order, assuming the practicability of making better rails; but it could not fix the price the roads should pay for them; and thus it might put the carriers, the party over which it has jurisdiction, at the mercy of the manufacturers, the party over which it has no jurisdiction and no influence but that of moral suasion.

Probably the commission will do the maximum of good and the minimum of harm by confining itself to getting and giving

the greatest possible publicity to the facts and using its moral influence to get the railways and rail makers to co-operate better than they have in the past in the interest of both economical and safe transportation. In other words, the commission will do the most good by the use of what A. T. Hadley has called "the power of common sense—which does not seem as strong as statutory power to prosecute people and put them in prison, but which, in the hands of a man who really possesses it, is actually very much stronger."

SOLID STEEL WHEELS.

It is estimated that there are now in service on the railways of the United States one million solid steel wheels, or about 5 per cent. of the total wheels under freight and passenger equipment. These wheels are now used quite generally for tenders, engine trucks and passenger cars, and their use is increasing in freight service, especially for high capacity cars and for refrigerator cars which are usually found on the fast freight lines. Recent orders for freight cars from five railways alone, call for over 40,000 of these wheels, so that the number in interchange will soon be so large as to make charges for solid steel wheels a prominent item in freight car repair accounts. A stock of such wheels will also be required at repair points for replacement of worn and slid flat wheels. The standardization of the size and shape of solid steel wheels, as well as the quality of the material, are, therefore, matters of considerable interest to those in charge of the car department.

These features were considered in the paper on "Steel Wheels," by Charles G. Bacon, Jr., which we publish elsewhere in this issue. Mr. Bacon has had a large experience in the manufacture of solid steel wheels and their service, and his recommendations are valuable and timely. On account of a lack of co-operation in the standardization of such wheels, there has grown up a varying practice with respect to the diameter of the hub; the special wheels which are made with any desired hub are more expensive to make, and the charge to railways must be larger than that for wheels of standard dimensions. For engine truck wheels the diameter of the inside face of the hub, 12 5/16 in., is fairly well established as a standard, though some lines make this dimension vary from 11 in. to 14 in. An agreement among the steel wheel makers to charge an extra price for these odd sizes would help to confine the hub diameter to a standard size.

The thickness of the hub wall of 33-in. steel car wheels is another dimension which is quite variable in current practice, as an occasional loose wheel (usually due to improper boring or mounting) has suggested that a thicker hub wall would hold the wheel more securely on the axle. It has already been well demonstrated that for a 7 in. wheel fit a hub wall 1¼ in. thick is sufficient, and it is not economical to use a greater thickness, so that this dimension should also become a standard.

Perhaps the most interesting and important feature of the solid steel wheel when used in freight car service is the cost of the total mileage obtained from it. It is claimed that on account of the low first cost and the long life the expense per 1,000 miles will be less than for chilled iron wheels. The service will depend on the quality of the steel, which in forged wheels is similar to that in locomotive driving tires, and the latter require frequent turning on account of sharp flanges, flat spots and worn tread. The forged wheel will require the same treatment, and its total mileage will depend on its resistance to the wear which produces these defects and to the available thickness for repeated turning.

In the paper referred to, Mr. Bacon takes a decided stand in favor of a rim 2½ in. thick instead of 3 in. The M. C. B. limit of 1 in. thickness allows a body of steel for wear of 1½ in. in the former and of 2 in. in the thicker rim. Under present conditions of manufacture the wearing quality of the steel is obtained by the work done in forging, and it is claimed that the depth of penetration of this work is best secured in the 2½-in. rim. Beyond that the steel is softer and more liable to the defects which correspond with shelling out in the chilled iron wheel. The limitation placed on the thickness of the rim is, therefore, due to the quality of the steel found beyond the 1½ in. wearing limit, and if this steel was equally good at 2 in. depth the objection to a 3-in. rim would not be sustained and an additional mileage would be obtained from the thicker rim and the cost per 1,000 miles would be reduced. A similar condition existed 15 or 20 years ago, when light and weak tire mills were making 4-in. tires, which were found defective beyond a certain depth, while the 3-in. tires gave a more uniform and satisfactory service. Since that time heavier and stronger tire mills have been used, and the 4-in. tire is in general use for freight service, which would indicate that the degree of penetration in making a tire or a steel wheel depends on the strength of the machinery employed in manufacture.

The reasons for favoring the thinner rim are, therefore, based on limitations in the present process of manufacture, and in advancing such reasons there is a virtual admission on the part of the forged wheel maker that he cannot produce a wheel which has sound steel in the tread beyond 1½ in. thickness. It may be best to retain the 2½-in, rim for the present, but it seems inevitable that if solid steel wheels are to come into general use in freight service, economic conditions will require a greater depth of steel for the wearing body, and this demand will result in such improvements in the process of manufacture as will provide a grade of steel suitable for the service throughout a deeper rim. It is reasonable to expect this, because steel forgings of a uniform grade of steel of much greater thickness are made for other purposes, and it should not be difficult to apply the same processes to the manufacture of steel wheels.

The details of the manufacture of forged steel wheels are not described in Mr. Bacon's paper, but the low price at which they are sold—at the rate of a little over 2 cents per lb.—would not indicate that any special treatment is given beyond forming accurately to shape under sufficient pressure to secure a solid steel structure to a limited depth. The improvement in the hardness, toughness and fineness of grain, which is obtained by heat treatment and oil tempering, has apparently not been applied to the forged steel wheel, and it is probable that further experience may show that the additional expense involved in these operations will be well justified by the longer life and greater mileage which should be thereby obtained.

NEW BOOKS.

Deflections and Statistically Indeterminate Stresses. By Clarence W. Hudson, Professor of Civil Engineering, Polytechnic Institute of Brooklyn, N. Y. John Wiley & Sons, New York. Cloth, 7¼ in. x 11 in. 258 pages. Illustrated. Price, $3.50.

While the importance of the study of statistically indeterminate stresses has been realized for years, few text books have been written in English on this subject until within the past year. Its treatment has been confined almost exclusively to the insertion of a short chapter in several of the standard bridge text books. In this book the author treats this subject thoroughly, with special reference to the distortions of the structures during erection. He goes especially into the methods of camber blocking and other devices used in the erection of the larger structures.

The book is well illustrated with drawings and photographs showing methods of design and erection, while a large number of tables are inserted showing the stresses, sections and weights for the different members of a number of typical designs. There are eleven chapters, which include discussions of deflections and reactions of straight and curved structures with solid webs, deflections of structures with solid or open webs, movable bridges and arches. One chapter is devoted to the distortion of structures as affecting their erection, while another discusses the adjusting devices and the adjustments required to make final connections for important structures. The volume should be a valuable one for reference in connection with class-room work in higher bridge design as well as for the use of designing engineers.

Letters to the Editor.

UNIFORM CLASSIFICATION.

Chicago, February 20, 1912.

To the Editor of the Railway Age Gazette:

The storm of controversy recently aroused over Western Classification No. 51, which was precipitated at the hearing in Chicago before Chief Examiner Brown of the Interstate Commerce Commission, and which has led to the suspension of the entire classification for 120 days, to my mind possesses some very significant features which it would seem well to consider carefully in connection with the work toward uniform classification.

In the first place, the Interstate Commerce Commission seems to have gained an impression that there is a strong demand on the part of shippers for uniform classification. It has been pressing the carriers to work out such a classification under the threat that unless they do so the commission will undertake the matter itself and force in a uniform classification. Under the spur of this continued agitation the carriers have now had a Uniform Classification Committee at work for three years and the results of their work are just beginning to come to light through the medium of the new issues of various classification committees. When the supplementary docket of the Western Classification Committee's July meeting came out the shipping public was taken completely by surprise, and not having time to go into the matter thoroughly, failed to discuss it with the committee to any great extent, contenting themselves with the request that its consideration be postponed until a later date. The carriers evidently misunderstood and under-rated the public sentiment, and adopted a large portion of the supplementary docket containing the recommendations of the uniform committee.

The answer came in the storm which broke before Examiner Brown on January 29. An analysis of that hearing seems to have demonstrated that not only is there no demand on the part of the public for a complete uniform classification, but, on the other hand, there is a tremendous hostility against the idea. It does appear that there is a demand for uniformity of descriptions of commodities and uniformity of some (but not all) of the rules and of minimum weights. The Uniform Classification Committee has done, and is still doing, a very important work in this direction, but the hearing seems to show that it has gone too far in its grouping of commodities for carload ratings. The committee should have contented itself with recommending only straight carload ratings of single articles and then left it to the individual classification committees to combine the articles that should take a single carload rating and minimum in accordance with the conditions and needs of their own territories.

Having been furnished this object lesson, is it not clear that the Interstate Commerce Commission should drop its pressure for absolute uniformity, leaving the carriers to continue the uniform committee to investigate and make recommendations to the various associations as above outlined? Instead of the Western Classification Committee abandoning its meetings, however, and by so doing working hardships not only upon the public but upon the railways, as well, should they not continue their sessions in order that the public may be afforded the opportunity to demonstrate its needs without being driven to the Interstate Commerce Commission for relief?

SHIPPER.

NATIONAL ASSOCIATION OF MANUFACTURERS AND LABOR UNIONS.

Dayton, Ohio, February 23, 1912.

To the Editor of the Railway Age Gazette:

I enclose herewith copy of a letter which I have received from the president of a large bridge construction company, whose signature I have omitted from the copy because of the fact that I have not his permission to use the letter in this, or any other, connection. The letter is self-explanatory. [The letter called attention to an editorial in the *Railway Age Gazette* of February 16, 1912, on "The Railway Labor Situation."—Editor.]

I also enclose declaration of principles of the National Association of Manufacturers; also, excerpts from an address which I delivered before the Builders' Exchange, at Baltimore, on February 8, together with pamphlet No. 2, published by the National Association of Manufacturers, containing an address of mine before the Young Men's Hebrew Society, of New York, November 7, 1909. I call your attention to the marked paragraphs on page 4 thereof.

The objectionable language employed in the editorial in the *Railway Age Gazette* referred to, to wit, "The course of the shop employees was as extreme, unwise and iniquitous as the campaign being conducted by the National Association of Manufacturers entirely to destroy unionism," being false, misleading and without warrant, I assume it to have been used under a misapprehension of the labor policy of the National Association of Manufacturers, which, as a matter of fact, is otherwise in accord with the whole spirit of your article; and your attention having now been called to the gross injustice thus committed against the National Association of Manufacturers, I assume you will make a proper reference to your error in your next issue.

The National Association of Manufacturers has never conducted a campaign to destroy unionism, nor has either of my predecessors, Mr. Parry, the late Mr. Van Cleave or myself, ever condemned unionism *per se*. On the contrary, in many public utterances, for many years, we have each declared legitimate trade unionism to be not only right, but beneficial and proper. We have, however, relentlessly opposed lawless closed shop unionism, and I will say for myself that I expect to continue doing so until my end shall come, or until the menace shall give way to a lawful and ordinary type of unionism, such as, in the article referred to, you advocate.

Many members of the National Association of Manufacturers are readers and supporters of your worthy publication, and they will expect you to correct the objectionable reference to their organization, which has diligently sought to purge unionism of its abuses, and which is rapidly accomplishing that purpose.

JOHN KIRBY, JR.,
President National Association of Manufacturers.

[Mr. Kirby's letter, the extracts from his public speeches, and the declaration of principles of the National Association of Manufacturers which he sent us indicate that the *Railway Age Gazette's* reference to that association was, as Mr. Kirby says, misleading and unjust, and that, as a matter of fact, it stands for the same principles in dealing with labor unions that this paper advocates. Therefore, the reference to it is cheerfully and completely retracted.—Editor.]

The Swiss seem to take naturally to tunnels. On the chief line from the North, passing southeast from Basel to Olten, the railway goes under one of the Jura ranges by the Hanenstein tunnel, which has the respectable length of 8,187 ft. Not satisfied with that, the Swiss have let a contract to straighten 10 miles of the line, by which they will shorten the distance 369 ft., but at the cost of an entirely new tunnel no less than five miles long (26,698 ft.). Of course it is not for the sake of the saving in distance that this great work is undertaken. The old tunnel rises with a grade of 139 ft. per mile, and it has become almost impossible on account of the steep grade to get the traffic through this tunnel. The steepest grade on the new line is to be only 56 ft. per mile, and its summit will be 361 ft. lower than the summit of the existing line. The contract for carrying out the work has been let to a Berlin firm.

STEEL WHEELS.*

BY CHAS. G. BACON, JR.

The wheel committee of the Master Car Builders' Association was instructed by the executive committee, last June, to consider the designs and specifications for steel wheels and to report at the convention to be held this coming June. The wheel committee held a meeting about two months ago at which were present, by invitation, representatives of the solid steel wheel manufacturers Upon learning that the subject of specifications covering solid steel wheels had been under consideration for upwards of two years by a special committee of the American Society for Testing Materials, the M. C. B. committee very promptly determined to accept an invitation which was extended to have representation on that committee. This latter committee is well qualified to handle this important item intelligently, being composed of representatives of the manufacturers and of the railways which have had the longest and most extensive experience with solid steel wheels. It is but right and proper that the question of design be thrown open to all, so that there may be full expression of opinion, and so that the manufacturers and the railways will reach agreements, or standards, at the earliest possible moment. The object of this paper is to place before you a list of twenty-one designs of solid steel wheels which long experience and careful study would seem to indicate are adequate standards in connection with more than ninety per cent. of the requirements of the railways of the United States today, and which would soon cover the other ten per cent. if railways would give attention to some points in connection with co-ordinate equipment; also to further place before you certain reasons why a study of the subject has convinced me that a total of eleven of these designs are all that are desirable or required.

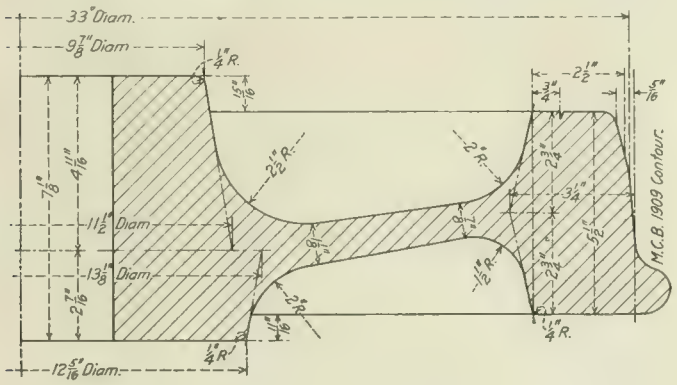


Fig. 1—Typical Design of Solid Steel Engine Truck Wheel.

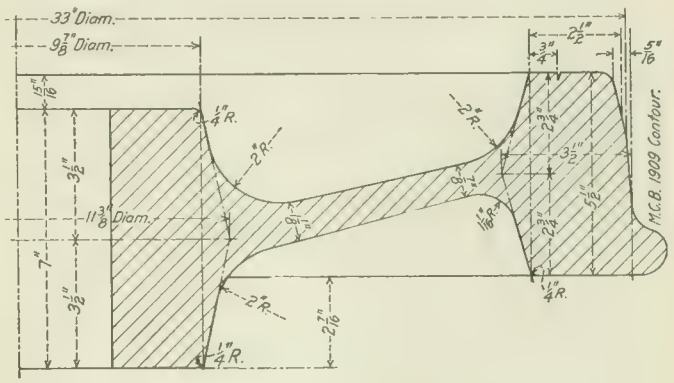


Fig. 2—Steel Wheel for Tenders, Freight and Passenger Cars.

A 33-in. steel engine truck wheel is shown in Fig. 1, which is representative of the other designs for different diameters of this type of wheel. Fig. 2 shows the design for a 33 in. tender, passenger car and freight car wheel. The salient point of difference between these two general classes is that wheels for engine trucks require inside hub faces of large diameter to provide adequate bearing surface. A total of eleven designs which I think are all that are desirable are, for engine trucks, 28½ in., 30 in., 33 in., and 36 in. For freight cars, tenders and passenger train cars, 28 in., 30 in., 33 in. (two designs) 36 in. (two designs) and 38 in.

One of the reasons for increasing the number of designs of wheels for engine trucks above the four above noted is that of the diameter of the inside face of the hub. It has long been considered by prominent roads, which have placed many thousands of solid steel wheels in engine truck service, that this dimension should properly be 12 5/16 in., but recently several large companies have called for engine truck wheels with inside hub faces of either 13 in. or 14 in.; in fact, one large system has issued a sheet setting forth that this dimension shall be either 11 in., 12 in., 13 in., 13½ in., or 14 in., under certain conditions. Ninety-five per cent. of the solid steel wheels which are in engine truck service in the United States today have 12 5/16 in. diameter of inside hub face. This dimension is standard with the roads which have had the longest and most extensive experience with solid steel wheels of this type and I am told that it has proved to be a proper and satisfactory dimension. The cost of manufacturing solid steel wheels, and therefore the price to the railways, is largely a question of the number of wheels produced per type, and this being the case it seems most important—particularly as regards engine truck wheels of which the total number required is not sufficiently large to enable manufacturers, even under the best of conditions, to reduce the cost of production to the same level as that of the other classes of which larger quantities are used—that specific attention and study should be given to this dimension of inside hub face diameter, so that a standard can be adopted for the best interests of all concerned.

For a 6 in. x 11 in. axle the hub diameter is increased from 9⅞ in. to 11 in., to provide proper hub wall thickness and this brings up a point which I wish to make one of the principal features of my paper, i. e., what is the proper hub wall thickness for solid steel wheels?

A hub diameter of 9⅞ in. has long been recognized as all that is required in mounting solid steel wheels on 4¼ in. x 8 in., or 5 in. x 9 in., or 5½ in. x 10 in. axles, i. e., up to and including 7 in. diameter wheel-seats, for even in connection with the 5½ in. x 10 in. axle, and allowing for the eccentricity provided for in the specifications, a 9⅞ in. hub diameter means a minimum hub wall thickness of 1¼ in. on a 7 in. diameter wheel-seat. During the past few months, and under the leadership of one of our large systems, which, however, is basing its statements and acts on experience with comparatively few solid steel wheels, there has been quite a move on the part of some roads, none of those which have had long and extensive experience in the matter, however, to use wheels with 11 in. hub diameter on 5½ in. x 10 in. axles, and even on 5 in. x 9 in. axles, on the ground that 1¼ in. is not sufficient for a minimum hub wall thickness and tended to "loose wheels." From a manufacturer's standpoint I have no reason to take exception to this move. A heavier wheel means a higher price, and so long as a railway wishes to pay for excess metal I do not know that it is within a manufacturer's province to object. But as one of the engineers who has had to do with the solid steel wheel subject from its infancy, and who is more or less responsible for the dimensions, I wish to assume just as definite and positive an attitude on this point as words will permit me to express.

I have long been in touch with this particular point and have had considerable personal experience in the boring and mounting of wheels, and since this question was raised recently I have made a further study of it and consulted with representatives of those roads which are qualified by long and extensive experience to speak definitely and intelligently on the subject. I find that

*Abstract of a paper read at the February 20, 1912, meeting of the Western Railway Club. Mr. Bacon is assistant to the president of the Forged Steel Wheel Company.

one large system, having over 200,000 solid steel wheels in service, has had less than a dozen loose wheels in the past six or seven years, despite the fact that 1¼ in. minimum hub wall thickness has been the adopted practice, and that in the early days of the solid steel wheel industry, when manufacture was not as accurate in some ways as at present, many wheels went into service with 1⅛ in. hub wall thickness. Of still greater interest, perhaps, is the fact that close investigation of each one of these few cases of loose wheels developed the fact that the trouble was due, solely and entirely, to improper boring and mounting and had no reference whatsoever to the wall thickness of the hub of the wheel. From another large system, with upwards of 90,000 solid steel wheels in service, I learn that in six or seven years only three or four cases of loose wheels have developed, despite the hub wall thickness of 1¼ in. minimum; investigation of these few cases showed them to be due to improper boring and mounting.

Such being the experience of those whose long and extensive use of solid steel wheels certainly qualifies them to know whereof they speak, I look upon it as a piece of undue assumption when a road with a limited experience, both in time and in quantity, sets out to be aggressive along a line with which it is unfamiliar. A hub wall thickness of 1¼ in. is all that is required with properly designed and manufactured solid steel wheels mounted on axles with wheel-seats up to and including 7 in. diameter; those who are troubled by loose wheels under such conditions must look to their own shop practices, to their boring-mills, their axle-lathes, and their wheel-presses.

Some roads in wishing for something larger than a 5½ in. x 10 in. axle have, for reasons of their own doubtless, neglected to adopt the M. C. B. standard, 6 in. x 11 in., and have gone to the use of sort of an "in-between," 6 in. x 10 in., which renders it necessary to add these two extra designs of wheels. As I am discussing wheels I do not like to encroach on another subject, but it seems to me that as much axle trouble is caused by overheating as by lack of section, and that conditions are not much improved by increasing the section without proportionate increase in bearing. In other words, is there any great advantage in a 6 in. x 10 in. axle over a 5½ in. x 10 in., the adoption of the 6 in. x 11 in. axle, instead of a mere "in-between"? I refer to this as merely another one of those features which has its effect on the cost of manufacture, and therefore the price to the railways of solid steel wheels.

Another point is brought up by the suggestion that, though shown as standard designs, I would like to eliminate the 30½ in. engine truck wheel, 33½ in. engine truck wheel, and two of the wheels used for cars, solely because they mean the use of solid steel wheels with a 3 in. rim thickness. Experience tends to prove that a 2½ in. rim thickness in connection with solid steel wheels makes for efficiency and economy, and that the use of 3 in. thickness is to be avoided. In the first place, one must consider the rim of a solid steel wheel as being of two general parts, the allowable wearing-body, being that depth which can be properly used in service, and the minimum allowable rim thickness, which necessitates removal from service. For example, in a rim thickness of 2½ in., it may be said that there is 1½ in. of allowable wearing-body, with 1 in. thickness remaining which calls for removal from service under M. C. B. Rules. It must be borne in mind that this 1½ in. of allowable wearing-body cannot be entirely used in road service. From time to time while the wheel is in service certain deformations of contour will occur, after varying mileages and with correspondingly varying depths of metal worn from tread, which necessitate removal of the wheel from service for re-machining to restore the contour.

Long experience, with general averages on numerous roads and under varying conditions, indicates that the allowable wearing-body in a rim 2½ in. thick will split-up far more economically than the wearing-body in a 3 in. rim, or, to put it in another way, as a general average proposition a road will secure more actual sixteenths of an inch of wearing-body, and fewer sixteenths of an inch of waste metal in the allowable wearing-body of a 2½ in. rim than in a 3 in. rim. And though this broad statement of fact may seem to over-shoot the mark, and to evoke remonstrance from those who have not given the point specific attention, all I ask is the opportunity for co-operative study with any railway official of conditions on his road, and I will be able to clearly demonstrate the correctness of my statement. To properly meet the conditions a solid steel wheel should possess, throughout the depth of its allowable wearing-body, an attrition-resistance equal to that of the rail, and, to obtain this, certain limits must be recognized in rim thickness from a manufacturing standpoint. Not alone must a high degree of attrition-resistance be obtained initially, but it should be maintained, as uniformly as possible, throughout the allowable wearing-body; this quality is largely secured by the work, and the depth of penetration of the work, which is put upon the rim. There is no process of manufacture of solid steel wheels known today which will produce as good and serviceable a wheel with a 3 in. rim thickness as with a 2½ in. rim thickness. Based on the records of a good many thousand wheels which have been worn out in service, the mileage-life of a solid steel wheel with 2½ in. rim thickness is greater than one with 3 in. rim thickness, all other things being equal.

I have always been, and I am today, a strong and persistent opponent of the use of the term "shelling" in connection with solid steel wheels. There has been too much of a tendency to call all defects shelling, owing to either convenience or lack of familiarity with the subject, whereas proper analysis would have classed the defect under one of three or four other and more specific headings, which would have enabled the manufacturer to handle the matter far more intelligently and in a manner decidedly more for the benefit of the railway. Shelling may be the easiest thing to think of, or to say, but it is absolutely non-specific under normal conditions in connection with solid steel wheels, and in 99 cases in a 100 means nothing at all. The chilled portion in the rim of a cast iron wheel extends at right-angles to the chill-block, and only to a certain depth, this depth being dependent on the quality of the iron, etc. The effect is a slight depth of metal with strong resistance, backed with ordinary gray iron of far less resistance, bordering, comparatively speaking, upon sponginess. When this strong surface metal had been worn so thin as to be unable to support the service-load which was on it, it would, having but a comparative sponginess or cushion beneath, mash-up and fall away in a manner which left the appearance of the outside of an oyster shell, and hence the term "shelling."

I have always opposed the use of the term "shelling" as applied to solid steel wheels, for I have believed, and my belief has been based on specific study, that no such condition should exist in properly designed and made solid steel wheels. But I must now go on record as saying that if some railway officials persist in using wheels with a 3 in. rim thickness, or over, and can succeed in inducing manufacturers to supply such types, then I must, though most regretfully, add the item of shelling to the liabilities of solid steel wheels, for close observation of many wheels of this type, not confined to any one manufacturer's product, convinces me that in a properly made solid steel wheel with a 2½ in. rim thickness there is good opportunity for knowing what you are getting, whereas with a 3 in. rim thickness you cannot be sure of anything, except that there will be a considerable percentage of dissatisfaction and trouble in the results. Let those who doubt the correctness of my position in this matter take note of the fact that the roads which have had the longest and most extensive experience with solid steel wheels have nearly all given up the use of wheels with a 3 in. rim thickness and have adopted the 2½ in. thickness as standard.

For years I have been an advocate of the idea of producing wheels so true to dimensions that the machine work was reduced to a minimum. I am still a firm believer in the theory, but only to the extent to which it can be carried in justice to the quality

of the material produced. Machine work increases the cost of production, and it may often remove metal of particular service value, yet if the effort to produce material on which machine work is unnecessary opens the door to a product which lacks uniformity, lacks many of the other virtues which it should possess, and borders on the dangerous, then extreme caution should be used in order that a "penny wise, pound foolish" policy be avoided. It may be all right to produce some of the commodities of life on the basis of tonnage, or general average, but in dealing with wheels let us not forget that we are dealing with units, each and every one of which should possess integrity; otherwise, much time will be spent in settling claims for low mileage, in providing for adjustments covering defective material, and, worse yet, in explaining how wrecks occurred. Uniformity in manufacture is perhaps the feature most to be desired in connection with solid steel wheels. But uniformity of quality should be held as paramount to uniformity of mere dimensions.

The production of proper solid steel wheels does not entail the mere forming of a bulk of steel into the shape of a wheel. It carries with it far greater requirements and responsibilities. Proper production means not alone mere shaping, but, and particularly, the working into shape along such lines as tend to preserve and develop the virtues of the material for the service in which the finished product is to be used, and the doing of this in such a way as to assure uniformity of quality as between wheels which are subsequently mated in service. Irregularity of dimensions can be easily overcome by a few pennies' worth of machine work, but lack of uniformity in quality is incurable and is sure to assume more or less serious, if not actually dangerous, forms when the wheels go into service.

Manufacturers of solid steel wheels are particularly accommodating when engaged in close competition for an order, and it is for that reason that wheels of all sorts and sizes can be obtained. But clear-headed railway officials certainly realize that the production of small quantities of an endless variety of designs means a higher cost than when a minimum number of designs permits of proportionately larger quantities, and that cost is always reflected in price. They certainly realize that in the heat of close competition a sales department will frequently offer odd designs which may or may not have been thoroughly demonstrated as unifying the possibilities of proper manufacture and the requirements of service, and they surely appreciate how standardization of wheel designs is an end to which we all should strive.

DISCUSSION.

Robert Radford (Standard Steel Works): I am not here as a competitor of the forged wheel, as all the manufacturers of rolled steel wheels feel that the latter is as much superior to the wheel which is pressed only as the pressed wheel is superior to the cast iron wheel. I am sorry that the matter of standardization should have been brought up at this time, for the Master Car Builders' Association is giving the subject attention and will report on it at the June convention. There is to be a meeting of the M. C. B. committee and the manufacturers next week, and no doubt an agreement will be reached that will be beneficial both to the consumer and the wheel maker. The Standard Steel Works is the pioneer in the manufacture of solid steel wheels in this country; the first ones made were cast and forged only, but were not entirely satisfactory; in 1904 we produced the first rolled steel wheel, withdrawing from service the forged wheels and substituting the rolled wheels, as we believed that the forged and rolled wheel was the better product. We have adopted 12½ in. as the diameter of the inside hub of engine truck wheels, and find that this gives an ample surface bearing for the box.

Regarding the thickness of the rim, I cannot agree with Mr. Bacon that in the rolled steel wheel the 3 in. rim is not as efficient and economical as the 2½ in. rim, but 3 in. should be the maximum in order that the steel may be thoroughly worked. This is the advantage of the rolling process. If the 3 in. rim is thoroughly worked and homogeneous throughout we should get ½ in. more wear from it than is obtained from the 2½ in. rim.

I admit that the expression "shelling out of steel wheels" is a misnomer, but it has been adopted as a general term, and we must accept it as showing the breaking down of the steel tire or solid wheel as well as the cast iron wheel. It is folly to say that a 2½ in. rim will not shell as much as the 3 in. rim. It has been very well demonstrated that shelling out is a condition of service, that a rim of any thickness will shell out and that the smaller the diameter of the wheel the greater the liability to shelling. The principal reason for adopting a 2½ in. rim is to avoid a multitude of dies.

If steel wheels can be rolled to diameters that will mate to the exact size, there is no necessity for machining, and if a wheel is homogeneous throughout there should be no such necessity. I have yet to find any good reason for machining wheels other than to mate them and to insure their being truly circular. There is an advantage in having few sizes and the minimum cost will result; when ordered in large quantities, and orders from several railways can be combined for a continuous rolling of one size wheel, much labor and other expense is saved which would not be possible if we were compelled to change the dies for each order.

H. C. Johnstone (Midvale Steel Company): All will agree with Mr. Bacon that adoption of standards for steel wheels is highly desirable, as there are entirely too many sizes; the changes in dimensions cost the manufacturers a great deal and they would be glad to join the railways in making a common standard. The subject of rim thickness is one in which the manufacturers of rolled wheels do not agree with Mr. Bacon. There is no reason why, in our process of manufacture, a 3 in. rim should not have homogeneous metal and be as compact, and give as much wear per 1/16 in. as a 2½ in. rim. In tires we have much greater thickness and uniform material, and I do not see why we should not have the same in rolled wheels, as the metal is all worked uniformly under the same pressure. The subject of shelled spots in steel wheels has been debated for nearly 20 years and carefully investigated by analysis of the metal, but with absolutely no final results, except that no one knows exactly what created shelled out spots. I have here an article giving a railway man's experience and stating 31 reasons which cause tires to shell out. I do not believe that there ever will be a metal produced that will not shell out, because no grade of metal thus far produced has been free from shelling. On the Canadian Pacific it is found that there is much more shelling out in winter than in summer, showing that the condition of the roadbed and the sliding of the wheels from ice and snow contribute largely to shelling out. Even tires which had been heat treated were not free from shelling, although the material was superior to anything that had been tried. With the added loads on rolled wheels there will be a still greater tendency to shell out. A majority of the railways are under the impression that the exterior metal, that is, the skin, of a tire or rolled wheel is much better than in the interior. There is a sort of a chill produced in the metal, and we have found that the mileage per 1/16 in. of wear for the first ¼ in. or ½ in. exceeds any obtained after that. I see no occasion for machining unless the process of manufacture makes it absolutely necessary, and there is nothing the matter with our metal which makes turning of the tread necessary. The only reason that we machine is to true up the contour. About 75 per cent. of our wheels are absolutely circular as they come from the tire mill, and a larger mileage is obtainel from them than from those which have been machined.

William Forsyth (*Railway Age Gazette*), in discussing the question of the 2½ in. and the 3 in. rim, agreed with other speakers that if the steel was homogeneous there was no reason why the 3 in. rim should not be used and the railways obtain from it the additional service it would render.

Mr. Bacon said, in closing the discussion: Nothing that I have said tonight must be considered in any possible way from the standpoint of an advertisement for my company. I want to say further that I was engaged longer in the manufacture

and sale of rolled steel wheels than I have been months in that of the forged steel wheel. I shall go farther and say that the observations which I have made in this paper, particularly as regards rim thickness, are based on records of rolled steel wheels. I am not advocating the use of forged steel wheels as against the use of the rolled steel wheel, or vice versa, but I want to make it understood that I am not advertising any particular method of manufacture. Of course, the 3 in. rim will be preferable to the 2½ in. if the material is homogeneous, but that is a question. I have examined wheels of different makers and have failed to see that the 3 in. rim was as homogeneous as the 2½ in. Mr. Johnstone spoke of making tires which are 3½ in. or 4 in. thick with uniform material, and I suppose that is possible. But tire manufacture cannot be compared with the making of a steel wheel, where you cannot get at the four sides for rolling. In regard to turning the tread, I have worked hard to avoid that, and within certain limitations I believe in it. I recently saw the record of several hundred wheels made by one company, used in the same service; I went over the records and found 400 wheels which had been machined and 400 which had not been turned which were comparable. The mileage of the unmachined wheels was no greater than that of the machined wheels. I found that in the process of manufacture the tread of the wheel had rolled in it all the impurities that might be on the surface, and this had caused some flaking of the metal.

THE QUESTION OF THE IMPROVEMENT OF RAIL DESIGN AND SPECIFICATIONS.*

BY W. C. CUSHING,

Chief Engineer, Maintenance of Way, Pennsylvania Lines, Southwest System.

The period between 1893, the year of the adoption of the standard rail sections of the American Society of Civil Engineers, and the first annual convention of the American Railway Engineering and Maintenance of Way Association in 1900, was occupied by the railway engineers in the study of the behavior in the track of the rails rolled, according to the new designs, which were rapidly put into service by the different railways of the country.

A preliminary meeting of the railway engineers was held in Chicago on October 21, 1898, for the purpose of organizing the American Railway Engineering and Maintenance of Way Association, and at that meeting a committee was appointed to draft the constitution and by-laws.

On March, 30, 1899, the permanent organization of the association was effected in Buffalo, by the adoption of the constitution and the election of officers.

As stated in the constitution, the object of the association was the advancement of knowledge pertaining to the scientific and economical location, construction, operation and maintenance of railways. The real and final object was, however, for the members to exchange information and experience with each other and to bring about the unification, as much as possible, of specifications for the purchase of the large amount of material and supplies used by railways, which ought to result in the mutual benefit of the manufacturers and the railway companies.

In order to hear the first reports of standing committees, the first convention was held in March, 1900, in Chicago, and among the standing committees was one on rail.

The report of the committee was largely historical, but it was developed at that and subsequent meetings that the subject was going to be one of the most important and most interesting of those to come before the association in the future.

The work of the committee of the American Society of Civil Engineers was undertaken with the object of improving the design or cross-section of rails, and did not undertake the preparation of specifications for their manufacture or inspection, but each railway issued its own specifications, which were not specifications for manufacture, but for inspection. These specifications differed from each other in various details, such as the method of testing, the allowable variations from the templates, the smoothness of the surface and the workmanship generally, while but little was said about the chemical composition. Indeed, this state of affairs must have been quite annoying and expensive to the rail manufacturers, and, as all railways were striving for exactly the same object, viz.: to obtain the best material which would make an absolutely safe steel rail, the unification of the specifications seemed to be very desirable, and if it could be brought about, the existence of the association would be entirely justified.

At the annual convention in 1901 it was ascertained that the rail sections or designs of the American Society of Civil Engineers were in use by about 70 per cent. of the railways of the country, and it soon developed in the discussion that the rail steel in use by the railways was not giving very good satisfaction. This dissatisfaction pertained to all sections of rails, and the railway engineers thought that the trouble was largely due to the temperature of rolling being entirely too high, leading to the expression of one member that "the material was squirted through the rolls." The engineers of the rail manufacturers, who were also members of the association, contended, on the other hand, that the fault was due to the rail sections, and especially to the thin base designs of the American Society of Civil Engineers. It thus developed that the railways engineers believed the trouble was entirely due to improper processes of manufacture, while the rail manufacturers' engineers placed the fault on the design of the rail cross-sections.

It was apparent, therefore, that the committee must study both the question of design and the question of rail manufacture, the latter with the special object of devising tests and methods of inspection which would more surely determine whether the material came up to the requirements of service or not. It was quite evident that this work would be of long duration, because it was necessary that more study than ever before should be placed upon both the question of rail design and its manufacture, and it would be necessary to proceed slowly and carefully, in order to avoid the misinterpretation of statistics and information. Sir Lowthian Bell is reported to have said, at the London meeting of the American Society of Civil Engineers, in 1900, that "as he had been 25 years a manufacturer of rails and 25 years a director in the North Eastern Railway, he represented both maker and user, and he had at his disposal 35,000 analyses to go upon in making deductions. From these he could prove and disprove everything that could be said for or against any composition of a rail—a facility beloved by the expert." It is well for any investigator not to forget Sir Lowthian Bell's remark. It has been brought home to the rail committee many times in its prolonged investigation.

Prior to this time, so much has been said by railway engineers about the necessity for rolling at lower temperature that, in 1900, the Kennedy-Morrison process of holding rails just before the final passes until they came to the desired temperature, after which they were put through the final passes at that temperature, was introduced by the Carnegie Steel Company, and great expectations of the value of the results were held. At the same time other rail manufacturers began rolling at lower temperature and claimed to accomplish the same results. The process did not, however, give the results expected, as the effect was only skin deep, for when the skin wore off, the ordinary metal was exposed underneath. The rails rolled after its introduction developed rather more failures than usual, and since that time the value of rolling at low temperature has been rather uncertain.

*Presented at the Indiana Railroad Commission's hearing on the rail question at Indianapolis on February 20. Mr. Cushing is president of the American Railway Engineering Association.

This experience is mentioned to show that the value of many changes in process of manufacture can only be developed after long experience, which is one of the reasons why an investigation of this kind is bound to cover a long period of time.

In 1895, at Zurich, Switzerland, the International Association for Testing Materials was organized to bring about "the development and unification of standard methods of testing, for the determination of the properties of materials of construction, and of other materials, and also the perfection of apparatus for that purpose." On June 16, 1898, or but a few months prior to the organization of the American Railway Engineering and Maintenance of Way Association, there was formed, at Philadelphia, the American section of the International Association, which, a few years later, was renamed The American Society for Testing Materials. The American section was composed of manufacturers as well as of consulting engineers, railway engineers and others, and had already begun the study of rail specifications. Therefore, at its annual convention in 1901, the rail committee of the American Railway Engineering Association submitted the rail specifications recommended by the American branch of the International Association for discussion, in order to get the subject under way.

Specifications for steel rails have always consisted of three general parts:

1. Chemical requirements or properties;
2. Physical requirements; and
3. Details of manufacture.

Up to that time the various railways emphasized one or more of these parts, according to their individual preference or experience. Some almost ignored the chemical requirements, others were more or less elaborate in their physical requirements, while some barely touched upon details of manufacture, and others treated the subject quite elaborately.

CHEMICAL REQUIREMENTS OR PROPERTIES.

The chemical properties of those proposed specifications for bessemer steel rails were those of the Carnegie Steel Company, and they are today the standard chemical specifications of all the steel rail manufacturers, and of the American Society for Testing Materials, with scarcely any alterations. They were as follows:

	50-60 lbs.	60-70 lbs.	70-80 lbs.	80-90 lbs.	90-100 lbs.
Carbon	.35 to .45	.38 to .48	.40 to .50	.43 to .53	.45 to .55
Phosphorus, not over	.10	.10	.10	.10	.10
Silicon, not over	.20	.20	.20	.20	.20
Manganese	.70-1.00	.70-1.00	.75-1.05	.80-1.10	.80-1.10

The specifications for foreign use were practically the same.

The only changes which have been made in these specifications by the steel manufacturers and by the American Society for Testing Materials up to the present time, are to make the carbon for 60 to 70-lb. rail .35 to .45, and the manganese for 90 to 100-lb. rail .84 to 1.14.

With few exceptions, the railways of the United States have accepted these chemical constituents as recommended by the rail manufacturers, because they have considered that the chemical properties were only a minor part of the specifications for rail steel, compared with the physical requirements.

To show that the railway engineers have been justified in taking this view of the matter, the following quotation is made from an article in the *Journal* of the Franklin Institute by Captain R. W. Hunt, once a manufacturer of steel rails and now a steel rail inspector of wide experience.

"Rails made by John Brown & Co., of England, and put down on American railways some years ago, have been generally held up as ideal rails, and the American makers for a long time suposed that when these rails did wear out so that they could be analyzed the secret of their good service would be told. As an illustration of how little regularity or purity of chemical composition influenced the wear, I call your attention to the analyses of thirteen of the John Brown rails, all of which had filled years of faithful service and have been selected as bright examples of what good rails should be:

	C.	Si.	Ph.	S.	Mn.	Cu.
1	0.35	0.08	0.128	0.068	0.742	0.048
2	0.39	0.071	0.156	0.155	0.662	0.32
3	0.36	0.103	0.125	0.060	0.815	Trace
4	0.70	0.306	0.111	0.008	0.681	0.016
5	0.36	0.069	0.153	0.131	0.621	0.043
6	0.44	0.208	0.098	0.059	1.046	None
7	0.45	0.102	0.128	0.105	0.616	0.056
8	0.36	0.087	0.148	0.181	0.625	None
9	0.24	0.068	0.131	0.104	0.645	0.005
10	0.37	0.051	0.096	0.050	0.639	Trace
11	0.32	0.089	0.145	0.077	0.745	Trace
12	0.35	0.069	0.077	0.099	0.945	None
13	0.28	0.032	0.084	0.053	0.312	None

"You will observe that carbon ranged from 0.24 to 0.70; silicon from 0.032 to 0.306; phosphorus from 0.077 to 0.156; sulphur from 0.050 to 0.155, and manganese from 0.312 to 1.046.

"These 13 rails, taken as a whole, were chemically a 'poor lot,' but physically, most excellent."

PHYSICAL PROPERTIES.

Two general methods for testing the physical requirements had been in use up to the year 1900, viz., a bending test of a small bar ½ in. to ¾ in. square and 10 in. to 20 in. long, and a drop test, which consisted in letting fall a weight of about 2,000 lbs. on a piece of rail with a span of 3 to 4 ft. Some railways used one method, some the other, and some both, but by 1900 the small bar test had been generally abandoned in favor of the drop test.

It was customary to make a test of every fifth heat of steel, and to let the weight fall from varying heights, according to the pleasure of the maker of the specifications. The proposed specifications of the American branch retained this method of testing the physical properties by dropping the weight of 2,000 lbs. on every fifth heat of steel, from a height of 16 ft. for rail weighing 55 to 65 lbs. per yard, 17 ft. for rail weighing 65 to 75 lbs. per yard, 18 ft. for dail weighing 75 to 85 lbs. per yard, and 19 ft. for rail weighing 85 to 100 lbs. per yard, but these conditions were not accepted by the American Railway Engineering Association, as there was a strong feeling among the railway engineers that more severe conditions of testing were necessary. They felt that the chemical properties could be left to the greater experience and chemical knowledge of the rail manufacturers, but that they must be the ones to prescribe the physical tests which the finished rails must stand in order to be accepted for such important service as carrying the railway traffic of the country. In 1904, therefore, the engineering association decided that each heat, instead of every fifth heat of steel, must be tested, and that the height of the drop should be increased.

It was also ascertained that the rail butts heretofore tested under the falling weight had been from the bottom of the ingot, and it was now made a part of the specifications that the test piece should be taken from the top of the ingot, on account of the probability that the metal would be less perfect at that end.

Testing every heat instead of every fifth heat, as formerly, was considered little short of a revolution in the method of testing at that time.

DETAILS OF MANUFACTURE.

Except in the case of a few companies, the specifications in regard to details of manufacture were not elaborate, being confined almost entirely to allowing for variations from the standard template and from the length of the rail, to smoothness and perfection of finish, to branding, etc.

In view of the agitation for colder rolling, the Pennsylvania Railroad had introduced into its specifications, in 1900, a clause requiring that the rail at the last pass should be at a red heat, preferably a dull red, but in 1901 they replaced it with the so-called "shrinkage clause," which was intended to control the temperature of the rail when being finished, by prescribing that the shrinkage, after the rail was sawed, should not exceed a certain number of inches. This clause was also introduced into the proposed specifications of the

American Railway Engineering Association, making an additional requirement in the details of manufacture.

Lately there has been a great deal of argument on the part of the rail manufacturers to have the railway engineers specify a definite percentage of discard from the ingot, in order to cut off material which is more subject to segregation and more liable to have interior defects from the shrinkage cavity, gas bubbles, etc., but the railway engineers have rigidly set their faces against such a requirement, because they feel that they are much better safeguarded by the clause introduced into the specifications of the American branch of the International Association for Testing Materials, which was that "sufficient material should be discarded from the top of the ingots to insure sound rails."

When that clause was adopted, in 1901, and for a number of years afterwards, the positions of the rail manufacturers and the railway engineers were reversed, the railway engineers believing that it was best to specify a definite amount of discard, while the rail manufacturers took the opposite view. It was well expressed by an engineer of one of the steel companies, who said: "I do not think this association, nor any other, should state definitely how much should be sheared from the bloom. The matter is entirely one-sided. If we agree here that 25 per cent. shall be sheared from the bloom, we might assume that would settle it, but it will not. The association will be perfectly safe in making the claim that sufficient shearing will be done to eliminate piping. If the manufacturers can remove the piping by shearing 15 per cent., they will not agree to shear 25 per cent. The object in shearing is to get rid of the piping, and the only matter of agreement will be to reach the point where sufficient shearing is done to remove the piping. For that reason, I think the association will make a mistake to demand that 25 per cent. be sheared off."

The railway engineers of today unanimously agree with that point of view, and their position has been further strengthened by an additional test, which will be described later. Furthermore, the records of rail failures which have been kept for a number of years disclose the incontrovertible fact that, where a 15 per cent. discard might do for one ingot, 50 per cent. would not be adequate for another.

In 1902 the American Society of Civil Engineers deemed it advisable in view of the continual criticism of the sections of rail which they had previously designed, to take up once more the study, both of real design and specifications, and accordingly a committee was appointed for the purpose. The committee of the American Society for Testing Materials also continued its study of the rail question, and joint meetings of all three committees were held so that each would derive benefit from the work of the other.

On April 25, 1906, the committee on standard rail and wheel sections was appointed by the American Railway Association, and on October 24, 1906, the committee was directed to report in addition on the subject of specifications for the manufacture of steel rails, in connection with its report on standard sections. The rail manufacturers were asked to co-operate with the committee by sending representatives to study the question with it at its meetings, and in addition the committee employed disinterested men of national reputation for their knowledge of steel making and the properties of steel, to give expert advice on the subject. After many meetings together a report was submitted on October 30, 1907, containing the recommended rail sections and specifications, both for bessemer and open hearth steel.

Further advice was obtained from disinterested persons, who had a wide knowledge of the properties of steel and its manufacture, and a final report was submitted by the committee on April 22, 1908, with the recommendation that there were many details of the development and the following up of the results in service of the new types of sections, rolled under the new specifications, which would require considerable time and much careful study, and that they could be more efficiently and more appropriately handled by the American Railway Engineering Association. The sections and specifications were, therefore, referred to the American Railway Engineering Association, with the request that it follow up the question in its various details and keep a careful record of the results, with a view to determining whether any changes should be made, either in the specifications or designs.

As the question of discard was dealt with in these reports quite fully, it is advisable to make quotations therefrom, because the earnest consideration given to the question led to the development of an additional test, which is considered of great importance in determining the quality of metal by eliminating a large number of the so-called "piped rails," or rails with interior defects:

"In the matter of discard, there was a desire on the part of the railway members to arrange for a greater discard, and a strong disposition to insist upon a uniform minimum percentage. The manufacturers, however, presented considerable evidence which tended to show that a fixed minimum percentage requirement would be not only unfair but unscientific, claiming that the extent of piping and segregation is influenced by the size of the ingot, the rate of pouring into the mould and other details of mill practice.

"With regard to the discard question, the committee has always been of the opinion that it would be preferable to test the finished product rather than specify as to details of mill manufacture.

"In pursuing its investigation of this discard question, the committee received a suggestion from William Metcalf to the effect that it would be reasonably practicable to apply the above theory to the manufacture of rails by arranging to test to destruction a number of rail butts representing a certain portion of the total output and to base rejections on the results of these tests.

"In order to avoid the unnecessary waste of good material, the committee set about to devise means by which the rejection of defective material could be insured without requiring an arbitrary and definite percentage of discard in every case, and a committee of the Pennsylvania Railroad, pursuing the same line of investigation, adopted a tentative specification which provided for a physical test of this nature, and which further provided that when physical defects were discovered all top rails of the heat should be rejected. This would result in a discard of about 25 per cent. to 30 per cent. of the entire metal in the heat whenever physical defects were discovered, and it was felt that a requirement of this nature would not only provide for the rejection of defective material, but would insure the greatest care on the part of the manufacturer.

"A trial lot of the rails of a section corresponding to type 'B' was recently rolled under these specifications as to discard, and the results convinced the committee that a development of this idea would prove the best solution of the discard problem."

In connection with the details of manufacture, an important addition was made by requiring that the brand on the rail should also contain a letter marking the position which the rail originally occupied in the ingot, so as to enable a study to be made of the effect of that position.

On June 5, 1907, a committee of civil and mechanical engineers of the Pennsylvania Railroad System and two rail manufacturers was appointed to take up the study of the rail question, and design new rail sections and recommend new specifications, with the object of improving the quality of the material used in rails manufactured for that system.

The first meeting was held on June 12, 1907, and the new rail designs, known as "P.S." sections, were adopted on September 20, 1907. Tentative specifications were recommended on November 15, 1907, and 10,000 tons of rail rolled in accordance therewith. The specifications were subsequently modified, on criticism of the manufacturers, and issued February 4, 1908.

The new rail designs of the Pennsylvania and the American Railway Association provided for a more even distribution of the metal in the head, web and base and for a thicker base, to meet the views of the rail manufacturers, who believed that a better distribution of the metal would result in an improved quality, due to more favorable rolling conditions. All of these sections are still in service and are being closely watched to determine whether the expected improvement will be realized.

The Pennsylvania Railroad System specifications have been modified several times, in the light of additional ex-

perience, and contain the improvements which have been brought about from time to time through the experiences and researches of its own committee and the committees of the other associations. So far as the chemical requirements are concerned, they are practically the same as adopted by the rail manufacturers, and the other associations. The physical requirements are determined by the drop test with the standard machine, and, in addition, the test piece is nicked and broken to reveal the presence or absence of interior defect. In the details of manufacture, the discard is required to be sufficient to secure sound rails, and the shrinkage clause to regulate the temperature of rolling is retained. The rails are marked for position in the ingot, for the purpose of subsequent identification, in order to study the effect of that position.

Similar studies and investigations are being conducted by the New York Central Lines, Harriman Lines, Baltimore & Ohio, Norfolk & Western, Lehigh Valley, Reading, and other companies, and the specifications are being improved as new knowledge is obtained. The first-named company has been foremost in the study of the effect of titanium in steel making.

Through the assignment of the rail question to the American Railway Engineering Association by the American Railway Association, the work of the committee was given an official character, and its real work commenced. The first thing of importance accomplished was the introduction of a standard drop testing machine at all the rail mills, so that the results obtained at any one mill were comparable with those obtained at any other. Up to that time, 1908, machines of different design and setting were used, and the results were unreliable. With the year 1909 began the collection of a large amount of information, obtained from research work, bearing on the disputed points of rail manufacture and on proving or testing.

In 1910 the specifications for bessemer rail, formerly adopted by the American Railway Engineering Association, were withdrawn and new ones, for both bessemer and open hearth, were presented for consideration by the association, which embodied all the improvements in the methods of determining the physical properties and the details of manufacture which had been brought forward up to that time. It was recognized, however, that numerous disputed points could only be cleared up by experimental research conducted by a trained engineer-physicist, and accordingly such an investigator was added to the committee to devote all his time to that work. The engineer of tests, M. H. Wickhorst, since his appointment, has been constantly busy with research work, and has added a great deal to our knowledge of the subject.

He has made reports on the following subjects: Influence of Carbon on Deflection; Drop, Bending and Tensile Tests on Bessemer, Titanium Bessemer, and Open-Hearth Rails; rolled by different mills, including chemical analyses and etched sections; Investigation of a Split Head Rail; Segregation, as influenced by Fire Clay on the Ingot; Strength of Rail Head; Drop Tests of Rails—Effect of Impact Energy variously distributed; Flow of Rail Heads under Wheel Loads; Segregation and Other Rail Properties as influenced by size of Ingot; Tests of Steel Rail Ingots and derivative shapes made at Watertown Arsenal; Influence of Rolling Temperature on the Properties of Bessemer Rails.

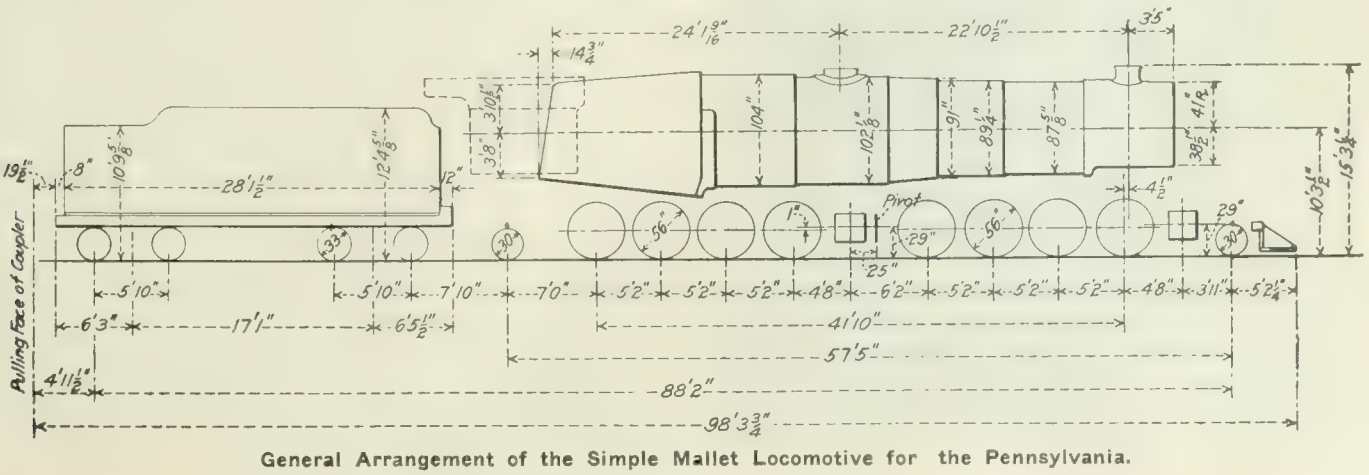
In all of this work Mr. Wickhorst has been afforded every facility by the rail manufacturers for carrying on the investigations, and their machinery, material and laboratory assistants have been placed at his disposal. In addition, their officers have been freely consulted by the committee and have attended some of its meetings.

While at the present time the American Railway Engineering Association has not adopted standard specifications for rails, yet it has had constantly before it for consideration and study a set of proposed specifications which have embodied the best knowledge of the subject, and they have been changed from time to time in the light of new experimental investigation. The most energy has been devoted to the improvement of methods of testing to determine the physical properties, and practically no changese have been made in the chemical requirements from the standard specifications of the rail manufacturers. The railway engineers prefer to subject the finished material to such tests as will cast aside the defective rails. Their specifications, therefore, include many additional tests over those in use ten years ago. The results of the work of the American Railway Engineering Association have been closely followed by the railway companies and *vice versa*, so that the specifications of the rail ways have been improved from time to time, and now embody the additional tests devised. Rails have been rolled in accordance with these new specifications for several years, and it is believed that a marked improvement is apparent in the rails being laid in the tracks since their adoption.

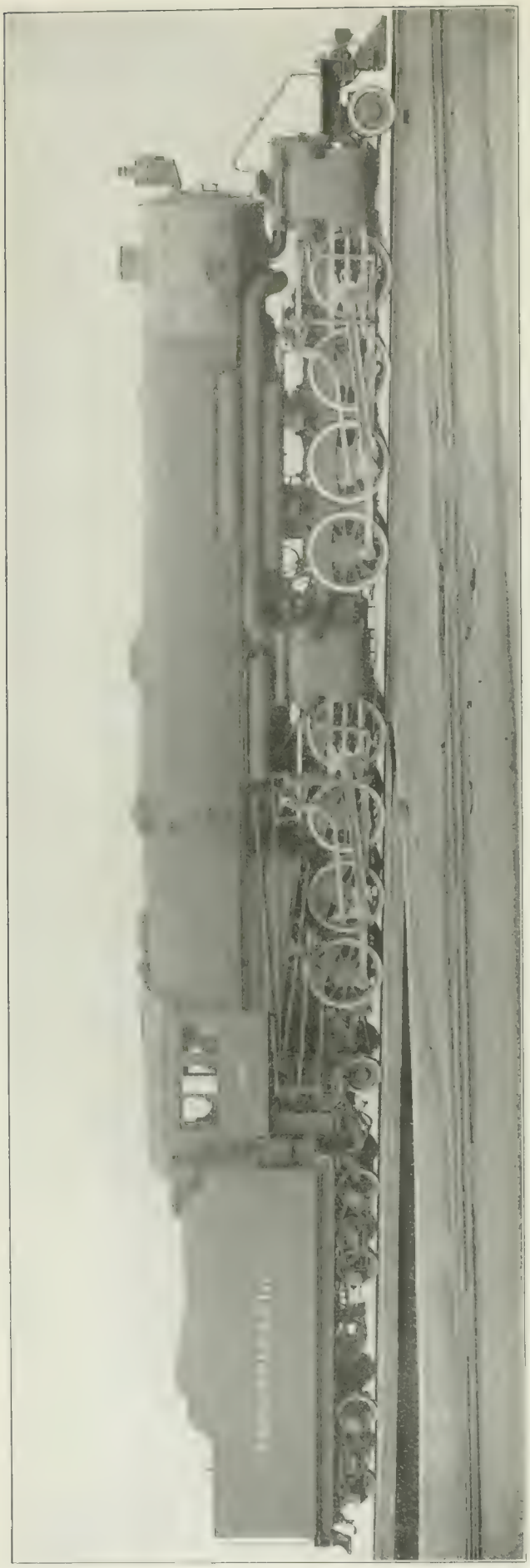
EXPERIMENTAL MALLET LOCOMOTIVE FOR THE PENNSYLVANIA.

For the first time in this country a Mallet locomotive having four simple cylinders and using high-degree superheated steam has been built. The American Locomotive Company recently completed a single example of this kind for the Pennsylvania, and it is now in experimental service out of Altoona. The locomotive has the largest boiler ever built, and is equipped with a Schmidt superheater having 1,257 sq. ft. of superheating area. There are 282—2¼ in. tubes and 45—5½ in. tubes, 24 ft. 8⅞ in. long between tube sheets, which together with the firebox give an evaporative heating surface of 6121.1 sq. ft., and an equivalent heating surface of 8006.6 sq. ft.

It was desired to use a steam pressure of 160 lbs., and com-



General Arrangement of the Simple Mallet Locomotive for the Pennsylvania.



Simple Mallet Articulated Locomotive with Superheated Steam; for the Pennsylvania.

pound cylinders of sufficient size to develop the capacity of the boiler would make the low pressure cylinders too large to pass the clearance limits. Furthermore, by the use of high-degree superheated steam it was thought that there would be no loss in economy from the absence of the compounding, and therefore four simple cylinders, 27 in. x 28 in., were applied. This arrangement, of course, necessitates the carrying of a high pressure pipe from the superheater connection in the front end back to a swivel joint near the pivot pin and then forward to the cylinders on the front engine. This has been so carefully designed and constructed, however, that it is believed that no trouble will be experienced with leakage. Because of its experimental character comparatively little information concerning the details of the design is available at this time. The engine has a total weight in working order of 482,500 lbs., of which 437,500 lbs. is on the drivers. The theoretical tractive effort figured at 85 per cent. boiler pressure is 99,200 lbs. The general dimensions are given on the accompanying diagram.

THE DANGER OF SHORTAGE OF RAILWAY FACILITIES.

The Railway Business Association has issued a bulletin forcibly calling attention to the danger of a shortage of railway facilities. "Before the shippers of the country the Railway Business Association lays the facts," says President George A. Post in an introductory note. "What is to our interest as manufacturers of railway supplies in this vital matter is to the shippers' interest. Every shipper is directly and deeply concerned in studying the danger, seeking the cause and co-operating for its removal."

The bulletin is fully abstracted in the following:

The Interstate Commerce Commission in 1908 declared: "The inadequacy of transportation facilities is little less than alarming."

What is the situation in 1912? For business men the time has already come to inquire whether the railways in the next period of constructive expansion in industry and commerce will be equipped to carry the business, or will as in 1906-7 encounter congestion, with all the disaster to industry which such a misfortune entails. The Railway Business Association has made such an inquiry. The result shows the following salient facts:

1. Locomotive, car and track capacity have increased since 1907 at a rate immensely less than what will be necessary to meet an increase in traffic approximately at the rate of growth shown in the immediate past. Current net car surplus is at so narrow a margin that a very small increase per cent. in the traffic offered would produce a net car shortage.

2. Equipment requirements to carry traffic, conservatively estimated for the five years ending 1915, will cost the railways a sum enormously in excess of their probable resources from earnings.

3. It will require the sale of new securities to an amount many hundred millions greater per annum than in the immediate past to obtain the necessary sums not available from income.

4. In order to attract purchasers and to justify incurring the obligation to pay a return on such new capital, the railways must be reasonably assured that freight rates will not be further reduced.

5. The public has now taken control of the rates. With the public the decision rests whether the rates shall or shall not be adequate to enable the railways to meet the necessities of the shippers. Failure to provide the facilities which will be needed to carry the raffic must be laid at the door of the public.

ASTONISHING GROWTH OF RAILWAY TRAFFIC.

Prudence forbids drift and delay. The problem is upon us. It may astonish many to learn that the annual tonnage is already vastly greater than the high point in 1907. The growth of freight traffic in the United States literally works while we sleep. Unseen, unheard, unnoticed, the population swells irresistibly through boom and slump alike. A calculator recently stated that since the census was taken in 1910 there had been an

increase of more than two million people. There is never a time when our enormous population falls below a certain consumption per capita. As numbers grow, so grows the aggregate demand for food, clothing, shelter and other necessities.

Long before the factories are running full time and once more enlarging plant, the tonnage carried by the railways is sweeping forward to new records. It was so after the panic of 1893. Commercial failures rising annually aggregated in the three fiscal years ending June, 1897, liabilities of $562,245,031. Yet in the fiscal year 1896, in the midst of that black period, the ton-miles passed 95 billions for the year, as against 93 billions in 1893, the previous high score. Since 1907 history has repeated itself. The ton-miles in the year ending June, 1910, were more than 255 billions, compared with 236 billions in 1907.

The persistence of growth in passenger traffic is even more remarkable. There was an increase in every year after 1907 in the number of passengers carried one mile, and the increase in 1910 over 1909, from 29,109,322,589 passengers carried one mile to 32,338,496,329, or 3,229,173,740, was greater than the increase shown in any previous year.

Do not these astounding facts suggest the desirability of inquiring into the conditions confronting us in the near future? No records of the past afford a satisfactory basis for computing the traffic of the future because of two factors:

First, the very large increase in consumption per capita, already met, in part, at least, by a large increase in productive capacity. To cite a familiar instance, the City of Gary, in 1907, did not exist; and it is believed that the increase in the productive manufacturing capacity at Pittsburgh has exceeded the total capacity created at Gary in the same period. The acreage under cultivation has also greatly expanded and modern methods must be expected to raise substantially the crop yields per acre.

Second, exports. The American invasion of foreign markets involves home production having no relation to home consumption and yet competing with other traffic for railway facilities from factory, farm and mine.

The increase in ton-miles carried from 1890 to 1900 was about 86 per cent.; from 1900 to 1910, about 80 per cent. Let us compute a growth of but 75 per cent. from 1910 to 1920. Such a growth would be made up of about 32 per cent. in the first five years, and, compounding 32 per cent. further in the second half of the decade. What increase of facilities would be required to handle a traffic increasing 32 per cent. in 1915 over 1910? Have the railways been currently augmenting their plant at a rate equal to reasonable expectation of needs? The Interstate Commerce Commission figures seem to show that they have not.

CURRENT INCREASE IN FACILITIES INADEQUATE.

It will require an increase of 18,633 locomotives to provide in 1915 a 32 per cent. increase over 1910 in total locomotive power, assuming the locomotives continue to increase in average size as in the past. The actual current increase in the number of locomotives—1907 to 1910—was at such an average annual rate that if continued it will provide only 6,307 locomotives by 1915 instead of 18,633, the estimate of requirements. It will require an increase of 586,529 freight cars to provide in 1915 a 32 per cent. increase over 1910 in total freight car capacity, assuming a continuance of the same increase in average capacity per car as in recent years. The actual current increase in number of freight cars—1907 to 1910—was at such a rate that if continued, it will provide only 256,215 freight cars by 1915, instead of 586,529, the estimate of requirements.

Passengers carried one mile increased 35.4 per cent. from 1890 to 1900, and 101.6 per cent. from 1900 to 1910. Since the increase in 1910 over the year preceding, one of extreme industrial depression, was at the highest rate per cent. in the decade except one, and by far the largest absolute increase ever recorded in a given year, it would seem prudent to assume that the passenger traffic will continue to increase at as high a rate at least as it has increased, from 1900 to 1910. For the five-year period on that basis the rate would be 42 per cent.

It would require an increase of 9,839 passenger train cars of all kinds to provide in 1915 an increase of 42 per cent. over 1910 in passenger-mile capacity, assuming (1) that density of loading and substitution of larger cars for smaller ones scrapped continues to affect the performance per car in the same degree as from 1905 to 1910; (2) that passenger, sleeping, parlor, dining, baggage express, postal and other passenger-train cars are all uniformly affected by a given increase in the number of passengers carried one mile, and (3) that the proportion of Pullman-owned cars to railway-owned cars of the same class remains the same. The actual current increase in number of passenger-train cars—from 1907 to 1910—was at such a rate that if continued it will provide only 5,557 pasesnger-train cars instead of 9,839, the estimate of requirements.

The question may fairly be raised whether an apparently low rate of increase in total locomotive power and car capacity may not have been offset by an augmented rate of increase in miles of main and yard track, enabling the roads nevertheless to handle the freight adequately. But the average number of miles of track, main and yard, added per annum from 1900 to 1905 was 9,602, and from 1905 to 1910 only 8,994, while from 1907 to 1910 it was but 7,930. If the average increase per annum which was shown from 1907 to 1910—7,930 miles—should continue for the next five years, the increase from 1910 to 1915 would be 39,652 miles, as compared with 48,012 in the first five years of the previous decade—or an increase of 11 per cent. in 1910-15, as against an increase of 18 per cent. in 1900-5. Track construction, in other words, instead of increasing at a faster rate, and thus offsetting the apparently low rate of increase in total locomotive power and freight-car capacity, has shown a falling off in the rate of increase.

The situation as to equipment may be summed up by stating the facts as to current car surplus and shortage. "Car surplus" as reported by the American Railway Association in its bi-weekly statements is the working margin of cars ready to be loaded and not loaded on the day of the report.

The "surplus" is so narrow that it only required a cold snap in January, 1912, to pull the surplus down from 142,316 to 102,479 two weeks later, and to increase the shortage from 6,378 to 12,194 or a net surplus (aggregate surplus minus aggregate shortage) on January 17, 1912, of 90,285, equivalent to only 4 per cent. of freight cars owned. The average net surplus for the year 1911 was only 5.4 per cent. of cars owned. A small increase per cent. in tonnage would convert the net surplus into a net shortage.

The pressing question is: What would be the shortages—the cars which shippers are ready to load and cannot get—in the case of a general resumption of industrial and commercial extension and construction?

ENORMOUS COST OF NECESSARY FACILITIES.

How much will it cost to provide, during the next five years, the facilities estimated to be necessary? Before considering additions and betterments the railway must first keep intact and operate the facilities it has. It cost the railways in the five years 1906-1910, inclusive, 41.1 per cent. more than in the five years 1901-1905, inclusive, to maintain their property intact, to renew what was destroyed, depreciated or obsolete. This sum for the five years ending 1910 aggregated $3,503,589,300. Assuming that it will increase at no faster rate than 41.1 per cent., maintenance for the five years ending 1915 will cost $4,943,564,502.

Passing now to additions and betterments—what sums had the railways available for such purposes in the five years ending 1910 and what will be the cost of additions and betterments needed for the five years ending 1915?

In the five years ending 1910, a period when the stock paying no dividends at all never fell below 32.7 per cent. of all stock outstanding and the total dividends never exceeded 5.3 per cent. on all stock outstanding, the sums appropriated out of earnings

for additions and betterments aggregated for all the railways of the United States as follows:

[illegible]	$49,042,631
[illegible]	38,552,890
1908	29,174,456
1909	24,933,255
1910	57,761,865
Total, five years	$199,465,097

Next, what will the additions cost? The added locomotive power of 32 per cent. over 1910 would be equivalent to 18,633 locomotives, costing, at an average of $16,000 apiece, $298,128,000. The added freight car capacity, equivalent to 586,529 cars, at an average of $1,000 apiece, would cost $586,529,000. The 9,839 added passenger-train cars, at an average of $13,650 apiece, would cost $134,302,350. Yard track increased 22.3 per cent. 1905 to 1910, and main track 12.3 per cent. An increase of 12 per cent. in main track over 1910 would come to 31,942 miles, commonly averaged to cost $30,000 per mile, or $958,-260,000; and 22 per cent. in yard track, or 18,828 miles, would cost, at $15,000 a mile, $282,420,000, giving for additions to track $1,240,680,000.

To the cost of tracks, locomotives and cars should be added a sum for enlarging terminals facilities—real estate, round houses, shops, stations, extensive terminal development like that at New York, Chicago, Washington, etc., track elevation and other similar items. This may be computed at $175,000,000 a year or $875,000,000 for five years.

Taxes increased, 1901-1911, $58,164,118, or 114.17 per cent. Compounded by five-year periods, this would be 46.3 per cent., and compounded per annum, 7.9 per cent. Estimating such an increase for the five years ending 1915, the taxes paid 1911-1915 which would not be paid if there were no increase over 1910 would be $136,745,889.

Return on new securities must also be included in the estimate of money which was not expended 1906 to 1910 and must be expended 1911 to 1915. The average rate of dividends and interest paid on net securities outstanding in the hands of the public in 1908, 1909 and 1910, the only years for which Interstate Commerce Commission figures on this subject are comparable with years succeeding, was 4.2 per cent. If the railways should issue securities in no greater amount than they did in 1910, the net increase over the year preceding of $461,227,385, and continue to pay a return no higher than 4.2 per cent. on all capital outstanding in the hands of the public, the interest and dividends which they would pay in the five years ending 1915, which they would not have paid if they had not issued such securities, will be $290,573,252. Thus we have:

Locomotives	$298,128,000
Freight cars	586,529,000
Passenger train cars	134,302,350
Track	1,240,680,000
Terminal facilities	875,000,000
Increase in taxes	136,745,889
Return on new securities	290,573,252
Total	$3,561,958,491

These figures say nothing of the return on securities necessary if capital instead of increasing annually in the same amount as 1910 increases in the amounts adequate to provide the facilities required; or of the vast expenditures made necessary by elimination of grade crossings, or statutes, both state and federal, increasing operating expenses, such as those dealing with hours of labor, size of crews, accident compensation and costly devices for promoting safety of employees and the public.

Labor cost per unit of railway service has increased instead of declining. This is in spite of increase in volume of traffic and the stupendous outlays for economical operation which have been made in recent years for reducing grades and curves, increasing size of cars and engines and hence length of trains, rebuilding of bridges and roadbed and increasing weight of rails and other track appliances to bear this added weight and the introduction of labor-saving machinery in the shops and terminals. The number of traffic units (passengers carried one mile and tons of freight carried one mile) per $1 of compensation paid to railway employees fell 17.6 per cent. from 1900 to 1910. This affords some indication of what may be expected in future.

It is estimated that three or four bills relating to safety and now vigorously urged upon Congress would involve the expenditure within the next three or four years of about $1,400,000,000.

The Hadley Railroad Securities Commission, in discussing the much higher capitalization of European roads per mile than of American, attributes this "to improvements which we have not yet made and many of which we must make in the future as population grows denser," looking to "the convenience of the public or the safety of passengers and employees."

VAST INVESTMENTS MUST BE MADE.

It is obvious that enormous sums must be raised by the issue of new securities. What sums have been raised in this way in current years? The Interstate Commerce Commission, in its report for 1908, the first year in which it seems to have stated a figure for railway securities outstanding in the hands of the public comparable with the figures for succeeding years, states that the amount in 1908 was $13,039,885,447. This increased as follows:

Year ending June 30.	Net new securities.
1909	$874,416,916
1910	461,227,385

The fiscal year ending June 30, 1910, enjoyed better general business than 1909, having shown from 1909 an increase in ton-mileage of about 16 per cent.

Yet the net amount of securities outstanding in the hands of the public showed over 1909 an increase which was $400,000,000 less than the increase in 1909 over 1908. Not only is this downward tendency significant, but the amount issued was comparatively small. If the net amount issued in 1909 were to be issued annually for the five years ending 1915 this would give total new net issues of $2,306,136,925. This sum would be subject to deductions or discounts, since few railways are able to market their securities at par. Yet the total falls more than a billion and a quarter short of the $3,561,958,491 which has been estimated in this Bulletin as necessary to be spent for the items alone of locomotives, cars, track, terminal facilities, increase in taxes and return on new securities. This is 17 times the amount spent out of income for additions and betterments in the five years ending 1910, which was $199,465,097.

Nor does it include return on more than a small part of the new securities which must be issued if facilities are to be adequate, nor the other large expenditures referred to, nor increases in the cost of labor per traffic unit.

The public has a direct responsibility for permitting such earnings as will afford the credit adequate for raising much larger sums than have been raised in the past. The position of the railway executive today is that he is told what he must spend for all these things which bring in little or no revenue, and he must also find where he can get the money with which to equip the road to carry freight. We submit that the welfare of the country requires business men as well as government officials to acquire a much more exact knowledge of railway necessities. The time has gone by for sitting back and confiding in the supernatural power of a railway manager to find the means somehow.

A QUESTION OF PRUDENT ADMINISTRATION.

The query may be put to the shipper in his capacity as the responsible head of a business enterprise: What would you do if you were in the place of the railway executive? In case you had reason to apprehend compulsory outlays of unknown amount and involuntary reduction of prices to unknown extent, would you not regard it as the part of prudence to postpone costly enlargements of plant until you could be more certain of being able to pay the charges on the new capital required?

It is evident that the responsibility of the railway executive in the matter of issuing new securities is imperfectly understood. It has been suggested that in testing their credit the railways

have not tried to place bonds bearing a higher rate of interest.

The assumption seems to be that a railway company is justified in selling bonds on terms which will tempt buyers without reference to its ability to pay the charges thus undertaken. Does it require argument to make clear that only a reputation for not doing just that sort of thing would enable a railway executive to secure capital under such conditions? He might do it once; he could hardly do it twice. Railway credit, like like individual credit, depends upon character and performance extending over long periods. It is not enough that under existing traffic conditions the obligations assumed in raising new capital could be met. The executive must consider whether or not existing conditions are reasonably certain to continue. At the present time he has no way of knowing to what lengths compulsory expenditure will be further imposed upon him or how far governmental decrees will continue to depress the schedule of freight rates.

To ask of the carriers an enlargement in their plant without provisions for additional net revenue for a return on the required investment of new capital is to exact of them what they cannot perform.

Professions of a willingness to grant the carriers adequate revenues, while welcome as an evidence of public friendliness, are only of practical value when translated by rate-regulating tribunals week in and week out into action which, while making the necessary readjustments, will protect the roads against depletion of gross revenue. For railway commissioners to grant an increase or deny a reduction in rates in a specific territory affecting particular shippers requires courage, for it may invite criticism, opposition and perhaps retaliation. They have in this respect now changed places with the railway officials. We have, however, an abiding faith in the fairness of the whole people, and we believe that a policy resting on a sound basis and frankly and fully explained to the public would meet with popular approval and general acquiescence.

A large part of the controversies now being decided have, as the parties litigant, not the railways, but rival communities. They are less concerned in the amount of the rate than in the establishment of the competitive situation to their satisfaction. Has not the time come when the adjustment of rate situations of this type should be accomplished without reducing the revenue of the carriers? The rate structure has grown up with the country. Time has made it desirable that some rates which are too high should be reduced and that others which are too low should be raised.

But in the gradual correction of these inequalities is it in the public interest that the process should involve a continual scaling down?

The Interstate Commerce Commission, in denying rate advances to the Eastern and Western trunk lines in February, 1911, announced that they were prepared, if the schedules in litigation should not be voluntarily withdrawn, to enter for the usual two years the rates then existing. May this not be taken as an official declaration that the schedules at that time in force were not producing revenue unreasonably large?

If this be conceded, then is it not clear that every rate readjustment should be effected only with a full recognition of the necessity and the justice of maintaining such tariffs as will meet not only expenditures on the scale current at that time, but also the rising expenditures due to necessary enlargement of plant for meeting the public demand, with attendant increase in capital charges, and to the miscellaneous obligations already enumerated, over many of which the railway manager has no control?

Surplus there must be if a railway is to attract capital for additions and betterments. It is of small consequence to the railway company that a first mortgage bond already issued sells at an undiminished price in passing from one private holder to another. Says the Hadley commission:

"Nor can the security which most of our railways offer be regarded as exceptional. The underlying bonds of the older systems are doubtless secure. It is not probable that even a grave commercial crisis will affect the return of a trunk line first mortgage. But very little of the new capital can be raised on securities of this kind.

"Most of it must come either from bonds which will not be a first lien for many years or from new issues of capital stock.

"The investors in these securities, and especially in stocks, take risks which cannot be accurately forecast. Apart from probable fluctuations in traffic and possible increase in cost of operation, new inventions may at any time render much of their present plant antiquated."

The question of railway credit is not what return investors "ought" to regard as attractive, but what return they do regard as attractive; not whether investors of capital, old and new taken together, "ought" to be willing to wait for the return which the new facilities may themselves ultimately yield, but whether they are willing—whether the surplus earned with existing facilities is sufficient to tempt the new capital and thus make possible the new facilities.

The downward trend of rates, occurring parallel with an upward trend of expenditures, must stop somewhere. It were well to survey the situation and find out where that point is before the country is taken through another period of congestion and embargo like that of 1906 and 1907, which is still fresh in the minds of business men. It is imperative that the investing public should be convinced that those responsible for regulation appreciate that the railway system of the country is unable to bear, without injury to itself or to the public, a further depression in freight rates.

WHAT THE PUBLIC MUST UNDERSTAND.

A new national policy as to railway freight rates having lately been laid before the country by a federal commission, including among its members a cabinet officer, an Interstate Commerce Commissioner, and the president of Yale University, and speaking unanimously, it is important that the public and the regulatory tribunals shall adopt that policy and forthwith put it in effect. The Railway Securities Commission makes this significant declaration:

"The necessary development of railway facilities is now endangered by the reluctance of investors to purchase new issues of railway securities in the amounts required. This reluctance is likely to continue until the American public understands the essential community of interest between shipper and investor, and the folly of attempting to protect the one by taking away the rewards of good management from the other.

"Neither the rate of return actually received on the par value of American railway bonds and stocks today, nor the security which can be offered for additional railway investments in the future, will make it easy to raise the needed amount of capital.

"The ratio of interest and dividends to outstanding bonds and stocks of American railways is not quite 4½ per cent. in each case. The average ratio of dividends to the capital of national banks is between 10 and 11 per cent.

"There is a widespread belief, based on imperfect examination of the evidence, that the amount of capital needed for the future development of our railway system is small in proportion to that which has been required in the past; that the profits on such added investments of capital are reasonably well assured; and that we can therefore fix attention predominantly, if not exclusively, on the needs of the shipper without interfering with the necessary supply of new money from the investors.

The Hadley commission goes further:

"A reasonable return is one which, under honest accounting and responsible management, will attract the amount of investors' money needed for the development of our railway facilities. . . . If rates are going to be reduced whenever dividends exceed current rates of interest, investors will seek other fields where the hazard is less or the opportunity greater."

The German locomotive works exported more engines in 1911 than in any previous year, though not many more than in 1908. The reports give not the number, but the weight. There were 58,127 tons of locomotives exported last year, which is more than 45 per cent. more than in either 1910 or 1909, but only 7½ per cent. more than in 1908. About one-ninth of the exports of last year were of light engines, weighing less than 22,040 lbs. Of the whole number of all kinds, 13,711 tons went to France, 7,480 to Spain, 6,150 to Argentina, 5,314 to Roumania, and 2,295 to Turkey.

CONSTRUCTION OF THE MILWAUKEE, SPARTA & NORTHWESTERN.

The largest mileage of new road completed and placed in service by any railway in the United States during 1911 was the portion of the North Western system known as the Milwaukee, Sparta & Northwestern, extending 130.5 miles from Lindwerm, Wis., to Necedah; 23 miles from Wyeville to Sparta, and 8 miles from West Allis to Butler. The branch line which the company had been operating between Wyeville and Necedah, 15.5 miles, was partially rebuilt to form a link in the new road, making a total mileage of 177 miles.

This line serves two important purposes in the development of the North Western system; first, a belt line around Milwaukee connecting with the Northern Wisconsin division near Lindwerm, and with the Madison division near West Allis; and second, a direct low grade connection from Milwaukee to the Chicago, St. Paul, Minneapolis & Omaha at Wyeville and to the Madison division at Sparta. The advantages of the belt line were shown in a description of the construction work on that portion of the line, published in the *Railway Age Gazette* of October 20, 1911.

Considered as a cut-off for western and northwestern traffic, the new line has the double advantage of directness and ease of operation. The distance from Milwaukee to Wyeville by way of Madison is 179 miles. By the new line it is 155 miles. The distance from Milwaukee to Sparta by way of Madison and Elroy is 190 miles; by the new line it is 178 miles. The maximum grade on the old line between Madison and Sparta and between Madison and Wyeville is 1 per cent. in both directions, while 0.5 per cent. is the maximum grade against eastbound traffic on the new line and 0.7 per cent. against westbound traffic. A large amount of curvature and a number of tunnels were also eliminated by the cut-off. The new through route from Chicago to the Twin Cities and upper lake ports, of which this line forms a part, is the same length as the old one. The operating conditions, however, are materially improved, and in addition, the line touches Milwaukee, an important point for both freight and passenger business.

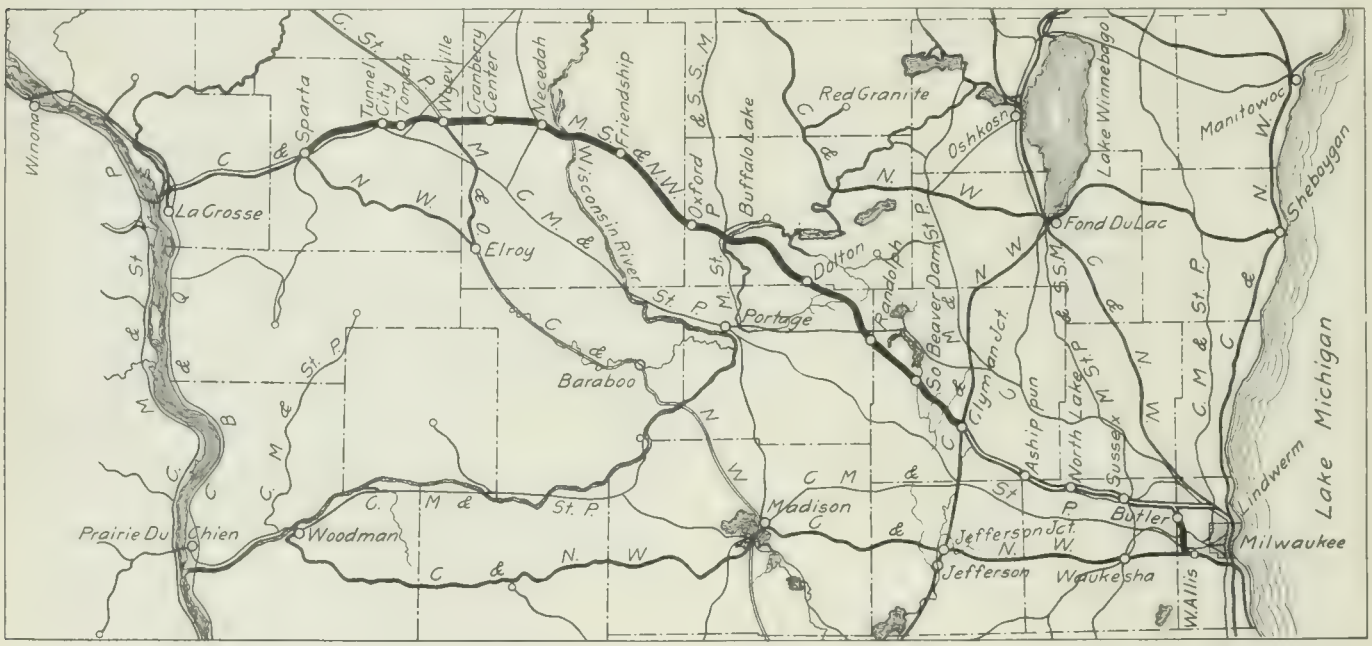
The lower grades allow a considerable increase in tonnage rating over the old line and the movement of through passenger traffic to the Northwest is considerably facilitated. Although the old route through Madison was double tracked, traffic had increased to such a degree that the line was badly congested.

The new line is double track and equipped with automatic block signals east of Clyman Junction, affording a more economical routing for freight from the Northern Wisconsin and Ashland divisions destined through the Milwaukee district than has been available with the 1 per cent. line between Fond du Lac and Milwaukee. In addition to the industrial development which is anticipated on the belt line, the new road will serve a considerable territory that has not before been reached. That portion of the line between North Lake and Necedah, about 109 miles, has practically no competition from other railways in serving the farming country traversed. Construction work on the new road was started in March, 1910, and it was opened for traffic December 11, 1911.

ROADBED.

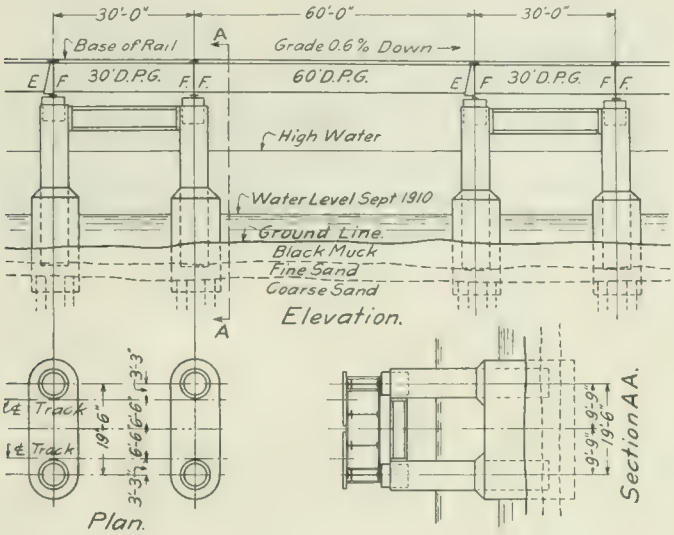
The route through central Wisconsin followed by the new road marks roughly the division between the rolling land of the southwestern portion of the state and the marshes of the lake country. In many cases the roadbed is built alternately across the points of swamps and through cuts in the noses of the hills. The soil on the eastern end is predominantly clay, and that on the western end sand, the division being approximately at the crossing of the Fox river, 75 miles from Milwaukee. The profile is undulating, the maximum difference in elevation being 380 ft. with four summits. All grades are compensated .05 per deg. for curvature. The maximum curvature is 3 deg., and the majority do not exceed 2 deg. The line east of Clyman Junction is graded for double track, and west of that point for single, although provision has been made in the substructures of all permanent bridges for future double track. The standard roadbed is 33 ft. wide for fills and 39 ft. wide for cuts on double track, the corresponding dimensions for single track being 20 ft. and 26 ft. The grading on the section of the line east of Clyman Junction averaged about 80,000 yds. per mile, and for the section between Clyman Junction and Buffalo Lake, about 50,000 yds. per mile. The only heavy excavation required on the west end was that in the approaches to the tunnel at Tunnel City, where an extreme depth of 140 ft. in the east approach cut was reached.

There was little of unusual interest in the grading, most of which was handled by contract in small sections. One contractor working near Necedah used a drag line excavator to very good advantage. This machine is shown in one of the photographs reproduced herewith, working on a fill of considerable length, which was made from a wide shallow borrow pit, for which such a machine is particularly fitted.



General Map of Milwaukee, Sparta & Northwestern and Connecting Lines.

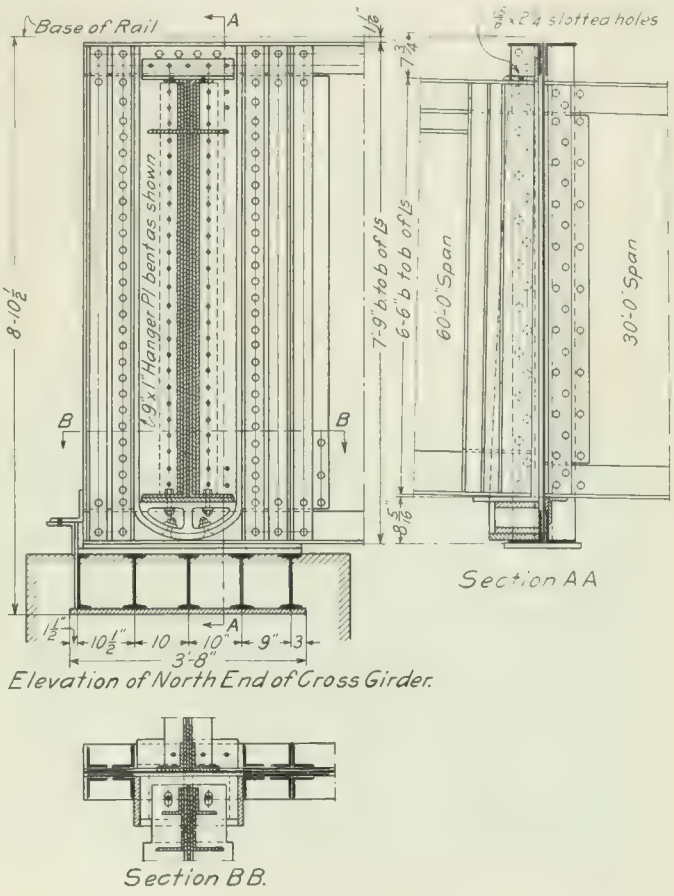
Less trouble was experienced with sink holes in the construction of the new road than is usual in country similar to that traversed. One of the worst sink holes encountered was near North Lake, in which 400,000 yds. of filling material was required in a distance of about 3,500 ft. The grade line at this point was about 20 ft. above the natural surface, and soundings showed soft material as deep as 90 ft. below the surface. The roadbed was finally completed by trestling, although considerable trouble was caused by the trestle sinking and coming up again outside of the right of way. A small bridge on a branch line of the Chicago, Milwaukee & St. Paul, which is parallel and closely adjacent to the new road at this point, was pushed about 20 ft. out of line by the fill made in this sink hole, and required considerable additional work for its replacement. At another point where soundings showed soft bottom in a small swamp shallow ditches were dug parallel to the center line and about 40 ft. each side of it, so that when track was laid across and the fill carried up a few feet the surface broke along these lines and the fill dropped vertically instead of breaking irregularly along one side and turning over, as is frequently the case under similar conditions. In hay marshes ditches were dug 200 ft. from the center line to serve as fire breaks.



General Design of Oxford Mill Pond Cylinder Pier Bridge.

BRIDGE WORK.

Highway grade crossings were eliminated as far as possible in the construction of the new road, overhead crossings being of temporary construction, pile or frame trestles, and undercrossings being of concrete or steel. There are seven overhead crossings with the Chicago, Milwaukee & St. Paul and one with the Minneapolis, St. Paul & Sault Ste. Marie. The only railway grade crossings are at Clyman Junction, Wyeville and Tomah, the first two being with the company's own lines, and the third



Details of Fixed and Expansion Connections of Longitudinal to Transverse Girders.



Sub-structure of Oxford Mill Pond Bridge, Showing Cylinder Piers.

with the Chicago, Milwaukee & St. Paul. Cast iron pipe was used for small culverts and concrete boxes and concrete arches for larger openings. One of the largest arches was that over the Menominee river near Butler, described in the former article on the Belt line. The concrete work on the eastern half of the road averaged 1,200 yds. per mile east of Clyman Junction, and 500 yds. per mile west of that point. To provide for future double-tracking, the through steel structures and all permanent sub-structures were designed for double track. Superstructures of deck spans are for single track at present. Concrete was used throughout for abutments and piers, the tendency being in most cases to favor mass in preference to heavily reinforced designs.

A type of U abutment used for a number of highway crossings is shown in one of the accompanying drawings. Comparative estimates for this type and for wing abutments were made for locations in high fills, the advantage of the U type being apparent in most cases. For crossings on excessive skews it was necessary in some cases to provide retaining walls at the toe of the slope to prevent encroachment of the fill on the highway. The side walls are non-reinforced, except for twenty-nine ¾-in. square bars 9 ft. long used as bonds to the front wall. Three tie walls are provided to resist the outward thrust of the earth embankment, these walls being 3 ft. thick and 31 ft. 6 in. high, reinforced by twenty-six ¾-in. square rods in each wall extending into the side walls to within one foot of the outer surface. The footing is 4 ft. thick carried down to rock and designed for an average bearing of three tons per square foot. The top of the abutment is open, the entire space between the walls being filled with earth which directly supports the track. To prevent the formation of voids this fill is compacted in place for a depth of 6 ft. over the footings. Openings at the bottom of the partition walls 4 ft. wide and 5 ft. 6 in. high are provided for the convenience of workmen during the construction of the abutment. Drainage is provided for by cast iron pipes in the side walls placed as shown in the drawing, and the interior of the abutment is waterproofed with an asphalt mastic compound. The top of the footing is sloped ⅛ in. in 1 ft. from back to front, drainage collecting over this area being carried through the front wall by a 6-in. cast iron pipe, the outer end of which is covered by broken stone. The two abutments for the location shown required 2,492 yds. of concrete and 12,600 lbs. of steel.

In addition to the new bridge work, the extension of three permanent bridges on the old line near the connection at Lind-



Wisconsin River Bridge, Near Necedah, Wis.

werm was made necessary by the double-tracking of the old line from that point into Milwaukee.

The most important stream crossings are over the Wisconsin river, Yellow river, Fox river and Oxford mill pond. The Wisconsin river at the point of crossing flows between a high sandstone bluff on the east bank and a low valley on the west. At times of high water this valley is flooded for a considerable distance back from the channel, and shortly after the completion of the new grade and the placing of the bridge abutments, an unusually high water stage seriously damaged the new bank back of the west abutment. To prevent the recurrence of trouble from this source a dike was built about 1,100 ft. west of the west



Yellow River and C. M. & St. P. Crossing.

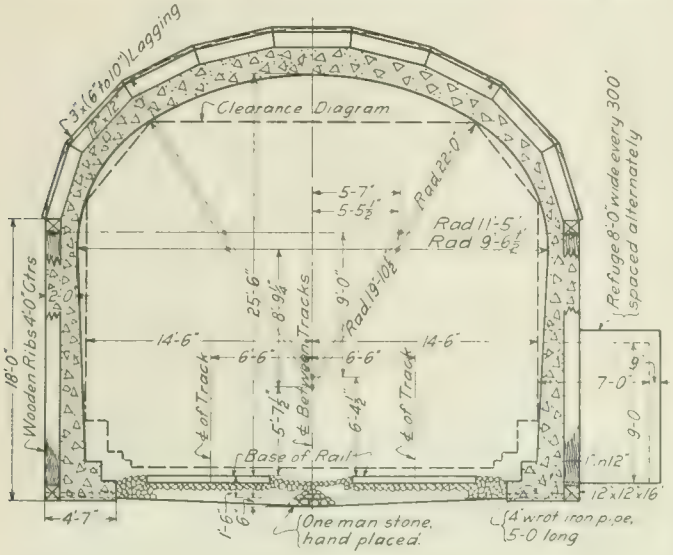
abutment, paralleling the river for a distance of 8,000 ft. up stream. The river slope of this dike and the upper slope of the grade supporting the track were protected by riprap. The dike is 8 ft. wide on top with a 2:1 slope on the river side and a 1½ : 1 slope on the opposite side. The fill was made by scraper outfits from borrow alongside and riprap was brought in by dinky engines and cars from a nearby stone cut on the new railway line. The riprap was dumped to place and roughly smoothed by hand to a depth of 2 ft. The bridge consists of six 80-ft. deck plate girders and four 150-ft. through lattice riveted truss spans, making a total length of 1,096 ft. 9 in. face to face of back walls.

The Yellow river bridge consists of a 150-ft. through riveted lattice span. a 78-ft. through plate girder, and three 69-ft. 4½ in. deck plate girders, making a total length of 440 ft. The through girder spans a single track line of the Chicago, Milwaukee & St. Paul, and a public highway.

The Fox river at the point of crossing widens to a shallow lake known as Buffalo Lake, which is underlaid with soft muck. The main channel of the river is navigable and is crossed by a double track through riveted swing bridge 205 ft. 6 in. long, providing two 75-ft. clear channels. In addition to this swing span, the bridge consists of eight 60-ft., eight 30-ft. and two 40-ft. deck plate girders. The piers, excepting those under the swing span, consist of two steel cylinders 8 ft. in diameter, filled with concrete. The cylinders at eight of these piers are carried down to hard material, and at the other eight they are supported on clusters of piles driven in the overlying sand and clay. Sixteen piles were used in each cluster, driven on concentric circles with a minimum spacing of 1 ft. 8½ in. The pressure under the piers founded on hard material is 6.2 tons per square foot, and the pressure on each pile in the pile-supported cylinders is 35,800 lbs. The tops of the 8-ft. cylinders are just above the elevation of high water, the superstructure being carried on 6-ft. sections of 5-ft. diameter cylinders set concentrically in the top of the large cylinders, and extending about 3 ft. above them. The cylinders are spaced 19 ft. 6 in. apart center to center between rows and alternately 30 ft. and 60 ft. center to center between cylinders in each row, the adjacent pairs of cylinders being connected by the superstructure to serve as towers. The columns supported on the cylinders are braced diagonally in both directions in each tower and support the transverse plate girders on which are carried the longitudinal girders under the tracks. This construction is clearly shown in one of the accompanying drawings. In placing the cylinders they were floated out to the desired location and sunk through the muck by weighing them with rails and dredging out

the enclosed material. They were then filled with 1:3:6 concrete.

The bridge over Oxford mill pond was designed to use the type of cylinder piers and tower superstructure described above.



Cross Section of Tunnel, Showing Timbering and Concrete Lining.

Owing, however, to a proposed water power development which, if installed, will materially raise the high water level, this design had to be modified. The condition of foundations was such that all piers had to be founded on piles. In place of two 8-ft. cylinders a single steel form of oval cross sections was used for the base of the piers. This form was 10 ft. wide and 29 ft. 6 in. long, with semi-circular ends, built up of 5/16 in. open hearth structural steel plates with riveted lap joints. Concentric with the semi-circular ends were placed 6-ft. diameter cylinders 33 ft. 7 in. high. The superstructure was carried directly by 6-ft. sections of 5-ft. diameter cylinders as described in connection with the Buffalo lake bridge. The large cylinders and the oval forms are filled with 1:3:6 concrete and the small cylinders supporting the superstructure with 1:2:4 concrete. The tops of the large cylinders are braced in both directions by plate girder diaphragms which make the four cylinders act as a rigid tower. The superstructure consists of transverse plate girders connecting each pair of cylinders and supporting longitudinal deck plate girders in the manner shown in one of the accompanying drawings. The 30-ft. longitudinal girders are made rigid at both ends. At the expansion ends of the 60-ft girders a special design of hanger plate was used. The end of the girder rests directly on a casting, whose lower surface is curved and is supported by a 9-in. x 1-in. hanger plate extending up to the top of the transverse girder and riveted to the stiffener angles. The lower flange of the longitudinal girder is bolted to this casting, but the holes are slotted to provide for necessary expansion.

TUNNEL WORK

The only tunnel on the new line is through the divide between the Mississippi and Wisconsin river basins, about 12 miles east of Sparta. It is 1,300 ft. long and double-tracked, the cross section being shown in the drawing reproduced herewith. The tunnel was driven through soft sandstone, the maximum depth above the arch ring being 182 ft. Deep rock cuts approach the tunnel from both directions, the maximum cut being about 140 ft. These cuts were sloped ½ : 1 in the layer of loose material near the ground surface and ¼ : 1 in the solid rock. The first headings were driven at the height of the wall plates, and these were enlarged to the full arch section. The timbering consisted of nine



East Portal of Tunnel, Tunnel City, Wis.

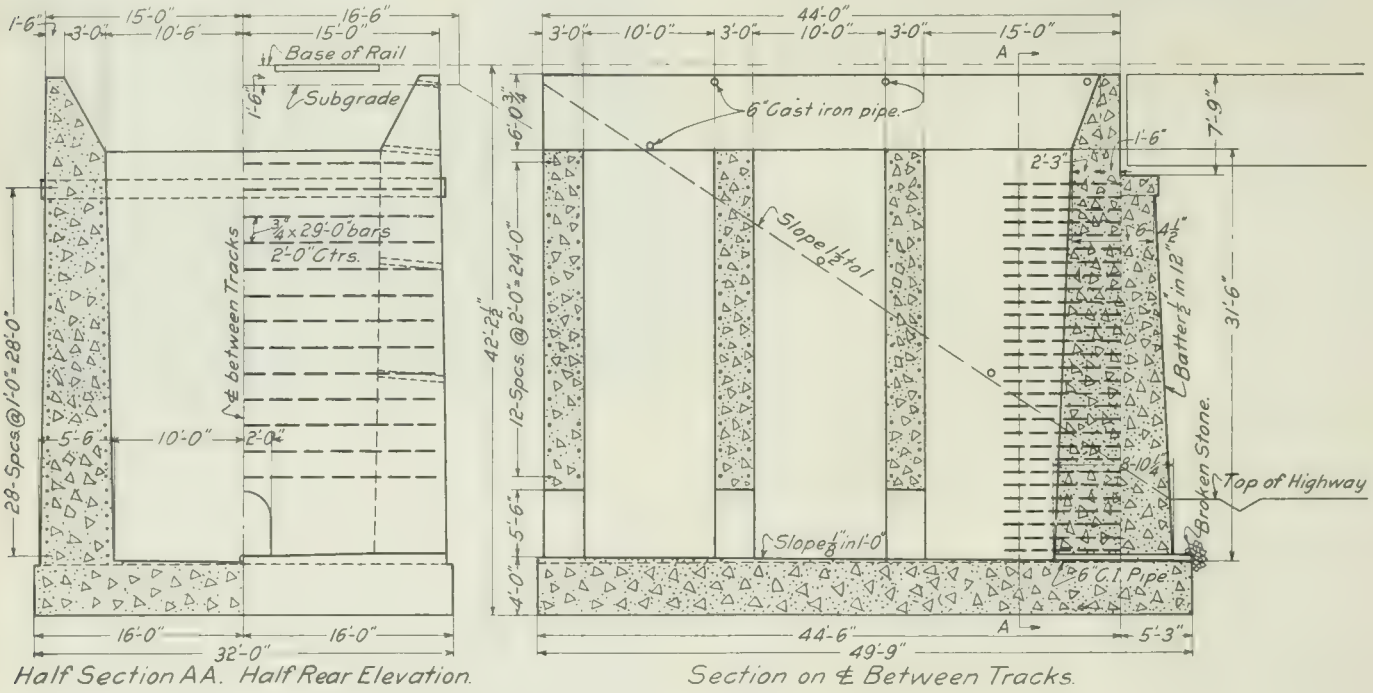
12-in. x 12-in. arch ribs and 3-in. lagging supported on 12-in. x 12-in. wall plates 16 ft. long. All falls over the arch were packed with cord wood tightly wedged, the stone being too soft for this purpose. The lower part of the tunnel section was taken out in a single bench. Light charges of 40 per cent. Monobel dynamite which produced practically no fumes were used, the rock being so soft that it shattered very easily. There was no difficulty in handling the drilling rapidly, as in some places the material was so soft that augers could be used. The rock shot down from the



Cylinder Piers for Buffalo Lake Bridge; Milwaukee, Sparta & Northwestern.

working face was shoveled into 1 yd. narrow-gage cars running on a track laid on the center line of the tunnel and hauled out by mules, usually in 8-car trains. Work was carried on from both portals, working two shifts at each end. About 140 men were required for each shift, the excavation averaging about 16 trainloads per shift. The total excavation was approximately 45,000 yds.

A mixer plant was established at each portal for placing the concrete lining. At the east end concrete materials were unloaded at Tunnel City, where stock piles were maintained and provision was made for heating during the cold weather. From these stock piles the material was hauled by dump wagons over a new road crossing over the portal of the Chicago, Milwaukee & St. Paul tunnel, which is adjacent to the new one, and dumped over the mixer location into chutes leading to storage hoppers. From these hoppers the mixer feed could be properly proportioned, the elevation of the plant being such that all handling of materials was done by gravity. The mixer dumped on the level of a trestle extending into the tunnel about 20 ft. above the base of the rail. At the west end the material was unloaded from a siding at the end of the approach cut, a stiff-leg derrick being



Details of Typical U Abutment for Short Plate Girder Spans.

used to unload gravel and stone from cars, and a clamshell to load small dump cars from the stock pile. These dump cars had a capacity of 3¼ yds., and each was hauled up a steep incline to a point over the mixing plant near the portal by a team of horses. Here the material was dumped into chutes hoppered at the bottom to control the mixer supply in a manner similar to that described at the other plant. The gravel chute was heated by four pipes laid on the floor of the chute up and down the incline and supplied with live steam from a boiler at the top. A cement storage house was also provided above the chutes, and the sacks of cement were dropped to the mixer platform in a wooden chute as needed. Smith mixers of ¾-yd. capacity were used in both these plants, the mix being 1:2:4 of gravel and broken stone. The concrete was carried into the tunnel in push cars with an average capacity of about 15½ cu. ft. The footings and side walls were placed directly from these dump cars through wooden chutes. The lower part of the arch was placed by dumping the cars to boards, from which it was shoveled into the forms, one form board being added at a time. The key section of the arch was placed by shoveling back into 4-ft. sections of the forms. This section was 3 ft. wide, placed in two pieces, which were bolted together and wedged tightly in place. Every second section of wall plate between posts was cut out and the space filled when the side walls were placed. The side walls were concreted in sections 70 ft. long and the arch in 16-ft. sections. The contractor's typical concrete gang at the west plant consisted of 12 men operating the three push cars, 6 spaders, 16 carpenters, 9 shovelers, 2 foremen, 2 men operating the feeding hoppers at the mixer, one dropping down cement sacks from the storage house, one engineer for the heating boiler, one engineer at the mixer and one operator at the mixer. In addition to these, 8 men and 4 teams were required to operate the four dump cars supplying the material from stock piles to mixer, and several other men were required around the stock piles for unloading the material, blacksmithing and caring for the camp. This gang could place about 100 yds. of concrete in a 10-hour shift. Actual construction work on the tunnel was begun about April 15, 1911, and it was opened for traffic January 14, 1912.

TRACK WORK.

The line is laid with 90-lb. rails on treated hemlock ties. It is double-tracked from Clyman Junction to Butler, and single-tracked for the remainder of the distance, although, as mentioned above, provision has been made in all permanent structures for future double-tracking. There are two yards and engine terminals on the new road, one at the crossing at Wyeville, and one at Friendship. Trains between Milwaukee and St. Paul use the Wyeville terminal, and those between Milwaukee and Winona change engines at Friendship. The former yard has 10 tracks 3,000 ft. long, an 18-stall engine house and an 80-ft. turntable. The latter yard has, in addition to a similar layout of ten 3,000-ft. tracks, a separate caboose and repair yard and a receiving yard of four 3,000-ft. tracks. The engine house at this point has 24 stalls. Both engine houses are of the company's standard brick construction on concrete foundations. At Clyman Junction four Y's are provided for connection with the old line in all directions. The typical passing track layout on the single track section is shown in an accompanying sketch. Passing tracks are 3,400 ft. long in all cases.

STATIONS, COALING AND WATER PLANTS.

The standard stations used at the new towns established along the line are of frame construction 20 ft. x 72 ft., having a waiting room, office, and combined baggage and freight room. Plat-

forms are 200 ft. long, constructed of brick in front of the buildings, and of gravel fill covered with a layer of granite screenings at the ends. A concrete curb is used along the brick station and a wooden curb along the gravel. Two other standard stations of larger dimensions are used at towns, where prospective passenger traffic seems to warrant their construction.

Coaling plants are located approximately 50 miles apart, and water stations 17 miles apart. The coaling plants are of the balanced bucket type. Water stations located inland secure a supply from 12-in. deep wells. The stations at Friendship and Butler



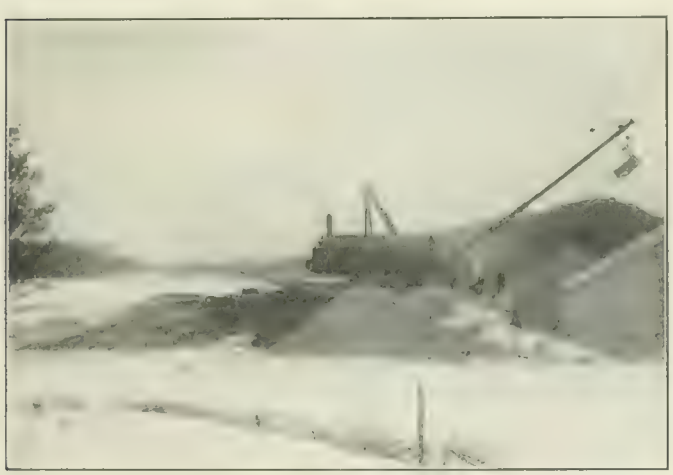
Standard Steel Highway Crossing.

are operated by electricity, and all others by gasoline. No water softeners were required.

SIGNALING AND INTERLOCKING.

The line from Clyman Junction to Butler, 18 miles, is equipped with automatic block signals, the remainder being provided with standard train order signals. Two mechanical interlocking plants were installed, one to protect the drawbridge at Fox river having 15 working levers in a 24-lever frame, and one at the C. M. & St. P. crossing near Tomah having 12 working levers in a 16-lever frame. Two electric plants were installed, one of 36 working levers in a 48-lever frame governing the crossing of the Chicago & North Western at Clyman Junction, and one of 49 working levers in a 64-lever frame at the crossing of the Omaha Line at Wyeville.

All construction work on the new line was handled by contract.



Drag Line Excavator Making Long Fill from Adjacent Borrow Pit; Milwaukee, Sparta & Northwestern.

The John Marsh Company had the general contract for the line east of Clyman Junction, and Winston Brothers for the portion west of that point. The work was done under the supervision of E. C. Carter, chief engineer, and under direct charge of W. H. Finley, assistant chief engineer. D. Rounseville was resident engineer in charge of field work east of the Fox river, and F. H. Bainbridge west of that point. L. J. Putnam was in charge of the tunnel work, and was later made resident engineer, succeeding Mr. Bainbridge. The bridges were designed under the direction of Mr. Finley and I. F. Stearn, formerly bridge engineer of that road.

TRAIN ACCIDENTS IN JANUARY.[1]

Following is a list of the most notable train accidents that occurred on railways of the United States in the month of January, 1912. This record is based on accounts published in local daily newspapers, except in the case of accidents of such magnitude that it seems proper to write to the railway manager for details or for confirmation.

Collisions.

Date.	Road.	Place.	Kind of Accident.	Kind of Train.	Kil'd.	Inj'd.
1.	Denver & R. G.	Salt Lake.	bc.	F. & F.	2	3
2.	Wabash	Brooklyn.	rc.	P. & F.	0	8
3.	Rock Island	El Reno.	bc.	P. & P.	1	20
3.	Georgia & F.	Normantown.	bc.	P. & F.	0	6
5.	Atchison, T. & S. F.	Wright, Kan.	bc.	P. & P.	2	18
6.	Long Island	Hempstead.	xc.	F. & F.	1	1
*6.	Pecos & N. Tex.	Hereford.	rc.	F. & F.	1	3
*7.	Grand Trunk	Durand.	rc.	P. & F.	0	1
8.	L. S. & M. S.	Cleveland.	xc.	F. & F.	0	4
8.	Chi., R. I. & P.	St. Joseph.	rc.	F. & P.	0	12
9.	L. S. & M. S.	Dunkirk.	rc.	P. & F.	0	3
9.	L. S. & M. S.	Ripley.	rc.	P. & P.	0	2
11.	L. S. & M. S.	Chicago.	xc.	P. & P.	0	10
11.	St. Louis & S. F.	Fort Smith.	xc.	P. & F.	0	12
*12.	N. Y. N. H. & H.	E. Freetown.	rc.	P. & F.	1	2
15.	A. C. L. / G. S. & F.	Valdosta.	xc.	P. & F.	0	3
15.	Pitts. & L. E.	New Castle.	bc.	P. & P.	5	5
16.	L. & Nash.	Long Run.	bc.	P. & F.	4	17
*†16.	St. Louis S. W.	Illmo.	rc.	F. & P.	1	0
†18.	Central of Ga.	Jonesboro.	bc.	P. & F.	5	3
18.	West. Md.	Parter's.	bc.	P. & F.	1	2
20.	Pere Marquette	McCord.	rc.	F. & F.	0	6
†22.	Ill. Central	Kummundy.	rc.	P. & P.	4	3
†23.	Del., Lack. & W.	Chenango Forks.	rc.	P. & P.	2	5
24.	Grand R. & Ind.	Sand Lake.	xc.	F. & F.	2	4
26.	Central of Ga.	Leesburg.	bc.	P. & F.	4	8
29.	Grand Trunk	Durand.	rc.	F. & F.	2	3
31.	Atch., T. & S. F.	Watrous.	bc.	F. & F.	3	2

Derailments.

Date.	Road.	Place.	Cause of Derailm't.	Kind of Train.	Kil'd.	Inj'd.
*1.	Wabash	St. Peters.	unx.	P.	0	14
†2.	Minn. & Int'l.	Farley	d. switch.	P.	1	13
3.	Texas & Pacific.	El. Paso.	b. flange.	P.	..	..
4.	Chicago Gt. West'n.	Welch.	b. rail.	P.	0	0
5.	Lake Shore & M. S.	N. Olmsted Fs.	unx.	P.	0	0
6.	Seaboard A. L.	McKenney.	eq.	P.	0	3
7.	Nor. Pacific	Little Falls.	unx.	P.	..	..
10.	Great Northern	Java.	avalanch.	F.	2	0
10.	Central Ga.	Americus.	d. track.	P.	0	1
11.	Penn.	Lime Lake.	b. rail.	P.	0	12
*14.	Missouri Pac.	N. Lyndon.	d. bridge.	F.	3	3
14.	C., C., C. & St. L.	Carey, O.	d. track.	P.	0	34
19.	Penn.	Davis, Ind.	b. rail.	F.	0	0
29.	Penn.	Phila. (y)	b. rail.	F.	1	2

[illegible]

[illegible]

Date.	Road.	Place.	Cause of Accident.	Kind of Train.	Kil'd.	Inj'd.
26.	N. Y. Central.	Oneida.	boiler.	P.	1	1

The collision near Salt Lake City, Utah, on the 1st, about 9:15 p. m., was between eastbound freight train No. 52, Ogden to Salt Lake, running at about 35 miles an hour and a switching

[1]Abbreviations and marks used in Accident List:

rc, Rear collision——bc, Butting collision——xc, Other collisions——b, Broken——d, Defective——unf, Unforeseen obstruction——unx, Unexplained——derail, Open derailing switch——ms, Misplaced switch——acc. obst., Accidental obstruction——malice, Malicious obstruction of track, etc. ——boiler, Explosion of locomotive on road——fire, Cars burned while running——P. or Pass., Passenger train——F. or Ft., Freight train (including empty engines, work trains, etc.)——Asterisk, Wreck wholly or partly destroyed by fire——Dagger, One or more passengers killed.

engine running west. Both engines were wrecked. The fireman and a brakeman on the switching engine were killed and three trainmen were injured. The switching engine was on the main track on the time of the freight, having been ordered out from Salt Lake City against the eastbound train by reason of a misunderstanding between the despatcher and a signal repairman who notified him by telephone of the derailment of a locomotive. This repairman, 19 years of age, who was in a signal tower, sent the telephone message at the request of the engineman of the engine which was derailed. He had to first call the Salt Lake City telephone exchange. He had also to telephone to the despatcher of the San Pedro Line. Learning that one of the telephone numbers had been changed, he made inquiry of the "information" operator. Being advised as to the correct number he made his call; but there was a mistake somewhere, and he gave to the D. & R. G. despatcher the message which he says he thought he was giving to the San Pedro despatcher. There was a good deal of noise in the signal tower and the repairman seems not to have clearly understood all of the questions which were put to him. The outcome was that the despatcher thought that a westbound freight train was the one which had been derailed, and he ordered out the switching engine, with some men from the terminal yard, to assist in getting the derailed engine back on the track. But in point of fact, the engine derailed was not obstructing the main track, and the train which the despatcher supposed to be derailed had long since proceeded on its way, and had met No. 52.

The collision at Wright, Kan., on the 5th, was between westbound passenger train No. 565 and eastbound train No. 12. One engineman was killed and the other fatally injured; and the number of passengers injured was 18. The engineman of the westbound train "lost his bearings" in a severe snow storm prevailing at the time, and ran past the switch at which he held orders to take the side track.

In the rear collision which occurred near St. Joseph, Mo., on the 8th, eastbound passenger train No. 72 was run into at the rear by a following freight train, and 12 passengers were injured. The rear car of the passenger train, which was a dining car, was split in two lengthwise. The passenger train had been unexpectedly stopped on an ascending grade.

The collision at Cleveland, Ohio, on the evening of the 8th, was between two engines, without trains, on a sidetrack. A passenger engine which had started for the Collinwood yards ran into a yard engine and both engines were thrown off the track. The collision occurred within 100 yds. of a roundhouse, but a violent wind and snow storm prevailed at the time and men in the roundhouse did not hear the crash. The four men on the engines, two on each, were all scalded or otherwise injured so that they were unable to give an alarm, their plight not being discovered until a brakeman on a passing freight train saw what had happened and got help from the roundhouse.

The collision at Dunkirk, N. Y., on the 9th, occurred about 10 a. m., in a blinding snow storm. An eastbound express train ran into two freight engines coupled together and running backwards to couple to their train. These engines were badly damaged and three members of their crews were scalded. The tracks were blocked for three hours. The passenger train had run past a distant and a home signal set against it.

The collision at Ripley, N. Y., on the 9th, occurred at 6 p. m., in a blinding snow storm. Eastbound fast mail train No. 32 ran into the rear of a train of express cars which had stopped because of some trouble with the engine. The express cars were wrecked and one messenger was injured. A cook and a waiter in the dining car of the fast mail were injured. All four main tracks were blocked until midnight.

The butting collision at New Castle, Pa., on the 15th, was between an eastbound passenger train of the Baltimore & Ohio and a westbound passenger train of the Pittsburgh & Lake Erie; the train of the B. & O. having run over a misplaced switch at Moravia street, and through a transfer track to the main line of the P. & L. E. Both enginemen, both firemen and one baggageman were killed. The collision occurred at 6:30 a. m. The B. & O. train had run about 3,400 ft. on the P. & L. E. track.

The butting collision on the Louisville & Nashville at Long Run, Ky., on the 16th, was between a westbound passenger train of the L. & N. and an eastbound train of the Chesapeake & Ohio, made up of empty passenger cars. Both enginemen and both firemen were killed, and two other trainmen were badly injured. Fifteen of the passengers on the Louisville & Nashville train were injured, but most of the injuries were comparatively slight. The collision was due to the engineman and fireman of the C. & O. train, running as the second section of C. & O. freight train No. 92, overlooking the passenger train, which was running on time on its schedule rights.

The rear collision at Illmo, Mo., on the 16th, occurred at 3:15 a. m., and the only victim was G. L. Stewart, agricultural and industrial agent of the road, who was in his business car at the rear of the passenger train. He was instantly killed. The wreck took fire and his body was badly burned. The collision occurred in the yard and was caused by a freight train of the St. Louis, Iron Mountain & Southern coming into the yard not under control; this train ran into a passenger train of the St. Louis Southwestern which had been stopped because of the detention of a freight train ahead of it. The passenger train was pushed forward about 300 ft. and wrecked the caboose of the freight, which was a train of the Chicago & Eastern Illinois; and the caboose and two cars of the freight took fire and were burned up. The atmosphere was clear at the time of the collision, but the temperature was about 5 deg. below zero. The flagman of the passenger train had gone back about 1,200 ft., and besides using his red light and a fusee he threw his lantern at the cab of the approaching locomotive; but this engine was working steam when it struck the passenger train at a rate of about 15 miles an hour. The fire in the passenger train, which destroyed the business car, and also one sleeping car, caught from the coals in the freight engine.

The butting collision at Jonesboro, Ga., on the 18th, occurred at 1:20 a. m. Both engines were badly wrecked. The engineman of the freight train, three colored passengers and a colored train porter were killed, and three persons were injured. The passenger train was No. 32, and freight train was No. 35. The collision was caused by the men in charge of train No. 35 overlooking train No. 32.

The collision at Kinmundy, Ill., on the 22d, resulted in the death of four railway officers. Southbound passenger train No. 25, standing at the station, was run into at the rear by passenger train No. 3. The block system not being in use, the standing train (which was behind time) according to the rule, should have been protected by flag, but this was not done; neither was any use made of fusees. The engineman of No. 3, however, could have seen the tail lights of No. 25, the line being straight and the atmosphere clear; also there was a distant signal about 800 ft. back of the rear of train No. 25, indicating caution for the crossing at Kinmundy. This engineman had had but brief experience as a runner on passenger trains. This collision was reported in the *Railway Age Gazette*, January 26 and February 2.

The collision of passenger trains at Chenango Forks, N. Y., on the 23rd, occurred at 12:48 a. m. Two passengers were killed and four passengers and the conductor were injured. Some of the passengers were scalded by steam escaping from the steam chest of the locomotive. Train No. 812 was standing just east of the station and was run into at the rear by No. 912. The engineman of No. 912 failed to observe automatic block signals. He disregarded a distant signal in the caution position and a home signal in the stop position, running by the latter and into the rear of No. 812, which was standing about 400 ft. east of the home signal protecting a cross-over. No. 812 had just crossed over and was waiting for the flagman to set the switches in normal position.

The collision at Leesburg, Ga., on the 26th, occurred at 5:45 a. m. It was between eastbound passenger train No. 8 and a westbound extra freight train, engine 1362. It occurred on a straight line, but there was a dense fog preventing either enginemen from seeing the opposing train. Both engines, 1 baggage car, and one freight car were considerably damaged. Both enginemen, one fireman and the freight train conductor, who was riding on engine, were killed, and eight persons were slightly injured. The collision was due to the men in charge of the freight train overlooking the passenger train, which was on time.

The train derailed at North Olmsted Falls, Ohio, on the 5th, was the eastbound Twentieth Century Limited. The forward truck of the dining car, which was the fourth car from the engine, ran off the rails because of a broken tire, and plowed for a considerable distance along the roadbed. The train was running at about 60 miles an hour, but the cars separated so as to cause an emergency application of the brakes, and the whole train was stopped within a short distance.

The passenger train derailed at McKenney, Va., on the 6th, was the northbound day express No. 66; and the engineman, fireman and one passenger were slightly injured. The derailment was due to a breakage of rolling stock. August Belmont, of New York, chairman of the Interborough Rapid Transit Company, who was on the train, sent to engineman W. R. Bishop five hundred dollars in recognition of his courage in sticking to his post.

Canada.—Of five train accidents reported in the newspapers as occurring in Canada in the month of January, and which were attended with fatal results, two were butting collisions and one was caused by an avalanche which overwhelmed a wrecking train. The most serious of these five accidents was a butting collision on the Canadian Pacific at St. Vincent de Paul, 30 miles east of Montreal, on Monday, the 8th. Four passengers were killed and five passengers and two trainmen were injured. It appears that the westbound train ran past the switch at the meeting point, the eastbound having been stopped west of the station.

Electric Car Accidents.—Of the 12 accidents to electric cars reported in the newspapers as occurring in the United States in the month of January, two were attended with fatal results. Near Martinsville, Ind., on the 17th, a butting collision between a passenger car and a work train killed two persons and a third was fatally injured. At Cincinnati, on the 5th, a car fell off the bridge connecting Cincinnati with Newport and lodged on the ground 55 ft. below. The number of passengers in the car was not large, but of these four were fatally injured.

FOREIGN RAILWAY NOTES.

A year or more ago the Austrian State Railways agreed with the producers of petroleum in Galicia to use oil on the Galician lines. Now about 700 locomotives are burning oil, generally with satisfactory results, though there are some complaints of rapid wear. A new process is being tried in which superheated steam is not required for atomizing the oil.

In a speech before the Prussian parliament Minister von Breitenbach said that among the effects of the drought last October was an increase of 6.2 per cent. in freight earnings, with scarcely any increase (only 0.04 per cent.) in the number of cars required. Low water in the rivers gave long rail hauls north and south, and the reduced rates on potatoes, etc., carried long shipments from the extreme East, where there was a good crop, to the West, where there was none to speak of. Though the inability to supply the cars required was chiefly due to this exceptional cause, the German State Railways, whose freight cars are pooled, have agreed to increase their stock 5 per cent. the current year, which will add 28,400 cars to the number by next October.

INTERMITTENT ACETYLENE LIGHTS ON SIGNALS.

E. G. Windahl, writing in the *Tecknisch-Tidskrift,* describes some intermittent lights which have been installed at an interlocking at Liljeholm, Sweden, the installation having been preceded by the experimental use of lights of this kind for a year or two on some signals on the Stockholm, Vesteros & Bergslagen. The apparatus was furnished by the Bolag Gas Accumulator Company.

It appears that the plan under which these signals are arranged provides for the use of intermittent lights for high speed routes and constant lights for moderate speed and diverging routes. At Liljeholm the traffic is dense and all kinds of indications are necessary. Different lights have different rates of periodicity; thus the distant signals show a light one-tenth of a second and are obscured for nine-tenths of a second. Certain home signals are adjusted differently. For example, for three signals the periodicity is 0.5 seconds alight and 0.7 seconds obscured; for one it is 0.5 seconds light and 0.8 seconds obscurity; for another it is 0.4 seconds light, 0.8 seconds obscurity; and for a sixth it is 0.5 seconds light and 0.5 seconds obscurity. These different adjustments were decided on after extended experiments. The station signals for the main line being the only ones provided with intermittent lights, the conductor on starting his train over the main line only needs to look for an intermittent signal and he pays no attention whatever to the constant lights. The starting signals are not kept lighted all the time and thus there is a saving in the expense of operation.

The gas used is purified acetylene, dissolved in acetone, under a pressure of from 150 to 225 lbs. per square inch, and a small accumulator is used. The accumulators in use at Liljeholm have a gross capacity of 915 cubic inches. At each signal there is a tank in a cylindrical shell at the foot of the post. The gas itself automatically opens and closes the valve, at the desired intervals, by which the flame is started and extinguished. The front of the lamp has a lens so arranged that the rays are projected in practically parallel lines. Its openings for ventilation are provided with fine nettings to keep out insects. The lamps have no reflectors and therefore it is not often necessary to open them for cleaning.

The constant lights show green for clear and are obscured when the semaphore arm is in the stop position. Therefore they only indicate clear; and the supply of gas is cut off except when the signal is cleared. The gas is taken through a branch pipe leading into the main pipe between the pressure regulator and the intermittent signal; when the arm is in the clear position the opening in the branch pipe is automatically opened and the gas is lighted by a pilot flame. The opening and closing of this orifice is regulated by means of a membranous valve attached to the signal arm.

The intermittent lights as well as the pilot flames of the constant lights are kept alight night and day and they require no further supervision than that necessitated by the renewal of the tanks and recharging them with gas. Usually these tanks will last about two months for the distant signals. The tanks for the station signals must be changed more frequently because the period of luminosity is longer and the consumption of gas is greater.

The cost of installation runs from $85 to $145 per light, and about $20 additional for each fixed light (on the same post). The expenses of operation have been found to be about as follows: One distant signal (lighted 0.1 seconds, obscured 0.9 seconds) for 24 hours, 0.424 cubic feet. One pilot light 0.353 cubic feet; or, annually, for one intermittent and one pilot light (0.777 cubic feet x 365 x $10.60 per 1,000 cubic feet) = $3.00; renewal of tanks, $0.50; total per year, $3.50. Where the periodicity is 0.5 seconds light and 0.8 seconds obscured the consumption of gas per intermittent light is 1.63 cubic feet. Add for a pilot light 0.35 cubic feet, and the cost per year, including renewal of accumulators is $8.83.

The extinction of the intermittent light for one-half the night

will afford an approximate saving of about $1.11 each year.

The annual expense of a certain starting signal with a periodicity of 0.4 seconds lighted and 0.8 seconds obscured, amounts to about $8.06, with a saving of 70 cents if the intermittent light is extinguished for one-half the night. For a signal with a periodicity of 0.5 seconds lighted and 0.7 seconds obscured, the figures become $12.69 and $1.39, respectively.

NORTHERN PACIFIC TRAIN RULES.

The Northern Pacific has lately completed a revision of its book of rules for the guidance of the employees in the transportation department, including train rules, block signal and interlocking rules and "general regulations." Following the rules for the movement of trains by train orders, there is a brief code (9 rules) of telephone instructions. The "general regulations" include, besides brief chapters for each class of employees, a chapter on each of the following subjects: Air brakes; operation on mountain grades; slow orders and bulletins; safety precautions and casualties; legal proceedings; and prevention of fires. The rules for the different classes of employees are preceded by 20 rules addressed to all employees.

That portion of the book which corresponds to the standard code of the American Railway Association has a number of additions, each such addition being made a supplement to one of the standard rules, and distinguished by a letter (a, b, c, d, etc.). We note such of these additions as are of general interest.

The rules applying to double track lines, as distinguished from single track, are interwoven with the others. These rules are D 5, D 14 (referring only to paragraph k) D 17, D 19, D 71, D 72, D 83, D 85, D 94, D 95, D 97, D 101, D 104a, D 151, D 152, D 153, D 208.

Rule 3a requires conductors, including yard conductors, to compare watches with their enginemen, provides for a comparison by men who have not access to a standard clock, and requires the train despatcher to record daily on the train sheet any variation of the standard clocks.

Rule 7a cautions trainmen, etc., to avoid taking hand signals that may be intended for other trains. In backing a train, the disappearance from view of trainmen or lamp by which signals are given will be construed as a stop signal.

Rule 14, paragraph k, provides for the giving of the whistle signal for the benefit of trackmen and bridgemen.

Rule D 19, requires that when a train is turned out against the current of traffic at night, green lights shall be displayed to the front and side, and that to the rear there shall be displayed a green light on the right hand side of the car and a red light on the left hand side (this for a road where the normal current of traffic is on the right hand track). The cut showing the arrangement is entitled "Rear of train by night running against the current of traffic."

Rule 20a requires the observance of rule 14, paragraph k, and also refers specially to cases where a train being met or passed has green signals. In such cases both trains must give the whistle signal and both must acknowledge.

Rule 27a. When a train is stopped by the absence of a signal light it will be governed by the day indication. On certain branches of light traffic the train order signals are not lighted at night; in these cases every train must positively ascertain the position of the signal.

Rule 32a forbids the sounding of the whistle while passing a passenger train except to prevent accident.

Rule 83a requires conductors to make proper entries in train registers; where an engineman consults the register regularly he must himself fill in his name; where the engineman is not required to consult the register, a copy of the record on the register is to be given to him by the operator or conductor. No train can leave a registering station which has telegraph service without a clearance.

Rule 83b provides for bulletins and regulates their use. When a bulletin is posted the time of posting is to be endorsed and the issuing officer advised. Telegraphic bulletins affecting safety of trains must be repeated.

Rule 90a. On a siding used by trains in both directions, trains must run expecting to meet opposing trains.

Rule 91 prescribes an interval of 5 minutes.

Rule 94a provides that a train held by another between telegraph stations may require the first train passing to carry a flagman to the next telegraph station, if this will not delay an important train. The train carrying the flagman must stop so as to make sure that opposing trains cannot get past him.

Rule 100 is omitted.

Rule 104a requires employees to stand 20 ft. away from a switch when a train is passing over it.

TRAIN ORDERS.

Rule 208a forbids the sending of orders to superior trains at the point of execution if it can be avoided; if not avoidable, special precaution must be taken, and the following notice must be incorporated in the order— ".....gets this order at ....."

Rule 221 is given in both forms, form A and form B; form A for use in manual block territory and form B, apparently, for use in automatic territory.

Rule 221c allows the use of the caution position of a three position semaphore when a 19 order is to be delivered, but not in case of a "middle order" addressed to an operator, nor when the order restricts the superiority of a train and is sent to it at the point where superiority is restricted.

Rule 222a requires clearance cards to be written in manifold, the same as train orders.

MANUAL BLOCK SYSTEM.

Rule 301 prescribes green for clear and yellow for caution, and in block signal communications the abbreviation "yel" means "caution displayed."

Rule 301a. Home block signals are also train order signals. . . .

Rule 317a provides for the use of caution cards under the manual block system. Except in the case of a wire failure, these cards are to be used only on authority of the superintendent; and they are to be numbered, repeated, and made complete, as is done with train orders. Heavy freight trains may be run on cards, following passenger trains, on a heavy continuous ascending grade. Where a passenger train is standing at a station, a card may be given to a following train if its run terminates before reaching the track occupied by the passenger train. Cards must not be used on descending grades, nor during snowy or foggy weather, nor through tunnels. When a train order is given for trains to meet or pass at an intermediate (non-telegraph) station there is to be given to each train a caution card, on which is to be noted the substance of the meeting order. When a train other than a passenger train is standing within the switches at a station, a card may be given to a second class or inferior train at the block station in the rear.

Rule 337 is omitted.

Rule 360 reads: "Block signals do not relieve train and enginemen from complying with rule 99."

Rule 362a reads: "A train may pass a Home Block Signal at "Stop" to do station work, take fuel or water, or enter a siding in advance of the signal, subject to the restrictions of Train Rules; but such train must obtain a clearance card before departing from that station."

AUTOMATIC BLOCK SYSTEM.

Rule 501a describes the arrangement of signals on posts at the right of the track or on bridges, or on bracket posts, etc.

Rule 504 allows a train to proceed without sending a flagman ahead provided the next signal can be plainly seen to indicate proceed.

Rule 505 is omitted.

Rule 508 describes switch indicators and tells how they are to be used.

Rules 509-514 prescribe the procedure at crossovers in automatic block signal territory, etc. Lights will not be maintained on trailing point switches on double track; nor on facing point switches or any switch on single track if the switch is not more than 300 ft. in advance of a block signal. When a train is stopped the flagman need not go back if he can see an automatic signal, at least half a mile back, indicating stop. Under all other circumstances rule 99 must be fully observed in block signal districts.

TELEPHONE INSTRUCTIONS (VERBATIM).

231. Speak directly into the transmitter in a moderate tone.

232. Where jack boxes are used plug must be left disconnected from the jack except when in actual use.

233. To answer a call:—Insert plug in proper jack, take down receiver and *speak name of the station.*

234. To call despatcher:—Insert plug in proper jack, take down receiver and listen; if line not in use, say "Despatcher" and name of your station.

235. Except train orders, which will be made complete in the usual manner, all communications will be acknowledged by "All Right" or "O. K.", followed by name of person receiving them.

236. In transmitting and repeating train orders, the following method will be observed:

Numbers one to nine inclusive will be pronounced, and then spelled thus: 1, O-N-E; 5, F-I-V-E, etc.

In numbers above nine, except time in the body of train orders, the figures will be pronounced separately, and then the whole number pronounced, thus: 1-0, ten: 3-2-5, three twenty-five: 2-3-7-8, twenty three seventy eight: (the figure 0 will be pronounced as though spelled Oh.)

Time in the body of train orders, except in schedule orders (Form G) will be pronounced and then spelled thus: 1-0-3-5; T-E-N T-H-I-R-T-Y F-I-V-E: 6-1-5; S-I-X F-I-F-T-E-E-N.

In transmitting and repeating time in schedule orders (Form G) the figures will be pronounced separately and then the whole number pronounced, thus: 1-0-3-5, ten thirty five, etc.

Names of stations in the body of orders, except when repeating schedule orders (Form G) will be pronounced and then spelled thus: Hawley, H-A-W-L-E-Y; Winlock, W-I-N-L-O-C-K; etc.

Example of order as transmitted and repeated:

Number 1 O-N-E engine 2-1-6-2 twenty one sixty two waits at Missoula M-I-S-S-O-U-L-A until 1-2-3-5 T-W-E-L-V-E T-H-I-R-T-Y F-I-V-E P. M. for Number 6-0-2 six hundred and two engine 2-3-7-8 twenty three seventy eight.

Example of same as written:

No. 1 eng 2162 waits at Missoula until 12 35 twelve thirty five p m for No. 602 eng 2378.

237. Trains should be reported thus:

OS Bluffton Number 1 by 4-2-0; OS Heron extra east 2-7-2-8 by 6-1-0, etc.

Trains may be reported without first calling the despatcher, but the despatcher should acknowledge getting the report by saying "All Right" or "O. K."

238. When in doubt, spell names and numbers. Confusion of similar sounds can be overcome by spelling such letters as T, B and C, etc., thus: T-E-A; B-E-E; S-E-E; etc., when necessary. Repeat until certain of being understood correctly.

239. When circuit is interrupted or selector signal inoperative, operators will cut in frequently in an endeavor to keep in touch with the despatcher.

EXAMINATIONS.

E. J. Hackenberg, trainmaster at Staples, Minn., and chairman of the general examining board, has sent us the following notes concerning the work of revising the rules:

The Northern Pacific book had not been revised since 1900. In this revision the company decided to make the rules conform as closely as possible to the standard code of the American Railway Association, as revised in February, 1911. For this purpose a committee was appointed, consisting of a division superintendent who acted as chairman, a trainmaster who had formerly been a train despatcher, a conductor and an engineman.

In addition to rules covered by the standard code, the new book contains rules applying to the despatching of trains by telephone. Telephones are now used for this purpose on the entire main line of the system, over 1,900 miles. The book contains 160 pages of the same type and size as the official copy of the standard code.

Written examinations on transportation rules at stated periods have long been in vogue on this road, and a written examination was conducted prior to putting the revised rules into effect. For that purpose a series of questions was prepared and printed. There are 420 questions on transportation rules, 53 on the manual block and 53 on the automatic block system, for trainmasters, road foremen, train despatchers, conductors, enginemen and yard foremen. Two hundred and sixty-four questions on transportation rules, 53 on manual block and 53 on the automatic block system are for brakemen and firemen. There are 112 questions on transportation rules and 100 questions on manual block system rules for telegraph and telephone operators, and 57 questions for bridge and track foremen on rules pertaining to their particular duties.

The Northern Pacific comprises twelve road divisions and three terminal divisions. The trains of several other roads use the Northern Pacific tracks between various points and the enginemen and trainmen of such tenant lines were required to pass the examinations, making a total of approximately seven thousand employees of various grades who had to be examined.

A general examination board was formed, consisting of one trainmaster, one inspector of telephone despatching, one air brake inspector, two conductors and one engineman. The trainmaster, the conductor and the engineman had been members of the committee which formulated the rules. This committee prepared the questions for the examinations.

A local examining board consisting of a train despatcher, a conductor and an engineman, chosen especially for their familiarity with the theory and practical application of train rules, was formed for each superintendent's division. These men were examined and instructed by the general examining board, after which they conducted the examination of the employees on their respective divisions.

In examining an employee, he was given a copy of the printed questions and required to write the answers (in a space provided) signing his name and giving his occupation and the date on which the examination was held on the outside cover of the blank.

At first the impression seemed to exist among the employees that it was necessary to repeat the language of each rule "from the book." This was very soon corrected and all were given to understand that what was desired was their answers in their own language, giving the meaning and intent of the rules. Thereafter there was no trouble.

The general examining board visited the local examining board of each division while it was examining employees, spending enough time on each division to see that the examinations were correctly and uniformly conducted, and correcting any wrong interpretations or misunderstandings of any rule. Thus all employees had an absolutely uniform understanding of all rules. The examiners made special effort to know that train and enginemen understood the rights of trains by time-table and train orders, and how and when to properly protect their trains.

The examinations were begun in the latter part of October and were concluded December 31; and the new rules went into effect January 1, 1912.

General News Section.

The International & Great Northern lost 94 freight cars in the fire at Houston, Tex., last week.

The shops of the Northern Pacific at Brainerd, Minn., which have been operated on short time, have been restored to a full time basis.

A fire in the inbound freight house of the Missouri, Kansas & Texas at Dallas Tex., on February 18, damaged the buildings and freight to an amount estimated between $30,000 and $40,000.

The storehouse connected with the shops of the Baltimore & Ohio, at Baltimore, was destroyed by fire on February 22, together with seven carloads of material standing nearby; loss, $100,000.

The Duluth, South Shore & Atlantic proposes to establish in the spring an experimental farm about 30 miles from Superior, Wis., under the supervision of E. W. MacPherran, land commissioner.

Representatives of the rail manufacturers have been invited to be present at a meeting of the executive committee of the American Railway Association on March 20 to discuss methods for improving rails.

The Conference Committee of managers will meet representatives of the Brotherhood of Locomotive Engineers on March 14, in New York, to discuss the proposed wage scale for enginemen on eastern railways.

Plans have been made by the Southern Pacific for the electrification of one of its lines into Portland, Ore., as far south as McMinnville, at an estimated cost of $1,600,000. It is reported that work will be started as soon as the city council passes necessary franchises.

Committees representing the locomotive firemen on 51 railways west of Chicago at a meeting in Chicago have formulated a list of demands for changes in working hours and conditions which have been submitted to a referendum vote, with the purpose of presenting them later to the railway managers.

Farquhar J. McRae, accountant for the Stanley steel investigating committee, made to the committee this week a report in which he declares that the corporation controls 80 per cent. of the country's steel trade; that prices are manipulated through the Gary dinners and that J. P. Morgan & Co. realized $69,300,000 in profits for promoting the corporation.

A report compiled by the pension department of the Chicago, Rock Island & Pacific shows that $65,000 has been paid to employees in pensions since the pension system was established January 1, 1910. Since that date 132 employees have been placed on the pension roll and of that number 16 have died. The ages of the pensioners range from 54 to 73 years.

Suits have been filed in the United States district court at Danville, Ill., against the Cleveland, Cincinnati, Chicago & St. Louis for violations of the federal hours of service law, and against the Southern and the Illinois Central, for keeping live stock in cars without rest, food or water for over 28 hours; and against the Mobile & Ohio for accepting cattle from a quarantined district for shipment.

Mayor Carter H. Harrison of Chicago, in accordance with a resolution of the city council, has appointed a commission to investigate the arrangement of the railway freight terminals in Chicago. As members of the commission he appointed: F. A. Delano, C. H. Markham, S. M. Felton, Charles H. Wacker, H. A. Wheeler, Dr. H. B. Favill, W. H. Bush, A. S. Trude, John L. Cochrane and Aldermen Geiger, Harding and Donahoe.

W. D. Williams, of the Texas railway commission, has addressed a letter to the members of the Texas congressional delegation, urging their assistance in securing the enactment of a law relieving from injunctions issued by the federal courts all state officers engaged in the discharge of official duties imposed by state statutes. The letter contains a lengthy argument in support of a similar letter heretofore addressed to members of congress by the Texas commission.

The central safety committee of the Baltimore & Ohio is making a trip over the western lines of the system for the purpose of meeting the division safety committees and addressing meetings of employees on the importance of promoting safety in railway operation. The addresses are being made by C. W. Egan, chief claim agent, and W. L. Robinson, special inspector of the motive power department; and are accompanied by stereopticon pictures, illustrating conditions which often result in accidents.

A bill has been introduced in the New Jersey legislature to provide for an extensive abolition of grade crossings entirely at the expense of the railways, and it has already been passed in the upper house, by a vote of 15 to 2. The bill was prepared by Senator Pierce, who says that under the proposed law 84 crossings will be abolished each year. He declares that the total cost to the railways (length of time not mentioned) will not be over fifty millions, whereas the railway lawyers say it will be five times that sum.

At a hearing before the legislative committee in Boston this week, representatives of the Southern New England—the proposed Grand Trunk extension to Boston—said that if they must file the plans of their proposed line before securing legislative authority the company could not build, as the filing of the plans would at once be followed by an increase in the prices of lands desired which would be unendurable. The committee voted to allow the company until March 30 to file the maps as required by the law.

Senator Gardner, of Maine, has introduced in Congress a bill under which the government can operate the express package business throughout the country, making it a part of the postal service, and thus throwing the express companies out of business. Representative Sabath has introduced in the House a bill to require the Interstate Commerce Commission to make valuations of the property of the express, telegraph, and telephone companies of the country with a view to having these properties acquired by the government.

The accident bulletin of the Interstate Commerce Commission for the months of July, August and September, 1911, shows the number of persons killed in train accidents to have been 201, and of injured 4,283; a decrease in the number killed of 120, as compared with the same months of 1910. Accidents of other kinds bring the total number of casualties, not including industrial accidents, up to 21,865, or 2,758 killed and 19,107 injured. On electric lines, in addition to the foregoing there were 98 persons killed and 1,094 injured.

The Chicago Association of Commerce Committee on Investigation of Smoke Abatement and Electrification of Railway Terminals has received the first of a series of reports which are to be submitted monthly by the various railways of the city, showing the total movement and tonnage of all freight and passenger trains within the Chicago district, including switching movements. The roads will furnish this data for a period of one year. A firm of chemists has been engaged to make an analysis of the atmosphere of Chicago at various points for the purpose of ascertaining the exact effect of smoke from locomotives.

The Chicago harbor and subway commission on February 21 submitted to the local transportation committee of the city council plans for a subway system of four routes, extending from the central loop district to Lawrence avenue on the north side, Sixty-third street on the south side, South Fortieth avenue and West Twelfth street on the southwest side and North Central Park avenue on the northwest side. The plans include approximately 100 miles of track to be constructed by the city at an estimated cost of $103,200,000, in connection with a system of down-town loops for which plans were reported within the last year.

Educational Department of the Central of Georgia.

D. C. Boy, recently from the Union Pacific, has been engaged by the Central of Georgia to establish an educational bureau for the benefit of the company's employees, modeled after the bureaus of the Union Pacific and the Illinois Central, with which the readers of the *Railway Age Gazette* are familiar.

Economy Campaign on the Chicago Great Western.

W. G. Lerch, assistant to the president of the Chicago Great Western, in an address before employees of the transportation department at a general meeting of the Chicago Great Western Station Agents' Association, held at Oelwein, Ia., on January 27, pointed out a variety of ways in which employees may assist the company in promoting economy.

In urging train crews to exercise care in the picking up and setting out of cars and the loading and unloading of freight at stations so as to cause the least amount of breakage and loss, he showed that during the last fiscal year the amount of loss and damage claims on freight amounted to $127,124 for his road, a sum equal to more than the company's yearly taxes in the states of Minnesota and Missouri. A saving of one-third of this, he said, would more than pay the combined taxes for a year in the states of Missouri, Kansas and Nebraska. He estimated that 40 per cent. of this sum was paid out on account of careless handling of cars by train crews, improper loading and stowing of freight and checking in and out. What are termed "avoidable" accidents, resulting in property damage amounting to $50 and over, cost the company in the fiscal year $30,750, not considering delays to trains and consequent overtime for crews. One-half the total cost of these accidents would equal an amount nearly sufficient to operate the Oelwein terminals for one month. Office and station employees were instructed to be economical in the use of stationery and supplies, of gas and electric light and in the sending of commercial telegrams. He placed the aggregate cost of these items for one year at $130,778, or two-thirds of the amount received by the road for carrying United States mails for one year. One-fifth of the amount, if saved, would have been sufficient to pay the premium for one year on the fire insurance carried on the property of the company.

He showed that the effort to practice economy is carried into the general offices. He said that the use of envelopes for sending mail between the various general offices and of printed letterheads for correspondence among the officials has been almost entirely discontinued. Instead of envelopes, a collapsible canvas package, with the names of the different officers stamped on the folds, is used. This permits them being sent back and forth indefinitely. Plain, inexpensive paper is used for letter writing.

To illustrate how a unit of saving may represent a very large sum if applied to the operations of the entire line, Mr. Lerch showed that one of the company's G-3 engines between Oelwein and Stockton burns about 13 tons of coal, or approximately 1,515 shovelsful each trip, and if by careful and expert firing two shovelsful per mile could be saved this would amount to an economy of 456 shovelsful on a round trip and 586.8 tons in a year, representing a money value of $1,343.77.

The Grand Trunk's March on Boston.

I am well aware that the sincerity of our motives has been questioned; but the Grand Trunk has but one object in view, and that is the necessary authority to construct through Massachusetts and New Hampshire a line into Boston, with the other projected extensions already set forth in our bill. We have no ulterior purpose. We are seeking nothing at the hands of any other railway, and nothing will prevent us from building into Boston except the refusal of the authorities to grant us the necessary rights. We have been urged by merchants and manufacturers who have shipped over our lines for years, to push into Boston, and many New England towns and cities want us to come their way. The Grand Trunk has long been a thorn in the side of the trunk line interests, by reason of its persistent refusal to give up its differential rates. This differential means much to New England manufacturers. Tremendous pressure has been brought to bear upon us, but we have stood firm in our determination to maintain this differential and nothing can shake us from it. Repeated efforts have been made by competitive roads to buy the New London Northern, but it is not for sale at any price. There has been a recent advance in Central Vermont and New London Northern securities.

Grand Trunk is not "an alien corporation." We already operate in New England 700 or 800 miles of road, and in the United States fully 2,500 miles, including steamboat lines. We have fourteen corporations organized under the laws of 12 states. We have shown that we mean business in building a modern railway from Palmer to Providence, at a cost of about $65,000 a mile, and we are just as sincere in our determination to come to Boston.—*E. H. Fitzhugh, President, Central Vermont, in Wall Street Journal.*

Advocate Restoration of M. C. B. Defect Cards.

A strong effort is being made by transportation officers throughout the country to bring about a restoration of the practice of applying M. C. B. defect cards at the time of the interchange of cars. At a meeting of the executive committee of the Chief Interchange Inspectors' and Car Foremen's Association in Chicago on February 10, recommendations to the arbitration committee of the Master Car Builders' Association with respect to changes in the Master Car Builders' code of interchange rules were agreed upon, and in addition resolutions were passed heartily endorsing the undertaking of the American Association of Railroad Superintendents, working in conjunction with the Master Car Builders' Association and the Association of Transportation and Car Accounting Officers, to restore the M. C. B. rules.

The resolutions declare that the Master Car Builders' code represents a signed and binding contract entered into by the executive officers, and that the practice of applying M. C. B. defect cards at the time of interchange in accordance with M. C. B. rules is entirely practicable; and pledge the utmost support of the committee to the end that the M. C. B. code shall be restored at all interchange points. It was ordered that a copy of the resolutions be sent to each member of the association, "that their hearty co-operation may be secured in bringing about this much needed reform effective if possible on April 1, 1912, the date the carding practice becomes effective in Chicago and other important interchange centers."

The American Association of Railroad Superintendents through President E. H. DeGroot, Jr., has called a special meeting to be held in St. Louis, on March 1, for the purpose of aiding in the restoration of the carding practice at as many interchange points throughout the United States as possible, effective on April 1, at the time the practice of carding cars in interchange will be instituted within the entire Chicago switching district. It is understood that many railway officers are desirous of having the plan adopted and that there is strong likelihood that uniform action will be taken as of April 1.

Lost from the Payroll.

William Allen White, editor of the Emporia (Kan.) *Gazette*, lately wrote an article on the subject "How to Handle the Trusts." He took the position that the trust is an economic tendency of the times. "It is part of the human development," he said, "This tendency is bigger than the Supreme Court. It is the heart of humanity growing kindlier and more trustworthy every year. The benefits of the trust in saving money to producers and consumers are too obvious to be lightly thrown aside. Putting men in jail, breaking up combinations, and indicting trust magnates will only muddy the water. It is the evils of trusts, not the trusts themselves, that must be broken."

The Ingalls, Kan., *Beacon* reproduced Mr. White's article and commented thereon, as follows: "It should be remembered that Bill Allen White draws a revenue from the Santa Fe for writing such brilliant articles. The editor of the *Beacon* believes he could dope out just as hot stuff if he had his bread basket well filled."

Yesterday the following letter from Mr. White was received by J. R. Koontz, general freight agent of the Santa Fe: "The enclosed from the Ingalls *Beacon* indicates that I am on the Santa Fe payroll. This is gratifying. I should like to have the man who is signing my vouchers return the money he has been spending all these years. Kindly take this up with your auditor and reply at your earliest convenience."

Mr. Koontz replied: "Dear Mr. White: Nothing doing in the

payroll line. I fail to find any official record of you since the anti-pass law went into effect. The *Beacon* man doubtless jumped to the conclusion that any editor who is not ready to throw the 'interests' into the creek must necessarily be in their employ."—*Topeka State Journal.*

Specification for Steel Postal Cars.

The committee of the postoffice department and that of the mechanical officers of the railways having in charge the preparation of a uniform specification for steel postal cars, met in Washington, February 23. After a brief discussion the specification as previously prepared and printed in circular No. 26 of the Special Committee on Relations of Railway Operation to Legislation dated Chicago, November 16, 1911 (published in the *Railway Age Gazette*, November 24, 1911, page 1049), was agreed to with slight modification by both committees. The first 28 paragraphs, which relate to the construction of the car, remain as before with the exception of the sum of the section moduli of all vertical end members, which is changed from "not less than 35" to "not less than 65." This was the only important modification of the specification as printed. The other minor changes which were agreed to are of such small importance that no formal action or approval by the railways individually was thought necessary. The specification for the construction of postal cars is now in condition for the approval of the Postmaster-General, and the postoffice department has already prepared plans for the interior arrangement of postal cars of different lengths which will be issued to the railways at an early date.

Cost of Carrying Second-Class Mail.

The commission appointed last year by the President to investigate the cost of transmitting newspapers and magazines through the mails, consisting of Justice Hughes, of the Supreme Court; President Lowell, of Harvard University, and H. A. Wheeler, of Chicago, has made its report to the President and he has sent it to Congress, endorsing the recommendations of the commission.

The commission recommends that the rate for newspapers be increased from one cent a pound to two cents a pound. It finds that the cost of handling and transporting second-class mail, in the items of transportation, postoffice cars, railway distribution, rural delivery, and certain miscellaneous charges, was approximately 6 cents a pound for paid-at-the-pound-rate matter (nothing said about distance), and for free-in-county and transient matter each approximately 5 cents a pound; and that upon this basis, as modified by subsequent reductions in the cost of railway transportation, the cost of paid-at-the-pound-rate matter, for the services mentioned, is now approximately 5½ cents a pound, while the cost of free-in-county and transient matter remains as formerly, namely, each approximately 5 cents a pound.

The other recommendations of the commission as to the postage rates on second-class mail are as follows:

1. The rate of 2 cents a pound on copies mailed by publishers to subscribers, to news agents, and as sample copies, and by news agents to their subscribers or to other news agents.

2. The rate of 1 cent for each 4 ounces for copies mailed by other than publishers and news agents; that is, the present transient rate.

3. The present free-in-county privilege retained, but not extended.

The commission also recommended that the cent-a-copy rate for newspapers other than weeklies and for periodicals not exceeding 2 ounces in weight, and the 2-cents-a-copy rate for periodicals exceeding 2 ounces in weight, when mailed at a city letter-carrier office for local delivery, be abolished.

The evidence submitted did not justify a finding of the total cost of transporting and handling the different classes of second class mail matter nor of the cost for different sorts of newspapers and periodicals.

The report says that by the extension throughout the country of the method recently introduced of transporting certain periodicals by freight instead of the usual mail trains, the cost of paid-at-the-pound-rate matter may be further reduced.

To obtain the total cost of transporting and handling the subclasses of second class mail, it would be necessary to add to the ascertained cost as now found, the shares of these subclasses, respectively, in the general postoffice expenses and miscellaneous outlays not directly assignable, for the proper apportionment of which the commission is without adequate data. The plan proposed of charging a special rate for the portions of magazines devoted to advertisements is open to grave practical objections. The amount of space given to advertising is no criterion of the educational value of a magazine; and, if the same provision were applied to newspapers, the attempt to measure the space occupied by advertisements would involve more labor than is consistent with the rapid despatch of the daily press.

The commission is further of the opinion that it would be a mistake to discriminate between newspapers and magazines or other periodicals. So far as educational value is concerned no satisfactory distinction can be made.

It is recommended that the postoffice department keep records showing the cost of service.

New Subways in New York.

The Interborough Rapid Transit Company has filed with the New York Public Service Commission what is understood to be its final offer in connection with proposed new subways; and it is generally believed that the offer will be accepted, terminating negotiations that have dragged tediously through many months.

The plan calls for the construction of a four-borough subway and elevated system costing $112,000,000, half of this cost to be borne by the city and half by the Interborough. The Interborough will expend additional $21,000,000 for equipment.

The Interborough is to be allowed 8.76 per cent. preferential payment on this $77,000,000 new money to be contributed, and on $48,000,000 represented in the present subway system. A similar percentage is allowed the city for interest and sinking fund. After these deductions, the city and the Interborough will share equally all profits. The new leases are to run for forty-nine years, and the present subway lease will be leveled for the same period. The earnings of all Interborough elevated and subway lines are to be pooled. From these earnings there will be deducted first the operating expenses, taxes, etc., and rent upon the existing subway to the city until the system is completed.

Ex-Dictator of Chinese Railways.

Franz Woas, of Wiesbaden, Germany, an engineer who has had much experience in China and still keeps himself informed about what is going on there in the railway line, writes as follows, concerning Sheng, the Ex-Minister of Railways in China, now in disgrace, to the Journal of the German Railway Union:

Sheng Hsuanhi, a man now of about 70, went through the traditional training as mandarin, and after examinations became an official in various departments until in the '80s he was transferred to the traffic and railway service, which previously had been an insignificant attachment to the other ministries in Peking. There he became the vice railway minister, though no proper railway ministry existed. He never was out of China, knows no language except Chinese, and all his intercourse with foreigners was conducted through interpreters. But he was by nature uncommonly alert, and he became in time well informed concerning the transportation and railway questions which, new in China, suddenly became very numerous and important, and came before this man for settlement.

Herewith came the peculiar circumstance, which is genuinely Chinese (or at least has been heretofore), that to him each of these questions was a money question. As new railway enterprises in China territory were continually being projected, he flourished on them and became immensely rich. Without a fixed sum, cash in advance, and promise of future payments, he would not lift his finger. The railway made in Txe Chuan charged him with this to his face, and he could say nothing against it, except, perhaps, that it was the universal custom in China. Thus about 1900 he had become the almighty dictator in all railway matters. He did not live in Peking, but, with notable premonition of the future course of things, took up his residence in Shanghai, and here in the independent domain of the foreign settlements, secured a princely abode, with a special museum of antique Chinese works of art.

Though he drew large profit from private railway concessions, he realized perfectly the great advantages which the Chinese government could obtain from state railways, and as the authori-

ties at Peking began to understand how their power could be secured by such a system, he came forward with a memorial in which he advocated a state system in the most decided way, which, after some hesitation, was adopted by imperial decree, providing for the immediate purchase of the existing private railways.

Meanwhile Sheng had become regular minister of transportation, and his name was transformed to Sheng Kungpao, which has sometimes led foreigners to suppose that there were two Shengs. The Chinese people, or at least the notables, had become familiar with the idea that the great through lines should be in the hands of the central government, but inclined in favor of provincial control for the other lines. Then came another imperial decree assigning the execution of the Canton-Hankow line to associated banks of Germany, France, England and America. This reversed public opinion. The suspicious past of the man who was responsible for these decrees was recalled. They remembered how this man had dealt with railway matters all his life, and always for his own personal advantage. They took it for granted that the whole state railway plan was contrived solely to help this man and other high officials to fill their pockets; and though the people had hitherto endured such things in silence, that time was past. The risings, started by certain secret societies, were prompted by this feeling about the railways.

The scape goat is an aboriginal Chinese institution. Here Sheng Kungpao was the scape goat. The prince regent in the name of the boy emperor decreed that the minister had shamefully betrayed the imperial confidence. He was deprived of all his offices and forbidden to even hold another. Two other high mandarins had signed the decree with Sheng. Nothing was done to them.

Progress on the Grand Central Terminal, New York.

The Grand Central terminal plans, up to June 30 last, had involved an expenditure of $18,500,000. The total cost of excavation to date is $7,067,000. Of the total of 3,094,000 cubic yards 2,147,000 have been excavated and 947,000 or 30 per cent. remains to be finished. Without including cost of the two present power houses electrification costs are as follows (cost of third rail, overhead construction, tracks, ducts and feeders): Within the Grand Central terminal, $200,000; Fifty-sixth street to Woodlawn, $1,600,000; thence to North White Plains, $225,000; Hudson River division, $500,000.

The excavation will be finished probably in 1914. We shall be fortunate if the station proper is finished at the end of the present year. All of the contracts for construction were made stipulating the date of completion as May 1, 1912, but the contractors are far behind in their deliveries of materials.

No arrangements have as yet been concluded for connection between the Grand Central terminal's lower level and the subway in the adjacent street, in spite of four years of negotiation. The railways' physical end is being constructed and bricked up. The lower level is approximately 30 feet below the present subway and the upper level is about on the same grade as the subway. The excavation has been finished up to the wall of the subway for about 30 feet in Forty-second street near Vanderbilt avenue.

The loop for suburban service (lower level) can be put in operation in about one year. A loop is also planned for trains on the upper level. Besides the loops there are to be thirty stub ends on the upper level, and twenty on the lower level. As soon as the problem of avoiding crossing at grade where the Harlem and Hudson divisions diverge (Mott Haven) the New York Central plans the construction of a new station at 149th street, where connection can be made with the subway.—*G. W. Kittredge, Chief Engineer, before Public Service Commission.*

Hoosac Tunnel Disaster.

The clearing of the Hoosac Tunnel, following the collision and fire of February 20, had been carried out sufficiently by Saturday, February 24, so that the westbound track was passable at 9:30 p. m. on that day; and the eastbound track on February 28. Both freight and passenger trains were run through on Sunday, but at this writing passenger traffic is not fully restored.

In this collision, briefly reported in our last issue, page 350, an eastbound train ran into the rear of a preceding freight, and the four men in the front end of the electric locomotive of the passenger train were killed. The freight had been stopped with its rear end about 1,400 feet west of the east end of the tunnel. The wreck took fire from the stove in the caboose of the freight, and there followed a fierce fire which thwarted all attempts to subdue it for 48 hours. The combustible portions of the caboose and 17 freight cars were entirely consumed and much of the iron and steel work was melted. The steel housing of the electric motor was crushed in at the front end by the collision with the caboose, and all of the lighter superstructure and minor electrical parts in this end of the engine were destroyed by the fire. The forward pair of motors was badly damaged, but the rear motors were unharmed. The engine was probably damaged from 50 per cent. to 60 per cent. of its value.

The gneiss rock which forms the roof and sides of the tunnel was heated to such an extent that hundreds of tons of it broke and fell to the roadbed.

As before stated, the collision occurred about four and one-half miles from the westerly end of the tunnel; that is to say, the passenger train had to be backed that distance after the collision to get out of the tunnel. The engineman of the steam engine failed in his first attempt to move the train with the electric motor attached. He uncoupled his engine from the motor, then set his train back about 200 yards, and then uncoupled from it and tried to pull back the electric engine. This he was unable to do and after about half an hour he backed up as far as the central shaft, 2 miles. From this point, the train despatcher was was spoken to by telephone and, after assurance was received that the track was clear, the train was backed down to North Adams, two miles from the westerly end of the tunnel, reaching there at 6 p. m.

W. S. Murray, electrical engineer of the New Haven road, and the man who had charge of the equipment of the tunnel for electric traction, made an inspection of the wreck on the 22nd, and reached the conclusion that the men in the cab of the electric motor had not been killed by electricity. It is quite probable that a short circuit occured at the time of the collision, which would have the effect of promptly opening the circuit breakers, thus cutting off current. It is quite impossible that the men riding on the engine could have been killed by a short circuit, as the protection afforded by the metal cab of the motor is complete, and any falling wires would have opened the circuit breakers without injury to those within.

The first man to go through the tunnel after the wreck was J. T. Tyter, assistant superintendent of the Fitchburg division, who, followed by other officers and employees, went through on foot on the morning of the 22nd, climbing over hot rocks lying from four to seven feet deep on the westbound track. Beneath these piles of rocks in many places fire was still burning and the explorers were obliged to protect their faces with wet cloths. All the time additional pieces of rock were falling from the roof, so that the men got through only by taking their lives in their hands. The mass of hot rocks lying on the track extended for a length of 900 feet and this mass, as well as the sides of the tunnel, was still very hot.

Relieving Anxious Passengers.

The following order has been issued by the Long Island Railroad to station agents and employees in train service. Comments will be found in our editorial columns.

"In event of any delay to trains or interruption of traffic which may be important enough to affect the comfort and convenience of passengers, conductors will make every possible effort to find out the cause of the delay and its probable extent and will furthermore see that a suitable announcement is made to passengers and others interested. Conductors and trainmen are instructed to freely and courteously answer all questions addressed to them upon this subject and give any and all information which may be necessary for passengers to make suitable arrangements. It may not always be possible for conductors and trainmen to find out exactly the cause of the trouble or the extent of the delay. In such instances they will only be expected to do the best they can. The chief train despatcher at Long Island City will endeavor to get in touch with the situation and will aid the efforts of conductors by giving them proper information, which in turn should be given to passengers. Station agents will endeavor to find out why trains are late and see that passengers waiting at the stations are properly advised. The despatcher's office will

also try to get in touch with the agents and assist them in ascertaining the cause and extent of trouble.

"This company feels that its patrons should be informed of any interruption of traffic or extraordinary delays to trains upon which they may be traveling or about to travel. In many instances information of this character is of great value to our patrons and frequently will enable them to change their arrangements and lessen the inconvenience to which they would otherwise be subjected. Nothing will produce so good an effect and contribute as much to the popularity of the Long Island Railroad as the announcement of information of this character."

Earnings Reckoned by the Day.

The French railway companies have a habit of stating their earnings per kilometer *per day*, which gives figures easily remembered and compared. In 1911, for instance, the old state system earned daily 60 francs per kilometer ($18,60 per mile); the new state system 105 francs ($33.60 per mile); the Northern Railway, which has the heaviest traffic, 218 francs ($67.60 per mile). All but one had slightly greater earnings than in 1910.

Master Car and Locomotive Painters' Association.

The advisory and executive committee of the Master Car and Locomotive Painters' Association held its annual meeting in New York, February 22, and decided on the following subjects for consideration at the next convention, which is to be held at the Albany hotel, Denver, Col., September 10-13:

What Is the Most Appropriate Finish for the Interior of Vestibule Ends? Specification for Standard Paint Materials for Railway Equipment. Treatment and Care of Steel Passenger Car Roofs. Modern Method of Exterior Passenger Car Painting, Including Primers and Surfacers. Relative Difference in Cost of Maintenance Between Steel and Wooden Passenger Cars. The following subjects for essays were chosen: Qualifications of The Present Day Foreman Painter, and Finish and Treatment of Passenger Car Concrete Floors. The following queries were also decided upon: What Is The Most Economical Process for Removing Old Paint from Locomotive Jackets? Would You Advise The Use of Interior Car Renovators and Why? What Are The Essentials of a Protective Paint Making Material? When Naturally Finished Ash, Oak or Mahogany Have Become Stained or Discolored by Exposure to Water or The Weather Can The Stains Be Permanently Bleached or Removed Without Scraping the Wood and How Should It Be Done to Obtain The Best Results. Would You Advise Painting a Wooden Roof of a Freight Car, Considering Its Treatment After Going Into Service?

American Society for Testing Materials.

At the convention of the American Society for Testing Materials, to be held in New York, March 28-29, reports will be received from the following committees among others:

Committee on the Magnetic Testing of Iron and Steel, by Charles W. Burrows, chairman. Committee on the Tempering and Testing of Steel Springs and Standard Specifications for Spring Steel, by Henry Souther, chairman. Committee on Hardness Tests, by Bradley Stoughton, chairman. Committee on Standard Specifications for Coal, by J. A. Holmes, chairman. Committee on Standard Specifications for Steel, by William R. Webster, chairman. Committee on Standard Specifications for Wrought Iron, by S. V. Hunnings, chairman. Committee on Standard Specifications for Cast Iron and Finished Castings, by Walter Wood, chairman. Committee on Standard Specifications for Cement, by George F. Swain, chairman. Committee on Standard Tests for Lubricants, by A. H. Gill, chairman. Committee on Standard Methods of Testing, by Gaetano Lanza, chairman.

American Railway Tool Foremen's Association.

The annual convention of the American Railway Tool Foremen's Association will be held at Chicago, beginning July 9. Following is a list of the committees and of the topics which will be discussed:

Standardization of Steel for Small Tools. Henry Otto (A. T. & S. F.), chairman; W. J. Eddy (Erie), A. M. Roberts (B. & L. E.), C. A. Cook (C. & I. L), J. Martin (C. C. C. & St. L.), and A. Sterner (C. R. I. & P.).

Milling Cutters, Their Formation, Tempering, Etc. A. R. Davis (Ga. Cent.), chairman; Gust Gstoettner (C. M. & St. P.), W. A. Fairbairn (N. Y. C. & H. R.), J. A. Shaw (Cent. of N. J.), F. W. Lugger (C. C. C. & St. L.), and A. W. Meitz (P. M.).

Care of Shop Tools. J. W. Pike (C. R. I. & P.), chairman; H. I. Derby (A. T. & S. F.), O. H. Dallman (Pennsylvania), Thos. Grant (D. & H.), E. R. Purchase (B. & A.), and G. L. Linck (H. & T. C.).

Checking Systems. J. T. Fuhrman (G. N.), chairman; J. B. Hasty (A. T. & S. F.), Wm. Greilich (C. H. & D.), H. E. Blackburn (Erie), Gilbert Mitchell (Erie) and F. Peterson (C. & S.).

Treating Steel in Electric Furnaces. G. W. Jack (I. C.), chairman; B. Hendrikson (C. & N. W.), J. C. Breckenfeld (St. L. & S. F.), and C. A. Shaffer (I. C.).

National Civic Federation.

The twelfth annual meeting of the National Civic Federation will be held at Washington, March 5, 6 and 7, the opening meeting being held at the Pan-American building, and those of the two other days at the Willard hotel. There will be a dinner on the evening of March 6, at which President Taft and Speaker Clark will be present. On the first day there will be an address by Judge Martin A. Knapp, on The Relation of The Public Utility Company to Its Employees, and it is expected that officers of railways and of railway brotherhoods will also speak. On the second day Workmen's Compensation and The Prevention of Industrial Accidents will be discussed, and Senator Sutherland will speak on Compensation for Injured Railway Employees.

American Electric Railway Association.

The annual convention of the American Electric Railway Association will be held in Chicago, October 7-11. The Dexter pavilion has been secured for the exhibit of the Manufacturers' Association.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.; annual, May 7-10, Richmond, Va.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Boston, Mass.; annual, May 10-11, San Francisco, Cal.

AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York; next convention, Seattle, Wash.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Detroit, Mich.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September; annual, March 17, Chicago.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York. Convention, October 7-11, Chicago.

AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOC.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next session, May 15, New York.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOC.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—M. H. Bray, N. Y. N. H. & H., New Haven, Conn. Convention, July 9, Chicago.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Annual, March 28-29, New York.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conrad, 75 Church St., New York. Convention, Oct. 7-11, Chicago.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago. Convention, May 22-25, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

Master Car and Locomotive Painters' Assoc. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass. Convention, September 10-13, Denver, Col.

National Railway Appliances Assoc.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railroad Club.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Business Association.—Frank W. Noxon, 2 Rector St., New York.

Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

Railway Gardening Association.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.

Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa. Next meeting, March 18, Chicago.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio. Convention, May 20-22, Buffalo, N. Y.

Railway Supply Manufacturers' Assoc.—J. D. Conway, 2135 Oliver Bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

Railway Tel. & Tel. Appliance Assoc.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. Y., Sterling; September, 1912, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; August, 1912.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The Wells-Fargo Express Company, which runs two solid express trains daily from New York to Chicago, and one from Chicago to Kansas City, is preparing to run a similar train from Kansas City to the Pacific coast over the Atchison, Topeka & Santa Fe.

The annual "family meeting" of freight and passenger agents of the Erie was held at the Great Northern hotel, Chicago, on February 24, with about 80 in attendance. Addresses were made by J. C. Stuart, vice-president and general manager; F. A. Clark, general auditor; E. T. Campbell, traffic manager, and Luis Jackson, industrial commissioner.

Shippers of Spokane, Wash., have filed with the Interstate Commerce Commission claims against the western railways for reparation amounting to approximately $2,000,000 on shipments moving during the years 1910 and 1911. Reparation is asked of the difference between the rates charged and those held to be reasonable in the latest decisions of the Interstate Commerce Commission in the transcontinental rate cases.

The Baltimore Chamber of Commerce and the Baltimore Clearing House, acting jointly, are establishing in that city a clearance bureau for bills of lading, to be under the direction of Mr. Sheridan, traffic manager of the Chamber of Commerce. This bureau, designed to accommodate shippers of all classes, is modeled after that established some months since in New York City for keeping records of bills of lading issued for export cotton.

The car service agent of the Grand Trunk Pacific says that there is no car shortage on this company's western lines. He says that the trouble is with the farmers, who are unable to thresh, and that the Grand Trunk Pacific can handle grain as fast as it is delivered to them. To bear out his statement he quotes despatches from various shipping points in Alberta and Saskatchewan, all of which say that the agents are handling all the grain that is delivered to them and that there is no shortage of cars.

A temporary organization, to be known as the Classification Committee, was effected at a meeting of representatives of state railway commissions and shippers' associations at St. Louis on February 20, for the purpose of prosecuting before the Interstate Commerce Commission the fight against the adoption of Western Classification No. 51 which has been suspended by the commission. Clifford Thorne, of the Iowa commission, who was elected chairman of the committee, in explanation of the purpose of the organization, took the position that while there is a well founded and just demand for uniformity in the descriptions of articles, it is practicable to secure a national uniform classification so far as descriptions of articles are concerned without lowering or raising freight rates.

Traffic Club of Chicago.

Nearly 600 members and guests attended the fifth annual dinner of the Traffic Club of Chicago, held on January 20, at the LaSalle Hotel, which was considered the most successful in the history of the club. John Barton Payne acted as toastmaster, and the speakers were Chief Justice Orrin N. Carter of the supreme court of Illinois, Dr. William McElveen of the Evanston Congregational Church, and James A. Green, president of the Matthew Addy Company of Cincinnati. President Taft, who is an honorary member of the Traffic Club will be its guest on March 9.

The annual meeting of the Traffic Club of Chicago for the election of officers for the ensuing year will be held on March 26. The nominating committee has nominated the following as members of the regular ticket: President, Frank B. Montgomery, traffic manager International Harvester Company; first vice-president, Edward S. Keeley, vice-president Chicago, Milwaukee & St. Paul; second vice-president, J. W. Hicks, traffic manager Sears, Roebuck & Company; third vice-president, Fred H. Tristram, assistant general passenger agent Wabash; secretary, Guy S. McCabe, general western freight agent Pennsylvania Company; treasurer, Charles B. Hopper, general freight

agent Goodrich Transportation Company. An active campaign is being conducted within the club to bring about the re-election of John H. Grace, assistant general freight agent of the Great Northern, to the office of treasurer of the club, which he has held ever since its organization.

Hearing on Express Business.

The Interstate Commerce Commission with Commissioner Lane presiding continued at Washington this week its hearings in the investigation into the business and practices of the express companies. Mr. Lane told the lawyers and the representatives of the companies that "the demand for transportation charges on prepaid shipments must cease. The complaint of this practice of express companies is universal, and a remedy for it must be found." Walker D. Hines, acting as special counsel for several of the express companies, presented a large mass of statistical matter relating to the business and profits of the American Express Company. He said, in part: "The total of all dividends disbursed to shareholders in a period of over forty-two years is less than $43,500,000. The gross receipts from the company's transportation business have grown from a little over $5,000,000 per year to about $40,000,000 per year. In other words, the business has increased more than seven-fold, but at the same time the company's annual profits from its transportation business are less than four times what they were at the beginning of the period. The ratio of operating expenses to revenue until and including 1888 averaged 78.46 per cent.; since 1888 the ratio has averaged 89.08 per cent.

"Until and including 1888 out of every dollar taken in for transportation service the company retained a profit averaging 12.86 cents; but since 1888 this profit, per dollar taken in, has dwindled to an average of 6.17 cents, and in 1911 this profit, per dollar taken in, was 5.80 cents."

Commissioner Lane desired to know why the express companies changed their forms of contracts with the railways from the tonnage contract, under which the railways were paid for the tons hauled for the express companies, to the present form of contract, whereby the railways are made partners by dividing the receipts. Mr. Bradley, of the American Express Company, said that in the old days the express companies carried practically nothing but merchandise and produce, and it was much easier to make the tonnage contract, but today, when the express companies carry nearly any and all things, a tonnage contract would not be elastic enough to meet the requirements. In the old days the express companies did not try very hard to get the 100-pound business, because with the larger shipment the rates were less, and this approached too near the rate the company had to pay the railway, and consequently the diminution of their margin of return. Under the percentage contract this does not enter as a consideration.

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association, in presenting statistical bulletin No. 113, giving a summary of car shortages and surpluses by groups from October 12, 1910, to February 14, 1912, says:

"The total surplus reported for this period is 50,886 cars, a decrease of 4,706 cars. The box car surplus shows a decrease of 1,355 cars and the coal car surplus decreased 2,578 cars. Flat and miscellaneous cars remained about stationary.

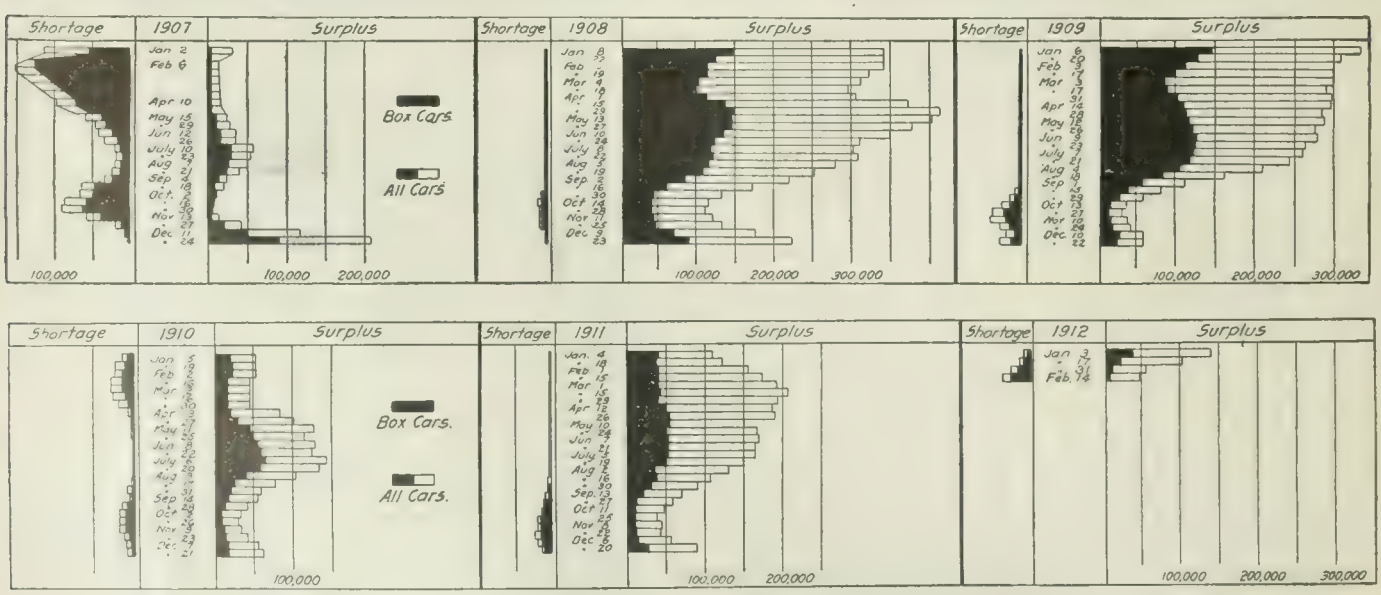
"The increased demand for box cars is shown by an increase of 9,052 cars in the box car shortage. The same can be said about coal cars, which show an increased shortage of 3,066 cars. Flat and miscellaneous car shortages increased 269 and 1,530 cars respectively, making a total increase of 13,917 cars in the car shortage, which brings the total shortage up to 36,928 cars."

The accompanying table gives car surplus and shortages figures

Car Surpluses and Shortages.

Date.	No. of roads.	Surpluses: Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Shortages: Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1.—February 14, 1912	7	48	1,717	562	113	2,440	1,151	0	260	20	1,431
" 2.— " 14, 1912	26	771	140	1,256	876	3,043	514	1	1,534	325	2,374
" 3.— " 14, 1912	25	273	1,031	1,904	1,873	5,081	4,502	25	3,144	591	8,262
" 4.— " 14, 1912	11	11	78	458	720	1,267	957	226	2,895	500	4,578
" 5.— " 14, 1912	19	209	115	0	497	821	2,901	21	424	340	3,686
" 6.— " 14, 1912	24	1,289	478	2,124	3,204	7,095	5,373	329	306	139	6,147
" 7.— " 14, 1912	3	0	99	396	329	824	514	0	0	0	514
" 8.— " 14, 1912	17	945	289	1,554	1,872	4,660	1,142	65	26	20	1,253
" 9.— " 14, 1912	11	3,521	135	541	925	5,122	300	32	15	12	359
" 10.— " 14, 1912	20	4,051	3,383	2,669	9,288	19,391	160	0	0	18	178
" 11.— " 14, 1912	5	308	331	0	503	1,142	6,580	108	0	1,458	8,146
Total	168	11,426	7,796	11,464	20,200	50,886	24,094	807	8,604	3,423	36,928

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland, and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages in 1907 to 1911.

by groups for the last period covered in the report, and the diagrams show total bi-weekly surpluses and shortages in 1907 to 1911.

INTERSTATE COMMERCE COMMISSION.

The Calmbach-Ford Company, Shreveport, La., has complained to the commission against the present rates on corn and corn prolucts from Kansas City to Shreveport, and asks that a differential be granted to Shreveport.

The commission has begun its hearings on the complaint of the Postal Telegraph Company against the practice of the Western Union in charging for certain extra words on messages accepted by the Postal for points on the Western Union which are not reached by the Postal. The New York Public Service Commission, Second district, held a hearing on this practice in New York state and issued an order in regard to it, as noted in the *Railway Age Gazette* of November 17, 1911, page 1025.

A complaint has been filed with the Interstate Commerce Commission by ten sand and gravel companies of Chicago through Walter E. McCornack, attorney, attacking as unreasonable a proposed advance in the rates on sand and gravel from the gravel pits of the complainants to Chicago from 1½ to 2 cents per 100 lbs., effective March 15. The complaint alleges that the advance in rates would amount to about $240,000 annually and also attacks the existing rates as unreasonable in so far as they exceed one cent per 100 lbs.

The Board of Trade of Wichita, Kan., has filed two complaints with the Interstate Commerce Commission against the Atchison, Topeka & Santa Fe and other western lines. The first attacks alleged unreasonable rates on grain and grain products from Kansas producing territory to Texas points as being discriminatory against grain dealers and producers in the state of Kansas. The second charges that the rules of the carriers governing transit privileges on grain and grain products at Wichita contain restrictions and conditions which are unreasonable and discriminate against grain dealers at Wichita in favor of dealers at Kansas City, St. Louis and Omaha, who are granted proportional rates and reshipping rates.

Reparation Awarded.

Lord & Bushnell Co. v. Mississippi Central et al. Opinion by the commission:

Without specific routing instructions, a railway should always route a shipment by the cheapest available route. (22 I. C. C., 463.)

J. K. Gill Co. et al. v. Oregon Railroad & Navigation et al. Opinion by the commission:

The complaint is as to the charge of $3 per 100 lbs. on manila paper filing folders and as to the charge on certain shipments of adding machine paper. While the commission does not uphold the complainant in its claim that manila paper filing folders are the same as manila tag board, which is given the rate of $1.10 per 100 lbs., it holds that the difference between $1.10 and $3 is unreasonable and that the rate should have been $1.75 per 100 lbs. It is on this basis that reparation is awarded on both the manila paper shipments and the adding machine paper shipments. (22 I. C. C., 442.)

Advances in Class Rates Refused.

In re Suspension of Advances in Class Rates. Opinion by Commissioner McChord:

Proposed increased class rates from St. Paul, Minn., and Duluth to Buffalo, Pittsburgh, and other points in central freight association territory, not shown to be reasonable. 21 I. C. C., 338.)

Refusal to Participate in a Tariff.

Edison Portland Cement Company v. Delaware, Lackawanna & Western et al. Opinion by the commission.

Again the commission holds that the railway publishing a tariff showing they can make delivery on the track of a road from which it had not previously obtained concurrence, and which road refuses to participate in the tariff, is liable for damages that may occur. (22 I. C. C., 382.)

Rates on Dressed Meat to New Orleans and Lake Charles.

Houston Packing Company v. Texas & New Orleans et al. Opinion by the commission.

The complaint is that rates on packing house products and fresh meats in carloads from Houston, Tex., to New Orleans, La., and Lake Charles, are too high as compared with the rates from Fort Worth, where Armour and Swift have packing house plants. The commission reduces the rate on packing house products to Lake Charles from 32 cents to 20 cents, and from 35 cents on fresh meats to 25 cents, but finds that the present rate of 36 cents on packing house products and 40 cents on fresh meat from Houston to New Orleans is reasonable. No reparation, however, is awarded. (22 I. C. C., 456.)

Rates on Steel from Mississippi River to Denver Reduced.

Vulcan Iron Works Co. v. Atchison, Topeka & Santa Fe et al. Opinion by the commission:

The rate on iron and steel bars and plates is 63 cents from Mississippi river crossings to Denver, while the rate on steel bars, etc., from Mississippi river points to Salt Lake City is only 82 per cent. of this 63-cent rate. The commission reduces the rate to Denver to 52 cents on iron and steel bars, and 43 cents on steel plates, sheets, etc. (22 I. C. C., 477.)

Lower Rates on Grain and Hay Ordered.

Chattanooga Feed Co. v. Alabama Great Southern. Opinion by the commission:

Rates on grain and hay from Chattanooga, Tenn., to points in Alabama are found to be unreasonably high, preventing Chattanooga dealers from competing in this territory. (22 I. C. C., 480.)

No Retroactive Transit Privileges.

Wood-Mosaic Flooring & Lumber Co. v. Louisville & Nashville. Opinion by the commission:

Although the defendant had made an agreement to refund a certain amount on proof of reshipment of manufactured products over its lines, the reshipment took place more than two years after the inbound shipments, and the commission, therefore, refuses to authorize an application of transit privilege because the intervening period was unreasonably long. (22 I. C. C., 458.)

Higher Rates on Iron and Steel Refused.

In re suspension of advances in rates on iron and steel articles. Opinion by Commissioner Lane:

The defendants presented one witness who frankly said that he did not presume to defend the case entirely. No briefs were filed, and the commission finds that the railways have not sustained the burden of proof placed on them. (22 I. C. C., 486.)

Burden of Proof in Coal Rate Advance Sustained.

Elmore-Benjamine Coal Co. v. Cleveland, Cincinnati, Chicago & St. Louis et al. Opinion by Commissioner Meyer:

Both the Illinois railway commission and the Interstate Commerce Commission permitted certain rates on coal to be increased by seven cents a ton. This was in 1910. In 1911 the road, in checking tariffs found that the rate from Williamson and Franklin counties was three cents a ton higher than from Salina county, and equalized its rates by advancing the Salina county rate by three cents. These advances were suspended by the commission. The complainant tried to prove that both the advanced rate which the commission had permitted and the advanced rate which the commission had suspended were unreasonable, but the commission finds that these advances were not unreasonable, and that in the second case the burden of proof which is placed on the railway company has been sustained; therefore, the suspension of advanced rates is dismissed. (22 I. C C., 341.)

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF DECEMBER, 1911.

Name of road	Mileage operated at end of period	Operating revenues: Freight.	Passenger.	Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Ann Arbor	291	$81,[illegible]	$48,036	$183,609	$15,492	$20,878	$4,978	$68,[illegible]15	$9,995	$119,[illegible]9	$64,114	—$3,644	$13,986	$46,[illegible]84	$8,[illegible]61
Atlanta & West Point	92	6,491	43,657	110,875	10,716	20,705	4,486	33,971	7,[illegible]09	75,087	35,788	—817	5,189	29,782	7,841
Atlantic & St. Lawrence	66	14,104	24,146	149,383	19,976	29,634	5,033	76,046	4,916	138,605	13,778	.	6,659	7,119	1,750
Belt Ry. Co. of Chicago	21	.	.	226,453	11,945	22,760	625	86,674	6,352	128,356	98,097	.	1,500	96,597	8,761
Butte, Anaconda & Pacific	46	88,[illegible]38	3,996	95,516	7,003	14,414	638	43,206	3,997	69,258	26,258	.	914	25,344	16,640
Central of Georgia	1,915	784,756	369,657	1,275,863	153,408	211,855	33,424	423,053	37,198	857,938	417,925	8,045	63,784	359,686	63,027
Central Vermont	411	119,437	76,390	322,608	26,534	53,131	7,349	166,881	13,031	266,916	55,692	1,178	13,500	43,613	—9,653
Chicago & Erie	269	332,223	62,956	441,877	45,819	79,600	19,918	230,131	12,193	387,661	54,216	. .	16,450	37,766	30,770
Chicago, Indianapolis & Louisville	616	999,908	138,116	488,955	68,116	76,302	18,197	206,796	15,548	384,959	103,996	. . . .	23,414	80,582	11,749
Detroit & Mackinac	358	65,890	27,103	96,007	15,639	18,973	2,019	32,189	2,998	71,818	24,189	106	10,782	13,301	1,173
Detroit, Grand Haven & Milwaukee	190	124,660	50,860	203,601	26,179	25,446	6,923	117,244	5,107	180,899	22,702	87	4,880	19,735	2,855
Duluth, Missabe & Northern	341	63,242	36,323	105,345	126,851	44,110	1,583	73,880	5,079	71,503	166,158	667	59,491	106,316	—106,450
Erie	1,995	2,854,311	739,387	3,903,416	391,008	641,850	85,660	1,431,739	89,392	2,636,649	1,266,767	57,885	163,006	1,045,856	—122,736
Florida East Coast	583	181,267	127,230	348,668	48,085	40,977	13,138	113,775	9,760	225,735	122,933	. . .	15,500	107,433	—15,899
Galveston, Harrisburg & San Antonio	1,338	593,071	250,828	891,025	105,637	177,185	41,264	370,713	31,135	725,934	165,091	6,437	108,886	49,768	—240,886
Grand Trunk Western	347	369,945	186,177	588,909	—18,913	67,294	20,006	244,102	15,465	327,954	260,955	1,372	31,636	227,947	18,653
International & Great Northern	1,159	734,917	225,176	1,020,492	87,707	107,234	23,854	373,162	33,279	624,236	396,256	—688	33,000	36,568	. . . . .
Kansas City, Mexico & Orient	809	113,984	31,378	153,866	41,912	32,153	5,505	74,219	9,162	162,951	9,085	. . . . .	2,698	—11,783	—32,374
Midland Valley	373	84,281	44,658	136,552	25,210	18,532	2,727	41,797	6,693	94,959	41,593	127	5,485	36,235	6,065
Minneapolis, St. Paul & S. Ste. Marie	3,769	1,476,474	444,809	2,042,385	176,290	260,186	49,411	716,375	40,357	1,242,619	799,766	—840	115,690	683,236	352,643
New Orleans, Mobile & Chicago	404	135,193	34,539	178,571	23,599	18,042	2,721	53,804	8,619	106,785	71,786	83	4,869	66,834	—7,084
New Orleans, Texas & Pacific	277	98,788	19,518	126,848	20,763	12,381	4,400	63,563	9,160	110,267	16,581	. . . . .	1,2733	19,314	—9,939
Northwestern Pacific	416	98,981	126,942	246,026	44,988	42,029	2,822	103,240	9,840	202,919	43,107	. . . . .	11,077	32,030	28,137
Pittsburg, Shawmut & Northern	240	105,539	9,228	116,835	10,830	23,473	1,197	34,586	4,657	74,743	42,092	. . . . .	1,557	40,535	21,920
St. Louis & San Francisco	4,731	2,[illegible]15,548	1,003,702	3,455,061	436,377	383,238	100,233	1,253,597	108,308	2,281,753	1,173,308	. . . . .	157,338	1,015,970	76,441
San Antonio & Aransas Pass	727	284,531	101,220	377,541	49,253	44,801	6,140	151,886	9,942	262,022	115,519	. . . . .	11,000	104,519	29,138
Seaboard Air Line	3,053	1,[illegible]95,276	492,410	1,992,462	265,035	259,830	64,071	727,311	61,027	1,377,274	615,188	1,233	75,000	541,421	—61,965
Southern Pacific Co.	6,195	4,450,223	2,519,223	7,494,681	803,283	1,107,382	169,595	2,335,213	187,756	4,603,229	2,891,452	84,799	383,808	2,592,443	170,972
Spokane, Portland & Seattle	550	238,127	131,565	407,994	33,522	31,850	6,266	97,022	11,898	180,488	227,506	188	32,200	195,494	84,398
Sunset	58	45,013	15,490	65,000	27,949	11,417	15	77,408	21,106	137,895	—72,895	. . . . .	3,390	—76,285	—122,871
Texas & New Orleans	458	207,458	93,815	319,747	50,103	77,252	10,145	139,134	12,959	289,593	30,154	344	29,471	339	—41,577
Virginia & Southwestern	240	117,983	15,257	136,495	20,752	30,636	1,653	49,031	3,605	105,677	30,818	. . . . .	4,710	26,108	—1,527
Wabash	2,514	1,637,907	596,761	2,426,263	232,392	432,882	87,236	1,105,632	85,209	1,943,351	482,912	—2,691	71,655	408,566	—99,846
Western Maryland	543	476,175	67,662	568,225	54,565	74,684	9,198	212,628	11,811	362,886	205,339	—1,134	21,000	183,205	36,732
Western Ry. of Alabama	133	69,732	47,399	127,212	17,356	21,405	4,897	33,792	5,625	83,075	44,137	998	4,612	40,523	2,327

SIX MONTHS OF FISCAL YEAR, 1912.

Name of road	Mileage operated at end of period	Operating revenues: Freight.	Passenger.	Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Ann Arbor	291	$730,954	$315,982	$1,116,691	$127,597	$111,324	$27,049	$376,432	$47,533	$689,935	$426,756	$2,445	$83,913	$345,288	$68,450
Atlanta & West Point	92	338,303	253,100	651,298	75,[illegible]04	124,771	29,007	193,807	29,523	451,712	199,586	71	31,135	168,522	—1,174
Atlantic & St. Lawrence	166	491,092	174,715	732,589	222,124	133,413	25,730	317,594	19,677	718,538	14,051	. . . . .	39,952	—25,901	—4,644
Belt Ry. of Chicago	21	. . . . .	. . . . .	1,355,855	87,283	150,647	3,817	483,655	36,515	761,917	593,938	. . . . .	33,000	560,938	37,541
Butte, Anaconda & Pacific	46	457,349	58,425	551,800	63,512	104,080	4,106	242,411	17,393	431,502	120,298	. . . . .	13,765	106,533	—22,217
Central of Georgia	1,915	4,578,462	2,050,141	7,[illegible]78,473	865,[illegible]55	1,304,603	[illegible]05,128	2,325,830	[illegible]29,670	4,930,886	2,347,587	35,814	[illegible]95,964	2,087,437	71,538
Central Vermont	411	1,349,129	679,691	2,145,251	257,534	317,104	47,646	[illegible]53,208	56,075	1,631,567	513,684	3,903	72,300	445,287	—12,373
Chicago & Erie	269	2,121,448	384,571	2,752,080	428,149	491,277	124,267	1,236,530	63,500	2,343,723	408,357	. . . . .	93,188	315,169	91,413
Chicago, Indianapolis & Louisville	616[1]	2,177,798	891,998	3,374,760	452,854	460,251	108,053	1,172,290	87,606	2,281,054	1,093,706	. . . . .	140,511	953,195	31,823
Detroit & Mackinac	358[2]	390,680	188,783	618,023	111,607	103,753	14,360	193,117	18,289	441,126	176,897	1,556	51,956	126,497	—42,605
Detroit, Grand Haven & Milwaukee	190	701,406	366,[illegible]78	1,[illegible]27,606	145,885	153,445	42,345	573,827	27,086	942,588	285,018	364	17,279	267,375	65,682
Duluth, Missabe & Northern	341[3]	4,316,172	235,083	4,607,732	656,188	404,663	11,760	764,254	86,968	1,923,833	2,683,899	36,685	225,451	2,495,133	—2,644,826
Erie	1,995	18,968,999	4,900,099	25,740,890	3,084,888	4,186,707	561,559	8,292,702	522,559	16,648,415	9,092,405	17,867	901,546	8,208,726	68,721
Florida East Coast	583	837,707	534,046	1,569,962	320,375	282,847	36,275	586,405	52,808	1,287,710	282,252	303	93,000	188,949	—29,741
Galveston, Harrisburg & San Antonio	1,338	3,803,391	1,481,147	5,565,873	661,488	916,395	194,278	2,044,474	161,180	3,977,815	1,590,758	—29,135	261,096	1,300,537	—296 630
Grand Trunk Western	347	1,033,864	1,198,806	3,445,878	352,859	484,121	117,710	1,337,101	80,880	2,373,671	1,073,207	—4,685	189,811	878,711	212,368
International & Great Northern	1,159[4]	2,863,505	749,378	3,815,997	307,358	389,859	77,812	1,279,998	107,966	2,162,993	1,653,004	—1,357	115,000	1,536,647	. . . . .
Kansas City, Mexico & Orient	809[5]	706,611	191,514	949,306	235,818	193,947	49,405	424,913	52,433	956,516	—7,210	. . . . .	32,937	—40,147	94,426
Midland Valley	373[6]	502,063	234,225	782,771	163,360	124,947	18,502	241,392	37,489	585,690	197,081	653	32,906	164,828	—17,804
Minneapolis, St. Paul & S. Ste. Marie	3,769[7]	9,867,670	3,121,057	13,735,802	1,350,145	1,658,311	273,956	4,211,952	268,179	7,762,543	5,973,259	82,830	836,685	5,219,404	1,467,237
New Orleans, Mobile & Chicago	404	716,841	189,780	962,426	143,636	101,679	16,615	286,934	48,084	596,948	365,478	—204	27,666	337,608	—20,180
New Orleans, Texas & Pacific	277[8]	550,748	115,237	709,745	136,523	79,384	25,009	312,026	43,357	596,299	113,446	. . . . .	3,473	109,973	1,097
Northwestern Pacific	416[9]	810,052	1,040,007	1,982,924	294,253	247,235	19,878	667,540	55,710	1,284,616	698,308	. . . . .	73,212	625,096	88,886
Pittsburg, Shawmut & Northern	240	625,936	56,079	693,630	84,348	145,332	6,721	196,580	23,533	456,514	237,116	. . . . .	9,472	227,644	100,117
St. Louis & San Francisco	4,731	13,389,401	6,017,513	20,886,946	2,666,689	2,669,067	536,994	7,111,373	593,533	13,577,656	7,309,290	. . . . .	953,312	6,355,978	265,900
San Antonio & Aransas Pass	727	1,743,075	668,950	2,546,541	385,590	278,853	33,775	853,513	58,419	1,610,150	936,391	. . . . .	66,000	870,391	59,827
Seaboard Air Line	3,053[10]	7,470,898	2,533,042	11,151,686	1,613,383	1,608,103	345,085	3,919,212	343,697	7,829,480	3,322,206	—5,059	447,000	2,870,147	—82,641
Southern Pacific Co.	6,195[11]	28,319,650	16,170,718	47,703 137	5,437,319	5,484,792	1,029,417	13,269,111	1,175,151	26,395,790	21,307,347	245,462	1,927,672	19,625,137	—1,071,103
Spokane, Portland & Seattle	550[12]	1,504,392	946,930	2,609,923	253,742	224,852	43,038	633,821	65,679	1,219,132	1,390,791	9,119	233,200	1,166,710	82,689
Sunset	58[13]	394,713	98,492	514,532	70,078	20,339	305	195,383	22,537	308,642	205,890	. . . . .	20,339	185,551	—114,254
Texas & New Orleans	458	1,309 912	537,773	1,965,196	329,838	429,665	46,896	756,501	59,814	1,623,714	342,482	—2,773	90,711	248,998	—91,895
Virginian & Southwestern	240	754,424	89,488	865,260	105,370	169,749	10,858	249,291	24,013	559,281	305,979	. . . . .	28,261	277,718	82,712
Wabash	2,514[14]	10,[illegible]3,769	3,984,382	15,282,521	1,863,166	2,524,749	497,538	5,952,142	460,434	11,298,029	3,984,492	—5,821	421,697	3,556,974	—822,577
Western Maryland	543	2,968,402	538,518	3,663,533	477,272	439,415	63,360	1,246,538	73,844	2,300,429	1,363,104	—343	126,000	1,236,761	—91,697
Western Ry. of Alabama	133	402,104	254,334	713,306	110,710	129,962	31,984	185,323	37,190	495,169	218,137	70	27,674	190,533	21,760

[1] Figures shown here are for the period September 16 to December 31, 1911.
Operated in previous year [2] 615; [3] 360; [4] 293; [5] 740; [6] 323; [7] 3,572; [8] 264; [9] 376; [10] 3,028; [11] 6,187; [12] 432; [13] 56; [14] 242. — Indicates Deficits, Losses and Decreases.

No Reparation to Uninjured Complainant.

Lamb, McGregor & Co. v. Chicago & North Western et al. Opinion by the commission.

The complainant is a grain commission house which paid charges on a shipment of wheat and flaxseed, but which recharged the full amount of the freight rate to the shipper, A. N. Barber. Barber is not a party to the complaint. The commission finds that there actually was an overcharge made on the shipment, but since the complainant was not injured in any way by the overcharge, reparation cannot be made to him; and since Barber is not a party to the complaint, reparation cannot be made to him. The railway, however, should find out who is rightly entitled to the amount of the overcharge and refund the same to him without an order from the commission. (22 I. C. C., 346.)

Bond Required for Average Demurrage Privilege.

Washburn-Crosby Milling Co., Inc., v. Southern Railway. Opinion by the commission:

The average demurrage privilege is granted only to shippers who furnish a bond providing for sufficient security for the payment of their balance at the end of each month. The complainant objected to the terms of this bond, and during the negotiations demurrage was charged on a straight demurrage basis. The form of bond, it is found, was not objectionable to the complainant, but only to the surety company first applied to. The rule of the defendants is not considered unreasonable and the complaint is dismissed. (22 I. C. C., 465.)

Hardwood Lumber Rates Reduced from Territory East of the Mississippi.

Michigan Hardwood Manufacturers' Association v. Transcontinental Freight Bureau et al. Opinion by Commissioner Prouty.

In the so-called Burgess case, 13 I. C. C., 668, the commission reduced the blanket rate on hardwood lumber from 85 cents to 75 cents from Chicago territory and from Mississippi river points to the Pacific coast, but refused to reduce the 85-cent rate from points east. The complainants are situated on the extreme western edge of the territory to which the 85-cent rate applies and are in sharp competition with nearby mills to which the 75-cent rate applies. The commission reduces the 85-cent rate from Michigan territory to 80 cents, but leaves the exact line where the 85-cent rate shall end and the 80 begin to be discussed later. (22 I. C. C., 387.)

Six Days Only, Given for Furnishing Special Equipment.

William K. Noble v. Baltimore & Ohio et al. Opinion by Commissioner Prouty.

A lumber merchant ordered a 33-ft. car from the Baltimore & Ohio, but after waiting six days, shipped 20,100 lbs. in a 36-ft. car. The minimum for C. L. rate in the longer car was 30,000 lbs., and for the shorter car, 24,000 lbs. The B. & O. charged the shipper for 30,000 lbs. The commission finds that since a competitor of this merchant might have been furnished a car with a minimum of 24,000 lbs., and thus obtained a discrimination over the shipper who got the larger car, such a discrimination ought not to be possible under the tariff of a railway. The commission recognizes that it is proper for the railway to make rules which shall help to utilize its smaller cars, but believes that all the hardships of such rules should be borne by the railway companies and not by the shippers. The commission finds, however, that shippers desiring to use equipment of an unusual size may fairly be required to give considerable notice to the railway. The commission thinks that any time longer, however, than six days' notice would be unreasonable. (22 I. C. C., 432.)

Division of Rate on Material for Company Use.

Switzer Lumber Co. v. Alabama & Mississippi Railroad et al. Opinion by Commissioner Meyer:

A shipment of ties was consigned to the Union Pacific, or to its storekeeper at Linwood, Kan., in care of the Union Pacific at Kansas City, Mo. The contract called for the lumber f. o. b. at Kansas City. The Union Pacific, on receiving the cars at Kansas City, did not ship them on to Linwood, but distributed them to points on its lines where the ties were to be used. The complainant claims that it should only have had to pay a freight charge equal to the division formed by the haul to Kansas City of the through rate from point of origin to Linwood, Kan. By the Union Pacific's action, however, it was compelled to pay the rate from point of origin to Kansas City, which was somewhat higher than the division of the through rate. The commission finds that the rate imposed was proper. The commission, of course, does not inquire into what right of action the complainant may have against the Union Pacific in the courts for breach of contract. (22 I. C. C., 471.)

Rates Reduced to Permit of Competition.

International Agricultural Corporation v. Louisville & Nashville et al. Opinion by Commissioner Prouty:

The complainant manufactures and sells fertilizer throughout the South and uses in the manufacture of this commodity large quantities of sulphuric acid, which it gets at Copper Hill, Tenn., a station on the L. & N. Sulphuric acid is manufactured from pyrites. The cost of sulphuric acid to the complainant at any point is the price at Copper Hill plus the freight from Copper Hill. The competitors of the complainant ship pyrites to the sea coast and there manufacture the sulphuric acid. The cost of sulphuric acid to the competitors is, therefore, the cost of manufacturing at the sea coast plus the rate on pyrites to the sea coast. The complainant insists that rates on pyrites and on sulphuric acid should be made to correspond, while the defendants claim that the pyrites rate is unduly low because of other conditions. The commission does not think that the rate on sulphuric acid and on fertilizer should be the same, the value of sulphuric acid being $5 per ton and the fertilizer from $15 to $20 per ton. The complainant asks that the present rates be reduced on a scale suggested by a reduction from Copper Hill to Augusta, Ga., from $3 per ton to $2.25 per ton. The commission reduces these rates, with one or two exceptions, on a scale suggested by a reduction from $3 per ton from Copper Hill to Augusta to $2.80 per ton. (22 I. C. C., 488.)

Grain Elevation Charges Passed Upon.

Traffic Bureau, Merchants' Exchange of St. Louis v. Chicago, Burlington & Quincy et al. Opinion by Commissioner Prouty:

In 14 I. C. C., 317 the commission fully discusses the facts in regard to a payment of an elevation allowance of three-fourths of a cent per 100 lbs. at the Missouri river, and no payment for elevation at points on the Mississippi river. In this case it was held that such an allowance was a discrimination against grain dealers in St. Louis. The Supreme Court held the commission's order prohibiting the payment of allowances altogether to be unlawful. In the Peavey cases the commission held that whatever allowance was made for elevation to the Peavey company must be made by the Union Pacific to all competing elevators at Omaha, and this order of the commission has been sustained by the Supreme Court of the United States. Considering these two cases together as applied to the general subject of elevation and transfer in transit, the commission concludes that it was the intention of the Supreme Court to hold that whatever might be the case, if a railway saw fit to confine its payment to elevation actually required in the conduct of its business, it must, when it makes this allowance to one elevator under such circumstances as to give that elevator payment for commercial elevation, extend the same privilege to all other elevators similarly situated. In accordance with these decisions of the Supreme Court, the commission has issued new orders requiring the defendants not to exceed three-fourths of a cent per 100 lbs. in the payment of elevation allowance at the Missouri river, and to confine that payment to grain actually passing through the elevator in ten days. (22 I. C. C., 496.)

Trimming Coal a Part of Rail Transportation.

New England Coal & Coke Co. v. Norfolk & Western et al. Opinion by Commissioner McChord:

The complaint is by a company which buys and sells coal and runs a line of vessels from Norfolk, Newport News, etc., to

Boston to carry its coal. The complainant's coal is loaded into the vessels from the mechanically operated coal chutes of the various railway companies, and the complainant says that a charge of three cents at Maryland ports and 4.45 cents at Virginia ports for trimming the coal while it is being dumped into the hold of the vessel is unreasonable. The commission is asked to reduce these charges to ½ cent per ton, or to permit complainants to do their own trimming. The defendants claim that the transportation by rail of coal ends at the top of the pier and that the trimming of the coal in the vessel's hold is entirely a maritime service and not a part of the rail transportation service. The commission, however, finds that this service is an essential link in effecting delivery, because no complete and reasonable delivery can otherwise be accomplished. The defendants claim that only one firm of stevedores should be allowed to do this work, and the commission thinks that this is fair, but the fact is that vessels may carry their own trimmers if they so desire. Complainant, however, has never availed itself of this privilege.

The vessels operated by the complainant are of what are known as the self-trimming type, with mechanical devices which do a part of the labor of the trimmers. The commission finds that the charge of three cents per ton is not unreasonable, but that the charge by the Virginian Railway of 4.45 cents per ton is unreasonable and is ordered reduced to three cents per ton. Reparation is awarded. (22 I. C. C., 398.)

Discrimination in Rates on Cement.

Alpha Portland Cement Co. v. Baltimore & Ohio et al. Opinion by Commissioner Clements:

Manheim, W. Va., where the cement plant of the complainant is located, is 77 miles west of Cumberland, Md., and connected by the Morgantown & Kingwood Railway with both the St. Louis-Cumberland line of the Baltimore & Ohio and the Chicago-Cumberland line. The Universal Portland Cement Co., a competitor, in whose favor it is claimed there is discrimination, is situated at Universal, Pa., 150 miles north of Manheim and 16 miles east of Pittsburgh, and is within the switching limits of Pittsburgh. Theoretically, there is no difference in the basis of rates from Manheim and Universal on eastern shipments. As a matter of fact, however, Manheim rates are constructed on a western termini basis, although Manheim is 130 miles east of those termini, whereas the rates from Universal, which is nearly on the Buffalo-Pittsburgh line separating central freight association and trunk line territories, are based on acual distance. The cement rates in trunk line territory seem to be influenced by competition from the Lehigh district, which includes New Jersey and eastern Pennsylvania. In constructing rates to central freight association territory, Universal is considered a central freight association point and operates under the central freight association scale, while the rates from Manheim are constructed upon the basis of a certain percentage of the New York-Chicago rate. The commission finds that Manheim is subject to unjust discrimination which is wholly unwarranted on the theories advanced by the defendant or on the transportation conditons as brought out in this case. Lower rates are therefore prescribed to Manheim, placing it on a basis reasonably comparable to Universal. (22 I. C. C., 446.)

STATE COMMISSIONS.

The Maine commission has issued an order to all railway companies in the state, requiring detailed plans of new bridges and of alterations proposed in existing bridges to be submitted to the commission and receive approval before construction work is begun.

The New York State Public Service Commission, Second district, has dismissed the complaint of merchants of Phoenix against the New York Central for taking off two passenger trains. The commission found that the merchants were accommodated by an electric railway.

The California Commission recently called before it the engineers of the principal railways of the state to explain why they had not complied with the order of the commission to file plans of the railways' property, with estimates of its value. The engineer gave, as a reason, the magnitude of the work, and the commissioners suspended their inquiry for thirty days.

The Texas railway commission is reported to be making an investigation of an alleged combination of coastwise steamship lines operating between New York and other Atlantic ports and gulf ports, with a view to securing the co-operation of other state commissions in bringing about a thorough investigation by Congress of charges that the alleged combination has stifled competition and is maintaining excessive freight rates.

The Massachusetts commission, reporting by request to the legislature, recommends that season ticket rates on the railways of that state be made uniform for similar distances on all lines. There is at present a considerable diversity in these rates on different roads and on different parts of the same road, the tariffs having been established years ago when some of the divisions were independent roads. It is held that all season ticket rates should be made on a monthly basis. In the same report the commission rejects the proposition to prescribe by law a rate of two cents a mile for all single trip tickets; such a reduction would unreasonably reduce the income of the carriers.

The Illinois railway commission, after a hearing in Chicago on February 19 on complaints of coal operators against the Illinois Central's rules for car distribution, issued a temporary order, effective until April 1, requiring the road to distribute coal cars to mines on the basis of shipments during the previous month. The Illinois Central had adopted a rule providing for a distribution on the basis of the average shipment during the nine months previous to February 1. The commission will conduct an investigation of conditions governing the distribution of coal cars at mines in Illinois, Indiana, Kentucky and Ohio, with a view to establishing a uniform rule. The Interstate Commerce Commission and the railway commissions of the states named will be invited to participate.

The New York State Public Service Commission, Second District, has ordered the Lehigh & Hudson River to resume running passenger train No. 6. This is a train between Warwick and Greycourt, ten miles, which has been discontinued during the winter months for the past three seasons, this season being the fourth. The train will afford a second morning connection with the Erie, and the commission holds that it can be run "without incurring additional expense," as the same crew that makes the two round trips over this section can make a third (deadhead one way). At the hearing in Warwick, the road showed that this train averaged but eleven passengers a day during the fall season up to December 19, when it was discontinued for the winter; and that its earnings from July 1 to November 30 were but 38 cents per revenue train mile; and the crew had to make a deadhead movement of ten miles to run the train. It was also shown that the passenger earnings for this train were 35 per cent. less during November than during August, that the entire passenger earnings of the road for the three winter months as compared with the three summer months were less by 42 per cent., and that a reduction in train service was in accordance with the custom in localities where the population is greater in summer than in winter. The commission justified its order also on the ground that the population had increased materially during the past ten years, though the road showed that four-fifths of the increase in population was made up of its own employees and their families.

COURT NEWS.

The Adams Express Company was indicted on eleven counts by a federal grand jury at Cincinnati on February 22 for charging more than the published tariffs on express shipments.

The United States circuit court has postponed until April 12 its original order directing the dissolution of the National Lamp Company, a subsidiary of the General Electric Company, which was to have become effective January 12. (October 26, 1911, page 806.)

The Supreme Court of the United States, on Monday of this week, decided in favor of the Southern Pacific Railroad Company in its suit to establish its right to the so-called "main-line grant" of land along the Atlantic & Pacific. It is said that the de-

cision validates claims to land in California worth more than $1,000,000.

Suit was filed in the United States District court at Chicago on Monday by the Taylor Coal Company and the Security Coal & Mining Company, asking that the Illinois Central be enjoined from putting into effect an order of the Illinois railway commission providing for the distribution of coal cars to mines on the basis of the previous month's shipments. The bill alleged that the commission is exceeding its authority and is in effect attempting to regulate interstate commerce.

John E. Bernard, a forwarding agent recently indicted in the Federal Court at New York for falsely describing freight shipped from New York westward, pleaded guilty on February 20, and was fined $1,050, this being $150 on each of seven counts; but the prosecuting attorney declared that there was evidence of 65 offenses. In one case silk shawls were classified as cotton goods. According to the government the forwarding agent charged the owners of the goods the full tariff rates. Two other men were fined smaller sums.

In the Federal court at Syracuse, N. Y., the Delaware & Hudson Company has been indicted by the grand jury on 30 counts for alleged violation of the commodity clause of the Interstate Commerce act. The case is based on the allegation that the company transported hay to feed mules in its mines. The company was also indicted for the alleged billing of cars of rails from Albany to Syracuse, when, the prosecution claims the cars were shipped from Carbondale to Syracuse; and J. White Sprong, the company's purchasing agent, was indicted for directing the making of the alleged false bills. Mr. Sprong and Lewis E. Carr, who appeared for the company, entered pleas of not guilty and gave bail for appearance at the April term of the court in Syracuse.

The case in which the federal government is to try to prove that the Hocking Valley and five other railways and three coal companies are operating in violation of the Sherman anti-trust law was begun at Columbus, Ohio, February 27, before three judges of the United States circuit court of appeals. The government's contention is that in 1903 the Pennsylvania, Erie, New York Central & Hudson River, Baltimore & Ohio and Chesapeake & Ohio gained control of the Hocking Valley, and as a result established a monopoly in the transportation of coal from the Ohio, Pennsylvania and West Virginia coal fields, and that the coal properties of these roads were merged in the Sunday Creek Coal Company. The government will try to prove that a monopoly in restraint of trade has been maintained ever since 1899.

The United States Commerce Court, in the case of the Louisville & Nashville, has annulled the order of the Interstate Commerce Commission reducing through rates on freight from New Orleans to Montgomery, Selma and Prattsville, Ala. The court says: "There was no attempt to meet the case as made out for the company, either by way of argument or otherwise. Counsel for the commission and for the government simply rely on the authority of the commission to determine what is a reasonable rate, and the conclusiveness of its judgment where it has done so, against which it was argued that the courts can afford no relief unless the rate which has been fixed is shown to be confiscatory. But this contention, as presented and sought to be applied in the case at bar, must be rejected. In our judgment, it was never intended to confer on the commission any such unrestrained and undirected power. As already pointed out, the law provides for a hearing and it must be more than a shadow. Both parties are entitled to be confronted with the evidence on which the case is to be determined, and the conclusion reached must be a reasonable inference from the facts disclosed by the investigation." This decision will revive discussion on the contention which has been presented in many arguments that the findings of the commission on questions of fact are final. In this contention it is held that the power of naming a reasonable rate is purely legislative; that this function has been delegated to the commission by Congress and that the Commerce Court cannot pass on findings of fact except in cases where the rates are shown to be confiscatory. In substance the court now decides that the evidence before the commission in the case was not sufficient to justify the order. The decision will, of course be appealed by the government to the Supreme Court.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

G. G. Yeomans, assistant to the president of the Wabash, at Chicago, has resigned. Effective March 1.

George J. Schoeffel, formerly fire warden of the Erie at New York, has been appointed a special agent of the Erie, the New York, Susquehanna & Western, the New Jersey & New York and the Chicago & Erie, with office at New York.

N. T. Guernsey has been elected chairman of the board of the Denver, Laramie & Northwestern; F. A. Bridge has been elected second vice-president; Otto Huber has been appointed treasurer, and O. D. Berroth has been appointed secretary.

Milton S. Barger, assistant treasurer of the New York Central & Hudson River, at New York, has been appointed treasurer of the Lake Shore & Michigan Southern and other New York Central Lines west of Buffalo, N. Y., with office at New York, succeeding C. F. Cox, deceased. George W. Porter, paymaster at New York, succeeds Mr. Barger.

Through an error in our issue of last week it was made to appear that J. W. Newlean, general auditor of the Illinois Central, had been appointed comptroller of that company. Mr. Newlean has resigned as general auditor of the Illinois Central to become comptroller of Wells, Fargo & Co., with office at Chicago, effective March 7, succeeding E. E. Honn, general auditor, who has been transferred to the operating department.

Operating Officers.

J. M. Turner, general manager of the Georgia & Florida, at Augusta, Ga., has resigned to go to a company that will build a new line in North Carolina.

E. C. Lilley, trainmaster of the Gulf, Colorado & Santa Fe at Cleburne, Tex., has been appointed train and station inspector of the St. Louis & San Francisco, with office at Springfield, Mo.

Addison H. Mars has been appointed assistant trainmaster of the Philadelphia Terminal division of the Pennsylvania Railroad, with office at Philadelphia, Pa., succeeding C. W. Valentine, retired.

Henry A. Williams, chief despatcher of the Erie Railroad at Hornell, N. Y., has been appointed trainmaster, with office at Hornell, succeeding A. Ruffer, transferred, and Edward H. Fahey succeeds Mr. Williams.

Fred S. James, formerly superintendent of the Missouri, Kansas & Texas of Texas at Greenville, Tex., has been appointed superintendent of the lines from Fort Worth to Granger, including Fort Worth yard, with office at Hillsboro, Tex.

W. Rudd, assistant superintendent of the St. Louis & San Francisco at Enid, Okla., has been appointed assistant superintendent, with headquarters at Newburg, Mo. As was announced in these columns last week, B. Casey succeeds Mr. Rudd.

E. H. Zeigler, trainmaster of terminals of the Cleveland, Cincinnati, Chicago & St. Louis at Indianapolis, Ind., has been appointed trainmaster, with office at Terre Haute, Ind., succeeding W. I. Lamport, resigned. E. F. Hayes, trainmaster of the south end of the Cairo division, at Harrisburg, Ill., has been appointed trainmaster of the west end of the St. Louis division, with office at Mattoon, Ill., succeeding G. M. French, granted leave of absence.

A merger having been effected of the Raleigh & Southport, the Sanford & Troy, the Durham & Charlotte, and the Aberdeen & Asheboro, with the Raleigh, Charlotte & Southern, the lines above referred to will be operated as follows: Raleigh & Southport, as the Raleigh & Southport division, with offices at Raleigh, N. C.; Sanford & Troy and Durham & Charlotte, as the Durham & Charlotte division, with offices at Aberdeen, N. C.; and the Aberdeen & Asheboro, as the Aberdeen & Asheboro division, with offices at Aberdeen, N. C. F. T. Ricks, secretary, treasurer and assistant general manager of the

Raleigh & Southport, has been appointed superintendent of the Raleigh & Southport division of the Raleigh, Charlotte & Southern, with office at Raleigh, N. C.

A change has been made in the operating organization of the Pullman Company by which, effective March 1, the four divisions designated as Northeastern, Southeastern, Northwestern and Southwestern, and the title of division superintendent have been abolished. Representatives at New York, Philadelphia, St. Louis, Houston and San Francisco will hereafter have the title of superintendent, and at the first three places mentioned the district organization has been merged into that of the superintendent. A. J. Grant, district superintendent at New York, has been appointed superintendent at New York; J. T. Ransom has been appointed superintendent, with office at Philadelphia; F. E. Cook, district superintendent at St. Louis, has been appointed superintendent, with office at St. Louis, D. H. Martyn, division superintendent at that place having retired; A. V. Burr, district superintendent at Houston, has been appointed superintendent at Houston; F. L. Wood, district superintendent at Denver, Colo., has been appointed superintendent, with office at San Francisco; J. C. Patterson, division superintendent at Chicago, has been appointed assistant to the general superintendent at Chicago; and P. L. Randall has been appointed assistant superintendent of car service at Chicago. J. L. Walker has been appointed superintendent of yards and stores, and the position of supervisor of cleaning is abolished. F. D. Chamberlin, district superintendent at Portland, Ore., has been transferred to Denver, Colo., succeeding Mr. Woods; and C. Lincoln, district superintendent at San Francisco, succeeds Mr. Chamberlin.

Traffic Officers.

J. C. Huertas has been appointed traveling freight agent of the Seaboard Air Line, with office at New York.

H. F. Bostwick has been appointed traveling passenger agent of the New York Central Lines, with headquarters at Oklahoma City, Okla.

C. L. Hanna has been appointed traveling freight and passenger agent of the Texas Central Railroad, in charge of territory from Gorman, Tex., west.

Philip E. McIntyre has been appointed freight solicitor in connection with the Los Angeles, Cal., agency of the Star Union Line of the Pennsylvania Lines West.

E. C. Tucker has been appointed soliciting freight agent of the Nashville, Chattanooga & St. Louis, with office at Jacksonville, Fla., succeeding W. R. Lovett, resigned.

J. A. Michaelson, traveling passenger agent of the Duluth, South Shore & Atlantic at Grand Rapids, Mich., has been appointed also traveling freight agent at that place.

Walter A. Smith has been appointed traveling freight agent of the Lake Erie & Western, the Fort Wayne, Cincinnati & Louisville and the Northern Ohio, with headquarters at Indianapolis, Ind., succeeding F. M. Martin, resigned.

J. W. McCann, chief rate clerk of the St. Louis & San Francisco at New Orleans, La., has been appointed traveling freight agent, with office at New Orleans, succeeding J. P. Fresenius, resigned to accept service with another company.

A. R. Brasted, commercial agent of the Rock Island Lines at Colorado Springs, Colo., has been appointed division freight agent, with headquarters at Wichita, Kan., succeeding E. B. Hooser, deceased. F. H. Faus succeeds Mr. Brasted.

N. F. Knight, soliciting freight agent of the Philadelphia & Gulf Steamship Company at New Orleans, La., has been appointed agent, with office at New Orleans, succeeding H. P. Dolard, resigned to accept service with another company.

T. B. Montgomery, general agent in the freight department of the Minneapolis, St. Paul & Sault Ste. Marie at Chicago, has been appointed general agent of the Chicago, Milwaukee & St. Paul, with office at Pittsburgh, Pa., succeeding J. C. Wood.

C. V. Gallagher, contracting freight agent of the Minneapolis, St. Paul & Sault Ste. Marie at Chicago, has been appointed general agent in the freight department, with office at Chicago, succeeding T. B. Montgomery, resigned to accept service with another company.

W. B. Durrett, traveling freight agent of the Missouri & North Arkansas at New Orleans, La., has been appointed traveling freight and passenger agent, with headquarters at Memphis, Tenn., and Fred Borgwald has been appointed soliciting freight agent, with office at New Orleans.

J. A. Brown, whose appointment as general freight agent of the New Orleans, Texas & Mexico, and the Beaumont, Sour Lake & Western, with office at Houston, Tex., was recently announced in these columns, has had his jurisdiction extended over the New Iberia & Northern.

R. R. Otis, general agent of the Mobile & Ohio at Atlanta, Ga., has resigned and his former position has been abolished. Charles Patton, traveling freight agent at Atlanta, has been appointed commercial agent, with office at Atlanta. C. O. Ruden, soliciting freight agent at Atlanta, succeeds Mr. Patton, and F. J. Young succeeds Mr. Ruden.

Allan Cameron, general traffic agent of the Canadian Pacific at New York, has been transferred to the department of natural resources, and his former position has been abolished. Communications on passenger traffic should in future be addressed to W. H. Snell, eastern passenger agent, and on freight traffic to W. F. Stevenson, eastern freight agent at New York.

C. C. Lewis, commercial agent of the St. Louis & San Francisco lines at Houston, Tex., has been appointed also commercial agent of the St. Louis, Brownsville & Mexico, with office at Houston. H. J. Neff has been appointed commercial agent, with office at Corpus Christi, Tex., succeeding F. P. Dixon, resigned, and J. W. Jacobs has been appointed traveling freight agent, with headquarters at Corpus Christi, reporting to Mr. Neff.

John Corbett, general foreign freight agent of the Canadian Pacific, at Montreal, Que., has resigned to go into other business, and his former position has been abolished. Communications on import traffic should in future be addressed to W. T. Marlow, import freight agent at Montreal, and on export traffic to F. G. Frieser, export freight agent at Montreal, and in connection with accounts to George Wood, foreign freight accounting agent.

W. M. Rhett, general foreign agent of the Illinois Central at Chicago, has been appointed assistant to the freight traffic manager of that road, and the Yazoo & Mississippi Valley with office at Chicago, his jurisdiction over export and important matters to remain unchanged. C. A. Florence, assistant general foreign agent of the Illinois Central at Chicago, has been appointed export and import agent, with office at Chicago, and both their former positions have been abolished.

J. B. Stewart, whose appointment as general freight and passenger agent of the New York, Ontario & Western, has been announced in these columns, was born on November 23, 1871, at New York City, and was educated in the public schools of his native city. Mr. Stewart began railway work on April 22, 1885, with the Erie Railroad, and in September, 1893, he went to the New York, Ontario & Western as a bill of lading clerk. He was afterwards made assistant ticket agent, and in May, 1900, became agent. In September, 1908, he was appointed general eastern agent, which position he held at the time of his recent appointment as general freight and passenger agent.

W. G. Womble, general freight agent of the Raleigh & Southport has been appointed division freight agent of the Raleigh & Southport division of the Raleigh, Charlotte & Southern, with office at Raleigh, N. C. Henry A. Page, president and general freight and passenger agent of the Aberdeen & Asheboro, the Durham & Charlotte, and the Sanford & Troy, has been apopinted general agent of the Durham & Charlotte division, and the Aberdeen & Asheboro division of the Raleigh, Charlotte & Southern, with office at Aberdeen, N. C., and John A. Mills, president and general manager of the Raleigh & Southport, has been appointed general agent of the Raleigh & Southport division of the Raleigh, Charlotte & Southern, with office at Raleigh, N. C. (See an item under Operating Officers.)

H. T. Jenney has been appointed commercial agent of the Lehigh Valley, with office at Toledo, Ohio. M. J. Todd has

been appointed commercial agent, with office at Cincinnati; M. Wolf has been appointed commercial agent, with office at Indianapolis, Ind., and E. L. Abbett commercial agent at Columbus, Ohio, has been transferred and his former position has been abolished. J. L. Kellogg, agent at Milwaukee, Wis., has been appointed commercial agent, with office at Milwaukee, and will also represent the following fast freight lines operating over the Lehigh Valley: Traders Despatch, Lehigh & Wabash Despatch, Lake Shore-Lehigh Valley Route, Michigan Central Lehigh Valley Route, Pere Marquette-Lehigh Valley Line and Reading Despatch.

E. C. Morgan, district freight agent of the Southern Railway at Chattanooga, Tenn., has been appointed commercial agent, and W. A. McCarthy, traveling freight agent of the Eastern & Southern Despatch at Rochester, N. Y., has been appointed traveling freight agent of the Southern Railway, both with offices at Buffalo, N. Y. J. N. Templeton, commercial agent at Pittsburgh, Pa., has been appointed commercial agent, with office at Birmingham, Ala., succeeding J. L. Edwards, resigned to go into other business. J. A. Werne, freight soliciting agent at Louisville, Ky., succeeds Mr. Templeton. G. A. Perry, traveling freight agent at Indianapolis, Ind., succeeds Mr. Werne, and G. H. Rudolph succeeds Mr. Perry. K. M. Pinaire has been appointed traveling freight agent, with office at Pittsburgh, Pa.

J. L. Amos, commercial freight agent of the Missouri Pacific-Iron Mountain system at Philadelphia, Pa., has been appointed general agent, with office at St. Louis, Mo., succeeding Charles Rippin, resigned to become traffic commissioner of the St. Louis Merchants Exchange, effective March 1. J. O. Barkley, commercial freight agent at St. Joseph, Mo., has been appointed general agent in charge of freight and passenger traffic, with headquarters at St. Joseph, and E. S. Blair has been appointed general agent, with office at Los Angeles, Cal., succeeding J. M. Norton, resigned to engage in other business. A. S. Edmonds, commercial freight agent at Birmingham, Ala., has been transferred to Philadelphia, succeeding Mr. Amos, and Norton England, commercial agent at Greensboro, N. C., succeeds Mr. Edmonds.

Engineering and Rolling Stock Officers.

E. G. Hewson has been appointed resident engineer of the Grand Trunk, with office at Toronto, Ont., succeeding C. W. Power, resigned.

J. T. Luscombe, division master mechanic of the Toledo & Ohio Central and the Zanesville & Western at Bucyrus, Ohio, has been appointed master mechanic of the Cleveland, Cincinnati, Chicago & St. Louis, with office at Bellefontaine, Ohio, effective March 1.

W. R. Coln has been appointed roadmaster of the Rock Island Lines, with jurisdiction over that part of sub-division 53 from Haskell, Ark., to Mile Post 97 and sub-division 53-A between Tinsman, Ark., and Crossett, succeeding S. J. Rufer, resigned.

H. E. Passmore, division master mechanic of the Toledo & Ohio Central at Kenton, Ohio, has been appointed division master mechanic of that road and the Zanesville & Western, with headquarters at Bucyrus, Ohio, succeeding J. T. Luscombe, resigned to accept service with another company, effective March 1.

P. C. Connelly, formerly trainmaster of the Dakota division of the Great Northern at Grand Forks, N. D., who was granted an indefinite leave of absence about four months ago, has been appointed roadmaster of the Spokane division, with office at Spokane, Wash., succeeding J. H. Conlan, transferred to the Cascade division.

H. A. Woods, assistant chief engineer of the Grand Trunk Pacific at Montreal, Que., has been transferred as assistant chief engineer to Winnipeg, Man., and will have charge of the construction of branch lines and the routine work of both the eastern and western sections. B. B. Kelliher, chief engineer at Winnipeg, will in future devote his time entirely to superintending the main line construction work through the Rocky mountains.

W. H. Erskine, assistant master mechanic of the Minneapolis & St. Louis at Minneapolis, Minn., has been appointed division master mechanic with jurisdiction over the Central and Western divisions, and headquarters at the Cedar Lake shops, Minneapolis. T. Windle, assistant master mechanic at Marshalltown, Ia., has been appointed general foreman of the Marshalltown shops, and his former position has been abolished. Henry Marsh, general car foreman at Marshalltown, has been appointed district car foreman of the Eastern division, with headquarters at Marshalltown, and his former position has been abolished.

Charles E. Gossett, whose appointment as general master mechanic of the Minneapolis & St, Louis, with office at Minneapolis, Minn., has been announced in these columns, was born January 25, 1869, at Millerstown, Ky. He received a common school education and began railway work in 1887 with the Kansas City, Fort Scott & Gulf, now a part of the St. Louis & San Francisco. He subsequently served a machinist apprenticeship in a contract shop and after completing that became a locomotive fireman. In 1892 he was made a locomotive engineer and served in that capacity on the Hannibal & St. Joseph, now a part of the Chicago, Burlington & Quincy; on the Wabash; the Chicago & Alton; the Atchison, Topeka & Santa Fe, and the old Rock Island & Peoria, now a part of the Chicago, Rock Island & Pacific. In 1899 he was made traveling engineer of the Rock Island at Chickasha, Okla.; in March, 1905, he was promoted to master mechanic, with office at Eldon, Mo., and two years later was transferred to Kansas City. He later resigned to become master mechanic of the Iowa Central at Marshalltown, Iowa, and two years afterward was transferred to Minneapolis as master mechanic of the Minneapolis & St. Louis. On January 10, 1912, subsequent to the absorption of the Iowa Central by the Minneapolis & St. Louis, he was made general master mechanic of the entire line.

OBITUARY.

A. S. Crawford, division passenger agent of the Chicago, Burlington & Quincy, with office at Galesburg, Ill., died at that place on February 18.

W. R. Miller, traveling freight agent of the Kanawha Despatch, with office at Kansas City, Mo., died in his room in a hotel at St. Louis, Mo., on February 23.

Frank Stuart Bond, who was president of the Philadelphia & Reading from 1881 to 1882, died on February 26, at Jekyl Island, Ga. Mr. Bond was born at Sturbridge, Mass., on February 1, 1830, and began railway work in 1849 in the office of the treasurer of the Norwich & Worcester. From 1851 to 1856, he was secretary of the Cincinnati, Hamilton & Dayton, and during the following four years he was secretary and treasurer of the Auburn & Allentown and the Schuylkill & Susquehanna. From 1868 to 1873 he was vice-president of the Missouri, Kansas & Texas, and then for eight years was vice-president of the Texas & Pacific. From 1881 to 1882 he was president of the Philadelphia & Reading, and from 1884 to 1886 was president of the Cincinnati, New Orleans & Texas Pacific, the Alabama Great Southern, the New Orleans & Northeastern, the Vicksburg & Meridian, and the Vicksburg, Shreveport & Pacific. In 1886 he became vice-president of the Chicago, Milwaukee & St. Paul, from which position he retired on January 1, 1900. Mr. Bond was a member of the Metropolitan, the Union League, and the Century clubs of New York, and the Jekyl Island club. He belonged also to the Loyal Legion, the Sons of the American Revolution, the Metropolitan Museum of Art, the American Museum of Natural History and the National Academy of Design.

FOREIGN RAILWAY NOTES.

The gross earnings of the Swiss State Railways in 1911 were 4½ per cent. greater than in 1910, their working expenses 6½ per cent. greater; which left an increase of less than 1 per cent. in net earnings.

In 1892 a commission was appointed to award contracts for rails, rail fastenings and rolling stock required by the Russian railways to the various works in Russia, according to their capacity, the principle being that the price should be what the foreign works would supply them for, plus the duty, and the purpose being to establish industries in Russia. This policy was to expire in 20 years, and the Russian works are anxious to know if it will be continued. The authorities are suspected of imagining that the industries have been encouraged enough and that they would do better if they had more competition.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Missouri, Oklahoma & Gulf has ordered 4 consolidation locomotives from the Baldwin Locomotive Works.

The Chicago, Milwaukee & St. Paul has ordered 10 Mallet locomotives and 30 Pacific type locomotives from the American Locomotive Company.

The Delaware, Lackawanna & Western, which was in the market for 40 locomotives, as mentioned in the *Railway Age Gazette* of January 26, is now figuring on 28 locomotives instead. This inquiry comprises 15 mikado locomotives, seven Pacific type locomotives and six six-wheel switching locomotives.

The New York Central Lines have ordered 30 Pacific type locomotives, 30 six-wheel switching locomotives and 25 consolidation locomotives from the American Locomotive Company. All these locomotives will be equipped with superheaters. This order will be distributed as follows: New York Central & Hudson River, 20 Pacific type locomotives having 26 in. x 26 in. cylinders, 69 in. driving wheels, and in working order weighing 266,000 lbs., designated as class K-11, duplicates of former locomotives ordered; Cleveland, Cincinnati, Chicago & St. Louis, 10 Pacific type locomotives having 22 in. x 26 in. cylinders, 75 in. driving wheels, and in working order weighing 237,000 lbs., designated as class K K, and 10 six-wheel switching locomotives having 21 in. x 28 in. cylinders, 57 in. driving wheels, and in working order weighing 166,000 lbs., designated as class B-10-T; Peoria & Eastern, 10 consolidation locomotives having 26 in. x 30 in. cylinders, 57 in. driving wheels, and in working order weighing 244,000 lbs., designated as class G-46-H; Toledo & Ohio Central, 10 consolidation locomotives having 26 in. x 30 in. cylinders, 57 in. driving wheels, and in working order weighing 241,000 lbs., designated as class G-46-E; Lake Erie & Western, 5 consolidation locomotives having 25 in. x 32 in. cylinders, 63 in. driving wheels, and in working order weighing 241,000 lbs., designated as class G-16-W; Michigan Central, 20 six-wheel switching locomotives having 21 in. x 28 in. cylinders, 57 in. driving wheels, and in working order weighing 166,000 lbs., designated as class B-10-W.

CAR BUILDING.

The New York, New Haven & Hartford has ordered 20 mail cars from the Laconia Car Company.

The Pennsylvania Equipment Company, Philadelphia, Pa., is in the market for 4 second hand, flat bottom gondola cars, preferably steel.

The Chicago, Milwaukee & St. Paul, mentioned in the *Railway Age Gazette* of February 9 as building 1,500 cars at the company's shops, has now increased this order to 2,000.

The Spokane, Portland & Seattle has ordered the 17 coaches, 4 observation cars and 1 dining car mentioned in the *Railway Age Gazette* of January 19, from the Barney & Smith Car Company.

The Bessemer & Lake Erie has ordered 1,000 fifty-ton all-steel gondola cars from the Pressed Steel Car Company, and 500 fifty-ton all-steel gondola cars, 500 fifty-ton steel underframe box cars, and 100 fifty-ton all-steel box cars from the Standard Steel Car Company.

The Pennsylvania Lines West, mentioned in the *Railway Age Gazette* of February 23 as having ordered 54 passenger cars, has divided this order as follows: Standard Steel Car Company, 35; American Car & Foundry Company, 8; Barney & Smith Car Company, 5; Pressed Steel Car Company, 4; Pullman Company, 2.

IRON AND STEEL.

The Norfolk & Western has ordered 12,000 tons of rails from the Carnegie Steel Company.

The Rock Island Lines expect to place orders in the near future for 25,000 tons of rails.

Supply Trade News.

E. M. Richardson has been elected a director of the Chicago Pneumatic Tool Company, to succeed Oliver Wrenn.

The fifth annual cement show of the Cement Products Exhibition Company was held at Chicago on February 21-28 inclusive.

See an item under Court News in regard to the General Electric Company, Schenectady, N. Y., and its subsidiary, the National Lamp Company.

The Independent Pneumatic Tool Company, Chicago, has secured larger floor space in the Farmers' Bank building, Chicago. The old office was at 1426, and the new office is located at Nos. 1208 and 1209.

Taylor & Arnold, Montreal, Que., have been made sole representatives in Canada for the American electric headlight equipment for locomotives, a product made by the Remy Electric Company, Anderson, Ind.

A. L. Whipple, whose retirement from the Whipple Supply Company, New York, was noted in the *Railway Age Gazette* of February 9, has entered the sales department of the Ward Equipment Company, New York. Mr. Whipple has been in the railway supply business for many years.

Samuel T. Fulton, western manager of the Railway Steel-Spring Company, New York, with office at Chicago, has been appointed general sales agent of the company, with office at New York, effective March 1. The greater part of Mr. Fulton's career has been in the railway service, and he enjoys a wide acquaintance among both railway and supply men. He was born January 11, 1866, at Topeka, Kan., and after being educated in the public schools entered the railway service July 1, 1879, as messenger in the telegraph office of the Kansas Pacific at Topeka. He was telegraph operator and agent at various stations on the Kansas Pacific and Union Pacific, and for two years was telegraph operator for the Western Union Telegraph Company at Topeka. In 1885 he became secretary to the superintendent of machinery of the Atchison, Topeka & Santa Fe; in 1888 secretary to the general superintendent at Chicago; in 1889 train despatcher of the Chesapeake & Ohio, and in 1890 he was made secretary to the freight traffic manager of the Cleveland, Cincinnati, Chicago & St. Louis. In 1891 he became stenographer to the chairman of the Central Traffic Association at Chicago; in 1892 secretary to the freight traffic manager of the Kansas City, Ft. Scott & Memphis; in 1893 chief clerk to the general superintendent; in 1895 chief clerk to the president and general manager, and in 1899 assistant to the president of that road. In August, 1901, he became chief clerk to the vice-president and general manager of the St. Louis & San Francisco at St. Louis, and from January, 1902, to February, 1903, was general manager of the Crowe Coal & Mining Company of Kansas City. In 1903 he returned to railway service as assistant to the vice-president of the St. Louis & San Francisco, and in April, 1904, was appointed assistant to the president of the Chicago, Rock Island & Pacific at Chicago, which position he held until December 1, 1909. After the segregation of the Rock Island and Frisco he entered the railway supply business as western manager of the Railway Steel-Spring Company.



S. T. Fulton.

Joseph M. Brown, Great Northern building, Chicago, has been appointed general western sales agent for the motor-driven baggage, warehouse and freight trucks built by the Elwell-Parker Electric Company of Cleveland, Ohio.

John B. Given, heretofore sales manager of C. H. Whall & Company, Boston, Mass., has opened an office at 253 Broadway, New York, to handle railway specialties on his own account. Mr. Given is still connected with the Whall company in another capacity.

The Hildreth-Jones Company, Monadnock block, Chicago, announces that that company title has been discontinued and the title of Morgan T. Jones & Company substituted. Hildreth & Company, of New York, Philadelphia and Pittsburgh, will be associated with it.

The Lea Equipment Company, New York, maker of centrifugal pumping equipment and the Lea-Simplex cold saws, has moved its general offices to the corner of Stenton and Wyoming avenues, Philadelphia, Pa., where its plant is located. The present quarters in New York will be retained for the export department, in charge of Albert C. Lea, president. The general sales offices will be in charge of H. R. Williams, general sales manager.

L. H. Mesker, in the Cleveland, Ohio, office of Manning, Maxwell & Moore, Inc., New York, has been made manager of the St. Louis, Mo., office of that company, succeeding C. L. Lyle, resigned. Frank P. Smith, formerly in the sales department of Manning, Maxwell & Moore, has again entered that department of that company, with office in New York. C. R. McCullough, of the Packard Motor Car Company, Detroit, Mich., has resigned to enter the sales department of Manning, Maxwell & Moore with office in Detroit.

The Vulcan Engineering Sales Company has been organized and incorporated, with offices in the Fisher building, Chicago, and at 30 Church street, New York. The company controls the entire product and will handle all sales of the Hanna Engineering Works, Chicago; Mumford Molding Machine Company, Plainfield, N. J.; and the Quincy-Manchester-Sargent Company of New York. Arrangements for additional factory facilities are under way, and the company will itself make a number of special railway tools and devices for shop and maintenance work. The officers are: President, H. K. Gilbert, formerly vice-president of the Buda Company, Chicago; secretary-treasurer, P. W. Gates, now president of the Hanna Engineering Works and formerly president of the Gates Iron Works. E. H. Mumford, now vice-president and general manager of the Mumford Molding Machine Company, will continue in the same position and with the same duties as heretofore, and William L. Laib, vice-president and secretary of the Hanna Engineering Works, will continue in his present position and present duties with that company.

Permanent Exhibit of Railway Appliances.

Rapid progress is being made in the installation of exhibits at the Permanent Manufacturers' Exhibit of Railway Supplies and Equipment in the Karpen building, Chicago, which is to have its official opening during the week of March 16-23. Thus far the exhibits of the following companies have been installed, or are being installed in the spaces reserved:

Crane Company, Dearborn Drug & Chemical Company, U. S. Metallic Packing Company, Railway Utility Company, Barco Brass Company, Pyle-National Electric Headlight Company, Railway Department, International Correspondence Schools, American Carpet & Rug Company, Gold Car Heating & Lighting Company, Detroit Hoist & Machine Company, Chicago Car Heating Company, the O. M. Edwards Company, the Verona Tool Company, the Forest City Paint & Varnish Company, and the *Railway Age Gazette*.

It has been decided to devote the entire second floor of the building to a permanent exhibit of maintenance of way appliances. The Car Foremen's Association of Chicago and the Car Clerks' Association have decided to make use of the assembly room and facilities afforded in connection with the exhibit for their regular meetings. The Western Railway Club will hold its March meeting there on March 19, and several other associations are considering making use of the facilities in a similar manner.

Railway Appliances Association.

A list of the exhibitors who have secured space for the fourth annual exhibition of the Railway Appliances Association, at the Coliseum and First Regiment Armory, Chicago, in connection with the convention of the American Railway Engineering Association, was published in the *Railway Age Gazette* of January 12, page 65. The following have since been added to the list of exhibitors:

Allith-Prouty Company, Danville, Ill.
American Rail Joint Co., Toronto, Ont.
American Nut & Bolt Fastener Co., Pittsburgh, Pa.
Atlas Preservative Company of America, New York.
L. S. Brach Supply Co., New York.
Cambria Steel Co., Pittsburgh, Pa.
Chicago Steel Railway Tie Co., Chicago.
Detroit Switch Lock Co., Detroit, Mich.
Duluth Corrugating & Roofing Co., Duluth, Minn.
Edison Storage Battery Co., Orange, N. J.
Enright-Frey Railway Equipment Co., New Orleans, La.
Fairmont Machine Co., Fairmont, Minn.
Hoeschen Manufacturing Co., Omaha, Neb.
C. W. Hunt Co., New York.
International Harvester Co., Chicago.
Jerome Metallic Packing Co., Chicago.
Kellogg Switchboard & Supply Co., Chicago.
Kennicott Co., Chicago.
Keuffel & Esser Co., Chicago.
The Lehon Co., Chicago.
Luitwieler Pumping Engine Co., Rochester, N. Y.
Walter Macleod & Co., Cincinnati, Ohio.
McGraw Publishing Co., New York.
McKinnis Switch Lock Co., Chicago.
North Western Construction Co., New York.
Ogle Construction Co., Chicago.
Payson Manufacturing Co., Chicago.
Rabok Manufacturing Co., St. Louis, Mo.
Rich Tool Co., Chicago.
Signal Accessories Co., Chicago.
Tweedy, Hood & Finlen Co., Chicago.
United States Electric Co., Chicago.
United States Light & Heating Co., New York.
Western Electric Co., Chicago.
G. H. Williams Co., Cleveland, Ohio.
Winters-Coleman Scale Co., Springfield, Ohio.
J. D. Young Railroad Rail Joint Co., Oklahoma City, Okla.

TRADE PUBLICATIONS.

Hammer Drills.—The Ingersoll-Rand Company, New York, has published form No. 4111 on type BC hammer drills, describing their construction in detail, and pointing out their advantages. Illustrations and diagrams are given.

Northern Pacific.—The passenger department of this company has published a small folder entitled Colonist Fares to the Fertile Northwest. These fares will be effective from March 1 to April 15. Additional information is given on the equipment of the trains, their schedules and also some interesting facts on some of the northwestern states. A large map is included.

Drills.—The Morse Twist Drill Company, New Bedford, Mass., has published a 350-page catalog, illustrating and giving the prices and dimensions of its angle twist drills, reamers, chucks, milling cutters, taps, machinists' tools, etc. A separate pamphlet published by this company illustrates and describes a new indexed case for drills from which the proper size drill can be quickly selected.

Southern Railway.—The Land and Industrial Department of this company has published an interesting booklet entitled Stock Raising in the Southeast, telling of the advantages of this region for the raising of cattle, horses, hogs, sheep, poultry, etc., and showing how cheaply and easily these animals are fed. Some figures are given showing the success with which many of the farmers have met. Facts on the water and climate, transportation and the market are included.

Equipment Insulation.—The Union Fibre Company, Winona, Minn., has published a 110-page booklet telling of the evolution of the refrigerator car in the United States, tests of the heat and cold-resisting properties of refrigerator cars and some data on insulation of refrigerator cars, steel passenger cars, etc. A description is also included of a refrigerator car built by the Union company to show its ideas of insulation, air circulation, ventilation and drainage for such equipment.

Railway Construction.

New Incorporations, Surveys, Etc.

Birmingham & Southeastern.—An officer writes that contracts are to be let at once to build an extension of about 20 miles in Alabama. The company now operates a line from Union, Ala., to Fort Davis, 7½ miles. J. M. Garrett, chief engineer, Union Springs, Ala.

Chicago, St. Paul, Minneapolis & Omaha.—An officer writes that contracts will be let this spring for laying second track from Hudson, Wis., east to Eau Claire, 68 miles. C. W. Johnson, chief engineer, St. Paul, Minn.

Clinton & Oklahoma Western.—Sub-contracts have been let for the work on this line, it is said, from Butler, Okla., west up the Washita Valley to a point in Roger Mills county to the following contractors: Acklin Brothers, F. L. Adams, M. Cunyon, E. L. Hale, B. Sweeney and P. Gleason. Guy V. McClure, chief engineer, Clinton, Okla. (February 16, p. 320.)

Crosbyton-South Plains.—Plans have been made to build an extension of about 35 miles from Crosbyton, Tex., southeast to Spur. It is expected that the work will be finished this year. The line is now in operation from Lubbock east to Crosbyton, about 38 miles. P. L. Connley, president, Chicago. (Apr. 28, p. 1016.)

Edmonton, Dunvegan & British Columbia.—The Board of Railway Commissioners of Canada has approved the location plans for the route through townships 53 to 56, ranges 24 to 26, west of the fourth meridian and authorized the crossing of highways between mile 0 and mile 30. The line is being built under an agreement with the Grand Trunk Pacific. The province of Alberta guarantees the company's bonds to the extent of $20,000 a mile for 350 miles. It is expected that about 100 miles will be built during 1912. J. D. McArthur, Winnipeg, Man., is interested.

Enid, Ochiltree & Western.—Work is now under way on an extension from the present terminus at Ochiltree, Tex., to the Texas-Oklahoma state line, about 40 miles. The line will eventually be extended to Enid, Okla., about 130 miles. W. T. Taylor, chief engineer, Dalhart, Tex. (Mar. 11, 1910, p. 546.)

Erie.—See an item regarding double-tracking work on this road, under Railway Financial News.

Gainesville & Northwestern.—An officer writes that a contract has been given to Burk & Joseph, Gainesville, Ga., to build from Gainesville, via Cleveland, to Robertstown, White county. The principal revenue will be derived from carrying timber. R. M. McCombs, president, St. Louis.

Grand Trunk Pacific.—Application will be made to the Saskatchewan legislature for the incorporation of the Grand Trunk Pacific Saskatchewan Railway to construct lines in Saskatchewan as follows: From a point at or near Watrous, southwesterly via Swift Current, to a point on the international boundary, between ranges 22 and 30, west of the third meridian; from a point at or near Saskatoon westerly and northwesterly to a point at or near Battleford; from a point near Melville west to a point near Regina; from a point near Saskatoon, southeasterly, to a point near Regina; from a point in township 36, range 8, west of the third meridian, southwesterly and westerly to a junction with the G. T. P. Biggar-Calgary line. B. B. Kelliher, chief engineer, Winnipeg, Man.

See Edmonton, Dunvegan & British Columbia.

Grand Trunk Pacific Saskatchewan.—See Grand Trunk Pacific.

Gulf, Texas & Western.—This company recently let contracts for building an extension from Jacksboro, Tex., southeast to Oran, about 25 miles. J. J. Jermyn, president, Scranton, Pa. (Feb. 23, p. 360.)

Houston & Texas Central.—Work is now under way building a cut-off between Giddings, Tex., and Stone City, about 40 miles. I. A. Cottingham, engineer maintenance of way and structures, Houston, Tex. (Feb. 9, p. 263.)

Illinois Central.—An officer writes that work is to be started at once on an extension from the present terminus of the Bloomington Southern branch to reach the Oolitic stone deposits, about seven miles. The grading contract has been given to John Scott & Sons, St. Louis, Mo., and the company's forces will carry out the rest of the work. It is expected to have the line completed in September of this year. A. S. Baldwin, chief engineer, Chicago, Ill.

Jonesboro, Lake City & Eastern.—An officer writes that surveys have been made and contracts are to be let soon for work on the extension between Wilson, Ark., and Memphis, Tenn. R. E. L. Wilson, president, Memphis, Tenn.

Kansas City, Mexico & Orient.—Work has been finished on the extension west from San Angelo, Tex., to Grenada, 132 miles. There remains a section of 32 miles to complete the line from Grenada to Fort Stockton. W. W. Colpitts, chief engineer, Kansas City, Mo.

Louisville & Nashville.—According to press reports, this company recently let 15 contracts for new lines and double-tracking work, aggregating about 150 miles, in Alabama and Tennessee, as well as the construction of three tunnels, to have a total length of 4,800 ft., near Blount Springs, Ala. Additional contracts are to be let in the near future for double-tracking work from Birmingham, Ala., south to Mobile, and to Pensacola, Fla. W. H. Courtenay, chief engineer, Louisville, Ky.

Medicine Hat (Electric).—Organized in Canada to build an electric line to connect Medicine Hat, Alta., with Dunmore and Elkwater lake. A. F. Krappel, D. W. Brown and W. Overplank are interested.

Minnesota, Dakota & Western.—According to press reports, a contract has been let for building 25 miles in Koochiching county, Minn. The company now operates 27½ miles of railway in Minnesota, and is planning to build about 150 miles of extensions. E. W. Backus, president, Minneapolis.

Missouri, Kansas & Texas.—It is understood that this company will build from Austin, Tex., south to San Marcos, 40 miles, during this year, if the present trackage rights over the International & Great Northern between those two places is not renewed. Such a line would necessitate the construction of a bridge over the Colorado river at or near Austin. S. B. Fisher, chief engineer, St. Louis, Mo.

Mountain Quarries Company's Line.—According to press reports, this company has finished work on the line from Auburn, Cal., east to the quarries near Cool, about eight miles. Morris Kind, president, San Francisco, Cal.

New York Subways.—The New York Public Service Commission, First district, is re-advertising for bids, to be received March 22, for the construction of section No. 2-A of the Lexington avenue subway. This section includes the work from the Canal street station on the Broadway line and the underlying portion of the Canal street crosstown subway. The section extends from the north side of Walker street under Broadway, 530 ft., to Howard street. The plans call for a four-track subway under Broadway, and two tracks for the underlying portion of the Canal street route.

Nipissing Central (Electric).—Bids are to be asked for soon, it is said, to build an extension from Haileybury, Ont., north along the shore of Temiscaminque lake to New Liskeard, five miles. P. L. Utley, chief engineer, Escanaba, Mich.

Nova Scotia Railway.—According to press reports, a contract has been given to M. P. & J. T. Davis, Quebec, Que., to build from Dartmouth, on the opposite side of the harbor from Halifax, east to Doan's Settlement, about 70 miles. The line is eventually to be extended to Country Harbor and the strait of Canso. A sub-contract is said to have been given to Cavicchi & Paganno, Halifax. L. K. Jones, Ottawa, Ont., secretary of the Department of Railways and Canals.

Oregon Eastern.—See Oregon Short Line.

Oregon Short Line.—A sub-contract has been given to Baube Brothers & Company, Salt Lake City, Utah, it is said, for grading work on the Oregon Eastern from Vale, Ore., southwest. The Utah Construction Company has the contract from Vale southwest through the Malheur river canyon to a point near the north shore of Malheur and Harney lakes in Harney

county. Carl Stradley, assistant general manager, Salt Lake City. (January 19, p. 132.)

Pecos Valley Southern.—This company, which operates a line from Pecos, Tex., to San Salmon Springs, is planning to build an extension northeast from Pecos to Lamesa, about 140 miles. It is understood that an extension will also be built south to Alpine, about 50 miles, to a connection with the Southern Pacific. L. M. Schwab, assistant engineer, Pecos, Tex. (Feb. 16, p. 321.)

Prince Edward & Hastings.—Incorporation has been asked for in Canada to build the following lines: From Trenton, Ont., to Gardenville, thence easterly through or near Albury, Rednersville and Rossmore, thence northwesterly to Frankfort and back to Trenton; from a point between Albury and Rednersville to Wellington, thence easterly through or near Bloomfield to Picton; from a point near Picton northerly to Demorestville, thence easterly through Northport and Solmesville to Ferry Point; from Bloomfield southwesterly to West Point; from Picton southwesterly to West Point; from Picton southwesterly to Black River, and from Picton easterly through Waupoos to Indian Point. Pringle & Guthrie, Ottawa, are the solicitors.

Quanah, Acme & Pacific.—Work is now under way from the present terminus at Paducah, Tex., west to Floydada, about 60 miles. It is understood that the line will eventually be extended to El Paso, about 450 miles. A. F. Sommer, resident engineer, Quanah, Tex.

Quebec & Saguenay.—Application has been made to the Quebec provincial legislature for an act to continue in force all the rights of its act of incorporation, to build through the counties of Montmorency, Charlevoix, Saguenay and Chicoutimi, from a point on the Quebec Railway, Light & Power Company at St. Joachim, northeast following the St. Lawrence shore through Baie St. Paul to Ste. Irenee and Malbaie, thence via a point on the Saguenay river, between its mouth and Lake St. John, to a point at or near the boundary of the province of Quebec, through the county of Saguenay, also to build branch lines. An extension of time has been asked for the completion of the line from St. Joachim to Murray Bay of three years, and the completion of the other lines within seven years. Sir Rodolphe Forget, of the Quebec Railway, Light & Power Company, is president of the Quebec & Saguenay.

Temiskaming & Northern Ontario.—An officer writes that bids are being asked for grading an extension from Earlton, Ont., to Elk Lake on the Montreal river. This extension is to be built at once. The maximum grades will be one per cent., and the maximum curvature six deg. There will be two steel briges, one over the Jean Baptist river and the other over the Montreal river. The roal will traverse an undeveloped agricultural district to the Elk Lake silver mining camp. S. B. Clement, chief engineer and superintendent maintenance, North Bay, Ont.

Texas Central.—Announcement has been made that an extension is to be built from the western terminus at Rotan, Tex., during this year. The present plans only call for building about 50 miles. This extension is ultimately to be built west to Roswell, N. M., about 275 miles. The branch, which runs from DeLeon to Cross Plains, about 40 miles, it is said, is also to be extended about 50 miles. R. H. Baker, president, Austin, Tex.

Yadkin River.—Incorporated in North Carolina with $25,000 capital, to build from Boone, N. C., east to North Wilkesboro, about 45 miles. C. H. Cowles, Wilkesboro, N. C., G. M. Grandin, Tidioute, Pa., H. C. London, Lenoir, N. C., and T. B. Finley, North Wilkesboro, are the directors.

RAILWAY STRUCTURES.

Appleby, Ont.—See Toronto, Ont.

Bay City, Mich.—The Grand Trunk is building a bridge at Bay City, Mich. The plans call for two draw spans of 250 ft. each, and five fixed spans of 150 ft. each, with concrete piers. Contracts have just been let for extending the Grand Trunk tracks from the west to the east side of the river at Bay City.

Burlington, Ont.—See Toronto, Ont.

Chicago, Ill.—The Indiana Harbor Belt has acquired from the Guaranty Trust Company of New York 13½ acres at the southwest corner of Forty-eighth and Morgan streets and the southwest corner of Forty-eighth and Aberdeen streets, to be used as a storage yard.

Cooksville, Ont.—See Toronto, Ont.

Earlton, Ont.—See Temiskaming & Northern Ontario under Railway Construction.

Hamilton, Ont.—The Grand Trunk, it is said, is seeking to secure waterfront property on Burlington bay at Hamilton, as a site on which it will put up a grain elevator.

Ingersoll, Ont.—According to press reports, the Canadian Pacific is planning to carry out improvements at Ingersoll, including the construction of a bridge to cost $30,000.

Islington, Ont.—See Toronto, Ont.

Lambert Point, Va.—An officer of the Norfolk & Western writes that plans for the proposed improvements at Lambert Point are not yet finished. The work will include an extension to the yard tracks of about 96,000 ft., or over 18 miles. New shops, car sheds, etc., and a 21-stall roundhouse. (February 23, p. 361.)

Lorne Park, Ont.—See Toronto, Ont.

Montclair, N. J.—An officer of the Delaware, Lackawanna & Western writes that bids have been received, and contracts will probably be let at once to put up a new passenger station at Montclair, N. J.

Montreal, Que.—The Grand Trunk is building a bridge over the Lachine canal at Wellington street, Montreal, Que. It is to be the same type as the present structure, but will be much stronger.

New Martinsville, W. Va.—An officer of the Baltimore & Ohio writes regarding the improvements to be made to bridges and trestles on the Ohio River division, that authority has been asked for some bridge work between Brooklyn Junction and Wheeling, but up to the present time the only work authorized has been on bridge 378 at New Martinsville, W. Va.

Newark, Ohio.—The work of remodeling the Baltimore & Ohio passenger station in Newark will be started within a week or two. The materials are now being assembled and the improvement will be made by the railway forces at a cost of $15,000. The general waiting room on the first floor will be 28 ft. x 73 ft., and the general offices on the second floor will be remodeled. Four entrances will lead from the general waiting room to platforms.

New York, N. Y.—See item in General News regarding the improvements at Grand Central Terminal, New York.

Oakville, Ont.—See Toronto, Ont.

Portland, Me.—The Grand Trunk is building a bridge over the entrance to the harbor at Portland, Me., to replace the present structure. The new bridge is to have a 225-ft. draw with concrete piers.

Portland, Ore.—The Southern Pacific will begin work soon on the erection of a freight house of brick and concrete, 200 ft. x 50 ft.

St. Louis, Mo.—The Manufacturers' Railway expects to begin work in the spring on a ten-story freight depot and warehouse to cost approximately $750,000. The warehouse will be used by some of the trunk line railways jointly with the Manufacturers' Railway.

Springfield, Mo.—President B. L. Winchell, of the St. Louis & San Francisco, told the Young Men's Business Club at a banquet given him on February 22 that work will be started within the present year on a new passenger station. The site for the station has been bought.

Toronto, Ont.—The Canadian Northern will build stations between Toronto, Ont., and Hamilton, it is said, at the following places: West Toronto, Islington, Cooksville, Lorne Park, Oakville, Appleby, Burlington and Watertown.

Tucson, Ariz.—The Southern Pacific plans to rebuild its machine shop at an estimated cost of $200,000.

Watertown, Ont.—See Toronto, Ont.

West Toronto, Ont.—See Toronto, Ont.

Railway Financial News.

Arkansas, Oklahoma & Western.—See Kansas City & Memphis Railway.

Atchison, Topeka & Santa Fe.—The $18,000,000 4½ per cent. 50-year bonds secured by a mortgage on the California, Arizona & Eastern, mentioned in our issue of February 16, page 322, are to be offered for sale by J. P. Morgan & Company, half of the issue being offered in the United States and the other half in London. The Kansas railway commission has given its permission for the sale.

Chicago & Eastern Illinois.—Kuhn, Loeb & Company, New York, have bought from the company and resold $2,680,000 Chicago & Eastern Illinois Railroad 5 per cent. purchase money first lien coal bonds.

Delaware, Lackawanna & Western.—Stockholders have voted to authorize the directors to increase the capital stock from $30,277,000 to $42,277,000, and to lease the Syracuse, Binghamton & New York. The S. B. & N. Y. has heretofore been operated independently but has been controlled by the D. L. & W.

Denver, Laramie & Northwestern.—The *Commercial & Financial Chronicle* says that a plan has been successfully formed to reduce the floating debt of the D. L. & W. by $1,000,000, and to so concentrate the holdings of the stock of the company that stability of management would be assured for ten years.

The *Wall Street Journal* recently published a report that it was expected to make arrangements for the sale of $6,000,000 30-year 5 per cent. bonds to pay for building the road into the coal fields of Wyoming.

Erie.—The directors have authorized $10,000,000 5 per cent. three-year notes to complete double tracking to Chicago. About $20,000,000 will be needed to complete the work but the balance of the cost will be supplied from earnings and cash on hand

Illinois Southern.—This company, which has been going through a friendly reorganization since June 1, 1911, has published a general balance sheet as of December 1, 1911, which gives assets as follows: Rail and equipment, $7,973,378; material and fuel, $52,561; cash, $47,539; other working assets, $51,959; total assets, $8,125,437. Liabilities as follows: Common stock, $4,000,000; preferred 6 per cent. cumulative stock, $1,000,000; first mortgage bonds outstanding, $1,630,000; income mortgage bonds outstanding, $1,380,000; working liabilities, $97,928; taxes not due, $12,000; equipment replacement, $3,650; profit and loss, $1,858; total, $8,125,437.

Kansas City & Memphis Railway.—Stockholders of the Arkansas, Oklahoma & Western have voted to ratify the proposal of the directors to exchange their stock on a basis of one share of A. O. & W. stock for five-eighths of a share of K. C. & M. The K. C. & M. has furnished $30,000 to pay off floating debt and has assumed the outstanding $300,000 bonds of the A. O. & W.

Maine Central.—Lee, Higginson & Co. and F. S. Moseley & Co., both of Boston, bought from J. P. Morgan & Co., New York, and resold at par $12,000,000 one-year 4 per cent. coupon debenture notes of March 15, 1912-1913. These notes are legal investments for Massachusetts savings banks. In July a general mortgage bond issue of $25,000,000 was authorized, of which $12,000,000 bonds were to have been sold at once for refunding purposes, but the sale was not apparently found to be expedient and the present sale of notes is said by the *Boston News Bureau* to be a temporary means of refunding until the notes may be themselves taken up through the sale of mortgage bonds or of stock.

Pere Marquette.—Control of this company has been bought by Newman Erb, who was associated with Edwin Hawley in the merger of the Minneapolis & St. Louis and the Iowa Central. Newman Erb has been elected a director of the executive committee. Mr. Erb gave out the following in regard to the Pere Marquette:

Until 1911 the Pere Marquette had not prepared for the natural development and increase of its business and was endeavoring to meet about 25 per cent. traffic expansion without any corresponding increase of its facilities or adequate improvements for economical operation required by the gradual reduction of rates and increase of wages in recent years; but during the last calendar year the company expended upward of $2,000,000 in revision of grades, double tracking 47 miles of main line, adding 25 miles of siding and passing tracks, new roundhouses, enlargement of machine shops, many new steel bridges and other important improvements. It also bought sixty locomotives and added to its passenger equipment, involving a total for improvements and equipment of upward of $3,000,000.

This development work has only just been completed. The company has therefore not yet reaped its benefit. Besides, during the improvement work traffic was moved under difficulties involving expensive delays and added transportation cost. Indeed, at times and for considerable periods embargoes were placed on through business.

It may now be confidently expected that the "turn of the tide" with this property is at hand and that the results of operation from now on will approach the normal ratio of operating cost, with corresponding surplus in line with its neighboring roads.

Philadelphia & Reading.—At a meeting of the stockholders of the Reading & Columbia, a majority of the capital stock being owned by Reading Company, authority was given for the issue of $850,000 consolidated first mortgage 4 per cent. bonds, to be used to retire $650,000 first mortgage 5 per cent. bonds, maturing March 1, 1912, and $350,000 second mortgage bonds maturing on September 1, 1912; $150,000 of these second mortgage bonds, which are owned by the Reading Company, will be canceled, and in place thereof the Reading Company will take $150,000 debenture bonds, which will be subsequent in lien to the new consolidated mortgage bonds.

Sanford & Troy.—This company has been merged with the Raleigh & Southport, the Durham & Charlotte and the Aberdeen & Ashboro, which have been taken over by the Raleigh, Charlotte & Southern now controlled by the Norfolk Southern. (January 5, page 3.)

Syracuse, Binghamton & New York.—See Delaware, Lackawanna & Western.

FOREIGN RAILWAY NOTES.

The concession to build a railway from Piratininga, Brazil, through the valleys of the Peixe Feio river to the frontier of the state of Matto Grosso, with an extension of over 360 miles, has been granted. The concession is to run for 90 years.

The Pacific Railway, Argentina, has opened to traffic its branch line from Rawson to Arribenos, its present terminal point. The new stations on the line are Ingeniero Silveira, Coronel Isleno, Ines Indart, Los Indios, and Ascension. It is soon to be extended to Sampacho, a distance of 25 miles from Arribenos. The total length of the line is 82 miles. A telegraph line has been erected alongside the railway.

The construction of railways from Elmore, Victoria, to Cohuna, and from Swan Hill to Piangil, is recommended by the Railways Standing Committee. The chief engineer of railway construction, who has inspected the proposed routes, states that there is every indication that the lines will prove valuable in encouraging settlement. Surveys of the lines are now being carried out, and plans will be prepared for specific reference to the Railways Standing Committee.

The Russian minister of finance is considering a proposed Ryazan-Ural railway to connect the town of Uralsk with the station of Ilietzk and the Tashkent railway, and also a proposal to widen the narrow gage Erschoff-Uralsk line. The new line it is asserted will greatly facilitate traffic in Central Asian products. A Russian inter-departmental council has been called to consider the proposed construction of several important railways as follows: Orenburg-Orsk, Uralsk-Ilietzk, and Troitzk-Orsk. All these projects will be subjected to an accelerated consideration, as they are expected, if they materialize, to be of great advantage to the local population in furnishing work where the harvest has failed.

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GENERAL NEWS SECTION 438

THE condition of the mechanical department equipment on the Illinois Central was radically improved during the fiscal year ending June 30, 1911, as compared to the previous year. At the same time large reductions were made in the cost of maintaining the equipment, as shown on another page. In these days when the motive power officers are doing their utmost to increase the efficiency of their departments the first and natural question is how this was accomplished, for it is a splendid example of practical efficiency engineering. The answer is not hard to find. In 1910 M. K. Barnum was appointed general superintendent of motive power; for over 25 years previous to taking up his new work he had been in the service of the railways and had had a thorough training in the mechanical department. For several years he was general inspector of machinery and equipment on the Chicago, Burlington & Quincy, reporting directly to the vice-president. This experience developed one of Mr. Barnum's strongest traits—diplomacy. Although remarkable results were accomplished by him while he held that position, there was at no time even the slightest friction with any member of the mechanical department. His thorough practical training, which gave him a clear insight into mechanical department problems, coupled with this diplomacy, made it possible when he undertook the work on the Illinois Central to determine immediately what problems were most in need of attention and to quickly gather round him and build up a strong organization. One of the first moves was to increase the supervision. The present scheme of organization must not be considered perfect, for it will undoubtedly be added to and amplified in the future. It must be admitted, however, that it is more complete than the organization of the motive power department of many roads of equal size, and is well worthy of the most careful study and attention.

TWO or three instances have recently been brought to our attention where railways have engaged so-called efficiency engineers to make reports as to how their efficiency might be increased. Fortunately this arrangement covered only the preliminary reports and did not necessitate retaining the engineers after the reports were made. In one case the recommendations were so indefinite, and stated in such general terms, that the officers of the road, after careful study, were forced to the conclusion that they had no practical application. In another case the representatives of the efficiency engineers made very elaborate reports, going into considerable detail, but in only one instance, and that an unimportant one, were their recommendations practical. On the other hand, several defects in the organization and in the shop equipment, which were more or less obvious to the practical men in charge, but which they had not been able to remedy because of lack of funds, were passed over and were not even noticed by the efficiency engineers. There is no question but that there is room for increased efficiency in almost any department of most of the railways in this country, but if real results are to be obtained is it not far better to accomplish them through the regular organization and under the direction of men of long and wide experience in the department which they concern?

ALMOST enlightening study of the problem of trespassing on railways is presented on another page by Frank V. Whiting, general claims attorney of the New York Central Lines. Out of 10,396 persons killed on our railways during the fiscal year 1911, 5,284 met death while trespassing on railway property; and of these 4,125 were reported as having been struck by engines or cars, which means that they were walking or standing on the tracks. It has been commonly assumed that most of the trespassers killed are tramps or "hobos," and even railway men will be surprised at the facts given by Mr. Whiting. From an examination of the reports of accidents resulting in the deaths of 1,000 trespassers, he concludes that the great majority are not of the class of aimless wanderers who might be expected to be careless of their lives, but are business or professional men, regularly employed workingmen, and members of their families, whose deaths are a distinct loss to the community. Most of them are people living or working near the railway tracks. Mr. Whiting's figures should be of special significance to lawmakers and local authorities whom the railways have long tried, with little or no success, to interest in the passage of stringent legislation against trespassing or in the enforcement of existing laws. Undoubtedly public authorities have excused to themselves their failure to take steps to keep off railway tracks people who have no business there, on the theory that a majority of those killed are of a kind whose loss is of little consequence, or even a good riddance to the community. Others have been so intent on condemning and regulating the railways, because of the less numer-

ous but more spectacular classes of casualties caused by train or crossing accidents, that they have neglected the much more numerous casualties due to trespassing. Mr. Whiting's demonstration that most of the people killed while trespassing are of a class that is in every way comparable with the passengers and employees killed in train accidents ought to lead to more intelligent co-operation on the part of public officials with the efforts of the railways to reduce this kind of fatalities, which can only be reduced by the passage and enforcement of proper laws.

"If the average for the last ten years is holding good, fourteen people were killed yesterday while trespassing on the railways, . . . fourteen were killed today; and fourteen will be killed tomorrow." In these words President Miller of the Burlington has put the seriousness of the trespassing problem squarely before the public and the authorities of the thirteen western states traversed by his company's lines in a letter to the governors of those states, which is published in our news columns. Most of the legislation enacted and proposed to promote safety in railway operation by requiring the expenditure of millions of dollars by the roads has for its object the protection of passengers and employees. Mr. Miller shows that there was not a single year in the last ten when the number of trespassers killed did not exceed the total number of passengers killed in all of the ten years, and that the number of employees killed during the period was only two-thirds as great as the number of trespassers. Mr. Whiting has shown that these trespassers are average citizens; yet they are being killed at the rate of fourteen every day, and, as Mr. Miller says, almost no public notice is taken nor concern manifested. Railway men for years have borne the condemnation and abuse that have been heaped upon the roads, because of the size of their casualty lists. Mr. Miller does not mince words in transferring the responsibility for over half of the deaths on railways to where it belongs, viz., to the public authorities who have permitted the conditions which cause these unnecessary deaths to continue by failure to pass and enforce proper laws to prevent walking on railway tracks and stealing rides on trains. Regulation of railways is justified, he says, "but does it not seem that the most important and necessary means of safety lies in the regulation of the public in this indiscriminate use of railway premises?" Mr. Miller has done the railways a commendable service in thus challenging the executives of the western states to a consideration of this vital subject; and the governors will do less than their duty to the public if they fail to respond to his request for their support in abolishing the great nuisance—the great crime might be a more appropriate way to characterize it—of railway trespassing.

THE *Railway Age Gazette* has already (December 8, 1911, page 1166, and January 19, 1912, page 80) pointed out numerous misstatements in the article entitled Speed, attacking the accident record of American railways, which was written by Charles Edward Russell, and published in the *Hampton-Columbian Magazine* for October, 1911. A letter written to G. W. Mingus of Pittsburgh by the chief clerk of the New Zealand state railways discloses that Mr. Russell is as ignorant of or as willing to misrepresent the facts about the railways of New Zealand as the railways of the United States. In his article Mr. Russell said, "in far-away New Zealand an automatic safety device long ago eliminated collisions." Mr. Mingus sent this statement to R. W. McVilly, chief clerk of the New Zealand railways, at Wellington, with an inquiry as to its correctness. Mr. McVilly replied, under date of January 17, as follows:

"Referring to your letter of November 13 last, I have to inform you that the automatic device referred to in your letter is not in use on the railways of this dominion. I understand that some such appliance is in use on one of the Great Western Company's lines in England where it has given satisfaction. If you write to the Audible Signal Company, London, they will, I have no doubt, be glad to send you literature respecting the appliance. The New Zealand railways use Tyer's Automatic Tablet Apparatus, with visual signals, for single line working, the object of the tablet being to prevent two trains from being on the one block section at one and the same time, and it effectually maintains an interval of space varying according to the distance between any two block stations, which is of course determined by the closeness of settlement and the frequency of the train services. The tablet, however, is merely an indication that the road is clear between given points and its possession authorizes the engine driver to proceed between the points which are named on the tablet."

In other words, the system in use in New Zealand is simply a block signal system, and not in any sense an automatic stop system. We have taken the pains to analyze Mr. Russell's article with such detail and particularity, because it is a typical muckraking effusion; and the fact that it has been possible to refute almost every statement of any consequence in it indicates the very limited extent to which the public is justified in relying on the literary productions of him and other writers of his class. Mr. Russell has been more persevering and virulent in his attacks on American railways than any other writer; and analysis of his Speed article shows that nothing that he writes on railway subjects is entitled to the slightest credence or consideration.

THE good of both the railways and the public is jeopardized by the present condition of the rolled and forged steel wheel market. Until some three months ago, the steel wheel makers were getting fair prices for their product. For some reason, known only to those concerned, "war" was declared; with the result that today the alert purchasing agent can buy solid steel wheels at his own price. During February, some of the makers sold rolled wheels at from $3 to $8 a wheel less than cost. That this cannot continue indefinitely is clear. One of two things must happen—either one or more of the companies will go into receivers' hands, or the product will be cheapened. Since solid steel wheels form but a part of the tonnage of at least three of the four concerns involved in the "war," the chances are against receiverships and in favor of reducing the cost of making. And a reduction in cost means an inferior wheel. Followed to its logical conclusion, an inferior wheel means an unsafe wheel—and unsafe wheels mean loss of life and delays to traffic. Situations like this are deplorable and should be impossible. Under our anti-trust law as interpreted to date, the wheel makers are prevented from getting together and settling their differences; but it is to be hoped that a way will be found to correct the evil before the product is made to fit the price.

WHETHER under the Interstate Commerce act as it now stands the federal courts are or are not authorized and required to review the findings of fact of the Interstate Commerce Commission in rate cases is a question that has been mooted for some time. The commission contends that the courts can review its orders only to ascertain if they are unconstitutional because confiscatory. Many refuse to accept this view, and maintain that practically all its orders are subject to judicial review. The law specifically provides for hearings by the commission before any final order can be issued, and that when the commission has found a rate unreasonable it shall fix the reasonable maximum rate thereafter to be charged. It is argued that if the commission makes an adjustment of rates that is not based on the evidence introduced before it, or is not reasonable, the courts must review and reverse the order even if the rates fixed would not be confiscatory. There is no question now regarding the Commerce Court's view of the subject. The commission issued an order requiring the Louisville & Nashville to reduce its through freight rates from New Orleans to Montana, Selma and Prattsville, Ala. The Commerce Court recently annulled the order on the ground that the hearing before the commission was inadequate and the evidence introduced insufficient to support the commission's conclusions. Says the Commerce Court: "The law provides for a hearing, and it must be more than a shadow. Both parties are entitled to be confronted with the evidence on which the case is to be determined, and the con-

clusion reached must be a reasonable inference from the facts disclosed by the investigation." It is desirable that the position taken by the Commerce Court shall be clearly understood. Whether the law *should* make the findings of fact of the commission final, and permit its decisions to be reviewed only on constitutional grounds, is one question. Whether the law *does* make the findings of fact of the commission final and permits the courts to review its findings only on constitutional grounds is an entirely different question. What the Commerce Court has held, relates not to what the law ought to say, but to what it does say. The *Railway Age Gazette* never has believed that, except under a most strained interpretation of the statute, it could be held to make the commission the final judge of the facts. If Congress meant that the courts should review the decisions of the commission only on constitutional grounds, why did it not say so? It was suggested during the debates on the Hepburn act and, subsequently, on the Mann-Elkins act, that the law should be thus framed, and Congress refused to do so. The Commerce Court in reviewing the commission's findings of fact is simply performing a duty which by plain implication is imposed on it by the law, and any criticisms of its interpretation of the law or of its orders under the law should be directed against the body that made the statute and not against the court that merely construes it. Congress is now in session. If the interstate commerce commissioners or any other persons do not like the law as it is and as the Commerce Court says it is, they can go to Congress and ask for its amendment. That would be a great deal more sensible and just than to denounce the Commerce Court for saying that the law means what Congress knew it meant when it passed it and intended the commission and courts to say that it meant.

THE PRESERVATION OF CAR LUMBER.

THE railways of the United States have not adopted the preservation of lumber very generally in the past, largely because it could be obtained at low cost. The principal use of preservatives has been for cross ties. There are many wooden structures along the roadway which are exposed to decay, and the cost of renewal of which would warrant expenditure for the preservation of the more exposed portions. With the advancing price of lumber and of labor, with a larger experience with preservatives and their suitability to various kinds of wood, and with the more general introduction of timber treating plants by the railways, there will doubtless be an extension of the work of these plants to the material in wooden structures.

The life of the underframes of wooden cars is materially reduced by decay, and the strength of the cars is also so reduced that they are often broken and badly damaged in heavy pushing service or rough switching. It is desirable, therefore, to increase the life of wooden cars and maintain their strength by preserving the timber in the underframe and floors. The beginning of this practice will naturally be with the class of cars in which there is the largest amount of decay. The side sills of stock cars require renewal on account of decay after five years' service. The life of the floor is about the same, and that of the center sills is only a few years more. This short service is obtained from Norway pine sills and flooring, which is the kind of wood generally used for this purpose.

The Master Car Builders' charge for car lumber of all kinds, including sills and flooring, is $35 per 1,000 ft. B.M., and each sill requires about 144 ft. of lumber. The labor charge for the renewal of decayed or broken sills is a large item in the cost of car repairs. The Master Car Builders' charge for labor in renewing two side sills is $9.60, and for one center sill $8.40, while the labor charge for renewing all longitudinal sills is $22.56. These figures are higher than the cost at the home shop, but they show what the lines are charging each other for this class of repairs. The cost of two 36 ft. side sills, 5 in. x 9 in., at $30 per 1,000 ft. B.M., is $8.64, and the labor charge for renewal is $9.60, a total of $18.24. The cost of creosoting with 10 lbs. of creosote per cu. ft. is about 20 cents per cu. ft., and the expense for preserving two sills is $4.80. If the life of the sills is doubled by preservation there is a saving of $18.24 — $4.80 = $13.44 at the end of ten years, and it is probable that good lumber properly treated would last the life of the car, or about 15 years, in which case there would be a saving of $26.88 for the side sills alone.

The Burlington is the first line to treat car lumber in large amounts, and it is using the creosote zinc chloride, or "Card," process for the sills and flooring of stock cars. It is now building 1,000 of these cars at the Aurora shops with treated lumber for these parts. The sills are Oregon fir, and the floor is Norway pine; it is treated at the tie plant at Galesburg, Ill. The cost of treating by the Card process is $10 per 1,000 ft. B.M., and the cost for the floors and sills of the stock car is $7. The workmen use mittens in handling the lumber, and wear goggles to protect the eyes when nailing the flooring.

The sills and floor of wooden gondola cars are constantly exposed to moisture, and they are also subject to decay after a short life, and it will doubtless be found profitable to preserve the lumber for this class of cars, also. The preservation of car lumber is a subject worthy of careful investigation, as it may be found to involve almost as many uncertainties, and cause as much discussion, as the economical treatment of ties. The most suitable kind of wood, the character of the antiseptic, and the degree of penetration of the liquid, are some of the facts which must be properly determined to obtain the greatest economy in the new field of lumber preservation for cars. It is true that steel underframes are used for most freight cars now ordered, but they are not suitable for stock cars, as they will corrode rapidly in that service. Wooden flooring is used with steel underframes, and when it is constantly exposed to moisture it should be preserved. The floors of box and refrigerator cars cannot be treated with creosote, on account of its effect on the lading, but it is possible that some odorless antiseptic may be found suitable for this purpose.

EFFECT OF TWO-CENT FARES ON PASSENGER TRAFFIC AND EARNINGS.

ALTHOUGH several state laws reducing maximum passenger fares to two cents a mile have been held unconstitutional on the ground that they were confiscatory, or interfered with interstate commerce, or both, such laws have been in effect in a large number of states for substantial periods—usually between four and five years. The constitutional questions growing out of this legislation are now before the Supreme Court of the United States, and many lawyers believe that they will be finally determined by a decision upholding that of Judge Sanborn in the Minnesota rate case. The number and importance of the states in which two-cent fare laws have been enacted are so large and the direct effect that the establishment of the reduced state fares has had on interstate commerce has been so pronounced that these laws have exerted a strong influence on the trend of passenger business and earnings throughout the country. There is, in consequence, opportunity for an interesting and enlightening study of the effect of two-cent fare laws.

That these laws have reduced the average rate per passenger per mile for the entire country is shown by the fact that it declined from 2.014 cents in 1907, the year when most of the two-cent fare legislation went into effect, to 1.938 cents in 1910, the last year for which the official figure is available. That the reduction has not been greater has been due to the fact that the railways have curtailed the number of special reduced rates made by them.

One of the principal arguments advanced for so drastic a cut as 33⅓ per cent. in the standard fare was that the reduction would so stimulate the growth of passenger traffic that the railways would earn more money by carrying more passengers at the lower rate than by carrying fewer passengers at the higher rate. Spokesmen of the railways contended in reply that busi-

ness would not be increased by a general flat reduction of the standard rate as much as by the roads' former policy of charging three cents a mile for ordinary travel and making special rates for numerous special occasions, usually on the basis of a fare and a third for the round trip, but sometimes as low as one cent per mile for excursions and summer travel. Which side does the outcome show to have been right?

The passenger business and passenger earnings of the railways have increased since the two-cent fare laws were passed. But so have their freight tonnage and earnings; and both have increased more or less steadily, as the country has grown in commerce, in population and in wealth, ever since railways were first built. To ascertain whether the increase in passenger business and earnings has been to any extent due to the reduction of passenger fares from three cents to two cents per mile it is necessary to find out whether the number of passengers carried and the earnings from passenger service have increased more rapidly or less rapidly since the passage of the laws than before. The passenger statistics reported by the Interstate Commerce Commission throw light on this point. As most of the state laws reducing passenger fares became effective in the early part of 1907, for the purpose of ascertaining their effect comparisons should be made between the figures for 1907 and preceding years and those for the later years, 1908 to 1911, inclusive. The figures for 1899-1911, inclusive, are given in the table:

Year.	Number Passengers Carried.	Passengers Carried One Mile.	Passenger Revenue.	Average Revenue per Passenger per Mile.
1911	*1,010,550,527	*33,631,956,182	$658,772,785	....
1910	971,683,199	32,338,496,329	628,992,473	1.938
1909	891,472,425	29,109,322,589	563,609,342	1.928
1908	890,009,574	29,082,836,944	566,832,746	1.937
1907	873,905,133	27,718,554,030	564,606,343	2.014
1906	797,946,116	25,167,240,831	510,032,583	2.003
1905	738,834,667	23,800,149,436	472,694,732	1.962
1904	715,419,682	21,923,213,536	444,326,991	2.006
1903	694,891,535	20,915,763,881	421,704,592	2.006
1902	649,878,505	19,689,937,620	392,963,248	1.986
1901	607,278,121	17,353,588,444	351,356,265	2.013
1900	576,831,251	16,038,076,200	323,715,639	2.003
1899	523,176,508	14,591,327,613	291,112,993	1.978

*Estimated.

During the years mentioned the number of passengers carried nearly doubled. Official figures for the number of passengers carried in the fiscal year 1911 are not available, but the figure for passenger revenues is available, and by assuming the same percentage of increase over 1910 in passengers carried as in passenger revenue, the number of passengers carried is found to be approximately 1,010,550,527. In the fiscal year 1907, the number of passengers carried was 873,905,133. There has been, therefore, in the past four years an increase of 136,645,394, or over 15 per cent. The average increase per year in passengers carried since 1907 has been 34,161,348, or a little less than 4 per cent. Between 1903 and 1907 the increase in passengers carried was 179,013,598, or 26 per cent., which was at the rate of 44,753,399, or 6½ per cent. per year. From 1899 to 1903 the increase was 171,715,027, or 21 per cent., an average of 42,938,756, or 5¼ per cent. per year, which was slightly less than the increase between 1903 and 1907, but still greater than that since 1907. The figures show clearly that the increase in passengers carried has been markedly less since the two-cent fare laws were passed than it was before.

Let us now consider the statistics for passengers carried one mile. Estimating the passenger mileage in 1911 by the increase in earnings officially reported, we find that passengers carried one mile increased from 27,718,554,030 in 1907 to 33,631,956,182 in 1911, or 5,913,402,152. This is an average increase per year of 1,475,850,533. The percentage of increase in the four years is 21, and per year 5¼. Comparing the figures for 1907 with those for 1903 we find an increase of 6,802,790,249, or 33 per cent.; an average per year of 1,700,667,562, or 8¼ per cent. From 1899 to 1903 the increase was 6,324,436,268, or 42 per cent.; nearly 11 per cent. per year. The increase in passengers carried one mile also has been less since the two-cent fare laws were passed than it was before.

In 1911 the revenue from passenger service was $658,772,785; in 1907, $564,606,343; in 1903, $421,704,592; and in 1899, $291,112,993. Therefore, during the past four years the increase has been 16⅔ per cent.; during the preceding four years it was 33⅓ per cent., and during the four years before that—1899-1903—it was 44 per cent.

The unmistakable conclusion from these figures is that two-cent fare legislation has not tended to increase either passenger traffic or passenger earnings. What increase there has been has been caused by the natural development of the country and the increase in population. In fact, the figures furnish evidence that instead of stimulating the growth of railway travel the two-cent fare laws have rather retarded it. Railway men have learned by experience, not by theorizing, that the amount of travel at a particular time or between particular points for a particular occasion may be greatly stimulated by a specific and temporary reduction in rates, but that ordinary, day-to-day travel for business or pleasure, which makes up the bulk of railway passenger business, is controlled by other considerations to a far greater extent than by a difference of a cent a mile in the standard fare. Nobody will do any more of such traveling, because the regular rate is two cents than because it is three cents or four cents. On the other hand, almost anybody may be induced to attend a convention, make a shopping trip or take a vacation tour by a temporary reduction in rates. It is the reduction of fares for special purposes and limited periods that stimulates traffic.

Moreover, the railways have learned, also by experience, that this latter class of traffic increases net as well as gross earnings. The unit of cost of passenger service is not the passenger mile, but the train mile. If trains which ordinarily run half empty can be filled by a reduction of fares for an excursion, the expense of transporting the increased number of passengers is not increased in proportion; and the proportion of the receipts left for net earnings is enhanced. When regular fares were three cents a mile there was a basis from which reductions could be made. When the basis was reduced to two cents, on the theory of equal rates to all at all times, there was nothing to reduce from without cutting much below what the railways felt they could in any case afford. Therefore, the roads, instead of making special rates to induce extra travel, have resorted to seeking to stimulate travel by special service and more luxurious trains, which, of course, have increased expenses. Another reason why they have maintained the flat two-cent rate is that it would have seemed inconsistent to contest the two-cent fare laws while in practice making lower rates. Furthermore, they have been restrained by the effective, though fallacious, argument advanced by those who were responsible for the two-cent fare laws, that if railways could afford to cut rates to two cents or less for special occasions they could do so at all times. If the roads were to cut rates below two cents a mile, how long would it be before those who caused the passage of the two-cent fare laws would start an agitation for a 1½-cent fare?

As passenger business is relatively unremunerative at best, when its fair proportion of fixed charges and overhead expenses is added to the direct operating expense of handling it, the carriers cannot be blamed for declining to make many rates below the legal maximum so long as that maximum is two cents a mile.

PENNSYLVANIA RAILROAD.

A FAIRLY good illustration of the policy of the Pennsylvania Railroad towards the financing of the betterment of its property is afforded in a little table published in the annual report for the calendar year 1911. This table shows that during the year the company spent for additions and betterments and equipment $14,320,000, of which $6,970,000 was spent from income of this year and previous years; $1,790,000 from depreciation reserve, and $5,560,000 from the proceeds of the sale of securities (charged to capital account). An even more impressive illustration of the company's determination to keep its capital account on the soundest possible basis is given in its treatment of the cost of the New York terminal. The Pennsylvania has advanced $84,860,000 for the tunnels and station and in exchange received a certificate of indebtedness of the Pennsylvania Tunnel and

Terminal for their amount but carries this $84,860,000 certificate on its books at $57,460,000.

The necessity for such a conservative policy, both as regards financing and as regards operation, is not shown on the face of the figures for earnings and expenses of the property. In 1911 the five grand divisions, operating 4,018 miles, earned a total revenue of $157,490,000, a decrease of $2,970,000 from 1910, and showed net operating income, after the payment of taxes, of $35,900,000, a decrease of $2,050,000. Since fixed charges were reduced, as is mentioned later, by over $1,000,000, the sum available for dividends was $37,320,000, or only $460,000 less than in 1910.

The Pennsylvania Railroad, operating as it does between such important manufacturing centers and the Atlantic coast, reflects in its net earnings quite accurately the industrial conditions of the country, and even in a year of great industrial depression, it has its large tonnage of both anthracite and bituminous coal to depend on as a steady revenue producer; in addition it has its passenger business, which in 1911 brought in $8,450,000 from passengers alone, an increase of $290,000 over the year before,



The Pennsylvania Railroad.

which is, to a large extent, independent of industrial conditions and which grows with increase in population.

The explanation of the necessity for thoroughgoing conservatism on the part of the management lies in an understanding of the enormous pressure under which the plant, as well as the officers, is put to meet the service required. One of the very large transcontinental western railways handled in a recent year 7,013,000,000 ton miles of freight. In 1911 the Eastern Pennsylvania *division* of the Pennsylvania Railroad, which comprises, roughly, only the lines between New York and Philadelphia and Altoona, handled 9,314,000,000 ton miles. The western road had two general managers, with their full staffs, and had 9,900 miles of railway to spread the business out over, while the Eastern Pennsylvania division had a general superintendent and 1,341 miles of railway. If the objection is made that the Pennsylvania has a great deal of four-track line, it is proper to reduce the comparison to a track mile basis, including sidings. On this basis the Pennsylvania handled nearly a third more ton miles over 3,534 miles of tracks than the western road handled over 13,674 miles of tracks. This comparison is given only to show how intense and how concentrated is the pressure on both officers and plant of the Pennsylvania.

The Pennsylvania east of Pittsburgh has on an average a locomotive to every mile and a quarter of road. It is a property worked to within a comparatively small per cent. of its absolute total physical capacity. A comparatively small per cent. of increase in freight and passenger business may necessitate the expenditure of vast sums for new facilities. It is not surprising, then, that those responsible to the public which such a property serves, and to the great body of holders of its securities, have adopted and perfected a policy of thorough-going conservatism.

An organization that can successfully operate under such conditions as those on the Pennsylvania Railroad must be founded on something more enduring than the genius of any one man. Its service requires almost a military standard of attention to duty, and its management must inspire in employees a confidence in the permanency of working conditions that is generally absent from American railway service. Its management must inspire in the officers a sense that their work will receive the appreciation and eventually the promotion which it deserves. The organization has to be built up over a long series of years. Such an organization is the ideal which the Pennsylvania Railroad tries to attain. The requirements of a plant to meet conditions of such great pressure will be mentioned later.

Returning to the figures shown by the company for the calendar year ended December 31, 1911, operating revenue, as has already been mentioned, was less in that year than in 1910. A decrease of $4,020,000 in freight revenue was partly offset by an increase of $840,000 in passenger revenue.

Operating expenses totaled $113,230,000 in 1911, a decrease of $1,580,000 from 1910. The saving in expenses, however, came entirely in maintenance cost, except for a slight saving in traffic; the cost of transportation totaled $58,050,000 or $850,000 more than in 1910. The fact that transportation expenses increased is explained by the comparative character of the traffic in 1911 and 1910, and by the fact that the increased wage scale was in effect only for eight months in 1910, while in 1911 it was in effect for the entire calendar year.

The ton mileage on all the lines directly operated was 19,428,000,000, a decrease of 4.24 per cent. from 1910. On the other hand, passenger mileage totaled 1,722,000,000 in 1911, an increase of 1.70 per cent.; and the fact that sleeping, parlor and observation car mileage increased 8.97 per cent. suggests in what class of passenger traffic the new business largely occurred. With an increase of 4.24 per cent. in the ton mileage, revenue freight train mileage actually decreased 7.37 per cent. In other words, while revenue per ton per mile remained almost the same, at 5.87 mills, revenue per freight train mile increased by 4.18 per cent. and totaled $3.942.

Passenger mileage increased by 1.70 per cent., and passenger train mileage increased by 5.72 per cent. Increased operating efficiency can, to some extent, decrease passenger train mileage per passenger mile, but it almost invariably meets with opposition from the traveling public and is generally recognized by railway men to be so counter to public sentiment as to be inexpedient.

The very distinct gain made in handling freight was apparently due to better train loading and to other economies and improve-

ments in operation. In 1911 the average train load of revenue freight was 671 tons, an increase of 22 tons, or 3.4 per cent.; and when it is taken into consideration how very heavy the average load is on the Pennsylvania this gain means a great deal. Locomotive mileage in freight service totaled 36,970,000, a decrease of 6.36 per cent.; and locomotive mileage in switching service totaled 21,750,000, a decrease of 7.67 per cent. The average haul of freight on the Pennsylvania was 155 miles, or only slightly less than in 1910. The gain in train loading was due to an increased number of cars per train, the loading per car being 26.59 tons in 1911, or 0.23 of a ton less per car than in 1910.

Of the total tonnage, amounting to 125,180,000 tons, carried on the Pennsylvania in 1911, 42,170,000 tons were furnished by bituminous coal, 11,740,000 tons by anthracite coal and 12,360,000 by coke. The increase in bituminous coal tonnage was about a million tons, and the anthracite coal tonnage about a quarter of a million. Coke, however, was less by 2,150,000 tons than in 1910. There was a notable decrease in the tonnage of bar and sheet metal, which tonnage totaled 3,850,000 in 1911, or over 1,000,000 tons less than in 1910.

In the spring of 1911 the Pennsylvania Railroad offered to its stockholders $41,260,000 stock at par, which was subscribed for. With the proceeds of this stock sale the company reimbursed itself for the sum spent in 1910 to pay at maturity general mortgage bonds and short term notes. The payment of these fixed interest bearing securities made a saving in the year 1911 of $1,020,000 in interest charges for funded debt. The Pennsylvania also, through its sale of stock, very materially strengthened its holdings in cash. At the end of 1911 there was $51,080,000 cash on hand, an increase of $18,720,000 over the amount on hand at the end of 1910. The Pennsylvania also increased its holdings of Norfolk & Western common stock and of New York, New Haven & Hartford stock. The total par value of Norfolk & Western common held at the end of 1910 was $31,660,000, and at the end of 1911, $32,480,000, while the par value of New Haven stock was $3,500,000 at the end of 1910 and $4,060,000 at the end of 1911. There is no indication in the annual report that the Pennsylvania Railroad itself has been buying Seaboard Air Line stock, as was rumored at times during the past year.

It has been customary to say that the Pennsylvania has not had under consideration since the completion of its New York terminal, any plans for very great extension of its facilities. This is by no means correct. The New York terminal had not been finished before the business at Philadelphia made pressing demands for large additions to facilities at this city. The Pennsylvania has also been at work jointly with the New Haven on the very important and expensive New York connection. Last year the directors and a committee of officers of the Pennsylvania worked at devising some method by which the situation at Philadelphia could be improved. They considered, among other things, taking a great deal of the through business away from the Broad street station, but probably such a plan met with a good deal of bitter opposition, and at the end of the year the board of directors had about concluded that the passenger facilities would be improved by increasing the tracks and platforms and enlarging the station facilities at the Broad street station and at North Philadelphia. The freight situation is to be improved by building two additional tracks so as to make a six-track system between Paoli and Philadelphia. Between Morrisville, Pa., and Newark, N. J., there are also under construction two additional tracks. The line between Paoli and Philadelphia will benefit Philadelphia, and the other new line will be used for New York traffic.

The Pennsylvania now has six tracks in operation all the way from Pittsburgh to Philadelphia, with the exception of the stretch on the Middle division, between Pittsburgh and Harrisburg. Possibly an outline of how the six-track road between Harrisburg and Philadelphia is operated will give as clear an idea of what the Pennsylvania is now doing, and what it may expect to have to do as can anything else. The four old tracks are used for passenger trains and fast freight trains. They are used even now at certain times of the year almost to their full physical capacity. The two-track low-grade freight line has a 0.2 per cent. grade. It is used only for slow freight, almost entirely coal, and for the westward movement of empty freight cars, mostly steel hopper cars. At busy seasons of the year 30- to 40-car trains of coal follow each other eastward over the line as closely as safety will permit. Notwithstanding the extraordinary density of traffic over this line, it is estimated that it probably does not pay the interest charges on its cost of construction; yet it was absolutely necessary. The service demanded on the old four tracks was so great that two additional tracks on the same grade would not have satisfactorily taken care of the business offered.

There is here a rather good illustration of a case where a railway company, in meeting the demands of its service, has to make an expenditure which cannot carry itself from its net earnings. The problem is obvious; the solution will have to be left to the future.

The following table shows the principal figures for operation in 1911 as compared with 1910:

	1911.	1910.
Mileage operated	4,018	3,977
Freight revenue	$113,414,431	$117,434,920
Passenger revenue	33,525,583	32,687,423
Total operating revenue	157,587,413	160,457,298
Maint. of way and structures	18,353,290	20,342,489
Maint. of equipment	30,579,967	31,117,989
Traffic	2,143,147	2,221,803
Transportation	58,046,751	57,200,886
Total operating revenue	113,228,393	114,812,628
Taxes	6,826,070	6,374,736
Net operating income	34,390,637	35,782,656
Gross corporate income	51,617,111	53,241,503
Net corporate income	37,318,551	37,775,484
Dividends	25,950,857	24,410,860
Reserved for additions and betterments	4,000,000	3,700,000
Extraordinary betterments and improvements	2,265,887	3,504,597
Principal of equipment trusts	3,076,853	3,418,658
For the trust of October, 1878	319,756	308,522
Surplus	1,704,997	2,753,396

NEW BOOKS.

[illegible]. McGraw-Hill Publishing Co., New York. 9 in. × 12 in. 566 pages. 3,899 illustrations. Leather, $6.00; Cloth, $3.50.

The Railway Signal Association Signal Dictionary, first published in 1908, has been revised and published in the second edition under the supervision of a committee of the association.

The aim in revising the book, as stated in the preface, has been to "retain descriptions and illustrations of apparatus which, although no longer made, is and will remain for some time in rather extensive use, as well as to reflect the latest work of the manufacturers." That the book is not merely a catalog of manufacturers' devices is shown, however, by the fact that it contains practically all of the standards of the Railway Signal Association and a great many standards adopted by the signal departments of prominent railways of this country and England.

Another change which will be found almost as valuable as the addition of up-to-date apparatus and standards is the rearrangement of the material in a form which is intended for ready reference. The definition section, or dictionary proper, was amplified considerably with special attention to the terms used in connection with alternating current apparatus, and the whole section was revised and brought up to date. All definitions which can be illustrated by the figures in the descriptive part of the book are referred to by their figure numbers. The descriptive part of the book is divided into five sections, which are clearly marked by title pages and subdivided to arrange each branch of the subject under distinct headings, and a complete cross reference index is added. The divisions of the descriptive part are: (1) Signal Symbols and Signal Indications; (2) Block Signaling; (3) Interlocking; (4) Highway Crossing Signals, and (5) Accessories. The last-named division contains 18 subdivisions, in which the apparatus and devices used in railway signaling are illustrated and described.

Letters to the Editor.

EXCESSIVE SPEED AND RAILWAY ACCIDENTS.

Chicago, February 26, 1912.

To the Editor of the Railway Age Gazette:

Is it not strange that our Congress, after legislating to itself the almost unlimited physical regulation of the railways, should confine so much of its activities to surface remedies for the prevention of passenger train accidents?

Why should Congress not go to the root of the subject, and by thorough investigation endeavor to discover whether the fundamental cause of accidents may not be unreasonably fast train schedules? Would it not be well for Congress to investigate each species of accident and learn how many are the direct result of, or connected with, excessively fast schedules? A careful study of the facts by Congress might compel the conclusion that excessively fast schedules are the fundamental cause of accidents.

May not Congress investigate the social and business necessity for excessively fast schedules? If it should be found that fast schedules exist for the benefit of but one in one thousand traveling patrons, this might justify the conclusion that the remaining 999 traveling patrons should not be subjected to the risks which investigation may show attend excessively fast running.

Investigation may convince Congress that it is far from the root of the subject, in making laws to compel the railways to adopt devices of which the most that can be said is that they are still in the most experimental stage, with the expectation that these delicate, highly mechanical, electric and uncertain mechanisms will come into play at the providential moment and avert the consequence of the temporary mental lapse of an engineman.

Is there not much which the railways can and should do and will do to safeguard transportation, of greater value for safety, which should precede the proposed requirements? Is it not within the province of Congress to investigate and learn what proportion of the serious accidents between two trains and in derailments and the giving away of equipment in the last few years, has occurred to trains running on long distance schedules at a speed of rate of over 40 miles per hour?

Congress might learn what proportion of accidents has occurred to trains on fast schedules running late and running fast to make up time. What proportion has occurred in instances in which the anxiety of capable, unexceptional enginemen to make up time, has caused them to overlook the language of incessant block signal indications? What proportion has occurred through failure of equipment on excessively heavy trains, hauled by excessive engine power on excessively fast time? What proportion has occurred from broken rails, largely attributable to fast time and heavy power? What proportion has occurred through the haste and hurry of train despatchers, signalmen and operators to facilitate the movements of fast trains and who have been led, in their anxiety, to violate rules laid down for safety, for the sole purpose of expediting the movement of the trains?

These are some of the principal classes of accidents resulting from fast time. Congress may not be able to regulate the rate of speed of railway trains. It might, however, do a beneficent work by investigating the effect of fast time and calling the attention of the public and the railways to the consequences, which so frequently result from it; and if it concludes that fast time is a largely contributing cause of accidents, it might call attention to its investigation and give publicity to its views.

Congress could not do more towards conserving the life of railway travelers than by calling attention in a persuasive way to the damaging consequences of fast time, after having made careful investigation and analysis of passenger train accidents for a reasonable period.

It would seem to be more the duty of Congress to make these investigations for the discovery of the fundamental cause, than to ignore the fundamental cause, on the ground that fast running is an indispensable necessity, and proceed in an impracticable and haphazard way to compel the use of expensive and inadequate devices for hedging against the consequences of such running.

If Congress could induce the railways to establish rates of speed of 25 and 35 miles per hour between long distance terminals, the lives of many who are now killed would be saved, and the lives of many who are not killed would be greatly prolonged by the comfort and pleasure of safer travel. Steel cars may prevent some loss of life in collision and derailing accidents, but who wants to take the chances in these accidents of having his life saved, at the risk of possible permanent injury in a steel car? Who would not prefer to so travel as to avoid the occurrence of accidents?

Let Congress make the suggested investigations before resorting to legislation, which seems to practical railway men to invite more danger than it can contribute toward safety.

Nothing could mark so great a stride towards safety as an authoritative recommendation by Congress to the railways that they slow down their fast schedules and that proposed legislation would be withheld pending a fair trial of the result of the change. Very many of our railways are composed very largely of branch mileage. Undoubtedly all superintendents will recall that since the construction of these lines embracing periods of from 20 to 50 years, on which schedules range between 20 and 25 miles per hour, the life of no human being has been taken and no human being has been injured by train accident.

It should be respectfully recommended to the committees of the two houses of Congress and the Interstate Commerce Commission, that the different bills now in their hands requiring the installations of different signal and automatic devices be withheld until the necessity for them can be investigated and their practicability can be established; and that if legislation must finally follow that it take the form, not of an inflexible law to be applied everywhere without regard to conditions, but of a flexible law giving due consideration to the financial ability, physical conditions, density of traffic and speed requirements of the various lines.

Congress should also be invited to ask for the assistance of, and take into its confidence the active railway men who have helped build up and are now operating the roads. The advice and judgment of these men should outweigh the advice of inventors, promoters and others, who without the actual experience and responsibility of railway operation, will for the sake of selfish speculation, urge upon Congress its legislative sanction of untried devices—devices, which to the present time are based on theories, and whose use would be full of risk. Our railways have not been built up to their present high standard of excellence by acting on the advice of such men. The good intentions of our Congress should take the form of action slowly, and by careful encouragement the railways should be assisted by helpful advice rather than coerced by compulsory legislation.

A committee or commission appointed by Congress to investigate and recommend to the railways the results of its studies would undoubtedly meet with the co-operation and conscientious support of the railways, because of the practical purpose in view and the candid manner of reaching the desired ends. The most influential bodies of men connected with government have often been found with authority only to investigate and recommend. The Massachusetts Board of Railway Commissioners is a striking example of a body, whose only authority is that of recommendation. It is frequently stated that this recommendatory commission is of greater influence than any other authoritative commission in the Union.

If Congress were to proceed under the advice of an unbiased and non-political agency, the railways which are to be regulated would undoubtedly be found most cordial assistants, rather than apparent obstructionists.

Nothing is more strongly felt by the railways than the inade-

quacy of the present method of introducing bills vitally affecting the operation of the roads, which are referred to the commerce committees of the houses, which at most can be given but perfunctory hearings to a small number of representatives of the railways, necessitating conclusions reached without due information and deliberate consideration.

F. C. RICE,
General Inspector of Transportation, C. B. & Q.

UNRESTRICTED USE OF THE "19" TRAIN ORDER.

NEEDLES, Cal., January 16, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The subject of improving train service merits serious consideration. While we have made fairly satisfactory progress with passenger traffic, there is continual dissatisfaction regarding the movement of freight. The traffic department is constantly urging upon the operating department the necessity for perfecting and quickening the transportation service. At the same time, the ever present necessity for rational economies must never be lost sight of. It therefore behooves railway officials to make the best possible use of the facilities and methods at their command.

On railways where the "31" train order is still in vogue, much delay to trains, both passenger and freight, is occasioned by the necessity of stopping trains for orders, requiring conductors to go to the telegraph office, sign for the orders, read them aloud to the operator, take the orders to the engineman, have him read them to the conductor and then give the conductor a receipt for the orders received. It costs money to stop and start trains. Much time is lost by the procedure made necessary by strict compliance with the rules for handling the "31" train order. Every stop which can be obviated and every minute of time that can be saved means money to the company. One of the most important requisites of the train order system is to get the order into the hands of the men who are to execute it. And the less hands the order is obliged to pass through between the despatcher and the men who are to execute it, the less possibility of failure. With the "19" order only one man handles the orders between the despatcher and the conductor and engineman. Some roads have long since adopted the unrestricted use of the "19" order and have pronounced it an absolutely safe and practical method, as well as economical. It is safer than to use the "31" order. This assertion is based upon actual experience.

Officers of those roads which have adopted the unrestricted use of the "19" order tell us that they have yet to hear of a single accident in any way traceable to the use of the "19" order, or that might have been averted by the use of form 31.

Timid, indeed, were the first experiments. An extra safeguard was thrown around the despatching system by the installation of automatic block signals. The step was watched with much interest. It was found to work satisfactorily, and while the automatic block signals served to stop trains in case something happened to create a hazard, it was found that trains were being handled in such a manner with the "19" order that the system did not depend on the block signals for its success. No hazards occurred that could have been obviated had a "31" order been used instead.

So other roads took up the practice—roads having no block signals. First, they authorized the unrestricted use of the "19" order for freight trains only. A year or so later, authority was given to use the "19" order for both passenger and freight trains. This system has been in vogue during the past three or four years on one of the busiest roads east of Chicago; and on four of the divisions on which it has been in use, every mile of which is single track, not one mile has automatic block signals or block signals of any kind. And they tell us the same story; not a single oversight or mishap of any kind has occurred which could be charged to the order system.

What better recommendation could one ask than the results of four years' experience on this single-track road? It has been said that we are living in an age of progress. If this be so, is it not time for some of the other progressive roads to take a step in the march of progress and discard the use of the "31" train order and adopt the unrestricted use of the "19" order?

It is one of the best methods of keeping the wheels of freight trains moving, and is an improvement in safety. And in asserting that it is a safer method, let me tell of a few specific hazards which actually occurred by reason of the "31" order having been used, which could have been obviated by the "19" order:

A light engine going over a division in charge of the engineman, fireman and a flagman, pulled into a station. The train order signal indicated "stop." The engineman pulled by slowly and stopped at the water tank a few hundred feet away. The fireman took water. The engineman got down and oiled around, and chatted with the flagman. A few minutes later, they got aboard the engine and started off, forgetting all about the signal having been displayed for orders. The operator thought the engineman would come back after having looked his engine over and made no effort to attract his attention, and the engine had gone before the operator knew it. If this had been a "19" order, the operator would have been out and handed it up to the engineman as the engine passed his office, and the hazard would not have been created.

A long freight train pulled into a station. The train order signal was displayed. The train stopped and the conductor went to the office and signed for the order. The head brakeman also dropped off and went in with the conductor. The conductor gave the brakeman a copy of the order to take to the head end, gave the usual "high ball," and they left town. On the way to the head end, the brakeman became involved in a quarrel with some tramps, and considerable time was lost in putting them off the train. In the meantime, the order was stuffed into his pocket and the train had passed the point where they were to have met another train before the brakeman thought of the order. The engineman had not thought to ask him for it, and the conductor was busy making out reports and had not noticed the oversight until they had passed their meeting point. The order on a "19" form could have been handed up by the operator, the necessity of stopping the train would have been avoided, and this hazard would not have been caused.

A passenger train pulled into a station—the train order signal was against it. The crew did their station work and pulled out. The operator expected the conductor to come in and sign the order. The conductor and engineman both overlooked the signal and afterward claimed that it was clear. Others substantiated the statement of the operator that it was "red." If the order had been on a "19" form, the operator would have been out and handed it up; and this hazard, as well as the dispute as to the position of the signal would have been obviated.

A despatcher sent a "31" order to an operator for a passenger train, changing a meeting point. It restricted the rights of this particular train. The operator failed to display his signal and did not notice the oversight until the train was speeding by his office. He was so surprised and bewildered that he could not think of rushing out with his red light until the train had passed the office, and then he was unable to attract the attention of any one on the train. In this case a collision occurred and many lives were lost. If the "19" form of order had been used, the operator would have been on the alert listening for the coming of the train and been out where he could have at least tried to deliver the order. No doubt he would have noticed the position of the signal in time to change it or to flag the train with his lantern.

In a certain case two freights met on the main line, because the despatcher blundered in giving directions which train should take the siding. He sent the order to one train, an extra, to be delivered at the meeting point. If the order had been on a "19" form, he would have given it to the extra at the first open telegraph office, and this hazard would not have been caused. He did not want to delay the train by making an unnecessary stop for the order.

All these oversights, of course, are what you might call "man failures," and were not entirely the fault of the "31" order. But a system which leaves so many loopholes for trouble as does the "31" order, should not be continued when it has been proved beyond a reasonable doubt that the opposite method, the unrestricted use of the "19" order, is a safer and more practicable method of handling trains as well as by far a more economical one.

It means a better and quicker service by avoiding the necessity of stopping trains for orders. It means fewer trains tied up in compliance with the 16-hour law. It means less work on the part of the train despatcher, operators and conductors. All this will tend to lessen the cost of operation. It means better movement of freight traffic—more business for the company. Reducing the number of stops means less drawbars pulled out and less damage to freight by rough handling.

One of the safeguards in connection with the use of the "19" order lies in the form of clearance card to be used, on which the operator is required to write the numbers of all train orders for delivery to the train, and repeat the numbers to the despatcher from the clearance card. If it is found that these are all the orders intended for the train, the despatcher gives the operator O. K. This gives the despatcher a check on the delivery of all orders.

The unrestricted use of the "19" order is no longer an experiment. The test has been made. The results are highly satisfactory. Let us pull for its universal adoption.

J. P. FINAN,
Train Despatcher, Atchison, Topeka & Santa Fe.

SPARK LOSS FROM LOCOMOTIVES.

URBANA, Ill., February 27, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In your issue for February 23 you present under the caption of "Tests in Smoke Abatement on Santa Fe Switching Locomotives," a very complete abstract of a report made by J. H. McGoff, mechanical superintendent, and H. B. McFarland, engineer of tests, on behalf of the Atchison, Topeka & Santa Fe.* The report describes experiments conducted by Mr. McFarland to determine the amount of solid matter discharged from the stack of a switching locomotive operating during the year on the Atchison, Topeka & Santa Fe in Chicago. After presenting certain results, the report proceeds as follows:

"These figures as to the cinders thrown from the stack in switching service discredit the popular theory of great heat losses due to cinders passing out of the stack. In Goss's 'Locomotive Performance,' figures are given for laboratory tests under various working conditions showing losses in the form of cinders passing out of the stack varying from 2.8 per cent. to 10 per cent. of the total coal fired. The results of the tests on engine 2024 in the Chicago yards show but 0.82 of 1 per cent. of the total Pocahontas coal fired passing out of the stack in the form of cinders."

Mr. McFarland's implication to the effect that his results discredit those which have been published by me is an unfortunate one. That there is lack of agreement seems obvious, but the fair-minded critic will prefer to weigh the evidence before deciding which set of results is to be discredited.

The statement as presented by me in the book, "Locomotive Performance,"† and which Mr. McFarland questions, includes results from seven formal tests made on a locomotive plant *under constant conditions of running*, each test being at a different rate of power. The results of these early tests have been confirmed by many subsequent tests. For example, a book entitled, "Superheated Steam in Locomotive Service,"‡ gives the spark losses occurring in 18 tests under different conditions of operation, the values of which must be nearly right, since those of each test enter as a factor in the determination of a heat balance covering the entire performance of the boiler. They show, with Pocahontas coal as fuel, results substantially as follows:

Draft, inches of water	Pounds of coal per hour	Pounds of water evaporated per foot of heating surface per hour.	Solid matter caught in smoke-box and discharged from stack per cent. of weight of fuel.
1.5	750	6	4.3
2.2	1,010	8	8.0
3.0	1,333	10	12.0
4.2	1,777	12	17.5

It will be evident from this statement that the extent of the spark loss depends on the rate of power at which the locomotive is worked. Mr. McFarland's statement shows that his locomotive was often running light, that its runs were always of short duration, and that it was sometimes standing still. The average power developed is indicated by the amount of coal burned which, when Pocahontas coal was used, is stated to have been 386 lbs. per hour, or 13.2 lbs. per ft. of grate per hour. This rate of combustion is from 1/10 to 1/15 that which is common in locomotives on the road. It is less than half that employed by me in a locomotive having a boiler half the size of that carried by his locomotive, in the lightest power test for which the spark losses have been determined. Applying my results to the conditions reported by Mr. McFarland, it becomes evident that the average draft value in his tests must have been much below 1 in. of water. My estimate is that it was about ½ in., and I estimate also that the spark loss which is normally to be expected under the conditions he reports, is about 1¼ per cent. of the fuel burned. His work shows that the spark loss was less than 1 per cent. Passing by this discrepancy for the present, I must insist that Mr. McFarland is wide of the mark when he undertakes to show the normal fuel loss through stacks in locomotive service by the use of a switch engine burning less than 400 lbs. of coal per hour when normal engines on the road having boilers no larger than that of his switch engine are consuming 4,000 or 5,000 lbs. per hour. It is entirely gratuitous to employ the results of such tests to discredit those obtained from carefully planned experiments, all the conditions of which have been specified.

The fact that Mr. McFarland's results show about one-half the cinder loss which might have been predicted from results obtained by me, and the fact that the sparks collected possessed a lower heating value than I have reported, is, I think, easily accounted for. He collected the sparks in a centrifugal separator about 30 in. high through which he drew approximately 11 per cent. of the total volume of gases discharged by the stack. This stream of sampled gases found its escape through a center opening in the separator 10.5 in. in diameter. The trouble with this arrangement is that the sample is too large, or the separator is too small. I have found it desirable to reduce the area of the sampling tube to about 1 per cent. of the area of the stack and to have all openings in the receptacle in which the sparks are collected covered by fine brass (milk strainer) gauze. In the light of my experience, it seems clear that Mr. McFarland did not catch all of the solid material entering his separator. The larger and heavier particles, which were well ballasted with ash, stuck, while many of the smaller and lighter coke particles passed through, with the result that the total solid matter collected was less than it should have been and the heating value of that which was colleced, lower.

W. F. M. GOSS,
Dean, College of Engineering, University of Illinois.

*The report was issued by the Chicago Association of Commerce Committee of Investigation on Smoke Abatement and Electrification of Railway Terminals, Bulletin VI.

†Published by John Wiley & Sons.

‡Published in 1910 by the Carnegie Institution of Washington.

The parliament of Tasmania has voted $145,800 for extending the railway from Hobart westward to Russell Falls, 20 miles farther to the settlement of Tyenna. This will open up a rich timber country and also several agricultural valleys. It is intended ultimately to further extend this railway to the west coast of Tasmania, where there is considerable mining for copper, silver and lead. The proposed route beyond Tyenna is through country entirely unsettled, heavily timbered much of the way, and supposed to contain valuable minerals.

PRACTICAL EFFICIENCY ENGINEERING.

A splendid record in improved mechanical department efficiency has been made on the Illinois Central within the past year and a half, as may be seen by studying the following table containing data as to the cost of maintaining freight and passenger cars and locomotives for the fiscal year ending June 30, 1911, as compared with the previous year.

Cost of Actual Repairs to Cars and Locomotives.

	Freight Cars.		Passenger Cars.		Locomotives.	
	1911.	1910.	1911.	1910.	1911	1910.
Number owned, June 30	60,824	62,705	995	945	1,447	1,398
Repairs, total cost	$5,715,107.34	$8,403,146.00	$878,859.90	$946,033.00	$4,812,649.46	$4,632,412.00
Average cost per car or locomotive	$93.96	$134.01	$883.28	$1,001.00	$3,325.95	$3,313.60
Total mileage	616,886,368	593,266,334	82,135,749	47,051,906	47,051,906	45,893,235
Cost per mile (cents)	0.926	1.417	1.070	1.182	10.23	10.094

The above figures cover the actual cost of repairs and do not include depreciation and renewals. The cost of repairs to freight cars was reduced $2,688,038 during 1910-11 in spite of the fact that a 6 per cent. increase in the wages of all shop men took effect during the last month of the fiscal year 1909-10. A considerable improvement was also made in the condition of the cars, the number of bad order cars being reduced from over 10,000 in July, 1910, to less than 3,000 on October 31, 1910. A large number of heavy repair cars, some of which had been waiting to be shopped for two or three years, were rebuilt during the fiscal year of 1910-11. It is thus clearly apparent that the reduction in the cost of repairs to freight cars from $134 to $94 per car was not brought about by allowing the equipment to deteriorate; in fact it was really in far better condition on June 30, 1911, than at the close of the previous fiscal year. About 2,000 old freight cars were dismantled during 1910-11, because of having outlived their profitable life and the difference between the inventory value and the scrap value was charged to renewals of freight cars.

The total cost of repairing passenger cars decreased $67,000. The decrease of $118 per car is more than it would have been, but for the number of new cars which were received during 1910-11, but, on the other hand, leaving the new cars out of consideration, there was a substantial improvement in the condition of the older equipment as compared with the previous year.

Locomotive repairs show an increase of $100,080 for 1910-11, as compared with 1909-10, but there was a good reason for this. On June 30, 1910, there were about 45 locomotives awaiting general repairs, and all of these were put through the shops within the next four months, and on November 1, 1910, there were 85 more locomotives in service with the same number owned, as compared to the same date in the preceding year, and less than 8 per cent. were out of service for repairs. The condition of the power was far better at the close of the fiscal year 1911 than it was at the end of the previous year. This is clearly reflected by the fact that the miles run per engine failure increased from 21,000 in 1909-10 to an average of 30,000 per month for 1910-11, and in June, 1911, the miles run per engine failure averaged 51,000.

WHY THIS IMPROVEMENT?

On Friday, April 1, 1910, M. K. Barnum was appointed general superintendent of motive power. He immediately began to plan for greater efficiency and more effective work in the mechanical department. Stated in general terms the improvement in results was obtained in three ways: by increasing the supervision; by eliminating unnecessary work, being at the same time careful not to interfere in any way with the successful operation of the equipment; and by the introduction of modern machinery and shop equipment. The fact that a large amount of freight equipment was repaired in outside, or contract, shops during the first six months of the fiscal year 1909-10 was, of course, responsible to a considerable extent for the high cost of maintenance. However, with better supervision and the elimination of unnecessary work it was found that it was not necessary to have this work done outside.

The effect of increased supervision—the present organization of the mechanical department will be considered at length in the latter part of this article—made itself felt in many ways. One or two illustrations will bring this out plainly. The establishment of a test and inspection department caused a marked improvement in the class of material which was being furnished to the road, saving thousands of dollars. Before this department was inaugurated, material was frequently delivered as first class which had been rejected by other roads which maintained inspection bureaus. An important saving has also resulted from the better contracts which it has been possible to make, because of having better and more thorough supervision over the work.

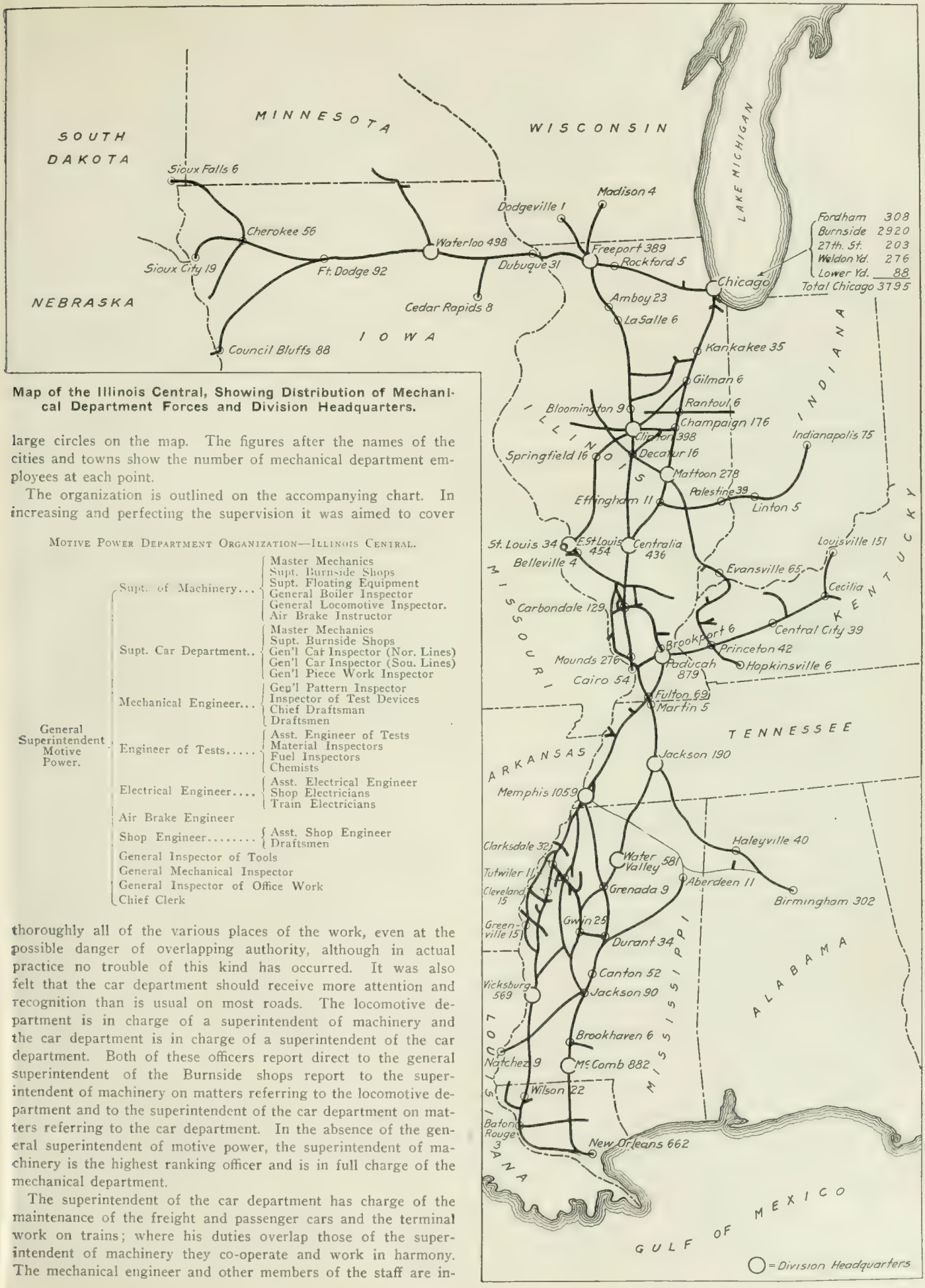
Following are a few examples of the elimination of unnecessary work: Cabooses were being painted a bright vermillion at a cost of $15 apiece over what it would have been had common freight car paint been used. Within a few months it was impossible to distinguish between the color of the freight cars and the cabooses. Every time the railway's trade mark was placed on one of the 35,000 house cars it cost $1, although it served no useful purpose. Trucks under old equipment were being replaced with expensive steel trucks, although the age and condition of the car bodies were not such as to justify this unnecessary expense. A saving of $25,000 per year has resulted from the relining of journal brasses instead of selling them as scrap. The repainting of freight car trucks when passing through the shops for repairs has also been discontinued, as investigation proved that it was a useless expense. In a similar way the treatment of passenger cars and locomotives in passing through the shops has been greatly simplified, care being taken, however, not to affect the efficiency or appearance of the equipment. The methods of reclaiming scrap or second hand material, another important development, were described at length in the *Railway Age Gazette* of September 1, 1911, page 441.

Very little new machinery or shop equipment was added during the fiscal year of 1910-11, but quite extensive improvements in the shop power plants are now under way which will greatly increase their economy and efficiency. The effect of this will be apparent in the future.

MOTIVE POWER DEPARTMENT ORGANIZATION.

Some idea of the improvements which have been made in the organization and their possible effect on future economies may be gained from a detailed study of the organization. As may be seen from the accompanying map, the Illinois Central operates in 14 states, reaching from Minnesota and South Dakota on the north to Louisiana, Mississippi and Alabama on the south, and from Indiana and Kentucky on the east to Nebraska on the west. Compared with the Chicago, Burlington & Quincy, whose mechanical department organization was described in the *Railway Age Gazette* of May 6, 1910, page 1136, it has 6,125 miles of track or 2,950 miles less than the Burlington. On the other hand it has 188, or about 12 per cent. less locomotives, and about 5,700 more cars.

The headquarters of the mechanical department are at Chicago, and here also are located the Burnside shops, the largest on the system. These shops are under the control of a shop superintendent, while the eleven other shops on the system are operated under the direction of the master mechanics on whose divisions they are located. The fourteen divisions and the headquarters of the division master mechanics are indicated by the



Map of the Illinois Central, Showing Distribution of Mechanical Department Forces and Division Headquarters.

large circles on the map. The figures after the names of the cities and towns show the number of mechanical department employees at each point.

The organization is outlined on the accompanying chart. In increasing and perfecting the supervision it was aimed to cover

Motive Power Department Organization—Illinois Central.

- General Superintendent Motive Power.
  - Supt. of Machinery...
    - Master Mechanics
    - Supt. Burnside Shops
    - Supt. Floating Equipment
    - General Boiler Inspector
    - General Locomotive Inspector.
    - Air Brake Instructor
  - Supt. Car Department..
    - Master Mechanics
    - Supt. Burnside Shops
    - Gen'l Car Inspector (Nor. Lines)
    - Gen'l Car Inspector (Sou. Lines)
    - Gen'l Piece Work Inspector
  - Mechanical Engineer...
    - Gen'l Pattern Inspector
    - Inspector of Test Devices
    - Chief Draftsman
    - Draftsmen
  - Engineer of Tests.....
    - Asst. Engineer of Tests
    - Material Inspectors
    - Fuel Inspectors
    - Chemists
  - Electrical Engineer....
    - Asst. Electrical Engineer
    - Shop Electricians
    - Train Electricians
  - Air Brake Engineer
  - Shop Engineer.....
    - Asst. Shop Engineer
    - Draftsmen
  - General Inspector of Tools
  - General Mechanical Inspector
  - General Inspector of Office Work
  - Chief Clerk

thoroughly all of the various places of the work, even at the possible danger of overlapping authority, although in actual practice no trouble of this kind has occurred. It was also felt that the car department should receive more attention and recognition than is usual on most roads. The locomotive department is in charge of a superintendent of machinery and the car department is in charge of a superintendent of the car department. Both of these officers report direct to the general superintendent of the Burnside shops report to the superintendent of machinery on matters referring to the locomotive department and to the superintendent of the car department on matters referring to the car department. In the absence of the general superintendent of motive power, the superintendent of machinery is the highest ranking officer and is in full charge of the mechanical department.

The superintendent of the car department has charge of the maintenance of the freight and passenger cars and the terminal work on trains; where his duties overlap those of the superintendent of machinery they co-operate and work in harmony. The mechanical engineer and other members of the staff are in-

structed to furnish such assistance and information as may be desired by either the superintendent of machinery or the superintendent of the car department.

The superintendent of floating equipment, who reports to the superintendent of machinery, has charge of the inspection and maintenance of 23 boats, including tugs and barges, which are used for transferring cars at various places on the Ohio and Mississippi rivers. His headquarters are at Paducah, Ky. The machinery and boiler repairs are generally handled in the locomotive shops at that point, while the work on the hulls is done in a contract marine shop at Paducah.

The general boiler inspector supervises the locomotive, marine and stationary boiler inspection for the entire system, visiting the various shops and engine houses, and seeing that the local and federal laws governing boiler inspection are carried out. A record of all the locomotive boiler inspections is kept in his office.

The general locomotive inspector looks after the maintenance and upkeep of the locomotive machinery parts which affect the steam economy, and among other things has been giving special attention to cylinder packing. He also looks after special assignments in connection with the inspection and maintenance of locomotives.

The air brake instructor has charge of the air brake car and looks after the instruction of the enginemen, workmen and shopmen in the operation and use of the air brakes.

The duties of the general car inspectors are evident from their titles. One of them has charge of the territory south of the Ohio and the other of the northern and western lines. They see that the car inspectors understand their duties thoroughly and also instruct the new men. They visit the repair tracks to see that the safety appliance regulations are properly carried out and look after other special assignments. The general piece-work inspector looks after the piece work in the car department.

The mechanical engineer has supervision over the design of cars and locomotives, and also looks after the testing of mechanical devices. He is assisted by a chief draftsman, who directs the work of the drafting room. The general pattern inspector checks the designs of patterns, making sure that excess material is not used. He also looks after the pattern record, which is kept in the form of a loose leaf book. Bulletins of changes of patterns, or new patterns, are sent out under his direction periodically.

The inspector of test devices looks after the special devices which are installed for test purposes. Every road tests new devices to determine whether the standard practice should be improved. The value of this work, however, is often almost, or entirely, lost because the devices are not closely followed in service. The inspector of test devices keeps an accurate card index record of when each device is applied, the name of the manufacturer, the price, etc., and periodically examines the device on the car or locomotive and consults with those who come in direct contact with it. These results are immediately noted on the proper card at headquarters, so that any of the mechanical department officers and the purchasing agent can get the latest information about the test devices by referring to the card index.

The engineer of tests has charge of the inspection of the material used by the mechanical department, including the fuel for both the locomotives and the shops. He also supervises the tests of various kinds of supplies. His force includes an assistant, material inspectors, fuel inspectors, and chemists. The chief material inspector has charge of the material inspectors, and in addition to the duties ordinarily involved in this work studies the performance of the material in service, looks into the causes of failures, and also has charge of the reclaiming of scrap or second hand material. The latter department includes a rolling mill with a head roller, heater, catcher, straightener and laborer; also a department in which air and steam hose are fitted up and repaired, the work being done by a foreman and six men; the relining of journal brasses is handled by a foreman and three men.

The fuel inspectors inspect the coal when it is loaded at the mines and check to see that it contains no impurities and does not have an excess of screenings. While traveling in connection with their duties they are instructed to ride on the locomotives and watch the performance. Nine of these inspectors look after the coal which is purchased from 45 mines. They work closely with the mine superintendents and miners, and are expected at all times to know the exact conditions in the mines. By following up this work closely it is possible to reduce the number of engine failures to a minimum and to greatly increase the efficiency of the motive power. The chemists look after the laboratory work and are also trained in material inspection, so that in case of a rush of this work they can be called upon to help out.

The electrical engineer has charge of the shop electricians and makes estimates for and superintends the installation of wiring for both light and power. He also has charge of the electric lighting of trains, which is done exclusively by the axle lighting system. He has an assistant and a force of shop and train electricians.

The air brake engineer is expected to keep informed as to the latest and best air brake practice, but he also looks after such details of shop practice as may be assigned to him. The air brake instructor, who was noted as reporting to the superintendent of machinery, is expected to carry out the air brake engineer's policy and instructions, but the details of his work are handled under orders from the superintendent of machinery, as indicated on the chart.

The shop engineer designs all shop additions and improvements, and supervises and carries out all plans for this class of work. In short, he is a specialist in shop design and is expected to keep informed as to the latest and best shop practice.

The general inspector of tools visits the different shops and keeps fully informed as to the condition and efficiency of the machine tools and of the portable tools which are kept in the tool rooms. He also studies the condition and efficiency of the tool rooms and checks all requisitions for tool room supplies. He is required to investigate the best designs of machine tools when lists are being made up for new tools, and he also attends to the transfer of tools between the different shops. In brief, he is expected to be fully informed on the subject of machine tools in the Illinois Central shops and as to the results which may be obtained from the latest designs of tools of the various manufacturers, so that he can advise as to the replacement of old tools, or as to their transfer from large shops to those of less importance.

The general mechanical inspector has been investigating the power situation on the Illinois Central, and has visited all the division officers; a report is in preparation which will recommend such additional new power as may seem best, and also a redistribution of the power now in service. He will be detailed on similar investigations of various kinds, including the economical use of locomotive fuel and shop efficiency problems.

The general inspector of office work visits the various offices and confers with the master mechanic and his assistants to see that all reports are correctly and uniformly made. He also passes on new forms for reports and on other questions in connection with office work. The value of this work is shown by the reduction of about 35 per cent. in the number of mechanical department reports during the past year, although all the necessary information is now being obtained and in better shape than formerly.

The following account of the way in which he has handled the work may be of interest. After studying the reports which were received in the office of the general superintendent motive power he found it advisable to start his investigations by seeing how this data was gathered in its early stages by the master mechanic. The most important outside points were visited and a complete list of the reports made out in connection with the mechanical department was obtained. Each of the master mechanics was then consulted, local conditions were considered, and any reports which were being furnished which were not

necessary, or of little or no value, were discontinued at once. The progress of these reports was then followed until they left the hands of the master mechanics; as a result it was possible on January 1, 1911, to eliminate twelve reports and to have five others kept as a local record for the inspection of the master mechanic on his visit to the shops. This left a clear field for the study of the reports coming from the master mechanic's office to the superintendent motive power. These were carefully investigated and listed, and those which were not desired were cut out. It was found that many of the report forms were obsolete and that others could be consolidated. Each separate form was discussed with the master mechanics in order to prevent the elimination of any that might be needed for recording purposes. Up to October 21, 1911, 178 of the forms had been entirely revised, 47 eliminated and 23 others were consolidated into eleven forms, thus making a total reduction of 76 forms, including the 17 which had been eliminated January 1, 1911. It is quite probable that a larger reduction will be made as the stock of certain forms runs out.

By the gradual elimination of unnecessary forms the clerks in the offices of the master mechanics have been able to give more care to necessary work. The duties of each clerk have been studied and by a rearrangement of their work it has been possible to practically eliminate overtime among the clerks, thus creating a much better condition. Formerly the master mechanics were required to furnish the superintendents with reports different from those which were sent to the superintendent of motive power; in many instances the superintendents have found that they could use a carbon copy of the superintendent motive power's report, with a consequent reduction in clerical work.

The chief clerk, whose name appears last on the organization chart, performs the usual duties of this office for the entire mechanical department at the general offices in Chicago.

NEW SIGNALS ON THE PENNSYLVANIA.

As announced in the *Railway Age Gazette* of December 29, the Pennsylvania plans this year to install new automatic signals on 111 miles of road. An officer of the road has given us an interesting description of this proposed new work, prefaced by a brief sketch of what has been done by the signal department of the road during the past six years, all of which is given below.

The automatic signals on the West Jersey & Seashore Electric line and on the Central division were installed in 1906, the latter being the first example of Philadelphia, Baltimore & Washington upper quadrant semaphores, and of other innovations now well known.

Since that time, five and one-half years, the extension of the automatic signal system on the Pennsylvania east of Pittsburgh has been practically at a standstill. Yet a great amount of signal work has been done. The great Manhattan terminal installation, extending from the Sunnyside yards on Long Island to Newark, N. J., with its interlockings at Sunnyside, New York station and Manhattan Transfer, has been completed.

The line from the west portals of the Hudson and Manhattan tubes, near Summit avenue, Jersey City, to Park place, Newark, has been electrified and the signal system rebuilt throughout this section.

Practically every interlocking on the New York division (90 miles) has been revised. At many of these, long crossovers have been substituted for short ones and signals relocated and made upper-quadrant; while at Bristol, on account of change of line, a new electro-pneumatic interlocking has been installed with alternating current automatic signals for about two miles (four track).

Many new interlockings have been built on the branches; the automatics have been rebuilt on the West Jersey & Seashore steam line; approach locking and electric switch locking have been introduced at nearly all the plants on the Philadelphia terminal division, and the system of signaling changed and all the plants practically rebuilt between and including West Philadelphia and Broad street station (six to ten tracks).

The large new terminal at Baltimore has been almost completed, and the installation (jointly with the Baltimore & Ohio) of the Washington terminal carried to completion, together with electro-pneumatic automatic signals and interlocking plants, with alternating current control, between the Washington terminal and the bridge over the Potomac river.

Electro-pneumatic interlockings have been substituted for mechanical at Bryn Mawr and Glen Loch on the Philadelphia division, and new power interlockings erected at Thorndale and Caln, and an electro-mechanical interlocking erected at Gap, all on the Philadelphia division. Most of the other interlockings on the main line of the Philadelphia division (100 miles) have been remodeled and rebuilt.

Nearly all the interlockings on the Middle division have been revised and rebuilt.

On the Pittsburgh division a majority of the interlockings have been revised, and (in 1906) two very large power plants were installed at East Liberty and Swissvale. Another was put in at Wilmerding (in 1911) and power plants have been substituted for mechanical at Radebaugh and Southwest Junction, the latter being one of the largest in extent in the country. Revisions have been made at Latrobe, and new power plants put in at Derry, Conpitt Junction, Conemaugh and Summerhill.

While a number of large interlockings still remain to be revised, notably the one at Perth Amboy junction on the New York division, in connection with the elevation of the main line through Rahway and duck-unders to the Perth Amboy & Woodbridge branch; and at North Philadelphia, because of additional tracks, together, probably, with changes at Broad street, Philadelphia, still, most of the large propositions in the interlocking field are out of the way, except possibly new interlockings at Harrisburg and Altoona terminals, and a revision at Pittsburgh. Therefore the time is now ripe for the further extension of automatic signals as a substitute for the manual block system, and the management has authorized the installation this year of automatic signals covering about 111 miles of road.

NEW AUTOMATIC SIGNALS.

Between Summerhill and Latrobe on the Pittsburgh division. This will give a continuous system of automatics over the main line of the Pittsburgh division, 114 miles.

The Philadelphia, Baltimore & Washington has automatics from Philadelphia south to Wilmington, 25 miles, and from Potomac river, north through the Washington terminal, to the junction with the Baltimore & Ohio, about five miles. The management has authorized the extension of the automatics from this junction to Baltimore, about 38 miles, and from Wilmington south to Oakington, beyond Havre de Grace, about 35 miles. This will complete the automatics between New York and Washington, with the exception of the stretch from Oakington to Baltimore, about 33 miles, which is postponed on account of some re-location work, and will possibly be completed next year.

A description of these proposed automatic signal installations follows:

The Pittsburgh division is now equipped with home and distant lower quadrant electro-pneumatic automatic signals from Pittsburgh east to Latrobe, about 40 miles. Five miles east of Latrobe lies Derry with a large engine and car yard, roundhouses and power house, and a new electro-pneumatic interlocking with upper quadrant signals. The air main extends from Derry west. The new signals between Latrobe and Derry will therefore be electro-pneumatic.

The eastern end of the division has the same system as the west end. It extends from Altoona west to Summerhill, 26 miles. There is a pumping station at Wilmore, two miles east of Summerhill, so that at present there is a two-mile section of air pipe west of Wilmore with a dead end. At Conemaugh, nine miles west of Summerhill, are the engine houses and yards for

the foot of the western slope of the Alleghanies; also a power house and a large electro-pneumatic interlocking with an air main extending east to Mineral Point, or four miles dead ended. Therefore by putting in about five miles of air main both these dead ends are eliminated; and the mains will be end-fed from Altoona to Conemaugh with intermediate compressors as necessary. The new signals from Summerhill to Conemaugh will therefore also be electro-pneumatic. All the electro-pneumatic automatic signals will be equipped with a. c. magnets. The automatic signals from Conemaugh west to Derry, 24 miles, will be operated by a. c. electric motors, the Union Switch & Signal Company's type T2.

The entire installation from Summerhill to Latrobe will have alternating current track circuits and electric lights. The automatic signals will be upper quadrant three-position, with one arm, of metal, pointed; and a red staggered marker light, except (as noted below) when a second operating arm is used. There are approximately 209 block sections, all end-fed, using polyphase relays, U. S. & S. type, with wireless control of the distant indication, except where the second arm is used. All mechanisms are top-post. This installation, aggregating 49 miles of road and 193 miles of track runs through and affects 13 existing interlockings. Practically all the signals are set on bridges.

Interlocking.—At the interlockings the dwarf signals are mechanical, two-position, horizontal indicating stop and diagonal proceed at low speed. The home signals are three-arm upper quadrant (high, medium and low speed); the two upper arms are three-position, and the low speed are two-position (horizontal and 45 deg.).

In all of the interlocking signals the circuits are direct current, as are those in most of the indicators and approach and through locking instruments; all are fed by storage batteries situated at the cabins and charged through mercury-arc rectifiers of from 10 to 30 amperes capacity, except, of course, the track circuits, which are a. c., using U. S. & S. Co.'s galvanometer and vane type relays.

The distant signals are two-arm; the top arm is three-position, and the second arm two-position; arms pointed, staggered lights, the signals so controlled as to give the following indications:

(A) Stop and proceed.
(B) Proceed, prepared to stop at next signal.
(C) Proceed, prepared to pass next signal at medium speed.
(D) Proceed.

The same aspects and indications are used on some of the automatic signals when, on high speed running ground, the blocks are 4,000 ft. apart, this for facilitating slow freight traffic; but the distant warning is given 8,000 ft. away for the high-speed passenger trains.

Power.—The power for the installation between Conemaugh and Summerhill will be furnished by a 25 k. w. generator at Conemaugh, and emergency taps from commercial lines at Summerhill and Johnstown; the power between Conemaugh and Latrobe by one 75 k. w. generator at Lockport, in the middle of this stretch, with one 25 k. w. generator at Conemaugh, one 75 k. w. at Lockport, and one 75 k. w. at Derry for emergency supply. The current will be furnished at 3,300 volts, 60 cycles, single phase. The power line will consist of two single conductor Kerite wires, No. 6 between Summerhill and Lockport, and No. 4 between Lockport and Latrobe, furnished in 2,000 ft. lengths, laid in creosoted pine trunking laid 2 ft. below top of tie, either on shoulder or between tracks, brought to the surface every 2,000 ft. for joining in waterproof concrete boxes above ground line. The line transformers are the standard commercial type 3,300 to 110 volt; track transformers U. S. & S. Co. air-cooled type 110 primary, with 10-volt taps for signal lamps, and secondary taps for various voltages, 3 to 15, for track feeds.

The line transformers will be housed in iron cases with the sectionalizing outfits. The other transformers, relays, etc., will be put in Pennsylvania Railroad standard relay boxes, fixed in the bridge legs.

MARYLAND DIVISION, P. B. & W.

The Maryland division has home and distant electro-pneumatic lower quadrant signals from Gray's Ferry (Philadelphia) to West yard, Wilmington, this being part of a continuous system, Wilmington to New York. The new installation will continue this automatic protection south 34½ miles to Oakington. The line is double track for ten miles to Newark, Del.; then seven miles three-track; three miles four-track; six and a half miles double; then six miles of four-track, the latter stretch including the two-track draw over the Susquehanna river between Perryville and Havre de Grace, with electric interlockings at each end. From Oakington to Bayview, 29 miles, some changes of line are in contemplation, so this work is deferred and Bayview to Baltimore is in Northern Central territory.

The new automatics then start at B. & P. junction, just south of Union station, Baltimore, and extend to the junction with the B. & O. at Washington, four miles north of the Union station, a distance of 38½ miles, nine miles being four-track, seven miles three-track, and the balance double track. This makes a total of 73 miles of road south of Wilmington to be equipped, approximately 192 miles of track; approximately 202 automatic blocks, with the system passing through and affecting 21 existing interlockings.

All signals will have top-post electric motors—the automatics alternating current, type T2, U. S. & S. Co.; the interlocking signals, except dwarfs and some low-speed arms, direct current type T2. The dwarfs and these low-speed arms are mechanical. There will be alternating current track circuits throughout, and the signals will be electrically lighted.

The number of arms and lights and their general arrangement is exactly like the Pittsburgh division, as is the method of operation of all the types of signals, except as noted above, and except, further, that instead of a mercury arc rectifier at each cabin for charging the storage batteries situated there, there will be a rectifier of 20 amperes capacity at every third cabin, charging portable storage cells for use at the other cabins.

Al track circuits at interlockings will operate vane type relays; all other track circuits will have polyphase relays.

The signals will be principally ground masts instead of being placed on bridges. The line transformers and sectionalizing outfits will be placed in iron shelters on a special signal foundation and under the ladder, while the track transformers and relays will be placed in an iron relay box attached to the front of the mast. Between Bowie and Landover on the southbound tracks, 8 miles, the medium speed distant indications will be given through the automatic territory, this being fast running ground where the blocks average a mile in length.

The power line will be run in trunking, as on the Pittsburgh division, and between tracks, the wire being No. 6 from Wilmington shops, two miles north of Wilmington, to Ruthby power house, nine miles south of Wilmington, and No. 4 from there to Oakington. The power will be furnished by two 75 k. w. generators at Ruthby, furnishing 3,300 volts, single phase, 60-cycle current, with an emergency tap at Wilmington shops of 13½ k. w. capacity; and an emergency generator of 50 k. w. at Perryville.

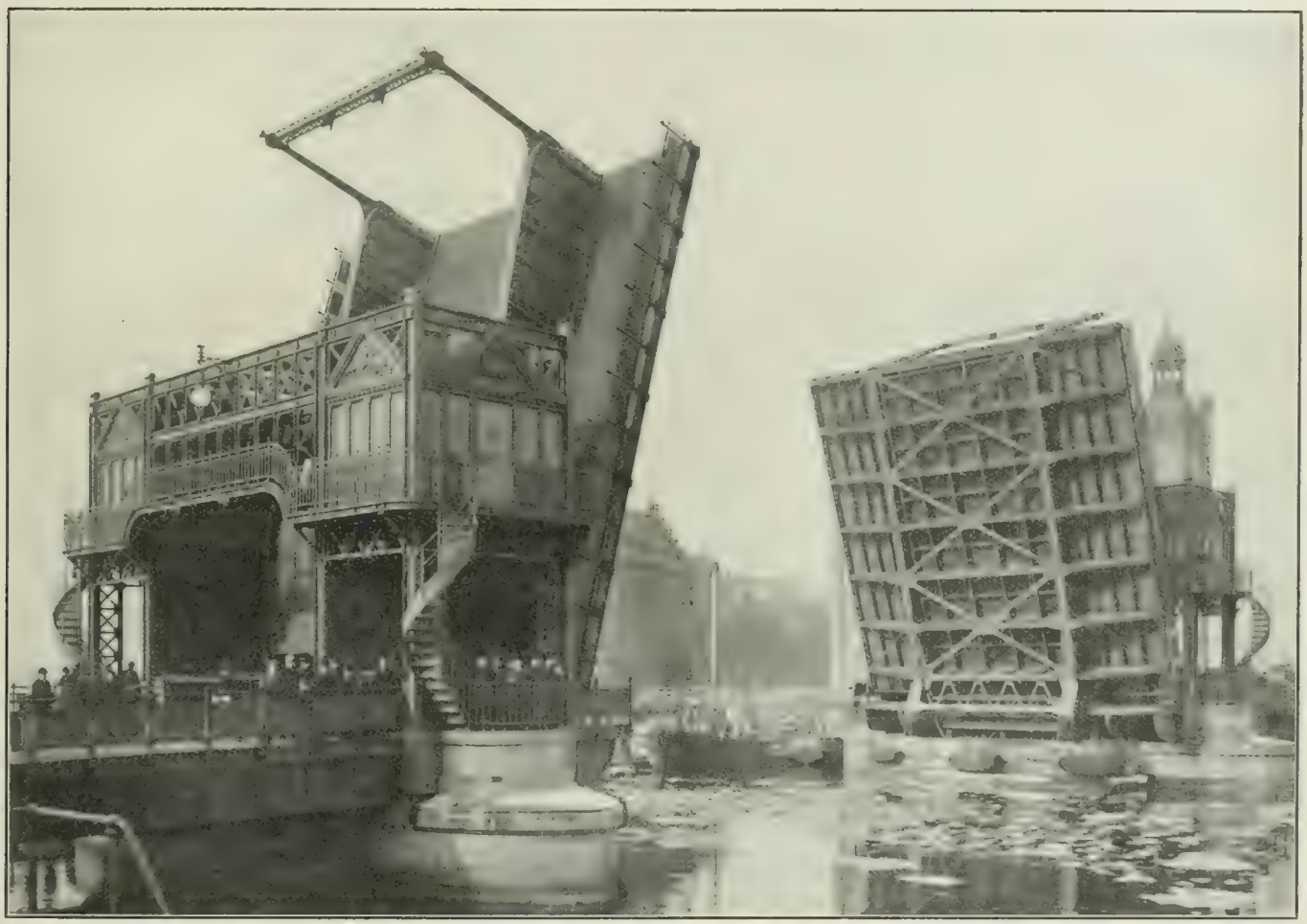
On the south end, the wire will be No. 6 from Baltimore station to Stony Run power house, 11 miles south of Baltimore, and No. 4 flexible to Washington. The power will be furnished by two 75 k. w. generators at Stony Run, with emergency taps to the Northern Central supply from Mt. Vernon power house at Baltimore of 28 k. w., and emergency taps to the Washington terminal lines at "F" Cabin of 37 k. w. From Cabin "F" upper-quadrant, electro-pneumatic signals are already installed through the Union station to Academy station on the Richmond-Washington line, a considerable portion being alternating current.

German exports of rails for the 11 months ending with November, 1911, were 5,083,601 tons, which is 2.6 per cent. more than in 1910, and 40 per cent. more than in 1909. The exports of steel ties were the smallest for many years, and 56 per cent. less than in 1907, yet they amounted to 81,500 tons.

BASCULE BRIDGE OVER HARBOR CHANNEL AT COPENHAGEN.

BY C. VAN LANGENDONCK.

The city of Copenhagen has provided improved facilities for communication between the city proper and the suburb of Christianshavn, on the Island of Amager, which are separated by the harbor channel, by the building of a new bridge of the double leaf bascule type. The bridge has a length of 258 ft. between land abutments, the channel under the movable span having a clear width of 92 ft. 6 in., and a depth of 25 ft. 6 in. The new bridge is ornamental in design, and is in harmony with the picturesque character of the neighboring building. It is located directly north of the structure it superseded, the dock lines being trained, and the angle of the bridge to the current being



Double-Leaf Bascule Bridge at Copenhagen, in Open Position.

so arranged as to ensure satisfactory navigation through the bridge.

Owing to the heavy traffic on the waterway, erection involved several difficulties. It was impossible to build the caissons for the piers on the site, and they were constructed in a convenient position in the harbor and towed into place and sunk upon the foundations which had been prepared for them. The caissons have an over all length of 76 ft. 5 in., a maximum width of 26 ft., are provided with chambers into which the tail ends of the leaves descend when the bascules are raised, and also contain a large portion of the hydraulic machinery. They were constructed on slips, each being built up on a ring-shaped iron girder provided with transverse stiffeners. Bottom plates were riveted to the underside of the ring, and to the outside was attached the vertical sheet iron plating forming the wall of the caisson. This was only carried up to a height of a few feet before launching. While the caisson was afloat concrete was laid on the bottom to form a foundation for the masonry, which was built to form a well, with transvere walls serving as buttresses, and with chambers between them. As the mass gradually sank under the weight of the masonry the sheet iron lining was continued upward, a height of about 3 ft. above the water level always being maintained. When the caisson had been built in this manner to the requisite height, the top was corbelled to receive the granite masonry forming the superstructure of the pier.

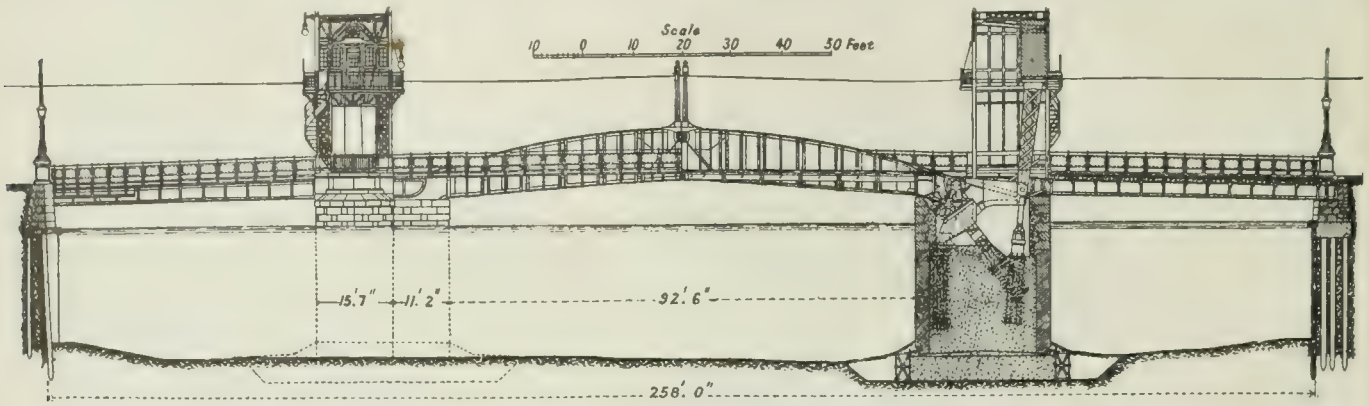
When the bottom of a caisson had sunk to a depth leaving only a space of about 12 in. between its lower surface and the upper face of the foundation prepared to receive it, the caisson was towed into position and slowly sunk until the iron ring girders bore upon the surface of the foundation. Divers then descended to see that the pier was in correct position, and the caisson was grouted to the foundation with cement mortar.

The combined length of the two bascule leaves is 109 ft. between centers, while the fixed spans, which are of ordinary plate-girders, have a length of 55 ft. each. The movable span is constructed in accordance with the Strauss Trunnion Bascule principles. The counterweight, when the leaves are down, is concealed in a tower high above the roadway, being pivotally carried by two legs on pins in the tail ends of the bascule girders, the movement of the counterweight above being controlled by the usual links constituting the characteristic parallel motion of the Strauss design. As the leaf rises the counterweight descends toward the roadway, finally stopping about 7 ft. above the roadway, when the limit of the upward travel of the span is reached. The equipoise of the leaf and its counterweight during this movement is dependent on the four axes of rotation, viz., the axis of

the bascule leaf, counterweight pin in the tail end of the girder, the axis of rotation of the guiding member on the counterweight, and the fixed axis of rotation of the guiding member on the tower structure, lying in the angles of a parallelogram. The advantage claimed for this arrangement is that the length of the tail ends may be considerably reduced, and the counterweight placed overhead or underneath the floor as may in each case be the most suitable. Each of the leaves of the bridge has a weight of 146 tons, and the weight of the counterweights is 247 tons. In order to eliminate all vibration arising from traffic, the bridge has been constructed in such a manner as to act as a 3-hinged arch when closed, the girders meeting on a hinge at the center of the bridge, and the arch thrust being transferred to structural steel skewbacks imbedded in the piers.

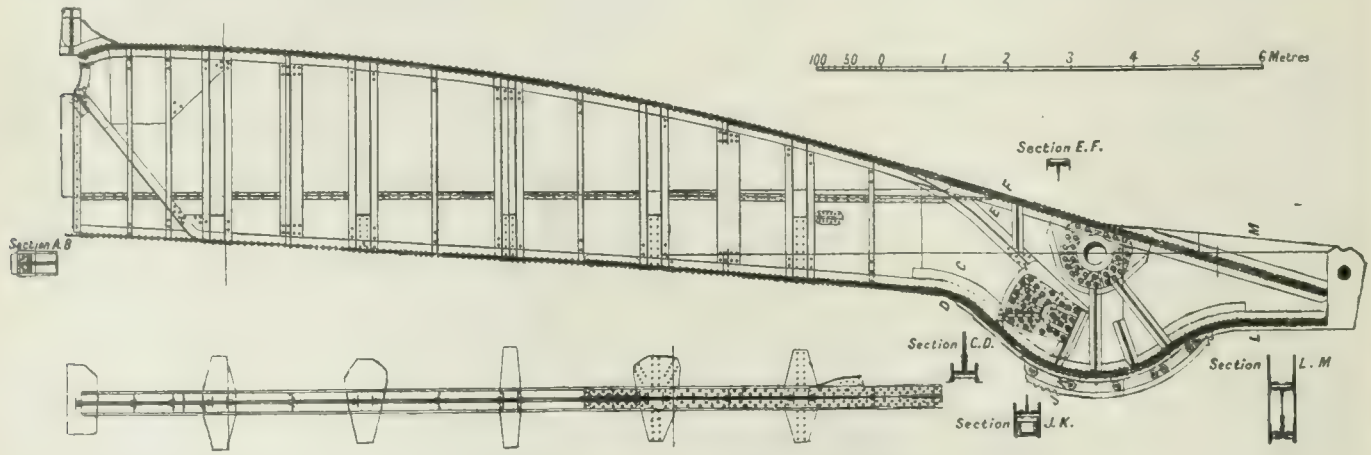
In raising the bascules, the first operation is the lowering of the counterweights upon the tail ends, so that they counterbalance the weight of the leaves. This is carried out hydraulically. The leaves are then raised by means of electrically-driven gearing. Each of the leaf girders has bolted to its tail end a circular rack meshing with a series of gears and pinions, and vertical shafts, which latter extend through the columns of the towers to the operating room above which contains the motors.

When the bascules have been lowered again to their correct position, the pressure of the counterweights on the tail ends of each leaf is removed by hydraulic pistons, which lift the legs of the counterweights until they cease to bear upon the tail ends of the girders. The mechanical action of raising and lowering each leaf is carried out by means of two 54 h. p. electric motors running at 450 revolutions per minute, one in each tower. About 13 kw. is expanded in the raising and lowering of both leaves, and the time occupied in either raising or lowering the bascules is about 25 seconds, the same time being occupied in removing the pressure of the counterweight from the tail ends. When vessels pass the bridge, traffic on the roadway is stopped for about two minutes. The bridge carries two electric street car tracks. The bascule section of the bridge has a roadway of 22 ft. 6 in. opening out on the fixed spans for the convenience of the traffic. On either side of the bascule section is a footpath 11 ft. 2 in. wide, and on the fixed spans this footpath is widened to 13 ft. 8 in. The cost of the whole work amounted to about $285,000. We are indebted for the illustrations and information from which this article was prepared to H. C. V. Möller, chief engineer of the Copenhagen Harbor Board, who designed the bridge in conjunction with the Strauss Bascule Bridge Company, Chicago, Ill., which acted as consulting engineers on the work.



Elevation of New Copenhagen Bridge.

The contract for the construction of the projected Trebizond-Sivas railway, Asiatic Turkey, has been given to a French company, the Régie Générale des Chemins de Fer, of Paris, which recently sent out engineers and surveyors. The plans will be submitted to the Turkish government about the end of March, 1912. The new line starting from Trebizond on the Black Sea, will go by way of Gumush-Hane and Baiburt to Pekkeridji, whence it will branch in two directions, the one following the valley of the Euphrates river eastward to Erzerum, and the other westward to Erzingian, and thence by way of Chardakli to Sivas. The building of the new line will involve not a few physical difficulties, among others the boring of a tunnel nearly 5 miles in length through the Zigana mountain, and a number of smaller tunnels and many bridges. The line will traverse a wonderfully rich and fertile country, and when the primitive crafts on the upper Euphrates are replaced by modern steam transports the river will feed the railway to a very considerable extent.



Details of One of the Lifting Spans.

PRELIMINARY INVESTIGATION OF NEW RAILWAY PROJECTS.

BY A. M. VAN AUKEN,
Chief Engineer, Memphis, Dallas & Gulf.

There are many small investors to whom the large returns from well chosen investments in bonds of new railway projects strongly appeal. It is history that a railway company organized in 1898 was financed by issuing bonds which were placed at a price of 85 cents on the dollar, and the purchaser given a bonus of stock equal in par value to one-half the value of the bonds he subscribed for. Eight years later this stock sold for $180 and the bonds slightly above par. Thus the investor had a market value of:

4 per cent. bonds.....	$1,000	Cost $850	Value $1,080
Common stock, 10 per cent..	500	Cost 000	Value 900
		$850	$1,980

The yearly income on these securities was $90.

Many investors are deterred from investing by the number of roads that have been reorganized, to the serious injury of stockholders, and ask themselves if there is not some way to be sure of success in such investments. It is the aim of this paper to suggest a plan by which the investor may form a fair judgment of the enterprise, and protect himself.

It is assumed that the investor has read the prospectus of the company; that the route selected has been pronounced feasible by a competent engineer; and that a traffic man has passed on the probable traffic and earnings. These are matters so frequently treated, and possessing so many technical phases that they will not be touched on here. But it is true that many enterprises which are passed on favorably by such investigators, fail to earn the sums estimated. This phase of the subject covering traffic in products of the forest and farm will be touched on in this paper. A given tract of timber can be counted on for a given amount of traffic. Under favorable conditions this should be moved in a definite number of years. Often this traffic fails to be secured, and disaster results. Agriculture may fail to develop. These results may come after the proposed road is completed and is unable to offer transportation facilities from the following causes: lack of cars or locomotives, with which to move the traffic offered, lack of connecting tracks at junction points to permit expeditious transfer of business, lack of connecting lines giving the line access to large markets, or lack of sufficient passing tracks to permit expeditious handling of trains. These necessary facilities must be provided in the building and equipment of the road, and it is because they are partially omitted that many enterprises fail.

The writer was asked by a banker in 1902 to give his opinion on a proposed line which was planned to connect a city on the Ohio river with two on the Gulf of Mexico. The preliminary estimate called for an outlay of $14,255 per mile. As this line would have to compete with high-class lines for through business, as well as to offer as favorable rates for local business as could be secured from parallel lines, it was reasoned that it must be laid with at least 75-lb. rail and be well ballasted. Such a track would have cost at that time about $10,000 per mile for material and labor, allowing that sidings and similar tracks would add one-eighth to the track mileage. Experience shows this portion of the cost to be about one-fourth the total for a high-class through line, which would raise the cost of this road per mile to $40,000, or nearly three times the promoter's estimate. The road has had a stormy career, and is just emerging from a receivership. The present plans call for $30,000 per mile as a needed amount with which to put it in shape to compete for business with its competitors.

In 1907 I was asked to make an estimate of the cost of a road 150 miles long which was what might be called a secondary main line. It developed much new territory, held a strong strategic position owing to its position between two rivers, and occupied good territory, but did not reach any cities of first-class traffic importance. The estimate amounted to $18,150 per mile. By the promoter's instructions this was cut down by omitting cost of right of way, fencing, terminals, telegraph and ballast and greatly reducing the length and number of passing tracks, and the like. The road has been far from successful. It has lost much business from not having cars to load it in. Owing to insufficient width of roadbed it has suffered from track imperfections, and its cost of operation has been very high. It is now trembling on the verge of receivership, and cannot maintain its roadway and equipment to standard. Over a year ago the general manager of a railway asked the writer to look over an estimate, his chief engineer being absent on sick leave. This called for an expenditure per mile of $6,820, and it was noticed that the cost of track material and labor amounted to $4,400. A test with known prices showed this to be about correct. It was assumed this would be 40 per cent. of the cost of the line, and such cost placed at $11,000 per mile. Its actual cost was very close to that.

The following percentages were obtained from a table given in an article by John F. Wallace, then chief engineer of the Illinois Central, and published in the *Engineering Magazine* some fifteen years ago. The costs are not given, as they have no relation to those of today, but the percentages are given in the table following:

Element of Cost.	Main Line. Per Cent.	Secondary Main Line. Per Cent.	Minor Branches. Per Cent.
Right of Way.....	5.0	5.6	6.7
Fencing	1.0	1.6	2.0
Grading	30.0	24.0	20.0
Bridges and Culverts.....	10.0	10.0	10.0
Telegraph	0.8	1.2	1.3
Track, material and labor.....	17.5	25.6	40.0
Ballast	7.5	9.6	0.0
Water supply, staitons, etc.....	2.5	2.8	3.3
Rolling stock and equipment.....	10.0	10.0	9.3
Proportion of terminals.....	12.5	6.0	3.3
Engineering	1.8	2.0	2.7
General and legal.....	1.5	1.6	1.3
	100.0	100.0	100.0

It is not contended that these amounts, or percentages are absolute. They will vary largely. But it is believed their use will assist an investor to determine if contingencies have been provided against. Right of way may cost much less, but it may cost more. Grading will vary largely, but when it does, the reason should be determined. When there is a heavy amount of timber trestling it is well to ask if provision has been made for renewals in the estimate of operating expenses. A timber trestle will need renewing every seven years in the Gulf states, and ties every six. Rebuilding a trestle costs about 80 per cent. of its original cost. Tie renewals cost the same with ten cents for placing in track. Look to these two items in the maintenance estimates. By securing the statistics of the Interstate Commerce Commission it is easy to learn what have been the various costs of the elements of cost and maintenance of the roads in that particular locality, and it can be seen if the prospectus allows proper amounts for operation and maintenance.

The tables following give for each of the three roads already mentioned in this article the cost of the Wallace table, in column 1; the cost as estimated by the promoter in column 2, and in column 3, for the first road, the cost of construction, plus the amount now needed to put the road in shape; for the second road, the writer's detailed estimate, and for the third road, the actual cost of the line as furnished the writer by the auditor of the parent company:

	Road No. 1.		Cost of Original Construction
Elements of Cost.	Wallace's Table.	Promoter's Estimate.	and Needed Betterments.
Right of way.....	$2,000	$605	$1,200
Fencing	400	100	350
Grading	12,000	3,000	13,000
Bridges and culverts.....	4,000	1,200	4,300
Track material and laying.....	7,000	4,500	10,500
Ballast	3,000	800	2,500
Water supply, stations, etc.....	1,000	600	1,200
Equipment and rolling stock....	4,000	1,600	5,000
Proportion of terminals.....	5,000	1,000	5,700
Telegraph	320	150	350
Engineering	720	350	850
General and legal.....	600	500	850
	$40,040	$14,255	$45,800

Road No. 2.

Elements of Cost.	Wallace's Table.	Promoter's Estimate.	Writer's Estimate.
Right of way	$1,200	.....	$600
Fencing	350	.....	150
Grading	5,180	$2,880	4,000
Bridges and culverts	2,150	1,350	1,800
Track material and labor	5,500	5,500	5,500
Ballast	2,000	000	1,500
Water supply, stations, etc.	600	500	600
Equipment and rolling stock	2,150	600	2,000
Proportion of terminals	1,300	000	1,000
Telegraph	260	100	250
Engineering	430	250	400
General and legal	345	300	350
	$21,500	$11,480	$18,150

Road No. 3.

Elements of Cost.	Wallace's Table.	Promoter's Estimate.	Actual Cost.
Right of way	$738	$250	$520
Fencing	220	100	180
Grading	2,200	1,100	2,450
Bridges and culverts	1,100	560	850
Track material and labor	4,400	4,400	4,350
Water supply, stations, etc.	363	150	333
Rolling stock and equipment	1,023	000	950
Proportion of terminals	363	000	338
Telegraph	143	000	150
Engineering	297	150	285
General and legal	143	100	340
	$10,990	$6,820	$10,746

In each of the above it will be seen how the promoter, in his anxiety to make a showing for economy, eliminated essentials. I have little actual knowledge regarding details of the first line. It was understood that it was forced to pay high prices for the right of way, and as a matter of economy passed to one side of several cities of considerable size, being later ordered by the courts to build into them. The width of the roadbed was reduced from 16 to 12 ft. on embankment, and from 20 to 14 ft. in cuts; guard rails were left off the bridges; wooden culverts were used; 60-lb. rail was laid in place of 75-lb. rail; the passing tracks were shortened to 2,600 ft.; no section houses, and but few depots, were built, etc.

As stated above, this railway went into the hands of a receiver, and is emerging from a drastic reorganiaztion. This should have been foreseen from the utterly inadequate funds provided. To secure competitive business a road must have its terminals as near the business center of a town as its competitor. Otherwise, drayage charges will deprive it of all competitive business.

The second line has been in operation about two years. It has such a struggle to meet its fixed charges that is is not keeping up its roadbed or bridges. In trying to build for the amount available, the promoter cut down the width of roadbed from 16 to 14 ft. on fills and from 20 to 18 ft. in cuts; he used 60-lb. in place of 70-lb. rail; built no section houses; omitted nut locks; used but two bolts per rail joint, built no yards or stations at the terminals, but rented from connecting roads, etc. This line will have to secure money soon from some source. It cannot get the business which it should have from lack of cars and engines. The timber along the route is not getting to market, and the land is not being brought under cultivation.

In the case of the last named line the promoter objected most vigorously to being charged for the wye and two yard tracks made necessary to enable the main line to care for the business of the branch, and to charge for engine and cars assigned to the line. He maintained that the parent company should take care of its own yard.

The question of a provision for terminals is always a troublesome one. There can be no rule laid down, but perhaps an estimate based on ten dollars per inhabitant for towns up to, say, 50,000 inhabitantts, will come near it. Terminals for a town located along a river where the space which can be used for railway tracks is limited will cost much more. In states where the laws allow vacation of streets to a railway, this may be reduced somewhat.

Another reason why investors may, and often do, lose, is inadequate surveys for location. The promoter is often very short of money, and makes very few surveys prior to attempting to finance a project. The railway lines above mentioned had expended for surveys prior to making financial arrangements the following:

No. 1—400 miles	$10,000	Per mile	$25.00
No. 2—150 miles	7,500	Per mile	50.00
No. 3—30 miles	2,800	Per mile	93.33

It is difficult to state what amount should be expended. Unless an adequate amount is spent the best line will not be secured, but the mere spending of money will not secure it.

It was estimated that surveys in the Rocky Mountains for the Union Pacific in the eighties cost $200 per mile of located line. Willard Beahan gives, in his work on railway location, details of five surveys in Missouri and Kansas where the location cost from $30.17 to $57.43. This is supposed to be for location alone. Preliminaries are in addition to this. F. Lavis, in his work on railway surveys, gives costs of four preliminary surveys for the Choctaw, Oklahoma & Gulf, covering 563 miles, which vary from $19.60 to $60.95 per mile; also for five located lines covering 188 miles, which vary from $44.43 to $90.47 per mile. Assuming two miles of preliminary to one of location, this shows a range from $83.63 to $212.37. He gives the total cost of the 188 miles of location as $192 per mile of located line, including preliminary.

I have secured the data from two lines which were built between 1897 and 1900 and the exact costs of the engineering on each. The first was a cheap line in the easiest portion of Oklahoma. It was about sixty miles long. The gradient was 0.6 per cent. The quantities averaged about 6,000 yds. to the mile, and it was laid with old steel which had been taken from other parts of the main road.

The percentages of the cost of the various items were as follows:

	Per Cent.
Grading	19.6
Bridges and culverts	10.7
Track material and labor	34.1
Ballast and surfacing	9.1
Fencing, cattle guards, etc	1.9
Right of way	3.0
Engine houses, water supply, etc	6.9
Locomotives and cars	10.2
Engineering	2.3
Office and legal	2.2
	100.0

Cost of engineering was as follows:

	Per Mile.	Per Cent.
Reconnaissance	$1.15	0.7
Preliminary survey	23.20	15.3
Location survey	39.80	26.5
Construction engineering	76.50	51.3
Permanent way survey	9.30	6.2
Total	$149.95	100.0

Under the head of reconnaissance is included the cost of procuring maps of the territory, and such studies as were made in the chief engineer's office preparatory to the inauguration of the work. Under the other heads are included the cost of all work done in the chief engineer's office, including a percentage of the salary of the chief engineer and his office force during construction. The permanent way party measured to all lines, located all buildings on the right of way, mile posts, bridges, culverts, etc., and made permanent maps.

The other was a much heavier line in Texas, 150 miles long. The maximum grade was 1 per cent., with 4 deg. curves, earthwork quantities averaging 30,000 yds. to the mile. On this line the proportions of the different classes of work to the total were as follows:

	Per Cent.
Engineering	2.0
Executive and legal	1.6
Right of way and fencing (includes cattle guards and road crossings)	2.1
Grading	24.0
Bridges and culverts	15.0
Track material and labor	24.1
Ballast, surfacing, etc.	7.0
Water supply, buildings, etc	8.8
Locomotives and cars	15.5
	100.0

The engineering costs are shown in the following table:

	Per Mile.	Per Cent.
Preliminary	$1.00	0.26
Reconnaissance	3.10	0.76
Preliminary surveys	53.50	13.14
Location surveys	84.40	20.73
Construction engineering	229.00	56.26
Permanent way surveys	36.00	8.84
	$407.00	100.00

Under the head of preliminary is embraced all engineering expense, including purchase of maps, filing maps with railway commission, studies made in office, etc. A charge was made for all work done in the chief engineer's office, also for a part of the time and expense of him and his assistants, clerks, etc., during construction and location. The permanent way party gave track centers and ballast grades, chained in all buildings, structures and openings, set stakes for all mile and signal posts, tied in all land corners, set limit posts to property corners, and made permanent maps and profiles.

These are costs incurred by well managed roads with capable engineering departments. It is not probable that work can be done for less. It would have been wise for the investors considering buying securities of roads Nos. 1 and 2, to have insisted that an amount equivalent to $150 per mile be spent on surveys before their money should be forthcoming. The investor would also be wise to insist on naming some of the engineers. He might name a consulting engineer, and have the locating engineers report jointly to him and the chief engineer. Then they could know the line was properly located. The late D. H. Ainsworth, of Iowa, is quoted by A. M. Wellington as saying that the location of a road was giving it is constitution. "It might be sick, nigh unto death, from evils of mismanagement, but with a good location it would survive and live."

The above actual records show how minor an item location is. On the Texas line a saving of 1 per cent. in the cost of grading would have paid for increasing the reconnaissance and preliminary surveys over 90 per cent., and the cost of preliminary and location over 35 per cent. The saving of 1 per cent. in the cost of bridging and culverts would have paid for an increase in reconnaissance and preliminary of over 20 per cent. On the Oklahoma line a saving of 1 per cent. in the cost of grading would have paid for increasing the cost of reconnaissance and preliminary 60 per cent., and the cost of location and preliminary over 20 per cent. A saving of 1 per cent. in the cost of bridges and culverts would have paid for increasing reconnaissance and preliminary surveys 25 per cent., and the cost of location, preliminary and reconnaissance 10 per cent.

In the absence of this careful location, the road may be located without regard to its best interests. There was once a road, which has now been absorbed into a larger system, which was projected to run from Des Moines, Ia., to Kansas City, Mo, Some forty miles south of Des Moines it turned to the east and ran in that direction over twenty miles, every mile taking it away from its destination, and for no reason but that the promoter received a subsidy from a town there. This ruined the line.

Three concrete illustrations from personal experience will be given of the evils of insufficient preliminary engineering. The first case was in the mineral district of Alabama. While going over the ground for another company which was considering building into the district, the writer was impressed with the line as a horrible example of poor location. It was 30 miles long, but was a continuation of two roads. It served five mines, the three best and biggest producers not being on the main line, but on two spurs, respectively 1.85 and 1.23 miles long. It was found that a line could be located between the terminals, reaching the two mines on the line and the three on the branches, with no greater mileage, no heavier work and equally good grades as the line now built. This would save the two spurs. Before condemning the engineer, some inquiries were made, and it was found that the construction was started before the location was completed; there had been no preliminary, and barely enough reconnaissance to find a possible line. The construction was done to forestall a competitor, and the two roads subsequently joined in building the inferior line. There were six daily trains operated over this branch, each of which made the extra 3.08 miles each day, or 36.96 miles in all. If it is estimated to cost one dollar per mile to operate a train, this would make the cost $13,490 per year to operate this increased distance, which is 6 per cent on $224,840. To this should be added the cost of building the 3.08 miles, or $70,234, which makes the wasted money $295,074 a year. This could have been saved by an expenditure of less than $100 for a reconnaissance, or less than $1,000 for a preliminary. As strategy entered in this case, it may be the prestige gained was worth this, although it might have meant the ruin of a weak road.

In 1907 the writer was engaged to make a location for a road between two points 23 miles apart by the preliminary. The line crossed an arm of a lake with a trestle 4,800 ft. long. It was found possible to secure an equally good alinement with no heavier work, which at the same time shortened the line 1.54 miles and eliminated 4,000 ft. of this trestle, besides reaching an industry giving the road three cars of freight per week, and losing no traffic the other line would have secured. The saving was:

4,000 lin. ft. of pile trestle, at $6.00	$24,000	
Cost of building 1.54 miles road	18,700	
		$42,700
Capitalized value of saving the renewing of 4,000 ft. trestle	$51,600	
Capitalized value of saving 1.54 mile distance	8,150	
		59,750
		$102,450

The third instance was the construction of a 16-mile extension of a 40-mile road. When the writer was engaged the line had been surveyed for a 3 per cent grade, and was built nearly to the foot of this grade. The manager was asked for authority to back up two miles and take another route, by which a grade of 1 per cent. could be secured, but he would not consent to this. A line was finally located up the hill with a 2.5 per cent. grade, omitting one curve, and climbing no higher at the summit. This grade made it necessary to use four trains to do work which could have been done by two had the line been changed to the 1 per cent. grade. Including doubling for part of the distance this required 110 train miles per day additional, which, if estimated at one dollar per mile for 310 days, omitting Sundays, and the three national holidays, gives an annual expense of $34,100, which is 6 per cent. interest on $568,333. This could have been saved to this company if the engineer had possessed authority to do what an engineer is hired to do—save his employer money.

To recapitulate, if the prospective investor, after assuring himself of the strategic position of the proposed line, and of its resources and its future, will take the Wallace table and test the provisions of the estimate of cost, seeing that it provides for equipment and terminals, as well as the apparent essentials, and will then take precautions to see that his money is wisely expended, his investment should be reasonably safe, subject to as few hazards as any business venture, and he should reap, jointly perhaps with the promoter, the underwriter's profit, which is always good, and often very large. It should be borne in mind, however, that these tables may not be applicable to roads east of the Mississippi and north of the Ohio. In these regions competition is so sharp, and low grades, interlocking plants, absence of grade crossings, etc., are essential; and each road must be in a class by itself. On some roads in Ohio, for instance, the masonry and steel structures will each exceed the cost of the rails.

The building of Turkish government railways in the Arabian province of Yemen, involves the expenditure of over $10,000,000. A line from Hodeidah to Hajila, at the foot of the mountains, having a total length of 69 miles, is already under construction. This, together with a line of 10 miles from Hodeidah to the new port at Ras-el-Ketib will be constructed with all possible haste.

ACCIDENT BULLETIN NO. 41.

The Interstate Commerce Commission has issued Accident Bulletin No. 41, containing the record of railway accidents in the United States during the three months ending September 30, 1911. The number of persons killed in train accidents was 201, and of injured 4,283. Accidents of other kinds, including those sustained by employees while at work, by passengers in getting on or off cars, by persons at highway crossings, by persons doing business at stations, etc., by trespassers, and others, bring up the total number of casualties, excluding "industrial accidents," to 21,865 (2,758 killed and 19,107 injured). The casualties are classified in Table No. 1, given herewith, which includes some details from Table 1B not here shown. (The accident statistics of electric lines are given in a separate table.) Supplementing the statement of railway accidents proper, the commission gives the following record of "Industrial Accidents"; those occurring to employees of the railway on railway premises in which the movement of cars or engines is not involved:

Industrial Accidents to Employees.

	Killed.	Injured.
While working on tracks or bridges	60	5,732
At stations, freight houses, engine houses, coaling stations, water stations, etc., where no moving railroad car or engine is involved	31	5,334
In and around shops	18	10,777
On boats and wharves	5	339
At other places	17	1,468
Total	131	23,650

Adding the casualties to employees in industrial accidents to the figures given in the larger table, the total number of employees killed, including those not on duty, is 840, and injured 34,907; and this makes the total number of persons killed, all classes, 2,889, and injured 42,757.

TABLE NO. 1A.—COMPARISON OF PRINCIPAL ITEMS WITH LAST QUARTERLY BULLETIN AND WITH ONE YEAR BACK.

	Bulletin 41.	Bulletin 40.	Bulletin 37.
1. Passengers killed in train accidents	65	21	63
2. Passengers killed, all causes	116	58	135
3. Employees (on duty) killed in train accidents.	104	107	209
4. Employees (on duty) killed in coupling	42	37	56
5. Employees (on duty) killed, total	626	512	869
6. Total, passengers and employees (items 2 and 5, above)	742	570	1,004
7. Other persons killed (including trespassers, nontrespassers, and employees not on duty), all causes	2,016	1,646	1,944
8. Employees killed in industrial accidents	131	87	132

The total number of collisions and derailments in the quarter now under review was 3,034, of which 176 collisions and 219 derailments affected passenger trains. The damage to cars, engines and roadway by these accidents amounted to $2,533,170, as shown below:

TABLE NO. 2.—COLLISIONS AND DERAILMENTS.

	Number.	Loss.	Killed.	Injured.
Collisions, rear	212	$207,118	13	386
Collisions, butting	164	242,163	33	855
Collisions, train separating	78	36,637	1	22
Collisions, miscellaneous	778	384,831	23	660
Total	1,232	$870,749	70	1,923
Derailments due to defects of roadway	303	$210,839	34	492
Defects of equipment, etc	831	699,060	17	257
Negligence of trainmen, etc	114	77,870	7	248
Unforeseen obstruction of track, etc.	88	122,894	12	121
Malicious obstruction of track, etc.	18	30,980	7	173
Miscellaneous causes	448	520,778	42	562
Total	1,802	$1,662,421	119	1,853
Total collisions and derailments	3,034	$2,533,170	189	3,776
Total for same quarter of—				
1910	3,130	2,871,501	303	3,352
1909	2,751	2,316,014	180	3,341
1908	2,567	1,950,408	176	2,729

The table of prominent collisions and derailments, with brief statements of causes, which heretofore has been given in each quarterly bulletin, is now omitted. In place of it a dozen pages are filled with accounts of 15 accidents which were investigated by the commission's inspectors during the three months covered by this bulletin. The *Railway Age Gazette* accident records for these three months were published on pages 315 (for July), 502 (for August), and 846 (for September); and notes were there given concerning the accidents here referred to, excepting the first (which is not a train accident) the fifth and the thirteenth. We copy from the bulletin the principal facts, relating to the causes of these 15 accidents, which have not been already published.

Boston & Albany, July 1, Post Road, N. Y. Automobile stopped on track in front of a train; three persons killed. This highway crossing was being used temporarily, because an adjacent crossing beneath the tracks was undergoing repairs; but the inspector says that a flagman should be stationed at the crossing "or some effective warning device be installed." Whether the accident occurred in daylight or darkness does not appear, but it is said that the engineman did not see the automobile until within 300 ft. of it. The highway approach to the crossing is on a steep grade, whether up or down is not stated.

Minneapolis, St. Paul & S. S. M., July 5, 5:50 a. m., Superior, Wis.; four employees killed, four injured. The conductor and engineman of a freight, who had been on duty 18 h. 50 min., forgot an order which had been delivered to them about nine hours before. This order required them to keep out of the way of

TABLE NO. 1.—CASUALTIES TO PASSENGERS, EMPLOYEES, AND OTHER PERSONS: JULY, AUGUST, AND SEPTEMBER, 1911.

	Passengers.		Employees on duty.		Employees not on duty.		Other persons not trespassing.		Trespassers.		Total persons.	
	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
Collisions	19	1,304	45	591	8	9	1	16	4	3	70	1,923
Derailments	46	1,270	49	513	5	7	...	27	19	36	119	1,853
Accidents to trains, cars, or engines, except collisions, derailments, and boiler explosions	...	43	7	183	1	4	...	9	1	4	9	243
Bursting of, or defects in, locomotive boilers or boiler attachments	...	...	3	264	...	...	...	...	...	...	3	264
Total train accidents	65	2,617	104	1,551	7	20	1	52	24	43	201	4,283
Accidents to roadway or bridges not causing derailment, such as fires, floods, landslides, explosions, etc.	...	...	...	8	1	...	4	...	1	...	6	8
Coupling or uncoupling cars (does not include accidents with air or steam hose)	...	...	42	697	...	1	...	...	...	...	42	698
While doing other work about trains (not in shops or engine houses) or while attending switches	...	...	42	4,402	...	...	...	...	...	...	42	4,402
Coming in contact, while riding on cars, with overhead bridges, tunnels, or any signal apparatus, or any fixed structure above or at the side of the track	5	13	15	357	...	5	...	1	19	23	39	399
Falling from cars or engines	14	94	94	1,246	4	12	10	21	122	180	244	1,553
Getting on or off cars or engines	23	727	29	1,869	9	62	5	39	167	542	233	3,239
Other accidents on or around trains not here named	1	1,036	4	283	...	25	2	135	9	85	16	1,564
Being struck or run over by engine or car at stations or yards	5	30	142	304	24	29	37	74	309	278	517	715
Being struck or run over by engine or car at highway grade crossings	...	...	...	...	...	2	290	697	19	27	309	726
Being struck or run over by engine or car at other places	1	...	144	167	38	13	17	25	846	402	1,046	607
Other causes	2	234	10	178	...	26	10	373	41	102	63	913
Total, other than train accidents	51	2,134	522	9,511	76	175	375	1,365	1,533	1,639	2,557	14,824
Grand total	116	4,751	626	11,062	83	195	376	1,417	1,557	1,682	2,758	19,107

a work train. On this line there was no telegraph office for a distance of 107 miles, and the train despatcher is censured for issuing an order which gave to this train the right to the road for a trip which obviously could not be completed within 16 hours—the time beyond which it would be illegal for the men to remain on duty. The inspector recommended that the railway be prosecuted for violation of the hours-of-service law, and also that the telegraph or telephone facilities be made adequate.

Oregon Trunk, July 10, Dyke, Ore.; derailment due to excessive speed on a curve of 11 deg., the alinement of the track being defective; five passengers killed, 30 passengers and five employees injured. The limit of speed prescribed by rule was ten miles an hour; actual speed 30 miles an hour. Nothing said about the age, character or circumstances of the men in charge of the train, or of the degree of fault in the track.

New York, N. H. & H., July 11, Bridgeport, Conn.; derailment of passenger train due to excessive speed. This accident, together with the government inspector's report on it, has already been noticed (pages 90, 316, 360, 374).

Baltimore & Ohio, July 14, Harper's Ferry, W. Va.; derailment of passenger train. Investigated July 27, because of the receipt of a complaint alleging defective road bed. The cause of the derailment was not discovered. The speed of the train was 30 miles an hour, and there was no evidence that this was excessive.

Seaboard Air Line, July 27, Hamlet, N. C.; butting collision, passenger train and freight; ten passengers killed, 262 passengers and five employees injured. Hamlet is a division point, and the division on one side is controlled by one despatcher, and that on the other side by another, both working in the same room. One of the despatchers sent a message to the freight train (on his district) allowing it to run a short distance over into the next district, and this message was sent without first consulting the other despatcher and receiving correct information as to whether or not the line was clear. Permission to allow a freight to run over into the next district in this way had been given frequently by telegraph, so as to make it unnecessary for the freight to stop at the foot of a heavy grade to examine the train register. This despatcher had been in the service over seven years, and he was considered reliable and competent.

Bangor & Aroostook, July 28, Grindstone, Me.; butting collision of passenger trains; five passengers and three employees killed, 40 passengers and three employees injured. This collision occurred at 9:10 p. m.; the train at fault, the second section of a regular passenger train, started from Millinocket at 8:58 p. m., when it was obliged to reach Grindstone (nine miles) at 9:09 p. m. The engineman was killed. The conductor, before reaching Grindstone, saw that he was encroaching on the time of the other train, yet took no action, saying that he relied on the judgment of his engineman. (As noted in the *Railway Age Gazette* of February 23, this conductor has been fined $500 and sentenced to imprisonment for 60 days.)

Pennsylvania (West of Pittsburgh), August 13, Fort Wayne, Ind.; derailment due to excessive speed; four employees killed, 57 passengers and four employees injured. This accident has already been noticed (pages 346, 502, 836, 1351).

Cleveland, C. C. & St. L., August 18, Columbus, Ohio; derailment of passenger train at a disconnected switch. Our account of this accident (page 502) gives details not shown in the government report. The bulletin says that the signalman had been in service only two and one-half months, and had had "no previous experience as a towerman or interlocking operator."

Lehigh Valley, August 25, Manchester, N. Y.; derailment caused by broken rail; 27 passengers and one employee killed, 59 passengers and four employees injured. This accident has already been noticed, pages 444, 502, 627; also February 16, 1912, pages 267, 280.

Pennsylvania, September 4, Dock Junction, Pa.; this collision occurred on the Lake Shore & Michigan Southern, but it is reported under the head of Pennsylvania. A passenger train of the Pennsylvania ran into a freight of the Lake Shore at a crossover. One passenger and two employees were killed, and 30 passengers and six employees injured. The passenger train ran past a distant and a home signal, which were set against it. The engineman appears to have been killed, although the report does not say so. He was a man 63 years old, of good character and habits, and had left home in the morning apparently in good health, but he had disregarded signals on this same trip, and the fireman had been compelled to stop the train. This fireman, in service on this division seven years, and on this train six months, is censured for not having taken charge of the engine when the engineman failed to obey the signals approaching Dock Junction.

Minneapolis, St. Paul & S. S. M., September 5, Fremont, Wis.; derailment of passenger train; one employee and two trespassers killed, two employees and 25 passengers injured. This was due to the malicious misplacement of a switch by a boy 15 years old.

Chicago & Northwestern, September 11, Oakfield, Wis.; butting collision of freight; nine employees injured. A freight train was side-tracked to meet two opposing extra trains. While on the side track all members of the crew went to sleep. After one of the extras had passed, the train started out and met the second one. These men had been on duty eleven and a half hours.

Lake Erie & Pittsburgh, September 13, Cleveland, Ohio; derailment of a work train; two laborers killed, 16 injured. This was a new road not yet opened for traffic. The derailment was due to excessive speed on new track. The conductor had been warned, by word of mouth, that the track was defective at this point, but the information was not given to the engineman. The train was running backward. The conductor had been engaged in this work four days, but the engineman and fireman had only made one or two trips over the road.

Pennsylvania, September 25, 1 a. m., Larimer, Pa.; butting collision of eastbound passenger and westbound freight; one employee killed, 4 injured. These trains had to cross each other's routes, using adjacent crossovers (a four-track railway). The freight was running at low speed and the passenger had nearly or quite stopped. The signalman operating the switches and signals became confused (apparently because of the unexpected appearance of the passenger train after he had given a route to the freight) and took away the route from the passenger after the passenger engineman had accepted it. This appears to have been done after the freight had passed its home signal, and it appears that the engineman of the freight was not keeping a good lookout. The inspector observes that approach locking by track circuits would have prevented the mistake of the signalman. This signalman had been at this place less than two months, but had had experience elsewhere. The inspector's report omits many details, so that a complete account of the accident cannot be made.

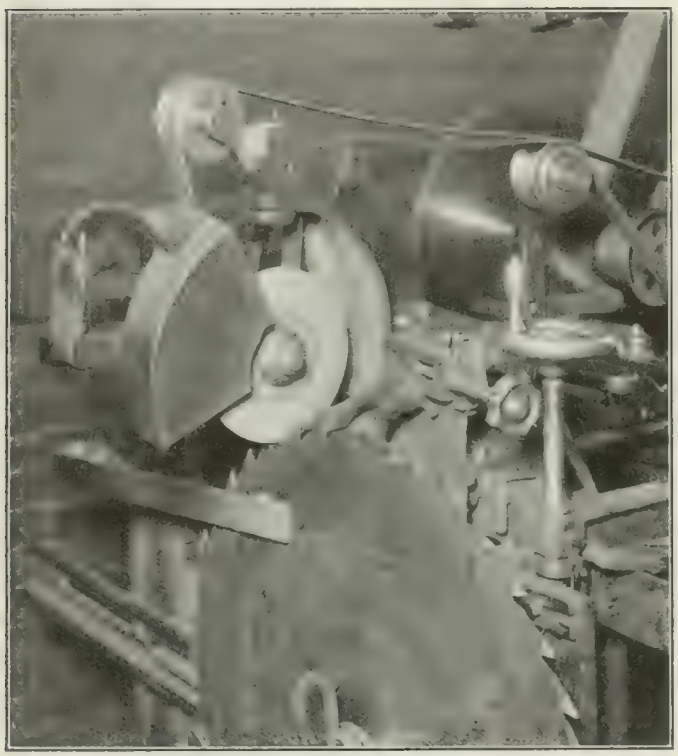
Electric railways reporting to the commission (not included in the foregoing statistics) had 108 persons killed during the quarter and 1,355 injured; and there were 36 collisions and 26 derailments. Train accidents are charged with only 3 fatalities —1 passenger and 2 employees killed in collisions. The total number of passengers killed from all causes was 9, and of employees 27 (10 in industrial accidents). The number of trespassers struck or run over by cars was 58; 27 killed and 31 injured.

Defending the organization of the Saxon State Railways the Minister in charge said that since 1901 while passenger traffic has increased 46 per cent. and freight traffic 35 per cent., the number of employees in the administrative service has decreased nearly 10 per cent.

PREVENTION OF INDUSTRIAL ACCIDENTS.

The Pennsylvania Railroad has in the past year reduced the industrial accidents in its shops from 8.7 to 3.5 per 1,000 employees in a month. Industrial accidents are those which result from the use of machinery and include everything from a scratched finger to a broken head. This road was recently awarded a medal, as the American employer, who during the year, in the judgment of the American Museum of Safety, did the most for the protection of the lives and limbs of its workmen by means of safety devices for dangerous machines and processes.

The officers of the Pennsylvania Railroad began a vigorous campaign of education among the employees in November, 1910. At the same time experts were employed to inspect the larger shops to see where safety devices could be installed to reduce the chances of accidents. Motive power inspectors of the railway accompanied the experts on their inspections. The resulting benefits were so marked that the making of industrial inspections of shops has become a fixed policy. Since the adoption of the plan 66 shops have been inspected. Reports were made to the general manager, and practically all of the recommendations offered have been adopted. The following data shows what has been accomplished.



Safe-Guard on Emery Wheel for Sharpening Circular Saws.

Month of 1911	Number of shop employees.	Killed.	Serious injuries per 1,000 employees.
January	34,127	4	8.7
February	34,171	7	7.3
March	32,899	0	8.3
April	31,380	1	6.0
May	34,694	3	7.9
June	34,001	1	5.2
July	31,641	2	4.7
August	32,512	2	3.4
September	32,932	0	3.4
October	33,462	0	3.2
November	33,997	2	3.5

The reports resulting from the inspections contained 3,126 recommendations covering improvements or changes in 3,737 tools or machines, at an estimated cost of $35,000, or an average of $530 for each shop. In many cases it was not that expensive. At one shop for which 238 recommendations were made, 157 covered improvements which were made with practically no cost. Shopmen have most at stake in the accidents and the organization of shop safety committees of the rank and file has proved invaluable. The prevention of industrial accidents depends largely on the care exercised by the individual workman. By serving on the safety committees they become interested in precautions and will instinctively avoid many of the common and preventable dangers. Even laborers serve on these committees.

A terminal division committee is composed of a locomotive inspector, brakeman, baggage porter, track foreman, yard foreman, usher and relief assistant trainmaster. A road and yard committee is composed of a passenger engineman, freight conductor, inspector of car repairs, telegraph operator and a laborer. These are standing committees, the members of which are changed from time to time. The recommendations they make are simple and cover a wide range of subjects, such as criticisms of a somewhat general character referring to recommendations for coaming strips for shop elevators, stairways and floor openings; protection for exposed gears, band saws and exposed set screws; safeguarding of all belts and pulleys; conduit for wires from rheostat boxes; protection for counterweight chains; boxing of weights and installation of guard rails at points where workmen may be exposed to belting or moving machinery. The Pennsylvania Railroad announces that its efforts to reduce industrial accidents will be redoubled in the present year.

TRESPASSERS KILLED ON RAILWAYS—WHO ARE THEY?

BY FRANK V. WHITING,
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Recent writers have stated that probably there are no fewer than 500,000 tramps in America. When we realize that they arrive at this number by taking as a basis the number of trespassers on railways killed, and multiply this by the figure representing the proportion of trainmen killed in a year to the total number of trainmen employed, we see how unreliable such figures are. As a matter of fact, trespassers come from all walks of life, and the statement that was recently made by Orlando F. Lewis, that from one-half to three-quarters of trespassers are vagrants, is without foundation. Mrs. Alice Willard Solenberger, in a book recently published by the Russell Sage Foundation, entitled "One Thousand Homeless Men," criticises the customs of railway officials in designating as "tramps," that very large body of men that "beat" their way about the country, and she refers to thousands of bona fide workmen, who, at certain seasons of the year are needed in a particular section of the country in large numbers. She states that these seasonal and shifting workmen are not tramps and should not be classed as such; and neither should other men, who with a legitimate purpose are on their way to a known destination, nor should those others who are only accidentally or quite temporarily upon the railways be so classed. She further states that to class these men as "tramps" is not only unfair to the men, but confuses the discussion regarding either homeless men or tramps. From her investigation she decided that 220 out of one thousand, or less than 25 per cent., were tramps.

Being impressed with the lack of information on the subject, and also by the assertions made with regard to tramps on railways, I deemed it profitable to secure some authoritative data, and to this end have examined reports of accidents resulting in the deaths of one thousand trespassers. The results are interesting as well as enlightening.

It is many years since the word "tramp" escaped from the vocabulary of most railway officials, and was superseded by that very sensient substitute, "hobo." A tramp means one who walks from place to place, either idly or in search of work; specifically, "an idle wanderer." "Hobo" is defined as an idle, shiftless, wandering workman, ranking scarcely above a tramp.

Among most railway men the hobo is a typical tramp, especially to those who come in contact with the trespasser problem

through the investigation of accidents resulting in injury or death of persons generally. However, neither the word "tramp" nor "hobo" is used, except in a very restricted sense, when applied to some person who is in fact a hobo or tramp. These words, however, are not used to designate that large class of persons who walk upon the tracks or "beat" their way upon railway trains, but such persons have for years been classed as trespassers.

The Interstate Commerce Commission reported that during the fiscal year ending June 30, 1911, 10,396 persons were killed upon railways, and this number includes those who were instantly killed or died within twenty-four hours from the time of accident. Of these, 5,284 are designated as "trespassers." It is a significant fact that, of the number of trespassers killed, practically 80 per cent. or 4,125 are shown as having been "struck by engine or car," in other words were walking or standing upon the tracks; 520 were killed in "getting on or off cars and engines," 1,043 "while on trains," and 116 from "other causes."

There are many trespassers on the tracks of railways who are regularly employed and who make it a practice to use the right-of-way between streets or highways in going to or from their work. The tracks are also used to a considerable extent by pedestrians when public highways are wet and muddy, or difficult to walk upon.

We found that of 1,000 persons killed while trespassing, 489 resided near the place of accident; 321 resided at a place distant from where the accident occurred; and the residence of the balance, 190, was not ascertained.

The conjugal state of the decedents has some bearing upon this question; and it is interesting to note that of these trespassers, 273 left widows or children, 33 were widowers, 376 single, and the family connection of 318 unknown. Further, 369 were living with their families or parents, 301 were not living with their families or parents, and 330 could not be classified in this respect. When we consider that many young men employed in our larger cities have left home and are boarding, and that among the trespassers there is quite a number of foreigners who come to this country without their families, it is not strange that so large a percentage should be found not living with their families or parents. Another thing that indicates clearly that the large majority of trespassers are not tramps in any sense of the word, is that 598 of the thousand referred to were self-supporting (388 were known to be regularly employed), and 105 were not self-supporting. This information was not obtainable as to the balance.

The age by groups are of interest: 68 were 15 years and under; 340 were 16 to 30 years old; 451 were 31 to 60 years old; 69 were over 60 years old; 72 were of unknown ages, all these being adults.

With reference to nationalities we found that 468 were Americans, including 3 Indians and 18 negroes. In 174 cases the nationality was not reported, but in the rest we find that no less than twenty-four foreign countries contributed their quota to this regiment of trespassers who trespass no longer.

The occupations of those killed and the number employed in each warrants detailed mention. These were as follows:

349 Unknown.	18 Merchants, salesmen and agents.	5 Soldiers.
19 None.	2 Coachmen and chauffeurs.	8 Sailors.
70 School children and students.	3 Linemen.	31 Railway trainmen and other employees.
268 Laborers.	3 Cigarmakers.	3 Musicians.
44 Farmhands.	3 Nurserymen.	1 Teacher.
1 Minister.	81 Shopmen and mechanics.	2 Fishermen.
1 Actor.	2 Barbers,	1 Patrolman.
1 Inmate asylum.	1 Contractor.	2 Shoemakers.
10 Engineers.	3 Bakers.	4 Horsedealers.
1 Chemist.	2 Messengers.	4 Lumbermen.
4 Clerks		3 Watchmen.
6 Hotelmen and bartenders.		8 Miners.

Then, there were in addition six small children and thirty women.

It is thus readily seen that not only from more or less actual knowledge, but by a definite process of elimination we learn that many of these unfortunates were neither tramps nor hoboes, and, in fact, we are justified in saying positively that 764 were not hoboes and 50 were, and that the status of the rest was not determinable.

Deaths are occasionally brought about by intention on the part of the decedents, and the information at hand shows that 15 of the cases were reported as suicides. Intoxication contributed to a large extent to the number of deaths, there being 93 cases reported due to this cause; at least the men killed were intoxicated at the time. In 708 cases the trespassers were not intoxicated, and in the rest the condition in this respect was not known.

Mrs. Solenberger says: "It is the mere accessibility of the railways more than anything else, I believe, that is manufacturing tramps today. So long as it is possible for practically any man or boy to beat his way about the country on the railways, we shall continue to have tramps in America. When we succeed in absolutely closing these highways to any but persons having a legitimate right to be upon them, we shall check at its source the largest single contributory cause of vagrancy, and the problem of the tramp, as such, will practically be solved. As an unemployed, untrained, sick or irresponsible homeless man he will still need attention, but this can be given him with incomparably less difficulty when once he is deprived of the facilities he now has for wandering from one place to another."

Considerable has been said of late with reference to laws against trespassing. Very few of the states have laws specifically directed against trespassing on railway tracks, and usually laws with reference to trespassing on trains are mild in form and not very often enforced. A great deal of difficulty has been experienced from time to time in getting magistrates to prosecute offenders in this respect.

Mrs. Solenberger suggests: "If the migration of tramps could be controlled, as already suggested, under some sort of federal interstate commerce law, the problems might perhaps be solved, but it is most unlikely that these vagrants can be dealt with by the national government until long after individual states have discovered how best to deal with them locally. Students of the problem now generally believe that little progress can be made by any state until the responsibility for the treatment of the tramp is assumed by the state as a whole; until the laws which affect him are state laws; until the cost of his arrest and punishment or treatment is met by the state, and not by counties or cities within the state."

It has been suggested from another source that Congress pass a law prohibiting trespassing on interstate railways; and this suggestion is an excellent one and should receive serious consideration.

However, it is evident from the information shown above that, after all, the problem is not so much one of dealing with tramps or hoboes, but with trespassers, who in many instances are regularly employed, well-to-do and respected citizens of our towns and cities, and that so far as the prevention of accidents to trespassers is concerned, the problem is largely a local one and wholly within the hands of the local authorities.

Notwithstanding the revolution in China train service over all but the last 5 miles of the extension of the Sunning Railway in Kwangtung province, China, to Kongmoon has been commenced. The last 5 miles, which are being constructed through swamp and rice fields, and require considerable filling, will be completed immediately. The road will then be 67½ miles long and will reach from the river port of Kongmoon into the interior of one of the richest portions of the Pearl river delta. Its equipment at present consists of 7 American and 5 German locomotives, 18 passenger coaches built in America, and about 70 box cars and about 70 flat cars, most of which were built in the United States. The extension of the railway north from Kongmoon and eventually to Canton and south from Sunning City to the sea is to be undertaken as soon as affairs in this portion of China return to normal.

DECISION OF THE COMMERCE COURT IN THE LOUISVILLE & NASHVILLE CASE.

The decision of the United States Commerce Court, in the suit of the Louisville & Nashville, asking the annulment of the order of the Interstate Commerce Commission reducing freight rates from New Orleans, La., to Montgomery, Ala., and other places, was noticed in our last issue, page 403. The complete decision in the case, which was heard before the full court, makes a pamphlet of 49 pages. The case is No. 4, decided February 28, 1912. The decision is written by Judge Archbald. A dissenting opinion was presented by Judge Mack, but this has not yet been published.

In brief, the court decided in favor of the Louisville & Nashville on the ground that the commission had ordered a reduction of rates without first having before it proper evidence that the former higher rates were unreasonable. Following are the principal points of the decision.

Prior to 1907, for many years, the rates on certain classes of freight from New Orleans to Montgomery, Selma and Prattville were higher than from New Orleans to Mobile, an intermediate point, plus the rates from Mobile to Montgomery, etc. The same conditions prevailed by way of Pensacola. The rates to Mobile and Pensacola were low because of water competition, but the water competition had been killed off several years ago. In 1906 the commission ruled that a through rate higher than the combination of intermediate rates would be regarded as prima facie unreasonable. Following this ruling the Montgomery freight bureau complained of the rates on certain classes and commodities. Influenced by this complaint and by the ruling of the commission, the railway on August 13, 1907, advanced its rates from New Orleans to Mobile and Pensacola on certain classes. This action, with reductions on a number of articles by giving them commodity rates, satisfied Montgomery. But, soon after, the New Orleans board of trade complained that the advances to Mobile and Pensacola were unreasonable; that the rates to Montgomery, etc., were unreasonable in themselves and also as compared with rates from Memphis, St. Louis and Louisville. The railway denied the charges, but before the commission held a hearing it voluntarily established commodity rates meeting some of the complaints, especially as regards those based on competition with Memphis.

The commission reported on the New Orleans cases November 26, 1909, condemning the advances to Mobile and Pensacola on the class rates and directing the restoration of the rates in force prior to August 13, 1907; and it declared the rates to Montgomery, etc., unjust, insofar as they exceeded the sum of the locals to Mobile and from Mobile. The rates which were so prescribed to Mobile and Pensacola were the same in each case as the rates which had existed prior to the advance made by the company, and the rates to Montgomery were exactly equal to the rates to Pensacola and Mobile as so restored, plus the rates from these places to Montgomery, which remained unchanged; the rates to Selma being made up in the same way, and those to Prattville having the prevailing arbitrary added. The railway appealed to the federal court in Kentucky. The court refused to grant a preliminary injunction, and the order went into effect and was complied with.

In the suit before the court the entire testimony and proceedings before the commission were made a part of the record, though the commission objected to this action, on the ground that its order, having been made after a full hearing, upon due consideration of the issues involved and in the exercise of its statutory authority, was not open to question. The case was not tried in Kentucky, but was transferred to the Commerce Court. There were many matters at issue, but the only one which the court deems necessary to pass on is whether the commission has not in a legal sense acted, as charged, in such an unreasonable manner that its order is invalid, having nothing of substance or persuasive force upon which it can rightly be predicated. This is claimed by the road to result because the reasons assigned in the report either do not justify the conclusion reached or are so at variance with the undisputed facts that effect has plainly not been given by the commission to the evidence which was produced before it. Stated in another form the question is whether this order, tested by the principles recently emphasized by the Supreme Court in *Interstate Com. Com.* v. *Union Pacific*, decided January 9, 1912, should not be set aside because there was no substantial evidence to sustain it. That is to say, whether the commission, while in form acting within the authority conferred by the statute, has not in effect disregarded it.

If the conditions had been as the commission describes them, the decision of the court would have been in favor of the commission's order, and "though there might have been a doubt as to the correctness of the commission's conclusion, nevertheless there was room for difference of opinion, and in such case the conclusions of the commission should be accepted. . . . The evidence has been read and re-read with the utmost care," and the court is unable to see how the commission's opinion could have been formed.

The statute (Section 15) requires the commission to find existing rates unjust and unreasonable before proceeding to prescribe future rates. There must be due notice and a full hearing. The hearing which is so provided for is not a perfunctory one. The carrier is entitled to know and to rely on what is adduced at it, either for or against the existing rate, and the commission is not authorized to disregard it and reach a conclusion not at all justified by it. If the rate attacked is shown to be unjust, it may be abrogated and a new one established. But if that is not the outcome of the hearing and on the contrary it is clearly shown that the rate is not unjust, the evidence as to this cannot be put aside, and if it is, and the commission without reference to it proceeds to condemn the rate and to fix another, its action is invalid.

After the most careful consideration we are forced to conclude that the action of the commission in the present instance is of that character. Having regard to the evidence, the only tangible ground upon which it will be found to rest is the fact that there had been an advance in the rates to Pensacola and Mobile, and that the Montgomery rate exceeded the sum of the rates through these points as they stood prior to this increase, making the increase in these intermediate rates the only proof of unreasonableness, not only as to Pensacola and Mobile, but Montgomery also. And if the reduction to Mobile and Pensacola was a mere restoration of the rates previously in force, based solely on the advance made by the railway, it is equally indefensible. And, taking the case as it stands, there is practically nothing else, as it seems to us, that can be made out of it. Not but that other reasons are given by the commission. But it will be found upon examination, either that they are entirely unsupported by the evidence or are involved in such capital mistakes with respect to it, or are in themselves so inconsequential as to the reasonableness or unreasonableness of these rates, that nothing can be consistently predicated upon them. And this we will now endeavor to demonstrate.

The original rate from New Orleans to Montgomery was based on a decision of Hon. Thomas M. Cooley, in 1886, who acted as arbitrator, at the request of the railways, on the general situation in southeastern territory. Judge Cooley virtually affirmed rulings which had been made by James R. Ogden, commissioner of the associated railways. In this decision the rates from New Orleans were made four cents less than from the Ohio river. Later, when a new road was built from Memphis to Birmingham, a reduction was necessary. The final adjustment was made in 1896. This judgment of Judge Cooley, basing rates on "what the traffic will bear," and which was accepted by the business public for 14 years, is accepted by the court as reasonable. Nothing militates against it except the water rates from New Orleans to Mobile and Pensacola. The through rates to Montgomery now fixed by the commission are nothing more than the restored competitive Mobile and Pensacola rates plus the pre-

vious rates from those places to Montgomery. There is one trifling exception, Class E. All the rates affected have to stand or fall together. It is true that there are other reasons assigned by the commission in its report for the reduction in the New Orleans-Montgomery rates, but, with due respect to the commission, they do not bear up under examination. The commission refused to be guided by the Cooley arbitration, holding that it had been set aside by the changes in conditions, but the record, as the court reads it, does not warrant this conclusion. The changes had been mainly, or wholly, in commodity rates, whereas the rates now changed by the commission are class rates. These class rates have continued undisturbed so long that they must be assumed to have been equitably adjusted. Some articles had been taken out of the classes from time to time and given commodity rates, but there is no evidence that the class rate adjustment was unfair to New Orleans.

The railway claimed that between points where the through rate exceeded the combination of locals, shippers had been given the benefit of the combination rate, and the commission took this into consideration; but the court finds that these concessions on the part of the road had not been enjoyed by shippers in New Orleans sending freight to Montgomery. New Orleans had sometimes shipped locally to Mobile and then reshipped to Montgomery, etc., but this was done without the co-operation of the road.

And the acceptance on other parts of the system of combination rates which were lower than through rates had no tendency to show that these particular rates were unreasonable. In short, when the undisputed facts regarding this feature of the case, as they appeared before the commission, are taken into account, they not only do not sustain the conclusion of the commission, but seem to be rather of contrary import.

The merchants of New Orleans had previously made ineffectual efforts to secure better rates to Montgomery, etc., but before the commission had finished hearing this case, these grievances had been met by reductions and adjustments which favored New Orleans as compared with Memphis. This was recognized by the commission, as it made no order respecting commodity rates; and as to the class rates, New Orleans has had an actual advantage over towns on the Ohio and upper Mississippi rivers. These facts, instead of sustaining the commission, tend to a contrary conclusion. Again, the commission makes comparison with rates from Savannah, Charleston, and other eastern and northeastern cities, but the court rules out this comparison, because it takes an entirely different territory where there is no evidence that the traffic conditions are at all similar. The commission is criticized also for introducing other comparisons equally irrelevant. And why did not the commission make comparison with the rates established by the railway commissions of Alabama and Georgia? The court here presents a table, reproduced below, showing that for 141 miles, which is the distance from New Orleans to Mobile, rates made by the state commissions, as well as numerous interstate rates made by the railways, are higher, and in most cases much higher, than those from New Orleans to Mobile.

	Class—						
	1	2	3	4	5	6	E.
Louisville & Nashville rates from New Orleans to Mobile, 141 miles	50	39	38	31	27	16	20
Southern Railway rates fixed by commissions of Alabama and Georgia for 141 miles	75	63	56	44	38	29	35
Minimum or standard tariff of Georgia Railroad Commission, 141 miles	60	50	45	36	28	23	28
Southern Railway rates in Tennessee, 141 miles	58	50	46	37	31	27	32
Southern Railway rates in South Carolina, 141 miles	62	52	42	39	31	24½	31
Southern Railway rates, Chattanooga to Birmingham, 143 miles	57	49	41	32	27	19	27
Southern Railway rates Birmingham, Ala., to Columbus, Ga., 157 miles	57	49	45	35	28	22	27
Southern Railway rates, Chattanooga to Atlanta, Ga., 138 miles	52	45	41	32	25	20	27

"Let us not be misunderstood upon this point. We recognize, of course, that comparisons are very commonly made in the investigation of rate cases, and that they may often be quite persuasive. The competency of such evidence is not questioned nor the right of the commission to give it due weight. Neither is it doubted that the commission may receive evidence of this kind, giving to the facts so shown their proper value, without proof of similarity of conditions. But what we do hold is that the comparisons made by the commission in its report in this case, taking into account all the facts and circumstances disclosed at the hearing, had no evidentiary bearing upon the reasonableness of the rates in dispute, and therefore furnish no appreciable support of the commission's conclusion."

The commission also made comparisons of the rates per ton per mile, taking an average of the first six classes, showing that this average was higher from New Orleans to Montgomery than from St. Louis and other points; but it is the ordinary rule that the ton-mile rate shall decrease as distance increases, other things being equal; so this comparison is rejected. Finally, the commission says that shippers of certain kinds of goods—naming them—had testified that they were unable to trade in the Montgomery territory on account of the high rates, but the evidence shows that this complaint was based on the former conditions existing before the road made the reductions and adjustments already mentioned; as to the class rates, to which the commission's order is confined, there is no evidence to sustain the observations made by the commission with regard to this claim of the New Orleans shippers.

Here the court goes on to abstract at considerable length the testimony of 11 shippers, naming them; and in each case it is found that the testimony does not support the conclusions of the commission. "Considered severally or collectively, this evidence contains nothing which we can discover that supports the conclusions of the commission with respect to the Montgomery rates, outside of the fact that, if the reduction is to stand to Pensacola and Mobile, it calls for a reduction to Montgomery to equalize the sum of the locals. It is not simply that the weight of the evidence does not sustain the reasons assigned by the commission in its report, but that there is no substantial basis for those reasons in the testimony passed upon."

The Mobile and Pensacola rates remain to be considered. The mere fact that they were increased by the company created no presumption that they were not fair and reasonable, nor was the commission justified in putting them back to what they had been without regard to whether they could be presumed reasonable. The rates for the third, fourth and fifth classes, under which most of the freight moved, were lower than the rates by water, notwithstanding which the commission proceeded to reduce them to their former low basis, making them 6, 9 and 8 cents, respectively, below the water rates. The court also accepts the argument that the reductions on these class rates are inconsistent with each other, some being much larger in proportion than others. Inconsistencies had existed in former rates, but this was no justification for this act of the commission. The commission says that the Mobile and Pensacola rates had remained unchanged for 20 years, and that there was no evidence that they had not been compensatory. But at the time this statement was made the rates in force were the higher ones, established in 1907, and it was the unreasonableness of these new rates which was at issue and which the complainants should have been made to show. There was no adverse presumption to be indulged because of the increase; neither was a voluntary rate established to meet competition to be taken as the measure of what is reasonable. And yet that is what the commission did. This was wrong, for at that stage of the proceeding it was not incumbent on the railway to show that the former rates had not been compensatory. Rather, the burden was on the complainant to show that the rates as they stood were unjust and unreasonable. The argument presented to the court in behalf of the commission was that a rate, however low, cannot be condemned if it gives any return above the cost of service. This proposition the court will not accept.

The commission declared that the rates to Mobile exceeded

the rates to Natchez, Vicksburg, etc., but "this clearly is not true" says the court. It may be that the commission had in mind the rates as raised by the railway, but even then the statement is not true, except with respect to the third, fourth and fifth classes. Again, the commission says that these rates exceeded rates from Nashville and for other similar distances, but no tariffs are quoted to sustain this conclusion, whereas there is evidence, uncontradicted, that with regard to a large number of rates from Nashville, etc., the fact is just the opposite.

Another ground taken by the commission to justify its action is that between New Orleans and Mobile the westbound rates were the same as the eastbound, but this is held to have no bearing, especially in view of the fact that there was a preponderance of empty cars moving westward.

The commission says that the advances made from New Orleans to Mobile were severely felt by certain shippers; but this is not a sufficient reason for holding the rates unjust. Any advance would be felt, of course. New Orleans wished to compete in Mobile with Mobile jobbers, and Mobile desired to compete in New Orleans with New Orleans jobbers; but, of course, a railway cannot be required to meet such a demand to virtually abolish the cost of transportation. Other arguments of this kind are found to be based on mistaken statements of fact. The court here goes on to quote at length and analyze the testimony of a half dozen shippers and jobbers, finding, as in the case of the Montgomery complaint, that the testimony was irrelevant or had been wrongly construed.

All this was in relation to the rates to Mobile; and the case of Pensacola was no different except that it was still weaker. The commission says that the New Orleans merchants shipping to Pensacola did not suffer so much as those shipping to Mobile, but that they strongly protested against the advance. The court says that there is nothing in the evidence to sustain the statement that the results at Pensacola were like those at Mobile. One paper dealer said that he would be affected at Pensacola the same as Mobile, "but he is not affected at all at Mobile and therefore cannot be at Pensacola."

Opposed to all of these claims of the shippers is the testimony of witnesses produced by the railway to the effect that these rates are less than those usually charged by the company and by other railways; that before being cut down by the commission they permitted a free movement of traffic; that no competitive conditions called for a reduction, and that the reduction gave New Orleans an undue advantage over Vicksburg, Memphis and other places. Also it is shown that the line from New Orleans to Mobile along the Gulf coast is costly to operate, long trestles and bridges being frequently damaged by floods and storms; the territory is so sparsely settled that the road depends for profit on the through business, and has never received even a fair return from its operations; and, finally, the increase in wages and in prices of material in the last few years makes the order of the commission very unjust.

Counsel for the commission and for the government made no reply to this, simply relying on the authority of the commission to determine what is a reasonable rate, and claiming that the courts could afford no relief unless the rate fixed could be shown to be confiscatory. This contention cannot be accepted. "In our judgment, it was never intended to confer on the commission any such unrestrained and undirected power. As already pointed out, the law provides for a hearing and it must be more than a shadow. Both parties are entitled to be confronted with the evidence on which the case is to be determined, and the conclusion reached must be a reasonable inference from the facts disclosed by the investigation. This conclusion is held to be entirely justified by the recent decision of the Supreme Court in the case of the Interstate Commerce Commission against the Union Pacific.

"Tested by the principles laid down in that decision, we are of opinion that the order here drawn in question must be held invalid as exceeding the delegated powers of the commission, because there was no substantial evidence to sustain it. It is not merely that the evidence preponderates in favor of the reasonableness of the rates which have been cut down. Concededly, that would not be enough to challenge the action of the commission. Not only is the commission vested with a discretion which cannot be disturbed, and which we intend unqualifiedly to respect, but it is entitled to select the testimony which it will believe and rely upon, according as it addresses itself to the discriminating judgment of the commission. But it is not within the authority of the commission to reduce the rates in this or any other case not merely against the weight of the evidence produced to sustain them, but without anything substantial to warrant the conclusion reached or the reasons assigned therefor. And this we are convinced is a case of that character. The only discoverable basis for condemning the rates to Mobile and Pensacola is the fact that they had been advanced in 1907, and this of itself was clearly not sufficient. *Interstate Com. Com.* v. *Chicago Great Western*, 209 U. S., 108. If the long continuance of lower rates to these points or the circumstances connected with their increase called for explanation, as suggested in the case cited, the explanation made by the carrier, in the absence of anything to discredit it, must be held to sustain the advance as against any presumption that it was unreasonable, and therefore there was nothing substantial to support its condemnation. Nor is there anything of substance to sustain the reduction of the Montgomery rates except the fact that they exceeded the former combination on Mobile and Pensacola. Outside of these facts, having regard to the undisputed evidence adduced at the hearing, the existing rates were not shown to be unjust or unreasonable and there was therefore no valid basis for the commission's conclusion. The petitioner is therefore entitled to a decree annulling the order."

PASSENGER CAR LIGHTING.

The Special Committee on the Relations of Railway Operation to Legislation has issued Bulletin No. 27, relating to the methods used in lighting passenger cars. The figures given are based on replies received from 200 railways having a mileage of 227,089 miles and operating 54,961 passenger cars.

Table I shows the methods of lighting for each class of cars, and Table II gives the totals and percentages for each method. The latter figures indicate that of the total equipment now in service 29.7 per cent. is lighted exclusively with oil, and 36.7 per cent. exclusively with gas. Where auxiliary systems are used, 7.8 per cent. is lighted with oil, 10.5 per cent. with gas, 13 per cent. with electricity, and 1.9 per cent. with acetylene.

TABLE I.—METHOD OF LIGHTING PASSENGER CARS IN SERVICE NOVEMBER 1, 1911.

	Oil Only	Gas Only	Electricity Only	Acetylene Only	Carburetor System	Oil and Electricity	Gas and Electricity	Acetylene and Electricity	Oil and Gas	No Lights	Total
1. Postal	132	594	377	9	1	121	136	20	304	.....	1,694
2. Combination mail and baggage	1,744	708	88	75	73	222	16	21	316	...	3,353
3. Baggage and express	2,830	2,729	283	96	360	330	82	10	557	64	7,350
4. Comb. Pass. and baggage / Pass. mail and bag. / Pass. and mail	1,772	1,521	342	192	127	56	32	54	103	.....	4,679
5. Coaches	6,010	1,450	2,010	707	574	1,167	701	359	530	3	26,829
6. Parlor, sleeping and dining	1,756	1,183	3,183	24	.....	283	2,642	505	44	2	9,134
7. Business and instruction	21	170	79	20	14	59	255	15	48	....	894
8. Motor	242	1	531	96	1	109	.....	10	.....	.....	1,011
9. Miscellaneous	17	.....	.....	.....	.....	.....	.....	.....	.....	.....	17
10. Total	16,887	20,188	6,893	1,228	1,150	2,347	3,864	983	1,902	69	54,961

Taking the total number of cars reported, including those with auxiliary lighting, 37.5 per cent. use oil, 47.2 per cent. gas, 25.6 per cent. electricity, and 4.1 per cent. acetylene.

TABLE II.—PASSENGER CAR LIGHTING. TOTAL NUMBER OF CARS AND PERCENTAGES.

	Exclusive		More Than One Method		Total	
	Number	Per Cent.	Number	Per Cent.	Number	Per Cent.
Oil	16,337	29.7	4,249	7.8	20,586	37.5
Gas	20,188	36.7	5,766	10.5	25,954	47.2
Electricity	6,893	12.6	7,194	13.0	14,087	25.6
Acetylene	1,228	2.2	985	1.9	2,213	4.1
Carburetor	1,150	2.1			1,150	2.1
None	69	0.1			69	0.1
Total	45,865		9,096*		54,961*	
Per Cent.		83.4		16.6		100.0*

*Duplications eliminated.

WATER-PRESSURE WATERPROOFING.

A 40-ft. extension has recently been added to the subway waiting-room of the Erie passenger terminal on the Jersey City water front to take care of passengers on the New York, Susquehanna & Western, which formerly used the Pennsylvania station in Jersey City. The original subway waiting-room, which was connected with the tunnel station of the Hudson & Manhattan by a subway about 770 ft. long, was 30 ft. wide, 176 ft. long and 8 ft. high. It is under and transverse to the tracks and communicates with the train platforms by 10 stairways each between two pairs of tracks. The extension adds two stairways to the number in the original waiting-room.

The proximity of the Hudson river is such as to cause high tides to reach to the top of this waiting-room. In the course of waterproofing the original waiting-room, it was necessary to use two powerful centrifugal pumps, one 8 in. and one 10 in., to keep the excavation free of the water, which entered rapidly through the bottom and sheeting. The Membrane method of waterproofing was used for both the original waiting-room and for the extension. This method consists of five layers of Hydrex waterproofing felt cemented together and coated with hot Hydrex Compound.

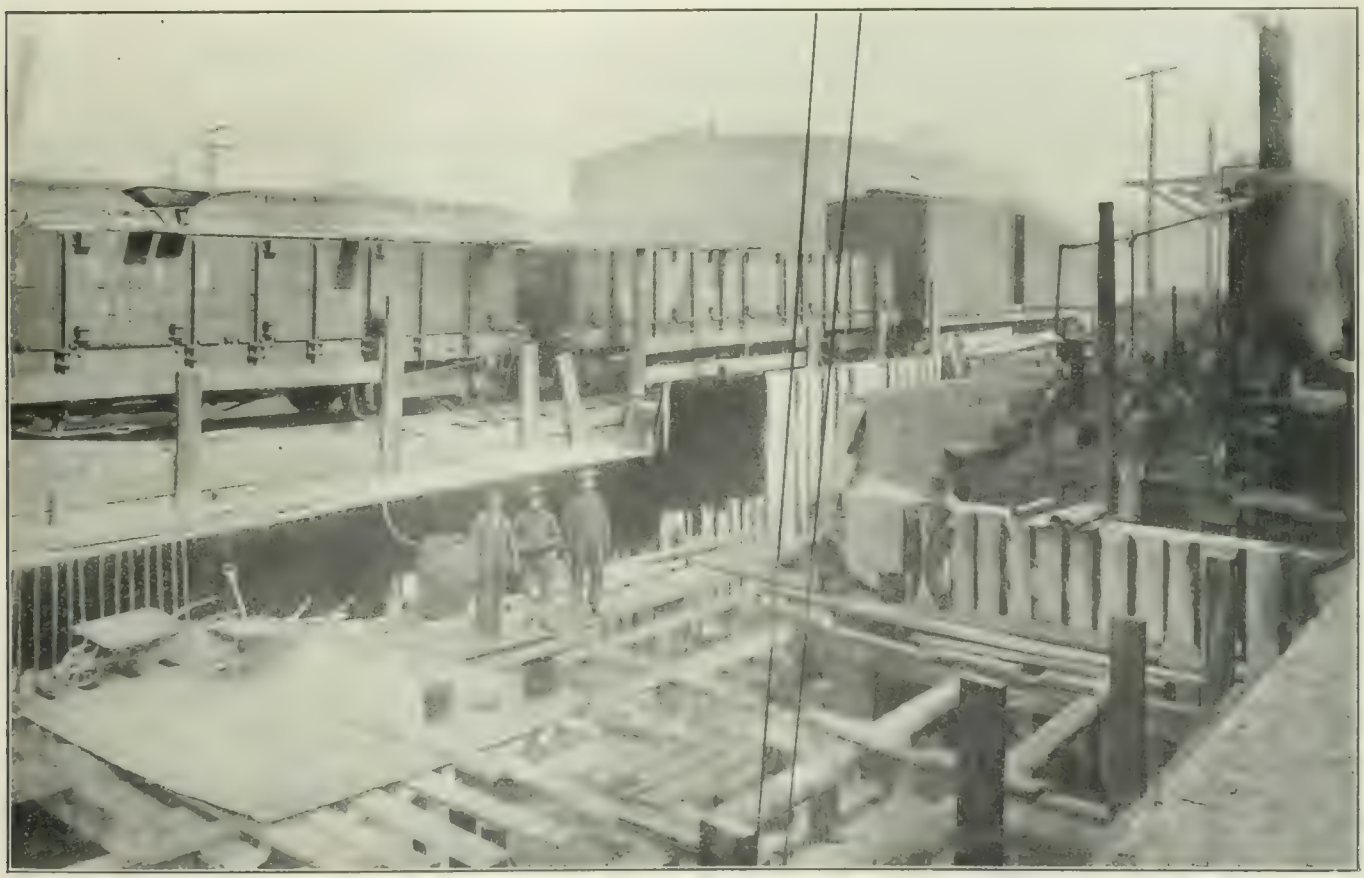
The extension had to be constructed in such a way as not to interfere with the full use of the waiting-room This made it necessary to waterproof and almost complete the extension before tearing out the intervening wall and imposed certain conditions which made it difficult to get the proper connection between the old and the new waterproofing. This, however, was successfully done and the extension was put into use on December 1, 1911, since which date the waterproofing has had to withstand a head of 12 ft. of water

The waterproofing on the floor and walls of both the extension and the original waiting-room was done by the Hydrex Felt & Engineering Company, New York.

FOREIGN RAILWAY NOTES.

The Congo Railway is to be largely rebuilt, with easier grades and curves and gage widened to 3 ft. 6 in.—the "Cape gage," as it begins to be called. The present railway has answered very well so far, and the company proposes to take 12 years to make these changes.

For some years the project of taking out the rack section of the Central Dominican Railroad between Puerto Plata and Santiago has been agitated. It is now understood that the Dominican government is prepared to undertake this work shortly. A tunnel and various replacements of track will be required. It is expected that reductions of grade at various other points on the line will also be effected. Doing away with the special equipment now required for the rack, together with the other reductions of grade, will markedly reduce the cost of traffic per ton-mile. Such a reduction of freight charges from the great cocao and tobacco districts of the interior to the seaboard will be certain to cause a greater export tonnage to pass through Puerto Plata.



Waterproofing Extension to Erie Station Underground Waiting Room.

General News Section.

The Rock Island Lines have granted an increase in wages to telegraph operators amounting to between 6 and 8 per cent, and the increase was made retroactive to cover the month of February.

The Missouri, Kansas & Texas is organizing safety committees in accordance with the plan which has been adopted by numerous prominent railways as described from time to time in the *Railway Age Gazette.*

The Ontario Parliament has adopted an amendment to the Railway Act under which cities may build street railways where an extension of an existing line is desired and the railway company declines to build it.

The Hoosac tunnel was opened for traffic, both passenger and freight, February 28, on both tracks, but the electric power had not yet been restored in that part of the tunnel which was affected by the fire of February 20.

Two engines and the two foremost cars of the Pennsylvania Special were derailed at Crestline, O., on Monday by the breaking of a wheel on one of the locomotives. No one was injured, and the train was but slightly delayed.

The Boston & Maine has granted trackage rights over its bridge between Portsmouth, N. H., and Kittery, Me., to the Atlantic Shore Railway, an electric company which heretofore has made connection with Portsmouth only by ferry.

A committee of representatives of the Order of Railway Telegraphers and the Brotherhood of Railway Trainmen has been conferring with the management of the Santa Fe at Topeka regarding proposed changes in wage schedules and working conditions.

The plans for the building of new railways in western Canada during the coming summer are so extensive that it is estimated that 50,000 laborers will be wanted, and it is said that the railways and the contractors at present cannot see where these men are coming from.

The Omaha Manufacturers' Association at a recent meeting decided to present to the Union Pacific engrossed resolutions commending the management of the road for patronizing home industry in purchasing a large amount of steel and castings in the Omaha market.

It is reported that the revenue to be received by the state of Minnesota for the year 1911 from its tax on the gross earnings of the railways of the state will show a decrease of $226,331, as compared with 1910, on account of decreases in the earnings of many of the railways.

The Chicago & Eastern Illinois has bought approximately 28,000 acres of coal land in Montgomery county, Ill., from A. R. Bird & Sons, of St. Louis, for $2,500,000. President Winchell has explained that the property was acquired in order to provide a future fuel supply. The five mines on the property will be leased to the present operators for a term of years.

Orders were made effective on March 1 on eleven of the principal railways in Illinois prohibiting the sale of liquors on all of their trains in the state. On July 1, 1911, a new state law went into effect which prohibited the sale of liquors on trains, but its language appeared to exempt buffet and dining cars. On account of a doubt as to this, the railways have decided voluntarily to apply the prohibition to their entire trains.

On the night of February 19, near Altamont, W. Va., the passengers in a sleeping car of a westbound express train of the Baltimore & Ohio were robbed by a masked man, who is said to have boarded the train when it was moving slowly on an ascending grade. He intimidated the trainmen with pistol shots, and secured a considerable sum of money. He jumped off before the train reached Altamont. The next day a police officer of the road arrested F. A. Becker, a freight brakeman of the road, 20 years old, who proved to be the robber.

The Chicago Great Western has issued the first number of a quarterly magazine devoted to the interests of employees and patrons, which is called *The Maize.* The magazine is to be published quarterly. The first number contains articles on "The Telephone as a Business Getter," by J. B. Morrison, assistant to the vice-president; "Railroad Signaling," by Joseph Beaumont, signal engineer; "Backing Up Our Advertising," by F. F. Wagner, advertising agent, and a large variety of short articles and news notes regarding the various activities of the railway.

The Post Office Appropriation bill reported in the Lower House of Congress on Monday of this week, contains a provision for the establishment of a parcels post on all rural mail delivery routes for an experimental period of two years, ending June 30, 1914. The limit of weight prescribed for parcels is eleven pounds, and the rates are graduated from one cent for each two ounces on smaller packages to five cents for a single pound, and two cents a pound additional up to eleven pounds. The bill also provides for the creation of a commission to study the subject of a general parcels post.

The department of industrial research of the University of Pittsburgh, Pittsburgh, Pa., is about to make a study of the smoke problem. This investigation will include the effect of smoke on health, plant life and buildings; also the increased cost of living due to damage and dirt caused by smoke. Each part of the investigation will be carried out by one or more men, each a specialist in his line, and it is hoped that by co-ordinating the various researches it will be possible to obtain valuable technical and scientific data. The investigations are being conducted under the direction of Dr. R. C. Benner and Dr. W. W. Strong.

The Joint Car Exchange Bureau at Denver on March 1 was amplified into a Joint Car Inspection and Interchange Bureau to handle the mechanical as well as the transportation inspection of cars interchanged at that point. William Hansen, who has been a traveling mechanical inspector for the Chicago, Burlington & Quincy, has been appointed manager of the bureau. The executive committee consists of J. A. Turtle, mechanical assistant superintendent of the Union Pacific; H. V. Vanbuskirk, superintendent of motive power of the Colorado & Southern, and W. A. Knerr, local freight agent of the Denver & Rio Grande.

There is a bill before the legislature of New York at Albany to create a state insurance fund for the benefit of employees in hazardous occupations. The bill is said to be of such a radical nature that it will pass only after serious opposition, if at all. It is said to be more drastic than the similar law of Ohio, which has just gone into effect. The New York legislature has also held long discussions of proposed amendments to the constitution of the state designed to provide for the enactment of general laws relating to employers' liability and workmen's compensation. Organizations of artisans and others are promoting the proposed amendments with a view to getting around the objections to the laws on these subjects on which were based the decisions of the Court of Appeals last year holding the laws invalid.

The Supreme Court of Fulton county, N. Y., deciding a suit brought by a shareholder in May, 1909, has ordered the directors of the United States Express Company to call a meeting of stockholders. It is said that there has been no such meeting for fifty years. The control of this company, which formerly was in the hands of Thomas C. Platt, has lately been supposed to be in the hands of interests connected with the estate of the late E. H. Harriman, and not long ago a number of new directors were elected, said to be representatives of the Harriman interests. Now it is said that those minority stockholders who began the proceedings in 1909 have secured the support of a majority of the shares. The company is not a corporation, but a partnership, and it is said that its charter allows the directors to dissolve the business at any time.

The transcontinental railways had to contend last week with some of the most difficult weather conditions encountered in years. In southwestern Kansas one of the worst blizzards on record tied up passenger trains for from one to four days. The Rock Island and Santa Fe appear to have been most affected. Cuts were filled with snow and sand packed so hard as to resist the efforts of the rotary snow plows, and drifts from 15 to 20 feet in height were reported at many places, while the high winds covered the tracks with drifts as fast as they were cleared.

Twenty trains, including three eastbound from the Pacific coast, were reported stalled between Newton and Dodge City, Kan., on February 29, and passengers were sent to hotels at the nearest points that could be reached at the expense of the railways. The trains arriving in Chicago on Friday included the Santa Fe's California Limited, which was due on Monday morning.

An employers' liability bill, carrying out the recommendations of President Taft, has been introduced in both houses of Congress. Hearings were held by the Judiciary Committee of the Senate this week, and thus far it is said that about one-half the sections of the bill have been considered by that committee. Only minor changes have been made. Numerous protests, however, have been received from workingmen's organizations, many of them based, evidently, on misapprehension. It is said that the Louisville & Nashville and the Atchison, Topeka & Santa Fe have expressed objections to the proposed law, though no formal complaint has been presented. President Taft's recommendations for the establishment of a commission on industrial relations have also been embodied in bills introduced in Congress by Senator Borah, of Idaho, and Representative Hughes of New Jersey. The bill, as drawn, provides for a commission of nine men, to serve without compensation, two members to be employers of labor and two representatives of workmen. Provision is made for an exhaustive investigation into every phase of the relations between employers and employees and the effect of industrial conditions on the public welfare.

In the old times before the universal use of air brakes on freight trains it happened now and then that a car in the middle of a freight train would jump the track, fall down a bank, and do so little damage to the track and to the adjacent cars that the trainmen could couple up and go on without discovering what had happened; and there are said to have been one or more cases in which the cars coupled themselves (on a descending grade), making the story still more mysterious. By the use of a little imagination a newspaper reporter has been able to report a case of this kind this present year. It was at Morehouse, Ind., on the Lake Shore & Michigan Southern. As the train was one of 13 cars, with the air connected through to the caboose, the statement as given was unbelievable; and besides, the line was not down grade. It is an interesting story, nevertheless. The train was running about 30 miles an hour, and it appears that the fifth car from the engine was derailed by a fallen brake-beam. The brakes were automatically applied and the engineman, looking back, saw that the train had parted. Observing that the rear part of the train was still moving (the air brakes of two cars at the rear having been cut out) he kept the forward portion moving for about a quarter of a mile; then, seeing that the rear portion had stopped, he backed up, and the train was coupled and went on its way. At the time the engineman looked back the derailed car, which had tumbled into the ditch, was hidden from him by the smoke from his engine. After the train had been coupled the conductor and brakemen noticed the derailed car, but assumed that it had come from some other train. In this situation the whole crew went on to the next station and discovered the loss of the car only when they checked up the numbers after setting out a car of coal.

Traffic on the Burlington.

President Miller is quoted as saying that figures have now been compiled showing the tonnage of the various commodities carried by the Hill roads. The Burlington's tonnage (presumably in 1911) was made up of 18.83 per cent. by agricultural products, 7.93 per cent. by animals and animal products, 38.35 per cent. by mine products, 7.74 per cent. by forest products, 11.39 per cent. by manufactured articles and 15.76 per cent. by all other freight.

Demands of Anthracite Coal Miners.

Representatives of the principal anthracite coal operators met in New York City on Tuesday of this week to consider the demands of the miners who, at the expiration of their present contract on April 1, want an increase in their rate of wages, which is said to amount to 20 per cent. It was decided to reject all of the demands presented, which are embraced in nine sections; and a committee of ten was appointed to draft a formal reply to be presented when the miners are conferred with next week The railway men included in this committee are E. B. Thomas (Lehigh Valley); W. H. Truesdale (Delaware, Lackawanna & Western); F. D. Underwood (Erie); L. F. Loree (Delaware & Hudson), and George F. Baer (Philadelphia & Reading). Press despatches from the anthracite region report very large supplies of coal on hand at all of the storage centers, but no accurate figures are given.

Proposed National Board of Trade.

A national trade body, apparently something like the merchants' associations of New York and other cities, but with a constituency covering the whole country, is proposed in a call which has been issued by President Taft for a meeting of business men to be held in Washington on April 15. It is proposed at that time to formulate a plan for an organization, and Charles Nagel, Secretary of Commerce and Labor, says that the responses to the President's invitation are already so numerous and hearty as to indicate a successful meeting. The President and Secretary Nagel evidently have in view the establishment of a responsible body, to be organized under a federal charter. The proposed body would have nothing to do with administration, but would be purely commercial. Secretary Nagel has been considering this subject for more than two years and believes that the proposed association will not only be useful but will quickly become popular. Referring to investigations of trade in foreign countries, Mr. Nagel says:

"We are doing something now, but only in a crude way. Merchants and manufacturers write us that they would like certain fields investigated, and we decide it would be a good thing, but we do not know where to turn to get the agents to make the inquiry. We pick out the best men we can find, but how much better it would be if we could turn to members of a central board here in Washington, and they, from their acquaintance and correspondence extending into every line of commerce and industry throughout the country, could suggest the right men.

"Another matter is that of making rules and regulations. Take, for instance, our Lighthouse Board, which recently was called upon to promulgate a new set of regulations. We had repeated conferences with representatives from various commercial interests, and we did the best we could, but we did not have the expert advice from disinterested sources that a national board could have supplied. The administration of the Pure Food law furnishes every week any number of examples where it is absolutely necessary, in fairness to all concerned, that the government should be fully informed upon trade customs and many other details which should have a bearing upon its ruling. The administration of the customs laws demands the most intricate knowledge of trade practices, yet in these and many other cases the government too often has to be dependent upon the testimony of interested parties. . . . It is essential that a body of this kind shall be national in every respect. It would be its duty to take the broad and not the local view of any question of administration."

Restoration of M. C. B. Defect Cards.

A special meeting of the American Association of Railroad Superintendents was held on March 1, at St. Louis, for the purpose of determining a uniform date for beginning the practice of applying M. C. B. defect cards to cars at time of interchange at large interchange centers, in accordance with the rules of the Master Car Builders' Association. Over fifty representatives of the transportation and mechanical departments from various sections were present, and, as a result of the meeting, it was announced that all roads entering Memphis, Kansas City, Pueblo, Denver, Chicago, Cleveland, Toledo, Columbus and the Niagara frontier have adopted or arranged to adopt the carding practice at these points, and it is expected that the practice will be in full force throughout the United States within a short time. During the discussion by members of the association the point was emphasized that the association is obligated to the Master Car Builders' Association's arbitration committee to recall so-called special agreements, in view of the broadening of M. C. B. rule 2, effective September 1, 1911, and that transportation men should do all in their power toward helping the mechanical officers to comply with M. C. B. rules.

It is understood that so far as the American Association of

Railroad Superintendents is concerned, the carding practice may be begun at all points where it is not now in effect on whatever date the mechanical men decide that their inspectors have been properly drilled in the M. C. B. rules, and that the united influence of the superintendents will be extended to accomplish this by April 1. The proceedings of the special meeting will be printed for distribution among all who are interested, and copies may be obtained from E. H. De Groot, Jr., president of the association, at St. Louis.

Station Building in Oklahoma.

Some say straws show which way the wind blows. Be this as it may, a railway executive tells this story about the Oklahoma railway commission: "One of the railways running through Oklahoma, by no means the strongest, contemplated the construction of a shack at cost of about $700, to serve as a passenger station for a small town, but had to get the consent of the commission. It wasn't given. The company showed its lowest-grade station, but the plan was rejected. Successive plans were offered up to one of the highest grades of station constructed by the road in question, and the commission ordered the new station at a cost of $20,000 to serve a population of less than 100. It's needless to say that our railway cannot afford to construct many branch lines or feeders and will build as little as possible in the state."

There's a moral. Look at the following table of mileage in southwestern states:

	Mileage	Miles of line per 100 sq. mi. of territory.	Miles of line per 10,000 inhabitants.
Arkansas	5,300	10	34.6
Missouri	8,100	11.8	22.5
Kansas	9,000	11	53
Oklahoma	6,000	8	63
Texas	14,000	5.2	38

Wall Street Journal.

English Coal Miners' Strike.

The strike of coal miners in England, covering the whole of that country, was reported on March 4 as having resulted in 1,250,000 miners stopping work, and the resulting interruption of railway traffic and manufacturing was estimated to have made idle 250,000 other persons. On the day mentioned, no coal whatever was brought into the city of London, a thing which had not happened before since 1838. Press despatches said that 2,223 freight and passenger trains had been discontinued, and that many stations had been closed because of the lack of traffic. The price of coal at London advanced two shillings a ton. The demands and threats of the miners have been the subject of discussion in Parliament for some time past, and the Prime Minister described the action of the miners as tending toward a national catastrophe. At the same time the miners looked upon their enforced idleness as a pleasant vacation, and they were spending their time in making trips to the seaside, or going to football matches and other amusements. On Tuesday, the 5th, following many conferences of the mine owners, the representatives of the workmen, and officers of the government, it was said that strong hopes were entertained that some agreement would be reached within a few days. There was slightly increased confidence on the stock exchange on Tuesday, leading railway stock advancing one point. One of the proposals of the government was to enact a law establishing a minimum rate of wages in the coal fields. This course appears to have been approved by a majority of the mine owners, and it was said that this majority was growing, having been augmented by the mine owners of Scotland, leaving only the Welsh owners as the principal objectors. Most of the railways are said to be well stocked with coal, but train service was severely curtailed in order to be prepared as well as possible for all emergencies. Numerous important sailings of steamships had to be abandoned or postponed because of difficulty in getting coal.

Proposed Harbor Development at Chicago.

The United States War department on Monday issued a permit for the construction by the city of Chicago of piers for the proposed outer harbor north of the mouth of the Chicago river in accordance with plans adopted by the city council, for which a bond issue of $5,000,000 will be voted on at the city election in April. Lieut.-Col. George A. Zinn, of the board of army engineers on rivers and harbors, has made a report to the department which fails to recommend the construction of the outer harbor, but favors the construction of a commercial harbor at some point on the shore of Lake Michigan in the vicinity of Gary or Indiana Harbor, a commercial harbor on the drainage canal in the vicinity of Summit, Ill., the construction of municipal docks at suitable intervals along the Chicago and Calumet rivers, and other smaller improvements, but finds that no other improvements in the waterways at Chicago or adjacent territory other than those specifically mentioned are either necessary or desirable at the present time.

A part of the plan contemplates the construction of a breakwater by the United States government near the mouth of the river at a cost of $2,500,000, which will be considered at a hearing before the Board of Engineers on March 27. Lieut.-Col. Zinn reported adversely to this project on the ground of lack of connecting railway facilities and said that the proposed harbor could not be properly developed unless the railways adopt a plan for a belt line completely encircling the city in accordance with a plan such as that outlined recently before the Traffic Club of Chicago by L. C. Fritch, chief engineer of the Chicago Great Western.

Darius Miller Urges Co-Operation of Governors to Reduce Trespassing.

President Darius Miller of the Chicago, Burlington & Quincy, has written a letter to the governors of Illinois, Iowa, Colorado, New Mexico, Kansas, Minnesota, Missouri, Montana, Nebraska, South Dakota, Texas, Wisconsin and Wyoming, the thirteen states through which the Burlington lines run, calling attention to the large proportion of trespassers in the number of persons killed on the railways of the United States, and asking their consideration of the seriousness of the subject. Mr. Miller points out that the interest of public authorities and railway casualties has been concentrated almost entirely on the classes of accidents which cause a smaller percentage of fatalities, and urges their support toward correcting the conditions which make trespassing possible. Mr. Miller's letter is as follows:

"Certain phases of the subject of railway accidents are being given attention by the officials of the state and national governments who are concerned with the regulation of railways. I am writing this letter to call the attention of yourself and others occupying public offices of responsibility and influence to the fact that the most serious phase of this subject seems to be receiving almost no consideration from either the public or public officials.

"The statistics of the Interstate Commerce Commission show that no less than 51,083 people were killed while trespassing on the property of the railways of this country during the ten years 1902-1911.

"Because of the fact that there recently have been some accidents due to breakage of rails which have been given widespread publicity, it is reported that certain of the regulating authorities are considering taking some action in reference to the rail situation. The statistics of the Interstate Commerce Commission show that during the last ten years 106 persons have been killed in derailments caused by rail breakages. This is an average *of less than 11 a year.* The average number of persons killed while trespassing on railway property has been during the same period *over 14 per day.* In other words, while people have been killed at the rate of only 106 in *10 years* by rail breakages, they have been killed at the rate of over 140 every *ten days* while trespassing.

"Three measures have been introduced in Congress to require the railways to install block signals, to substitute steel for wooden passenger train cars, and to widen their clearances. It is estimated that compliance with this proposed legislation would cost the roads $1,361,000,000, which is almost 10 per cent. of their present total net capitalization. The object sought is to protect passengers and employees. The number of railway passengers killed during the last ten years was 4,340. There was not a *single year* of the ten years when the number of trespassers killed did not exceed the total number of passengers killed in all of the ten years. Furthermore, the number of employees killed during this period is only two-thirds as great as the number of trespassers. Indeed, the number of trespassers killed has

considerably exceeded the total number of all other classes of persons, including employees, passengers, those meeting death at highway crossings, etc. If a wreck should take place tomorrow, in which 14 people should die, the news of it would be widely printed over the country. Now, if the average for the last ten years is holding good, 14 people were killed yesterday while trespassing on the railways, whose deaths were wholly unnecessary, and under proper laws might have been avoided. Fourteen were killed today; and 14 will be killed tomorrow; and yet, chiefly because these 14 people who are killed daily meet their deaths in 14 different places, almost no public notice is taken nor concern manifested. The railways are constantly making efforts to keep the public from trespassing upon rights of way where danger of death and injury is always present, but without public support through passage of adequate laws and firm enforcement of them, these terrible statistics show how futile the efforts of the railways are.

"Lawmakers and commissions are justified in imposing on the railways reasonable regulations to promote public safety. But does it not seem that one of the most important and necessary means of safety lies in the regulation of the public in this indiscriminate use of railway premises, and that for this purpose public authorities should give attention to and take action regarding the main cause of fatal accidents on railways? This main cause, as the figures I have given show, is that people persist, as the Interstate Commerce Commission says in its latest accident bulletin, in 'trespassing on the property of the railways, principally while walking on the tracks or stealing rides on trains" and they persist in doing so, because proper laws to prevent this sort of intrusion on railway property are not passed, and courts and police officers do not enforce such laws where they exist.

"Trespassing on railway property, which is almost universal in the United States, is a cause of great trouble and expense to the railways. It is constantly necessary for trainmen to stop trains to put off people who are stealing rides or to keep from running down those who are walking on the tracks. Oftentimes, trainmen become involved in fights with trespassers and are injured or killed by them. The tramps who infest railway tracks, yards, cars, and rights of way start fires which destroy property of great aggregate value and commit depredations upon railway property and that of the public entrusted to carriers for transportation. Trespassers often meddle with switches or signal lights or put obstructions on the track in such a way as to cause serious train accidents. For these reasons the railways and their patrons are entitled to have laws passed and enforced which will stop this almost universal practice. Finally, trespassing ought to be abolished for the protection of those who participate in it. If it is worth while for the railways to spend millions of dollars for block signals to stop collisions when the total number of persons annually killed in collisions is only about 400, is it not worth while for the governments to take some action to stop the evil of trespassing which costs an average of over 5,000 lives annually?

"All that is necessary to stop it is to recognize the fact that the property of railways, excepting places provided for public use, can never be otherwise than a place of danger for those who have no business on it and to pass and enforce laws for the punishment of those who intrude upon it. This is done in foreign countries, and is one of the main reasons why the number of fatalities on foreign railways is less in proportion than on the railways of the United States. Representatives of the railways repeatedly have appeared before legislatures to ask appropriate legislation dealing with this subject, and innumerable times they have had trespassers arrested. But little progress seems to have been made in securing the passage and enforcement of proper laws. The fact has been widely published over the country that in the year ending June 30, 1911, 10,396 people were killed on the railways of the United States. How many people know that if no trespassers had been killed the number would have been only 5,112—in other words, that of those killed 5,284, or 51 per cent., belonged to this class?

"Under these circumstances, it would therefore seem entirely proper that serious consideration should be given to this subject by every public officer in whom is reposed any duty or responsibility relating to the regulation of our railways, and I feel justified in asking that you give this important subject your earnest consideration and support so that something can be done to correct these conditions."

Program of the American Railway Engineering Convention.

The program for the thirteenth annual convention of the American Railway Engineering Association, to be held in Chicago, March 19-21, inclusive, has been announced as follows. The order may be changed by a two-thirds vote of the convention or by the time required for consideration of reports.

Morning sessions—9 a. m. to 12:30 p. m.
Afternoon sessions—2 p. m. to 5:30 p. m.

TUESDAY, MARCH 19.

President's address.
Reports of secretary and treasurer.
Reports of standing and special committees.
XII. Rules and Organization—Bulletin 141.
X. Signals and Interlocking—Bulletin 141.
Minority Report on Signals and Interlocking—Bulletin 141.
XV. Iron and Steel Structures—Bulletin 141.
VII. Wooden Bridges and Trestles—Bulletin 141.
XIV. Yards and Terminals—Bulletin 141.
II. Ballast—Bulletin 141.
III. Ties—Bulletin 142.
Adjournment at 4 p. m. to visit Railway Appliances Exhibition in the Coliseum.

WEDNESDAY, MARCH 20.

V. Track—Bulletin 142.
I. Roadway—Bulletin 142.
IV. Rail—Bulletins 143 and 144.
XIII. Water Service—Bulletin 142.
VIII. Masonry—Bulletin 143.
XIX. Conservation of Natural Resources—Bulletin 143.
XI. Records and Accounts—Bulletin 143.
XVIII. Electricity—Bulletin 143.
Annual dinner at 7 p. m.

THURSDAY, MARCH 21.

XVI. Economics of Railway Location—Bulletin 144.
IX. Signs, Fences and Crossings—Bulletin 143.
VI. Buildings—Bulletin 144.
Special. Grading of Lumber—Bulletins 133 and 144.
XVII. Wood Preservation—Bulletin 144.
Special. Uniform General Contract Forms—Bulletin 145.
New business.
Election and installation of officers.
Adjournment.

Railway Signal Association.

The regular meeting of the Railway Signal Association will be held at Congress Hotel, Chicago, on Monday, the 18th, the morning session beginning at 9:30 o'clock. Reports will be presented by sub-committee E, of committee No. 3, on power interlocking; by sub-committee No. 1, of committee No. 4, dealing with revisions of the specifications for relays; by committee No. 4 on automatic block signaling, dealing with specifications for steel cross-arm pins; by sub-committee No. 4, of committee No. 4, dealing with specifications for channel pins; by committee No. 6 presenting drawings for proposed standard rocker shaft arms, bearings and details, detector bars, and a terminal block; by sub-committee C, of committee No. 8, presenting a proposed code of requisites of apparatus and material for an alternating-current automatic block signal system; by committee No. 9, dealing with specifications for copper clad line wire, armored submarine cable and copper clad bond wires; by the special committee on storage batteries, and by the special committee on contracts.

In connection with the notice of the March meeting, Secretary C. C. Rosenberg announces the result of the letter ballots which were ordered at the annual convention held at Colorado Springs last October. The total number of ballots received was 598; from active members, 191, and from representative members, 407. The subjects voted on were a scheme for uniform signaling; a large number of standard designs for material; 12 pages of symbols to be used in drawings; specifications for signal pipe and concrete and for locking draw-bridges; typical plans for electric interlocking;

typical circuit plans and designs for trunking, etc.; specifications for electro-pneumatic interlocking; for wires and cables; for apparatus and materials for use in automatic signaling; for storage batteries and for many other things. All of the propositions received the required two-thirds affrmative vote with the exception of the recommendations of committee No. 1 for a uniform method of signaling. On this subject, concerning which the committee had presented eight conclusions, the votes were as follows: conclusion No. 1, 296 affirmative, 276 negative and 26 not voting; conclusion No. 2, 344 to 230; No. 3, 332 to 243; No. 4, 341 to 233; No. 5, 285 to 287; No. 6, 336 to 235; No. 7, 345 to 226, and the resolution (page 536 of the December *Journal*), 291 to 223. It will be seen that there was a majority of affirmative votes on each conclusion except No. 5.

Spokane Transportation Club.

The third anniversary of the Spokane Transportation Club was celebrated by a banquet and business meeting at the Spokane hotel, Spokane, Wash., on February 23. The following members were elected to the executive committee for the ensuing year: Charles W. Colby, United Iron Works, Oakland, Cal.; H. C. Munson (O.-W. R. & N.); Stephen H. Brown (G. N.); R. A. Willson, Washington Water Power Co., Spokane, and C. L. Bankson (S. & I. E.). At the meeting of the executive committee, held February 26, the following officers were elected: Charles W. Colby, president; R. A. Willson, vice-president; H. C. Munson, second vice-president. J. W. MacIntosh was secretary and treasurer last year; the new secretary and treasurer has not yet been elected.

American Society of Mechanical Engineers.

At the meeting of the American Society of Mechanical Engineers, to be held March 12, a paper will be presented on Practical Problems in Tap and Screw Making, by Frank O. Wells, president and treasurer of the Wells Brothers Company, Greenfield, Mass., dealing with the importance of size and lead in the cost of assembling manufactured work, the practical limits of accuracy, reasons for abandoning the V-thread, the proper size of tap drills, the power required for tapping, the effect of lubricants on size and power, and other interesting points. A number of prominent tap makers have been invited to discuss the subject.

Chicago Transportation Association.

At the meeting of the Chicago Transportation Association on March 4, 360 new members were enrolled, bringing the total up to 1,175. On May 1, 1911, the membership was 160.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.; annual, May 7-10, Richmond, Va.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Boston, Mass.; annual, May 10-11, San Francisco, Cal.

AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York; next convention, Seattle, Wash.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Detroit, Mich.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—O. G. Fetter, Crew building, Chattanooga, Ohio, 3d Friday of March and September; annual, March 17, Chicago.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York. Convention, October 7-11, Chicago.

AMERICAN ELECTRICAL RAILWAY MANUFACTURERS' ASSOC.—George Keegan, 29 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next session, May 15, New York.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Convention, 2d week in Oct., Baltimore, Md.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOC.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—H. H. Rice, N. Y., N. H. & H., New Haven, Conn.; convention, July, Chicago.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Annual, March 28-29, New York.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—F. R. Wentinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago; annual, June 13, 1912, New York.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conrad, 75 Church St., New York. Convention, Oct. 7-11, Chicago.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago. Convention, May 22-25, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOC. OF U. S. AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Convention, September 10-13, Denver, Col.

NATIONAL RAILWAY APPLIANCES ASSOC.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

NORTHERN RAILROAD CLUB.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

OMAHA RAILWAY CLUB.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 2 Rector St., New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOC.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

RAILWAY GARDENING ASSOCIATION.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.

RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa. Next meeting, March 18, Chicago.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio. Convention, May 20-22, Buffalo, N. Y.

RAILWAY SUPPLY MANUFACTURERS' ASSOC.—J. D. Conway, 2135 Oliver Bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

RAILWAY TEL. & TEL. APPLIANCE ASSOC.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. Y., Sterling; September, 1912, Buffalo, N. Y.

ST. LOUIS RAILWAY CLUB.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hodges, L. S. & M. S., Detroit, Mich.; meetings monthly.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; August, 1912.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosser, P. O. Box 1767, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

A serious shortage of cars for the movement of grain eastward is reported from Duluth, Minn., and Superior, Wis.

President Taft will be the guest of the Traffic Club of Chicago at an entertainment on Saturday evening, March 9, in the banquet hall of the Hotel LaSalle.

A bill which is now before the New York legislature at Albany provides for the creation of a commission to examine traffic conditions on the Great Lakes and on the canals and water courses of New York.

In the United States District Court at Philadelphia, W. J. Jacoby & Sons, coal shippers, have sued the Pennsylvania Railroad for $51,950 damages for alleged illegal discrimination in the distribution of coal cars to the mines between April, 1903, and October, 1905.

On March 1 the agencies of the Lake Shore-Lehigh Valley and Michigan Central-Lehigh Valley fast freight lines, at Cleveland, Cincinnati, Toledo, Indianapolis, St. Louis and Milwaukee, were discontinued, and hereafter the solicitation of traffic for these lines will be done by the representatives of the individual railways.

The Philadelphia & Reading has introduced ten-trip tickets between Camden, N. J., and suburban points in New Jersey, the rates in many cases being the same as those heretofore in effect for 100-trip tickets. New forms of round-trip tickets have been introduced on the Lebanon division. For many journeys there are now available both six-day and ten-day round-trip tickets, the six-day being slightly cheaper.

The Union Pacific and Chicago, Milwaukee & St. Paul have made a traffic agreement whereby trains will run solid from Chicago to the Pacific coast, an agreement for years held exclusively by the Chicago & North Western and Union Pacific. Westbound trains will be split into three sections at Green River for Portland, San Francisco and Los Angeles. Eastbound, three sections arriving at Green River will run as one solid train to Chicago.

The Grand Trunk, in connection with the Central Vermont, proposes to run a through night passenger train the coming summer between Montreal and New London, running through in twelve hours each way (376 miles). It is announced that this train is to be put on for the benefit of Canadians with a view of inducing them to include New London and its vicinity among their summer resorts. The schedule announced will require somewhat faster time than is made by the night trains now running from Montreal to Boston and Springfield.

The College of Agriculture of the Ohio State University is preparing to run a special instruction train over the lines of the Baltimore & Ohio in that state March 26, 27, 28, 29 and 30. Instruction will be given in corn culture and fruit raising. The Department of Agricultural Extension, of this college, of which Prof. A. B. Graham is superintendent, has been one of the most active instrumentalities in the conduct of "traveling lectures," having run 14 such excursions during the year 1911, covering 3,379 miles. Stops were made at 360 places, and the people who listened to the lectures numbered 42,198.

The proposed law to regulate the issuance of bills of lading was the subject of a hearing before the Senate Committee at Washington last week. Mr. Thom, general counsel of the Southern Railway, describing the conditions which have prevailed during the past few years, and criticizing the proposed law, said that the liability of the railways for bills of lading made out between the agents and shippers, with all the opportunity for collusion between these two individually, would place the railways in the position of being not only carriers, but bankers. He said that the Southern Railway system had from 1,500 to 2,000 agents of varying ability, intelligence, and character. Through the Southeastern territory, east of the Mississippi and south of the Potomac, the railways were already co-operating, and had established a central bureau at New York, to which the roads forwarded copies of all lading bills. He said the complaints came from the banks, which felt that a New York bureau concentrated business at New York to the detriment of other ports. The railways wanted to co-operate to the fullest extent, but they should not be held liable.

INTERSTATE COMMERCE COMMISSION.

The Oklahoma Traffic Association has filed complaints with the Interstate Commerce Commission alleging excessive and discriminatory rates on iron and steel articles from eastern points to Oklahoma.

The commission on March 4 vacated its order of February 23 suspending an advance in freight rates over the Boston & Maine, the Boston & Albany and the New York Central from Chicopee, Mass., and other points, to New York City.

John Marble, who was appointed secretary of the Interstate Commerce Commission not long after Mr. Moseley's death, as was announced in the *Railway Age Gazette* at the time, took the oath of office on February 23 and immediately took up his duties. The official announcement has been delayed since the appointment because of other work that Mr. Marble was doing. On February 5 the commission created the office of assistant secretary and elected G. B. McGinty, heretofore private secretary to Commissioner Clements (last year chairman) to that office.

Special Examiner Gerry began a hearing at New Orleans on February 29 on the complaint of the New Orleans Cotton Exchange, asking a readjustment of the rates on cotton from Texas points to New Orleans in order to establish a parity of rates to New Orleans and Galveston. Witnesses representing the New Orleans cotton interests objected to the differential of ten cents in the Galveston rates under those to New Orleans, rather than to the New Orleans rates themselves, and it was brought out that the Galveston rates were controlled mainly by the Texas Railway Commission.

Testifying at the hearing of the express investigation before the commission last week, W. A. Worthington, representing the Union Pacific and Southern Pacific, said that the express traffic did not pay its fair share of the cost of railway operation; no other class of traffic is so unremunerative. James Peabody, speaking for the Atchison, Topeka & Santa Fe, said that in January, 1910, the road actually lost money on its express business—$17,406. His calculations were based on receipts per car-foot mile, taking into account the proper proportion of expenses, taxes and interest. Where the passenger service yielded a surplus of $80,740, the mail business showed a loss of $28,064, and the express business a loss of $17,406.

Rates on Salt Not Reduced.

Board of Railway Commissioners of Kansas v. Atchison, Topeka & Santa Fe. Opinion by Commissioner Prouty.

The commission finds that the present rates on salt from Kansas fields to points east of the Mississippi and Missouri are not unreasonable, either *per se* or as compared with rates from the Michigan field. An application for relief under the fourth section in regard to the salt rates, however, will be taken up later. (22 I. C. C., 407.)

An Exception to the Fourth Section Permitted.

Bluefield Shippers' Association v. Norfolk & Western et al. Opinion by Commissioner Prouty:

The complaint is in regard to rates both from the East and from the West to Bluefield, W. Va. The rates from New York, Philadelphia, etc., are claimed to be unreasonable *per se*, and the rates from Cincinnati, Columbus, Chicago and Pittsburgh are claimed to be in violation of the fourth section. The commission finds that the present class rates and rates on grain from Cincinnati and Columbus to Bluefield, and the class rates from Pittsburgh to Bluefield, are unreasonable and lower rates are ordered. The rates on iron articles from Pittsburgh to Bluefield via Columbus are not found to be unreasonable. Class rates from New York, Philadelphia and Baltimore to Bluefield are found to be unreasonable and lower rates are ordered. The commission finds that there are competitive conditions at Roanoke, Va., which are beyond the control of the Norfolk & Western and which compel the maintenance of rates at that point now in effect from Cincinnati, Columbus, Chicago and Pittsburgh. The charging of higher rates at intermediate points than to Roanoke and points east from Pittsburgh, etc., should be permitted so long as the present rates from these points to Roanoke and beyond do not exceed those now in effect; also, so long as no higher rates are charged at Bluefield than have been found reasonable from Pittsburgh, etc. (22 I. C. C., 519.)

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF JANUARY, 1912.

Name of road	Mileage operated at end of period.	Operating revenues: Freight.	Passenger.	Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Alabama & Vicksburg	142	$97,865	$38,241	$146,296	$21,480	$30,752	$3,605	$55,419	$4,098	$116,234	$30,062	—$1,299	$4,600	$24,163	- $10,692
Alabama Great Southern	369	370,715	84,961	485,952	49,508	87,813	12,801	174,759	10,239	285,125	100,827	—619	15,285	84,923	—11,110
Atchison, Topeka & Santa Fe	7,977	4,344,368	1,947,869	6,852,459	1,013,435	1,203,743	193,109	2,378,493	161,685	4,953,458	1,902,001	.....	293,596	1,608,405	—292,424
Atlanta, Birmingham & Atlantic	661	501,045	47,789	566,084	29,194	49,983	16,968	119,287	13,704	229,136	36,948	.....	15,700	21,248	- 25,108
Atlantic & St. Lawrence	166	109,500	17,645	139,145	12,847	19,686	4,865	85,443	4,104	126,945	12,200	.....	6,658	5,542	—12,586
Atlantic Coast Line	4,526	1,781,237	754,330	2,737,997	386,769	405,676	57,045	1,041,087	73,875	1,964,452	773,545	.....	107,000	666,545	—145,583
Baltimore & Ohio Chicago Terminal	22	.....	1,901	110,121	8,115	18,302	767	62,359	3,860	93,403	16,718	$774	18,206	— 714	16,653
Bangor & Aroostook	617	338,712	39,372	383,133	41,430	31,867	4,507	100,998	10,381	189,183	93,952	.....	10,375	83,577	—6,037
Bessemer & Lake Erie	93	361,479	10,320	390,107	41,718	127,422	7,864	134,961	9,909	321,867	31,760	.....	9,000	- 40,760	—28,840
Boston & Maine	2,243	1,013,400	1,079,134	3,297,745	340,017	546,465	30,317	1,709,258	84,848	2,684,905	607,840	4,337	175,186	436,991	—60,819
Butte, Anaconda & Pacific	46	88,362	6,014	100,941	7,595	16,894	708	49,263	2,468	76,928	24,013	.....	2,000	22,013	14,868
Canadian Pacific Lines in Maine	233	107,067	26,737	140,128	19,246	26,628	4,719	62,638	6,732	119,963	20,160	.....	7,000	13,160	6,685
Carolina, Clinchfield & Ohio	259	167,106	10,343	181,17	10,975	20,928	5,770	37,407	7,874	83,954	98,218	.....	8,000	90,218	17,878
Carolina, Cincinnati & Ohio (Lines in S. C.)	17	1,639	1,356	11,335	704	119	580	2,812	673	5,288	6,247	.....	500	5,747	- 1,110
Central of Georgia	1,911	713,035	284,639	1,112,005	164,007	221,784	33,918	459,499	36,965	916,173	195,832	4,580	50,893	140,519	—129,210
Central New England	376	137,085	77,357	275,205	38,468	21,988	1,118	84,919	3,448	149,941	125,264	- 2,721	9,000	113,543	40,177
Charleston & Western Carolina	340	106,420	29,104	144,407	30,845	23,843	3,920	70,988	4,615	133,311	11,116	.....	5,000	6,116	—40,604
Chicago & Alton	1,028	692,388	87,964	1,065,366	107,968	274,128	38,137	484,908	33,624	938,885	126,481	4,465	36,000	86,016	—119,926
Chicago & Northwestern	7,598	4,671,494	1,366,171	6,503,710	590,031	880,190	114,711	2,800,690	126,810	4,512,432	390,778	16,067	275,000	99,711	- 831,438
Chicago, Burlington & Quincy	9,074	4,346,249	1,449,741	6,569,074	481,298	1,315,027	114,440	2,487,810	191,539	4,590,114	1,918,960	—11,699	264,413	1,642,848	- 102,598
Chicago & Eastern Illinois	1,275	890,841	234,963	1,226,237	113,258	274,113	28,015	545,418	44,112	1,003,916	222,311	2,931	37,500	187,742	—129,140
Chicago, Indiana & Southern	358	296,717	21,334	348,184	45,931	105,422	7,518	130,346	8,422	306,639	21,545	94	13,000	8,451	- 10,118
Chicago, Milwaukee & Puget Sound	2,078	738,436	139,662	981,38	118,636	164,982	29,561	467,894	24,405	805,478	125,760	—1,231	137,049	—12,520	—159,189
Chicago, Milwaukee & St. Paul	7,711	3,809,615	893,377	4,256,349	361,738	837,624	100,423	2,350,502	98,477	3,738,264	518,085	—17,825	250,694	249,566	- 83,256
Chicago, Peoria & St. Louis	255	108,227	20,558	138,162	20,129	28,140	7,816	69,895	6,385	132,365	5,797	.....	4,300	1,497	13,107
Chicago, Rock Island & Pacific	7,551	2,864,803	1,269,816	4,463,610	518,584	682,095	159,920	2,214,390	178,612	3,753,601	710,009	- 17,987	225,123	466,899	—507,234
Chicago, St. Paul, Minneapolis & Omaha	1,743	674,342	343,746	1,099,350	74,074	150,126	24,052	598,381	33,519	880,352	218,998	3,000	63,928	154,770	—140,982
Cincinnati, Hamilton & Dayton	1,014	530,749	108,901	720,428	73,302	144,385	20,018	339,926	18,751	596,382	124,146	.....	24,689	99,457	26,681
Cincinnati, New Orleans & Texas Pacific	337	583,08	155,548	779,627	80,792	190,154	20,902	250,425	19,620	561,893	217,734	415	21,800	196,349	—39,870
Cincinnati Northern	244	74,134	14,003	9,15	17,183	24,763	2,452	48,011	3,686	96,095	—3,880	.....	5,300	- 9,180	—14,540
Cleveland, Cincinnati, Chic. & St. Louis	2,011	1,515,172	528,698	2,344,664	271,996	450,680	70,176	1,159,586	51,882	2,004,320	240,344	—8,153	95,000	137,191	—103,478
Colorado & Southern	1,052	554,502	87,310	688,890	70,115	137,873	12,188	251,862	21,357	493,395	195,495	—1,838	29,200	164,457	—68,256
Cumberland Valley	102	173,718	47,555	231,480	41,874	36,335	4,761	87,699	7,362	178,031	53,449	316	5,612	48,153	- 32,731
Delaware, Lackawanna & Western	958	2,09 ,840	53 ,416	3,82 ,894	221,913	501,705	73,067	992,622	66,586	1,855,893	967,001	10,889	168,940	808,950	—256,565
Denver & Rio Grande	2,544	1,1 ,042	28,950	1,678,558	145,714	367,739	51,674	697,992	57,354	1,320,473	358,085	—8,503	78,000	271,582	—55,775
Denver, Northwestern & Pacific	11	93,387	9,641	107,531	13,907	20,726	2,333	48,646	3,423	89,035	18,496	.....	4,500	13,996	—14,942
Detroit & Mackinac	358	56,179	2,539	84,701	19,051	20,067	2,965	37,248	3,721	83,052	1,649	129	8,249	- 6,471	—25,398
Detroit, Grand Haven & Milwaukee	160	107,000	34,600	162,597	15,580	27,850	6,214	117,323	4,812	171,779	- 9,182	- 63	2,880	—12,125	—20,949
Duluth & Iron Range	300	76,984	19,408	107,301	31,948	44,250	839	79,731	10,361	167,119	—59,818	—2,903	4,494	— 67,215	— 8,999
Duluth, Missabe & Northern	341	77,523	30,882	108,742	40,939	47,977	1,568	64,124	11,194	165,802	—57,060	101	4,256	— 61,215	—54,406
Elgin, Joliet & Eastern	841	719,463	3	761,771	74,164	149,831	4,067	267,692	14,494	510,248	251,523	.....	18,125	233,398	120,175
Florida East Coast	699	178,069	183,822	423,304	58,624	50,513	13,300	203,829	10,943	336,209	87,095	.....	15,500	71,595	- 49,684
Fort Worth & Denver City	454	268,649	103,633	394,618	44,113	78,414	5,972	156,817	15,247	300,563	94,055	—209	10,292	83,554	—51,813
Galveston, Harrisburg & San Antonio	1,538	553,549	237,676	834,345	125,309	191,708	34,098	379,417	29,334	759,866	74,479	—6,628	16,508	51,343	—106,555
Grand Rapids & Indiana	586	274,645	104,381	358,949	52,777	72,477	11,427	194,654	14,826	346,161	12,788	—249	23,226	—10,687	- 37,075
Grand Trunk Western	347	345,080	144,100	519,116	33,905	92,263	17,855	248,901	14,215	407,139	111,977	- 2,002	31,635	78,340	- 29,057
Great Northern	7,344	2,624,783	820,833	3,806,389	389,305	677,716	88,145	1,572,192	106,345	2,833,703	972,686	—11,572	243,013	718,101	458,925
Gulf & Ship Island	307	131,586	30,712	177,833	19,605	29,384	2,754	54,103	8,955	114,751	63,082	.....	4,457	58,625	—1,567
Gulf, Colorado & Santa Fe	1,597	710 ,8	201,188	982,33	133,602	159,342	26,207	433,111	38,995	791,257	191,075	.....	42,929	148,146	107,289
Houston, East & West Texas	190	69,739	20,907	96,035	23,631	12,843	1,885	38,618	3,536	80,513	16,122	.....	3,916	12,206	- 24,808
Houston & Texas Central	789	252,521	109,767	403,804	32,068	92,727	16,322	220,970	22,297	434,384	—30,580	- 1,690	20,558	—52,828	—91,212
Illinois Central	4,7	2,633,052	1,027,312	4,198,218	523,398	1,328,026	104,758	2,157,267	120,535	4,233,984	—35,766	64	230,955	—266,657	—1,743,797
Indiana Harbor Belt	104	.....	.....	197,312	23,501	22,980	3,029	102,686	7,839	160,035	37,377	543	5,000	32,920	21,855
Kansas City Southern	8	501,988	118,318	697,848	81,192	118,250	28,411	291,788	30,491	550,132	147,716	.....	30,924	116,792	- 114,956
Lake Erie & Western	8	339,451	60,632	4 5,765	62,005	83,324	12,119	205,615	11,717	374,780	50,985	.....	19,000	31,985	- 23,790
Lake Shore & Michigan Southern	1,7	8 ,910	886,374	3,847,877	423,965	699,978	78,867	1,524,055	75,688	2,802,553	1,045,324	- 7,592	140,000	897,732	236,982

Operated in the previous year. [2] 7,526. [3] 4,194. [4] 304. [5] 2,242. [6] 236. [7] 7,743. [8] 9,091. [9] 1,097. [10] 7,548. [11] 1,180. [12] 930. [13] 360. [14] 190. [15] 316. [16] 587. [17] 7,274. [18] 1,518. [19] 4,575. [20] 113. [21] 1,662.
— Indicates Deficits, Losses and Decreases.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF JANUARY, 1912 (CONTINUED).

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Lehigh Valley	1,450[29]	2,484,918	278,831	2,868,305	317,302	561,480	76,944	1,090,569	68,870	2,115,165	753,140	—34,954	130,000	588,186	—222,082
Long Island	398[3]	230,485	406,581	666,358	114,832	110,019	8,755	383,663	21,037	638,306	28,052	16,364	56,450	—12,034	—13,066
Louisville & Nashville	4,704[2]	3,296,884	967,715	4,535,545	729,288	851,513	98,080	1,600,861	100,950	3,380,692	1,154,853	7,239	148,950	998,664	63,695
Louisville, Henderson & St. Louis	199	69,345	30,372	106,999	21,081	14,229	4,510	42,876	2,830	85,476	21,523	159	3,000	18,682	4,533
Louisiana & Arkansas	255	104,735	16,232	125,246	22,148	18,516	2,341	35,399	4,703	83,107	42,139	.....	4,233	37,906	—7,314
Maine Central	1,203[5]	503,746	182,971	731,622	104,641	127,377	6,998	349,777	21,734	610,527	121,095	—4,488	42,897	73,710	—53,276
Michigan Central	1,816[4]	1,063,721	535,292	2,388,902	235,872	359,540	60,677	1,104,612	44,129	1,804,830	584,072	1,532	116,000	469,604	242,000
Midland Valley	373[5]	71,474	37,236	117,231	28,329	15,131	2,880	40,424	6,616	93,380	23,851	51	7,592	16,310	1,306
Missouri Pacific	3,913[6]	1,253,349	323,700	1,750,523	222,172	242,803	57,691	976,591	68,015	1,567,272	183,251	—4,486	82,600	96,165	179,423
Monongahela	64	111,723	2,384	115,508	10,668	12,153	479	26,489	1,932	51,721	63,787	.....	2,000	61,787	9,885
Nashville, Chattanooga & St. Louis	1,355	659,950	235,797	974,602	147,058	184,545	40,165	371,152	25,117	768,037	206,565	- 891	23,816	181,858	—85,915
Nevada Northern	165	108,571	10,786	122,573	11,858	16,220	381	27,594	3,680	59,733	62,840	.....	5,500	57,340	— 2,106
New Orleans & Northeastern	178	83,156	44,506	137,860	27,206	58,581	9,401	131,850	11,692	238,730	69,130	—955	8,300	59,875	—19,225
New Orleans, Mobile & Chicago	104	1,[illegible]17	26,429	163,446	23,556	19,892	2,817	52,927	7,964	107,156	56,290	- 48	4,154	52,088	15,727
New York, Central & Hudson River	3,[illegible]6	4,961,114	3,288,677	8,061,535	940,581	1,600,045	150,456	3,564,643	913,617	6,469,342	1,592,193	43,866	556,924	1,079,135	357,153
New York, Chicago & St. Louis	5[illegible]	745,586	197,867	883,964	83,880	107,665	47,071	472,173	17,320	731,109	153,585	- 2,667	32,000	118,918	—28,008
New York, New Haven & Hartford	1,[illegible]7	2,[illegible]3,[illegible]17	1,[illegible]74,867	4,883,603	434,332	644,937	35,005	2,253,507	152,841	3,510,632	1,373,981	107,654	310,000	1,170,635	54,821
New York, Ontario & Western	4[illegible]	3[illegible]3,33[illegible]	74,[illegible]37	649,187	81,162	133,051	9,676	301,851	17,559	543,299	105,883	2,520	17,917	85,446	- 5,841
New York, Philadelphia & Norfolk	1[illegible]	174,[illegible]63	30,803	235,354	12,042	44,632	3,701	108,713	11,968	191,056	34,198	.....	7,900	26,298	—17,545
Norfolk & Western	1[illegible]4	1,[illegible]48,[illegible]00	[illegible]7,667	2,038,264	173,503	662,197	57,521	1,011,546	66,771	2,072,538	865,726	-1,087	120,000	744,639	- 118,885
Northern Central	6[illegible]7	1,[illegible]30,0[illegible]	56,[illegible]43	38,349	29,842	30,093	4,871	86,797	13,172	164,725	68,624	77	7,500	61,047	—8,249
Northern Pacific	4,[illegible]3[illegible]	7,[illegible],[illegible]06	1,[illegible]6[illegible],3[illegible]7	9[illegible],[illegible]58	153,397	238,179	12,090	557,743	25,085	983,664	- 27,066	83	36,175	- 63,158	77,746
Northern Pacific	6,[illegible]34[illegible]	2,[illegible]65[illegible],[illegible]37[illegible]	[illegible]81,[illegible]63	3,[illegible]18,[illegible]67	381,896	553,187	86,119	1,871,908	108,838	3,000,948	917,724	- 8,625	231,366	687,733	—329,641
Oregon Short Line	1,[illegible]7[illegible]	1,[illegible]03[illegible],[illegible]61	[illegible]43,[illegible]42	1,[illegible]45,[illegible]47	137,492	201,459	29,940	451,900	38,411	889,702	503,220	—3,048	100,000	490,172	- 43,717
Oregon Washington R. R. & Nav. Co.	[illegible]9[illegible]	[illegible]6[illegible],[illegible]01	[illegible]3[illegible],[illegible]78	1,[illegible]0[illegible],[illegible]61	159,184	169,987	42,866	487,009	47,173	906,716	117,945	-707	88,089	29,149	—222,293
Pecos & Northern Texas	178[illegible]	130,[illegible]63	34,824	175,033	24,061	43,556	2,701	80,621	5,709	156,648	18,385	.....	6,045	12,340	696
Pennsylvania Co.	1,7[illegible]0	2,[illegible]56,[illegible]36	680,[illegible]56	3,[illegible]56,[illegible]05	585,696	769,131	75,067	1,683,085	93,395	3,176,374	710,131	1,103	198,585	510,443	114,494
Pennsylvania Railroad	4,[illegible]0[illegible]	9,[illegible]3[illegible],[illegible]766	2,473,470	13,[illegible]80,[illegible]50	1,032,477	2,[illegible]84,[illegible]728	158,884	5,[illegible]46,086	366,713	10,459,488	2,320,932	—148,438	564,473	1,608,021	—162,419
Peoria & Eastern	2[illegible]	1,[illegible]00[illegible]	4[illegible],[illegible]58	[illegible]40,[illegible]63	31,134	40,182	4,149	170,670	5,411	291,546	29,407	.....	9,800	19,607	—26,280
Pere Marquette	8[illegible]	7[illegible],[illegible]05	[illegible]65,[illegible]93	1,[illegible]57,[illegible]18	159,532	245,731	34,918	704,193	34,187	1,178,861	21,663	- 7,025	56,517	- 85,705	- 69,093
Philadelphia, Baltimore & Washington	7[illegible]	[illegible]4,[illegible]06	60[illegible],[illegible]02	1,43[illegible],741	206,578	274,193	30,902	7[illegible],062	37,441	1,283,176	153,565	.....	49,268	104,297	—51,004
Pittsburg & Lake Erie	2[illegible]	1,[illegible]4[illegible],[illegible]1	[illegible]05,[illegible]15	1,23[illegible],863	13,772	224,011	11,782	341,[illegible]80	[illegible]4,360	734,245	498,618	- 363	31,000	467,255	56,045
Pittsburg, Cincinnati, Chic. & St. Louis	1,4[illegible]	2,[illegible]7[illegible],[illegible]00	591,844	3,[illegible]04,8[illegible]5	372,907	646,955	68,805	1,319,[illegible]08	69,144	2,476,819	728,306	- 842	119,[illegible]41	608,223	16,905
Santa Fe, Prescott & Phoenix	9[illegible]	[illegible]0,[illegible]40	2[illegible],[illegible]05	100,064	17,237	8,[illegible]22	2,379	26,517	3,849	58,504	41,560	.....	2,777	38,783	.....
St. Joseph & Grand Island	3[illegible]	7[illegible],[illegible]14	27,371	118,173	11,152	29,562	4,762	60,007	6,284	111,767	6,408	- 16	6,396	—4	- 13,583
St. Louis, Iron Mountain & Southern	3[illegible]4	1,[illegible]83,670	475,083	2,329,112	288,898	262,133	55,798	904,635	74,883	1,586,347	742,765	—2,683	83,615	656,467	—166,472
St. Louis Southwestern	7[illegible]	[illegible]8,646	101,925	366,610	59,612	94,599	27,608	181,162	27,100	390,081	176,529	- 846	22,563	153,120	—120,814
San Pedro, Los Angeles & Salt Lake	1,1[illegible]	[illegible]5,[illegible]83	243,010	690,712	92,437	200,367	29,801	289,195	16,633	628,433	62,279	—5,947	24,177	32,155	—22,765
Southern	7,[illegible]8[illegible]	3,[illegible]7[illegible],[illegible]91	1,284,486	4,[illegible]8[illegible],377	623,111	792,292	141,900	1,[illegible]43,325	166,893	3,636,521	1,215,856	7,230	204,919	1,018,167	—162,495
Southern in Mississippi	8[illegible]	[illegible]5,[illegible]9	30,084	[illegible]3[illegible],26	20,596	11,142	2,846	42,013	4,759	81,356	12,570	.....	4,056	8,514	—25,937
Southern Kansas of Texas	124	[illegible]8,[illegible]91	14,537	87,383	10,802	27,890	1,750	47,538	3,130	90,820	- 3,437	.....	2,571	—6,008	— 16,446
Southern Pacific Co.	6,[illegible]98	3,767,[illegible]40	1,[illegible]47,[illegible]98	6,703,308	765,832	1,061,627	182,935	2,[illegible]88,817	184,164	4,483,375	2,220,023	- 39,355	358,519	1,822,149	—16,114
Syracuse, Binghamton & New York	[illegible]0	[illegible]5,[illegible]70	[illegible]7,[illegible]53	[illegible]3,[illegible]69	3,700	7,831	3,027	36,[illegible]23	2,523	53,404	30,2[illegible]5	.....	6,820	23,405	—1,995
Texas & New Orleans	4[illegible]	1[illegible],[illegible]8[illegible]	[illegible]8,[illegible]72	2[illegible],400	53,981	78,831	8,593	134,[illegible]09	11,343	287,357	9,043	190	13,683	—4,450	—47,190
Toledo, Peoria & Western	[illegible]7	7[illegible],[illegible]3	31,376	113,664	14,093	23,338	2,217	45,924	3,425	88,997	24,667	.....	4,800	19,867	14,505
Toledo, St. Louis & Western	4[illegible]	[illegible]51,[illegible]0[illegible]	26,[illegible]76	2[illegible],078	27,010	55,777	8,109	121,826	8,450	221,172	77,906	.....	14,250	63,656	20,117
Union Pacific	3,[illegible]8[illegible]	2,[illegible]0[illegible],[illegible]03	754,[illegible]78	3,164,[illegible]83	258,230	535,716	90,681	1,238,572	125,976	2,249,175	915,757	- -6,423	159,960	749,374	—525,533
Union R. R. of Baltimore	[illegible]	[illegible]9,[illegible]33	[illegible]3,[illegible]01	120,603	9,777	.....	793	5,882	2,276	17,142	103,461	.....	5,414	98,047	1,709
Union R. R. of Pennsylvania	3[illegible]	[illegible]	[illegible]	[illegible]4,[illegible]36	15,569	86,461	100	130,439	2,467	235,036	- 10,900	2,318	4,750	—13,332	32,868
Vandalia	8[illegible]	[illegible]74,[illegible]59	176,689	[illegible]48,990	88,373	162,616	24,345	378,642	17,979	672,955	177,035	.....	28,010	149,025	22,383
Vicksburg, Shreveport & Pacific	171	74,[illegible]31	[illegible]8,429	122,[illegible]99	[illegible]2,702	22,85[illegible]	3,167	41,190	4,626	94,544	27,955	— 50	6,600	21,305	- 9,859
Virginian	474[illegible]	[illegible]5,[illegible]88	17,[illegible]0	411,[illegible]19	48,712	75,189	5,502	111,154	7,831	248,[illegible]8	162,931	4,717	17,600	150,048	36,060
West Jersey & Seashore	355[illegible]	1,[illegible]27,[illegible]33	1[illegible]4,895	[illegible]19,687	92,564	71,987	10,968	[illegible]21,766	11,016	408,701	89,014	- 4,824	29,902	—123,740	58,341
Wheeling & Lake Erie	4[illegible]7	4[illegible],[illegible]06,[illegible]07	41,140	[illegible]61,987	51,804	113,478	7,346	211,111	13,246	396,985	165,002	4,377	32,035	137,344	44,918
Yazoo & Mississippi Valley	1,[illegible]71	5[illegible],[illegible]99	[illegible]00,[illegible]82	[illegible]16,756	180,083	163,554	15,542	[illegible]83,062	[illegible],[illegible]08	769,279	47,477	- 51	37,904	9,522	- 371,999

[1] Operated on the previous year. [2] 1,433. [3] 365. [4] 4,591. [5] 1,179. [6] 1,803. [7] 3,3[illegible]. [8] 3,919; [27] 2,041; [28] 545; [9] 1,990. [10] 468; [11] 6,028; [12] 1,646; [13] 1,636. [14] 296; [15] 1,415; [16] 3,976; [17] 2,334; [18] 191; [19] 3,316; [20] 1,105; [21] 3,472. [22] 473. [23] 353. Indicates Deficits, Losses and Decreases.

[24] Figures shown here are for the period January 1 to 21 (inc.). On the 22nd this road was merged into the Atchison, Topeka & Santa Fe.

REVENUES AND EXPENSES OF RAILWAYS.

SEVEN MONTHS OF FISCAL YEAR, 1912.

Name of road	Mileage operated at end of period	Operating revenues				Operating expenses						Net operating revenue or deficit	Other income			Interest on funded debt
		Freight.	Passenger.	Total, incl. misc.	Maintenance: Way and structures.	Maintenance: Of equipment	Traffic	Transportation.	General.	Total.				Taxes.		
Alabama, [illegible] Vicksburg	142	$86,[illegible]77	$[illegible]05,850	$1,[illegible]03,127	$[illegible]18,786	$[illegible]90,944	$[illegible]3,991	$34[illegible]96	$36,040	$[illegible],44[illegible]		$[illegible]5,[illegible]	$[illegible]4,[illegible]	$[illegible],[illegible]96		$[illegible],[illegible]65
Alabama, Great Southern	309	849,919	712,[illegible]87	[illegible],797,381	307,688	6[illegible],[illegible]61	77,498	850,673	67[illegible]14	[illegible]94,[illegible]91		$75,142	[illegible],722	1[illegible],[illegible]24		[illegible],[illegible]96
Atchison, Topeka & Santa Fe	[illegible],[illegible]27	$4,[illegible]07,[illegible]79	13,[illegible]47,[illegible]75	$[illegible],240,[illegible]69	$[illegible]43,[illegible]07	$8,060,[illegible]21	[illegible],[illegible]45,[illegible]35	[illegible],[illegible]65,[illegible]64	[illegible],[illegible]93,[illegible]03	[illegible],[illegible]07,[illegible]64		[illegible],[illegible]93,[illegible]06	[illegible],[illegible]93,[illegible]06	[illegible],[illegible]07,[illegible]64		[illegible],[illegible]93,[illegible]06
Atlanta, Birmingham & Atlantic	661	[illegible]31,042	420,[illegible]91	[illegible],[illegible]86,[illegible]48	[illegible]06,700	3[illegible],[illegible]78	[illegible],[illegible]96,[illegible]96	[illegible]7[illegible],136	[illegible],[illegible]43,[illegible]60	[illegible],[illegible]45,[illegible]10		[illegible],[illegible]98,[illegible]38	[illegible],[illegible]98,[illegible]38	[illegible],[illegible]98,[illegible]38		[illegible],[illegible]98,[illegible]38
Atlantic & St. [illegible]ence	166	600,[illegible]97	192,360	[illegible]71,734	[illegible]34,[illegible]97	1[illegible],[illegible]83,[illegible]09	80,[illegible]96	403,026	[illegible]7,280	[illegible]84,[illegible]85		[illegible]	[illegible]6,[illegible]60	[illegible]6,[illegible]60		[illegible],[illegible]60
Atlantic Coast Line	[illegible],[illegible]96	12,[illegible]41,[illegible]74	4,[illegible]58,[illegible]17	18,534,[illegible]83	2,466,[illegible]74	2,760,[illegible]98	31,[illegible]04	6,[illegible]19,670	[illegible],[illegible]1[illegible]	[illegible],[illegible]46,[illegible]11		[illegible],[illegible]69,[illegible]46		74[illegible],[illegible]68	[illegible],[illegible]70,[illegible]08	66[illegible],[illegible]62
Baltimore & Ohio Chicago terminal	27	[illegible]	16,710	[illegible]74,[illegible]90	191,[illegible]06	1[illegible],[illegible]70	6,[illegible]96	405,[illegible]76	36,[illegible]6	[illegible]70,[illegible]48		1[illegible]4,[illegible]52	[illegible],[illegible]00	1[illegible],[illegible]56	40,[illegible]26	1[illegible],[illegible]56
Bangor & Aroostook	6[illegible]7	[illegible],[illegible]80,[illegible]49	39,[illegible]43[illegible]	1,98[illegible],[illegible]61	3[illegible],[illegible]80,884	[illegible]28,[illegible]30	[illegible]0[illegible]7	598,[illegible]13	80[illegible],[illegible]16	1,[illegible]91,[illegible]2[illegible]		20[illegible],[illegible]86		[illegible],[illegible]7[illegible]	[illegible],[illegible]48[illegible]	[illegible],[illegible]97
Buffalo & Susquehanna	[illegible]03	4[illegible]83,[illegible]73	[illegible],[illegible]03	[illegible],[illegible]16,[illegible]89	[illegible]95,[illegible]67	9[illegible],[illegible]5,[illegible]93	[illegible]47[illegible]	1,[illegible]5[illegible],[illegible]39	7[illegible],[illegible]77[illegible]	[illegible]13[illegible],[illegible]		[illegible]3[illegible],[illegible]39		[illegible],[illegible]74	[illegible]	[illegible],[illegible]77
Buffalo & Susquehanna	[illegible]4[illegible]	[illegible],[illegible]06,[illegible]49	9,[illegible]34,[illegible]94[illegible]	7,337,[illegible]76	3,[illegible]11,[illegible]03	3,707,340	7[illegible],[illegible]79	1,[illegible]86,[illegible]43	59[illegible],[illegible]62	[illegible]0,776,[illegible]67		[illegible],[illegible]69	[illegible]	[illegible],[illegible]	[illegible],[illegible]41	[illegible]
Butte, Anaconda & Pacific	46	[illegible]48,711	64,450	[illegible]5[illegible],741	71,108	1,[illegible]0,975	[illegible],[illegible]14	[illegible]91,[illegible]73	19,860	[illegible]98,430		144,[illegible]41	[illegible]	1,[illegible]76[illegible]	1[illegible],[illegible]45	—7,[illegible]49
Canadian Pacific Lines in Maine	[illegible]33	447,[illegible]96	169,[illegible]7[illegible]	[illegible]61,167	137,[illegible]60	110,841	35,[illegible]39	[illegible]98,[illegible]74	30,[illegible]8[illegible]	6,[illegible]30,[illegible]43		[illegible]1,[illegible]		[illegible],[illegible]60	17,[illegible]	[illegible],[illegible]68
Carolina, Clinchfield & Ohio	[illegible]84	1,110,[illegible]38	[illegible]3,760	1,[illegible]34,[illegible]37	[illegible]79,[illegible]21	150,[illegible]37	36,[illegible]81	[illegible]0,[illegible]03	[illegible],[illegible]47	[illegible]67,[illegible]67		666,[illegible]74	[illegible]38	[illegible],[illegible]41	[illegible],[illegible]6[illegible]	2[illegible],[illegible]87
Carolina, Clinchfield & Ohio of S. C.	[illegible]7	[illegible],[illegible]45	[illegible]1,[illegible]30	[illegible]5,[illegible]41	[illegible],028	[illegible]38	[illegible],[illegible]68	[illegible],[illegible]86	[illegible],[illegible]41	[illegible],[illegible]69		[illegible],[illegible]19		[illegible],[illegible]01	[illegible],[illegible]7	[illegible],[illegible]47
Central of Georgia	[illegible],[illegible]67	[illegible],[illegible]94,[illegible]47	[illegible],[illegible]34,[illegible]78[illegible]	[illegible],[illegible]80,[illegible]78	1,[illegible]09,663	1,[illegible]26,388	[illegible]30,046	[illegible],[illegible]88,[illegible]28	[illegible]06,[illegible]34	[illegible],[illegible]47,[illegible]69		[illegible],[illegible]43,[illegible]09	40,[illegible]94	[illegible]6,[illegible]86	[illegible]6,[illegible]57	—[illegible],[illegible]57
Central New England	76	1,[illegible]86,[illegible]72	[illegible]8,[illegible]83	1,[illegible]63,[illegible]78	[illegible]4,[illegible]70	149,[illegible]76	[illegible],[illegible]50	[illegible]7,[illegible]71[illegible]	[illegible]9,[illegible]31	1,[illegible]30,[illegible]63		[illegible]63,[illegible]15	[illegible]67	[illegible]3,[illegible]00	[illegible]7,[illegible]70	[illegible]1,[illegible]63
Charleston & Western Carolina	[illegible]40	[illegible]4[illegible],[illegible]76	30,[illegible]79[illegible]	1,139,[illegible]19	[illegible]05,[illegible]88	[illegible]69,[illegible]73	[illegible]0,[illegible]81[illegible]	[illegible]4[illegible],[illegible]84	30[illegible],[illegible]02	[illegible]33,[illegible]88[illegible]		[illegible],[illegible]31		[illegible],[illegible]00	[illegible],[illegible]71	[illegible],[illegible]00
Chicago & Alton	1,[illegible]05	5,[illegible]3,[illegible]75	2,[illegible]61[illegible]8	8,941,100	1,[illegible]6[illegible],[illegible]03	1,[illegible]94,711	[illegible]80,[illegible]61	[illegible],[illegible]7[illegible],[illegible]	[illegible]3,[illegible]41	[illegible],[illegible]42,[illegible]3		[illegible],[illegible]42,[illegible]57	[illegible],[illegible]01	[illegible],[illegible]00	1,[illegible],[illegible]86	[illegible]24,[illegible]76
Chicago & Eastern Illinois	1,[illegible]7[illegible]	6,[illegible]8,[illegible]60	1,[illegible]84,[illegible]3	9,[illegible]81,[illegible]34	1,[illegible]35,[illegible]73	1,[illegible]63,[illegible]16	[illegible]06,[illegible]76	[illegible],[illegible]36,[illegible]10	[illegible]88,[illegible]84	[illegible],[illegible]9[illegible],[illegible]0		[illegible],[illegible]7[illegible],[illegible]3	[illegible],[illegible]7[illegible]	[illegible]8,[illegible]03	[illegible],[illegible]69	[illegible],[illegible]80
Chicago & Northwestern	7,[illegible]98[illegible]	[illegible],[illegible]70,[illegible]36	11,[illegible]2[illegible],[illegible]8	44,[illegible]64,[illegible]8[illegible]	[illegible],[illegible]6[illegible],[illegible]09	5,[illegible]02,[illegible]83	[illegible]8[illegible],[illegible]96	1[illegible],[illegible]06,[illegible]11	[illegible]87,[illegible]78	[illegible]1,[illegible]17,[illegible]08	1[illegible],[illegible]48,[illegible]60	[illegible]3,[illegible]47	1[illegible],[illegible]00	[illegible]0,[illegible]48[illegible]	[illegible],[illegible]66,[illegible]57	[illegible],[illegible]66,[illegible]66
Chicago, Burlington & Quincy	[illegible],[illegible]07[illegible]	34,501,[illegible]4[illegible]	13,[illegible]6[illegible],[illegible]44	[illegible]3,[illegible]79,[illegible]74	6,[illegible]88,[illegible]93	8,[illegible]95,[illegible]18	[illegible]98,[illegible]67	10,[illegible]19,[illegible]3[illegible]	1,[illegible]1[illegible],[illegible]3	[illegible]3,[illegible]16,[illegible]5[illegible]	18,[illegible]6[illegible],[illegible]49	67,[illegible]43	1,[illegible]50,[illegible]7[illegible]	16,[illegible]74[illegible],[illegible]85		[illegible]63,[illegible]19
Chicago, Indiana & Southern	[illegible],[illegible]88[illegible]	[illegible],[illegible]01,[illegible]43	1[illegible],[illegible]86,[illegible]63	[illegible],[illegible]77,[illegible]90	[illegible],[illegible]16,[illegible]06	503,[illegible]91	[illegible]7,[illegible]77[illegible]	[illegible]88,[illegible]1[illegible]	[illegible]8[illegible],[illegible]45	1,[illegible]78,[illegible]94[illegible]	[illegible]0,[illegible]02,[illegible]05	1,[illegible]88,[illegible]3	[illegible]8,[illegible]09[illegible]	[illegible]1,[illegible]89	4[illegible],[illegible]78[illegible]	[illegible]3,[illegible]87
Chicago, Milwaukee & Puget Sound	2,[illegible]08	7,430,[illegible]74	1,[illegible]01,[illegible]6[illegible]	[illegible],[illegible]83,[illegible]07	66[illegible],[illegible]30	997,[illegible]93	34[illegible],[illegible]11	[illegible],[illegible]06,[illegible]84	144,[illegible]05	[illegible]13,[illegible]93	3,741,[illegible]14	[illegible],[illegible]63	[illegible]13,[illegible]54	[illegible],[illegible]30,[illegible]42	[illegible]31,[illegible]07
Chicago, Minneapolis & St. Paul	7,[illegible]1[illegible]	[illegible]5,[illegible]53,[illegible]04	8,[illegible]6[illegible],[illegible]91	[illegible]7,[illegible]00[illegible],[illegible]03	[illegible],[illegible]30[illegible],[illegible]9[illegible]	[illegible],[illegible]08,[illegible]10	74[illegible],[illegible]51	[illegible]4,[illegible]0[illegible],[illegible]83	[illegible]80,[illegible]47	[illegible]7,[illegible]35,[illegible]00	[illegible]98[illegible],[illegible]03	[illegible],[illegible]71[illegible]	1,[illegible]66[illegible],[illegible]28	[illegible]8[illegible],[illegible]1,[illegible]93	[illegible]9,[illegible]48
Chicago, Peoria & St. Louis	[illegible]5	740,[illegible]83[illegible]	[illegible]19,[illegible]89	1,[illegible]09,[illegible]87	[illegible]33,[illegible]96	[illegible]0[illegible],[illegible]67	51,[illegible]46	[illegible]45,[illegible]31[illegible]	[illegible]3,[illegible]28	[illegible]74,[illegible]46[illegible]		[illegible],[illegible]41		[illegible]0,[illegible]10[illegible]	[illegible]0[illegible],[illegible]41	[illegible]6,[illegible]82
Chicago, Rock Island & Pacific	7,[illegible]8[illegible]	[illegible],[illegible]37,[illegible]30	11,[illegible]15,[illegible]66[illegible]	[illegible]7,[illegible]67,[illegible]78	[illegible],[illegible]6[illegible],[illegible]84	4,[illegible]83,[illegible]81	1,[illegible]99,[illegible]97	14,[illegible]63,[illegible]56	1,[illegible]18,[illegible]70	[illegible]7,[illegible]59,[illegible]88	[illegible]9,[illegible]67,[illegible]50	110,[illegible]87	1,[illegible]41,[illegible]10	[illegible],[illegible]15,[illegible]93	1,[illegible]88[illegible],[illegible]39
Chicago, St. Paul, Minneapolis & Omaha	1,[illegible]43	[illegible],[illegible]34,[illegible]81	2,[illegible]64,[illegible]69	[illegible],[illegible]15[illegible],[illegible]8	1,[illegible]13,[illegible]05	1,[illegible]89,[illegible]50	[illegible]6[illegible],[illegible]01	[illegible],[illegible]70,[illegible]64	[illegible]1[illegible],[illegible]87	[illegible],[illegible]65,[illegible]59	[illegible]93[illegible],[illegible]26	4,[illegible]45	[illegible]6,[illegible]99[illegible]	[illegible],[illegible]43,[illegible]87	—[illegible],[illegible]40,[illegible]07
Cincinnati, Hamilton & Dayton	1,[illegible]44	4,[illegible]73,[illegible]27	1,[illegible]29,[illegible]85	6,[illegible]36,[illegible]47	[illegible]17,[illegible]80	[illegible]84,[illegible]23[illegible]	[illegible]35,[illegible]28	[illegible],[illegible]40,[illegible]19	[illegible]34,[illegible]15[illegible]	[illegible]4[illegible],[illegible]63,[illegible]44	[illegible],[illegible]06[illegible],[illegible]63	[illegible]	[illegible]68[illegible]13	[illegible],[illegible]4[illegible],[illegible]90	[illegible]48,[illegible]41
Cincinnati, New Orleans & Texas Pacific	[illegible]37	4,[illegible]69,[illegible]14	1,[illegible]66,[illegible]74	5,[illegible]8[illegible],[illegible]83	[illegible]66,[illegible]17	1,[illegible]89,[illegible]40	1[illegible],[illegible]6[illegible],[illegible]4	1[illegible],[illegible]0[illegible],[illegible]4[illegible]	1[illegible],[illegible]0[illegible],[illegible]9	[illegible],[illegible]7[illegible],[illegible]4	1,[illegible]50,[illegible]88	[illegible],[illegible]88	[illegible]3,[illegible]60	1,[illegible]66[illegible],[illegible]8[illegible]	1,[illegible]35,[illegible]80[illegible]	—[illegible],[illegible]65,[illegible]4
Cincinnati Northern	[illegible]4[illegible]	[illegible]2[illegible],[illegible]1[illegible]5	[illegible]3[illegible],[illegible]89	[illegible]80[illegible],[illegible]08	148,[illegible]91	156,[illegible]07	[illegible]9,[illegible]37	[illegible]14,[illegible]9[illegible]8	[illegible]1,[illegible]44	[illegible]39,[illegible]47	140,[illegible]76[illegible]	[illegible]4[illegible]		[illegible]0,[illegible]39[illegible]	[illegible]00,[illegible]69	[illegible]5,[illegible]40
Cleveland, Cincinnati, Chic. & St. Louis	[illegible],[illegible]01[illegible]	11,[illegible]86,[illegible]58	4,[illegible]68,[illegible]84[illegible]	18,[illegible]50,[illegible]64	1,[illegible]74,[illegible]08	2,[illegible]01,[illegible]83	54[illegible],[illegible]80	7,[illegible]59,[illegible]83[illegible]	88[illegible],[illegible]37	[illegible],[illegible]90,[illegible]86	[illegible]8,[illegible]87	677,[illegible]1[illegible]	4,[illegible]95,[illegible]30[illegible]	1,[illegible]87,[illegible]93	
Colorado & Southern	1,[illegible]0[illegible]	[illegible],[illegible]8[illegible],[illegible]31	[illegible]97,[illegible]93	[illegible],[illegible]57,[illegible]9[illegible]	[illegible]74,[illegible]84	[illegible]60,[illegible]30	[illegible]0[illegible],[illegible]1[illegible]	1,[illegible]8[illegible],[illegible]06	160,[illegible]88	3,[illegible]57,[illegible]33	1,[illegible]00,[illegible]89	[illegible],[illegible]77	[illegible]81,[illegible]60	1,[illegible]11[illegible],[illegible]12	—[illegible],[illegible]36,[illegible]18
Cumberland Valley	16[illegible]	1,[illegible]43,[illegible]80	406,[illegible]79[illegible]	1,[illegible]73[illegible],[illegible]87	[illegible]03,[illegible]46	[illegible]19,[illegible]06	[illegible]3[illegible],[illegible]49	[illegible]58,[illegible]68	[illegible]4,[illegible]54	1,[illegible]69,[illegible]03	[illegible]6[illegible],[illegible]04	[illegible],[illegible]49	[illegible]4[illegible],[illegible]03	[illegible],[illegible]3[illegible],[illegible]80	—[illegible],[illegible]80,[illegible]68
Delaware, Lackawanna & Western	9[illegible]1	[illegible],[illegible]9,[illegible]66[illegible]	4,[illegible]6[illegible],[illegible]3[illegible]	1,[illegible]9[illegible],[illegible]10	[illegible],[illegible]83,[illegible]00	3,[illegible]49,[illegible]89[illegible]	[illegible]6[illegible],[illegible]76	6,[illegible]13,[illegible]66[illegible]	[illegible]57,[illegible]45	13,[illegible]39[illegible],[illegible]07	8,[illegible]57,[illegible]60[illegible]	[illegible]50,[illegible]41	1,[illegible]0[illegible],[illegible]90	7,[illegible]67,[illegible]04	—[illegible],[illegible]88,[illegible]73
Denver & Rio Grande	[illegible],[illegible]54[illegible]	[illegible]0[illegible],[illegible]26,[illegible]52	3,[illegible]1[illegible],[illegible]09	[illegible]4,[illegible]07,[illegible]81[illegible]	1,[illegible]40,[illegible]48	2,[illegible]91,[illegible]77	[illegible]8[illegible],[illegible]09	[illegible],[illegible]38,[illegible]98[illegible]	[illegible]80,[illegible]40[illegible]	10,[illegible]20[illegible],[illegible]88	[illegible],[illegible]94,[illegible]35[illegible]	[illegible],[illegible]18	[illegible]30,[illegible]00[illegible]	[illegible],[illegible]68,[illegible]13[illegible]	—[illegible],[illegible]53,[illegible]57
Denver, Northwestern & Pacific	[illegible]4[illegible]	[illegible]3,[illegible]6[illegible]	[illegible]8,[illegible]0[illegible]	[illegible]88,[illegible]3[illegible]	98,[illegible]09	114,999	17,[illegible]86	267,970	[illegible],[illegible]98	[illegible]5[illegible],[illegible]51[illegible]	63,[illegible]03	[illegible]. . .	[illegible],[illegible]00	[illegible]41,[illegible]03	14,[illegible]18
Detroit & Mackinac	[illegible]88[illegible]	[illegible]46,[illegible]89	[illegible]11,[illegible]33	[illegible]70,[illegible]74	130,[illegible]68	[illegible]23,[illegible]80	17,[illegible]34	[illegible]30,[illegible]66	[illegible],[illegible]11	[illegible]5[illegible],[illegible]17[illegible]	178,[illegible]45	1,[illegible]86	60,[illegible]05	[illegible]0,[illegible]16	- 68,[illegible]04
Detroit, Grand Haven & Milwaukee	[illegible],[illegible]0	[illegible]05,[illegible]06	401,[illegible]78	1,[illegible]09,[illegible]03	161,[illegible]66	181,[illegible]94	48,560	[illegible]91,150	31,[illegible]98	1,[illegible]14,[illegible]36	[illegible]7,[illegible]33	[illegible],[illegible]6	[illegible],[illegible]59	[illegible]5,[illegible]50	44,733
Duluth & Iron Range	[illegible]0[illegible]	[illegible],[illegible]0[illegible],[illegible]86	[illegible]3,[illegible]87	[illegible],[illegible]30,[illegible]03	8[illegible],[illegible]1	3[illegible],[illegible]76	6,[illegible]43	[illegible]29,[illegible]33[illegible]	[illegible]4,[illegible]38	[illegible],[illegible]83,[illegible]3	[illegible]47,[illegible]71	11,[illegible]6[illegible]	[illegible]0[illegible],[illegible]4	[illegible],[illegible]39,[illegible]07	4[illegible],[illegible]3[illegible]
Duluth, Missabe & Northern	3[illegible]	[illegible],[illegible]88,[illegible]08	[illegible]6[illegible],[illegible]96[illegible]	[illegible],[illegible]16,[illegible]47[illegible]	[illegible]97,[illegible]17	[illegible]8[illegible],[illegible]41	[illegible]8,[illegible]37	[illegible]8[illegible],[illegible]37[illegible]	[illegible]98,[illegible]16[illegible]	[illegible],[illegible]08[illegible],[illegible]35	[illegible],[illegible]76,[illegible]38	36,[illegible]87	[illegible]9,[illegible]07	2,[illegible]33,[illegible]91[illegible]	[illegible],[illegible]90,[illegible]20
Elgin, Joliet & Eastern	[illegible]41[illegible]	[illegible],[illegible]04,[illegible]6[illegible]	[illegible]0	[illegible],[illegible]08,[illegible]43	[illegible]3[illegible],[illegible]99	1,[illegible]05[illegible],[illegible]14	[illegible]8[illegible]86	1,[illegible]67[illegible],[illegible]43	11[illegible],[illegible]83	3,[illegible]41[illegible],[illegible]67	[illegible],[illegible]8[illegible]	[illegible]. . .	13[illegible],[illegible]28	[illegible],[illegible]59,[illegible]00	78[illegible],[illegible]62
Florida East Coast	[illegible]0[illegible]	[illegible],[illegible]63,[illegible]29	71[illegible],[illegible]68	1,[illegible]93,[illegible]76	[illegible]87,[illegible]99	[illegible]33,[illegible]60	48,[illegible]74	[illegible]90,[illegible]85	63,[illegible]50	1,[illegible]63,[illegible]18	[illegible]69,[illegible]47	[illegible]	[illegible]0[illegible],[illegible]30	[illegible]0,[illegible]44	79,[illegible]15
Fort Worth & Denver City	4[illegible]4	[illegible],[illegible]9[illegible],[illegible]81	9[illegible]4,[illegible]7[illegible]	[illegible],[illegible]06,[illegible]96	[illegible]8[illegible],[illegible]08	[illegible]53,[illegible]58	[illegible]0,[illegible]60	98,[illegible]1[illegible]	[illegible]8,[illegible]43,[illegible]10	[illegible],[illegible]74,[illegible]0[illegible]	4,[illegible]07	[illegible]3,[illegible]71	1,[illegible]37,[illegible]88	—[illegible],[illegible]71,[illegible]58
Galveston, Harrisburg & San Antonio	1,[illegible]8[illegible]	4,[illegible]36,[illegible]70	1,[illegible]71[illegible],[illegible]3	[illegible],[illegible]40[illegible],[illegible]19	[illegible]86,[illegible]96	1,[illegible]08,[illegible]03	[illegible]8,[illegible]56	[illegible]4[illegible],[illegible]89[illegible]	1[illegible]0,[illegible]15	[illegible],[illegible]37,[illegible]68[illegible]	[illegible]6,[illegible]38	[illegible]3,[illegible]3[illegible]	[illegible]77,[illegible]0[illegible]	[illegible],[illegible]51,[illegible]80	—[illegible],[illegible]86,[illegible]86
Grand Rapids & Indiana	[illegible]8[illegible]	1,[illegible]68[illegible],[illegible]17	1,[illegible]1[illegible],[illegible]8[illegible]	3,[illegible]45,[illegible]84	31[illegible],[illegible]99	[illegible]94,[illegible]37	79,[illegible]47	1,[illegible]60,[illegible]73	10[illegible],[illegible]76	[illegible],[illegible]32,[illegible]8[illegible]	79,[illegible]60[illegible]	[illegible]51	160,[illegible]82	63[illegible],[illegible]69	140,[illegible]63
Grand Trunk Western	[illegible]47	[illegible],[illegible]78,[illegible]74	1,[illegible]34[illegible],[illegible]60[illegible]	3,[illegible]64,[illegible]94	[illegible]86,[illegible]76[illegible]	[illegible]76,[illegible]84	13[illegible],[illegible]76[illegible]	1,[illegible]56,[illegible]00[illegible]	[illegible]95,[illegible]95	[illegible],[illegible]79,[illegible]10	1[illegible]85,[illegible]84	[illegible],[illegible]80	[illegible],[illegible]46	[illegible]97,[illegible]05[illegible]	[illegible]83,[illegible]11
Great Northern	7,[illegible]48[illegible]	[illegible]9,[illegible]81,[illegible]99	8,[illegible]27,[illegible]89[illegible]	40,[illegible]4[illegible],[illegible]46[illegible]	4,[illegible]17,[illegible]87	4,[illegible]34,[illegible]61	63[illegible],[illegible]59[illegible]	[illegible]0,[illegible]79[illegible],[illegible]74	[illegible]10,[illegible]75[illegible]	[illegible]9,[illegible]90,[illegible]17[illegible]	19,[illegible]8[illegible],[illegible]90	104,[illegible]06	1,[illegible]79,[illegible]34	17,[illegible]67[illegible],[illegible]6[illegible]	3,[illegible]47,[illegible]74
Gulf & Ship Island	[illegible]0[illegible]	[illegible]8[illegible],[illegible]3[illegible],[illegible]1	[illegible]53,[illegible]91	1,[illegible]17[illegible],[illegible]30	156,[illegible]08[illegible]	[illegible]10,[illegible]37[illegible]	17,[illegible]91	[illegible]35,[illegible]64	[illegible]7,[illegible]70	[illegible]76,[illegible]87[illegible]	[illegible]0,[illegible]60	[illegible]. . .	[illegible]1,[illegible]70	[illegible]65,[illegible]90[illegible]	—[illegible]9,[illegible]76
Gulf, Colorado & Santa Fe	1,[illegible]97[illegible]	5,[illegible]7[illegible],[illegible]38	1,[illegible]84[illegible],[illegible]86	7,[illegible]68,[illegible]13	1,[illegible]08,[illegible]36[illegible]	1,[illegible]09[illegible],[illegible]48	184[illegible],[illegible]8	[illegible]86,[illegible]13	[illegible]7,[illegible]29	[illegible],[illegible]5[illegible],[illegible]13	[illegible]0[illegible],[illegible]31[illegible]	[illegible]. . .	[illegible]0[illegible],[illegible]00	1,[illegible]71[illegible],[illegible]30	[illegible]9,[illegible]92
Houston, East & West Texas	[illegible]90	[illegible]94,[illegible]87	[illegible]0[illegible],[illegible]38	[illegible],[illegible]68,[illegible]25	141,[illegible]64	[illegible]80,[illegible]71	[illegible]3,[illegible]46	[illegible]51,[illegible]74	[illegible]5[illegible],[illegible]74	[illegible]11[illegible],[illegible]0	[illegible]7,[illegible]66	[illegible]. . .	[illegible]0,[illegible]72	[illegible]26,[illegible]74	[illegible]1,[illegible]63
Houston & Texas Central	[illegible]89	[illegible],[illegible]98,[illegible]80	1,[illegible]13[illegible],[illegible]09	[illegible],[illegible]93,[illegible]08	[illegible]09,[illegible]34	[illegible]13,[illegible]85	1[illegible],[illegible]8[illegible],[illegible]93	1,[illegible]47[illegible],[illegible]09	146,[illegible]03	[illegible],[illegible]87,[illegible]04	[illegible]16,[illegible]14	[illegible],[illegible]67	160,[illegible]31	[illegible]46,[illegible]96	[illegible]73,[illegible]46
Illinois Central	4,[illegible]58[illegible]	1,[illegible]8[illegible],[illegible]06	[illegible],[illegible]7[illegible],[illegible]91	[illegible]4,[illegible]45,[illegible]60	[illegible],[illegible]1[illegible],[illegible]09	[illegible],[illegible]20,[illegible]80	[illegible]1[illegible],[illegible]48	[illegible]5,[illegible]84,[illegible]8[illegible]	[illegible]01,[illegible]96[illegible]	[illegible]8,[illegible]34,[illegible]45[illegible]	[illegible],[illegible]17,[illegible]09	[illegible],[illegible]46[illegible]	1,[illegible]61[illegible],[illegible]25	[illegible],[illegible]46,[illegible]19	5,[illegible]60,[illegible]38[illegible]
Indiana Harbor Belt	10[illegible]	[illegible]. . . .	[illegible]. . . .	1,[illegible]46[illegible],[illegible]46	[illegible]85,[illegible]73	[illegible]58,[illegible]07[illegible]	[illegible]0,[illegible]48	[illegible]64,[illegible]73[illegible]	[illegible]3,[illegible]81[illegible]	1,[illegible]08[illegible],[illegible]45[illegible]	[illegible]85,[illegible]94	[illegible]2,[illegible]74[illegible]	[illegible]8,[illegible]45[illegible]	[illegible]78,[illegible]99	[illegible]07,[illegible]9[illegible]
Kansas City Southern	[illegible]97	3,[illegible]31,[illegible]37	[illegible]73,[illegible]16[illegible]	[illegible],[illegible]19,[illegible]19	[illegible]64,[illegible]13	[illegible]10,[illegible]70	[illegible]87,[illegible]10	1,[illegible]18,[illegible]30	[illegible]0,[illegible]91[illegible]	[illegible],[illegible]66[illegible],[illegible]37	[illegible],[illegible]07[illegible]	[illegible]. . .	[illegible]68,[illegible]94	1,[illegible]88[illegible],[illegible]88	[illegible]9,[illegible]40
Lake Erie & Western	[illegible]86	[illegible],[illegible]59,[illegible]29[illegible]	[illegible]73,[illegible]07	[illegible],[illegible]3[illegible],[illegible]19	[illegible]65,[illegible]91[illegible]	[illegible]65,[illegible]79	[illegible]9[illegible],[illegible]09	1,[illegible]91,[illegible]35[illegible]	[illegible]7,[illegible]30	[illegible],[illegible]90,[illegible]18[illegible]	[illegible]8[illegible],[illegible]35	[illegible]. . .	[illegible]38,[illegible]96	[illegible]69,[illegible]09[illegible]	[illegible]86,[illegible]90
Lake Shore & Michigan Southern	1,[illegible]77[illegible]	[illegible],[illegible]73,[illegible]93[illegible]	[illegible],[illegible]18[illegible],[illegible]93	[illegible],[illegible]63,[illegible]31	[illegible],[illegible]10[illegible],[illegible]35	3,[illegible]95,[illegible]97	[illegible]04,[illegible]32	[illegible],[illegible]56,[illegible]70[illegible]	[illegible]18,[illegible]83	[illegible],[illegible]80,[illegible]37	[illegible],[illegible]83,[illegible]94	[illegible]6,[illegible]86[illegible]	[illegible],[illegible]03,[illegible]94[illegible]	[illegible],[illegible]97,[illegible]88	[illegible],[illegible]63,[illegible]55

Operated in the previous year. [illegible],526, [illegible],494, [illegible]04, [illegible],[illegible]43, [illegible]86, [illegible],743; $[illegible],091, $[illegible],997, $[illegible],548, $[illegible],180, $[illegible]930, $[illegible]360, [illegible]190, $[illegible]316, $[illegible]887, [illegible],[illegible]24, $[illegible],518, [illegible],[illegible]57[illegible], $[illegible]13, [illegible],66[illegible]
a [illegible],76, [illegible]340, [illegible]43[illegible] a [illegible],928 e [illegible],541, [illegible]831, [illegible],583 Indicates Deficits, Losses and Decreases.

REVENUES AND EXPENSES OF RAILWAYS.

SEVEN MONTHS OF FISCAL YEAR, 1912 (CONCLUDED).

Name of road.	Mileage operated at end of period.	Operating revenues: Freight.	Passenger.	Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Lehigh Valley	1,450[29]	18,951,152	2,974,540	22,608,302	2,568,296	3,901,067	570,566	7,608,190	478,525	15,126,644	7,571,658	175,236	801,700	6,594,722	264,496
Long Island	398[29]	1,931,441	4,294,130	6,500,714	849,086	763,644	99,798	2,855,441	147,299	4,715,268	1,785,446	447,680	377,771	1,855,355	250,522
Louisiana & Arkansas	255	643,620	129,651	806,365	148,143	125,085	16,389	223,051	33,139	545,807	260,558	.....	24,233	236,325	62,945
Louisville & Nashville	4,704[29]	28,581,993	7,393,295	32,858,684	4,964,542	5,763,269	665,351	10,409,069	622,000	22,424,231	10,434,453	14,028	1,042,650	9,377,775	534,447
Louisville, Henderson & St. Louis	199	462,939	249,122	758,506	167,586	94,678	30,133	251,609	21,228	565,234	193,272	2,360	21,000	174,632	10,773
Maine Central	1,203[29]	3,843,179	2,108,970	6,331,225	1,183,460	789,990	64,776	2,297,339	183,687	4,519,252	1,811,973	27,092	299,580	1,539,485	160,952
Michigan Central	1,816[29]	11,799,667	4,898,162	18,493,978	2,118,117	2,052,185	464,110	6,966,344	310,605	11,911,361	6,582,617	27,346	798,371	5,811,592	2,188,866
Midland Valley	373[29]	573,537	271,461	900,002	191,689	140,079	21,382	281,815	44,105	679,070	220,932	704	40,497	181,139	19,111
Missouri Pacific	3,915[29]	10,580,897	2,892,283	14,819,475	2,691,098	2,903,034	423,525	6,747,769	498,385	13,263,811	1,555,664	26,090	578,200	951,374	436,145
Monongahela	64	691,077	16,767	717,937	101,618	55,669	2,364	153,318	13,452	326,421	391,516	.....	19,430	372,086	39,511
Nashville, Chattanooga & St. Louis	1,255	4,779,897	1,785,224	7,057,712	1,074,750	1,311,702	260,304	2,579,520	176,515	5,402,791	1,654,921	7,387	166,712	1,480,827	- 139,819
Nevada Northern	165	727,169	76,009	818,729	88,915	104,123	2,774	175,898	24,135	395,845	422,884	.....	33,666	389,218	67,284
New Orleans & North Eastern	195	1,649,808	374,995	2,171,347	203,697	404,679	63,339	803,973	80,003	1,555,691	615,656	5,476	61,871	548,509	86,729
New Orleans, Mobile & Chicago	404	843,358	216,210	1,125,873	167,192	121,571	19,432	339,861	56,048	704,104	421,769	25	31,840	389,697	35,907
New York Central & Hudson River	3,596[29]	36,465,187	14,648,944	61,633,119	8,947,824	9,622,488	1,270,339	22,885,997	1,526,022	48,552,670	13,080,449	289,784	3,599,286	15,740,947	2,770,912
New York, Chicago & St. Louis	562	5,476,733	1,012,692	6,749,897	774,879	694,640	325,661	2,746,077	117,870	4,659,127	2,090,770	10,657	233,125	1,846,988	203,122
New York, New Haven & Hartford	2,094[29]	18,105,490	16,257,636	37,846,605	4,053,721	4,393,865	230,997	14,458,162	1,117,503	28,253,944	13,592,661	857,850	2,270,000	12,180,511	449,539
New York, Ontario & Western	568[29]	4,088,363	1,114,939	5,426,516	781,180	910,674	68,521	2,043,804	120,192	3,924,371	1,502,145	5,591	153,417	1,371,137	- 240,600
New York, Philadelphia & Norfolk	131	1,526,907	280,917	1,953,763	208,478	344,541	28,337	768,493	83,723	1,436,572	517,191	.....	52,900	464,291	73,348
Norfolk & Western	2,004[29]	19,423,676	2,681,097	22,923,835	2,738,496	4,388,172	366,496	6,692,974	443,348	14,608,286	8,995,549	15,783	810,000	7,469,766	400,664
Norfolk Southern	697	1,155,988	521,645	1,897,633	209,612	223,552	39,405	509,913	93,548	1,165,226	662,407	- 3,285	52,500	606,622	17,843
Northern Central	473[29]	5,042,079	1,401,440	7,493,662	756,888	1,257,001	103,671	3,758,559	167,698	6,343,747	1,149,915	4,350	278,195	875,970	69,073
Northern Pacific	6,034	26,306,687	9,579,478	38,398,447	4,696,024	4,108,542	680,616	12,293,376	594,373	22,371,831	16,025,610	289,943	1,945,345	14,363,208	540,697
Oregon Short Line	1,761[29]	8,942,688	2,870,915	12,564,050	1,400,242	1,209,177	199,030	3,051,559	248,935	6,108,986	6,455,114	380	891,991	5,563,043	175,355
Oregon-Washington R. R. & Nav. Co.	1,919	6,128,704	3,073,672	9,874,338	1,265,801	999,823	304,877	3,426,829	298,331	6,295,161	3,579,077	13,638	769,651	2,823,064	.....
Pecos & Northern Texas	478[29]	845,065	226,899	1,122,297	166,845	227,336	17,033	381,780	34,736	827,504	294,773	.....	28,840	265,933	28,531
Pennsylvania Co	1,760[29]	23,408,698	5,277,570	31,357,686	4,081,649	5,556,628	523,025	10,755,217	695,959	21,519,480	9,838,206	8,968	1,323,621	8,506,617	428,485
Pennsylvania Railroad	4,017[29]	68,000,032	20,583,745	94,942,121	10,790,608	18,665,624	1,285,347	34,880,685	2,400,172	68,022,436	6,919,685	899,331	4,200,060	21,870,294	739,086
Peoria & Eastern	351	1,307,146	439,751	1,884,959	249,686	267,859	37,482	770,923	40,594	1,366,544	518,415	.....	68,003	450,412	85,405
Pere Marquette	2,332[29]	6,796,705	2,608,238	10,250,924	1,443,221	1,593,955	255,172	4,545,340	328,566	7,865,154	2,385,770	19,469	397,527	1,968,774	169,083
Philadelphia, Baltimore & Washington	713	5,399,439	4,671,492	11,231,647	1,546,760	1,913,461	187,454	4,620,519	288,790	8,520,984	2,704,663	.....	35,345	2,351,208	8,917
Pittsburg & Lake Erie	215[29]	8,383,752	933,459	9,604,127	1,045,479	1,543,230	91,868	2,234,869	160,090	5,061,536	4,542,591	1,887	208,389	4,332,315	557,140
Pittsburg, Cincinnati, Chic & St. Louis	1,467	16,196,492	4,873,304	23,703,146	3,266,790	4,324,547	479,954	8,405,595	460,726	16,937,612	6,765,534	- 6,078	889,638	5,869,818	- 38,906
St. Joseph & Grand Island	319	614,861	263,290	961,341	164,661	143,603	35,403	421,007	39,606	804,280	157,061	60	48,879	108,242	1,856
St. Louis, Iron Mountain & Southern	3,314[29]	13,027,723	3,699,396	17,927,476	3,077,167	2,682,651	372,210	5,752,897	492,523	12,378,448	5,549,028	40,179	576,055	4,932,794	363,204
St. Louis Southwestern	796	3,467,748	832,375	4,538,141	406,640	741,411	198,590	1,120,276	165,546	2,632,463	1,905,678	6,987	145,788	1,752,903	—115,941
San Pedro, Los Angeles & Salt Lakes	1,115[29]	3,006,643	1,726,995	5,073,140	877,666	1,147,977	223,769	1,988,476	119,337	4,357,225	715,915	28,847	172,939	514,129	—377,728
Santa Fe, Prescott & Phoenix	364[3]	614,704	247,814	935,357	141,421	85,766	20,817	267,348	37,009	552,361	372,996	.....	23,346	349,650	.....
Southern	7,088[29]	23,888,398	10,371,516	37,199,614	4,371,850	5,905,404	954,913	12,690,831	1,093,480	35,016,478	12,183,136	45,907	1,413,571	10,805,472	123,169
Southern in Mississippi	280	420,199	244,993	718,575	157,533	63,370	17,066	268,576	26,969	533,514	185,061	.....	35,356	149,705	29,178
Southern Kansas of Texas	124	624,077	110,368	766,425	126,306	164,612	14,610	290,675	28,584	624,787	141,638	.....	18,328	123,310	109,315
Southern Pacific Co	6,195[1]	32,087,060	18,608,716	54,406,535	6,203,151	6,546,419	1,212,352	15,557,978	1,359,316	30,879,166	23,527,369	206,107	2,286,190	21,447,286	1,087,917
Syracuse, Binghamton & New York	80	352,527	250,129	685,356	86,116	45,216	19,419	242,224	16,397	409,372	276,004	.....	44,140	231,864	3,172
Texas & New Orleans	458	1,508,594	615,945	2,267,596	383,819	508,496	55,489	891,110	71,158	1,910,071	357,524	2,582	104,594	244,548	139,086
Toledo, Peoria & Western	247	447,721	277,306	769,743	121,891	165,865	16,213	288,677	23,780	616,426	153,317	.....	33,600	119,717	16,110
Toledo, St. Louis & Western	450	1,929,923	387,661	2,360,158	282,603	434,758	57,525	857,007	61,195	1,693,088	667,070	.....	101,950	565,870	72,200
Union Pacific	8,537[29]	20,210,699	6,437,146	29,751,357	2,648,638	3,460,279	745,926	8,200,036	748,308	15,803,187	13,448,070	7,098	1,195,967	12,245,005	2,843,383
Union R. R. of Baltimore	9	776,189	145,337	882,228	74,752	.....	5,116	39,096	16,548	135,512	747,416	.....	40,953	706,464	63,687
Union R. R. of Pennsylvania	31	.....	.....	2,552,876	213,781	567,306	714	895,150	35,996	1,703,877	849,999	26,669	48,573	828,088	313,724
Vandalia	867	3,887,940	1,478,919	6,049,351	854,323	1,133,460	184,388	2,345,844	183,553	4,651,533	1,397,788	.....	197,332	1,200,456	167,783
Vicksburg, Shreveport & Pacific	171	491,769	301,965	868,309	154,979	151,546	21,977	270,367	32,308	631,177	37,132	- 1,498	49,071	186,563	180,647
Virginian	474[3]	2,526,491	164,136	2,767,728	315,266	492,066	35,435	789,380	55,235	1,667,382	1,100,346	37,153	106,160	1,031,968	224,503
Wheeling & Lake Erie	457	3,885,698	381,239	4,558,761	534,999	798,504	52,214	1,467,925	97,674	2,950,616	1,608,145	18,401	305,335	1,421,211	99,125
West Jersey & Seashore	355[0]	1,125,662	2,595,340	3,979,969	597,535	681,549	96,896	1,665,718	73,778	3,115,496	864,473	4,748	160,741	679,013	—191,806
Yazoo & Mississippi Valley	1,371	4,026,896	1,616,386	6,078,679	1,174,948	892,880	113,193	2,312,715	185,852	4,679,038	1,399,641	7,058	265,887	1,131,676	—866,394

[1] Operated in the previous year. [2] 1,433. [3] 395. [4] 4,591. [5] 1,179. [6] 1,803. [7] 328. [8] 3,919. [9] 2,041. [10] 545. [11] 1,990. [12] 468. [13] 6,128. [14] 1,646. [15] 1,636. [16] 296. [17] 1,415. [18] 3,976. [19] 334. [20] 191. [21] 3,316. [22] 1,110. [23] 7,038. [24] 3,472. [25] 473. [26] 353. [27] 3,891. [28] 561. [29] 6,187.

( ) Indicates Deficits, Losses and Decreases.

[30] Figures shown here are for the period July 1, 1911 to January 21, 1912, inclusive. On January 22 this road was merged into the Atchison, Topeka & Santa Fe.

Complaint Dismissed.

Merchants' and Manufacturers' Association of Baltimore et al. v. Atlantic Coast Line et al. Opinion by the commission.

The rate charged on iron girders which are too long to be loaded into box cars is not found unreasonable. (22 I. C. C., 467.)

Rate on Wire Reduced.

Leggett & Platt Spring Bed & Manufacturing Co. v. Missouri Pacific et al. Opinion by the commission:

A rate of 33 cents per 100 lbs. for plain wire, C. L., from Waukegan, Ill., to Carthage, Mo., found to be unreasonable. (22 I. C. C., 513.)

STATE COMMISSIONS.

The Pennsylvania commission has declined to consider a petition for better train service on the Northern Central between York and New Freedom, holding that, as the trains run through to Baltimore, Md., and are engaged in interstate traffic, the commission cannot interfere with them; but the commission will do what is proper and practicable toward securing the establishment of a new local train.

COURT NEWS.

The New York, Chicago & St. Louis and the Lehigh Valley have entered pleas of not guilty in the United States district court at Chicago to indictments charging the payment of rebates to Booth & Company, now the Booth Fisheries, which were returned in 1907. A petition for a demurrer filed some months ago was overruled by the court.

The constitutionality of an act passed by the Indiana legislature in 1909 authorizing the railway commission to investigate and regulate the condition and efficiency of locomotive headlights was upheld by Judge Carter of the Superior Court on March 2, in a decision on a demurrer of the state to a suit brought by the Vandalia to enjoin the commission from enforcing an order requiring the railways to equip their locomotives with headlights of a least 1,500 candle power. The court held that the commission has the authority to make such an order.

Six express companies operating in Indiana have filed in the federal court at Indianapolis suits for an injunction restraining the enforcement of an order of the railway commission reducing express rates within the state, approximately 15 per cent. The injunction is asked on the ground that the order is confiscatory, that the commission's methods of calculating the profits of the company were erroneous and that the commission included the earnings of the company from financial business, which are declared to be three times as great as those from the transportation business.

The Supreme Court of Missouri on March 1 denied the writ of ouster asked by the state against the Missouri Pacific, St. Louis, Iron Mountain & Southern and Wabash railways, the Pacific Express Company and the American Refrigerator Transit Company. The state sought to have the charters of the companies revoked on allegations that the Missouri Pacific held stock in the other companies and that the Wabash was a parallel and competing line. The court held that it was not unlawful for a railway to hold stocks in another company when it does not undertake to control the other corporation, and that the Wabash is not a parallel and competing line with reference to the Missouri Pacific.

Judge Landis of the United States district court at Chicago, on February 28, dismissed a petition of the Taylor Coal Company, Chicago, and the Security Coal & Mining Company, St. Louis, for an injunction restraining the Illinois Central from putting into effect an order of the Illinois railway commission requiring the distribution of coal cars to mines on the basis of the previous month's shipments. The coal companies contended that the order was discriminatory against interstate shipments. The injunction was refused on the ground that an appeal from the commission's order pending in the circuit court of Sangamon county acted as a stay. On February 29 the Illinois Central notified the commission that it would restore its former rules providing for a distribution on the basis of the average shipments during the nine months ended February 9.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

F. L. Wanklyn has been appointed general executive assistant of the Canadian Pacific, with office at Montreal, Que., and will perform such duties as may be assigned to him by the president.

H. B. Holbert, division freight agent of the Chicago Great Western at Des Moines, Iowa, has been elected vice-president and general manager of the Muscatine North & South, with office at Muscatine, Iowa.

W. K. Vanderbilt, Jr., assistant to president of the New York Central Lines at New York, has been elected vice-president of the New York Central & Hudson River and the Lake Shore & Michigan Southern, with office at New York.

W. C. Parker, who has been connected with the auditing department of the Union Pacific, has been appointed general auditor of the Illinois Central, with office at Chicago, succeeding J. W. Newlean, recently appointed comptroller of Wells, Fargo & Company.

Operating Officers.

William D. Trump, general superintendent of the Pere Marquette, with office at Detroit, Mich., has resigned.

E. Horton Turner has been appointed general superintendent of the Alabama & Mississippi, with office at Vinegar Bend, Ala.

Donald McDonald has been appointed superintendent of the Montreal & Ste. Flavie district of the Intercolonial Railway, with office at Levis, Que.

J. F. Chapman, general freight and passenger agent of the Oshawa Railway at Deseronto, Ont., has been appointed manager in charge of operation and traffic, with office at Deseronto.

F. H. Kahl has been appointed superintendent of telegraph of the Chicago, Rock Island & Gulf, with office at Fort Worth, Tex., succeeding E. D. Winslow, resigned on account of other duties.

J. E. McLean has been appointed acting assistant superintendent of the Galveston, Harrisburg & San Antonio, with office at San Antonio, Tex., succeeding T. H. Mooney, granted a leave of absence on account of illness.

Robert King, superintendent of district No. 1 of the Canadian Pacific, at Toronto, Ont., has been appointed superintendent of the London division, with office at London. H. G. Grant succeeds Mr. King, with office at Toronto.

F. B. Mitchell, trainmaster of the Baltimore & Ohio Southwestern at Seymour, Ind., has been appointed assistant superintendent; and C. A. Plumly, operator on the Indiana division at Cincinnati, Ohio, succeeds Mr. Mitchell.

George Hodge, whose appointment as general superintendent of the Eastern division of the Canadian Pacific, with office at Montreal, Que., has been announced in these columns, was born on October 2, 1874, at Montreal. He was educated in the public schools, and began railway work on March 24, 1890, as a clerk in the passenger department of the Canadian Pacific, and since that time has been in the continuous service of that company. In August, 1890, he was transferred in the same capacity to the vice-president's office, and in 1892 was made secretary to the vice-president. Four years later he was promoted to chief clerk to the vice-president, and from 1907 to 1908 he was superintendent of the Montreal terminals. He was then transferred as superintendent to district Three of the Eastern division, and in 1911 was again transferred as superintendent to district Two of the Ontario division, which position he held at the time of his recent appointment as general superintendent of the Eastern division.

Traffic Officers.

F. N. Hait has been appointed commercial agent of the Lehigh Valley, with office at Cleveland, Ohio.

G. H. Windsor has been appointed general freight agent of the Crystal City & Uvalde, with headquarters at Crystal City, Tex.

E. F. Stovall has been appointed a general agent in the freight department of the Central of Georgia, with office at Birmingham, Ala.

H. L. Burch, general freight and passenger agent of the Kentucky & Tennessee, with office at Stearns, Ky., has resigned to engage in other business.

T. H. Wilhelm, commercial agent of the Chicago, Rock Island & Gulf at Dallas, Tex., has been appointed assistant general freight agent, with headquarters at Fort Worth, Tex.

J. L. Cahoon has been appointed soliciting freight agent of the Queen & Crescent Route, with headquarters at Chattanooga, Tenn., succeeding E. F. Sisson, retired on a pension.

C. B. Brodie, chief clerk to the district passenger agent of the Pennsylvania Railroad at Washington, D. C., has been appointed Canadian passenger agent, with office at Toronto, Ont.

S. M. Patterson, commercial agent of the Missouri Pacific-Iron Mountain system at Atlanta, Ga., has been appointed commercial agent, with office at Greensboro, N. C., succeeding Norton England, promoted. C. M. Davis succeeds Mr. Patterson.

C. F. Reed, station agent of the Canadian Pacific at Greenville, Maine, has been appointed a traveling freight agent, with office at St. John, N. B., succeeding C. K. Howard, resigned to become right-of-way agent of the St. John & Quebec.

William West Ruth has been appointed foreign freight agent of the Baltimore & Ohio, with office at Baltimore, Md., succeeding Robert B. Ways, deceased, and Frederic J. Course has been appointed assistant foreign freight agent, with office at New York. J. L. Hayes, commercial freight agent of the Baltimore & Ohio at Wilmington, Del., has been appointed commercial freight agent, with office at Baltimore, Md., succeeding William West Ruth, promoted, and B. S. Dowdell succeeds Mr. Hayes.

John J. Stevens, traveling freight and passenger agent of the New Orleans Great Northern at Columbia, Miss., has been appointed commercial agent, with office at Jackson, and his former position has been abolished. The position of F. L. Merritt, general agent at Jackson, has also been abolished.

George S. Bruce has been appointed traveling immigration agent of the International & Great Northern, with headquarters at Houston, Tex., succeeding R. R. Claridge, recently appointed agricultural commissioner of the joint Texas immigration bureau of the St. Louis, Iron Mountain & Southern, the Texas & Pacific and the International & Great Northern.

C. W. Merrilies has been appointed general agent of the Chicago Great Western, with office at Butte, Mont., succeeding A. N. Johnson, resigned to go into other business. W. C. Hine has been appointed division freight agent, with office at Fort Dodge, Iowa, succeeding L. M. Foss, resigned. Loyd Jodon has been appointed division freight agent, with office at Des Moines, Iowa, succeeding H. B. Holbert, resigned to go to another company, and T. J. Cleary, agent at Waterloo, Iowa, has been appointed commercial agent, with office at Waterloo.

James Freeman, district passenger agent of the Southern Railway, at Atlanta, Ga., has been appointed division passenger agent, with office at Atlanta, Ga. Richard H. DeButts, traveling passenger agent at Charlotte, N. C., has been appointed division passenger agent, with office at Charlotte. Benjamin H. Todd, chief baggage clerk at Washington, D. C., has been appointed district passenger agent, with office at Louisville, Ky., succeeding A. R. Cook, who becomes city passenger agent at St. Louis, Mo.; Matthew H. Boone, district passenger agent at Dallas, Tex., succeeds Mr. Todd, and Robert B. Creagh, district passenger agent at Birmingham, Ala., succeeds Mr. Boone. Robert L. Baylor, traveling passenger agent at Chattanooga, Tenn., has been appointed division passenger agent, with office at Birmingham, Ala. James R. Martin, chief clerk to the assistant general passenger agent at Chattanooga, has been appointed district passenger agent, with office at Chattanooga, and Hubert C. Motley, succeeds Mr. Martin. Frank L. Jenkins, traveling passenger agent at Augusta, Ga., has been appointed district passenger agent, with office at Washington, D. C., and Alexander H. Acker, traveling passenger agent at Jacksonville, Fla., succeeds Mr. Jenkins; Charles P. Bostwick succeeds Mr. Acker. Harry J. New, traveling passenger agent at Kansas City, Mo., has been appointed traveling passenger agent, with office at Atlanta, and William Flannelly succeeds Mr. New. William C. Spencer, city passenger and ticket agent at Chattanooga, Tenn., has been appointed traveling passenger agent, with office at Chattanooga. J. A. Edwards, city passenger agent at St. Louis, Mo., has been appointed traveling passenger agent, with office at Chicago. C. R. Chesney, traveling passenger agent at Memphis, Tenn., has been appointed traveling passenger agent, with office at Cleveland, Ohio, and George A. Fisher, city passenger and ticket agent at Winston-Salem, N. C., succeeds Mr. Chesney.

Engineering and Rolling Stock Officers.

George Langton has been appointed master mechanic of the Texas & Pacific, with office at Marshall, Tex., succeeding O. A. Clarke, transferred to Dallas, Tex.

E. J. Wheeler has been appointed general car inspector of the Chicago, Burlington & Quincy, lines west of the Missouri river, with office at Lincoln, Neb., succeeding William Hansen, resigned.

John Pontius, road foreman of engines of the Pennsylvania Lines West at Columbus, Ohio, has been appointed general inspector of engines at Columbus, and C. S. White succeeds Mr. Pontius.

W. M. Bond, division engineer of the Baltimore & Ohio Southwestern at Chillicothe, Ohio, has been appointed division engineer of the Monongah division of the Baltimore & Ohio, and H. M. Hayward, assistant engineer of the Baltimore & Ohio Southwestern at Cincinnati, Ohio, succeeds Mr. Bond.

John T. Luscombe, whose appointment as master mechanic of the Cleveland, Cincinnati, Chicago & St. Louis, with office at Bellefontaine, Ohio, has been announced in these columns, was born June 29, 1874, at Queenstown, Cork county, Ireland. After a high school education at Belleville, Ont., in 1891, he began railway work with the Grand Trunk Railway at the same place. During the ten years from 1891 to 1901 he was with a number of roads as machinist, and also studied at the Scranton school. In May, 1901, he was made general foreman of the Baltimore & Ohio at Uhrichsville, Ohio, and was later transferred to Newark, Ohio, as machine shop foreman. In 1905 he went with the Chicago & Alton as machine shop foreman at Bloomington, Ill., and in September, 1907, became general foreman of the Toledo & Ohio Central at Bucyrus, Ohio. In March, 1908, he was promoted to master mechanic, which office he resigned to accept his present appointment. As outlined in another item in this column, Mr. Luscombe's jurisdiction extends over the consolidated motive power department of the Cleveland-Indianapolis and Cincinnati-Sandusky divisions of the Big Four and the Cincinnati Northern Railroad.



J. T. Luscombe.

W. P. Carroll, master mechanic of the Rochester division of the New York Central & Hudson River, with office at Rochester, N. Y., has been appointed master mechanic of the Mohawk division, with office at West Albany, N. Y., succeeding S. J. Delaney, who has been appointed assistant to master mechanic of the Mohawk division, with office at West Albany. W. J. Crandall succeeds Mr. Carroll, and M. H. Strauss has been appointed master mechanic of the River division, with office at New Durham, N. J., succeeding G. H. Eck.

H. M. Stone, division engineer of the Chicago, Rock Island & Pacific at Little Rock, Ark., has been appointed chief engineer of the Chicago, Rock Island & Gulf, with office at Fort Worth, Tex., succeeding K. H. Hanger, whose appointment as trainmaster of the Oklahoma division of the Rock Island lines has

been announced in these columns. Francis Nugent succeeds Mr. Stone. E. Robertson has been appointed road foreman of equipment of the Chicago, Rock Island & Pacific, with headquarters at Pratt, Kan., succeeding C. W. Sheffer, resigned.

The motive power departments of the Cleveland-Indianapolis and the Cincinnati-Sandusky divisions of the Cleveland, Cincinnati, Chicago & St. Louis, and that of the Cincinnati Northern, have been consolidated; and J. T. Luscombe, whose appointment as master mechanic, with office at Bellefontaine, Ohio, was announced in these columns last week, is in charge of the consolidated divisions. F. J. Zerbee, formerly master mechanic at Bellefontaine, has been appointed superintendent in charge of federal and state inspection and safety appliances on locomotives and cars, with headquarters at Indianapolis, Ind.

H. B. Welsh, supervisor of the Pennsylvania Railroad at Titusville, Pa., has been appointed supervisor with office at Brocton, N. Y., succeeding A. C. Gates, assigned to other duties. F. M. Robb, assistant supervisor at Tyrone, Pa., succeeds Mr. Welsh, and N. A. Camera, assistant supervisor at New York, succeeds Mr. Robb. E. K. Post, supervisor of signals at Camden, N. J., has been appointed supervisor of signals at Altoona, Pa., succeeding J. J. Craig, assigned to other duties, and C. S. Foster, supervisor of signals at New York, has been appointed supervisor of signals, with office at Reading, succeeding A. B. Pollock, transferred.

Walter Hunter Erskine, who has been appointed master mechanic of the Minneapolis & St. Louis, with headquarters at Cedar Lake Shops, Minneapolis, Minn., as has been announced in these columns, was born February 3, 1878, at Rushford, Minn. He attended the grade and high schools at St. Paul, Minn., from 1884 to 1895, and began railway work in June of the latter year, with the Chicago, St. Paul, Minneapolis & Omaha. Except for a short period when he was with the Northern Pacific and the Union Pacific, he was with the C. St. P. M. & O. continuously until August, 1910, having been machinist apprentice, machinist and foreman. On August 29, 1910, he became general foreman under the master mechanic of the Minneapolis & St. Louis, was appointed assistant master mechanic on September 2, 1910, and on February 19, 1912, was promoted to master mechanic, as above.

Special Officers.

E. A. Ryder has been appointed commissioner of the new department of fire claims of the Boston & Maine, with office at Boston, Mass., reporting to Vice-President T. E. Byrnes. He will have full authority over all matters pertaining to the prevention of fires and the settlement of fire claims, excepting those arising from damage to merchandise in transit. All adjustments of the company's insurance will be made by W. J. Hobbs, vice-president in charge of the financial and accounting department, as heretofore, with office at Boston, Mass.

OBITUARY.

James Brownlee, superintendent of the Canadian Pacific at Kenora, Ont., died at his home in Kenora recently. Mr. Brownlee was born at Belleville, Ont., and about a year and a half ago he was transferred as superintendent from Moose Jaw, Sask., to the Kenora division at Kenora.

Joshua B. Barnes, formerly superintendent of the locomotive and car department of the Wabash Railroad, with office at Springfield, Ill., died at Springfield on February 21. Mr. Barnes was born December 13, 1840, at Reservoir, Lincolnshire, Eng., and began railway work in 1856. Previous to 1861 he was master mechanic of the Dubuque, Marion & Western, now part of the Chicago, Milwaukee & St. Paul, and from 1861 to 1862 was machinist on the Pittsburgh, Fort Wayne & Chicago. In the latter year Mr. Barnes went with the Wabash, St. Louis & Pacific, and remained with that road and its successor, the Wabash Railroad, until his retirement in 1907. From 1862 to 1882 he was general foreman in the machinery department, was then for three years master mechanic; from 1885 to 1905, superintendent of motive power and machinery, and on July 1, 1905, his jurisdiction was extended over the car department, with the title of superintendent of the locomotive and car department, which title he retained until the time of his retirement several years ago.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Louisiana Railway & Navigation Company is in the market for five locomotives.

The Mobile & Ohio has ordered two mikado locomotives from the Baldwin Locomotive Works.

The Southern Railway has ordered 5 Pacific type locomotives from the Baldwin Locomotive Works.

The Houston & Texas Central, it is said, has ordered 33 locomotives from the company's shops. This item has not been confirmed.

The Denver & Rio Grande is making tentative inquiries for about 35 locomotives, though nothing yet has been definitely decided upon.

The Wabash has ordered 18 mikado locomotives, 6 Pacific type passenger locomotives and 12 six-wheel switching locomotives from the Baldwin Locomotive Works.

The Pittsburgh & Lake Erie has ordered 5 ten-wheel locomotives from the American Locomotive Company. The dimensions of the cylinders will be 22 in. x 26 in., and the diameter of the driving wheels will be 72 in. These locomotives will be equipped with superheaters.

CAR BUILDING.

The Duluth & Iron Range has ordered 10 refrigerator cars from the Peterler Car Company.

The Missouri & North Arkansas has ordered two 70-ft. gas electric cars from the General Electric Company.

The Savannah & Southern has purchased one 60-ft. combination car from the Central Locomotive & Car Works.

Phelps, Dodge & Company, New York, have ordered 100 Rodger ballast cars from the American Car & Foundry Company.

The Pierce-Fordyce Oil Association, Dallas, Tex., has ordered 100 tank cars from the American Car & Foundry Company.

The Western Chemical Company, Denver, Col., is in the market for five oil tank cars of 8,000 gallons' capacity and one flat car.

The New York Central Lines have ordered 500 box cars from the American Car & Foundry Company. These cars are for the Rutland.

The Northern Pacific has ordered 1,000 box cars from the American Car & Foundry Company, and 50 tank cars from the Pressed Steel Car Company.

The Vandalia has ordered 235 box cars from the American Car & Foundry Company, and 50 fifty-ton all-steel gondola cars from the Cambria Steel Company.

The Bessemer & Lake Erie, as mentioned in the *Railway Age Gazette* of March 1 has ordered 100 all-steel box cars from the Standard Steel Car Company. The contract for these cars was awarded to the Summers Steel Car Company, but they will be built by the Standard Steel Car Company. These cars will be of the Summers design throughout, and will be equipped with the Summers balanced side bearing truck.

IRON AND STEEL.

The Lehigh & New England has ordered 2,000 tons of rails from the Bethlehem Steel Company.

The Missouri Pacific has ordered 11,500 tons of open hearth rails from the Illinois Steel Company.

The Hocking Valley has ordered 4,000 tons of open hearth rails from the Cambria Steel Company.

The Chicago, Rock Island & Pacific has ordered 3,000 tons of bridge material from the American Bridge Company.

The Great Northern is reported to have ordered 31,000 tons of rails from the Colorado Fuel & Iron Company, and 20,000 from the Pennsylvania Steel Company.

General Conditions in Steel.—Orders for new business are increasing in volume, especially the orders from railways. It is believed by many that the unfilled tonnage report of the Steel Corporation for February will show an increase over January, though the contrary was until recently expected. The Steel Corporation continues to operate at almost 90 per cent. of its capacity. Prices are showing a tendency to stiffen and everything seems to point toward a marked improvement in the near future.

SIGNALING.

New Installations of Block Signals, Interlocking, Telephones for Train Despatching, Etc.

The El Paso & Southwestern is arranging to install the telephone system of train despatching on its Eastern division.

The plans of the Pennsylvania Railroad for extensive installations of new automatic signals are the subject of an article on a preceding page.

The Chicago & North Western is planning the installation of a telephone train despatching system on the Galena division, between Chicago and Clinton, Iowa, and between Nelson, Ill., and Peoria.

The Grand Trunk Railway of Canada announces that automatic signals are to be installed on its line from Toronto to Niagara Falls, about 80 miles, and also from Hamilton, Ont., to Lyndon Junction, 16 miles. These will be the first extensive installations of automatic signals on the Grand Trunk in Canada.

The Piedmont Traction Company is to install on its line from Charlotte, N. C., to Gastonia, 24 miles, eight train order signals to be controlled from a single central office. The Greenville, Spartanburg & Anderson electric road will make a similar installation on 58 miles of its line, Greenville, S. C., to Greenwood, with 11 stations. On both of these railways the installation will include a telephone line, with selectors, all the apparatus being furnished by the Western Electric Company.

The Atchison, Topeka & Santa Fe in the near future will install automatic block signals between Needles and Goffs, Cal., 32 miles, double track. On this district the ruling grade westward is 1½ per cent. The eastward signals will be three-position, and the westward two-position, giving caution and proceed indications only. The blocks will be two miles long, except at Goffs and approaching Needles, where the sections will average about one mile long. The two-position up-hill signals will have full block overlaps. Power for the control and operation of the entire installation, and also for the lights at stations, will be obtained from the signal department's 4,400-volt transmission line. The generators furnishing this power will be located in the company's power plant at Needles.

FOREIGN RAILWAY NOTES.

A concession has been granted for the construction and operation of a railway from Mar del Plata, in the province of Buenos Aires, Argentina, to Antuno, Chile, or a point opposite Los Angeles. The railway will have a branch to Bahia Blanca, Argentina.

The railway across the Andes from Arica, Chile, to La Paz, Bolivia, was completed on March 3, when the rail ends near the Chile-Bolivia frontier were jointed. The line, which is 270 miles long, attains in places an elevation of about 1,400 ft. The contract price was $13,750,000. The work has taken less than three years, despite the difficulties presented by the nature of the country which the line traverses. In the first fifty or sixty miles the railway crosses a desert, then it crosses the Andes, while the last 200 miles or so are over high tableland. Many short tunnels had to be constructed. The line gives Bolivia a much shorter route to the Pacific coast. It was constructed for the Chilean and Bolivian governments in accordance with treaties signed in 1904.

Supply Trade News.

The Remy Electric Company, Anderson, Ind., has received an order from the Canadian Pacific for 12 American locomotive electric headlights.

Norman Malcom has been made manager and chief engineer of the railway and waterproofing department of the Standard Asphalt & Rubber Company, Chicago.

T. R. Wyles, second vice-president of the Detroit Graphite Company, Chicago, was elected a director of the company at its recent annual meeting. Mr. Wyles has been connected with the Detroit Graphite Company since 1897, when he entered its employ as agent, and has been second vice-president since 1907. He was born in Prince Edward county, Ontario, January 14, 1872, and attended an English public school from 1879 to 1888. Until the fall of 1890 he was employed in various capacities in the coal business and tobacco business at Richmond, Va., and during the next year was private secretary to the president of the Lambert Pharmacy Company at St. Louis, Mo. From 1891 to 1896 he was a stenographer in the purchasing department of the American Refrigerator Transit Company at St. Louis, and from 1896 to 1897, contracting freight agent of the company at Chicago, which position he left to become connected with the Detroit Graphite Company.



T. R. Wyles.

The Jno. F. Stevens Construction Company, 55 Wall street, New York, has been incorporated to execute by contract, or supervise, the construction of railways, canals, river and harbor improvements, irrigation projects, water power developments, etc., in any part of the world. It will make a specialty of expert engineering, covering examinations and reports upon proposed or existing properties, not only as to physical conditions and values, but also as to methods and economies of maintenance, operation and general policies.



John F. Stevens.

The president of the company is John F. Stevens, who resigned last spring from the presidency of the Spokane, Portland & Seattle and other Hill lines in Oregon and Washington. Mr. Stevens was born on April 25, 1853, at West Gardiner, Me. He became assistant engineer of the city of Minneapolis, Minn., in 1874, and remained in that position until he began railway work in 1876 in charge of surveys on the Sabine Pass & Northwestern, of which he was later made chief engineer. He was appointed assistant engineer of the Denver & Rio Grande in 1879, and the following year went to the Chicago, Milwaukee & St. Paul as assistant engineer. From 1882 to 1886 he was division engineer on the Canadian Pacific, leaving that position in

1886 to return to the Chicago, Milwaukee & St. Paul as assistant engineer. The following year he was made principal assistant engineer of the Duluth, South Shore & Atlantic, and in 1889 was appointed assistant engineer of the Spokane Falls & Northern. He resigned in 1890 to go to the Great Northern as principal assistant engineer, becoming assistant chief engineer in 1893 and chief engineer in 1895. In June, 1898, he resigned to go into business as a contractor. The following April he was appointed chief engineer of the Great Northern, becoming also the general manager in June, 1902. He was appointed chief engineer of the Chicago, Rock Island & Pacific in March, 1903, and the following August was elected the fourth vice-president, becoming the second vice-president in April, 1904. He was appointed chief engineer of the Isthmian Canal Commission in July, 1905, and in August, 1907, was elected vice-president in charge of transportation of the New York, New Haven & Hartford. In June, 1909, he became president of the Oregon Trunk, being later made also president of the Spokane, Portland & Seattle and allied companies.

The American Agencies, Ltd., Los Angeles, Cal., acting as Pacific coast agent for eastern manufacturers, is making arrangements to open offices in San Francisco, Cal., Portland, Ore., and Seattle, Wash.

Chester Jones, who has been connected with the signal accessory department of the General Electric Company, Schenectady, N. Y., since 1910, has been transferred to the Chicago office of that company, where he will continue to specialize in the sale of signal accessories, being associated with A. I. Totten.

Permanent Exhibition of Railway Supplies.

Extensive preparations are being made for the formal opening of the Permanent Manufacturers' Exhibition of Railway Supplies in the Karpen building, Chicago, during the week of March 16-23. Over 30,000 invitations have been mailed to railway officials, together with tickets of admission and a handsome prospectus which includes half-tone reproductions of photographs of some of the principal exhibits, aisles, assembly and committee rooms, together with a description of the exhibition and its purposes. Plans are being made for a program of entertainment throughout the week, and the club and grill room will be opened for the first time. The Western Railway Club will hold its monthly meeting in the assembly room on March 19, and efforts are being made to make the exhibit room headquarters for railway and supply men during the week.

Annual Report of the American Steel Foundries.

The annual report of the American Steel Foundries issued this week covers the period of 17 months from August 1, 1910, to December 31, 1911, on account of a change in the company's fiscal year to correspond with the calendar year, in accordance with the government's annual report requirements. The gross sales for 17 months were $14,300,562, or at the rate of $10,094,514 per year, as compared with $17,173,740 for the preceding year. Earnings from the operations of plants and net income of subsidiary companies were $697,610, and the total income $757,103. After deductions of $1,016,134, including interest on borrowed money, on debentures and on bonds, bond sinking fund installment and profits amounting to $157,066.84, and depreciation of buildings, plant and equipment amounting to $332,636.20, the report shows a net loss balance of $259,030.92. President William V. Kelley, who has since been elected chairman, shows, however, in his report, that after ordinary deductions and provisions, the actual net earnings of the company were $85,452.42, but from these there has been deducted and converted into the bond sinking fund $240,980, and also a sum of $103,502, to bring the inventory of raw materials down to the low market prices obtaining on December 31. The property account during the period increased $234,831. The following observations on the business conditions of the year were made by President Kelley in his report:

"To those familiar with general business conditions during the past few years and particularly with those pertaining to railway affairs, no comment on the result of our operations is necessary. By far the largest portion of the business of this company originates from the building of railway cars and locomotives; therefore its operations and output closely follow activity in those lines. During the period under report accepted authorities give the ratio of car building as less than 60 per cent. of those built during our preceding year, and only one-third of those during the calendar year 1907. The result of the lack of buying by railways and generally depressed business conditions, both due to conditions with which the public is familiar, was that the steel casting plants of this company were only able to operate an average of 50 per cent. of their capacity during the entire period of 17 months and during six of the months at 40 per cent. or less, one month dropping to 32 per cent.; while the Hammond Works, which is devoted entirely to railway material and usually one of our best earners, was only able to run at 30 per cent. of its capacity during the entire time, and during four of the months below 20 per cent., and for one month at only 12 per cent. At times there was only a week or ten days' work ahead for any of the works which, in a business of this character, means that operations were practically at a standstill. Orders on hand are larger than at any time since the beginning of the period covered by this report, but prices, like those in other lines of steel manufacture, are unsatisfactory. It is hoped, however, that a liberal buying movement will both improve prices and increase our output."

TRADE PUBLICATIONS.

Cylinder Packing.—The Detroit Leather Specialty Company, Inc., Detroit, Mich., has issued a folder entitled Efficiency, describing the company's Wear Well Air Cylinder Packing.

Turbine Pumps.—The Lea Equipment Company, Philadelphia, Pa., has published bulletin K on the Lea high-duty turbine pumps. The bulletin is illustrated and gives a detailed description of the construction of these pumps.

Rail Joints.—The Humason Rail Joint Company, Shreveport, La., has published a small booklet illustrating and concisely describing its rail end supported rail joints. Illustrations show both these and other joints in service. The booklet includes some interesting results of tests.

Northern Pacific.—The passenger department of this company has published a small illustrated folder on the North Coast Limited, which tells of the equipment of this train, shows the times of arriving at the different stations and includes some interesting facts on the points along the route.

The Russian city of Odessa, on the Black Sea, has only one railway leading into it. Furthermore, while this line, which comes from the Northwest in the direction of Austria-Hungary and Germany, is favorably situated for outbound passenger traffic, it is at a disadvantage for bulky freight for export. This is one reason why in late years, since the improvement of the ports of Nicolaief and Kherson, also on the Black Sea, which offer shorter connection in the direction leading toward the center of Russia, trade has been greatly diverted from Odessa toward those two places. In the interests of Odessa, and to remedy matters, there is being built the new railway from Odessa to Bakhmach, which will greatly reduce the distance between Odessa and Moscow. Construction of this road is being actively pushed and it will soon be open for traffic. This road, however, will pass over the navigable River Bug at the town of Woznesensk, which already has much shipping, shallow-draft barges being employed to carry cargoes down to Nicolaief. Exporters at Nicolaief are already planning to tap the Odessa-Bakhmach railway at Woznesensk with the intention of intercepting cargo which the road may bring down from the interior, so that the new line is not likely to benefit Odessa greatly unless artificial impediments are thrown in the way of the Nicolaief tapping at Woznesensk. The merchants of Kherson have set about to obtain a road to connect their town with the interior of Russia by a road to Kharkof, the intention being to have it run parallel with the Odessa-Bakhmach road and not too far off, so that it will offer still greater advantages. It is now stated that the committee on construction of new railways has decided in favor of a road from Kherson via Merefa to connect with Kharkof. The length will be about 521 miles, to cost approximately, $23,175,000. This will go far toward enabling Kherson to outdistance both Odessa and Nicolaief.

Railway Construction.

New Incorporations, Surveys, Etc.

ALABAMA GREAT SOUTHERN.—An officer writes, regarding the reports that considerable double tracking work is to be carried out this year, that while this work is contemplated, none of it has yet been authorized. C. Dougherty, chief engineer, Cincinnati, Ohio.

BIRMINGHAM & CHATTANOOGA.—An officer writes that surveys are now being made for a line from Birmingham, Ala., northeast via Boaz to Chattanooga, Tenn., about 140 miles. The survey work is about half finished. It has not yet been decided when this will be asked for the work. There will be one steel bridge and six trestles on the line. The company expects to develop a traffic in agricultural products, coal, iron and timber. J. M. Spradlin, president and treasurer, Boaz; W. W. Shortridge, vice-president and secretary, Boaz, and P. S. Milner, locating engineer, Birmingham.

BRITISH COLUMBIA ELECTRIC.—The Vancouver, Fraser Valley & Southern has applied to the Canadian parliament for an extension of time for the construction of the following lines: From New Westminster, B. C., to Douglas, on the international boundary; from the New Westminster bridge in an easterly direction up the Fraser valley to Chilliwack, and from a point south of the Fraser river, westerly to Ladners Landing in the municipality of Delta. A. T. Goward, manager, Victoria, B. C.

CAMBRIA & CLEARFIELD.—See Pennsylvania Railroad.

CANADIAN NORTHERN.—This company has asked the British Columbia government for a subsidy of $12,000 a mile for 520 miles from the summit of the Rocky mountains to Vancouver, B. C. It is expected that the work will be finished in about two years. T. Turnbull, assistant chief engineer, Winnipeg, Man.

The Battle River subdivision has been extended from Stettler, Alta., to Drumeller, 68½ miles; the Brandon, Maryfield-Lampman section has been extended from Radville, Sask., to Antar, 80½ miles, also from Radville to Bengough, 45 miles. T. Turnbull, assistant chief engineer, Winnipeg, Man.

CANADIAN PACIFIC.—According to press reports, contracts have recently been given by this company to build 308 miles of line. Most of the work will be in the province of Saskatchewan.

A grading contract has been given to J. G. Hargrave & Company, Winnipeg, Man., for work from Suffield, Alta., to a point 30 miles southwesterly. The work will involve the handling of about 700,000 cu. yds. of earth. The contractors will sub-let some of the grading, and the work will be started as soon as weather conditions will permit. The same contractors are completing work on the Canadian Pacific from Rassano northerly.

The Lacombe & Castor branch of the Alberta division has been extended from Castor, Alta., east to Coronation, 22 miles. J. G. Sullivan, chief engineer, western lines, Winnipeg, Man.

CENTRAL OF CANADA.—A preliminary survey has been made between Montreal, Que., and Midland, Ont., also for a branch from St. Andrews, Que., to Ste. Agathe. The final surveys for the line from Montreal, through St. Eustache, St. Placide, Oka, St. Andrews, Hawkesbury, McAlpin and Lemieux, to South Indian, have been completed, and a considerable portion of the right of way, with land for terminal purposes at Montreal, has been secured. Construction work has been commenced on the bridges over the River des Prairies and River des Mille Iles, near Montreal, at St. Eustache, and over the Ottawa river at St. Andrews. Orders have been placed for rails and for ties to be laid on about 50 miles. C. N. Armstrong, managing director, and F. S. Williamson, chief engineer, Montreal. The contractors are C. J. Wills & Sonss of London England, who have an office in Montreal. (February 16, p. 320.)

CHARLOTTE HARBOR & NORTHERN.—An officer writes that work is now under way relaying two miles of track near Pierce, Fla., with 70-lb. rail. C. P. Murdock and Lloyd Carlton are the contractors. G. S. Bruce, chief engineer, Boca Grande, Fla.

CHICAGO & NORTH WESTERN.—This company is receiving bids for the construction of a new line from Peoria, Ill., to Girard, where it will connect with the Macoupin County Railway, a North Western line reaching the coal mines of that road south of Girard. The new line will require the construction of a bridge across the Illinois river near Pekin, and of a large terminal yard at that point. The grading will be heavy, as crossings with other lines will be separated. E. C. Carter, chief engineer, Chicago.

CHICAGO, OTTAWA & PEORIA.—This road has been extended from Morris, Ill., east to Joliet, 22 miles. W. B. McKinley, president, Champaign, Ill.

COVINGTON, BIG BONE & CARROLLTON.—Rights of way are now being secured to build from Carrollton, Ky., northeast via Big Bone Springs to Covington, about 52 miles. The incorporators include N. J. Crouch, president, Union; L. Fritz, vice-president; R. S. Holmes, treasurer, and J. J. Weaver, engineer, all of Covington. G. W. Anderson, Carrollton, Ky., is interested. It has not yet been decided whether steam or electricity will be used for the motive power.

DOMINION ATLANTIC.—The company has applied to the Canadian parliament for an extension of time to build from a point between Kentville, N. S., and Canning, westerly to a point on the line between Berwick and Middleton. P. Gifkins, general manager, Kentville.

EUFAULA & CHATTAHOOCHEE VALLEY.—An officer is quoted as saying that the company will let contracts in the near future to build the first section from Pittsview, Ala., to Eufaula, 21 miles, and that work will probably be carried out soon on additional sections between a point in Russell county and a point in Henry county. J. P. Foy, president; A. H. Merrill, vice-president, and W. L. Wild, secretary and treasurer, Eufaula. (September 29, p. 615.)

GREAT NORTHERN.—An officer is quoted as saying that the company is relaying and ballasting about 400 miles of track, all of this work is to be carried out this year.

Bids are now being asked for by the Great Northern for grading 60 miles of new line from Wenatchee, Wash., northeast to Pateros. When completed this line is to be 135 miles long, extending from Oroville south to Wenatchee. Grading has been finished from Oroville to Pateros.

Work is now under way on the line from Bluestem, northwest to Peach, about 25 miles. A. H. Hogeland, chief engineer, St. Paul, Minn. (December 22, p. 1300.)

HUDSON BAY RAILWAY.—J. D. McArthur, Winnipeg, Man., who has the contract for the first section of 185 miles from LePas, Keewatin, northeast, says that as soon as the frost is out of the ground 1,000 will be put to work on the line. It is expected that the work on this section will be finished within one year. (February 23, p. 360.)

KETTLE VALLEY.—This road is to be extended from Coldwater Junction, B. C., to Hope, 50 miles, thence to Coquahala river. The Vancouver, Victoria & Eastern is to have trackage rights over the road. The company has been granted a subsidy of $10,000 a mile by the British Columbia government, and a $200,000 bridge is to be built by the province of British Columbia over the Fraser river at Hope. A. McCulloch, chief engineer, Penticton, B. C.

LAC SEUL, RAT PORTAGE & KEEWATIN.—This company has applied for an extension of time to the Ontario legislature for the construction of the following lines: From a point at or near Lac Seul, Ont., in the Rainy River district, and from Kenora, northwesterly or northerly, to a crossing of the National Transcontinental; from a point at or west of the junction of the National Transcontinental with the Lake Superior branch of the Grand Trunk Pacific to Lac Seul, and from or near the same point to the northern boundary of Ontario at or near Separation lake. J. F. McGillivray, Kenora, Ont., is acting solicitor of the company.

LOUISIANA ROADS.—Plans are being made to build a railway from Monroe, La., northeast to Boeuf river, about 30 miles. Colonel E. W. Anderson, secretary, Progressive League, Monroe; J. S. Watson and L. J. Hale, Memphis, Tenn., are interested.

LOUISVILLE & NASHVILLE.—An officer writes that contracts for grade reduction and double-track work in Tennessee and Alabama have been let as follows: To Denvonshire & Max-

field, Pointdexter, Ky., or Miamisburg, Ohio, 3 miles, Maplewood, Tenn., to Cumberland river at Nashville, Tenn.; Walton-McDowell Company, Brentwood, Tenn., 19 miles, from Cumberland river at Nashville to Clovercroft, Tenn.; T. Towles & Co., Wise, Va., 25 miles, Clovercroft to Duck river; W. J. Sparks Company, Lewisburg, Tenn., 11 miles, from Duck river to Lewisburg, Tenn.; Leighton-Ambrose Construction Company, Knoxville, Tenn., 8½ miles, Lewisburg to Richland creek; S. Walton & Co., Falls Mills, Va., 4½ miles, Richland creek south; Callahan Construction Company, Knoxville, Tenn., 15 miles, from Richland creek to Elk river; A. & C. Wright, Ballston, Va., 9 miles, Elk river to 1½ miles south of Tennessee-Alabama state line; Ryan Construction Company, Portsmouth, Ohio, 13 miles, from 1½ miles south of Alabama-Tennessee state line to Athens, Ala.; Williams Bros. Construction Company, Roanoke, Va., 4⅔ miles of work, Flint to Hartselle, Ala.; C. G. Kershaw Contracting Company, Birmingham, Ala., 6 miles, Hartselle to Leesdale, Ala.; T. J. Vermillion, Barbourville, Ky., 2 miles, Lacon to Wilhite, Ala.; E. K. Langhorne & Co., Visalis, Ky., 1½ miles, Vinemont to Holmes Gap; J. C. Carland & Co., Toledo, Ohio, 18 miles, Holmes Gap to Garden City; Adams & Sullivan, Louisville, Ky., 5 miles, Garden City to south of Bangor, Ala.; Thrasher & Gunter, Knoxville, Tenn., 9 miles, from north of Blount Springs to Locust Fork river; Callahan Construction Company, Knoxville, Tenn., 6 miles, Locust Fork to Self creek, and Asheville Construction Company, Knoxville, Tenn., 10 miles of work, Self creek to New Castle, Ala.

Mexican Roads.—Announcement has been made by A. D. Meloy, who is interested in mines in the Guanacevi districct, in the state of Durango, Mex., that he has completed financial arrangements to build a railway from that place to Tepehuanes, where connection is to be made with the National Railways of Mexico.

The line from San Augustin, Mex., to Irolo has been extended south to San Lorenzo, 6 miles. James M. Reid, chief engineer, Mexico, Mex.

Muscatine North & South.—This road has been extended from Kingston, Iowa, south to Burlington, 13 miles. Charles Howard, president and general manager, Muscatine, Iowa.

New York Connecting.—See Pennsylvania Railroad.

Northern Pacific.—This company will shortly begin elevating the tracks through Spokane, Wash. The work will necessitate the reconstruction of about two miles of railway. Double track is to be laid on an earthen embankment, which is to be constructed with space enough for four tracks. In addition to the track elevation, a rearrangement of the company's shops and roundhouses on the outskirts of the city will be made. The total cost of the improvements will probably be between $3,000,000 and $4,000,000. W. L. Darling, chief engineer, St. Paul, Minn.

Ottawa & Lake McGregor.—Incorporation has been asked for in Canada to build from Ottawa, Ont., to Hull, Que., thence to Gatineau Point, Perkin's Mills and Lake McGregor. It has not yet been decided whether steam, or electricity, will be used for the motive power. J. A. Ritchie is solicitor for the applicant.

Pennsylvania Railroad.—The report of this company for the year ended December 31, 1911. shows that during the year right of way was secured for small branch lines in the bituminous coal regions of Pennsylvania. The new four track elevated line and passenger station at Bristol, Pa., have been completed and are now in operation, and all main line grade crossings at that city have been eliminated. The Newark Rapid Transit line from the Hudson terminal, New York, via the Manhattan Transfer station to Park Place, Newark, N. J., has been finished, and is now in operation. The construction of the eastern section of the six track system between Morrisville, Pa., and Newark, N. J., has been started by beginning the construction of two additional tracks adjoining the present four track main line from Colonia to Bay Way west of Elizabeth. This work includes elevating the existing main line tracks through Rahway. The extension of the six track system through Elizabeth to Waverly, including line and station improvements, will be carried out when the necessary municipal authority has been secured. Expenditures have been made by the Philadelphia, Baltimore & Washington for the extension of the four track system at various points, and the construction of a car load delivery yard at New Jersey avenue, Washington, D. C. On the Cambria & Clearfield, work on the Bear Run branch has been started and will be finished in 1912, the Burley branch was completed during the year. The work of improving the grade and alinement on the Western New York & Pennsylvania was continued during the year. The New York Connecting Railroad, which is owned jointly by the Pennsylvania Railroad and the New York, New Haven & Hartford, is building from a connection with the Long Island Railroad near the boundary line between the boroughs of Brooklyn and Queens, New York City, through Queens borough, to and over the East river and Randall's and Wards islands, to a connection with the New York, New Haven & Hartford near Port Morris in the borough of the Bronx, and also a connection from the main line to the New York tunnel extension in Sunnyside yard, Long Island City. Contracts have been let for the steel work for the East river bridge, and the viaducts and approaches on the north into Bronx borough, and on the south into the borough of Queens. About three years will be required to build the line, including the East River bridge and viaducts. The estimated cost of the work is $15,000,000 in addition to the $5,000,000 previously advanced.

Philadelphia, Baltimore & Washington.—See Pennsylvania Railroad.

Porcupine-Rand Belt (Electric).—Application has been made in the province of Ontario for a charter to build from McGarry in Lanark county, to Larder City, Hearst, McElroy, Boston, Otto, Grenfell, Robertson, Argyle, Gerkie, Musgrove and Doyle. The headquarters of the company are at Porcupine.

San Antonio & Aransas Pass.—This company is said to have given an order for rails to be laid on an extension of about 50 miles from Falfurrias, Tex., south to Edinburg. It is understood that the line will eventually be extended an additional 65 miles southeast to Brownsville. L. Andrews, assistant engineer, Yoakum, Tex.

Southern Alberta.—Application has been made to the Alberta legislature for an extension of time to build from the Canadian Pacific at Medicine Hat, Alta., northwesterly to a point on the Bow river in township 11, range 13, west of the fourth meridian, thence westerly to the Calgary & Edmonton Railway, and from that line in township 24, range 1, west of the fifth meridian, northwesterly to a point in township 24, range 1, west of the fifth meridian. White & Laidlaw, Lethbridge, Alta., are solicitors for the company.

Southern New England.—In the hearing before the Massachusetts legislative committee, held in Boston last week, President Fitzhugh, speaking for this road, and answering questions as to the routes by which the company proposes to approach Boston from the southwest and from the northwest, said that the company had in mind the construction of a belt line around Boston, for the purpose of securing desired connections with other railways and with the docks.

Southern Pacific of Mexico.—The Sinaloa division has been extended from Yago, Mex., south to Tepic, 52 miles. E. Randolph, president and general manager, Tucson, Ariz.

Texas Southeastern.—This road has been extended from Neff, Tex., to New Camp, 3 miles. J. E. Mitchell, vice-president and chief engineer, Diboll, Tex.

Toronto Suburban.—Announcement has been made that this company will finish work this coming fall on an electric line from Toronto, Ont., west via Cooksville, Acton, and Eden Mills, to Guelph. It is intended to eventually extend the line from Guelph to Galt and to Berlin. The headquarters of the company are at Toronto.

Vancouver, Fraser Valley & Southern.—See British Columbia Electric.

Waycross & Western.—An officer writes that work is under way from Waycross, Ga., west via Sirmans and Milltown to Rays Mill, 51 miles. The track has been laid on 13 miles. The company is carrying out the work with its own men. A. K. Sessoms, president, Waycross.

Western New York & Pennsylvania.—See Pennsylvania Railroad.

RAILWAY STRUCTURES.

Augusta, Me.—The Maine Central has asked architects to submit designs for the new passenger station to be built at Augusta.

It is reported that the Maine Central will put up a double-track bridge over the Kennebec river at Augusta, to replace the present single-track structure.

Fairmont, W. Va.—An officer of the Baltimore & Ohio writes that the company is planning to build a new freight terminal at Fairmont, W. Va.

Goderich, Ont.—The Canadian Pacific is planning to make improvements at Goderich, Ont., to include new sidings, a 500-ft. shed on the pier, and an electric light and heating plant.

Harrisonburg, Va.—Bids are wanted until March 20, by C. B. Williams, superintendent of the Chesapeake Western, Harrisonburg, for putting up a combined freight and passenger station at Bruce street, Harrisonburg. The building is to be two stories high, of brick construction with slate roof, 60 ft. x 140 ft., and will cost $12,000.

Hope, B. C.—See Kettle Valley under Railway Construction.

Montreal, Que.—Bids are wanted by W. B. Powell, vice-president and general manager, Montreal, of the Montreal & Southern Counties, for building a sub-station two stories high, 60 ft. x 85 ft. The building is to be of steel frame construction, with concrete and brick walls. Bids are also asked for a building to contain car barns, offices, etc., two stories high, 85 ft. x 205 ft., to be constructed of brick, concrete and steel, with a four-track shed.

Norristown, Pa.—The report of the Pennsylvania Railroad for the year ended December 31, 1911, shows that additional property was secured during the year for the enlargement and improvement of the freight station facilities at Norristown, at Lancaster, at Harrisburg and at Uniontown, also for the abolition of grade crossings at various places. Grade crossings at Coatesville, at Christiania, at Jeannette, at Trafford and at Lambert street, Pittsburgh, have been abolished by the construction of undergrade bridges. A new freight and transfer station was built at Harrisburg, the new passenger station at Bristol was completed, and considerable extensions were made to various car shops during the year. The improvements at Greensburg, including a new passenger station and the revision of grade and completion of the four-track system were finished during the year. A change of grade, and extension of the track facilities in West Brownsville yard to reach the elevation of the new double-track Monongahela river bridge at that place, were begun during the year, and contracts have been let for the construction of the bridge to replace the present single-track structure. The Northumberland classification yard was completed during the year, and is now in operation. Work has been started on the construction of a 16-span, double-track steel bridge over the west branch of the Susquehanna river at Montgomery to replace the present single-track structure. The company has concluded that improvements to the passenger facilities in Philadelphia should be accomplished by increasing the tracks and platforms, and enlarging the station facilities at Broad street station and at North Philadelphia station. On the Northern Central, a new passenger station was built in Baltimore, Md., and the facilities increased and a rearrangement of the tracks were made. A roundhouse was put up at Orangeville. On the Delaware Railroad a new station was built at Dover, Del., and the second track extended from Broad Creek to Laurel.

Pekin, Ill.—See Chicago & North Western under Railway Construction.

Roanoke, Va.—An officer of the Norfolk & Western writes that plans have not yet been finished for additions to be made to the erecting shop at Roanoke, Va., and for the installation of traveling cranes. These improvements will probably be carried out during the coming summer.

San Antonio, Tex.—An officer writes that the Missouri, Kansas & Texas has bought property for a freight terminal, and is preparing to build yards, a roundhouse, shops and freight house, but it has not yet been determined whether the improvements will be made this year.

Railway Financial News.

Atchison, Topeka & Santa Fe.—The $9,394,000 California-Arizona lines first and refunding mortgage 4½ per cent. bonds of March 1, 1912-1962, which were offered by J. P. Morgan & Co., the First National Bank and the National City Bank, all of New York, were subscribed for, it is understood, to the extent of about 75 per cent. within the first 24 hours of offer. The £1,830,000 ($9,150,000), however, offered in London were only subscribed for, a press despatch from London says, to the extent of a small per cent., the remainder of the bonds being taken by the syndicate which underwrote them.

Canadian Pacific.—A bill has been approved by the railway committee of the provincial legislature of Canada for the leasing by the Canadian Pacific of the Quebec Central for 999 years, with a guarantee of 4 per cent. dividends on the Quebec Central stock and a guarantee of the fixed charges of the Quebec Central.

Cincinnati Northern.—A dividend of 1½ per cent. has been declared on the $3,000,000 stock. This compares with 3 per cent. declared in 1911 and 3 per cent. declared in 1910. The C. C. C. & St. L. owns $1,707,400 of Cincinnati Northern stock.

Cleveland, Cincinnati, Chicago & St. Louis.—See Cincinnati Northern.

Dayton, Lebanon & Cincinnati. *The Commercial & Financial Chronicle* has been informed by a vice-president of the Pennsylvania Lines West that there is no truth in the report that control of this company had been bought by Pennsylvania interests.

Detroit, Toledo & Ironton.—The Ohio Public Service Commission has asked the attorney general of Ohio to "wind up the affairs" of the Detroit, Toledo & Ironton, because it is claimed that the service rendered to the public is "deplorable." The road is now in the hands of federal receivers.

Georgia & Florida.—Stockholders are to vote on March 19 on the question of authorizing an issue of $2,000,000 6 per cent. general mortgage bonds of February 1, 1912-1932. For the first ten years 5 per cent. interest is dependent on income, but is cumulative, and after ten years the interest charge becomes fixed. The bonds were underwritten by a syndicate headed by Middendorf, Williams & Company, Baltimore, at 52, less a commission of 1¼ per cent. The proceeds of the bonds are to be used to redeem equipment obligations, pay floating debt and provide working capital.

Grand Trunk Pacific.—This company, through the Pacific Great Eastern, has bought the property of the Howe Sound & Northern for about $375,000.

Howe Sound & Northern.—See Grand Trunk Pacific.

Missouri Pacific.—The Nebraska railway commission has authorized the company to issue $2,415,000 of a newly authorized issue of $6,415,000 equipment refunding bonds.

Norfolk Southern.—W. H. Williams, vice-president of the Delaware & Hudson, has been elected a director of the Norfolk Southern, but it is said he represents other interests than the D. & H. (which has no interest in the Norfolk Southern).

Pere Marquette.—Newman Erb, who, it is understood, recently bought control of the Pere Marquette, after returning from a ten-day inspection trip, said that the trip had convinced him that the statement which he gave out (*R. A. G.*, March 1, page 410) in regard to the prospects of the road was correct and that the difficulties of the road were due to certain operating conditions which could be remedied.

Pittsburgh & Lake Erie.—This company has declared an extra dividend of 12 per cent., payable March 29. Stockholders are offered the right to subscribe to 19 per cent. of their holdings to new stock at par. This issue will amount to $4,788,000. This stock is part of the increase from $10,000,000 to $30,000,000, authorized by the stockholders in February, 1907, and will about bring out the full amount of stock authorized.

Quebec Central.—See Canadian Pacific.

ANNUAL REPORT

PENNSYLVANIA RAILROAD COMPANY.

THE PENNSYLVANIA RAILROAD COMPANY.

General Office, Broad Street Station, Philadelphia, March 1st, 1912.

The Board of Directors submit herewith to the Stockholders of The Pennsylvania Railroad Company a synopsis of their Annual Report for the year 1911:

Operating revenues, rail lines directly operated		$157,487,412.70
Operating expenses, rail lines directly operated		113,228,393.03
Net operating revenue		$44,259,019.67
Outside operations, Deficit		1,525,201.96
Total net revenue		$42,733,817.71
Taxes		6,826,069.53
Operating income		$35,907,748.18
Rentals paid (roads operated on basis of net revenue)		1,517,111.48
Net operating income of The Pennsylvania Railroad Company		$34,390,636.70
Other income:		
Dividends and interest on securities owned	$14,450,593.95	
Hire of equipment, interest General Account, and other items	2,775,880.10	17,226,474.05
Gross income		$51,617,110.75
Fixed charges		14,298,759.70
Net income		$37,318,351.05
From this Net Income amounts have been deducted for the following:—		
Appropriation to the Trust of October, 1878	$319,756.11	
Portion of principal of Equipment Trusts	3,076,853.00	
Amount expended in revision of grades and alignment, etc	2,265,887.29	
Cash dividends, aggregating 6 per cent	25,950,857.25	
Reserve for Additions and Betterments	4,000,000.00	$35,613,353.65
Balance transferred to credit of Profit and Loss		$1,704,997.40

CONDENSED GENERAL BALANCE SHEET.

December 31st, 1911.

Assets.		
Property investment:		
Road	[illegible]	
Equipment	136,392,437.73	$403,423,553.71
Securities owned		321,540,716.02
Securities under lease of U. N. J. R. R. & C. Co		2,559,660.25
Miscellaneous investments		1,045,308.02
Cash		51,076,339.53
Materials and supplies		14,650,140.02
Cash and securities in sinking, insurance and other reserve funds		32,884,354.19
Cash and securities in Provident Funds		6,229,466.33
Other assets		36,233,528.71
		$869,643,066.78
Liabilities.		
Capital Stock	$453,877,850.00	
Convertible bonds receipts exchangeable for stock	2,710.00	$453,880,560.00
Premium realized on Capital Stock from January 1st, 1909		7,050,175.00
Funded Debt of The Pennsylvania Railroad Company	$162,930,370.00	
Funded Debt of Companies whose properties have been acquired by The Pennsylvania Railroad Company	54,546,500.00	
Guaranteed Stock Trust Certificates, Philadelphia, Wilmington and Baltimore Railroad and New York, Philadelphia and Norfolk Railroad Companies	14,822,250.00	
Equipment Trust Obligations	26,757,827.78	
Mortgages and Ground Rents Payable	3,791,060.69	262,848,008.47
Securities received with the lease of the U. N. J. R. R. & C. Co		2,559,660.25
Liability on account of Provident Funds		6,229,466.33
Other Liabilities		35,103,889.99
Additions to property since June 30th, 1907, through income		33,988,133.01
Reserves from Income or Surplus:		
Invested in Sinking, Redemption and other reserve funds	$33,847,775.42	
Car Trust Principal charged out in advance, and reserve for Additions and Betterments	6,737,590.15	40,585,365.57
Profit and Loss		27,397,808.16
		$869,643,066.78

The number of tons of freight moved on the five general divisions east of Pittsburgh and Erie in 1911 was 125,175,068, a decrease of 4,683,285, or 3.61 per cent.; the number of passengers was 67,445,714, a decrease of 2,533,743, or 3.62 per cent.

The Railroad Companies east of Pittsburgh and Erie in which your Company is interested show satisfactory results. Detailed statements of their operations will be found in their respective annual reports, as well as in the full report of your Company.

The number of tons of freight moved on the lines west of Pittsburgh was 138,743,881, a decrease of 14,997,240. The number of passengers carried was 34,392,215, an increase of 399,781.

The operating revenue of all lines east and west of Pittsburgh for the year 1911 was $336,351,868.56, operating expenses, $261,210,277.67, and operating income, $75,141,590.89, a decrease in operating revenue, compared with 1910, of $9,863,630.41, and a decrease in operating income of $3,650,990.86. There were 413,184,812 tons of freight moved on the entire system, being a decrease of 28,030,405 tons, and 168,725,921 passengers carried, an increase of 680,046.

There were expended during the past year for construction, equipment, and real estate on the Lines West of Pittsburgh $12,350,447.84, of which $8,801,922.97 were charged to Capital and $3,548,524.87 to Surplus Income.

The expenditures were principally for new ore docks at Cleveland, and the elevation of tracks in Fort Wayne, construction of new yards at Moravia, and additional main tracks on the Pittsburgh, Youngstown and Ashtabula Railway, second track on the Pittsburgh, Cincinnati, Chicago and St. Louis Railway and Vandalia Railroad.

GENERAL REMARKS.

It will be noted in the General Income Account that while the revenue from passenger transportation shows an increase of $838,159.53 over 1910, it being the largest in the Company's history, the gross revenues of the railroad lines for the year show a reduction of $2,969,885.76, due principally to a decrease in merchandise freight revenue and a small decrease in coal and coke revenue. The decrease in gross revenues was partially offset by a saving of $1,584,235.19, or 1.38 per cent., in operating expenses so that the decrease in the net operating revenue for the year, compared with 1910, was $1,385,650.57. The transportation expenses increased chiefly because the increased wage schedules were operative the entire year, as against only for about eight months in 1910.

Taxes, which have been continually increasing in the last few years, show a further increase for the year of $451,333.77, due principally to the taxes paid on the completed New York Tunnel Extension.

In rentals paid roads operated on the basis of net revenue, the decrease is due principally to the absorption by the Pennsylvania Railroad Company of the Allegheny Valley Railway on April 7th, 1910, when the payment of its leasehold rental consequently ceased.

The greater part of the decrease in fixed charges compared with 1910, is due to the payment at maturity, in that year, of the General Mortgage Bonds and Short Term Notes referred to in the last annual report.

After meeting all liabilities, including the necessary payments to the Sinking Funds, the net income for the year was $37,318,351.05. The decrease in this item of only $457,133.03, compared with 1910, is due to the saving resulting from the retirement of your fixed obligations, as explained in the preceding paragraph, which was effected through the issue of capital stock. Out of the net income remaining, $319,756.11 was contributed to the Trust Fund of October, 1878, and dividends of 6 per cent. were paid aggregating $25,950,857.25, leaving a balance of $11,047,737.69, a decrease of $2,008,364.35, compared with 1910. Car Trust Principal payments of $3,076,853.00; Extraordinary Expenditures of $2,265,887.29 were also made, and $4,000,000.00 transferred to the Reserve for Additions and Betterments to provide such additions and betterments as in the judgment of the management should not be charged to Capital Account, and the remaining balance of Net Income $1,704,997.40, was credited to Profit and Loss.

There were charged against Profit and Loss Account advances to branch and affiliated companies, as hereinafter stated, which with adjustments made to sundry accounts, aggregated $1,351,651.04, leaving the balance to the credit of Profit and Loss on December 31st, 1911, $27,397,808.16.

As foreshadowed in the report for the year 1910, an allotment of ten per centum of capital stock, at par, was made to stockholders of record May 5th, 1911, and was fully subscribed for, realizing at par $41,261,600.

The expenditures on road and equipment, during the year, consisted of the following:—

Additional property for enlargement and improvement of the freight station facilities at Norristown, Lancaster, Harrisburg, and Uniontown, and for the abolition of grade crossings hereinafter mentioned.

Right of way for small branch lines in the bituminous coal regions.

Awards under right of way condemnation proceedings on the Darby Creek Low Grade Line between Philadelphia and Paoli, and purchase of additional right of way between Colonia and Waverly, New Jersey, the eastern section of the relief line between Morrisville, Pa., and Newark, N. J.

Considerable progress was made in the rebuilding of the Cortlandt Street Ferry, New York City, which will probably be completed in 1912.

The new four-track elevated line and passenger station at Bristol, mentioned in the last annual report, were completed and put in service during the year, and all main line grade crossings in that city were thereby eliminated.

The Newark Rapid Transit Line, described in the annual report for 1910, which provides a frequent multiple unit electric service to and from the Hudson Terminal, Cortlandt and Church Streets, New York, via Manhattan Transfer Station to Park Place, Newark, New Jersey, was completed and placed in operation November 26th, 1911.

The construction of the eastern section of the six-track system between Morrisville, Pennsylvania, and Newark, New Jersey, was undertaken by beginning the construction of two additional tracks adjoining the present four-track main line from Colonia to Bay Way, West of Elizabeth, including the elevation of the existing main line tracks through Rahway. The extension of the six-track system through Elizabeth to Waverly, including line and station improvements, will be carried forward when the necessary municipal authority has been obtained.

Grade crossings at Coatesville, Christiana, Jeannette, Trafford, and at Lambert Street, Pittsburgh, were abolished by the construction of undergrade bridges.

A new freight transfer station was constructed during the year at Harrisburg for the purpose of facilitiating the movement of merchandise freight and increasing carloading.

Considerable extensions to the various car shops and additions to the tools and machinery were made during the year.

The improvements at Greensburg, including a new passenger station and the revision of grade and completion of the four-track system, mentioned in the last annual report, were practically completed during the year.

The change of grade and extension of the track facilities at West Brownsville Yard, to reach the elevation of the new double track Monongahela River bridge at that point, were begun during the year, and contracts have been awarded for the construction of the bridge, to replace the present single track bridge.

The Northumberland Classification Yard, also mentioned in the last annual report, jointly owned by this Company and the Northern Central Railway Company, was completed during the year and placed in operation.

The construction of a sixteen-span, double-track steel bridge over the West Branch of the Susquehanna River at Montgomery, to replace the present single-track bridge at that point, was authorized and begun during the year.

The aggregate expenditures made by the company for construction and equipment during the year on its owned lines and those of the Harrisburg, Portsmouth, Mt. Joy and Lancaster Railroad Company and United New Jersey Railroad and Canal Company, operated under long term leases, comprising the main line system between New York and Pittsburgh (including $599,363.01 on account of water trust certificates), were $14,319,530.65.

This sum was disposed of as follows:—

Charge to Reserve for Additions and Betterments appropriated out of Income of previous years	$4,700,000.00	
Charged to Income for the year 1911	2,265,887.29	
		$6,965,887.29
Provided out of Equipment Depreciation Reserve		1,792,687.24
Charged to Capital Account:—		
Road	$1,889,499.17	
Equipment	3,671,456.95	
		5,560,956.12
Total		$14,319,530.65

The charges to Capital Account were further increased $482,054.88 by the absorption of the Ridgway and Clearfield Railroad, making the total charges to that account for the year, $6,043,011.

Under the Balance Sheet prescribed by the Interstate Commerce Commission, the Road and Equipment Account includes not only these capital charges, but also similar expenditures made out of Income since June 30th, 1907, on the roads embraced in the Balance Sheet. Therefore, of the foregoing $6,965,887.29, Income expenditures not properly chargeable to capital account $3,040,229.03 on the lines owned, and on the Harrisburg, Portsmouth, Mt. Joy and Lancaster Railroad Company, have been so included in the Road and Equipment Account for the year 1911, but the balance of $3,326,295.25, leasehold expenditures for the United New Jersey Railroad and Canal Company, and $599,363.01 for water supply Trust Certificates are accounts not dealt with in the Balance Sheet of this Company.

An offsetting liability appears on the credit side of the Balance Sheet, entitled "Additions to Property since June 30th, 1907, through Income," in which is carried not only $3,040,229.03, but also the payments through Income on account of Car Trust Certificates amounting to $3,076,853.00 for 1911, and $637,644.07 for previous years, aggregating $6,754,726.10.

There is also included in the General Balance Sheet, in the Cost of Equipment, $1,792,687.24, covering the net expenditures for equipment purchased during the year 1911 out of the Reserve for Accrued Depreciation of Equipment, established under the regulations of the Interstate Commerce Commission. From the total cost of equipment is also deducted the Reserve for Accrued Depreciation of Equipment, $10,489,877.77, so that the net book value of the equipment can be ascertained.

The accrued depreciation can be reduced only to the extent of the original cost of any equipment retired, but as the original cost is not sufficient to replace the retired equipment and provide for the accrued depreciation, the Company, in conformity with its established practice, will maintain the standard and value of its equipment, and the amount which remained unapplied, December 31st, 1911, viz: $4,290,028.35, will be spent for equipment ordered but not yet received.

The improvement of the Company's passenger facilities in the City of Philadelphia, the necessity for which was explained in the last annual report, has been given most careful consideration during the year, and the Board of Directors have about concluded that it should be accomplished by increasing the tracks and platforms and enlarging the station facilities at Broad Street Station and North Philadelphia Station.

Consideration is also being given to the separation of through and local train traffic at Broad Street Station, and whether the electrification of some of its suburban lines would not afford material relief at that terminal. This decision will be announced when the studies now being made by the experts have been concluded.

The principal construction work on the other lines in which this Company is interested was as follows:—

On the Northern Central Railway in Baltimore, the construction of the new passenger station and the enlargement of facilities and re-arrangement of tracks, were practically all completed during the year, as well as the Orangeville round house, which was paid for jointly by the Philadelphia, Baltimore and Washington Railroad and the Northern Central Railway Companies. The old round house at Mt. Vernon Yard was abandoned and the service is now performed at Orangeville.

There is practically no change to report in the status of the proposed lease by this Company of the railroad, property and franchises of the Northern Central Railway Company, which was fully explained in the report for 1910. The lease has been duly authorized by both companies and approved by the Public Service Commission of Maryland, and, but for the impediment occasioned by impending litigation, instituted by a small number of minority stockholders, in the United States Circuit Court for the Eastern District of Pennsylvania and for the District of Maryland, respectively, said lease would have been promptly executed and delivered. Under its provisions the lease and the rental payments became effective January 1st, 1911, and therefore when the lease is fully executed and delivered, it will necessitate a just and equitable accounting between the lessor and the lessee, in such manner as will properly protect and preserve the rights and interests of each party in conformity with its terms and conditions.

Expenditures have been made by the Philadelphia, Baltimore and Washington Railroad for the extension of the four-track system at various points, and the construction of a car load delivery yard at New Jersey Avenue, Washington, D. C.

[redacted] constructed at Dover, Del., [redacted] from Broad Creek to Laurel.

The Pennsylvania Railroad Company has issued [redacted] to settle [redacted] including $1,896,004.92 advanced to that Company during the year 1911, [redacted] full paid Capital Stock, are included in the detailed List of Securities [redacted] respectively of $57,461,419.44 and $1. The balance of its Capital Stock, namely, $10,000,000., is owned by the Pennsylvania Company. The results of funding this indebtedness is reflected in the General Balance Sheet.

The Company during the year made further advances, aggregating $4,531,000.00, to the Long Island Railroad Company for the improvement [redacted] ment, and will receive in payment therefor a four per cent. debenture of that Company.

In pursuance of action taken at last annual meeting of the stockholders, the Ridgway and Clearfield Railroad, whose capital stock had been previously [redacted] and became part of The Pennsylvania Railroad on April 1st, 1911.

Effective May 1st, 1911, the Bedford and Bridgeport Railway Company and the Bedford and Hollidaysburg Railroad Company, two branch lines of the system, in central Pennsylvania, were merged and now constitute the Hollidaysburg, Bedford and Cumberland Railroad Company.

On the Cambria and Clearfield Railway, the construction of the Bear Run Branch was begun and it will be completed in 1912. The Burley Branch was completed during the year and the telephone system for train dispatching on the Bellwood Division was also placed in operation. This Company advanced $352,088.22 to meet these and other construction expenditures which the Cambria and Clearfield Railway Company could not pay, and charged the amount against Profit and Loss Account.

The work of improving the grade and alignment on the Western New York and Pennsylvania Railway, mentioned in the last annual report, was continued during the year. To meet its construction and equipment expenditures for the year, advances aggregating $888,790.81 were made by this Company to the Western New York and Pennsylvania Railway Company, which [redacted] and is leased to this Company, and that Company being unable to pay the same, this amount was charged against the Profit and Loss Account.

This Company has received a note for $107,111.28, from the New York Connecting Railroad Company to cover advances made to the latter, during the year, for construction and right-of-way expenditures.

The New York Connecting Railroad Company—the capital stock of which has been owned for many years one-half each by this Company and the New York, New Haven and Hartford Railroad Company—is constructing a railroad from a connection with the Long Island Railroad, near the boundary line between the Boroughs of Brooklyn and Queens, New York City, through the latter Borough to and over the East River and Randall's and Wards Islands, to a connection with the New York, New Haven and Hartford Railroad near Port Morris, in the Borough of Bronx, and also a connection from said main line to the New York Tunnel Extension in Sunnyside Yard, Long Island City. Contracts have been awarded for the steel work for the East River Bridge, and its viaducts and approaches, on the north into Bronx Borough, and on the south into the Borough of Queens, Long Island.

Upon the completion of the railroad, and the exercise of trackage rights to be obtained from the Long Island Railroad Company between the said connection and its Bay Ridge terminals on New York Harbor, the freight traffic interchanged between the Pennsylvania and New Haven Systems, now transported by floats between the Pennsylvania terminals on the west side of the Hudson River and the New York, New Haven and Hartford Railroad Company's lines at Port Morris—a distance of about 14 miles—will be floated from Greenville, New Jersey, to Bay Ridge, Long Island—a distance of about 3½ miles—and thence moved by rail to Port Morris. The connection with the Tunnel Extension will permit a direct all-rail movement via the Pennsylvania Station, New York City, for the passenger traffic interchanged between the two systems. The New York Connecting route will materially increase the facilities for, and expedite the movement of, the New England passenger and freight traffic, and will avoid congestion of the New York Terminals and Harbor, and the delays which often arise in float service due to fog, ice, tides and the crowded conditions of the Hudson and East Rivers.

About three years will be required to construct the New York Connecting Railroad, including its East River Bridge and Viaducts, and the cost thereof—estimated at about $15,000,000, in addition to the $5,000,000. previously advanced in equal amounts by the two Owning Companies and represented by its capital stock and notes,—will be provided for through an issue of its securities. The principal and interest of these securities will be guaranteed by this Company and the New York, New Haven and Hartford Railroad Company, and the line operated pursuant to an agreement between the two Companies, under which they will participate in its profits, or meet its deficits.

The securities held by the Company, December 31st, 1911, at a valuation of $321,540,716.02, produced a direct income during the year of $14,450,593.95.

Under the provisions of the Pension Department the following officers were retired:—

Chas. E. Pugh, First Vice-President, on February 28th, 1911, after a service of fifty-two years, the last eighteen as a Vice-President; Theodore N. Ely, Chief of Motive Power, June 30th, 1911, after forty-three years' service, and Geo. V. Massey, General Counsel, December 31st, 1911, after thirty-five years' service.

These Officers carry with them the best wishes of the Board and their associates, that, after such faithful and able service, so fully appreciated by the Board and so well known to the Stockholders, they may enjoy for many years a well-earned relaxation from their arduous duties and responsibilities.

By order of the Board,

JAMES McCREA,
President.

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GENERAL NEWS SECTION 508

BY a bill presented in Congress by Representative Peters, of Massachusetts (House Bill 19795), it is proposed to authorize the Interstate Commerce Commission to establish branch offices in any leading commercial center of the United States; the agent in charge of the office to be empowered to grant preliminary hearings, to adjust differences arising on questions of freight car demurrage, and to adjust differences on such other matters as the commission may refer to him; all decisions of the agent to be subject to the approval of the commission. Freight car demurrage being specially mentioned, it is probably fair to assume that this bill represents the views of the merchants of Boston, where a demurrage bureau, which is conducted under the supervision, if not the authority, of the commission, has been in operation for about a year past. D. O. Ives, the representative of the Boston commercial interests, is understood to have been one of the chief sponsors of the bill. Whether or not it has any chance of passing at the present session of Congress would seem rather doubtful, as the House committee on interstate and foreign commerce seems to have its hands full in dealing with the bill for the government of the Canal Zone, and the proposed amendments to the Pure Food law. Mr. Thomason, the demurrage commissioner at Boston, appears to have made a very successful record, and undoubtedly an arbitrator might do good in any large city. At the same time we have never heard that any great volume of disputes has come up for settlement at Boston, and it does not seem likely that the railways will be enthusiastic supporters of the proposed law. However, if the commission should put experienced and competent railway men in charge of the proposed offices, the railways not only could have no great objection, but quite probably would favor the change. At least, the New England roads would be rid of the very one-sided condition now existing at Boston—where the railways provide the money and the government holds the control. So far as we can see, the commission might appoint these territorial agents without a word of additional legislation. At any rate, the examiners of the commission in their hearings at numerous cities throughout the country have long exercised such functions as those named in the bill. However, an amendment specially naming some new requirements will be a very convenient lever with which to secure an additional appropriation.

A MAJORITY vote in favor of the "comprehensive scheme of signaling," which has been recorded in the Railway Signal Association, as noted in our issue of March 8, page 441, marks an encouraging step forward; and this in spite of the failure to secure the two-thirds majority which was necessary to put the modern scheme into the signal association's manual of recommended practice. When the scheme was first submitted to letter ballot the progressives mustered only 236 votes, being beaten by a majority of 75, the conservatives casting 311, and leaving the committee 129 short of a two-thirds majority. Now we have 344 votes in favor of the committee's main proposition—Conclusion No. 2, embodying the principles of the scheme—as compared with 230 against it, a majority of 114. We call the present result encouraging because it is a foregone conclusion that progress must be gradual. Already, for new work, enough important roads have adopted the three-position semaphore, the upward inclination and the medium speed indication, to insure their substantially universal acceptance in time—probably important exceptions will remain forever—but an association vote cannot get very far ahead of actual practice; and actual practice will continue to be old fashioned, in old installations, for a number of years to come. Our congratulations at present, therefore, must be on the progress of the idea. The idea is sound and we now have a good body of men who intend to carry it out. Conclusion No. 2, the radical proposition that has required such a long campaign of education, received a majority of 114, as above stated; but even on Conclusion No. 1, embodying the incomplete scheme, the affirmative vote was 20 more than the negative. Evidently some of the majority must have voted for that scheme mainly from a spirit of courtesy. Such courtesy is especially

commendable, for the desideratum now is not so much that the best practice be exalted as that the association shall come to some agreement. Conclusion No. 1 was brought forward for that specific purpose, and it is calculated to accomplish the purpose with the least possible room for inconsistencies in practice. The signaling news in our last issue was important in actualities as well as in theories, as will be seen by a reference to page 423, containing a description of proposed new signals on the Pennsylvania Railroad. Mr. Rudd will not only employ the principle of speed signaling at interlocking on 111 miles of road, but will introduce that principle on considerable stretches of the open road also; this for the purpose of giving two distant indications, each distinct from the other. Thus, in a line extending from A to B, C, D, and so on, with an eastbound train in block C-D, protected by a home signal at C, the ordinary distant indication



will be given at B while at A the signal will indicate "proceed, prepare to pass next signal (B) at medium speed." If a train running at 60 miles an hour is following another, equally fast, and as closely as the signals will permit, and if the leading train is obliged to slacken its pace, the second train needs to be warned so that it can slacken accordingly. With this arrangement this can be done, in many cases, while still there is space enough to admit of slackening without stopping, which conduces both to economy of operation and to the comfort of passengers. Assuming that "medium" means 40 miles an hour, the second train reduces to that speed (and no lower, unless necessary), until there is again a space of two blocks between the two trains. This arrangement makes no trouble for freight trains, for they can put up with the 40-mile limit at all times. A scheme of this kind has long been needed on lines where fast trains are numerous.

THE Chicago Association of Commerce has adopted an attitude toward the regulation of the tolls and rates to be charged on the ships and traffic passing through the Panama canal, the fairness and reasonableness of which should appeal to all who are interested in the new problems presented by the approaching opening of the canal. In resolutions which have been addressed to the senate committee on interoceanic canals and the house committee on interstate and foreign commerce, the Association of Commerce advocates the imposition of reasonable tolls on all vessels passing through the canal, having due regard to the competition of the Suez canal, and declares against discrimination of any nature either as between American and foreign vessels, or as against any vessels engaged in coastwise trade because of their ownership by railways. Some shippers have demanded that boats owned or controlled by railways be shut out of the canal either by direct legislation or by discrimination and prohibitory tolls. To guard against any danger of a monopoly of the shippers using the canal, or a neutralization by the railways of its anticipated benefits, the association in its resolutions urges that all vessels engaged in coastwise trade be subjected to regulation by the Interstate Commerce Commission. As in the nature of things the opening of the Isthmian canal is destined to be of far greater advantage to the people of the Atlantic and Pacific coasts than to those of the central west, the Chicago shippers are naturally opposed to the granting of virtual subsidy to the boat lines by levying no tolls or making them unreasonably low, thereby enabling the boats to make lower rates than they can if required to pay reasonable tolls. There cannot be advanced any fair argument for granting a subsidy either to the boat owners or to the shippers by the fixing of less than reasonable tolls in a canal built by and for the nation as a whole when the necessary result of such action would be to give a relative advantage to the people on the Atlantic and Pacific coasts over those of the middle west. The Association of Commerce has also made a wise and fair suggestion by advocating the regulation of coastwise traffic by the Interstate Commerce Commission. If American vessels had to meet the competition of foreign vessels in the coastwise trade there would be reason for leaving them free from restrictions; but they are given a monopoly of the coastwise business. Railways have been condemned for and prohibited by law from unfairly discriminating in their rates, while directly competing boat lines engaged in the coastwise trade have been left entirely unregulated, except as to traffic handled partly by water and partly by rail. There is no good reason for subjecting a railway to regulation which prohibits unjust discrimination while at the same time permitting a competing boat line to cut rates and give rebates as it pleases.

ELECTRIFICATION OF MAIN LINE RAILWAYS.

THE electrification of main line railways was discussed by William J. Clark, of the General Electric Company, in a paper presented at the March 7 meeting of the Franklin Institute, Philadelphia, Pa. He approached the problem from a somewhat different viewpoint than is usually taken by electrical engineers in discussing this question, and predicted that within a few years the prime reason for electrification will be for the advantageous operation of freight traffic and that the advantages of electric traction in passenger transportation would then be considered as incidental. Attention was directed to the fact that the original introduction of electric traction on surface railways was largely because of its advantages for operating over heavy grades where the cost of cable construction, equipment and operation was prohibitive.

Two surveys have been made within the past few months of a proposed western railway about 160 miles long, which is located in a rough mountainous region. One of these surveys took into consideration the grades that would permit of steam operation and the other those which could be easily and economically operated by electricity. The locating engineers estimated a saving in favor of electricity on 6½ miles of the proposed line, which would be more than sufficient to offset the cost of electrifying the entire 160 miles. Moreover, they estimated that the expense of operating by electricity would be less than for steam. Mr. Clark suggested that the railways instead of spending millions of dollars to reduce the ruling gradients on the main lines of steam roads would do far better to electrify them. He drew a parallel between the slowness with which the steam roads take advantage of electrification to reduce the capital investment and cost of operation in this way and the fact that a considerable amount of the mileage of the cable operated street railways was built and placed in operation after the advantages and reliability of electrical operation for this purpose had been demonstrated.

In concluding his paper he stated that there were three reasons why the steam roads had not converted more of their mileage from steam to electrical operation. The first of these was that the roads had been severely harassed and hampered by legislation, both federal and state, so that railway managers found it difficult to raise the additional capital which was required by electrification and other betterments. In the second place the electrical engineers have not been able to come to any agreement as to the best system to use and naturally the steam railway officers have been deterred from taking up this matter while the "battle of the systems" was going on. The third reason was because of the past traditions and conservatism prevailing in railway circles, although Mr. Clark later made the statement that American railway men are conceded to be the most progressive in the world.

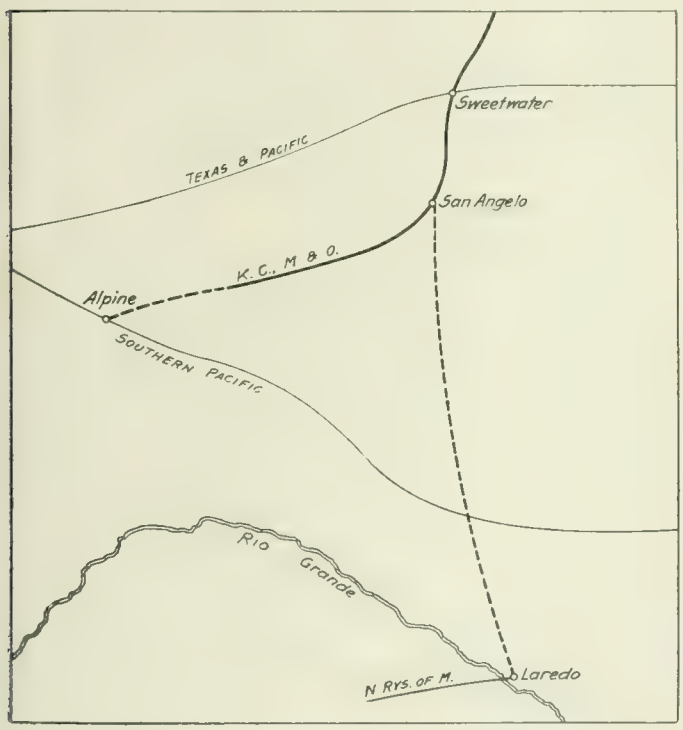
One of the other speakers suggested that possibly another factor had more to do with this than the three above mentioned, and that was that the railway men have so much to do and the roads are growing so rapidly that they can not take the time to consider electrification, and that any money which is available for betterments is more badly needed for other purposes. G. R. Henderson, of the Baldwin Locomotive Works, suggested that the whole proposition was purely a financial one and that it was impossible to show good financial returns for electrification on many of our railways. On every road where electrification has been adopted up to the present time there has been some special

reason for so doing. The reason why European countries have gone into the matter to a greater extent is because of the greater density of traffic. Uniformity of traffic is just as necessary as density, in order that a good load factor may be obtained, and it is practically impossible to obtain this condition on most of the steam roads in this country. Another speaker suggested that the greater extent of electrification in European countries was undoubtedly due to the scarcity of fuel and the need of conserving it to a very much greater degree than is now necessary in this country.

PROSPECTS FOR THE KANSAS CITY, MEXICO & ORIENT.

DURING the past week receivers have been appointed for the Kansas City, Mexico & Orient. The receivership proceedings were brought in the interests, presumably, of a committee of English bondholders. While the receivership is friendly in the sense that it is undertaken under the auspices of the security holders, it is probably due largely to a feeling that, if the road is to be put on a paying footing, a change in the method of financing it must be undertaken at once. The situation is particularly interesting, because it stands a good chance of having a "happy ending" and throws light on a number of theories and fallacies of those who claim that the part played by underwriting syndicates and bankers in railway financing could well be dispensed with.

About eleven years ago Arthur Stilwell, president of the present railway company, formed a construction company and sold stock at par, or above, to the extent of about $10,000,000, and later formed another construction company, selling $3,000,000 additional stock at par. These construction companies made contracts with the railway company formed under the name of the Kansas City, Mexico & Orient, by which they agreed to build the road for so much per mile in stocks and bonds of the railway company. Parts of these stocks and bonds were to be sold in the interests of the construction companies by the United States & Mexican Trust Company.



The Southern End of the Kansas City, Mexico & Orient.

The dotted lines show building that remains to be done to give K. C. M. & O. traffic connections.

The original financing of the construction companies was done rather skillfully. Mr. Stilwell was originally an insurance man and, having no banking connections, he undertook to sell the construction companies' stock to private investors. It is believed that there are in the neighborhood of 4,000 stockholders of these two companies. On the terms under which the construction companies undertook to build the line, the stockholders stood to make a rather good profit, while the railway bondholders had the protection of the $13,000,000 equity back of their bonds. At the time at which the contracts were made, materials and labor were very considerably lower than they are at present, and a 4 per cent. bond was selling at a higher price than it is today.

The K. C. M. & O. was projected from Kansas City to Topolobampo, which is a good port near the mouth of the gulf of California. Probably, either because of actual railway opposition or of fear of railway opposition, the line was not started from Kansas City, although it is claimed that the K. C. M. & O. had, and still has, a franchise for a belt line part way around Kansas City. Construction was begun on three separate pieces of road. One was from Topolobampo northeast, of which 73 miles are in operation. The second piece was over the mountains in Mexico, and of this section 283 miles, from Sanchez, Mex., to Falomir, has been completed. The third and most important piece was that which has been built in the United States from Wichita, Kan., southwest to Big Lake, Tex., 583 miles. There is a connection with the Texas & Pacific at Sweetwater, Tex. A branch has also been projected and surveyed from San Angelo to a connection with the National Railways of Mexico. The complete line from the Pacific coast to Kansas City holds out very attractive possibilities in the way of through traffic, and naturally would meet with the opposition of trancontinental railways serving Kansas City.

From the start, the construction company, not having any strong banking affiliations, was unable to build as rapidly as would have been profitable. Railway bonds had to be sold with a bonus of railway company stock. It was probably the original intention to keep the greater part of this stock of the railway company for the construction company stockholders. The necessities of the situation have been such, however, that some of the equity of the construction company stockholders has been eaten into by the need for completing the building of additional railway.

The railway built in the United States has been built on good standards for that part of the country; the money has been well and economically spent, and at times, even in its uncompleted state, the railway has been able to earn its operating expenses and something toward its fixed charges; but last year it was operated at a deficit. The fact that the road has not got into Kansas City has made it very difficult to compete for through traffic, but it has received from its connection with the Texas & Pacific a certain amount of traffic which is shipped into Kansas City from Wichita over the Santa Fe or some other road. A connection with the Southern Pacific at Alpine would much improve the strategic position of the K. C., M. & O., and the projected branch line from San Angelo down to a connection with the National Railways of Mexico would put it in first class position to make a strong bid for a good share of the traffic delivered to the United States lines by the National Railways. The sketch map shows thoroughly the situation of the southern U. S. lines. The dotted line into Alpine is graded. The dotted line to Laredo is only projected.

What the road needs is a line to Kansas City and the completion of its other lines in the United States. If this can be done at a moderate cost for financing, it ought to be by no means impossible to operate the United States part of the project as a railway and operate it profitably; the Mexican line can be connected up later. The trouble has been that the project has dragged on over ten years or more; if it had been financed in the ordinary way through strong banking connections the United States part of it at least would have been built long before this.

Here is an example of a railway, for which there is good traffic reason, which naturally has to meet the opposition of competitors already in the field, and which has been financed through the sale of its securities to private investors, but which could

not be carried to completion. Moreover, in selling its securities the road has had the energies and abilities of a quite extraordinarily skillful man.

The stocks of the railway company and, it is understood, of the construction company, are held in a voting trust which does not expire until 1917. Mr. Stilwell himself did not gain control of the company through any great amount of money which he was able to put into the road, but entirely through his own personality and through his ability to interest private investors. Instead, however, of proving a cheap way of financing the road, this sale directly to investors has proved an expensive way. Of course, no accounts of the construction companies have been made public, even to the directors of the railway. The road is thoroughly well built, and where the construction company originally estimated that it would only have to put in $15,000 a mile it has actually paid in in cash about $18,000 a mile, so that as far as can be told, there has been no promoter's profit at all made out of the road. The bondholders had a large actual cash equity behind their bonds, and yet the company has had to go into the hands of a receiver and will probably have to be completed under a different plan of selling its securities. Since the road has been put in operation, it has had the services of a first class traffic man and has been inspected by reliable engineers and found to be in excellent shape.

THE NEW YORK CENTRAL'S INTEREST FREE TERMINAL.

WHILE the Pennsylvania Railroad during the past year wrote down on its books the cost of its New York terminal from about $85,000,000 to $57,000,000, the New York Central & Hudson River and the New York, New Haven & Hartford have been making plans to utilize the space above their terminal tracks in such a way as to make the income from this space pay the entire interest charges on the cost of building the terminal yards, and even of the station itself. It is doubtful whether there is any other railway terminal in the United States beside the Grand Central at New York so situated as to permit such a plan as that of the New York Central being carried out successfully. The reason for this is that land values in that part of New York have risen so rapidly since the owners of the land on which the terminal is to be built bought their holdings, and transit facilities have become so concentrated in this part of the city, that there is an almost unlimited demand for office space in this neighborhood.

The New York Central & Hudson River and the New York & Harlem own between them all of the property bounded on the south by Forty-second street, on the north by Fiftieth street, on the west by Madison avenue, and on the east by Lexington avenue. This makes an oblong of 32 "blocks" of about 200 ft. sq. each. This property, owned severally as indicated above, has been leased in *toto* to the New York Central & Hudson River and the New York, New Haven & Hartford, and these two companies are jointly building the new Grand Central terminal.

The new station is being built at Forty-second street to have a frontage half the length of the distance from Madison avenue to Lexington. On either side of this station there is to be built a very large hotel. The hotel on the Madison avenue side is to be built in an expensive style that will be comparable with the finest hotels in Europe or America. All the rooms will have baths, and they will all be outside rooms. The prices will be in accordance with the luxuriousness of the hotel. The hotel on the Lexington avenue side is to be a very large one, but is to be built to meet the needs of the traveling public who wish to get comparatively small rooms and pay correspondingly small prices, from $1.50 to $2. It is to be thoroughly modern.

The idea of the New York Central is to make a terminal yard extending from Fiftieth street down into the new station at Forty-second street, the yard to be the full width of the property between Madison and Lexington. This yard, as well as the train floor of the station, is to be in two decks. Property in this neighborhood is worth between two and three million dollars a "block." From the surface down the entire strip is almost solid rock. This rock is being excavated, and both decks of tracks will be put considerably below the present street level. Over these tracks it is planned to erect a number of commercial office buildings.

The railway use of the ground does not in any way interfere with the use of it above the street level in exactly the same way that any other real estate might be used. As in the case of the experimental building put up for the Furniture Exchange, and now being used by that company, the New York Central and the New Haven will probably advance the greater part of the money needed to build these commercial office buildings, and in exchange will take mortgages which, beside carrying interest, will have a sinking fund provision which will eventually make the building revert to the New York Central and the New Haven. The building company will, in addition to the interest on the money it borrows, pay the Central a rental, and it is the income thus derived that will go to wash the cost of excavation and the construction work, and carry the cost of the land.

For this entire strip of office buildings, including the station and the two hotels, there will be a single power plant at Fiftieth street, furnishing light, heat, power, compressed air, etc., for all properties, so that there will be just two smoke stacks for all these buildings.

At present the New York Central and the New Haven are operating their trains into a temporary station with two levels of tracks at Lexington avenue and Forty-third street. The property from Forty-second street north to Fiftieth is occupied in part by the express buildings at Madison avenue and Forty-fourth street and some buildings on the northeast corner of the strip which are not now being used for railway purposes, and by two office buildings put up over the railway tracks as a beginning of the scheme of improvement.

The special conditions which make such a plan as this feasible, and which hold out a reasonable hope that such a plan will be financially successful, are due largely to the unusual transit facilities which are concentrated at this part of New York City. On both Madison and Lexington avenues there are surface car lines. On Lexington avenue there will be the east side subway, and on the west there is now the Broadway subway extending both into the Bronx and up the west side. At Forty-second street there will be, starting at the top, the Third avenue elevated, the surface lines, the present local and express subway, the new extension from the McAdoo tunnels to New Jersey, and below that the Steinway tunnels to Brooklyn and Long Island. There is no other places in the world where urban traffic is so concentrated as to require five levels. Such a concentration of traffic as this makes the property for office buildings very valuable indeed. While, of course, New York is now divided into zones in which different classes of business apparently tend to segregate, there are a very great number of business men who do not need to travel down to the lower end of Manhattan and to whom it would be of great advantage to have their office uptown. The New York Central and the New Haven serve the entire suburban district northeast of Manhattan from the Hudson river to the sound; the McAdoo tunnels serve the New Jersey suburban district in connection with the roads ending at Jersey City, Hoboken, etc., and the Steinway tunnel will afford a route to all of Queens and a part of Long Island.

Floor rates in nearby good buildings are now about $2 per square foot for outside rooms and $1.50 for inside rooms, but with the opening of the new tunnels and the improvement in New York Central and New Haven facilities, they must be expected to be rather higher by the time the contemplated development is completed.

The plans that we have outlined will take possibly as long as 15 years to become accomplished facts, but within at least that time the present dream should become a reality.

CAR SHOP APPRENTICES.

THE increasing importance of the car department is seen not only in the enormous car equipment and the heavy expense for repairs and renewals, but in the variety of cars, the rapid progress of the conversion from wood to steel, the great increase in carrying capacity, the improvements which reduce wear and increase the strength, as well as in the construction and equipment of car shops suitable for the radical changes in shop and repair yard practice which have come with the steel car. It is becoming apparent that the organization of the car department has not been fully adjusted to these changes, and that generally speaking, the men who are being trained for responsible positions do not appear to measure up to the mark which the change demands. It seems desirable, therefore, in some way to induce a higher grade of young men to enter the car department, with the idea of making themselves specialists in that line of work.

Railway presidents and managers are deploring the fact that there is not a sufficient supply of good material among the younger men in the car shops from which they can make promotions to responsible positions, but they have not yet worked out any scheme of education and organization to improve this condition. The Master Car Builders' Association has recognized the necessity of some improvement in the character and education of the car shop apprentice. At the close of the 1911 convention a member said, "Very little attention is now paid to the development of young men for the car department. The steel car is different from the wooden car, and the work in connection with it is more complicated. The material for apprentices of proper intelligence and education appears to be scarce, and something should be done to encourage young men of that kind to take up car work. There is trouble in filling the position of car shop foremen, and some action should be taken by the M. C. B. Association toward securing a good grade of apprentices in the car shops."

A motion to appoint a special committee on car shop apprentices was adopted by the convention, but the executive committee has since arranged for an individual paper on the subject by I. S. Downing, master car builder of the Lake Shore & Michigan Southern at Collinwood, Ohio, as a part of the program for the 1912 convention. That paper may elaborate some of the facts here stated and show the necessity of a reform, and we trust it will recommend an improved apprentice course for the car department and a change in the organization of the mechanical department which will place the car apprentice in the same line of promotion as the machinist apprentice.

Compared with the locomotive, cars are regarded by most young men as uninteresting, and their construction and repairs as unimportant. Promotions from the car department to the higher official positions are very rare, and we can easily mention the few conspicuous examples. On the New York Central lines the car men have come to the front more than any other line. E. D. Bronner, master car builder, was made superintendent of motive power of the Michigan Central. LeGrand Parish, master car builder, was made superintendent of motive power of the Lake Shore, and A. M. Waite, a master car builder, was made general superintendent of motive power of the New York Central lines. On the Pennsylvania, E. B. Wall, a graduate of Stevens Institute, entered the Altoona car shop as a special apprentice, and learned the car business so well that he became an important member of the Master Car Builders' Association. He was made a superintendent of motive power, and afterward superintendent of the Chicago terminal of the Pennsylvania Lines. These men were advanced on account of their superior knowledge and executive ability, and not through any direct line of promotion provided for in the organization of the mechanical department of these railways.

The relative importance of the car and locomotive departments may be gaged in some respects by the amount expended for repairs and renewals, and on most lines this cost for cars exceeds that for locomotives, each being usually over 10 per cent. of the total operating expenses. The item of car repairs, in addition to the direct charges for labor and material, includes large appropriations for shops, tools and salaries for supervision; the fund should be sufficient to permit of salaries for foremen and superintendents which will be attractive to educated men of high character and good ability. The car shop in the past was regarded as of minor importance and was poorly equipped with labor-saving devices. It is only within recent years that these shops have been designed with overhead traveling cranes, electrical equipment and improved heating furnaces for metal working tools.

The design of steel passenger and freight cars involves engineering problems which are worthy of the best talent of the technical man, but very few such men are found in the railway car department. The technical schools have courses in car design which should provide a good foundation for specialists in that line of work, but the conditions of railway shop employment are not such as to make it an attractive field for further development in a practical way. As we have pointed out there is a demand for such material, but the prospect of advancement must be more definite, and the salaries more remunerative, to induce a better grade of young men to select car building as their profession.

The motive power men, those whose training has been almost entirely in the locomotive department, now dominate the two great railway mechanical associations, and the master car builder is no longer regarded as eligible to the principal offices of the Master Car Builders' Association. This condition has been brought about by the higher officers of the railways who now find that something must be done to bring the car department up to a higher degree of efficiency.

The development of car design and of most car equipments and details is almost entirely in the hands of outside manufacturers, and it requires rare good judgment and technical knowledge, as well as practical experience, to select that which is best. There is opportunity for the exercise of these qualities in the preparation of specifications for car wheels for heavy equipment. The freight car truck, probably the most important item in freight rolling stock, is built in the greatest diversity of designs—some good, some bad. Why is there not competent authority and ability to decide which is best? The draft gear of freight cars, which causes such a large expenditure for repairs, is sold in a variety of designs which bear trade names instead of railway standards.

The history of the friction buffer is not very creditable to the men of the car department, for they have not persistently followed up the tests of this apparatus in various forms, so that now, when it should be generally applied, there is no authoritative information to show which type is best. The box car door and the car roof show equal diversity; some of them must be better than others, but the decision as to which type is used often rests more on personal relations than on actual mechanical merit. These are some of the reasons why there is a call for reform in the car department, and which show the necessity of training up a body of men who will have the ability to design cars and their details, and to select with good judgment those which are purchased.

The locomotive equipment on many lines is now so large that it could well occupy the entire time of the motive power officers, and there should be officers of equal rank in general charge of the car departments. On some lines this condition exists, the car department superintendent having the old title of master car builder, but there should be a superintendent of motive power and a superintendent of the car department of equal rank. Under such an organization, the car shop apprentice would have before him the opportunity of advancement to car foreman, superintendent of car shops and superintendent of the car department. When the officer in charge of cars becomes recognized as equal in rank and importance to the superintendent in charge of locomotives, the car department will become a more attractive field for young men of ability with the training, both practical and technical, which the modern conditions demand.

THE RAILWAY LABOR SITUATION. IV.

RAILWAY operating officers complain that they never have any rest from negotiations, controversies, mediations and arbitrations regarding wages and conditions of employment. Whether the business situation, from the railway standpoint, is good or bad, they are constantly being presented by employees with demands for higher wages, shorter hours of work and other changes which, if made, tend to increase operating expenses. Regardless of whether complaints concerning these conditions are justifiable, it is a fact that they do exist. The managements hardly get settlements made with one class of employees until the representatives of another class are knocking at the door. And settlements for one year are hardly made until those for the next year must be taken up. The use of the word "settlement" in this connection is often a misnomer. It implies that something has been settled; and sometimes new arrangements are sought long before the periods for which the old ones were made have expired.

Railway officers also complain that the results when differences with their employees are mediated or arbitrated are apt to be as unsatisfactory as when they are determined by direct negotiations, because the agreements reached by mediation and the findings made by the boards of arbitration are based on no recognized principle and furnish no precedent for future settlements. Nor do such expressions come from railway officers alone. They come also from the leaders and the rank and file of the labor organizations, although in recent years practically every negotiation, mediation or arbitration has resulted in higher wages or easier conditions of employment. Both sides agree that there is room for much improvement in the settlements made and in the methods used in reaching them.

Within recent years wages have steadily increased, whether railway gross and net earnings have been increasing or decreasing. One argument made for increases in wages in many places has been that the compensation of labor should be standardized. In other words, the wages of men doing the same class of work in the same territories, whether on different roads or on the same road, should be the same. The standard to which they should be brought, the labor leaders have contended, is that of the highest wages being paid on any road in any given territory. The principal and most effective argument for higher wages, however, has been that the cost of living has been increasing. Admitting that wages should be standardized, it does not follow that the standard to which all should be made to conform is the highest scale in effect. Admitting, also, the force of the cost of living argument, the railways' cost of living must be considered as well as the employees'. The employees' contention is that they must be paid reasonable wages, and that if this unduly increases the railway's cost of living it should recoup itself by increases in its rates. But here the public's cost of living becomes a factor, and the Interstate Commerce Commission, in its decision a year ago in the Eastern rate advance case, having in mind the addition to the public's cost of living that might result from advances in rates, said: "Before any general advance in rates can be permitted, it must appear with reasonable certainty that the carriers have exerted proper economy in the purchase of their supplies, in the payment of their wages and in the general conduct of their business." It follows that in fixing the wages and conditions of work of railway employees the rights and interests of the employees, of the railways and of the public should all be given due weight. What wages the employees ought to receive, and what rates the railways ought to receive from the public, can be equitably determined only when they are considered as a part of one problem.

The matter has not been handled in this way in the past. When settlements have been reached by means of direct negotiations between the railways and their employees, which side has gained the more has depended on which has been the more skillful negotiator, or has been able to back up its diplomacy with the heavier battalions. The effect of the settlement on the public has seldom been considered. The mediators under the Erdman act have assumed that their only duty is to secure some adjustment which will prevent a strike, whether the adjustment is itself fair to all parties or not. The arbitrations under that law have been compromises which have always been favorable to the employees, have established no principles as precedents for future arbitrations and have given practically no consideration to the rights and interests of the public. In addition, the Erdman act provides for mediation and arbitration only between the railways and employees who are concerned in the operation of trains. It provides no means for mediation or arbitration between the roads and their shop employees, for example, although a lockout or strike of shop employees may seriously interfere with operation and cost employees, railways and public heavily.

In a letter published in the *Railway Age Gazette* of April 7, 1911, page 825, F. A. Delano pointed out the evils and dangers of the present situation and advocated the creation of a federal court of arbitration to which should be submitted controversies between the railways and their employees. He favored an even-numbered court so that every decision would be made by a majority of at least two. The late F. O. Melcher, in a letter to this paper (*Railway Age Gazette*, June 2, 1911, page 1235) commenting on Mr. Delano's proposal said:

> "It is questionable if either side would assent to an arrangement contemplating a permanent court composed always of the same individuals. The permanent court having once decided against a party to a controversy might again be unacceptable to that same party, whereas an arrangement by which the personnel of the court or board of arbitration could be changed would remove this objection."

Mr. Melcher summarized the policy which he thought it might be expedient to adopt as follows:

> "The Erdman act might be amended to require a member of the Interstate Commerce Commission and the commissioner of labor to put themselves in communication with the contending parties and endeavor by mediation and conciliation to bring about an adjustment of the controversy; and, failing therein, to acquaint the President with the situation, hostilities to be suspended until a commission could be appointed to investigate the subject and prepare a report as outlined above. A thorough investigation and public report would in themselves create a public opinion which neither side might care to disregard. It would provide the only compulsory feature which would be practicable to inject into such proceedings under the present conditions."

The need for the adoption of some means which will bring about adjustments of railway labor controversies of all kinds without strikes, and will at the same time cause the settlements to be made on some recognized basis which will foster the interests and safeguard the rights of all concerned, seems very clear. Railway officers say that the railways cannot go on indefinitely increasing wages without increasing rates. The Interstate Commerce Commission, very properly assuming the attitude of a protector of the public, says that railways before they will be allowed to raise rates must show that the wages that they pay are reasonable. The time is likely to come when the railway managers will say to the representatives of the railway brotherhoods that they cannot afford to raise wages any more unless they can raise rates and that they could not justify increases of rates on the ground that the payment of any higher wages would be reasonable. It is not to be expected that the representatives of the employees would accept the view of the managers that the maximum wages that would be reasonable had been attained. Substantially this situation has developed in the past, and the result has been strikes of serious magnitude. Many railway managers predict that before the labor problem on the railways is solved there will be a greater and more costly strike than any which has ever taken place. Well considered legislation to prevent this would be as important as any for the regulation of railways that ever has been passed.

NEW BOOKS.

The American Transportation Question. By Samuel O. Dunn, Editor of the *Railway Age Gazette.* D. Appleton & Co., New York. Cloth. 5 in. x 7½ in., 290 pages. Price, $1.50 net.

This volume deserves a thoughtful reading by everyone interested in the problem of railway regulation. In the first place, it is interesting. Originally given in large part in the form of lectures, it carries throughout the informal atmosphere of the lecture room. Yet notwithstanding this, its presentation of principles is clear and logical, and its reasoning is in large part convincing. Moreover, the close touch with the practical railway situation that the author enjoys by reason of his position as editor of a railway paper gives him abundance of pertinent illustrative material upon which to draw, and an inside view of the relations between shippers and carriers that is denied to the ordinary student of transportation questions.

This is not a historical treatment of the problems in any way, but a discussion of present issues—a cross-section as it were of the railway situation of the twentieth century. The only significant problem omitted is that of government ownership; the book assumes that regulation rather than ownership is to be the policy in the United States and handles all the issues with that assumption as a basis. It is only fair to say that this was deliberate on the part of the author, and does not commit him one way or the other on the far-reaching question of nationalization.

One's own point of view on the many problems discussed may influence one's judgment as to whether the author is "pro-railway." Personally I am unable to discover any prejudice or bias in the book; such positions as are taken seem to be the result of deliberate thinking which has taken into account all the factors. Disagreement is inevitable concerning an unsettled question, and I have indicated below the points upon which I have reached conclusions at variance with those of the author, yet in no way would I wish to imply by this disagreement that Mr. Dunn's attitude is an arbitrary one, or that it has been taken without due consideration.

Fundamental principles of rate-making are the subject of the first two chapters. The author presents an admirable summary of this intricate question, giving full recognition to the cost of service principle, and demonstrating the inconsistency of those railway officials who deny the influence of this principle in the fixing of individual rates, and at the same time rely upon it as a main support in their arguments against rate reductions. At the same time the limits of the application of the principle are clearly shown and the relative parts that this principle and the principle of value of service play in actual rate-making are made plain.

Discrimination in all its phases is discussed in the next two chapters with abundance of apt illustrations derived from recent rate controversies. The perplexities of the long and short haul situation are well depicted, but I am not sure that the author has sustained his case when he asserts that the lower rate for the long haul is "clearly defensible" if a circuitous route is obliged to put such rate into force to meet a rate already in existence made by a more direct line. Defensible from the railway point of view unquestionably, but hardly so from the broad public point of view, if the new and circuitous route simply divides with its competitor traffic formerly carried by the competing road alone and does not create new traffic itself. I raise another question in connection with the "Commodities Clause," which the author incorrectly calls the "Carmack Amendment." He declares it to be one of the inconsistencies of our law that this clause, while forbidding railways to haul commercial products which they own, allows industrial corporations to own railways. In view of the sweeping language of the clause and the attitude of the court toward it, the author's pessimism seems hardly warranted. Inertia in prosecution rather than inconsistency in legislation seems to be the trouble. Mr. Dunn's suggestions for the elimination of discrimination are sound, and have long been advocated by the more thoughtful students of the problem, namely, pooling under government regulation and the endowment of the commission with power to prescribe a minimum rate.

Railway valuation occupies two chapters and is a strong argument against the real practicability of any complete physical valuation of the railways of the country. It can be of no use in determining the reasonableness of any specific rate and of little use in estimating the justice of an entire schedule of rates. Mr. Dunn very properly questions whether it would be wise to limit railways to a "fair return" by appropriating for the public treasury all earnings in excess of such fair return. He might well have gone farther and insisted that such a policy would inevitably drive us into government ownership.

Efficiency is considered both from the standpoint of economy of operation and from that of the public service. The author does not mince matters, but shows clearly the many ways in which economies may be practiced, such as the reduction of the number of competitive passenger trains. Yet he brings out clearly what the apostles of efficiency so persistently refuse to recognize—the fundamental conflict between economical service from the standpoint of the railway and efficient service from the standpoint of the public. It is his opinion, moreover, that as the country becomes more densely populated and the short haul traffic increases, we shall demand faster and more costly service rather than our present slow and economical service. This would certainly be in harmony with our present unfortunate tendency to increase steadily the costs of distribution. I am hardly in agreement with him in his endorsement of the huge expenditures for magnificent terminals unless, as seems will be the case with the Grand Central, such structures can be made productive. To be sure, aesthetics and advertising are difficult to measure in dollars and cents, but the unnecessary waste of money is clearly apparent in some instances. A good analysis of the accident situation is presented and the feelings of the railways are not spared in the discussion of this, the worst feature of American railway operation. The disciplinary difficulties of the labor situation are fairly shown.

The chapters are given to the competition of railways and waterways, and the point is well brought out, which is so often overlooked by waterway advocates that the cost of water transportation is not determined until the capital charges borne by the public have been properly assigned to the traffic handled. It is a sound position that money should not be spent on waterways until the traffic need for such facility is clearly demonstrated, and that more economical methods of regulating railway rates can be found—through administrative commissions—than by the construction of unusable water routes. The argument for the inferiority of water facilities might have been made stronger if the author had discussed physical difficulties with which such a stream as the Mississippi has to contend. I am not as sure as Mr. Dunn seems to be that there is no ground for anticipating any substantial increase in the amount of traffic moving north and south, for I feel that the Panama Canal has possibilities. Neither do I agree that the government should not provide at public expense the great water highways of commerce. They are as truly "public works" as are the harbors for which the author believes expenditures should be made.

The last two chapters relate to government regulation. The author believes that one of the difficulties of the present administrative commission is its confusion of powers, executive, legislative and judicial, and proposes, so far as the Interstate Commerce Commission is concerned, a plan for a separation of its functions. Its power over rates should be carefully guarded, for administrative discretion tends to arbitrariness. "No right of the public should be left unprotected. But no restriction or burden that the protection of the rights of the public does not clearly require should be placed upon the rail-

road." Control over capitalization should be conferred not to prevent high rates, but to prevent looting, and to ensure a proper use of the moneys derived from the public.

Mr. Dunn pays his respects to commissions, state and federal, and after discussing the qualifications of the members of the Interstate Commerce Commission somewhat critically, says: "Owing to these and other causes it must be regretfully said that many persons, including most railway officers, lack full confidence in the commission's expertness and impartiality." This is a carefully guarded statement, so carefully guarded that it might be used in connection with even so impartial a body as the Supreme Court, yet it creates a wrong impression. There is probably no traffic officer of any railway so expert concerning traffic questions throughout the country as are some of the commissioners, and their impartiality in almost all instances is scarcely open to discussion. I should like to substitute for the sentence quoted another statement guarded with equal care, as follows: Most railway executives recognize the commission's expertness and its increasing impartiality. One other sentence seems to me to need modification: "The laws passed by the state legislatures in the spring of 1911 contain provisions regarding not only the number of men that must be employed in train crews, but also regarding the railway experience employees must have had. The purpose of this is to strengthen the labor monopolies of the railway unions and embarrass the railway managements in case of strikes." While this may in some instances have been the outcome, I doubt very much whether this is a fair statement of the purpose. Most of our legislation is crude, but railways must expect this unless they will firmly grip the accident situation and cure it themselves.

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Maximum Production in Machine Shop and Foundry. By C. E. Knoeppel. 5 in. x 7½ in. Cloth. 365 pages. Illustrated. Published by the *Engineering Magazine*, 140 Nassau street, New York. Price, $2.50.

The title of this book clearly indicates its scope and object, and while, of course, the complete discussion of everything that enters into maximum production could not be incorporated in one volume, the important factors have been very carefully covered. The author has based his whole discussion on personal experience, and, as a consequence, speaks most convincingly. He groups the machine shop and foundry in his discussion, stating that their work is so closely related that the problems can best be studied in this way. It appears that the foundry is given closer attention, largely because it has previously received less and offers greater opportunity for improvement. The work is divided into 16 chapters, starting with cost accounting, its importance and the best methods, and following through organization, systematic processes, deliveries, despatching and shop details. It briefly discusses the principles and the application in each case.

Proceedings of the Nineteenth Annual Convention of the International Blacksmiths' Association, held at Toledo, Ohio, August 15-17, 1911. 242 pages. Cloth. Illustrated. Published by the association, A. L. Woodworth, secretary, Lima, Ohio. Price, $1.00.

The work of this association steadily improves in its quality and scope. Reports of the committees, while generally brief, were supplemented by excellent contributions from various members, and by the clearing up of debatable points during the discussion. The volume contains papers and reports on the following subjects: Drop forgings; frogs and crossings; special welding and threading steel; oxy-acetylene welding; tools and formers; properties of iron and steel in connection with their chemical composition; piece work; effect of heat and working on metals; the foreman and his men; flue welding; frame making and repairing; case hardening; spring making and repairs, and high speed steel. The proceedings also contain a list of members and the membership of the various committees which will report at the next convention to be held in Chicago, August 15, 1912.

Letters to the Editor.

THE STEEL WHEEL MARKET.

Pittsburgh, Pa., March 11, 1912.

To the Editor of the Railway Age Gazette:

The *Railway Age Gazette* is entitled to credit for printing the remarks contained in the editorial in the issue of March 8 on the subject of steel wheels. The remarks are pertinent and indicate the exact conditions as they exist. It is to be deplored that many purchasing agents, and in fact we might say almost the whole railway world, are more interested in the lowest price than in the quality. It seems impossible for them to realize that the service obtained from any product should be the measure for comparison and that the cheapest first cost is not always the ultimate cheapest cost. It is not realized that price wars tend to demoralize the whole railway supply industry, and that if a war is continued to a finish it results in a monopoly, regardless of how this monopoly may be attained. When the war is over the consumer must then pay the penalty by an exorbitant price in order to make good the losses that have accrued.

Unquestionably the whole railway world would be bette· supplied if the purchasing powers would learn to object to too low a price as well as to a too exorbitant price. We should all assist in the stopping of this war, as you aptly term it, demanding quality that will give proper and safe service; at the same time paying a price for the material consistent with the quality and which will afford the manufacturers a reasonable profit.

MANUFACTURER.

USE OF THE "19" TRAIN ORDER.

Nashville, Tenn., March 9, 1912.

To the Editor of the Railway Age Gazette:

Referring to the article on the unrestricted use of the 19 order, to be found in the *Railway Age Gazette*, March 8, I agree with Mr. Finan in many respects; but I should not care to recommend adoption of the plan on this road, the Nashville, Chattanooga & St. Louis, under present conditions. I know it to be a fact that a southern road has been operated successfully for the past quarter of a century under what may be termed the 19 form of order. I also know that many roads require trains to be stopped to sign orders that only help such trains, and should have been given on form 19, as the train thus helped could not move without such train order. One of the greatest risks we have to run in using both forms is that the 19 order is torn off and hung up where the operator can at once see it, while he may have on his desk a 31 order for the same train, which is much more important. In that situation delivery of the 31 is not made because it is forgotten; it may be covered accidentally by a newspaper. An experienced train-rule examiner can easily take care of this risk and provide against it.

This company has used the 19 form in a most liberal manner during the past six years, and has had no accidents that might be charged to the practice. It permits its despatchers to use the 19 form to run one train ahead of another, or for practically any movement when trains are moving in the same direction. The 19 form is used to fix meeting points between all trains when the order can be sent to all trains to meet or be met before they reach the place of meeting, provided, always, that a copy of the same order be sent to the operator, on form 19, at the meeting point. When we desire to restrict a superior train and find it necessary to give first notice at the meeting point, we use the 31 form for such superior train. We also use the 31 form in directing a superior train to meet another train at a blind siding, that is, a station where no operator is on duty.

It would be impracticable to do away with the 31 form, as it must always be used when necessary to send a restricting order to a crew at some blind siding, and their signatures obtained be-

fore the despatcher can safely permit an inferior train to move against such train.

One of the most serious accidents that have occurred on this road in many years would have been prevented had we been in position to place the middle order at the designated place of meeting. There are very few roads that are able to afford open telegraph offices at all passing sidings, and it begins to look as though there would be even fewer operators employed in the future, unless there should be a radical change in the present public sentiment which imposes almost impossible conditions upon railway companies, while at the same time it denies them the right to secure the money to pay their bills by slightly increasing their charges for service.

I have used the 19 form in many ways during the past 35 years, and have yet to hear of a collision that resulted from its use when it was sent to both trains before reaching the meeting point, and also was issued in duplicate to the operator at the meeting point. I recall many collisions where the 31 form was used and the men on the superior train failed to remember.

Of all the reasonable and practicable devices we have at hand, I regard the middle order as the most valuable, and am surprised that so many officers oppose it without having given it a fair trial.

H. W. FORMAN.

THE INTERSTATE COMMERCE COMMISSION'S ACCIDENT REPORTS.

Chicago, March 6, 1912.

To the Editor of the Railway Age Gazette:

An article in the March number of the *Railroad Trainmen*, "Concerning Railroad Accidents," serves to emphasize the manner in which the public opinion is being manufactured, and the extent to which the present policy of the Interstate Commerce Commission in the investigation of accidents is contributing to promote a series of false conclusions.

A few paragraphs from the article in the *Railroad Trainmen* are illuminating:

"Investigations show rather uncomfortably, for the railways, that the causes can be attributed to defects in equipment and roadway, for in running over the reports of the Interstate Commerce Commission it develops that out of every one hundred derailments approximately sixty-four are caused either by equipment failures or roadway defects, twenty-three are assigned to miscellaneous causes, and it is asserted by a careful observer of wrecks that at least 83 per cent. are traceable to defective equipment and roadway.

"We have had a bad winter so far as rail disasters go and it is a satisfaction to know that at last the public is getting hold of the truth concerning the causes of some of them. The Interstate Commerce Commission deserves full credit for its efficient method of conducting investigations, for the plain unvarnished truth will bring safer conditions more quickly than they ever will be brought about by charging every disaster to Providence." . . .

"On the Big Four, on December 27, a limited left the rail while running seventy miles an hour, and tore up the track for a distance. The cause of the wreck can not be definitely ascertained, but we venture to guess that when the Interstate Commerce Commission makes its investigation, and looks in the inside of a rail or two, Mr. Steel Trust will be found somewhere in the trouble. A few days later the Great Northern 'put one over the bank' and the cause was given as a broken rail. Since then the Pennsylvania has wrecked a limited with the usual results, and these named disasters are but a few of the total number. A combination of science, experience and common sense will assist materially to lift the burden of railway murder from the shoulders of Providence. The demand for high speeds, heavy tonnage, and steel trust profits cannot hide behind an 'act of God' explanation when the truth is disclosed by intelligent investigation." . . .

"It will no longer be the practice to account for a serious wreck by dismissing it off-hand with a simple explanation. An 'act of God,' something gave way under the engine, or an employee did not perform his duty as he should, have about served their time as answers to why wrecks occur."

It must of course have been known to the editor of the *Railroad Trainmen*, as it is known to all who are in touch with railway matters in any degree, that if all the investigations of accidents made by the Interstate Commerce Commission were made public, it would be found that upwards of 80 per cent. of both train accidents and locomotive accidents were ascertained to be caused by the grossest carelessness and disregard of rules on the part of employees.

The Interstate Commerce Commission has made public, at this time, only four reports of investigations which it has undertaken. In all of these the responsibility has been located with the railway.

It has not published any report of the numerous other accidents which it has investigated where the responsibility has been squarely placed upon the employees concerned by reason of their disregard of discipline and criminal carelessness. Precisely what policy directs this manner of dealing with so important a subject cannot be definitely stated, but the inference is unavoidable.

Is it too much to expect that a body charged with such duties as is the Interstate Commerce Commission may at some time realize that its responsibility is to give all the facts in its possession, and not merely those which may serve to emphasize its consistent position as the scourge of the railways?

NUT LOCK.

ECONOMICAL USE OF TIES.

Chicago, February 28, 1912.

To the Editor of the Railway Age Gazette:

Referring to the article on "Opportunities for Economy on Railways" on page 1273 of the *Railway Age Gazette* of December 22, 1911, I do not believe on any well regulated railway, and certainly not on the Rock Island, that ties are handled in the way mentioned.

The fact that treated first class ties are used in side tracks does not necessarily prove that untreated second class ties are used in important main tracks, on the same railway. Our experience has convinced us that we are not justified in using untreated white oak ties of either class in main or side tracks on some portions of our lines.

On our southern territory it would be possible to secure white oak ties for a portion of our requirements. These ties cost 53 cents on cars for first class ties, and 15 cents to unload and place in track, making the total cost in place 68 cents each. Based on our records, possibly some of them may last a maximum life of seven years and on this basis the cost per tie year would be $0.0971 for first class ties. The available supply of second class ties is limited and usually will not exceed 10 per cent. of the first class ties. The second class ties cost 28 cents each f. o. b. cars, 15 cents to unload and place in track, or a total of 43 cents in place. On the basis of seven years' life, which is the maximum in our southern country, the cost per tie year is $0.0614.

Treated ties in the same territory now cost us 69 cents each; cost of placing, 15 cents; total cost in place, $0.84. Estimating the life of treated ties in main track at 12 years, which is very low, the average cost per tie year will be $0.07, or less than for untreated white oak. Estimating the life of treated ties in side tracks at 15 years, the cost per tie year is $0.056, which is less than for second class white oak ties.

Our program for tie distribution, which covers both treated and untreated ties, enables us to secure the greatest economy, and is based on price and source of supply, climatic conditions which affect the life of untreated ties, density of traffic, condition of rail and ballast. Our available supply of untreated ties, white oak and cypress, is being used on the territory where our experience has proven these woods will give us maximum service. Second class ties, both treated and untreated, are being used to the extent of the supply in side tracks, but as the supply of second class ties is not sufficient to meet our requirements, we are compelled to use some first class ties in sidings. Our program is revised from time to time to meet changed conditions.

Aside from the showing which I have made on our line, that it is much better for us to use treated ties, there is another indirect cost which we have not approximated, that is, the item of surfacing track due to replacing a number of ties which would not have been necessary if the ties had lasted longer. This adds

to the expense, and also leaves the roadbed unsettled in many cases.

We have given a very long life for untreated ties. In fact on the line between Dallas and Fort Worth, and from Alexandria, La., to Eunice, the maximum life of untreated ties is only five years. If we were to take this life of ties it would make a much better showing in favor of treated ties.

In addition to that, on our Louisiana division we found that pecky cypress is a splendid tie, and it is economical to use it as compared with creosoted ties, although Louisiana is one of the worst states we have for decay.

While it is true that no particular railway was mentioned, I am inclined to believe that other railways are just as efficient as the Rock Island is in this matter.

J. B. BERRY,
Chief Engineer, Rock Island Lines.

Chicago, March 1, 1912.

To the Editor of the Railway Age Gazette:

In replying to Mr. Berry's letter of February 28 relating to that portion of the article on "ties" in the series of articles on "Opportunities for Economy on Railways" which appeared on page 1273 of the *Railway Age Gazette* of December 22, 1911, my opinion coincides exactly with Mr. Berry's as to the economy in using treated ties for either main or side tracks in the cases named. The case which I cited, however, was not in a territory where second class untreated white oak, chestnut or other similar hardwood ties could be secured at less than half the cost of treated ties. On this railway untreated ties were being used in main tracks. I simply called attention to the waste in using first class treated ties in side tracks, and perhaps in the same locality using untreated ties in the main tracks.

Several instances of this have come under my observation in the last year, and I called attention to them because through the lack of supervision or of proper instructions practices were resorted to which were wasteful in the extreme. There is no argument against the use of treated ties under the conditions named in Mr. Berry's letter, but it is certainly unwise to use first class treated ties in side tracks where untreated ties cost less than half as much as treated ties, and furthermore when untreated ties are being used in the main track on the same railway and in practically the same vicinity.

L. C. FRITCH,
Chief Engineer, Chicago Great Western.

WHEEL LOADS AND TRANSVERSE RAIL FISSURES.

New York City, March 1, 1912.

To the Editor of the Railway Age Gazette:

The report of the Interstate Commerce Commission on the Lehigh Valley rail, which was published in your issue of February 16, was an indictment, not of the mills for producing an inferior grade of steel, but of the railways for overloading their rails to a point of destruction. Mr. Howard offered an explanation of the failure which is, at least, a reasonable one, though it may not be accepted by everyone. He describes, and tries to bring out in the reproductions of photographs, the peculiar appearance of the fractures or cracks which seemingly existed in the body of the head of the rail, and which lie at right angles to its length. But no description or photograph can convey a clear idea of the aspect of these fractures to one who had never seen them. They resemble, though they would never be mistaken for it, the smooth surfaces of a progressive fracture, which is so common in the case of axles and other forms subjected to a bending stress. Yet there is a peculiar striation and luster about them that is unmistakable. The phenomena are not new. Many samples of rails have been found in which these peculiar surfaces of broken parts are found, and yet the most careful selection of specimens for chemical analysis by scraping the surfaces has failed to show that segregation exists at such points or that there is anything peculiar about the structure of the metal.

Mr. Howard's explanation is a purely physical one. The hypothesis is that the pressure and movement of heavy wheel loads on the rails cause a cold rolling to take place on the head of the rail, which tends to expand the metal and, if the rail were free to move, would cause it to assume a curved form with the head on the convex surface. As the rail cannot bend, this cold rolled metal is subjected to a compression stress and sets up a corresponding tensile stress in the adjacent metal, which is below the zone of cold rolling effect. This stress increases under the continued rolling, until, at last, it exceeds the strength of the material and a fracture occurs in the body of the head where it cannot be seen.

This cold rolling is identical in its effect to the straightening of a piece of steel by pening. The most common example is to be found in the hammering of circular saws to straighten them. In the process of manufacture, these saws, especially the larger sizes, are left with a complicated mass of internal stresses, which are so balanced that the saw is flat and straight. But when it is heated in its work, or has a portion of its outer edge cut away by gumming, a lack of balance is brought about and the saw will warp. It is put back by hammering the concave surfaces, thus expanding the metal, converting a tensile to a compression stress and warping the plate back into shape. Identically the same thing occurred with this rail. When the top of the head was sliced off from one of the pieces, it immediately assumed a curved form with the expanded or cold rolled surface on the convex side, showing it to have been under compression. Whatever that compression stress may have been, it was balanced by a corresponding tension stress in the adjacent metal. The same tendency exists in wheels, and where brakeshoe wear has been insufficient to compensate for the cold rolling similar cracks have appeared.

Mr. Howard calls attention to the significant fact that these peculiar fractures are found only on the gage side of the rail where the wheel pressures are the greatest; a condition that could hardly be a never-varying coincidence.

It has been shown by experiments made independently by P. H. Dudley and George L. Fowler that the present wheel loads of the ordinary freight car are quite sufficient to put a permanent depression on the head of the rail; experiments that have been corroborated by work done in the laboratory of Wm. Sellers & Co. Further, in an analysis of the stresses imposed by a car wheel on the head of the rail, Mr. Fowler estimated that the pressure existing at the center of the area of contact between the wheel and the rail, where the wheel load was 20,000 lbs., might rise as high as 170,000 lbs. per square inch. These figures have not been questioned; and it is certain that the average pressure over the whole area of contact is more than 100,000 lbs. per square inch, which is well above the elastic limit of the material of any rail.

Again, in the meager investigations that have been made, it has been shown that lateral wheel pressures are very high. Actual measurements have shown that some classes of locomotives may put a load of 56,000 lbs. on the side of the head, and that the thrust of an ordinary freight car wheel may rise to 16,000 lbs. at moderate speeds and to possibly as much as 30,000 lbs. These pressures must produce a pening or cold rolling effect, and, if this is produced, what is to become of the stresses so induced if they do not set up internal stresses in the metal? And if these peculiar markings, which seem to be caused by such stresses, are not so caused, what explanation can be given for their non-appearance in new rails which have not seen service in the track?

Still, the case cannot be said to be proven, even by the facts and analogies here set forth, or by Mr. Howard in his report. And what has been said has been presented merely to show the reasonableness of the hypothesis. It remains, then, to make such an investigation as will demonstrate the soundness or the untenableness of Mr. Howard's reasoning. And to do this would be a comparatively simple task.

MECHANICAL ENGINEER.

INDUSTRIAL RAILWAYS.

St. Louis, Mo., March 8, 1912.

To the Editor of the Railway Age Gazette:

I have read with considerable interest articles published by your most excellent magazine in its issues of February 16, page 269, and February 23, pages 325 and 340, and find that in the main I can subscribe to many of the conclusions arrived at by the eminent gentlemen contributing. [The articles mentioned were entitled "Raw!", "The Industrial Railway Situation," and "President Milton M. Smith on Industrial Railways and Unfair Discrimination."]

The "industrial railways," as treated by the Hepburn act and other acts supplementary and amendatory thereto, represents facilities furnished by the shipper to a common carrier. The law plainly states that the allowance made by the common carrier for the use of such facilities, must be reasonable and not sufficiently remunerative to be considered a rebate.

As on a previous occasion, I take exceptions to "statements of facts" that are based on supposition and erroneous information. Your items referred to in this communication, and publications in the past, seem to be for the purpose of criticizing the Manufacturers' Railway and to eliminate, if possible, its function as a common carrier.

Let us assume as a fact that the Manufacturers' Railway has never at any time since 1882 been owned wholly or in part by the Anheuser-Busch Brewing Association. The stock book of the company shows this to be true. The original stockholders were Adolphus Busch, George F. Meyer, William D. Orthwein, et al; and the ownership of the issued stock today is the same as of record in Case No. 3151, partially decided by the Interstate Commerce Commission. On page 304 of this decision the commission states, "The Manufacturers' Railway Company is a common carrier at common law, and therefore within the provisions of Section 1 of the act to regulate commerce, the payment to it of a reasonable portion of the St. Louis rates for the terminal switching services rendered by it, is not unlawful."

Prior to and following the publication of this decision, all St. Louis lines issued tariffs fixing a per car rate on such business as the tariffs covered.

Tariffs issued by lines prior to the publication of the decision, were suspended by the Interstate Commerce Commission, and simultaneous with the publicity of the decision vacation orders were issued, allowing the tariffs to become effective.

Now, in all fairness, withdraw the assumption and admit that these statements I have made are true, or disapprove them from the record, if it be possible.

You regard Milton H. Smith's attitude and his testimony as being eminently fair, honest and helpful to the commission, and by inference I take it that you desire all other railway executives to go and do likewise. Mr. Smith is a man of ripened experience. He has been a power in Southern railway circles for many years, and I venture could tell many things of great interest if he cared to do so.

I also find, from consulting the records of the Interstate Commerce Commission, that in the past it has found it necessary to apply corrective measures to the Louisville & Nashville. If this property's hands are now clean it is the result of frequent scrubbings. We are all entitled to our opinions whether they are right or wrong, and gain wisdom only through experience. My opinion of Mr. Smith's carefully prepared statistical statement is that he has produced but little excepting his personal opinions, and his efforts to read into the criminal class all who have followed the published opinion of the Interstate Commerce Commission, is not only undignified, but will eventually re-act against those so vitally interested in the larger terminals of St. Louis. "Dutch courage" is sometimes essential, but it rarely over-rides law and evidence.

On page 269 (*Railway Age, Gazette,* February 16, 1912), an article appears, written by someone who no doubt desires to hide his identity under a signature of "Railway Man." I have no desire to smoke out this railway man, because his statement indicate that he is "a railways' man." He considers it "raw" that I testified under oath that, as president of the Manufacturers' Railway, I would in all cases endeavor to route business by way of the lines with which our road had traffic relations, rather than, in a spirit of amazing generosity, give the traffic to roads that would allow the Manufacturers' Railway no revenue from the through rates. May I not say to this charge something similar to what is attributed to Patrick Henry in his speech made near Richmond, Va.? I will add something which will seem even rawer to my crictics. It it were possible for me, as an executive of the Manufacturers' Railway, to control the routing on every car of freight received and forwarded by it, I would give every ounce of traffic to railways allowing the line I represent a legal division of the rate, in preference to sending this business by way of routes that did not provide a division of the through rate, and thereby forcing our company to penalize the shipper by adding to the St. Louis rate a charge for the terminal services of the Manufacturers' Railway.

There is one essential distinction between the Manufacturers' Railway and the other common carriers doing business in St. Louis. I believe we are the only common carrier leasing from a shipper facilities which we daily use for the preparation of outbound business and the delivery of freight received. This is one of two points held in reserve for a future decision by the Interstate Commerce Commission. The Manufacturers' Railway has a lease from the Anheuser-Busch Brewing Association, controlling 6½ miles of team tracks and drive-ways, making these tracks accessible for common carrier purposes, and under the lease there is a stipulated rental charge of $24,000 per year which the railway pays to the Anheuser-Busch Brewing Association. For the last eight months of the calendar year ended December 31, 1911, the Manufacturers' Railway handled on these leased tracks 45,106 carloads. Approximately 7,100 of these cars were handled for patrons of the railway who had no relations whatever with the Anheuser-Busch Brewing Association; in fact, a substantial part of this outside business was furnished by other brewing concerns conducting active competition against the Anheuser-Busch Brewing Association.

I tender this communication because many of the railways in the United States are not in accord with the policies outlined in your items referred to herein. As Americans, we know that an impartial tribunal will decide on the law and evidence as to the merits of these contentions, and justice is not dependent upon the insatiable desire to consume and destroy which seems to be vested in certain financial centers. The great steam railways have, in the years gone by, evinced their capabilities of taking care of themselves, and will always find champions to come forward in their defense. Regardless of the great interest in financing transportation, there is a well-defined feeling among the common people that private capital may also undertake to construct and operate railways. A study of the franchises granted to the Manufacturers' Railway by the legislative bodies of the City of St. Louis, would indicate that the people of this city are not only willing, but anxious, to have the Manufacturers' Railway fulfill its destiny and to furnish, as it is now doing, additional transportation facilities for that part of the City of St. Louis now served by it.

G. F. MOORE,
President and General Manager, Manufacturers' Railway.

[With regard to Mr. Moore's contention that the Anheuser-Busch Brewing Association does not control the Manufacturers' Railway, the facts, as shown by the record, are that 95 per cent. of its securities are owned by Adolphus Busch and his son A. A. Busch, and that 5 per cent. of them are owned by the Schuttler Estate of Chicago. These same interests own 75 per cent. of the stock of the Anheuser-Busch Brewing Association. —Editor.]

MR. ACWORTH ON RAILWAYS AND INTERNAL WATERWAYS.

London, Eng., February 12, 1912.

To the Editor of the Railway Age Gazette:

I have read with very great interest Mr. Brown's paper in your issue of January 12, on "Why Steamboat Traffic Declined Before the Railway."

Mr. Brown's history of the Mississippi valley trade seems to bear on its face the evidence of its truth. Granting, however, that the railways beat the steamboats, neither by speed nor by economy, but by organization and certainty, I should like to ask whether this is not after all the essence of the question. And whether the railway will not always beat the steamer for these reasons. The steamboat must always be hampered by the difficulty of through connections. It can only go to certain places, while the railway can go everywhere. Further, it cannot earn a dividend as a railway does by balancing against its small profit or no profit on some parts of its system its much larger profits on other parts; for it is open at all times to competition for the really profitable traffic by anyone who can get together a few thousand dollars to buy a boat. And, again, once a railway is built, the public can rely on its being permanently operated. It is pretty sure to pay something more than working expenses. And any earning on capital is better than none. Steamers with no capital invested in fixed plant will always be taken off less profitable routes and transferred to more profitable ones. Further, the steamboat business is so liable to cut-throat competition at any moment that it is a dangerous investment for small men; while on the other hand, it needs so much local and detailed attention that it is hardly fit for great capitalist companies. Of course, in all this I am referring only to internal waterways.

May I tell a story which has some bearing on this matter, and which will, I think, interest your readers? It was told to me in the year '99 by C. P. Huntington. To what year, however, it related I cannot tell. The Southern Pacific built two fine steamers to run between San Francisco and Sacramento, Cal. They gave a daily service, each boat running up one day, and down the next, and the passenger fare was $2. A private individual thought he saw his way to compete with advantage, and bought a smaller boat, which only gave a service every other day, but, on the other hand, only charged $1 for this service.

The Southern Pacific began to lose money, and when Mr. Huntington next came to California the position was put before him. "Would you like to leave me to run this fight?" said he to the local manager. "Certainly, sir," was the reply. "Is there an old boat you can buy that could give a service?" Being told that there was, Mr. Huntington bought it, ordered the two first-class boats to be laid up, and announced that the new purchase would run alongside the rival boat at a fare of 50 cents. "Why, sir," said the local manager, "50 cents won't pay for the coal." "No, I do not suppose it will," was the answer, "but when you go to war you have got to fight!"

Before long the owner of the rival boat came to Mr. Huntington and asked him what he was prepared to do about it. Mr. Huntington replied that he would buy his boat for $10,000—I think the sum was. "But, Mr. Huntington, the boat cost me $20,000, and she is worth it." "Very likely, but I am only going to give you $10,000." So the fight went on for a while longer. When the spring came Mr. Huntington was on the point of returning to New York. He sent word to his rival that he was leaving California the following week, and that if the matter was not settled before he left, his 50-cent boat would continue to run till his return the following winter. Whereupon his competitor at once threw up the sponge and then sold his boat for $10,000. "Since then," concluded Mr. Huntington, "there has been no competition with the Southern Pacific on the Sacramento river."

W. M. ACWORTH.

A PLEA FOR TRAVELING INSPECTORS FOR THE MASTER CAR BUILDERS' ASSOCIATION.

Chicago, February 27, 1912.

To the Editor of the Railway Age Gazette:

From time to time the suggestion has been made that mechanical inspectors, representing the Master Car Builders' Association, be employed to travel throughout the United States, to aid in bringing about uniform understanding and proper observance of the M. C. B. rules relating to car interchange and car repairs. That room exists for an improvement in the application of the rules of interchange there is little question, and it is believed that traveling inspectors would be extremely helpful in stopping the unnecessary rejections of cars which now take place in interchange, as the result of a misconception of what the rules require.

The American Association of Railroad Superintendents and the Association of Transportation and Car Accounting Officers have joined in recommending concerted action throughout the entire country to minimize the setting back of cars in interchange. Their recommendation that a standard form be adopted whereby the rejecting road shall issue a detailed report at the time of rejection, showing the responsible officer of the delivering road exactly why the car was rejected, will without doubt materially improve the service, if put into effect. This recommendation of the two associations, good in itself, might well be carried still further, so that the M. C. B. Association, through its traveling inspectors, could be kept in touch with what is going on in this respect throughout the whole country, comparing the practices in vogue at the more important places, so as speedily to correct whatever difficulty there may be. That such traveling inspectors would also aid in bringing about an improvement in the rendering of car repair bills there is little doubt, and the need of an improvement in this respect is recognized, although unfortunately not as fully appreciated as it ought to be. Another thing the traveling inspectors could do for the railways would be to help to bring about an observance of the M. C. B. loading rules, particularly with respect to lading on open cars.

These loading rules are, of course, primarily for the guidance of the shippers and of the initial carrier, and while they are supposed to be binding so far as the roads are concerned, they certainly have not been, up to this time at least, binding upon the shippers, and as a matter of fact the railways can and do deviate from them at will. Wrecks in the past have been caused by the improper loading of open cars, and if a serious wreck should again be caused on this account, it has been intimated more than once that the Interstate Commerce Commission will extend its inspection to cover the loading of cars.

Still another useful purpose to which such a traveling force could be put would be that of examining into the methods used in preparing per diem interchange reports, and helping the railways as a whole to bring about reforms in this regard. The expense of maintaining a force of, say, six competent mechanical men would be slight, taking the railways as a whole, and there seems little doubt that the imperfections now discovered by the safety appliance inspectors of the Interstate Commerce Commission would be lessened under a system of general supervision such as that contemplated.

The Master Car Builders' Association is of the greatest importance, as all will agree. Let its executive officers be given that help which is absolutely essential in carrying on important work. With a competent staff, supplemented by the gratuitous service which the members will continue to give, important and far-reaching results are bound to follow.

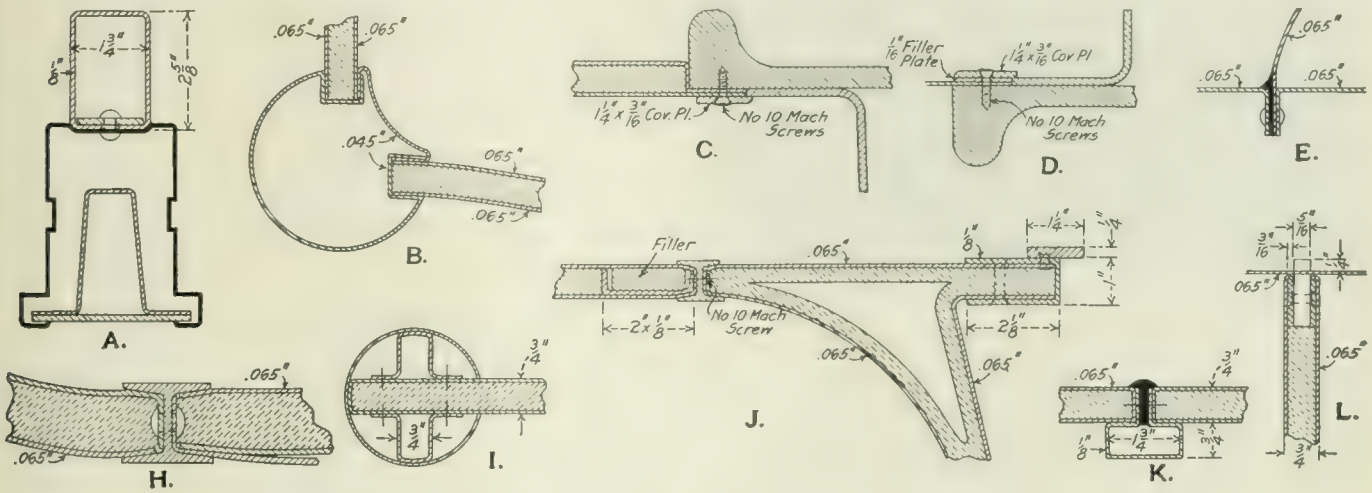
MASTER CAR BUILDER.

The Bolivian railways from Oruro to Cochabamba and from Rio Mulatos, on the La Paz-Antofagasta line, to Potosi, now in course of construction, will be completed and in operation within six months.

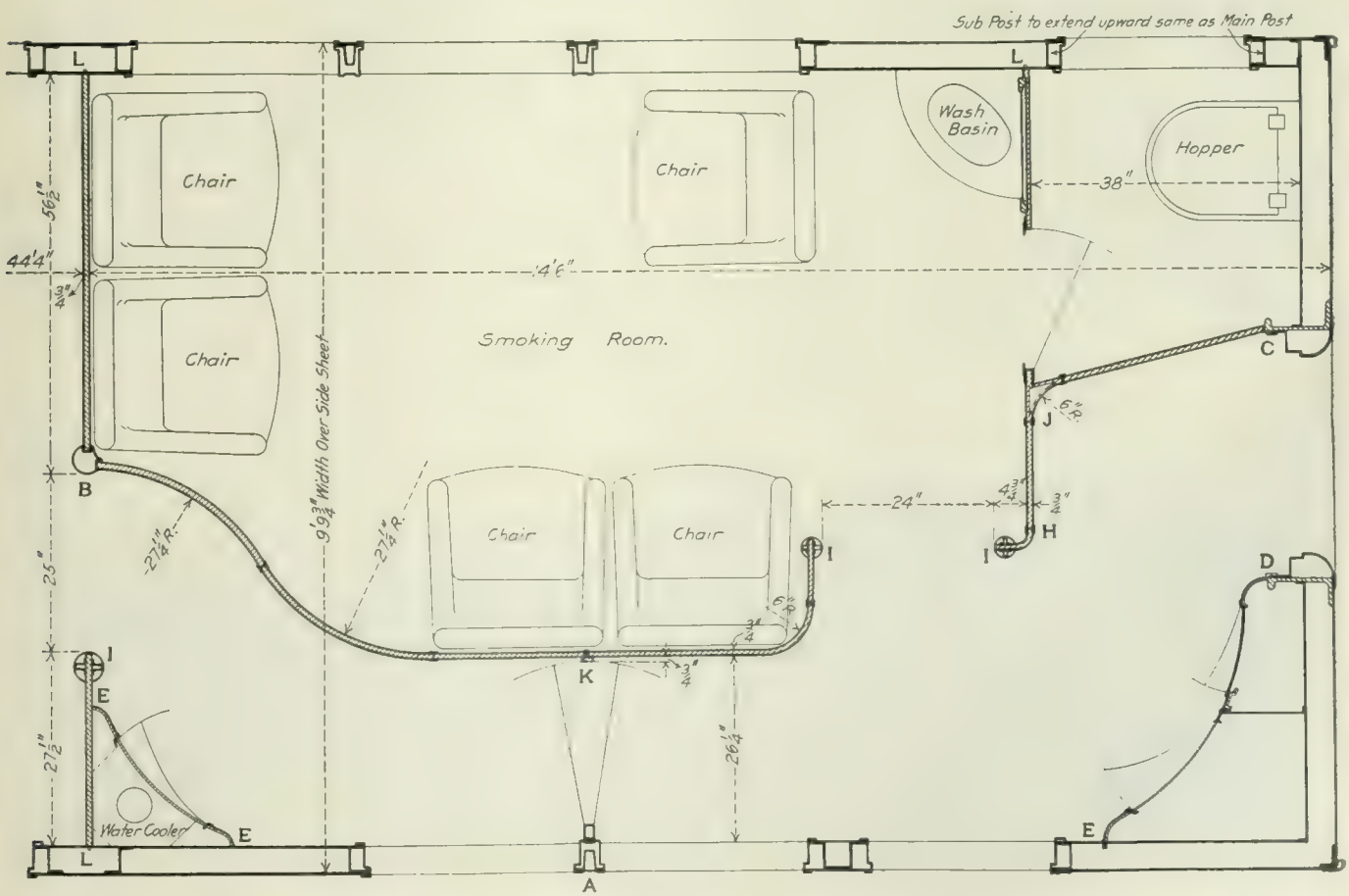
STEEL PARLOR CARS FOR THE LONG ISLAND.

Attractive parlor car equipment is an important part of the rolling stock on a railway where there is a large amount of passenger traffic on comparatively short hauls. Recently in ordering new cars of this type the Long Island used the framing of the standard Pennsylvania P-70 all-steel coach as the basis of what has proved to be commodious and attractive parlor cars. Ten of these have been built by the American Car & Foundry Company, New York. The structural part of these cars was fully described and illustrated in the *Railroad Gazette* of June 14, 1907. They are 70 ft. 5¾ in. long over the body corner posts, and have been arranged for 26 chairs, a drawing room with a sofa and two movable chairs, a smoking room with five wicker chairs, or a total of 36 seats in addition to two toilets and the necessary lockers, etc.

Extreme simplicity has been the keynote of the design in the interior, and the flatness of the surfaces has been relieved with small moldings only. Commodious racks of a square box design in keeping with the rest of the car have been provided in place of hooks. The only sign of ornamentation in the interior is found in the door posts and caps at either end and this, as may be seen in the illustration, is severely simple in its treatment. The interior is finished in steel grey tone, being relieved with narrow gold stripping and a fine red line in the panels. The lower deck is of slightly darker shade than the sides. Special care has been given in the interior to get smooth surfaces and rounded corners at the junction of all of the



Details of Steel Interior Finish in Smoking Room End of Steel Parlor Car.



Plan of Smoking Room End of Steel Parlor Car.



Interior View of Parlor Car Showing Simplicity of Finish.

steel plates. The way in which this has been done is clearly shown in the detailed illustrations at the various junctions. The chairs have mahogany frames and rattan seats and backs which with the green Wilton carpent on the floor, and the light interior finish makes the car especially attractive for summer traffic.

Electric lighting is furnished by an axle-lighting system, and several electric fans are provided. The cars are also equipped with steam heat, arrangement being made so that the system is divided into four parts, any combination of which can be put into use as required. Four-wheel trucks of the standard Pennsylvania type for this class of car have been used, with the exception that they have an 8 ft. 6 in. wheel base and 5½ in x 10 in. journals, in place of a 7 ft. 1¼ in. wheel base, and 5 in. x 9 in. journals. The cars have a total weight of 124,000 lbs.

THE EMPLOYEES' COMPENSATION BILL.

The bill to provide compensation for accidental injuries to railway employees engaged in interstate commerce, which was recommended to Congress by President Taft February 20, and which was discussed in our issue of December 15 last, is H. R. No. 20,487, and it was introduced in the house by Representative Brantley, of Georgia, a member of the commission which drafted it. The title is "A bill to provide an exclusive remedy for compensation for accidental injuries, resulting in disability or death, to employees of common carriers by railroad engaged in interstate or foreign commerce, or in the District of Columbia, and for other purposes."

Section 1 requires every common carrier, etc., to pay compensation to any employee who "while employed by such employer in such commerce" sustains injury, etc., or to his dependents.

Section 2 imposes the same obligation in the District of Columbia as regards all traffic.

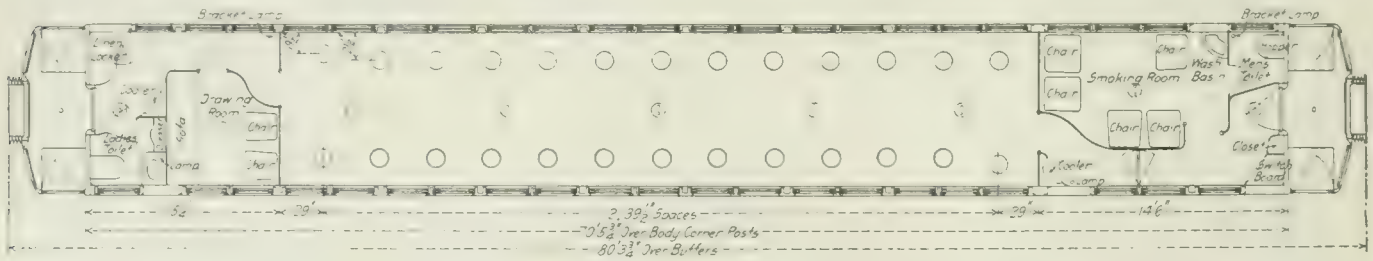
Section 3 exempts the employer from civil liability for personal injuries.

Section 4. Liability for payment begins 14 days after an injury, but the employer must furnish suitable medical and surgical aid and assistance during the 14 days.

Section 5. After the 14 days, the liability for medical aid, etc., is limited to $200. The employee may furnish his own physician or surgeon. The compensation named in the schedules is in addition to medical aid, etc.

Section 6. Compensation is not to be allowed if an injury is occasioned by the willful intention of the injured person to injure himself or another, nor if an injury is due to intoxication on duty.

Section 7. Requires written notice of injuries to be given within 30 days; but with good excuse this period may be length-



General Arrangement of 70-Ft. Steel Parlor Car.



Seventy-Foot Steel Parlor Car; Long Island.

ened to 90 days. But if an employee dies within 24 hours, no notice is required; nor when an employee, absent from his work two days, dies within 30 days and the employer knows that he has been injured. Provision is made for serving the notice in various ways, even by registered letter.

Section 8. At any time after 14 days an employer and employee may settle by written agreement, as may also his dependents in case of death, but the amounts and periods of payment agreed upon shall not vary from those prescribed in the law.

Section 9. An employer and his employees may organize committees to settle disputes and award compensations. Where such a committee exists differences shall, upon request in writing of one party and the written consent of the other, be settled by such committee. The award made by such committee shall be final, except that it may be modified by a subsequent agreement; and except also that, within two years, an agreement may be reviewed and revised by the government adjuster on the ground that the incapacity of the injured employee has ended, increased or diminished.

Section 10. At any time within two years an injured employee, having made an agreement, must submit himself at reasonable times for examination by the employer's physician, having also his own physician present if he so desire. The employer shall have the right in any case of death to require an autopsy at his expense.

Section 11. Authorizes the revision of agreements by the adjuster, as before mentioned.

Section 12. The employer must file all agreements with the adjuster within 60 days, otherwise the agreement is voidable by employee or dependent. Filing by the employee or dependent also makes the agreement valid.

Section 13. (1) The United States District Court is to appoint a competent person as adjuster of accident compensation, with additional adjusters where necessary; salaries from $1,800 to $3,000. The attorney-general is to decide territorial limits and prescribe salaries according to amount of business to be done. Every appointment is to be reported to the Circuit Court of Appeals which, within 30 days, may disapprove the appointment. (2) The adjuster shall be a resident of the district for which he is appointed; must hold no other office, and must not be a relative of any federal judge in his district, and shall hold office for four years. He may be removed by the court if his services are no longer required, or for other good cause, subject to reinstatement by the Circuit Court of Appeals. An adjuster is not forbidden to act in a like capacity under the law of any state. (3) The adjuster is empowered to enforce order in his presence while transacting business, to subpoena witnesses, and to formulate his processes, etc., consistent with law. (4) Misconduct, disobedience or contempt may be referred to the district court which, if the evidence warrants, shall punish the offense the same as for contempt; but no person shall be required to attend before an adjuster more than 100 miles from his residence or outside the state of his residence. (5) The adjuster shall have an office, to be kept open during reasonable hours, but may hold hearings at other places. His traveling expenses will be paid, but the sum for subsistence must not be over $5 a day. (6) An adjuster shall not act in a case in which he is interested. If it appear that he is biased or prejudiced, the court may transfer the case to another adjuster, or, if this be not convenient, may appoint a temporary adjuster. (7) Neither an adjuster, nor the partner of an adjuster, shall appear as an attorney. (8) The adjuster may have medical examinations made by disinterested physicians, the fee to be not over $10 for each examination. The adjuster must receive the testimony of any physician called by either the employer or the employee. (9) Witness fees and mileage are to be the same as in the district court and the adjuster may tax costs in his sound discretion; but in any case an employer may offer to allow findings to be made in favor of the employee; but unless the adjuster decides that the sum thus offered by the company is too small, no costs thereafter incurred on behalf of the employee shall be taxed against the employer. (10) The adjuster in the District of Columbia is to be appointed by the Supreme Court of the district.

Section 14. (1) No agreement having been made and no committee having been called upon to act, any case may be brought before an adjuster within six months from the date of the injury. (2) Within ten days after the petition is served the defendant may answer, and as soon as practicable the adjuster shall proceed to hear the case. The decision, both on questions of fact and of law, is reviewable in the district court. If a claim is not presented within six months it shall be forever barred unless the delay was due to circumstances clearly beyond the control of the employee or dependent; but no claim can be maintained after one year, except as provided in this law; under certain conditions, however, claims may be made within three months from the date of the last of a series of payments. (3) The adjuster shall allow either party to be represented by counsel, who need not be a member of the bar, and shall promptly render his findings in writing. Within 20 days, either party may file exceptions and appeal to the district court, where all questions of law and fact may be opened for consideration de novo. The fee on appeal is to be $5 plus a jury fee, where a jury is required. Such fees are to be taxed against the losing party. (4) Either party on written demand may have trial by jury, the jury fee being $5. If not demanded within five days, a jury shall be deemed to be waived. The findings of the adjuster shall be received by the court as prima facie evidence. (5) If a counsel is employed at a stipulated fee, the agreement for such a fee must be filed with the adjuster or the clerk of the court, and in every case it shall be the duty of the adjuster or the court, regardless of any agreement, to fix a reasonable compensation. (6) Appeals may be taken to the circuit courts of appeals and to the Supreme Court. (7) Subpoenas, etc., may be served by a court officer or by any citizen over 21 years old who is a resident of the district; or by registered mail.

Section 15. For persons under eighteen years, or those mentally incompetent, a guardian may act.

Section 16. Payments under this act shall not be assigned and shall be exempt from levy or sale for private debt. In case of insolvency of the employer liabilities under this act shall constitute a first lien on all the property of the employer liable therefor, paramount to all other claims or liens except for wages and taxes.

Section 17. Nothing in the act shall interfere with the enforcement of acts regulating appliances or the conduct of any common carrier. Nothing in this act shall affect the power of the courts to reform or cancel any agreement or any award or findings.

Section 18. Where a person injured has a legal claim against an interstate carrier other than his employer, the employer shall be subrogated to the right to recover from such other carrier. Where an injured person has a claim against any person other than his employer, such person not being subject to this act, proceedings may be taken against such other person; but if anything be recovered the employer shall be entitled to deduct an equal amount from what he pays. The injured employee may assign his rights to his employer; but such employer shall pay over to the injured person all sums collected in excess of the amount due under this act, deducting reasonable expenses.

Section 19. No contract, rule, regulation or device shall relieve the employer from his liability under this act.

Section 20. A month's wages shall be estimated as equal to 26 times the established day's pay prevailing in the service for which the employee was receiving pay at the time of the accident; but no employee's wages shall be considered to be more than $100 a month, nor less than $50 a month; provided that if an employee receives less than $25 a month, the payment for the first 24 months of disability shall not exceed the full amount of such monthly wages. Compensation is to be paid monthly, a percentage of the employee's wages.

Section 21. *Schedule.* (A) Where death results from an in-

jury the following amounts (with certain exceptions) shall be paid for eight years: (1) To a widow with no child under 16 and no dependent child, 40 per cent. of the wages of the deceased. (2) To a widow and a child or children under 16, or a dependent child over 16, 50 per cent.; to be paid to the widow for the benefit of herself and such child or children. (3) To a child under 16, or a dependent child over 16, where there is no widow, there shall be paid, if one such child, 25 per cent.; if more than one, then 10 per cent. for each of such children, but not over 50 per cent. altogether, the whole to be divided equally among the children. If the number of children entitled to payment be subsequently reduced to less than four, the payment is to be correspondingly diminished. (4) If a widow dies or remarries payment thereafter is to be made to the child or children, subject to subdivision 9, following. (5) If there be no widow or children, parents partly dependent shall receive 15 per cent.; wholly dependent, one parent 25 per cent., two parents 40 per cent. (6) Where there is no widow, child or parent, payment is to be made to a brother, sister, grandparent or grandchild, wholly dependent, as follows: If but one, 20 per cent.; if more than one, 30 per cent., to be divided equally among the dependents. If no such relative is wholly dependent and there are those partially dependent, 10 per cent. is to be paid, to be divided equally. (7) The foregoing subdivisions (1 to 6) apply only to dependents residing in the United States or Canada, and provision is made for payments in lump sums to non-resident dependents, provided there be no resident dependent. Detailed provision is made for favoring a non-resident widow. (8) Where the monthly payment for a death is not more than $15, the employer must pay $75 toward burial expenses; where no compensation is paid for death [as, for example, in the case of an employee injured by his own fault or while intoxicated], the employer is to pay reasonable burial expenses, not exceeding $150. (9) Payments cease on the death or marriage of a dependent, and payments to children cease when they reach the age of 16.

(B) For permanent total disability, the payment is to be 50 per cent. during the remainder of the employee's life. Total disability is defined as loss of both eyes, both feet, etc.

(C) Temporary total disability, 50 per cent. during its continuance.

(D) Permanent partial disability (1) 50 per cent., as follows: loss of arm, 72 months; loss of hand, 57 months; one leg, 66 months; one foot, 48 months; permanent and complete loss of hearing, 72 months; in one ear, 36 months; loss of one eye, 30 months; and so on down to the loss of one finger, one toe or one phalanx of a thumb. (2) For other injuries not specified payments are to be made proportionately, but not in any case more than for 72 months.

(E) Temporary partial disability, the employee being unable to secure work, 50 per cent., but not longer than for a permanent partial disability of the same character. If the employee refuses work offered, he shall receive no pay during the continuance of such refusal. If he works at reduced wages he shall receive pay in proportion.

No payment is to be made to an injured employee while he is at work and receiving pay equal to 90 per cent. of his regular wages; receiving less than 90 per cent., he can be paid the difference, but not over 50 per cent. of his regular wages. The time during which he is thus at work is to be deducted from the aggregate period for which payments otherwise would be made.

Section 23. If an injured employee dies after 14 days of disability the employer is liable for death payments, the amount to be determined by computing the amount which would have been due on account of death and making an equitable deduction; but if an employee, sustaining permanent partial disability, should die from a cause other than the injury, the liability of the employer is not to exceed the unpaid balance which would have been due if the injured employee had lived.

Section 24 provides for adjusting the compensation where an employee suffers two different injuries and for combining the periods of time prescribed during which payment is to be made.

Section 25 provides for joint payment where a person is employed by two or more employers subject to this act, and also for cases where there are two employers and one of them is not subject to the act; but such joint employers may agree as to the distribution of the joint burden.

Section 26 provides for the giving of suitable receipts by beneficiaries.

Section 27 defines the terms "dependent," "injury," "employee," "physician," "child," "disability," etc. "Employee" includes an apprentice, but does not include casual employees. "Disability" is want of capacity, by reason of injury, to make full wages and full time. An employee of an interstate carrier shall be presumed prima facie to be engaged in interstate commerce.

Section 28 excludes an employee not engaged in, on or about the premises occupied by or under the control of the employer, with certain exceptions. Injuries caused by the willful act of another, directed against the employee for reasons personal to the employee, are excluded. Disease or infection shall not be included, except if it shall result from the injury when reasonably treated.

Section 29. After payments have continued for six months, either party may apply to the court for an order commuting the further payments to a lump sum. The court, sitting without a jury, may grant such application if it deems the proposal for the best interests of the beneficiary, or if the continuance of monthly payments will entail undue burden on the employer, or if the beneficiary has removed from the United States. The court must calculate the lump sum according to the probable future payments capitalized at 5 per cent.

Section 30. The law does not affect rights of action accruing before it takes effect.

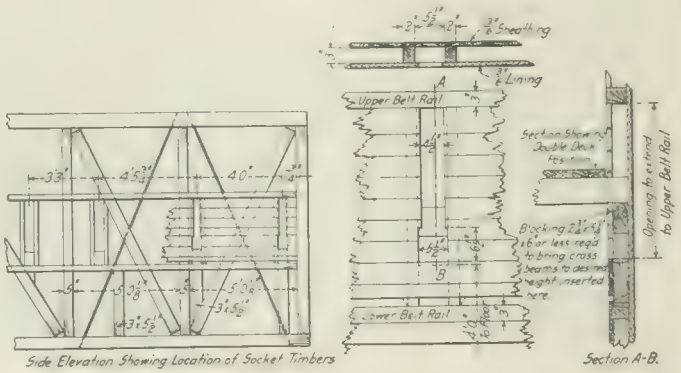
Section 31. It is the policy of Congress that the burden of this law shall be considered as an element of the cost of transportation, and the Interstate Commerce Commission must recognize this policy.

Section 32. Employers must make regular reports to the Interstate Commerce Commission, according to regulations to be prescribed by the commission; and the commission must publish the results of such reports.

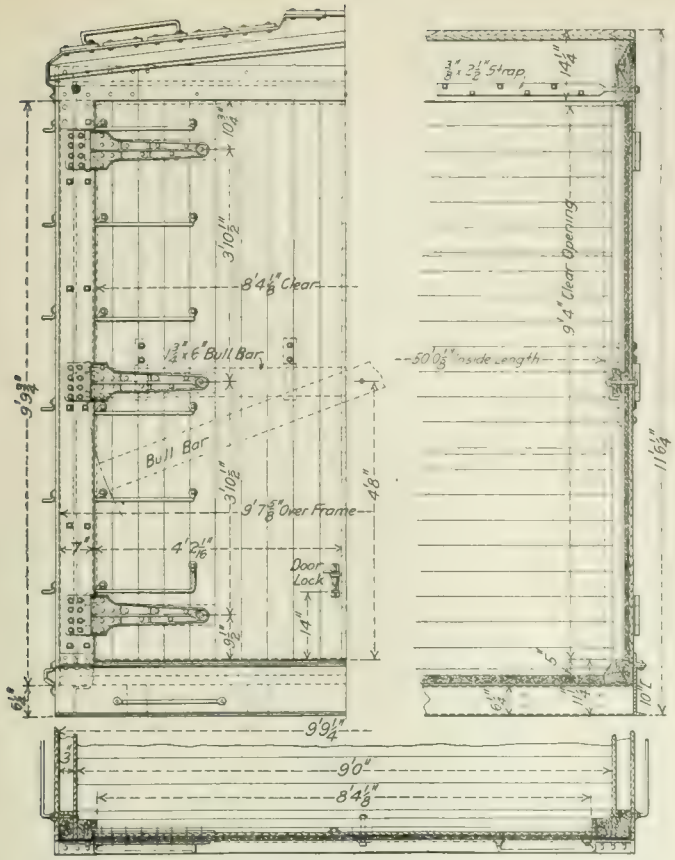
Section 33. The act shall take effect July 1, 1912.

AUTOMOBILE CAR FOR THE CHICAGO, MILWAUKEE & ST. PAUL.

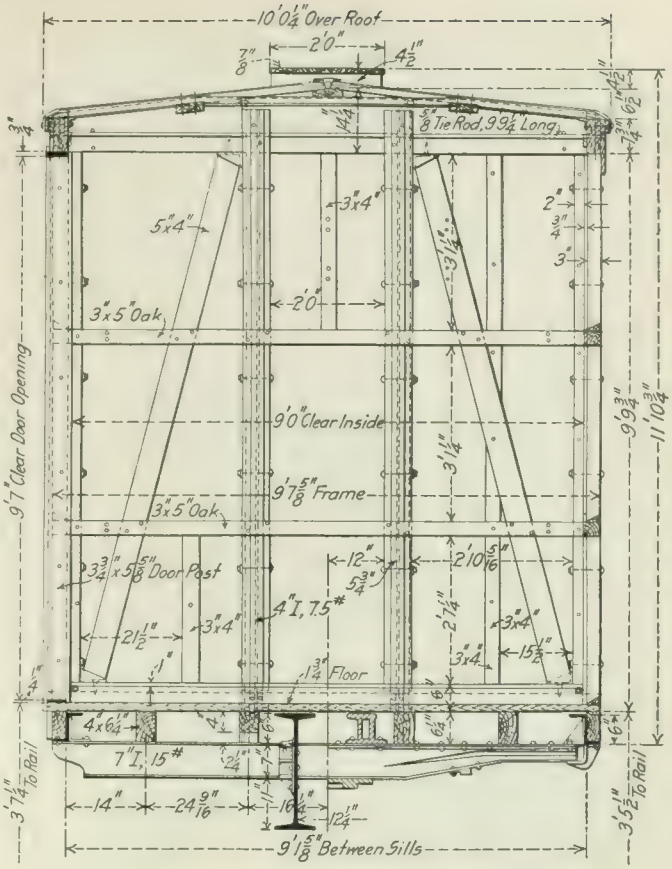
The automobile business in the Northwest has grown to such an extent that the Chicago, Milwaukee & St. Paul finds it necessary to build large numbers of special box cars for this trade. It is now constructing 470 fifty-foot automobile cars at the Milwaukee shops, with underframes and trucks designed for a car capacity of 80,000 lbs. The general plan and some of the principal details are here illustrated. In addition to the unusual length the car is very high, measuring 10 ft. 6¾ in. from the floor to the carline, thus providing a capacity of 4,675 cu. ft. The Bettendorf steel underframe is used, and is 50 ft. 10 in. long by 9 ft. 7⅝ in. wide. The center sills consist of two 24-in.



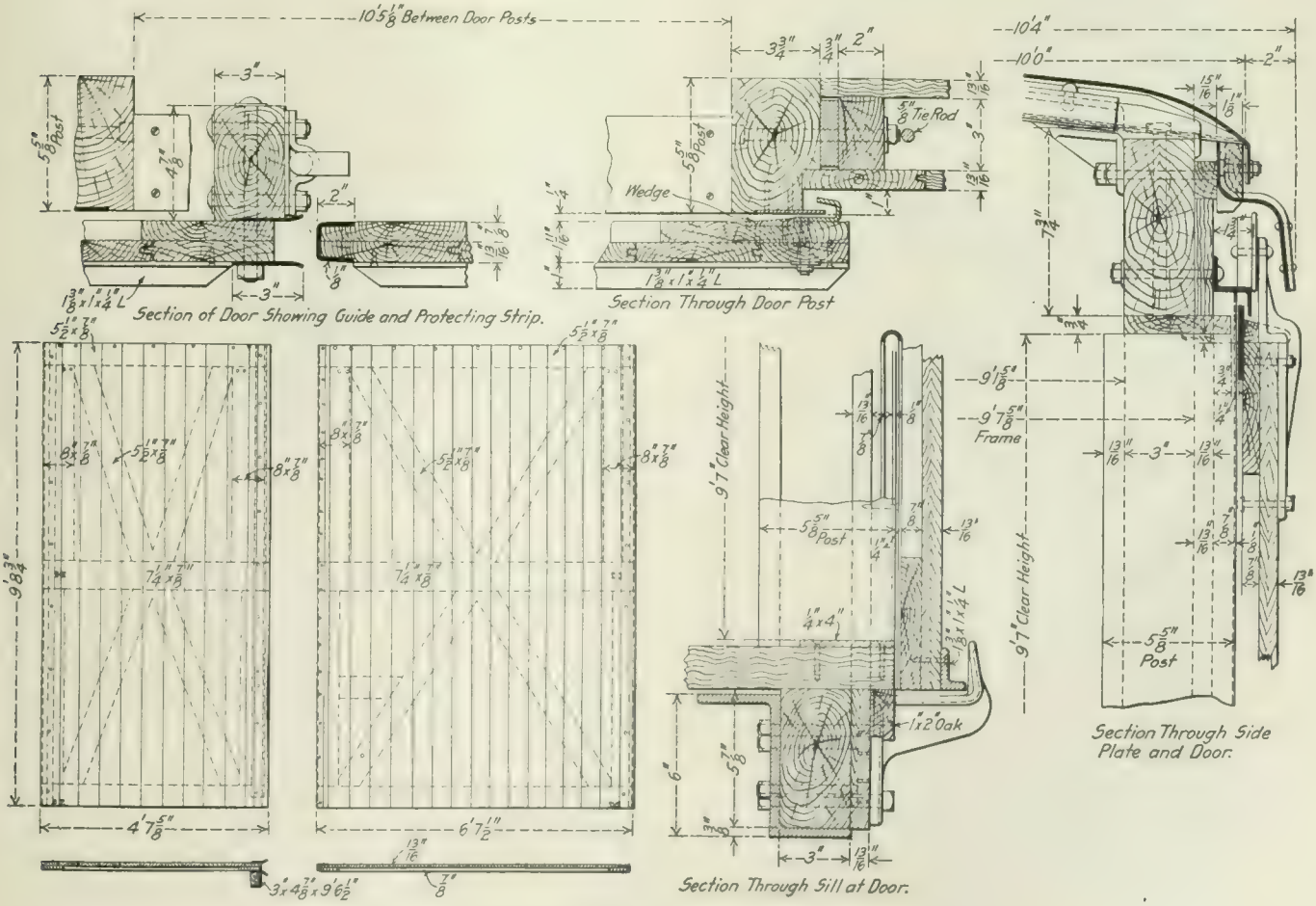
Arrangement of Double Deck Supports for Automobile Car.



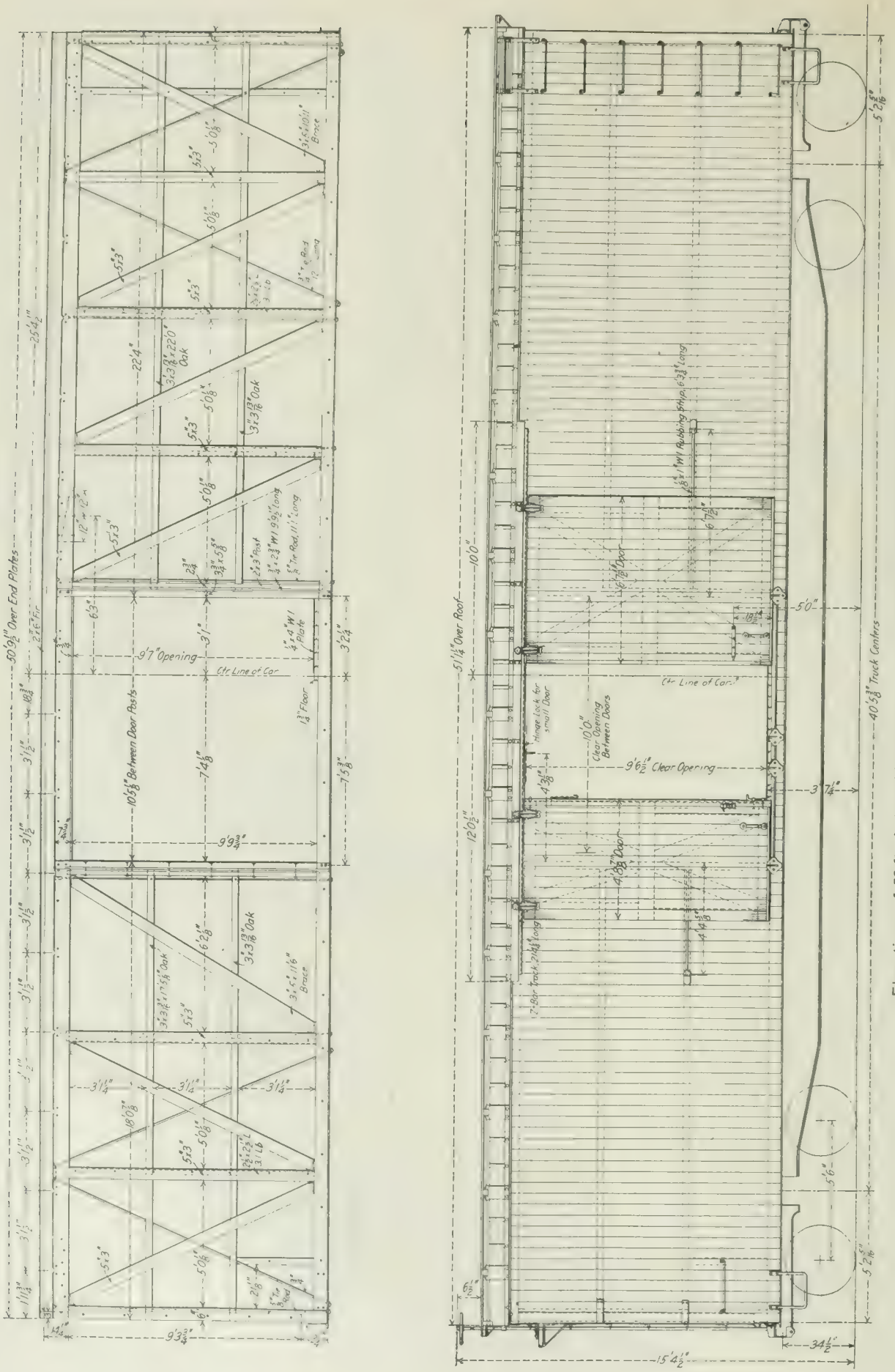
Construction of End Door on Automobile Car.



Cross-Section of Automobile Car.



Side Doors of Automobile Car and Details of Their Construction.



Elevations of 50-ft. Automobile Car for the Chicago, Milwaukee & St. Paul.

I-beams, tapered at the ends near the body bolster with separate draft sills beyond the bolster. The side sills are 6-in. Z-bars, with 3 in. x 6 in. nailing strips. The load is carried principally by the center sills, cross bearers made of 7-in. 15-lb. I-beams connecting the side and center sills. The end sills are 10-in. channels. The Miner friction draft gear and the Major couplers are set well up near the floor line, the top of the floor being only 3 ft. 7¼ in. from the top of the rail. This makes the height from the rail to the running board 14 ft. 10 in., and to the brake staff 15 ft. 4½ in. The side posts and braces are made of oak, 3 in. thick x 5 in. wide; the posts are reinforced on one side by 2½ in. x 2½ in. angles. The center posts at the ends are 4 in., 7½-lb. I-beams with 3 in. x 4 in. white oak pieces bolted to each side. The corner posts are double, and at one end are faced on the outside by 7 in., 9.75-lb., channels, to which the heavy hinges for the end doors are riveted. The end plate is faced with a 7 in. x ½ in. iron plate.

The special provisions for loading automobiles, include doors at one end of which allow the full width of the car to be opened, wide doors at each side, and an adjustable double deck. These features have been worked out in an original manner, and are clearly shown in the detail drawings. Each end door is fitted with three large malleable iron strap hinges, with each butt secured to the channel post with 8 rivets. The doors are secured by a 1¾ in. x 6 in. bull bar, which swings on a pivot bolt fixed in one of the doors, the ends of the bar entering notches in the corner posts.

There are two doors on each side which provide a clear opening of 10 ft. when both are opened. One of them is 4 ft. 8⅞ in. wide, and the other is 6 ft. 7½ in. wide. The wider door covers the central opening as in ordinary box cars, and the narrow door is to the left in each case so that their centers are on a diagonal line with respect to the floor plan. The intermediate door post is made of oak, 3 in. thick x 5⅝ in. wide, and is arranged to be made fast with the narrow door when the wide opening is not needed. The car is then equivalent to one with central side door openings 6 ft. wide on each side. This feature of securing the narrow doors with a substantial post fitted between the floor and side plate is patented. The detail drawing shows the narrow door bolted to the intermediate post; the edge of the door is fitted with ⅛ in. protecting strips into which the edge of the wide door fits.

Provision is made for the installation of a temporary double deck, as shown in one of the illustrations, in order to load the car more nearly to its capacity and to the best advantage. The inside lining is nailed to furring strips which are specially arranged for the insertion of blocking to support the cross bearers for the temporary deck. The height of the deck may be regulated by the number of blocks which are placed in these sockets. The belt rail is supported by special posts directly below the blocking. The cars are fitted with the Bettendorf boltless trucks, the weight with these trucks being 46,800 lbs. Other fixtures include the Westinghouse air brakes, Hutchins' metallic roof and Security side door fixtures.

A contract has been signed by the minister of public works on the part of the Venezuelan government and Federico Brandt, which provides for constructing a new railway from Caracas east to Guatire, passing through Guarenas and other points not mentioned in the concession now held by the Central Railway. The contract provides that the holder of the concession has the right, within five years, to prolong the line to Caucagua, and also to continue it to Rio Chico. Electric or steam motive power may be used. The gage of the road is to be 3 ft. 2 in., the minimum radius of the curves is to be 65 yds., and the maximum grade 3 per cent. It is said that German capital will be used for constructing the line. Before becoming effective this contract must be approved by the congress, and is to be for 99 years. This line will open up a rich agricultural region, and if prolonged to Rio Chico will give access to another seaport from Caracas.

STATISTICS OF EXPRESS COMPANIES.

The report of the Interstate Commerce Commission herewith abstracted is compiled from the returns made by express companies in their reports to the commission for the year ended June 30, 1910, and is the second annual report on the statistics of express companies. Like the first annual report, it covers statistics of the 13 important companies:

No tonnage reports, such as those in the first annual report, have been required of express companies since December, 1909. The considerable expense involved in the preparation of statistical reports requiring the handling of millions of waybills, has deterred this office from requesting further tonnage reports. Nor does the present report go into sundry collateral matters as did the preceding report. That report, being the first one based on returns rendered by express companies in accordance with accounting rules of the commission, effective on July 1, 1908, contained in addition to purely statistical matter compiled from the returns made by express companies, a discussion of certain other matters connected with express companies and their methods of operation. Such matters not discussed in the present report included the following: Accounting rules; character of express service; operating contracts and practices; computation of express charges; revenue tonnage report.

The present report also omits the appendixes containing an outline of the history, organization, and capitalization of express companies, and analyses and comparisons of graduate tables, rules, etc.

The accompanying table presents a comparative statement of mileage covered in the operations of express companies for the years 1910 and 1909, and while it includes coastwise, river, and lake mileage, it does not include ocean-going mileage, or any mileage in foreign countries, except Canada and Mexico:

Mileage Operated.

Name of carrier.	Total mileage. 1910.	1909.
Adams Express Co.	36,495.00	34,360.00
American Express Co.	55,577.84	48,224.78
Canadian Express Co.	7,128.27	7,794.27
Canadian Northern Express Co.	3,314.50	3,129.62
Globe Express Co.	1,915.65	1,899.85
Great Northern Express Co.	8,215.37	7,412.16
National Express Co.	1,640.25	1,714.25
Northern Express Co.	6,862.47	6,757.75
Pacific Express Co.	16,962.43	22,672.54
Southern Express Co.	32,213.00	33,181.00
United States Express Co.	32,771.46	24,206.00
Wells Fargo & Co.	51,522.84	65,698.43
Western Express Co.	3,509.69	3,456.39
Total	258,128.77	260,507.04

It will be observed that there is a decrease of 2,378.27 miles in the total mileage covered in 1910 as compared with 1909. Mileage on electric railways increased 194.78 miles, while that on steam railways decreased 1,093.01 miles, that on steamboat lines decreased 1,318.04 miles, and that on stage lines decreased 162 miles. The decrease in mileage on steam railways is largely caused by the withdrawal of Wells Fargo & Co. from certain railway lines in Mexico. The decrease in steamboat line mileage is accounted for by an assignment of mileage to ocean-going instead of coastwise mileage. Stage line mileage decreased owing to the abandonment of lines.

Of the total mileage on steam railways covered by the operations of these companies on June 30, 1910, 225,179 miles, or over 94 per cent., were in the United States, the remainder being in Canada and Mexico.

During the year covered by this report there were various changes in express companies operating over important lines of railway, and the foregoing table is of interest in showing the increases or decreases in mileage of the respective express companies occasioned by such changes. On April 1, 1910, the American Express Co. extended its service over the Union Pacific, the Oregon Railroad & Navigation Co.'s lines, and the Oregon Short Line, the Pacific Express Co. retiring therefrom.

On January 2, 1910, the United States Express Co. began operations over the St. Louis & San Francisco, the Kansas City,

Fort Scott & Memphis, the Chicago & Eastern Illinois, and several less important lines. On March 1, 1910, it also acquired the express privileges over the Choctaw, Oklahoma & Gulf, Wells Fargo & Co. withdrawing from all the lines named.

On May 1, 1910, Wells Fargo & Co. retired from the Colorado & Southern, being succeeded thereon by the Adams Express Co.

The accompanying table contains a comparative statement of the cost of real property and equipment used in operation by the express companies as of June 30, 1910 and 1909. An increase in total cost of $3,012,093.41 will be noted, the total for 1910 being $25,325,668.94, against $22,313,575.53 for 1909, an increase of 13.50 per cent.

All companies save two, the Pacific Express and the Southern Express, show an increased investment, the American Express Co. showing the greatest increase, $1,588,604. Part of this sum, however, does not represent additional money put into the plant during the period. For 1909 the value of all equipment owned by that company was carried on its books at a nominal valuation of $1,000,000; that amount has now been adjusted to the inventory value of the equipment, which was given in 1909 as $2,367,369.91. It thus appears that the actual increase in investment was $221,234, made up of $96,198 increased cost of real property and $125,036 increased investment in equipment.

Until forbidden to do so under the rules prescribed in the classifications of accounts issued under orders of the Interstate Commerce Commission, it was the practice of many express companies to charge all purchases of equipment to operating expenses, regardless of whether articles so purchased took the place of existing equipment or added to the capital assets of the companies. It was by this method that the American Express Co. accumulated additional equipment worth over a million and a third of dollars. Such an accumulation of assets through charges to operating expenses is equivalent to a concealment of profits to that extent.

As shown in table of inventory values [abstracted] the book values of the total assets of the 13 companies amount to $204,710,036.91; and the record value of all property used in operation by the express companies is but 12.37 per cent. of their total assets. The significance of this fact should not escape attention, indicating, as it does, the peculiar business conditions of express companies. Given express privileges over transportation lines, the express business may be conducted with but small capital invested.

The table is of interest to those who would make a study of the express business, showing, as it does, the important items which go to make up the equipment necessary to handle the business. It may be of interest to observe that the number of horses and other draft animals increased 1,316, in spite of the fact that 62 more automobiles were used. Stated in items of percentage, the number of draft animals increased 7.59 per cent., and the number of automobiles 24.22 per cent. As two companies, the Northern Express Co. and Wells Fargo & Co., began the use of automobiles during the present year and installed only eight, this indicates that the automobile is coming to be more extensively used by those express companies which had them in service in the previous year.

Many comparisons may be made as to the relation of equip-

Cost of Real Property and Equipment of Total 13 Companies and of Four Important Companies.

Accounts.	Grand total.		Adams Express Co.		American Express Co.		United States Express Co.		Wells Fargo & Co.	
	Total cost to June 30, 1910.	Total cost to June 30, 1909.	Total cost to June 30, 1910.	Total cost to June 30, 1909.	Total cost to June 30, 1910.	Total cost to June 30, 1909.	Total cost to June 30, 1910.	Total cost to June 30, 1909.	Total cast to June 30, 1910.	Total cost to June 30, 1909.
I. Real estate used in operation										
II. Buildings and fixtures used in operation	$15,890,048	$14,999,211	$3,992,599	$3,761,819	$7,448,571	$7,352,373	$1,366,104	$1,321,906	$734,817	$627,888
							169,873		1,207,554	1,111,646
III. Equipment:										
1. Cars	401,188	7,314,363	.....	.....	.....	1,000,000	.....	.....	380,168	208,465
2. Horses	2,720,975		614,022	587,700	870,341		443,733	324,688	558,047	515,931
3. Vehicles	2,515,967		869,115	825,500	601,790		332,008	282,778	485,567	452,024
4. Other equipment.	3,797,488		985,671	975,880	1,020,273		462,976	381,833	885,782	868,128
Total	$25,325,668	$22,313,575	$6,461,407	$6,150,899	$9,940,977	$8,352,373	$2,774,695	$2,311,207	$4,251,939	$3,784,084

Statement Showing Inventory Value of Equipment Owned.

	Grand total. 13 Companies.		Adams Express Co.		American Express Co.		United States Express Co.		Wells Fargo & Co.	
	1910.	1909.	1910.	1909.	1910.	1909.	1910.	1909.	1910.	1909.
Cars:										
Number	138	120	.....	.....	.....	.....	.....	.....	124	99
Inventory value	$401,888	$232,116	.....	.....	.....	.....	.....	.....	$380,169	$208,466
Office furniture and fixtures value	$1,041,773	$1,135,126	$328,888	$427,864	$270,315	$267,302	$90,260	$79,615	$214,814	$225,778
Horses and other draft animals:										
Number	18,648	17,332	4,072	3,918	5,504	4,972	3,643	3,064	3,079	3,054
Inventory value	$2,833,350	$2,499,781	$614,022	$587,700	$870,342	$760,704	$443,733	$324,689	$558,048	$515,932
Vehicles—number:										
Automobiles	318	256	236	212	24	9	50	35	7	.....
Double wagons	3,671	3,667	751	770	977	1,007	715	710	746	708
Single wagons	9,938	9,790	2,580	2,564	2,703	2,776	1,636	1,569	1,499	1,429
Sleighs	3,016	2,878	558	550	1,337	1,340	395	371	318	227
Total equipment, value..	$9,830,815	$9,150,795	$2,351,809	$2,372,846	$2,492,406	$2,367,370	$1,238,718	$989,301	$2,309,566	$2,044,551

Income Account and Profit and Loss Account.

Income Account.	Grand total.		Adams Express Co.		American Express Co.		United States Express Co.		Wells Fargo & Co.	
	1910.	1909.	1910.	1909.	1910.	1909.	1910.	1909.	1910.	1909.
Express privileges	$69,917,562	$64,032,127	$16,494,960	$14,938,228	$16,677,941	$14,545,778	$8,308,220	$7,788,730	$12,866,364	$11,370,662
Operating expenses	61,690,473	56,273,055	13,086,248	12,079,188	16,864,491	14,902,675	8,841,420	8,387,996	10,949,561	9,698,690
Taxes	1,126,726	906,520	202,234	145,184	302,166	271,171	92,216	102,353	187,618	132,820
Operating income	13,392,082	11,387,489	2,027,528	1,697,501	2,623,849	2,176,873	448,031	582,547	3,183,475	3,262,479
Other income	5,633,792	5,160,946	1,862,380	1,684,970	1,162,167	1,119,291	385,029	413,782	1,641,067	1,401,900
*Net corporate income..	17,988,557	15,382,554	2,925,707	2,382,294	3,785,802	3,276,352	803,929	883,608	4,824,541	4,664,379
Dividends declared from current income	5,928,104	4,326,939	1,213,680	1,012,200	.....	.....	600,000	400,000	1,598,370	800,000
Gross receipts from operation	$146,116,316	$132,599,191	$31,810,971	$28,860,100	$36,468,447	$31,896,497	$17,686,888	$16,861,626	$27,178,652	$24,464,651
Profit and Loss Account.										
Dividends declared out of surplus	$26,775,787	$2,223,090	.....	.....	$2,119,200	$2,119,200	.....	.....	$24,000,000	.....

*Since Adams Express Co. is the only company which has any fixed charges to speak of, gross income and net income for the others are just about the same figure. Adams Express Co. had $860,581 interest on funded debt in 1910 and $921,247 in 1909.

ment to the volume of business transacted by the respective companies. For example, the total receipts from operation of the United States Express Co., with 3,643 draft animals and 50 automobiles, were $17,689,888. Those of Wells Fargo & Co., with 3,079 draft animals and seven automobiles, were $27,178,652, showing that the number of items of any given class of equipment does not necessarily increase in proportion to the gross receipts from operations.

The foregoing table [abstracted] presents a comparative statement of the income account and the profit and loss account for the years ended June 30, 1910 and 1909. The items covered by this table have been changed from the list used in the first annual report so as to agree with the changes in the annual report form for 1910.

It will be noted that the Pacific Express Co. shows the remarkable increase of 200 per cent. in operating income. This is accounted for by the fact that in 1909 this company charged to express privileges an additional payment of $800,000 for "Extra facilities furnished," which amount was distributed among the three railway companies which owned the capital stock of the express company in the following amounts:

Missouri Pacific Ry. Co.	$320,000
Wabash R. R. Co.	160,000
Union Pacific R. R. Co.	320,000

The effect of thus burdening the "Express privileges" account with an amount which apparently might properly have been charged to accumulated surplus was that operating income showed only a comparatively small amount, and, by comparison, the figures for 1910 appear abnormal.

Reverting to the consolidated statement for all companies it is found that the total "Other income," covering the net profit from separately operated properties, dividends on stocks owned or controlled, interest on funded debt owned or controlled, income from other permanent investments, and like items, amounted to $5,633,792, an increase over the corresponding amount for 1909 of $472,847. By comparison it is found that income from investments equals 42 per cent. of income from operations, emphasizing the well-known fact that express companies are large investors.

Deducting interest on funded debt, other interest, and similar deductions, the net corporate income of express companies is found to be $17,988,557, an increase over the preceding year of $2,606,004, or nearly 17 per cent. From this $17,988,557, dividends amounting to $5,928,103 were declared; $47,561 worth of additions and betterments of property used in operation were added; $50,000 was added to reserves; and $3,000 to miscellaneous appropriations; the remainder, $11,959,891, being carried to the profit and loss account as a credit.

Dividends declared from current income increased from $4,326,939 in 1909 to $5,928,103 in 1910, an increase of $1,601,164, or over 37 per cent. Dividends declared from surplus in 1909 amounted to $2,223,089 and in 1910 to $26,775,726, an increase of $24,552,637, or over 1,104 per cent., of which amount Wells Fargo & Co. contributed $24,000,000. The net amount of undivided surplus remaining to the credit of profit and loss in 1910 was $59,215,600, compared with $50,525,228 in 1909, an increase of $8,690,372, or over 17 per cent.

The preceding table presents an analysis of the gross receipts from operation, which were stated in the income account to be $146,116,315, and shows the separate accounts with the amount credited to each. The total amount of revenue from transportation for 1910 was $143,445,250, compared with $130,165,602 for 1909, and total revenue from operations other than transportation $2,671,065, compared with $2,433,588 for 1909, the later item increasing a little less than 10 per cent., and the former slightly more than 10 per cent.

The greatest increase in any single item shown as non-transportation was that of $69,373 in the revenue from C. O. D. checks. The table shows the relative importance to the express companies of transportation and other services which they render to the public.

The balance sheet contains not only a consolidated statement for all companies, but a separate statement of assets and liabilities for each of the 13 companies covered by this report.

The consolidated statement shows the book value of the property devoted to the express business as of June 30, 1910, to be $25,325,668, the operating income for the year 1910 was $13,392,081. It therefore appears that the $25,325,668 investment returned nearly 53 per cent. Attention has already been directed to the fact that the book value of all property used in operation by the express companies is but 12.37 per cent. of their total assets.

It will be observed that total assets show an increase over

Analysis of Operating Revenues for the Years Ended June 30, 1910 and 1909.

Account.	Grand total.		Adams Express Co.		American Express Co.		United States Express Co.		Wells Fargo & Co.	
	1910.	1909.	1910.	1909.	1910.	1909.	1910.	1909.	1910.	1909.
I. Revenue from transportation:										
1. Express revenue..	$143,417,124	$130,130,126	$31,631,433	$28,704,763	$35,167,561	$30,759,578	$17,433,839	$16,603,843	$26,716,963	$24,026,606
2. Miscellaneous transportation revenue.	28,126	35,475	.....	.....	.....	.....	.....	.....	3,495	632
Total rev. from transportation.	$143,445,250	$130,165,602	$31,631,433	$28,704,763	$35,167,561	$30,759,578	$17,433,839	$16,603,843	$26,720,459	$24,027,238
II. Revenue from operations other than transportation:										
3. Customhouse brokerage fees	$131,274	$118,707	.....	.....	$86,078	$44,831	$13,121	$12,462	$26,514	$52,547
4. Order and commission department.	3,680	4,672	.....	.....	.....	.....	.....	.....	3,680	4,672
5. Rents of buildings and other property	72,934	57,141.	$148	$270	42,425	27,696	14,582	17,584	8,755	2,616
6. Money orders—Domestic	707,471	654,540	38,688	34,344	227,476	222,491	73,778	74,204	149,214	132,258
7. Money orders—Foreign			.....	.....	1,266	1,540	1,357	833	643	471
8. Traveler's cheques—Domestic	70,527	16,473	.....	.....	6,091	5,098	1,039	453	14,323	10,849
9. Traveler's cheques—Foreign		46,606	.....	.....	46,869	44,555	1,129	1,601		.....
10. "C. O. D." checks	977,467	908,094	131,673	113,893	250,471	235,849	132,811	132,136	231,048	208,559
11. Telegr. transfers..	10,447	14,026	.....	.....	3,731	3,463	945	2,177	5,759	8,371
12. Letters of credit..	4,625	6,961	.....	.....	4,351	6,952	273	.....	.....	.....
13. Other rev.—Financial department..	515,720	476,298	.....	.....	485,835	445,758	17,009	16,318	12,816	14,102
14. Miscellaneous rev.	176,918	130,064	9,026	6,828	146,287	98,680	.....	.....	5,434	2,963
Total rev. from operations other than transport'n	$2,671,065	$2,433,588	$179,537	$155,337	$1,300,885	$1,136,918	$256.048	$257,782	$458,192	$437,411
Gross receipts from operation	$146,116,315	$132,599,190	$31,810,970	$28,860,100	$36,468,447	$31,896,497	$17,689,887	$16,861,625	$27,178,651	$24,464,650
Express privileges—Dr..	69,917,561	64,032,126	16,494,960	14,938,227	16,677,940	14,545,778	8,308,220	7,788,729	12,866,364	11,370,662
Total operating rev.	$76,198,753	$68,567,064	$15,316,010	$13,921,872	$19,790,506	$17,350,719	$9,381,667	$9,072,895	$14,312,287	$13,093,988

1909 of $18,482,050, or nearly 10 per cent., and that holdings of stocks and bonds, as well as cash and current assets, have largely increased. An increase in capital stock liability of $16,166,600 may also be noted. This is explained by the fact that Wells Fargo & Co. increased its capital stock during the year covered by this report from $8,000,000 to $23,967,400, and

General Balance Sheet Statement as of June 30, 1910 and 1909.

Assets.

Item	Grand total.		Adams Express Co.		American Express Co.		United States Express Co.		Wells Fargo & Co.	
	1910.	1909.	1910.	1909.	1910.	1909.	1910.	1909.	1910.	1909.
Expenditures for real property	$15,890,048	$14,999,211	$3,992,599	$3,761,819	$7,448,571	$7,352,373	$1,535,977	$1,321,906	$1,942,372	$1,739,534
Expenditures for equipment	9,435,620	7,314,363	2,468,808	2,389,080	2,492,406	1,000,000	1,238,717	989,300	2,309,566	2,044,550
Stocks owned	50,598,202	40,879,647	23,194,746	20,858,184	21,246,330	14,770,373	381,801	383,283	3,756,506	3,211,087
Funded debt owned	51,513,022	45,955,672	34,075,936	28,328,272	5,107,513	6,791,093	4,230,626	4,395,368	4,183,762	3,750,286
Other permanent investments	14,220,092	26,017,709	415,563	536,132	2,097,250	2,175,461	3,344,031	3,417,089	7,930,730	19,427,090
Cash and current assets	45,421,184	33,682,608	4,805,528	1,553,512	15,412,288	13,741,677	3,340,674	4,021,411	13,529,608	7,657,122
Materials and supplies	332,494	138,210	15,415	10,057	115,708	33,699	48,548	.....	107,555	58,990
Sinking, insurance, and other funds	140,384	128,491	.....	.....	.....	.....	.....	.....	.....	.....
Advance payments on contracts	688,833	5,836,666	.....	.....	.....	.....	565,833	816,666	.....	.....
Franchises, good will, etc.	10,916,445	10,916,703	.....	.....	.....	.....	.....	.....	.....	.....
Other assets	547,955	266,965	156,271	210,980	.....	.....	23,906	.....	362,265	.....
Profit and loss	3,753	91,196	.....	.....	.....	.....	.....	.....	.....	.....
Total assets	$204,710,036	$186,227,380	$69,124,869	$57,648,039	$53,920,068	$45,864,677	$14,950,117	$15,345,027	$34,122,367	$37,888,662

Liabilities.

Capital stock	$69,523,300	$53,356,700	.....	.....	$18,000,000	$18,000,000	$10,000,000	$10,000,000	$23,967,400	$8,000,000
Funded debt	36,000,000	36,000,000	$36,000,000	$36,000,000	.....	.....	.....	.....	.....	.....
Current liabilities	37,953,220	24,980,828	7,754,875	148,710	17,437,131	13,059,371	3,330,295	3,989,325	6,212,737	5,197,180
Accrued interest on funded debt not yet payable	153,959	.....	153,959	.....	.....	.....	.....	.....	.....	.....
Other liabilities	1,855,203	21,273,493	[1] 1,040,946	[2] 996,525	93,787	.....	133,147	102,978	285,175	19,937,639
Profit and loss	59,224,353	50,616,358	24,175,087	20,502,804	18,389,149	14,805,305	1,486,674	1,252,723	3,657,054	4,753,842
Total liabilities	$204,710,036	$186,227,380	$69,124,869	$57,648,039	$53,920,068	$45,864,677	$14,950,117	$15,345,027	$34,122,367	$37,888,662

[1] Includes $879,678 of excess described in note 2.
[2] Represents excess book value of securities deposited with trust companies over par value of company's bonds outstanding.

the Canadian Express Company issued $199,200 of additional shares.

On December 23, 1909, the directors of Wells Fargo & Co. declared a special dividend of 300 per cent., and voted to increase the capital stock to $24,000,000. As of the date of this report, all of this stock, except shares to the par value of $32,600, was outstanding.

Statement of Financial Paper Issued During the Years Ended June 30, 1910 and 1909.

Item.	Grand total.		Adams Express Co.		American Express Co.		United States Express Co.		Wells Fargo & Co.	
	1910.	1909.	1910.	1909.	1910.	1909.	1910.	1909.	1910.	1909.
Money orders sold:										
Number	12,516,722	11,992,413	903,402	824,956	4,524,148	4,467,989	1,393,071	1,427,029	2,053,328	1,778,369
Amount	$124,960,284	$124,303,149	$9,392,186	$8,678,502	$42,959,767	$42,718,976	$13,766,682	$14,467,041	$24,470,858	$22,395,862
Traveler's cheques sold:										
Number	1,262,276	1,023,723	.....	.....	1,081,925	893,715	59,654	44,309	111,991	78,591
Amount	$30,213,900	$24,589,630	.....	.....	$25,886,000	$21,293,070	$1,305,600	$1,006,070	$2,836,630	$2,149,100
"C. O. D." checks issued:										
Number	5,182,875	4,867,353	764,112	660,330	1,407,837	1,342,790	742,253	738,930	1,116,024	995,286
Amount	$55,878,805	$52,751,369	$8,708,193	$7,378,887	$16,706,361	$15,645,385	$8,100,082	$8,056,577	$12,242,313	$10,787,121
Telegraphic transfers:										
Number	13,884	10,191	.....	.....	5,153	.....	1,310	2,835	6,106	7,316
Amount	$1,542,924	$1,766,078	.....	.....	$718,916	$608,836	$103,121	$256,747	$720,136	$898,343
Letters of credit issued:										
Number	856	643	.....	.....	831	631	25	12	.....	.....
Amount	$2,320,073	$1,685,511	.....	.....	$2,289,549	$1,657,132	$30,524	$28,379	.....	.....
Miscellaneous:										
Number	860,936	630,762	.....	.....	831,004	616,144	27,196	14,443	.....	.....
Amount	$108,418,976	$167,217,184	.....	.....	$106,679,727	$168,606,111	$1,375,057	$603,303	.....	.....
Total:										
Number	19,836,753	18,525,085	1,667,514	1,485,286	7,851,498	7,321,269	2,223,509	2,227,646	3,287,449	2,859,562
Amount	$423,331,964	$374,312,924	$18,100,379	$16,057,389	$295,190,322	$250,529,711	$24,721,069	$24,418,020	$40,269,939	$36,230,428

The chamber of deputies of Tunis has sanctioned the new railway loan of $17,616,730. The principal lines to be constructed or completed are a 50-mile line from Graiba to Gabes, a 30-mile line from Tozer to Metlaui—both of these are calculated directly to benefit the natives in the south of the protectorate—thirdly, an electric line from Tunis to Hammam, which is designed to link up the capital with various coast resorts, and fourthly, a 90-mile railway from Tunis to Tebursuk with a branch to Gubillat. The balance of the new loan will be devoted to improving the existing railway services. It is stipulated that all material shall be of French or Tunisian origin.

RECENT DEVELOPMENTS IN THE UNIT SYSTEM OF ORGANIZATION.

At the meeting of the New England Railroad Club in Boston, December 12, Major Charles Hine, of the Harriman Lines, gave an address on the adoption of the Hine system of organization on those roads. This system is already well known to the readers of the *Railway Age Gazette*, but the discussion of Major Hine's address brought out some recent experiences with it and some answers to criticisms.

In the discussion, the first speaker was Professor William J. Cunningham, of Harvard University and the Boston & Albany Railroad. Last summer Prof. Cunningham spent two months traveling over the Harriman Lines studying the Hine system. He said in part:

On the first principle, consolidation of offices, there was a unanimity of opinion as to its marked success. In every office that I visited, and I saw most of the division offices, they were all heartily in favor of the consolidation of the files, and pooling of the forces. In some of the offices where I spent considerable time and where the files were opened for my inspection, a look was enough to demonstrate the practical advantages. A file that under our ordinary form of organization would have been voluminous with much duplication, would, with the elimination

of inter-office correspondence, be about one half the usual size. In the office of one superintendent there are now something like seventy men, the consolidated forces of the former division master mechanic, the master car repairer, the division engineer, the train master, the chief train despatcher, the division storekeeper, the signal supervisor, the road master, and I believe, the superintendent of bridges and buildings. It made a very formidable looking array of clerks, yet everything was so systematized and worked so smoothly that to see was to believe.

On the second principle, of having a senior assistant at headquarters at all times, there was also a decided unanimity of favorable opinion. It means an extra expense on a great many divisions, because the senior assistant, or the man who took his place outside, is an extra officer, but there was no doubting the justification of the extra expense on the score of increased supervision and the substitution for what Major Hine calls "rule by chief clerk," by having the correspondence handled by a man with a broader experience.

On the third principle, that of co-ordination of rank, title and authority, there is not at the present time—or at least was not last summer—the same unanimity of opinion or the same sympathetic support. This is probably due to the fact that the opportunities of the system are not fully appreciated nor understood. Possibly, too, there is a sort of an undercurrent of feeling that the system is "on trial"—that it may not be permanent. I understand now that these negative influences are being corrected and that there is no question in the minds of the management as to the permanency of the system..

The full fruits of the new system cannot be attained with the present generation of assistant superintendents. A new generation must be trained to bring out its possibilities. Present results are regarded as satisfactory, but not as satisfactory as the originator of the system and the higher authorities have a right to expect. It is reasonable to assume that there will be clashing and ill feeling, but I saw none of it and heard of no trouble on that account. Possibly this happy condition is due to the timidity of the officers to exercise their broadened functions and their fear of the consequences if they should venture outside their own assignments. But after all the fundamental principle is to afford broader training to the division subordinate officers. The system certainly affords that opportunity. If its opportunities are not embraced as they should be, the criticism is not on the system but on its operation; and on the apparent weakness of an officer who feels his authority but not the obligation to act.

T. E. Byrnes (N. Y. N. H. & H.)—It seems to me we should distinguish ourselves between administrative and technical duties. The trained mechanical or civil engineer feels that he is better equipped for his department than the man who has all his life been engaged in the transportation department. The unit system will not reach its full fruition until these assistant superintendents have both technical and administrative training. Suppose the chief of staff has no technical training qualifying him to criticise a letter written by one of the others, and in addition has no special admiration for the mechanical officer who wrote the letter. Would the modification of that letter increase the efficiency of the mechanical department? I believe not. You know how frequently a splendid subordinate is submerged by the fact that the man to whom his recommendation goes does not like the subordinate. When the time comes that the superior is big enough to consider a recommendation on its merits, and also has the skill to pass upon the merits intelligently, the unit system will be perfect. I have known cases when the friction existing between the heads of the various departments has been very embarrassing and I don't believe changing the titles of the individuals will remove the embarrassments arising in such cases. Giving a man a title does not necessarily give a man initiative or capacity. One of the greatest difficulties I have is to make subordinates feel that I want them to give their work their best individuality and effort and not try constantly to find out what I want. If a subordinate has a proposition to present to me I want him to stand up man fashion and defend his proposition, not because it pleases me, but because he believes in his proposition. Nine times out of ten the men are trying to find out what the superior wants instead of asserting their own individual views.

I should like to see introduced into the modern railway, if it were possible, that spirit of the old days that I knew in Vermont when my father was a section boss. It was a common thing for the president of the company and the other general officers to sit down with him and discuss the general policy of the company. This would not be possible today, but suppose we could introduce into the railway world again the spirit of the old Irish section man who felt just as much pride in the management and success of the company as did the president or general manager. It is this spirit that will make railways more efficient and not the spirit so prevalent among some of our organization men whose chief effort seems to be to increase their pay and to so do their work as to make the number of men employed as large as possible. How are you going to change this? I don't know, I think sometimes that if the general officers of these companies could come a little closer to the rank and file and make them feel a personal pride and responsibility in their work it would do much good.

A. W. Martin.—The Major's history of the unit movement leads me to make just one inquiry. What becomes of the superintendent? Over here in the East we don't need so much reorganization, because réally, Major, I can sit down at my old desk and in thirty minutes I can lay out an organization and put out a few titles and do all that I see that you have accomplished up to this time; but where does the superintendent come in? Does he have authority? That is what we need in the East. In theory it is all right, but you gentlemen all know that our railroading in the East is done at too long a distance. If the superintendent today wants to lay forty feet of rail to extend a sidetrack, it takes him six months to get the machinery in motion to get it, and a man who asks for a sidetrack is dead before he gets the iron. Give your operating officers in this section of the country a right to go on and do the things that ought to be done, hold them responsible for their action, and if they do well compliment them; if they don't do well, wipe them off the slate and get somebody that will. When you get things done in that way here in New England your railway situation will compare very favorably with the unit system on the Harriman Lines, and until you do do it we are way behind the ages.

Major Hine.—Answering Professor Cunningham's criticisms, I may say that now, with the light of experience, we see that we began at the wrong end. We now advise other roads to begin at the top and work down. In the beginning we had to try one division at a time. We have only just got around to a satisfactory situation in the higher offices. In the new building of the Union Pacific at Omaha we have brought together officers and clerks formerly scattered over the town in seven different buildings. At Houston, Tex., we had to wait for the completion of a new office building. We recognize the difficulties but are not seriously concerned about them. At first our chief objectors were the mechanical and engineering officers, but they now realize that their opportunities are being broadened. The real objectors should be the transportation men, for formerly they had the first chance for promotion in the operating department. One critic asked, "Does not the system help the technical man?" Certainly it does. The technical men should welcome the new plan. If a man is ambitious for a reputation as a civil engineer or a mechanical engineer, if he feels that that is the most important, why, don't bother with a little thing like a railway; go and be associated with some industrial enterprise or hang out a shingle as a consulting mechanical engineer or civil engineer, but don't bother with the railway.

The recent strike has served to cinch the new system on the Harriman Lines, because when the strike came an assistant superintendent was sent to each important point, and he had full authority to act. We had old division road masters and old division engineers organizing gangs of car repairers. I grant

you that you can say, "Well, our division engineer will do it, too," and "our division road master." They do on some roads in some emergencies, but we claim there is less lost motion, that he does not have to go there and apologize for taking action, when that little loss of time may be costing the company money. He does the best he knows how until we can get a man there who is more skilled in the technique of that particular work; but, meantime, are not the company's interests better protected? We have found that they are.

It has been objected that we cheapen the title of assistant general manager; we shall be glad if anyone will invent a better name. Mr. Martin asked what became of the superintendent; he is a bigger man than he was before. He may say to the senior assistant, "Hold up every engineering matter until the maintenance assistant comes back." It is true that we have not yet inculcated a sense of responsibility so fully as we shall do in the future. We feel safe in leaving that. We have perhaps been excessively cautious.

Since last July we have all the division stores under the division superintendents. As we have division accounting, this is a success. A superintendent in California was telling me week before last that he found the division storekeeper the most valuable man on his staff, that he was using him for various purposes, among others he had instituted surprise checks for stationery in agents' offices, which is done by the division storekeeper in addition to his other duties.

The harmonious organization of the Boston & Albany is a matter of favorable comment the country over; but our position is that, as trustees, for the future, we owe it to our stockholders so to organize that there may be a reasonable assurance of a probability of a continuance of those happy conditions, that it should not depend upon the happy accident of having a broad, strong man at the head. If they do happen to make a mistake in selection some time, we are trying to arrange it that we will minimize the harmful effects that may follow. And we do not minimize the importance of the individual. As Mr. Byrnes and Mr. Martin have so well brought out, it all goes back to the man.

It will take another generation to show the full effects of the system, but the officers of the Harriman Lines said, "We will jump in and break the ice, and get as far as we can." I predict that, with the evolution of the system, it will be extended to the legal, traffic and accounting departments.

OIL BURNING LOCOMOTIVES.*

BY HOWARD STILLMAN,
Mechanical Engineer, Southern Pacific.

The first locomotive converted from a coal burner to an oil burner in regular service, was on the Southern Pacific in November, 1900, and a number of comparative tests proved so satisfactory that in February, 1901, other engines were converted. In about five years all locomotives on the Southern Pacific in California, and on the lines extending to El Paso, Tex., embracing the Calvin Lines, were converted to oil burners. The approximate number of locomotives now burning oil is as follows:

Passenger	396
Freight	455
Switch	140
Total	991

On the above basis the oil consumption is 677,875 lb. per month, or 8,134,500 bbl. per year. These figures are for about six months ago and are slightly exceeded at this time. There is a slight variation in the specific gravity of the oil, ranging from 14 deg. to 15 deg. Baumé. Its calorific value is taken at 18,500 B.t.u. The following specifications for fuel oil have been adopted by the Southern Pacific system:

General Requirements. Liquid fuel is crude petroleum as received from the wells, or the product of crude petroleum, distilled or reduced. It must contain no sand or foreign matter in the shape of sticks, waste, stones, etc., and must be sufficiently liquid to flow readily in the pipes at a temperature of 70 deg. F. It must contain as little water as possible, and oil containing more than 2 per cent. of water and other impurities will not be accepted. Fuel oil will be paid for on the basis of volume at 60 deg. F., also deducting all water contained, according to the method outlined as follows:

Tests. One sample will be taken from each carload or fraction thereof. The sampling is to be made with a car thief having a valve at the lower end. The thief with open valve will be lowered gradually into the car and the valve closed at the instant of touching bottom. The thief thus filled will contain the oil sample to be tested for water, sand, basic sludge, and specific gravity. Oil received in settling or storage tanks will be sampled with the Robinson or other standard thief, a sufficient number of samples being taken to secure an average of its contents.

Fuel oil will not be accepted for general use, the flash point of which is less than 110 deg. F. when tested by the open cup, Tagliabue method. The oil is to be heated at a rate of 5 deg. per min., and the test flame applied every 5 deg., beginning at 90. This flash point being the danger point at which the oil begins to give off inflammable gas, the fire or burning point is not required.

The test for water, sand, and Baumé specific will be made as follows: 100 cu. cm. of the sample will be placed in a 250-cu. cm. graduated glass cylinder provided with a stopper, and thoroughly shaken up with not less than 150 cu. cm. of gasoline. The mixture will be heated to 120 deg. F. for from 3 to 6 hours to facilitate the separation of impurities, the amount of which can then be read from the graduations of cylinder. All proportion of water and other impurities contained in the sample will be deducted from the volume contained in the car and not paid for.

The temperature of the shipment will be tested directly as the sample is removed from the sampling tube, or by immersion of a thermometer in the receptacle itself for not less than one minute. A deduction in volume for expansion at a temperature of over 60 deg. F. will be made at rate of 0.0004 for each degree. At 90 deg., the deduction would be 1⅗ per cent, etc.; Kansas and Oklahoma fuel oil furnished from Sugar Creek or Kansas City, Mo., at 90 deg., should have a deduction of 1¼ per cent. Gravity of fuel oil should range between 13 and 29 deg. Baumé at 60 deg. F.

Conditions. If any portion of an accepted shipment is subsequently found to be damaged, or otherwise inferior to the original sample, that portion will be returned to the shipper at his expense. Any sample failing to meet all the requirements of this specification will be condemned, and the shipment represented by it will be returned to the manufacturers, they paying freight both ways.

In the evolution of oil burning in locomotives, the matter unfortunately resolves itself to one of local conditions. The modern locomotive boiler is not an ideal form of oil furnace. Railways must burn whatever fuel is cheapest and most available, and the matter continues to be one largely of expediency. Locomotive fuel oil is carried in tanks bujlt to fit the coal space in the tender and gravity supply is depended upon through flexible pipes to the locomotive. The burner used is of the flat jet type consisting of a flat casting divided longitudinally by a partition over which the oil flows as it is admitted to the upper cavity. The lower cavity receives the steam for the jet which strikes the oil flowing over the partition, spraying it into the furnace. The oil should be completely atomized near the burner tip in order that it may be immediately vaporized. The form of burner is of little importance provided it is simple, easy to clean, and without complication from carbonizing. It has in truth been said that those who try to improve the efficiency of fuel oil by alteration of the burner are on a plane with those who try to improve the steaming quality of a boiler by altering the injector. High efficiency from fuel oil is due mainly to the arrangement of the furnace.

The steam for atomizing is obtained from the dome and is available at full boiler pressure of 200 lb. through a suitable regulating valve. Compressed air has been used experimentally with a form of burner that delivered the air inductively to the burner itself. Other than by a localization of heat at the point of the burner, no benefit could be found by tests with air mingled with the steam in this way. Atomization with compressed air is undoubtedly of value under certain conditions, but is liable to produce a more intense heat locally in the furnace than is desirable. With the steam jet the oil is sprayed and broken up mixing with the air, admitted through proper dampers, and is completely consumed without damage to the sheets. Tests on our locomotives by Prof. Gray, formerly of the University of California, show that temperatures ranging from 2,500 to 2,750 deg. F. are obtained, the latter being the highest observed.

The method of fitting a locomotive fire box for oil burning,

*Abstracted from a paper presented in the August proceedings of the American Society of Mechanical Engineers.

which is the present standard arrangement for the heavy freight engines of the consolidation type, is shown in the illustration. Fire bricks, the most refractory obtainable, are placed at the lower side of the fire-box plates to prevent the oil blast impinging against the sheets. No more bricks are used than are necessary for the purpose. The most refractory bricks melt out in a comparatively short time—not from an intense degree of heat, but from the fluxing agents introduced with the oil, especially salt or other alkalis with which California petroleums are associated.

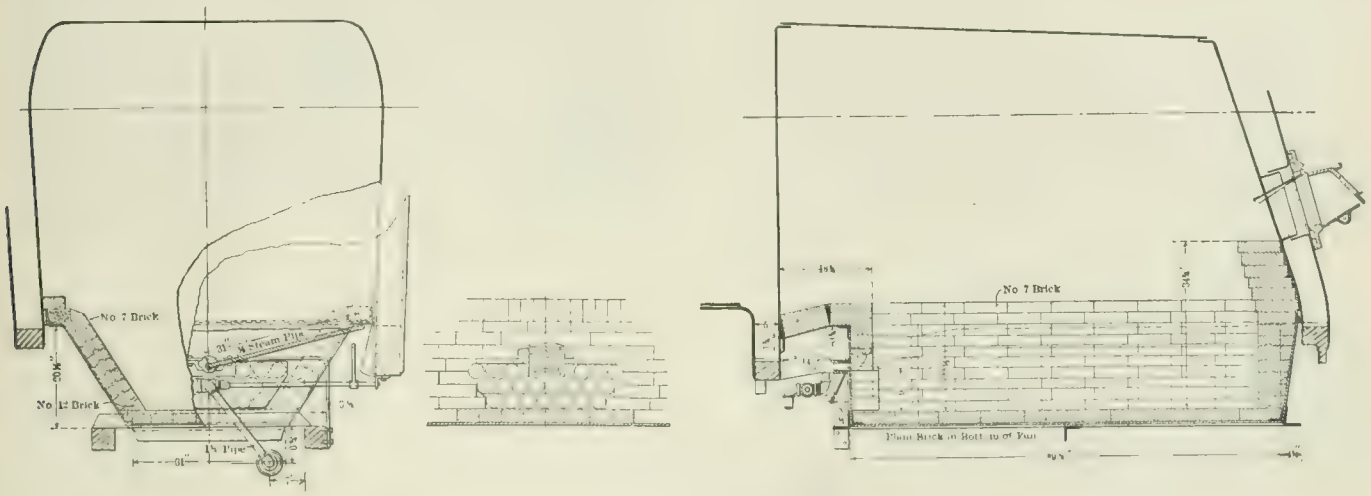
Fire-box repairs to the oil-burning locomotives do not exceed those of the coal-burning engines. From records kept of the cost of maintenance, it is shown that if a furnace is properly equipped with draft adjustment and burner, an oil-burning fire box will outlast a fire box burning coal; that is, on the same class of engines in the same service. However, it cost a good many fire boxes to determine the best arrangement. In this connection the oil fireman is a large factor in successful oil burning on locomotives. He must watch the operation of the locomotive with intelligence and every movement of the engineer demands a corresponding regulation of the fire and watchfulness on the part of the fireman. He has two gages to guide him, the steam gage and the top of the stack, the desired steam pressure with least smoke being the object. It is a general though not universal condition that the locomotive should give some smoke. In general a thin gray smoke is indicative of the most economic result. A careless fireman can do great damage to the fire box and flues if he neglects to attend to the dampers and regulators at the proper time.

It is the writer's opinion that a greater depth of fire box is more essential for economic oil burning than for coal. If combustion is not approaching completion when the gases enter the flues, the vapors in process of combustion fall in temperature below that required for oxidation of the carbon, which is precipitated as soot or black smoke. While this is a common phenomenon of smoke production with any fuel, it is more in evidence with oil than with solid fuel where there is nothing to burn but volatile combustible. Lack of oxygen is generally supposed to be the cause of smoke, but lack of proper temperature required for chemical combination is as often, if not oftener, the cause. The lack of sufficient fire box volume is the common cause of smoke in oil-burning locomotives when demands are made on the boiler for rapid evaporation. The deposit of soot upon locomotive flues is a common difficulty, and calls for the regular operation in service of sanding the flues. The operation of sanding consists in dropping the reverse lever, if possible, while the engine is running, and pulling the throttle wide open, while the fireman puts a few cupfuls of sand through the opening in the fire door, the draft carrying the sand through the flues, ridding them of soot, the operation being repeated if necessary. A supply of sand is carried on the footboard for this purpose. In oil burning the factor of grate surface disappears. The grates are bricked over and air admission regulated through openings and proper dampers.

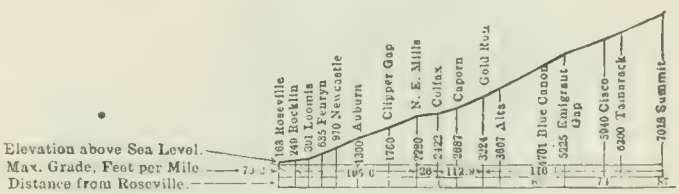
Comparative Tests With Oil and Coal.

Type of Locomotive.	Number in Service.	Evaporation, 2,000 lb. Coal Equivalent to Fuel Oil, Gal.
Eight-wheel 18-24	50	144
Ten-wheel	294	151
Mogul	176	146
Twelve wheel	67	158
Consolidation	139	162
Atlantic	19	144
Mallet	17	No coal record.

The figures shown in the table of comparative tests, are based on evaporative tests made before and after con-



Locomotive Firebox Fitted for Burning Oil.



Profile of Road, Roseville, Cal., to Summit.

The accompanying table gives the results of evaporative tests made on oil burning locomotives crossing the Sierra Nevadas, the profile of the division being shown above:

Class of engine	10 wheel	Consolidation	Mallet consolidation
Service	Passenger	Freight	Freight
Number of single trips in test	2	2	2
Total time of test	17 hr. 39 min.	21 hr. 23 min.	29 hr. 2 min.
Actual running time	13 hr. 55 min.	12 hr. 59 min.	18 hr. 11 min.
Miles run	315	174	174
Average steam pressure (gage), lb.	196.0	196.1	194.5
Smokebox temperature, deg. F.	797	738.5	451.3
Total lb. water evaporated	367,642	400,858	759,058
Total gal. oil burned	3,951.6	4,328.4	7,692.1
Total lb. oil burned	31,613	34,627	61,537
Equivalent evaporation, lb. water per lb. oil	14.14	13.95	15.04
Lb. water evaporated per sq. ft. heating surface per hr.	8,698	8.809	6,392
Lb. oil burned per sq. ft. heating surface per hr.	0.748	0.761	0.518
Number of cars in train	7	14.5	24.5
Weight of train, tons	342	481	1,056
Gross ton mileage	107,730	83,694	183,744
Lb. water evaported per 1000 ton miles	3,413	4,790	4,131
Gal. fuel oil burned per 1000 ton miles	34.90	48.40	39.51
Boiler efficiency, per cent	73.84	72.83	78.52
Maximum i. h. p.	1,719	1,470	2,486
Mean i. h. p.	1,368	1,222	2,057
Engine No.	231	2564	4001
Size of cylinders, in.	22 x 28	22 x 30	26 and 40 x 30
Diameter of drivers, in.	63	57	57
Total weight of locomotive, lb.	203,300	208,000	425,900
Weight on drivers, lb.	160,000	187,000	394,150
Weight of tender, lb.	138,070	134,745	169,765
Total heating surface, sq. ft.	2,994	3,403	6,394
Feed water heater, heating surface, sq. ft.	.....	.....	1,221

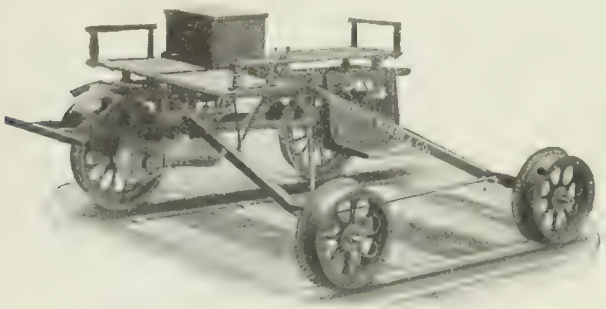
Note.—Train weights are the average for the distance hauled and are

exclusive of engine and tender. Tests made under ordinary service conditions. Engines unaided. In "water evaporated and oil burned per sq. ft. heating surface per hr.," the figures are for actual running time; the allowance of 15 gal. of oil and its equivalent in water is made per hr. while standing. In "gal. and lb. oil per ton mi.," a deduction is made of 15 gal. per hr. while standing and 3.5 per cent. of oil for evaporating steam for atomizing oil. Quantity of oil burned corrected to normal temperature of 70 deg. F. All measuring instruments calibrated. Analysis of fuel: Kern River oil; gravity, 15.8 deg. Baumé; flash point, 230 deg. F.; fire point, 278 deg. F.; commercial weight, 8 lb. per gal.

version. The comparisons are with ordinary bituminous coal of about 13,350 B.t.u. The total number of locomotives accounted for is 745, and the mean equivalent is 152 gal. or 3.62 bbl. of 42 gal., equivalent in heat value to 2,000 lb. of coal. The average equivalent figures in the table cover much careful work and are based on equivalent evaporative results from many service tests. It should be borne in mind that the figures are from service tests and represent oil burned on the main line between terminals only and not losses in transfer, handling or firing up, etc. Our accounting department uses a figure of 168 gal., or 4 bbl. of oil, equivalent to one ton of coal. It may be said that with fuel oil, providing the engines are burning it with a fair degree of efficiency, the quality of fuel is a constant factor. Poor or bad coal as accounting for engine failures drops from the delay report and cleaning fires is abolished.

FAIRBANKS-MORSE ALL-STEEL MOTOR CAR.

Among the recent developments in motor cars is the Fairbanks, Morse & Company No. 28 car, which is a comparatively new design. It is "all steel," the frame being made of sheet steel, sheared and punched to shape, then flanged around so that the top, sides and bottom flanges of the frame are all one. The engine is of the two-cylinder (one on each side of the front



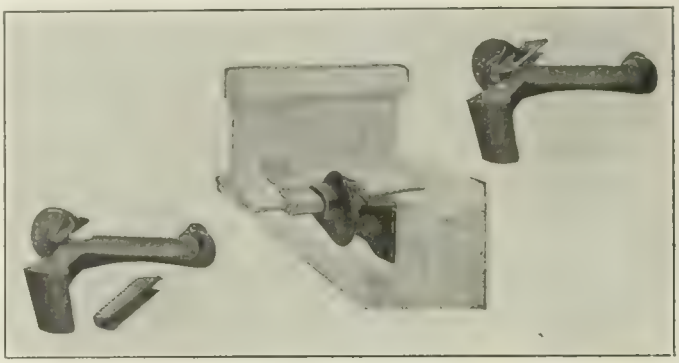
Fairbanks-Morse No. 28 All-Steel Motor Car.

wheel), two cycle air-cooled type, giving great simplicity as well as economy by reason of a small number of wearing parts and consequent small expense of renewals. The engine is direct connected to the front wheel, and will drive the car at any speed from six to 25 miles per hour. The car has a capacity for three people, but it is light and can easily be handled by one man. The car is built by Fairbanks, Morse & Company, Chicago.

A NEW ANTI-RAIL CREEPER.

The railways have tried numerous means to prevent the bad results of rail creeping, but such means as tamping the joint ties, inserting blocks of wood between the ties and strapping the rails to ties by bolting metal straps to the rails and spiking the ends to adjacent ties, have proved inadequate.

One of the most recent types of anti-creepers which have been developed to successfully stop creeping is illustrated herewith. It is known as the Q & C wedge anti-rail creeper. The device is made of malleable iron or semi-steel, and consists essentially of a yoke fitting over the base of the rail and held in place by a wedge. The yoke, with its abutting face on the same end that receives the wedge, has a lug on its large hook side. The under side of this lug is corrugated to form teeth sloping in the direction of the abutting tie. Directly beneath these teeth, but set one-half a tooth's width back, is a similar set of teeth which engage with corrugations on the wedge. The device can be applied very simply. The yoke portion is slipped over the base of the rail, bringing the abutting face up against the tie, and by giving the wedge a tap with any convenient tool the teeth on the wedge are meshed with those on the yoke, in which position the device will remain tight. It is claimed that the design of teeth on the yoke and both sides of the wedge gives an auto-



Q & C Anti-Rail Creeper.

matic tightening effect so that the wedge can tighten up and will never give back and that the greater the pressure brought to bear upon the yoke the tighter the anti-creeper grips the rail. As the abutting face bears upon the tie the ratchet teeth in the yoke slide over those on the wedge, tightening the device permanently and preventing its loosening when the train passes over and the rail rebounds. This device is being placed on the market by the Q & C Company, New York.

FOREIGN RAILWAY NOTES.

The Russian committee on new railways has been considering projects for the construction of lines in the eastern part of Russia, notably that of the Troitzsk Railway Company, which seeks permission to construct under guarantee of the government a line from Orenburg through Orsk to Troitzsk, of a total length of 420 miles. The contractors wish to also form a share company for the construction of an Orenburg-Orsk railway 190 miles long. The committee is giving these lines full consideration.

The first section of the proposed Pan-American railway in Guatemala, between Las Cruces and Coatepeque, presents difficulties heretofore unencountered in the construction of railways in Guatemala, since, in the desire to locate the line as near as possible to the zone of production, it penetrates, in consequence, a territory, extremely broken, an adequate idea of which may be received from the fact that, in the first 20 miles, the excavation will exceed 2,500,000 cu. yds. The required bridges, in addition, are numerous. There are several bridges which will be 560 ft. long and 250 ft. high. Twelve of the 42 miles have been graded. Of the part which remains, eight miles run through very broken ground, necessitating deep excavations, where operations must necessarily proceed slowly because of the limited number of workmen which can be concentrated at any one point. Once arrived at Coatepeque, the condition of the ground undergoes a notable change, reducing greatly, in proportion, the amount of earth to be removed, and assuring for that section a rapid completion. Seven miles have been completed and opened to traffic; that part of the line between Las Cruces and San Miguelito. With the installation of three bridges, rails will be laid to Taltute or Santa Joauina, 12 miles. The extension to Agutla, on the Mexican frontier, is expected to be completed by July, 1913.

Maintenance of Way Section.

OUR contest on The Foreman Problem—How to Provide a Supply for the Future, is arousing much interest. The problem is of such direct concern to maintenance men, and its importance is so fully realized by them that the contributions should be especially valuable. The railways that are not already facing this problem must face it soon, and the methods of solving it advocated by the men directly concerned with or engaged in track work should prove interesting to their superiors. Ten days still remain in which to send in contributions, and it is hoped that as many as possible will tell of their experience for the benefit of others. We will pay $25 for the best and $15 for the second best discussions of this subject, and all other contributions accepted and published will be paid for at our regular space rates. All contributions must reach the Civil Engineering Editor of the *Railway Age Gazette,* 417 South Dearborn street, Chicago, not later than March 25.

THE statements showing the remarkable savings effected by the Union Pacific and Chicago Great Western by the use of motor cars, which appear in this issue, are of such definite value in showing actual results on two important railways as to warrant careful study. That these savings are due to the use of cars and not because the track has been allowed to run down is evident to any one familiar with the roads, for on the contrary, the condition of the track has been gradually improved, especially on the Chicago Great Western. While the saving of $258 per mile per year on the Union Pacific is partially due to the combined track and signal maintenance, the larger part of it, it is believed, resulted from the use of the cars. The saving of $9,504.50 per month on the Great Western is at the rate of $76 per mile of main track per year.

TRACK men will soon be preparing for the heavier work to be done during the coming season, including rail relaying, ballasting, etc., and a discussion of the best methods of handling such work is timely. In most cases floating or extra gangs are used. The question frequently arises as to whether this is the most economical method. It is frequently the case that work is done with extra gangs which can be done to better advantage by increasing the regular section forces, and the reverse is also sometimes true. In planning for extra gang work it is necessary to consider the selection of suitable foremen as well as men. How should foremen, assistant foremen and timekeepers be provided? Is it best to put regular section foremen in charge of the gangs, or to hire outside foremen? If section foremen are used, does this tend to demoralize and break up the section organization? Also, are the foremen selected because of their experience with the class of men to be handled? Is an effort made to secure those laborers who are naturally suited because of their strength, racial characteristics, etc., for the work to be done, and are the gangs transferred from one class of work to another without considering these natural characteristics? What peculiarities and relative advantages do the different kinds of labor possess for the different classes of work? All of these questions and others suggest themselves to the roadmaster and supervisor when they are organizing their extra gang forces. The whole subject is an important one, in view of the large number of men employed and the amount of money expended each season. We desire to secure a full discussion of the extra gang problem and will pay $25 for the best and $15 for the second best papers submitted on this subject, while others accepted and published will be paid for at our regular space rates. All contributions must be in the hands of the Civil Engineering Editor of the *Railway Age Gazette,* 417 South Dearborn street, Chicago, not later than April 25.

CHICAGO will be the central point of interest for the engineering maintenance of way men of the United States, Canada and Mexico next week. The annual convention of the American Railway Engineering Association will be held on Tuesday, Wednesday and Thursday, while the spring meeting of the Railway Signal Association will be held on Monday. The annual exhibition of the Railway Appliances Association will be open all week at the Coliseum. Because of these important annual meetings the third week in March is becoming more firmly fixed each year in the minds of railway men as convention week. Greater interest is being taken from year to year, and the meetings are becoming more largely attended and more valuable. The Railway Appliances Association, which has been somewhat crowded for the past two years, has spread out this year into the First Regiment Armory, so that a larger space is available for exhibits. It is to the benefit of every one from chief engineer to supervisor and foreman to attend as many of the meetings of the American Railway Engineering Association as possible. A visit to the exhibit at the Coliseum is specially instructive, for there one has an opportunity to see and investigate practically all the leading track devices in use, as well as many new devices which are now being tried. For the benefit of those who cannot attend, as well as to provide those who do attend with a record of the meetings, the *Railway Age Gazette* will publish a daily edition during the conventions which will contain complete reports of the proceedings, including the discussions. This daily edition will be sent to all subscribers to the Maintenance edition, as well as to the regular weekly edition.

ON most roads it is the practice for the section forces to maintain the approaches to highway crossings and the highways themselves out to the right of way lines. Generally this practice has come to be regarded as a legal obligation, both by the railways and by the highway supervisors, and the supervisor promptly sends a notice and a demand to fix a crossing whenever he has any complaint to make. As the amount of travel, and especially of automobile travel, on the highways has increased, the work required to keep these crossings in proper condition has likewise become greater, until at present it is making serious inroads on the time of the track forces and the annual cost is a large sum. In many cases little thought has been given to the question of the railways' legal responsibility for the maintenance of those portions of the roads between their right of way lines. The legal department of one railway recently investigated this subject in Kansas, and advised that when a railway is constructed across a public highway after the highway has been laid out and dedicated to public use, it is the duty of the railway company to restore the road as nearly as practicable to its former condition and construct the necessary approaches to the railway track. If drains in the approaches are necessary the railway is required to maintain these drains. When a road is opened across the railway tracks it is not the duty of the railway company to construct the approaches or to put in and maintain the drains in these approaches, but the railway is simply required to properly plank the crossing. As a result of this advice, this railway has discontinued maintaining those portions of the highways beyond the ends of the ties. The Supreme Court of Iowa has ruled that a railway company must maintain the approaches to a crossing in that state. However, even here railways generally maintain to the right of way line, which, in most cases, is beyond the end of the approaches. The statutes and the court decisions on this subject vary in the different states, and in these days of strict legal interpretations, when the public in general is very careful to see that the railways comply with every detail of the law which works to the public's benefit, the railways might well in-

vestigate these different statutes, and, if it is found that they are maintaining more than they are required to do, place the burden where it legally belongs.

A FROG and switch repair car, such as that used on the St. Louis & San Francisco, and described in the *Railway Age Gazette* of January 19, or that of the Southern Pacific described in this issue, should prove of equal value on other roads. On the lines mentioned a blacksmith travels over the road with the car repairing frogs, switches and other track material as he proceeds. This eliminates shipping such heavy material to the storehouse or shops for repairs, which is no small expense in itself. It also insures better workmanship, for the man who devotes his entire time to this matter is better prepared to handle it expeditiously and properly, and he will also do better work, for he will know that any defects will show up against him. The Frisco repair man advises the section foreman in advance when the car will be due at his station. The foreman arranges to have his men near at hand where they can be readily called in when the car arrives. All frogs, switches and other track material are carefully gone over and put into good condition before the car leaves. The blacksmith also repairs the workmen's tools and does any work that may be needed for the station master, such as repairing defective trucks, etc. When the car leaves the station all the tools are in good condition, having been tempered and sharpened. The moral effect of this plan on the track forces is very good, as it gets the men to watching their tools more carefully. Instead of throwing them away when they become worn they will carefully lay them aside until the repair man comes along. One of the older foremen was so pleased with the result of this plan that he dug up a lot of discarded tools and had them repaired. It would appear possible to extend this method to important lines on other roads where the traffic is heavy and frog and switch repairs are in proportion. A good place to try it out experimentally would be in yards or terminals where the number of frogs within a limited area is large and the car would be subject to few delays.

A RAILWAY LABOR BUREAU.

WHEN one considers the care with which material is purchased for use on a railway he is inclined to wonder at the apparent want of care in the selection of the large number of men who make up the bulk of the unskilled labor used in maintenance and construction work. Specifications for surplus are prepared to insure proper material and workmanship, and bids are asked from several manufacturers to secure competition. After the contract is let inspectors test the finished product before it is accepted. At every stage of the transaction the purchasing department tries to protect the interests of the road by getting the best material for the money. Furthermore, as all purchases are made through one department benefits are derived from the greater experience of the men in this department and from the combination of orders for different parts of the system.

When getting unskilled labor, especially for floating gangs, and also to an increasing degree for section work, such precautions are not taken. On most roads such labor is secured through labor agents, and the railway gives few, if any, instructions beyond the number of men required. On some roads this work is concentrated so that one representative of the company deals with the labor agents. On other roads each division officer conducts his own negotiations.

The wide range in efficiency of different nationalities in special lines of maintenance work, and of different men in the gang, many times is not considered, the assumption being that one man is as good as another. It might as well be assumed that a soft tie is as good as an oak tie, so it is a tie. Part of the decline in the quality of track labor is probably due to this attitude. Because men of the better class are paid no more than the poorest workman in the gang, and a fixed wage applies to the same work on all parts of the system, there is no incentive for an ambitious laborer to exert himself, and he goes into other trades where industry is rewarded by increased pay. This is largely because many railway men believe that all foreigners of the nationalities making up the bulk of track labor are incapable of anything but unskilled labor, whereas large numbers of them are to be found in the ranks of the building and other skilled trades.

The organization of a labor bureau, such as is advocated by Mr. Wollner in an article published elsewhere, would appear to have a number of advantages. It is true that the first result would be to increase the cost of operation by the amount expended for the organization of the bureau, but the results secured by the better selection and distribution of labor should much more than offset this. This increased first cost should not be allowed to blind the higher officers to the merits of the plan, for sometimes a small increase in salaries is a stumbling block which prevents important improvements from being made.

A railway having such a bureau could exercise control over the labor secured, which is not the case when roads deal with the labor agent. As his fee is received from the laborer the agent has an incentive to have each laborer come to him as often as possible. He will naturally encourage short service and frequent change, because his income is thereby increased. This fee system is demoralizing to the laborer, especially if he has but recently come to this country. In many cases the foreman, or more frequently the interpreter, levies further tribute by charging the men for allowing them to keep their jobs. Even strict supervision will not entirely eliminate this, and it seems impossible to stamp it out under the present organizations. In many cases an interpreter has such a strong hold on his men that he is able to take them wherever he goes. He bargains for their work as a unit, and the discharge of one means the quitting of the entire gang. Such gangs give much trouble, for it is very difficult to maintain any sort of discipline over them. Because of the demoralizing influence of many interpreters many roadmasters prefer to do without them.

There is much to be gained by a careful selection of the men for the special purposes for which they are desired. For laying rail or doing other heavy work native hoboes or Austrians are usually better than Italians or Greeks, because of their stronger physique. The reverse is true of ballasting work. For laying frogs and switches in yards hoboes are better than foreign labor, because of their greater intelligence and familiarity with the work. Again, where several gangs are concentrated on the same work excellent results are secured by hiring as far as possible gangs of different nationalities. By taking advantage of national rivalries the men may be spurred to increased efforts. A labor bureau should be able to distribute gangs so as to get the best results, a thing which is many times not now done because of a lack of such a central organization.

Another advantage of such a system would be the opportunity it would afford for the inspectors traveling over different parts of the systems to study the weaknesses and strong points of the different classes of men on different divisions. The fact that one division has obtained better results with one class of labor than another division has obtained with another class is not necessarily conclusive, for the difference may be due to differences in the methods adopted by the roadmasters or foremen in handling the men. Each class must be handled differently, and many foremen are unable to do so. By having the opportunity to study results on a number of divisions an inspector should be able to give valuable advice to the roadmasters and foremen, and, perhaps, to get a corps of foremen who could be used with the class of gangs in the handling of which they were most proficient.

Only one or two roads have experimented with the plan advocated by Mr. Wollner. The present year probably will offer a good opportunity for such experiments, for the present outlook is that the supply of labor will exceed the demand, making it possible to exercise more than usual care in selecting labor.

EVOLUTION IN TRACK AND SIGNAL MAINTENANCE ON THE UNION PACIFIC.

BY A. M. FOOTE,
Chief Clerk, Maintenance Department, Nebraska Division, Union Pacific.

Although much progress has been made toward efficiency and economy in many railway departments that employ a large amount of labor, the organization of the maintenance of way department has long remained practically unchanged. There is no question but that considerable labor is duplicated in this department.

Following is an outline of an organization in force for the past two years on a portion of the Union Pacific, which may be of interest and use to others who are working toward improvements in maintenance operations. The three principal reasons for changing from the former organization of maintenance forces were:

(1) The loss of time in transporting men back and forth between section headquarters and the place of operation, when hand cars are used. By the hand-car method there is a loss of both time and energy. It cannot be expected that the gang which has "pumped" a slow-moving hand car against head winds will start the day's work on the track with very much vigor, nor will they show energy in the afternoon's work with a prospect of pumping a hand car several miles before arriving at home in the evening.

(2) The amount of time "killed" by laborers when left to themselves or when "pumping" the foreman over a section, as is necessary under the old organization, while the foreman is inspecting track. Nearly all trunk lines require foremen personally to inspect the track on their respective sections at least three times a week. A foreman must either take the entire gang with him or leave a number of the men to themselves while he is absent, which, in either event, results in practically nothing being accomplished by the gang during this inspection. This is especially true if foreign labor is used.

(3) The lack of sufficient force on any one section under the former method for successfully and economically handling heavy work. This is due to the allotment of men per section being small, as the length of the section is restricted by the use of hand cars, and the allowance of laborers on a district is made practically on a mileage basis. Main line sections on trunk lines usually average four to six miles of single track or three to five miles of double track. During the summer season, when the maximum force is employed, there are barely enough men in the section gang properly to line or surface track where heavy steel, hardwood ties, tie plates, and ballast are used. When the force is reduced, there are seldom enough men left to handle a full-length heavy section rail, to say nothing of lining track, and when any heavy work is to be done, it becomes necessary to combine two or three section gangs, some of them "pumping" hand cars six to nine miles. This plan results in no care of the track during the interim on the sections that have been robbed. The winter force on each section as a unit is of little use except to "pump" the foreman back and forth over his section, perhaps tightening a few bolts or tapping down a few spikes. There is not sufficient force properly to gage, spike, line or shim track.

The three principal difficulties above outlined have been overcome by the modernized organization which we have in effect on the western district of the Nebraska division. The district consists of approximately 95 miles of double-track main lines, fully protected by automatic block signals, and approximately 65 miles of single-track branch line, with no block signals.

The main line is divided into 11 sections. The first section consists of two and one-half miles of double main track and a large yard at the junction of the main line and branch. The remaining 10 sections are nine or nine and one-half miles in length, each with a total of 18 or 19 miles of track. On each of these sections there is a foreman in full charge of track and signals at a salary of $75 per month; an assistant foreman at a salary of $65 per month; and 12 to 15 laborers during the summer season and five to seven laborers during the winter months. On each of these sections, gasolene section motor cars are used, with push-car trailers, capable of transporting 15 to 20 men and a full consignment of tools. A hand-power velocipede is also provided for the use of each foreman in making track and signal inspection. The work on the entire district is under the direction of a roadmaster with an assistant roadmaster.

On the branch line there are three sections of 16 miles and one section of 17 miles. Gasolene section motor cars are used. A foreman and six or eight men are employed during the summer season, and two men during the winter on each section, and the track is maintained in better condition and at less expense than was formerly the case with eight eight-mile sections.

The automatic block signals are of the semaphore type, made by the Union Switch & Signal Company, and installed by the railway company's forces. It formerly required, for the automatic signal maintenance, seven signal maintainers at salaries of $75 per month, each using a small gasolene motor car and covering a territory of approximately 13½ miles. These maintainers were in charge of an assistant signal supervisor, and under the general supervision of the signal supervisor.

This organization required the maintainers to cover their respective territories daily, taking care of the signal apparatus. They frequently called upon the section foreman for the necessary assistance in making repairs to insulated track joints, and there was constant friction between the signalmen and track men as to the care of bond wires, the adjustments of switches, repairs to joints, etc. In addition, the roadmaster, of course, required each section foreman to inspect the entire track on his section at least three times a week during stormy or severe weather, and track walkers were used to insure that the track was thoroughly inspected daily.

It was observed, however, that one man could cover the track daily, inspect it carefully, make what minor repairs were usually required of a track walker, and also give the necessary attention to bond wires, signal lamps, batteries, and other apparatus—in other words, that one man could easily perform the duties of both signal maintainer and track walker. This was then tried by entrusting the work of a track walker to the signal maintainer, but, as the maintainers were not responsible to the section foremen or the roadmaster, it was found very unsatisfactory.

When the modernized organization was put into effect, all of the signal work was placed under the supervision of the roadmaster, and the former assistant signal supervisor was appointed assistant roadmaster. The few signal maintainers who cared to remain under the revised organization were made section foremen or assistant foremen, an experienced track man being placed on the same section either as foreman or assistant, as the case might be, care being taken to have a competent track man and signalman on each section. The section foreman has since been made responsible for the maintenance of track and signals on his section. Each morning either the foreman or assistant foreman takes the gang and tools, with a section motor car, to the point of operation on the section and remains with the gang the entire day in direct supervision of track maintenance. The other foreman, with the use of a hand-power velocipede car, takes the necessary tools and supplies for the signal repairs and for light track repairs, proceeds over the section inspecting the track carefully, repairing bond wires, batteries, etc., filling signal lamps, oiling and adjusting signal apparatus, replacing or tightening bolts, inspecting frogs and switches; in fact, doing all work formerly performed by both signal maintainer and track inspectors. He makes note of any bad spot in the track which requires the service of the gang, and reports the condition when he returns at night, or when he meets the foreman and gang on his return to the section headquarters. If conditions are such as to require immediate attention, he re-

turns to the gang at once and procures the necessary assistance.

Experience has taught us that a thorough inspection of track conditions and signal apparatus cannot be made by the use of motor cars. No matter how conscientious the inspector may be, he will unconsciously, if not intentionally, travel over his section at a rate of speed that will not permit of proper inspection. Therefore, we consider it advisable to equip each section with a hand-power velocipede for use in making daily inspections. This has resulted in considerable saving in the difference in cost of the two types of cars, and at the same time has secured a more perfect inspection, and consequent higher efficiency in track and signal maintenance.

We find that this organization overcomes the three principal difficulties previously mentioned, namely:

(1) Gangs are transferred to or from any point on a nine and one-half mile section in 30 or 40 minutes.

(2) The men are under the constant supervision of a foreman.

(3) There are a sufficient number of men on each section at any time properly to handle any ordinary track or signal repairs.

In general, we get more frequent and more careful inspections of track and block signals, and both are maintained in as good condition as under the former separate organization with as few avoidable signal failures, and at a greatly reduced labor expense. There is now no friction between the men of different organizations, as there is but one organization, and the foreman on each section reigns supreme. Some difficulty, quite naturally, was experienced at first with the signal work until the men had been sufficiently instructed and had gained experience, but this has long since become history.

We believe the organization can be further improved; and though it might not be adaptable to all conditions, it has certainly proved successful on the western district of the Nebraska division. We have attained a higher state of efficiency and maintained the high standard for which the Union Pacific has a world-wide reputation, very much more economically than by the former organization. This is shown by the following comparative statements:

Comparative Statement of Block Signal Failures for Six Months, Ending November 30, 1911.

	Failures of Practically Same Mileage on Different Districts.			
	Separate Organization, 307 Signals.		Combined Organization, 357 Signals.	
Description of Failure.	Avoidable.	Unavoidable.	Avoidable.	Unavoidable.
Broken leading wires	.	1	..	2
Relays damaged by lightning	.	7	.	10
Defective relays	.	1	..	1
Broken wires on slot coil		.	..	4
Broken wires in battery chute		0	..	1
Broken wires on terminal board back of battery		1	.	0
Defective lightning arrester		1	..	0
Broken bond wires	4		2	..
Loose connections	0	.	3	..
Weak track battery	0	..	2	..
Defective insulated joints	0	.	1	..
Improper connection on track battery	1	..	0	..
Totals	5	13	8	18

Comparative Statement of Average Monthly Cost per Block Signal of Maintenance and Operation.

	Average cost of practically same mileage on different districts.			
	Separate Organization.		Combined Organization.	
Character of Work.	Per Signal.	Total.	Per Signal.	Total.
Maintenance	$ .53 7-10	$164 84	$ .70½*	$251.69
Operation	1.85 3-10	568 73	1.17½	419.47
Total	$2.39	$733.57	$1.88	$671.16
Separate organization, average cost per month, per signal				$2.39
Consolidated organization, average cost per month, per signal				1.88
Average saving per month, per signal				$ .51

Monthly Comparison of Cost of Separate and Consolidated Organizations—Main Line, Western District.

Separate Organization without Motor Cars.		Consolidated Organization with Motor Cars.	
Force.	Cost per Month.	Force.	Cost per Month.
1 Roadmaster	$140.00	1 Roadmaster	$140.00
1 Assistant Signal Supervisor	110.00	1 Asst. Roadmaster	110.00
24 Foremen	1,465.00	11 Foremen	825.00
7 Maintainers	525.00	11 Asst. Foremen	715.00
Total	$2,240.00	Total	$1,790.00

Separate organization, cost per month for supervision	$2,240.00
Consolidated organization, cost per month for supervision	1,790.00
Saving per month on supervision	$450.00
Saving per month on reduction in number of laborers, account use of motor cars	624.00
Total saving per month account reduction in force	$1,074.00
Total saving per year account reduction in force	$12,888.00

Statement of Cost of Maintaining Track and Signals, Main Line, Western District, Under Separate Organization, as Compared with Cost of Maintaining Same Territory by Combined Organization.

Supervising Force—Separate Organization:			
1 Roadmaster	$140.00		
1 Asst. Signal Supervisor	110.00		
24 Section Foremen	1,465.00		
7 Signal Maintainers	525.00		
Total		$2,240.00	
Supervising Force—Combined Organization:			
1 Roadmaster	$140.00		
1 Asst. Roadmaster	110.00		
11 Section Foremen	825.00		
11 Asst. Section Foremen	715.00		
Total		$1,790.00	
Saving per month on supervision			$450.00
Saving per month on reduction in number of laborers, account using motor cars	$624.00		
Saving per month in time going to and from work, account of motor cars	*707.72		
Saving per month in time of laborers, account combined organization leaving foremen in charge, while other foreman is inspecting track and signals	353.93		
Total saving per month on laborers' time			$1,685.65
Total saving per month on labor			$2,135.65
Total saving per year on labor			$25,627.80
Cost of additional buildings that would have been required by separate organization	$17,754.00		
Less cost of additional buildings required to take care of combined organization	4,916.00		
	$12,838.00		
Expense of moving buildings to suitable locations and repairing same, account combined organization	4,697.00		
Net saving on permanent investment in buildings	$8,141.00		
Interest at 4 per cent. per annum on net saving in permanent investment			325.64
Saving on investment in 24 hand cars that would have been required under separate organization	$648.00		
Saving on investment on seven two-man motor cars for signal maintainers	945.00		
Total saving on cars	$1,593.00		
Interest at 4 per cent. per annum on value of cars	$63.72		
Annual saving on hand and two-man motor cars			$63.72
Total gross saving per year			$26,017.16
Invested account combined organization:			
For 11 section motor cars	$3,850.00		
Interest at 4 per cent. per annum on above investment	$154.00		
Cost per year maintaining above cars	440.00		
Cost per year to operate 11 section motor cars:			
Gasoline oil	$660.00		
Lubricating oil	192.00		
Waste	30.00		
Total cost of operation	$882.00		
Total per year for investment, maintenance and operation		$1,476.00	
For 11 two-man hand power velocipedes	$302.50		
Interest at 4 per cent. per annum on investment	$12.10		
Cost for oil and general maintenance	24.20		
		$36.30	
Total expense per year for equipment, account combined organization			$1,512.30

*Figures closely estimated; no positive data at hand at this time.

Total expense per year for equipment, account combined organization (brought forward)	$1,512.30
Total net saving per year on main line, account combined organization	$24,504.86
Total net saving per year, per mile of double main track and block signal equipment for maintenance and operation	$258.00

Monthly Comparison of Cost of Organization Equipped with Hand and Section Motor Cars, Branch Line, Western District.

Hand Car Organization. Force.	Cost per Month.	Motor Car Organization. Force.	Cost per Month.
1 Roadmaster	*	1 Roadmaster	*
8 Section Foremen	$480.00	4 Section Foremen	$250.00
Organization with hand cars, cost per month for supervision			$480.00
Organization with motor cars, cost per month for supervision			250.00
Saving per month on supervision			$230.00
Saving per month on reduction in laborers, account use of motor cars			195.00
Total saving per month, account reduction in force			$425.00
Total saving per year, account reduction in force			$5,100.00

Statement of Cost of Maintaining Track, Branch Line, Western District, Under Hand Car Organization, as Compared with Cost of Maintaining Same Territory by Motor Car Organization.

Supervising Force—Hand Car Organization.		Supervising Force—Motor Car Organization.	
1 Roadmaster	*	1 Roadmaster	*
8 Section Foremen	$480.00	4 Section Foremen	$250.00
Saving per month on supervision			$230.00
Saving per month on reduction in number of laborers, account using motor cars	$195.00		
Saving in time going to and from work, account use of motor cars	140.46†		
Total saving per month in laborers' time			$335.46
Total saving per month on labor			$565.46
Total saving per year on labor			$6,785.52
Saving on investment in eight hand cars required by the hand-car organization	$216.00		
Interest at four per cent. per annum on value of cars	$8.64		
Annual saving on investment			8.64
Total saving per year			$6,794.16
Invested account motor car organization: For four section motor cars	$1,400.00		
Interest 4 per cent. per annum on value motor cars	$56.00		
Cost per year maintaining above cars	160.00		
Cost per year to operate four section motor cars:			
Gasoline oil	$240.00		
Lubricating oil	69.80		
Waste	11.00		
Total cost of operation	$320.80		
Total cost per year for investment, maintenance and operation	$536.80		
Total expense per year, for equipment, motor car organization			$536.80
Total net saving per year, branch line, account motor car organization (see Note)			$6,257.36
Total net saving per year, per mile, of single branch line track, for maintenance			$96.26

*Roadmasters' salary all shown on Main Line.
†Figures closely estimated; no positive data at hand at this time.
[Note.—Section buildings not taken into consideration in the compilation of this data, as we had no buildings under the hand car organization, neither have we now under the motor car organization. However, a further saving can be shown, as only four complete sets of section buildings would be required by the motor car organization, while the hand car organization would call for eight complete sets.]

Summary.

	Per Year.	Per Mile.
Total net saving, Single Branch Line	$6,257.36	$96.26
Total net saving, Double Main Line	24,504.86	258.00
Total net saving on District	$30,762.22	

The officers of the American Wood Preservers' Association have adopted a plan this year of indexing all articles pertaining to timber preservation which appear in the technical papers, and sending copies of this index monthly to all members of the association.

THE CEMENT GUN.

The use of a device known as the cement gun for placing cement in various ways not previously considered practicable has recently attracted considerable attention. While formerly thin layers of cement could be deposited only by means of slow and expensive methods either by plastering or by the building of forms, the same result is secured with great rapidity and in some cases at even a lower cost with the cement gun. The advantages of this machine and a complete discussion of the character of the cement deposited by it were presented in a paper read by William A. Jordan before the American Society of Engineering Contractors at the society's regular meeting November 14, 1911. The following details are abstracted from this paper.

The apparatus was invented by C. F. Akeley, a taxidermist of Chicago, who was connected with the Field Museum committee in charge of remodeling and preserving the World's Fair building in Jackson Park used for that museum. The coating of this



Cement Gun Apparatus.

building with stucco was the first commercial use of the new apparatus, the work being performed rapidly and successfully.

The cement gun consists essentially of a hopper in which the materials are placed, a hose connected to the bottom of the hopper through which a dry mixture of cement and sand is forced by compressed air, and a specially constructed nozzle at the end of the hose to which is attached another hose supplying water for hydrating the material. The hopper holds about 3 cu. ft., its capacity ranging from 10½ to 28 tons of material in eight hours. The materials are mixed dry either by hand of by a machine before they are placed in the hopper. In large operations it is usually economical to use a mixer for this purpose. The material must be thoroughly screened and mixed to prevent the choking of the feed wheel by foreign matter. Ordinary laborers can be used for supplying the material to the hopper, but the man at the nozzle must be experienced. The hose is of an extra quality of rubber and has been found to last from four to six months. Metal hose has been tried but does not give as long a life as a good grade of rubber. Metal nozzles are worn out very rapidly by the action of the sand in the blast. On this account they are lined with rubber of a special grade which has

so far proved to be the cheapest and most serviceable material for protecting the metal. The apparatus is designed to handle aggregates as coarse as buckwheat or limestone screenings for making a pebble dash finish. The design could be altered to use larger aggregate, but so far it has not been necessary. For some classes of work hydrated lime is mixed with the cement. A mixture composed of 85 per cent. cement and 15 per cent. hydrated lime has been found very satisfactory, as the lime diminishes the number of voids in the material, tending to waterproof it, and apparently the mixture goes through the gun better, "lubricating" the mechanism. The nozzle velocity corresponds to an air pressure of 35 lbs. per sq. in.

The action of depositing concrete by this process can be best explained by considering the action of the ordinary sand blast. In that apparatus a powerful current of air is allowed to escape from a nozzle, a quantity of sharp, clean sand being introduced into the stream at some point back of the nozzle. The velocity of the air imparts a high velocity to the particles of sand, the force exerted by their momentum being sufficient to wear away hard substances, such as iron castings, stone, etc. If a sand blast were directed against a surface of comparatively soft and sticky nature, such as ordinary wax, the particles of sand, instead of wearing the wax away, would penetrate the surface and become a part of the mass. This process would continue until the wax contained so much sand that the sand itself would resist the force of the blast, and the particles striking it would be thrown off. If, however, a proportion of powdered wax were introduced into the sand blast and the combined material directed against a hard surface the first particles of sand striking the surface would bounce off, but the particles of wax being soft and sticky would adhere until a thin coating of wax had been formed over the surface. When this coating had become thick enough some of the particles of sand would begin to penetrate it and remain in the wax. The process would then continue building up wax and sand in a solid mass. This is the action which occurs in the use of the cement gun. Tests of cement deposited in this way show that there is a layer of practically neat cement formed at the junction with the old surface, and on it is built up the mass of perfectly proportioned cement.

The process of depositing cement in this manner insures certain properties for the mass which are difficult to obtain in material mixed either by hand or machine. It is well understood that to obtain the maximum strength in concrete no excess water should be used above that needed for hydration of the cement, but in practice cement mixed with the theoretical amount of water is so dry as to be extremely hard to place. In the case of cement placed with the gun, any excess water which may be introduced at the nozzle is forced to the surface of the layer of cement, which is being formed by the impact of the stream, and runs away. The action is the same as that in ramming or tamping concrete which is deposited in place. This action also accounts for the fact that gun-placed cement has fewer voids than mixed cement. The proportioning is more nearly perfect than can be obtained by mixing, since the action of depositing depends upon the proper mixing of the adhesive particles of cement and the particles of sand, as was explained in connection with the sand blast. A series of tests conducted by Westinghouse, Church, Kerr & Company showed that the tensile strength of gum-made cement excelled hand-mixed cement in every case by amounts ranging from 20 to 26 per cent. The compressive strength of the gun product was even more marked, ranging from 20 to 72 per cent. better than hand work. The gun-placed cement absorbed from 5 to 70 per cent. as much water per hour per unit of area as similar hand-made surfaces. The hand-made mortars absorbed from 1.4 to 5.3 times as much water as gun-made mortars. The percentage of voids in the gun made product ranged from 52 to 75 per cent. of that in the hand-made products. The adhesion of gun-applied mortars averaged 27 per cent. better than that of hand work.

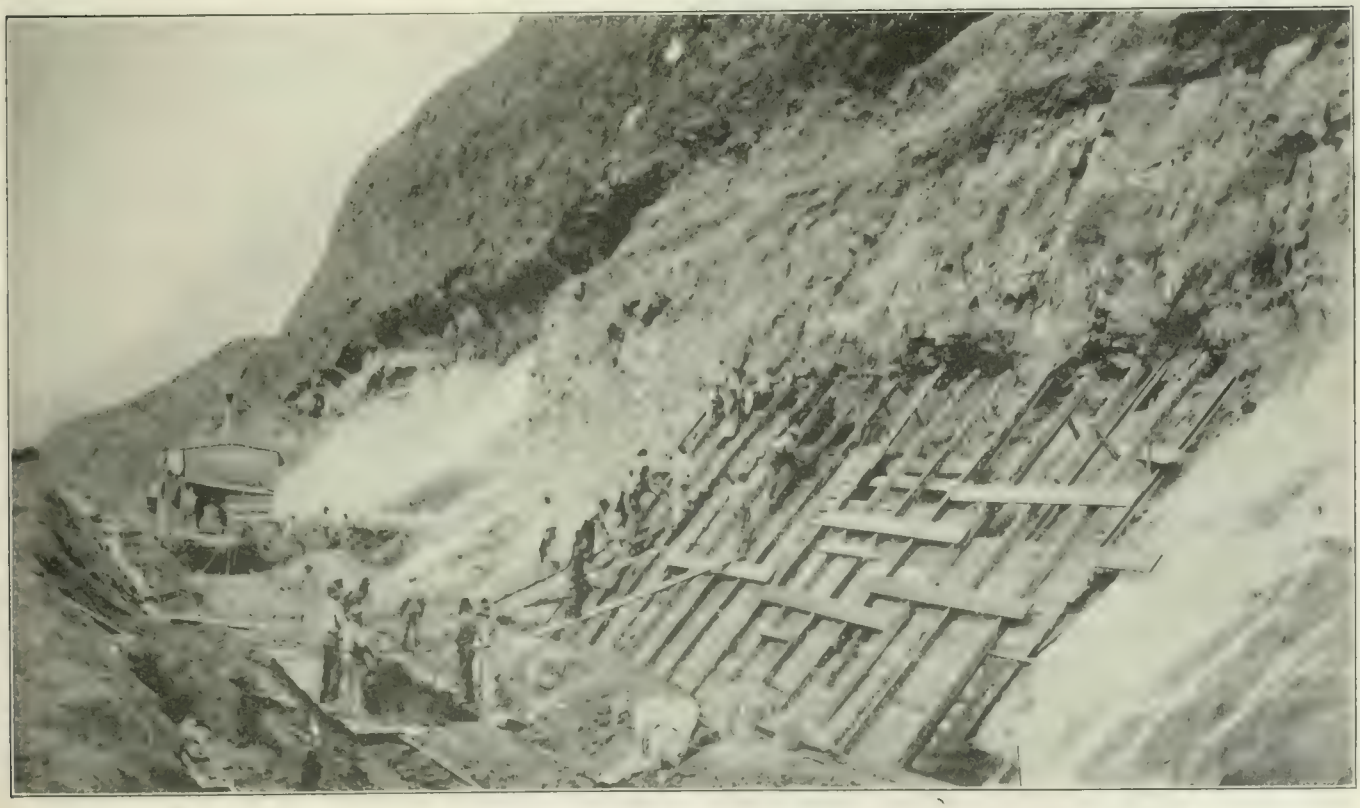


Sea Wall at Lynn, Mass., After Being Repaired with a Cement Gun.

The cement gun has been used for a number of widely different purposes, probably its best known application being that on the Panama Canal work. The excavation in Culebra cut exposed a fine grained clay rock which was moderately hard when first exposed but crumbled after a short exposure to the air. This surface disintegration was a very serious matter as it undermined the overlying strata and produced serious overhanging of the heavy rock above. To protect this rock from disintegration it was first thought necessary to build a flat wall through the cut. The engineers in charge planned to reinforce this wall with old French rails and some sections of the wall were built, varying in thickness from 4 in. to 4 ft. The cement gun was later used for this work, the surface of the rock being coated with a layer of cement about 2 in. thick which served the same purpose as the heavier walls and could be placed at a



Cement Gun in Use in Bergen Hill Cut on Central Railroad of New Jersey.



Cement Gun in Use on the Panama Canal.

great saving in cost. The gun was mounted on a flat car, carrying materials sufficient for one day's work and was operated by five men.

The New York Central & Hudson River has used the cement gun process for coating the steel work in its new terminal in New York City. This work was done without forms or centering, the coating being from 2 to 3 in. thick. On account of the vibration of trains the coating was reinforced with wire mesh. In this case the cement gun process was very economical since no forms had to be used, and, in fact, it would have been practically inpossible to set up forms around some of the structural members. The steel work was first given three coats of paint and the reinforcing wire was depended on to hold the cement in place and secure it against vibration. It is very important in applying the cement gun process to steel that the surface be free of rust and perfectly clean.

The process is well adapted to repair work on bridge piers. The best example of this class of work is that done on a pier of the Dover Street bridge in Boston which had been seriously disintegrated by the action of the sea water. In this case it was necessary to contend with tides, and it was found that after



Coating Steel Work in Grand Central Terminal, New York.

the work had been placed from three to four hours it was unaffected by the rise of the water. In experimental work a hose had been turned on cement gun work after it had set for 2½ hours without seriously affecting the quality of the product. As an experiment, the nozzle of the gun was held under water and dry cement and sand forced out through the sea water, a very good grade of cement being thus formed. This method was not used in repairing the pier, but was simply a trial to show that cement may be built up in this way.

This process will no doubt find application in numerous other forms of construction, particularly for placing the crowns of arches, tunnels, and sewer inverts. It is often a difficult matter to place the section over the top of such arches, especially when the concrete is heavily reinforced. By the use of the gun process it should be possible to deposit cement rapidly in such places.

There is insufficient data available to determine accurately the cost of work placed by the gun process, the best figures being those obtained from the work on the Panama Canal. In this case the cost of labor and material alone was 50 cents per square yard of surface covered, while the corresponding cost of protecting a square yard by the concrete wall was $3.89. The data obtained in other classes of work indicate that the cost is at least no higher than that of hand work, and for some applications to which the process is best adapted the cost should be materially reduced. It has been quite widely applied to stucco work on houses, where it has been found that a coat of stucco can be applied for about the cost of two coats of paint. New houses have been built at a cost below the best hand work, the resulting material being better in quality than hand work.

ORGANIZATION FOR THE SEASON'S MAINTENANCE WORK.

The economical and efficient prosecution of maintenance work depends very largely on the thoroughness of the organization of the forces and the care with which the season's duties are planned in advance. There is a particular part of the season in which each of the various maintenance operations can best be done; and if either is delayed, this will throw later operations out of their proper time and derange the schedule for the entire season with a resulting loss in effectiveness.

Much of the work of track and bridge forces is dependent on authority from the higher officers, and the responsibility for a late start often rests with them. Allotments of rail and ballast should be made early in the year, and the roadmaster notified where the material is to be used, so that he will not do anything which may have to be undone later. Bridgemen, likewise, should know early in the season what bridges will be renewed, so that they will make only necessary repairs. Heavy improvements, such as construction of second track or terminal yards, are best authorized early for the same reason. Instances are not unknown where a track has been ballasted early in the year, and later the construction of a second track or other heavy improvement has been authorized, with the result that the ballast on the original track has been spoiled by the grading for adjacent tracks.

It is the custom on many roads to prepare a budget about the first of the year on which is listed the work which the various departments desire to do during the year, together with the estimated costs. Theoretically, this budget includes only what the different officers believe it advisable to do, in view of the business outlook and other influencing conditions. Practically, on many roads the budget has degenerated into a list comprising all work which the various officers think there is a slight possibility of securing approval for, and including many items which they would not authorize if in control, and held responsible for expenditures. To be most useful the budget should include only that work which it is most advisable to do in order that the higher officers may distribute the money allotted for improvements to the best advantage.

It is of great advantage to secure definite action on the budget early in the year, so that work may start promptly when the frost leaves the ground rather than be delayed until May or June, awaiting authority to proceed, as is often the case. While the railways, and especially the less prosperous western roads, must closely reflect general business conditions in their expenditures, it seems unwise in many instances for these expenditures to fluctuate with business as closely as they do. It is very expensive to delay maintenance or construction until the early part of the summer while the officers are determining how business is going to be. This involves losing a month or two at the best end of the season, and necessitates carrying the work into the following winter as a result. The average railway executive is able to estimate closely enough what his road can undertake before frost leaves the ground. A very expensive form of economy commonly practiced is to postpone all the maintenance and improvements possible from year to year until after July 1 in order to include them in the account for the new fiscal year, and make a good paper showing in the expiring year. The certain result of such a system is to greatly increase expenses.

Given an early outline of what is to be done on their division, the responsibility for its successful prosecution rests largely

on the thoroughness of the organization of the roadmaster and bridge supervisor. They should arrange so that each step will be taken at the most favorable time and in accordance with the programme outlined for the entire season. The reason why one man regularly appears to have little to do while his neighbor is always badly rushed, although perhaps having less on his programme, often is that the former has eliminated all false motions, every piece of work fitting into his general plan. The duty of the roadmaster in this regard is especially important, and it is here that he can secure his best results. The section foremen likewise should know in detail what is to be done on their respective sections, and should be encouraged to plan in some manner for it. If the roadmaster can get them sufficiently interested to plan the work on their sections and then to endeavor to follow their schedules, he can unload much of his responsibility on their shoulders, and at the same time secure better results.

At this season the section foreman should be making every preparation to enter on his spring work. During the winter months he has had to watch his track gradually go down, but with the approach of spring he can begin to bring it back to proper standards. The roadmaster often has to caution new foremen about picking up low spots or bringing the low side of the track to level before the frost is entirely out of the ballast and subgrade. Shimming needs to be looked after carefully and the shims changed as the frost leaves the ground. Drainage is an important matter at this time of the year. The effects of poor drainage are especially evident where a large amount of snow has been on the ground, as has been the case in many parts of the country this winter, and leaves with a heavy rain.

After careful study of track conditions during the winter the roadmaster will find it profitable to go over each section with the foreman and coach him in detail regarding the work of most importance. Although the practice on some roads is to renew ties with extra gangs, many maintenance officers do not look on this with favor, and the handling of tie renewals by the regular section forces is more general. For single tie renewals the spring offers the most advantages to the track man. The ballast is loose and mellow, and the weather cool enough to allow the men to work to the best purpose. In order to take advantage of these conditions and to avoid delay when the weather is favorable, the ties should be distributed at an early date when the men cannot do other things. Unless this is done about one-fourth of the available working time is lost in trucking ties to the places where they are required. With proper arrangements it is usually possible to have the distribution made before the renewal work starts. Where the supply of ties has been stored in yards along the track, especially on branches or less important main lines, a good way to distribute them is to furnish a few flat cars at these stations. The section forces can then load and unload the ties where wanted by way-freight. As a car of ties can be unloaded in ten to fifteen minutes this causes but little delay to trains. The empty cars can be set out at the next station where they can again be loaded and unloaded by the way-freight on its return trip. After the ties have been put in track, which is usually the heaviest part of the section foreman's work, the regular work can proceed. There is plenty of time for the ties to become settled by the spring and the early summer rains, thus making it possible to level up and surface the track in good condition during dry weather. In fact, in this way the track can be kept in good riding condition and the customary mowing of the right of way, weeding, etc., done at the proper time, giving opportunity to clean the ditches, prepare fences, and do in the fall other work preparatory for the winter. Many roadmasters have found it advantageous to make a definite schedule for their foremen, showing the number of ties to be put in each month, thus giving them a definite figure to work to. An occasional meeting of the foremen on the division to discuss their work and compare notes on its progress will also prove advantageous.

Heavy work, such as ballasting, laying rail or widening banks, should be done by extra gangs, the kind of laborers used depending on the locality and the nature of the work. The foremen for these gangs can usually best be selected from the regular section foremen, care being taken to pick those well fitted to handle the class of laborers under their charge. However, where extensive work is done it is frequently better, when possible to do so, to hire outside experienced foremen rather than take good foremen away from sections which are difficult to handle for any length of time. It is best that the kind and quality of work to be done be well understood by the foremen before it starts, as it is often hard to get even fair results from these gangs unless great care is used. Their degree of efficiency depends largely on the foremen, who should see that no bad ties are left in the track when ballasting, that track is properly gaged and that ties are spaced as exactly as possible. Only close supervision of even these matters which seem simple will get the best results.

When possible to do so it will be advantageous to divide such work as surfacing and ballasting, so that the foremen will exert themselves not only because of a desire to do more than their neighbors, but also because they know that their work will be checked. The best results will be obtained if the roadmaster points out the little details that are neglected or that are well done. For instance, while adzing of ties is a small detail, it is one which is very hard to get done well; but it can be done by the average foreman if he will but devote himself to it.

It has been found that small jobs of bank widening which can be done economically by hand can in some cases be done most easily and cheaply with foreigners. The average hobo does not like this kind of work, and will not do as much per day as an Italian or Greek. A good way to handle it is to give each man a certain distance to cover, which will amount to one-half a day's work. With proper supervision one-third more can be got done in this way than in any other. The men like it best, and do not waste much time talking. The same method has been used with good succeess in mowing right of way with foreign laborers.

On several roads increased attention has been given in the past few years to systematic handling of maintenance work. Prominent among these is the Erie, which has worked out a definite programme which is followed from year to year. Late in the summer a division engineer accompanied by a master carpenter inspects all structures and reports on the work to be done in this department during the coming year. Similar inspections and reports are made on the track as soon as the frost is out of the ground. The season's work, with these reports as a guide, is laid out in the office of the engineer maintenance of way, and a definite programme arranged giving the time in which the different kinds of work should be done. It is required that the various items be completed at or before the time provided in the schedule. The division engineers send daily reports to the engineer maintenance of way, advising him of progress on the different jobs. This programme is also used as a guide for the shipping of material, which is found to eliminate many of the usual delays due to waiting for supplies. Late in the fall an inspection trip is made by the engineer maintenance of way with the division engineer, supervisors and foremen, on which the handling of the past season's work is discussed and improvements are suggested for the following year.

Such an organization for maintenance of way work, from the higher officers down to and including the individual foremen, should lead to decided economies. The possibilities for improvements by these means in the performance of duties of the roadmasters and bridge supervisors are especially great.

A railway from Booyong, New South Wales, to Ballina is proposed. This line will be 12 miles long, and it is estimated that it would cost $503,575. It is argued that the construction of this line be deferred until the North Coast has been completed.

PORTABLE STEEL BUILDINGS FOR MAINTENANCE FORCES.

The recent development in the use of steel in the construction of small buildings, such as hand car houses, oil houses, cement and other storage houses and bunk houses for construction and maintenance crews is of much interest. This type of construction provides buildings which ahe portable and at the same time substantial and fireproof. They are designed on the truss principle, the frame being formed of adequate steel angles which are bolted together at the connecting points with galvanized steel bolts and plates. To insure rigidity, truss rods with turnbuckle adjustments extend diagonally from corner to corner of the building, guarding against twisting or sagging of the building and roof under strong wind pressure or a heavy snow load. The buildings are provided with strong steel doors constructed on steel angle frames, and steel-framed windows of heavy ribbed glass run in fine wire mesh of approved fireproof material. Similar sectional parts of the frame are interchangeable, and each part is numbered to correspond with a blueprint of instructions furnished with each building as it is shipped from the factory.

The wall and roof enclosures consist of galvanized sheets made in panels on angle iron frames and unite in weather-tight joints on the tongue-and-groove principle, very similar to wooden construction. These sections or panels are made in 28-in.



Adaptation of Steel Building for Section House.

widths and are attached vertically to the steel frame of the building by an ingenious application of the tongue-and-groove principle without nails, rivets or screws. The general simplicity and mechanical completeness of the entire plan of construction, as well as the durability and slightly appearance of the finished building are important points in its favor.

This type would seem to be an excellent form of construction for section houses, as shown in the accompanying illustration. Being portable, a crated building can be shipped complete to any point where it is wanted, unloaded at the desired location and erected in a few hours by the section crew. A very little paint will cover the house to harmonize with other buildings of the road. Buildings of larger capacity are well adapted for bunk houses for construction crews as they are absolutely sanitary, and they are also suitable for storage houses in which to keep materials and supplies. When it is desired to move a crew from one location to another, these buildings can be taken down in the same sectional parts without waste or loss of any of the original material and readily moved to the location of the next job at small expense.

This plan of construction will very probably come into extensive use as it is brought to the attention of the proper officials. Already some important electric railways have it under advisement and are taking advantage of its low lost as compared with other forms of buildings as well as its low cost of maintenance.

On the question of new Russian railways, the second department of the imperial council is considering in conjunction with the ministers of finance and ways of communication the formation of the Altai Railway Company, which is to run a line from Novo-Nikolaievsk to Barnaul and Semipalatinsk, with branch to Bisk.

PLAN OF ORGANIZATION FOR A RAILWAY TRACK LABOR DEPARTMENT.*

BY WILLIAM S. WOLLNER.

The system of hiring all semi-skilled and common labor for maintenance of way and construction work through employment offices having no connection with the railway company is practically uniform on all roads operating through the western portion of the United States, and it is partially due to this system that the railways have become burdened with the inefficient labor that now works on the right of way throughout the west. As the labor agent receives a fee only from the men he hires it is needless to say that he takes the bad with the good; in fact, the ability of the man has nothing to do with whether he shall be hired or not. This lowers the average efficiency of the labor employed, thereby increasing the cost of the work performed. The present system of employing labor can be compared with the impossible situation of a company placing the purchasing of its supplies in the hands of a man who receives no compensation from it, but receives a commission from the sellers for all goods bought by him, the railway accepting all goods without inspection or test.

It is common knowledge among those who handle labor that some men will do twice or three times as much work as others, and that while certain classes of labor are suited to one kind of work, they are entirely unsuited to any other kind. Still the employment agents will engage any man who may be seeking a job, and the railway, in most cases, accepts any man offered to them by the employment offices.

Another bad feature of the present system is the method of handling transportation for laborers. At present, the labor agent frequently gets a pass for the men he is going to ship before he actually has the men signed up for the job, and as he hopes to pick up the number wanted before train time, he requests enough transportation to cover any men he may be able to sign up between the time he gets the pass and the time the train leaves. This results in parties of men traveling over the road with passes reading greatly in excess of their actual number. The usual thing for the man who holds the pass to do under these circumstances is to look around the depot for someone traveling in the same direction as himself and to sell him a ride for any price that he can get. It is not unusual for a man to travel alone on a pass good for 50 or 60 men because he is the only one of the party to accept the job between the time the pass is obtained and leaving time.

Probably the less said about graft in connection with the employment of labor the better, but the periodical discharging of officials and employees for this reason is sufficient proof of its existence. This graft is the natural outcome of the present system of employing labor, and it will exist in some form as long as the present system is used.

EXPERIMENTAL SYSTEM.

In an effort to prevent the misuse of transportation, and to increase the efficiency of the labor employed, the writer has experimented with different systems of checking men at the time of shipment. These experiments have continued over a period of about two years, and while no additional force has been employed or expense incurred in conducting them, the results obtained have fully demonstrated that the theory involved is practical. The first plan tried was as follows:

When an employment agent had men to send to work on this road he would advise the chief engineer's office by telephone, giving the name of one of the men in the party, and upon what train the men were to be sent. A ticket was then filled out with the name of the man in charge of the party, destination, date of expiration, etc., but the number of men in the party was left blank. A clerk in the chief engineer's office, who had had considerable experience on construction work, and who acted

*Rewritten from a report made by the author for the officials of a Western railway system, October, 1910.

as "labor inspector" during these experiments, then took the ticket to the depot where the labor agent, or man in charge of the party, pointed out to him each man who was to travel on the ticket. He carefully examined the men to see that they were capable of doing the work for which they were being hired, and saw that as far as it was possible for him to determine, there were none in the party who were not entitled to be there.

After satisfying himself that all the men were entitled to travel free he filled in on the ticket the actual number of men that were to travel upon it, assisted with the checking of the baggage and identified each man for the ticket collector as he passed through the gate. After the ticket had been properly punched by the collector it was handed to the man whose name appeared upon it and the party proceeded on its way in the usual manner.

After this plan had been used for some time it was found that the men would sometimes sell their places to persons not entitled to free transportation after the conductor had checked them up. It was also found desirable to furnish individual tickets in order to provide a record of each man who traveled over the road free. With this in view a special ticket was printed good only on the train number and date punched in the margin, the point of origin and destination being printed on the ticket. The employment agents were instructed to furnish the names of the men they wished to ship to the inspector, and he in turn placed the number of the ticket against the man's name as he passed through the gate. The use of these individual tickets simplified the checking of trains by conductors and afforded a means of ascertaining at any point that the man traveling on a ticket was the same person as the one to whom it was issued.

PROPOSED PLAN.

In organizing a labor department for a railway system that covers a large territory, the first consideration should be the central headquarters from which all labor matters will be handled. These headquarters should not only have charge of the employment of all labor, but should be responsible for the efficiency of all labor employed. It should be the duty of this bureau to observe closely the relative efficiency of different nationalities on various kinds of work, and to so distribute the available supply of labor as to obtain the best results for the whole system without constantly disbanding and reorganizing extra gangs, construction forces, etc. There can be little doubt that the constant discharging of men on one division on account of lack of work and their re-employment on another division as soon as new work is undertaken, on a large railway system covering considerable territory, is largely unnecessary.

With the central bureau to distribute the forces, the men could be transferred from one part of the system to another as conditions require, thereby keeping the men constantly employed, adding to their efficiency, and doing away with the repeated breaking in of "green labor."

The labor department should have at its head a labor commissioner, who should have sole and complete charge of all matters pertaining to the employment and distribution of labor forces. He should report to the officer in charge of maintenance and operation, and should receive reports relating to all matters in his department from all officers in charge of operating and maintenance units. The employment offices, which it would be necessary to establish at various points, should be directly in charge, as should all inspectors, special agents, and other men connected with his department.

The labor commissioner should have a staff of inspectors whose duties should include keeping in constant touch with the labor situation at all points on the system, living conditions of the men, relative efficiency on various classes of work, as well as the inspection of the various employment offices. These men should not be given any particular territory to cover, but should be detailed by the labor commissioner to any point where their services might be required. At times it might be necessary to detail the entire corps of inspectors to one locality, and again it might not be necessary to send an inspector to a certain point for a long period.

In selecting these inspectors a point should be made of employing men of different nationaltities, or those who are familiar with the languages and customs of the various classes of labor usually employed, but it should be understood that the men are not to be specially detailed to the supervision of the class with which they are most familiar, but are to be detailed to all classes of inspection work, at all points on the system.

It would undoubtedly develop that certain inspectors were better qualified to perform certain duties, and these men would, from time to time, be detailed to special work, but the policy in regard to these inspectors should be to train them to represent the labor commissioner and the labor department at all times, and not to regard themselves as specialists detailed to certain fields of activity.

It will be found necessary to establish employment offices in the various cities that have become distributing points for labor, but these offices would be run on different lines from the employment offices now conducted by private persons. They should be in charge of men experienced in actual working conditions on the track, and it would be best to get roadmasters who have been disabled or retired, if possible. In the case of an important office, it might be found desirable to detail a young roadmaster or assistant from the operating department for this work.

The men in charge of these offices should keep in constant touch with the condition of the labor market in their respective localities, and should keep the labor commissioner advised of any available supply of labor in their vicinity.

The establishment of these offices would enable the railway to obtain a better class of labor than that which they obtain at the present time, as good men are unwilling to accept a job offered them when they know that the only interest the labor agent has in hiring them is the fee which he will receive. Men are calling at railway offices daily inquiring if the jobs offered by the employment offices actually exist, and they all tell the same story—that they are willing to pay the labor agent for a job if they are sure that there is a job, and that it is as he represents it, but that they have been fooled so many times they are afraid to take another chance.

It would not be advisable to ask an employment fee in these offices, for the reason that the laws in some states prohibit an employer charging a fee for a job, and even if this were not so the class of men employed as laborers are as a rule so ignorant and suspicious that the charging of a fee would probably prejudice them against the company, which is just the effect which the establishment of these offices is meant to prevent. However, the efficiency obtained by the establishment of company employment offices, and the creation of a labor department, would more than pay for the expense involved in the carrying out of this plan. When the amount of misused transportation and disloyalty to the company caused by the present system is taken into account, there can be very little doubt in the minds of practical railway men but that it is time for a change of some kind to be made in the method of handling the employment and direction of labor.

The following is a rough estimate of the cost of carrying out the above plan on a system employing ten thousand laborers.

General Headquarters—		
Salary of labor commissioner	$3,000	
Salary of chief clerk	1,440	
Salary of stenographer	960	
Salary of inspectors (4 at $1,800)	7,200	
Traveling expenses of commissioner and inspectors	6,000	
Office rent, stationery, etc.	1,200	
		$19,800
Four Employment Offices—		
Employment agents (4 at $1,500)	$6,000	
Clerks for above (4 at $900)	3,600	
Office rent, light, fuel, etc. (4 at $1,000)	4,000	
		13,600
		$33,400

Least possible increase in efficiency of labor, 10,000 men at 5 cents per man per day	$180,000
Less cost of operating labor department	33,400
Net saving to company per year	$146,600

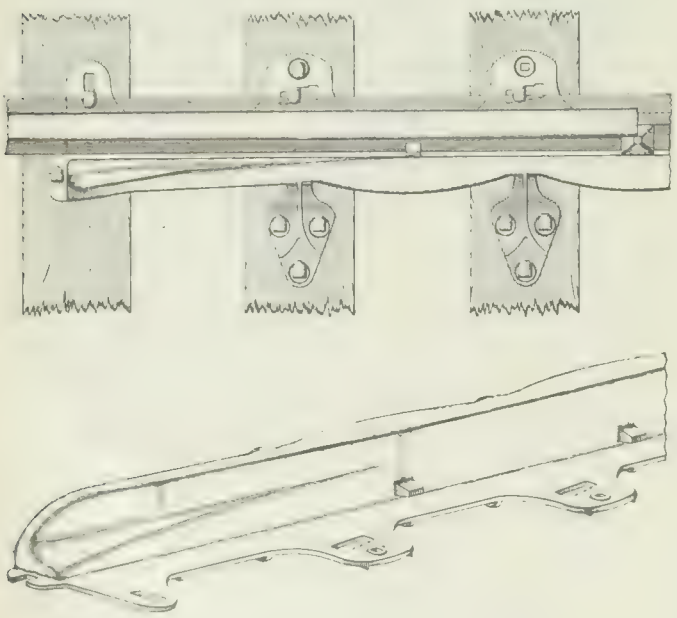
The foregoing figures are based on a very conservative saving of labor, but when it is understood that the duties of the inspectors include the training of laborers in the best manner of performing their work, and that when the best men have been found they will be given permanent employment in the company's service, it is not hard to believe that the saving will reach three or four times this figure.

The foregoing is, of course, only a brief synopsis of what can be accomplished by the establishment of a labor department, but will serve, I hope, to open the mind of the reader to the great opportunity not only of reducing a great existing waste to the railways, but to better the condition of the thousands of laborers who help to make up the working forces of the roads.

MANGANESE STEEL ONE-PIECE GUARD RAIL.

In the issue of the *Railway Age Gazette* of November 17 there are described a home-made arrangement in which a guard rail was equipped with tie plates and continuous joints so that it acted as a unit with the main rail and required but little maintenance. The Ajax Forge Company of Chicago has developed a guard rail to accomplish this same purpose, and which has the advantage of greater life, owing to its being made of manganese. This is essentially a one-piece guard rail combining with it rail braces, tie plates and filler blocks, and so does not require the customary auxiliary attachments.

A plate extends under the main rail and is provided with



Manganese Steel One Piece Guard Rail.

slots for varying widths of rail base, through which the rail is spiked to the ties. Four braces project out at the rear of the guard rail and are spaced to come over the ties. Lugs projecting against the web of the rail maintain the proper spacing between the guard and the main rail. By such construction a load on the main rail tends to hold the guard rail in position and the base plate prevents the running rail from cutting into the ties, in this way maintaining the same relative height between the main and guard rails. This base and the rail braces also resist any tendency toward overturning. No bolts are used, as the guard rail is simply spiked to the tie. Because of the absence of a large number of parts the maintenance cost is reduced, while the first cost is practically the same as that of the ordinary guard rail with all attachments. The cost of installation is very small, as one of the guard rails can be put in place within a few minutes after the ties have been spaced. The length, which is 8 ft. 6 in., is interesting as indicative of the growing



Manganese Steel One Piece Guard Rail in Track of C. & N. W. Chicago.

tendency of maintenance men to shorten the guard rail behind the point of the frog.

The first guard rail of this type was placed in the tracks of the Chicago & Western Indiana in May, 1911, and has been in service about nine months. It has since been installed on about 90 other roads.

HOW THE ROADMASTER CAN PROMOTE EFFICIENCY.*

BY M. GANLEY,
Roadmaster, A. T. & S. F., Argentine, Kan.

The matter of roadmasters promoting efficiency among foremen is up-hill work at the present time, as the material is very limited to draw foremen from. It is a good policy to give foremen who are new beginners as much personal time as is possible without neglecting any other work. A roadmaster should go out on the work with the foreman, especially if he is lax and does not accomplish enough for the force he has, and endeavor to educate him up to the cheaper method of getting a piece of work done and to get good results. Some will be a little slow, but if they show a disposition to learn and improve, the roadmaster's time is well spent.

I gather all the foremen together at meetings, and then call on each of them to discuss some subject that pertains strictly to their work. They are also permitted to bring up anything they think will result in a saving or betterment to the company. Of course, things of the last mentioned nature are passed on to the superintendent, but any subject pertaining to track work is thoroughly discussed. A foreman at one end of the division will have worked out a scheme for doing some kind of work, and by bringing it out in the meeting, all the other foremen get the benefit of it.

The roadmaster should endeavor to create a feeling among his foremen that they are glad to have him come around and visit their work. No foreman is much good to a roadmaster or the company if he is afraid of his superiors and detests to have the roadmaster show up on the work. When a foreman thinks he has been mistreated, the roadmaster should point to his work and give him his side of the question. In general, after he has weighed the matter he sees that he has been treated fairly, and as a rule he is frank enough to admit it In this way the roadmaster does not create a feeling among his foremen that he feels he is better than they are, and this enables him to get in closer touch with the men. If one has occasion to speak to a foreman concerning some disregard of current instructions, he

*From a paper entered in the contest on How the Roadmaster Can Promote Efficiency, which closed July 1, 1911.

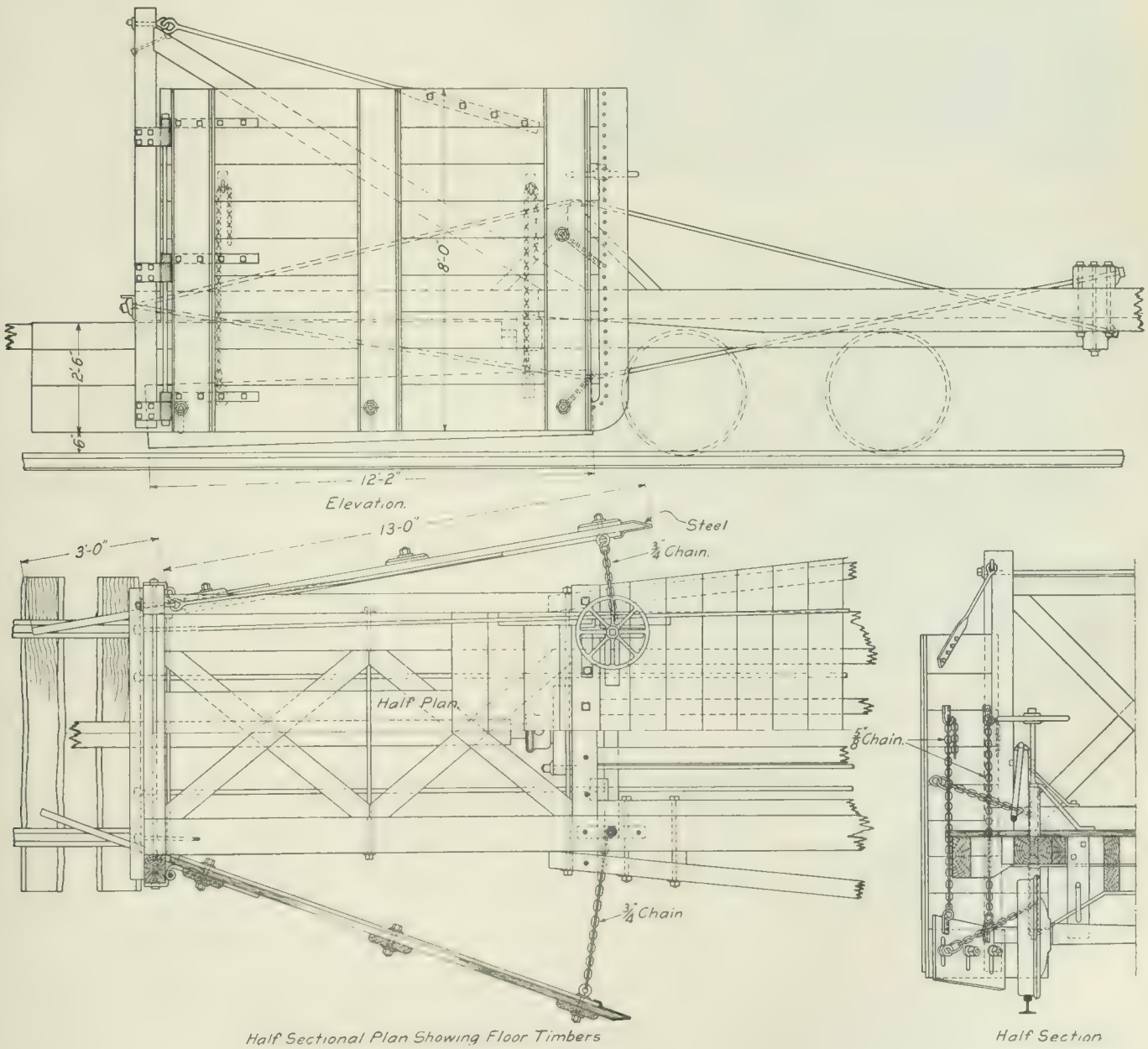
should talk to him pleasantly. If he has made a mistake in regard to instructions unintentionally, but owing to an oversight, proper handling by the foreman without becoming abusive, which is too often the case, causes the foreman to become loyal to the roadmaster, and if the roadmaster is loyal to the company, as he must be, if he handles his men properly, results are good for the company, foreman and roadmaster. The foremen take more interest in their work, endeavor to do more of it, and as they pass over a piece of work will endeavor to make it look neat as well as serviceable.

THE SNOW CRAB.

An effective device for cleaning out a cut which is filled with snow is the snow crab used on one of the northern roads. The repeated pushing back of successive snows in cuts results in the formation of banks of hard snow on each side of the track which finally resist the crowding action of the snow-plow wing and are beyond the reach of the rotary plow. The snow crab was devised to relieve this situation and readily loosens snow so hard that it will strip teeth from the gear wheels controlling the movements of the wings of the Russell snow plow or break the set of wings of the "V" plow. This machine is simply and readily constructed in any well equipped car shop.

The snow crab is a noseless "V"-shaped wing plow, with steel protected cutting edges on the vertical wing heels. As its name implies, it is designed to move slowly backwards, thus scraping the hard snow from the slopes of the cut into the open space between the wings on to the ties and between the rails, from which position a rotary or Russell snow plow readily throws it out of the cut. Very hard snow sometimes requires two, but rarely three, trips of the crab through the cut.

As the plans indicate, the snow crab is a stout, wooden frame extension on the end of a flat car which is strongly braced and covered with metal. It is 15 ft. long and is designed to support two laterally spreading wings which are strongly hinged to vertical posts. These wings extend 3 ft. in front of these posts and 13 ft. back, and may be spread to a total cutting width of 16 ft. 8 in. The wings extend to a height of 8 ft. 6 in. above the top of the rail. The bottoms of the wingsare attached to the car with ⅝ in. chains and hangers. Steel plates ¾ in. x 15 in. by 12 ft. 2 in. long, are provided to serve as shoes, and to scrape the snow from above the top of the ties. The shoes may be raised or lowered by means of the chains. Ordinarily the outer



Plan and Elevation of D. S. S. & A. Snow Crab.

ends are lowered to clear the snow away about 2 in. below the top of the rail.

A 7 x 7 in. timber, bolted under the center of the floor truss of the car and connected with the drawbars, extends 4 ft. 6 in. beyond the end sill, terminating in a link and pin coupler. Truss rods and floor timbers extend well back beyond the flat car truck and are securely held by transverse timbers. The wings are held in position by ¾ in. chains and ⅞ in. rods. The



Snow Crab Used on D. S. S. & A.

weight of the crab is counterbalanced by loading the flat car with scrap car wheels.

This machine was devised by James Bice, formerly locomotive engineer on the Duluth, South Shore & Atlantic, and now mechanical engineer of the Michigan Railroad Commission, and was first built under the direction of J. J. Conolly, superintendent of motive power and machinery of the Duluth, South Shore & Atlantic. A crab of this type has been in use on this road for about 20 years, and is still in first class condition.

USING A STEAM SHOVEL TO SPOT CARS.

The Chicago, Burlington & Quincy used a steam shovel in place of a switch engine to spot cars when filling its ice house in the Chicago yards in January. At this point about 28 cars of ice were unloaded daily, only four of which could be set at the ice house at a time. This made seven settings of cars per day, and under the old arrangement required the constant use of a switch engine. This winter a steam shovel, which would otherwise have been laid up for the winter, was placed on an adjacent track beyond one end of the ice house. The loaded cars were placed beyond the opposite end of the ice house by a switch engine each morning. A cable wound about the drum of the steam shovel was attached to the cars and they were pulled to the ice house four at a time. When these cars were emptied they were pulled out of the way and four additional cars pulled down. In this way the steam shovel, requiring but one man, replaced a switch engine and crew, and a charge of $35 per day was reduced to $6, making a saving of $29 daily. About $500 was saved in filling this one 1,200-ton ice house, and similar results were secured in filling another ice house on the same road at Galesburg, Ill.

Rapid progress is being made in the construction of the Cooma-Nimitybelle Railway, New South Wales. It is expected that this line will be opened to traffic within the next five or six months.

OPERATION OF MOTOR CARS IN COLD WEATHER.

BY C. G. MAHANA.

Gasoline motor cars are rapidly coming into use for section forces, signal maintainers, inspection service, etc. It is very important that the men who use them should understand fully how to operate them. They have one characteristic which is the cause of no little trouble and complaint to some who use them who are not fully acquainted with their correct operation and care, but which may be avoided if a few simple precautions are followed.

This is their tendency to refuse to "start" in cold weather. It is a well-known fact that any gasoline engine is more difficult to start when it is cold than when it is warm. This is due to the fact that gasoline does not vaporize easily when it is cold, and the vapor is easily recondensed by cold to liquid gasoline. Gasoline in the liquid form will not burn; it must first be vaporized or mixed with air in the form of vapor. When an engine is started in cold weather, therefore, there is only a small charge of gasoline vapor in the cylinder when the spark is flashed across the points of the spark plug, and a large portion of what little vapor the carburetor does supply is recondensed by contact with the cold walls of the intake pipe, the cylinder and the piston. If a few charges can be secured which are large enough and rich enough to be fired and start the engine, the cylinders will usually become warmed sufficiently to promote vaporization rather than prevent it, and the engine will then take care of itself and run as usual. It is, therefore, sometimes advisable in cold weather to use some means of producing the first half dozen impulses or explosions, which is not necessary in warmer season of the year.

In the first place, it is well to apply a little heat to the carburetor itself. This is conveniently and safely done by pouring warm water over it, wrapping a bag of warm salt or sand around it for a few moments, or by any similar means which may suggest itself to the operator. Heat should not be applied by means of a torch, live coals, or any like method where fire is used directly, as there is danger of an explosion.

After the carburetor has been somewhat warmed a small amount of gasoline (half a thimbleful is usually sufficient) should be injected into each cylinder through the priming cup, and the cup should be closed. This is termed "priming the engine." The carburetor should then be "flushed" or "flooded" by means of the little plunger provided for that purpose. If, now, the crank shaft is revolved the engine will seldom fail to start. Of course, do not forget to have the gasoline turned on, the switches closed, and the throttle open.

In winter, especially, procure a good grade of gasoline if possible, as the higher the grade the more easily the gasoline vaporizes. It is also a fact that the higher the grade the harder it is to get it, but if at least 62 or 64 deg. (Baume scale) gasoline is not furnished for ordinary use, it will be advantageous to procure a small amount of higher test, if possible, for priming purposes. The grade or density of gasoline may be determined by means of a hydrometer by anyone having access to one. The proper temperature at which to make the test is 60 deg. Fahrenheit, as gasoline expands and becomes lighter when heated, and becomes heavier when cooled. If, therefore, it is tested at a temperature much above or much below 60 deg. the reading obtained will be incorrect and a correction factor must be applied. This amounts to approximately one degree Baume for each eight degree variation from 60 deg. temperature. In other words, if gasoline tested at 68 deg. temperature shows a reading of 65 deg. Baume on the hydrometer, 64 deg. is the correct reading. The same gasoline tested at 52 deg. temperature would show only 63 deg. Baume on the hydrometer.

If a high test gasoline is not available for priming purposes, a good plan is to carry a small quantity of it in a bottle or squirt can. On extremely cold days warm this gasoline before using, if convenient, by holding the bottle or can in hot water for a minute or two.

There is another liquid called sulphuric ether often more

easily procured than high test gasoline, as it can be purchased at any drug store, and which is especially good to prime with, as it is much more volatile, or, in other words, more easily vaporized, than gasoline. Being much more volatile, however, it is also much more explosive, and correspondingly greater care must be exercised in its use. It is also more expensive than gasoline.

Many of the motor cars on the market are of the two-cycle type, and the lubricating oil for the engine is then mixed with the gasoline before it is put into the gasoline tank. This affords a good chance to obtain warm gasoline for starting. The lubricating oil is usually mixed in the proportion of one-half or three-quarters pints of oil to one gallon of gasoline. In cold weather the lubricating oil can be thoroughly warmed before mixing it with the gasoline. This gives a tank of warm gasoline to start out with without any danger of explosion.

Usually there is some water mixed with gasoline which often separates, and as the water is heavier it settles in the low points of the pipe connections to the carburetor or in the carburetor itself and then freezes, blocking the pipe and preventing the gasoline from flowing. To determine whether this has occurred flood the carburetor, and if gasoline flows continually the pipe is probably clear. If it is blocked, heat should be applied to the low points to melt the ice. Even in warm weather it is not a bad plan to strain all gasoline used through a chamois skin to remove the water, but in winter it is an extremely good plan, as it will prevent trouble with frozen carburetors and feed tubes. Gasoline flows slowly through a chamois skin, and it may be found that it will take too long to strain it at the time of filling the tank, in which case it is a good plan to have an extra gasoline can and strain the gasoline into it at convenient times, then fill the tank on the car from that can. Another way to prevent freezing is to drain the carburetor and feed tube at night after closing the gasoline tank shut-off cock. The gasoline thus drained out may be caught in a cup and poured back into the gasoline tank.

It is a good plan in cold weather to warm up the engine in the car house by running it a moment or two there before taking it out into the colder air. On cars which have a clutch for freeing the engine from the driving mechanism, this is simple. With the direct driven type of cars such as is largely used for section work and signal maintenance, where the driving axle forms the crank shaft of the engine, or is directly connected to it by gears or chain without a clutch, the engine can be run in the car house by raising the end of the car on which the engine is located and sliding a box under it so that the driving wheels will not touch the floor, then starting the engine by revolving the driving wheel or wheels with the hands. The engine will start more easily this way without a load than by pushing the car on the track, especially if the rails are frosty.

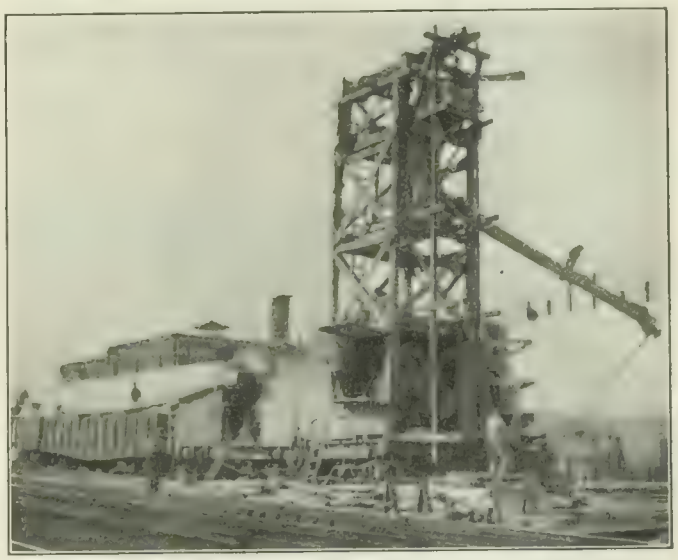
As stated above, after the engine is once started and warmed up, it usually will continue to operate without trouble, but it is a fact that a gasoline engine operates within reasonable limits with a greater fuel economy at high temperature than at low On water-cooled cars it is, therefore, a good plan to somewhat reduce the cooling capacity of the radiator during the winter months. This is easily done by covering part of the radiator with a piece of oil cloth or canvas. The water will continue to flow through the entire radiator, but air will be drawn only through that part which is not covered by the cloth, and where there is no air circulation there is practically no cooling effect. In this way the cooling capacity of the radiator can be reduced in almost any desired proportion.

Precautions must be taken on water-cooled cars to see that the water does not freeze in winter and burst a cylinder or radiator. An anti-freeze solution is the best precaution. The following table gives the freezing points of anti-freeze solutions made by mixing various proportions of alcohol, glycerine and water. Calcium chloride solutions are sometimes used, but they are injurious to some of the parts through which the solution must pass.

Wood Alcohol.	Glycerine.	Water.	Freezing Point.
5 per cent.	5 per cent.	90 per cent.	25 deg. above zero
10 per cent.	10 per cent.	80 per cent.	15 deg. above zero
12½ per cent.	12½ per cent.	75 per cent.	8 deg. above zero
15 per cent.	15 per cent.	70 per cent.	5 deg. below zero
16½ per cent.	16½ per cent.	67 per cent.	15 deg. below zero
10 per cent.		90 per cent.	5 deg. above zero
20 per cent.		80 per cent.	5 deg. above zero
25 per cent.		75 per cent.	2 deg. below zero
30 per cent.		70 per cent.	9 deg. below zero
35 per cent.		65 per cent.	15 deg. below zero
	10 per cent.	90 per cent.	28 deg. above zero
	30 per cent.	70 per cent.	15 deg. above zero
	40 per cent.	60 per cent.	5 deg. above zero
	50 per cent.	50 per cent.	2 deg. below zero
	55 per cent.	45 per cent.	10 deg. below zero

CONCRETE DISTRIBUTING TOWER.

The accompanying photograph shows a concrete distributing tower which has proved very satisfactory in placing concrete for a retaining wall alongside operated tracks where it was impossible to give over more than one track for construction purposes. The tower, mixer and hoisting engine are mounted on a standard flat car to which are coupled sand and stone cars. The material from the cars is loaded into barrows and wheeled on a runway over the center of the cars which connects to the roof of the house enclosing the hoisting engine. A one-yard Foote batch mixer is arranged to feed from this level and discharges into a one-yard hoisting bucket. This bucket is elevated by a 35-h. p. Lambert engine, and the concrete dumped at the top



Concrete Distributing Tower.

of the tower into a hopper which feeds an open trough. This trough is supported by a cable passing over pulleys set in the ends of a timber at the top of the tower which is pivoted on a dolly. The hoisting engine has a double drum, one line being used for hoisting the bucket, and the other for supporting this trough. The trough can be raised or lowered and sprung laterally by pulling the lower end to either side. The chute is 24 ft. long, and is strengthened by a twisted wire truss rod passing over a wooden strut. The hoisting cable is of ⅝-in. steel, and the vertical distance from rail to hopper is 40 ft. The plant requires 27 men, eight of whom are kept in the forms. With this force 175 yds. of concrete can be placed in a day, which completes one section of the wall on which the plant is being used. This plant was designed by A. H. Bannister, general superintendent of the Brownell Improvement Company, Chicago, and is used on work being done by that company.

SHIMS.

BY E. R. LEWIS,

Division Engineer, Michigan Central.

Of the factors in the problem of railway maintenance, none are of more vital importance, more constantly altering and at the same time more continually present in one form or another than track conditions resulting from climatic changes. All changes in weather have some influence on track conditions which must be anticipated, met and overcome by sheer force, strategy and constant watchfulness as they appear. Altitude, latitude, longitude all exert their individual and combined effects on track, largely through some phase of the presence, or absence of, moisture.

Many American railways traverse a stretch of country so extensive that more than one "climate" is observable in a journey from terminal to terminal. The railways of the southern half of North America, except in the highest altitudes, are not usually affected at any time of year by frost, while on the other hand the railways in the northern half of the continent have to fight frost continuously during six months of the year.

On these northern roads it is impracticable to do any track

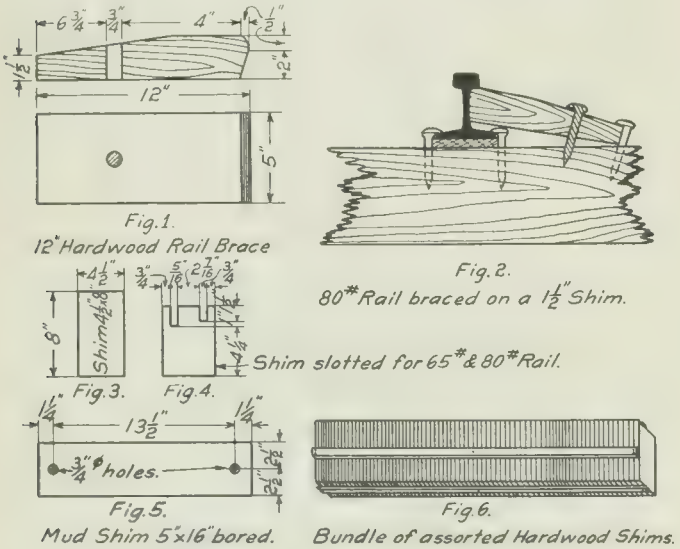


Fig. 1. 12" Hardwood Rail Brace

Fig. 2. 80# Rail braced on a 1½" Shim.

Fig. 3. Fig. 4.

Fig. 5. Mud Shim 5"x16" bored.

Fig. 6. Bundle of assorted Hardwood Shims.

Various Types of Shims.

work which includes the moving of ties or ballast during the winter months. The track cannot be raised, tamped or lined. It is at this season, moreover, that any unevenness of track surface is most likely to result in the breaking of rails; a very large percentage of all the rail failures of northern roads occurring during the winter and early spring.

There are years when the fall rains are extraordinarily late and long continued, as was the case last autumn in the middle states. These abnormal late fall rains, coming after the track has been surfaced and prepared for the winter, saturate the newly worked ballast and roadbed and are quickly followed by freezing weather. These conditions work much mischief to the track during the whole of the following winter and spring until the moisture can be eliminated from the ballast and roadbed.

Water reaches its maximum density at + 39.1 deg. F.; in other words, at that temperature water occupies its minimum of space, and any variation from that temperature causes it to expand. The expansion of moisture in the ballast or roadbed, or both, results in like expansion in the ballast or roadbed, which, following the line of least resistance, expands upward. As it bulges upward the track rises irregularly with it because of the uneven rise of the ballast containing various percentages of moisture. This erratic increase in elevation of the track surface is commonly known as "heaving."

Heaving results in track conditions which so severely test the strength of rails, splice, arch bars and spring hangers as to be highly dangerous to traffic. Crossing plank must be closely watched to prevent them heaving high enough to catch and break the pilots and footboards of locomotives and switch engines. Such accidents may frequently occur in extreme weather because of the collection of water from engines standing in front of depots, freezing under the planking of platforms.

Heaving is accentuated at road crossings also, the conditions under ties covered by plank being different from the conditions under ties not so covered. It is frequently necessary to remove from track planks which have a tendency to heave. In freezing weather snow, ballast or earth may be safely put in place of the plank temporarily removed. It is impossible to cure a track from heaving, but this may be prevented by altering conditions in summer so that moisture cannot be retained.

If the track heaves in winter, the only antidote during that season is shimming. One rail may be higher than the opposite rail; both rails may be equally lifted, say 2 in. above grade, for a distance of 2 to 10 ft., or there may be several such bumps in succession. To nullify these inequalities of surface, which "ride like a roller coaster," it is necessary to provide for raising the rails to corresponding elevations with the higher heaved spots, or to provide easy runoffs from the abrupt vertical frost curves. Shims are used to accomplish this.

The word "shim" is of uncertain origin. It is derived from the old English "shimmer" and Anglo Saxon "scimerian," meaning to shine uncertainly. A shim is placed between surfaces between which there is a shimmer of light, and may be broadly defined as a piece of wood or metal placed between two parts to make a perfect fit.

In American railway maintenance both wrought iron and wooden shims are used, the former to space adjacent rail ends to the proper distances from each other to allow for expansion and contraction due to extremes of temperature, the latter to correct unevenness in track elevation.

The permanent cure for heaving track is, of course, perfectly drained roadbed and ballast. Comparative exemption may be secured by using plenty of clean, crushed stone ballast. The finer the ballast, the more it will heave. It is doubtful if any railway track traversing a country in which frost must be reckoned with can be so perfectly appointed as safely to do without shims entirely. There are, however, many railways which do without shims, or which use home-made shims of soft, decayed and warped wood. Into such ill-advised purchases enters the element of ignorance of the uses to which these little squares of wood are put, ignorance of the vast importance of shimming to the safety of winter traffic and of the prevention of rail and engine failures and defects of equipment. To the uninitiated shims are only chips of wood which cost a paltry few cents per bundle and are allowed to lie about the roadbed in spring.

Is there any good reason why, year after year, a large percentage of the better roads of North America get along without adequate shims and shimming in winter? Surely the matter is of sufficient importance to merit scientific study and the placing of the track in that condition which will reduce to a minimum the accidents to life and property resulting directly and indirectly from heaving track. It requires time, effort and patience to forcibly impress men of experience with any new idea relating to their business. It is evident from the apparent lack of literature extant upon this subject of shims that such effort has to date been sadly lacking or largely wasted.

Track shims should be of different thicknesses to fit the varying inequalities of surface resulting from the expansion of ballast containing various percentages of moisture. They must be of different lengths and widths to correspond with the widths of rail base and cross ties. They may be plain, bored or slotted, as shown in the figures. They may be made of any wood having enough transverse fiber to withstand the pressure of traffic for at least two seasons. Shims of oak, maple, beech, birch and even hemlock have given good results. It is important that they

be well seasoned before being placed in track, as shims of green wood will not endure, but crush readily. This seasoning may be done by air or kiln drying. The latter method is not expensive and is more practicable since few shim makers keep stocks in hand from one season to another. The plain shim, which is most used, is bought in bundles of 80 to 110 pieces, of thicknesses varying from ⅛ in. to 1 in., as ordered. These shims, about 4½ to 6 in. in width and 8 to 9 in. long, are tightly packed between two red oak end pieces and baled with four elm slats. The average cost of such a bundle is approximately 22½ cents at the mills.

A mile of moderately heaving single track may require in one season five to ten bundles of plain shims and possibly one hundred thicker shims. These thicker shims are more than 1 in. in thickness and 5 in. wide by 16 in. long. They are made of hardwood, usually of white oak, and bored for spiking on top of the tie, after removal of the tie plate, as shown in one of the illustrations. These shims may also be used for soft track in summer, and are known as mud shims.

The slotted shim is a patented article and is a trifle more expensive than the plain shim.

It is made ordinarily with two spike slots in one end, the deeper slot being of such depth that when the shim has been applied from the inside of the rail in such manner that the outside spike engages the slot, and the shim is pushed home, the plain or unslotted end will be flush with the inside edge of the foot of the lighter of two rail sections for which the shim is designed. The other shallower slot is designed to allow the same shim to fit a heavier rail base. These shims cannot, of course, be used on top of shoulder tie plates unless applied from the outside of the rail. The slotted shim is made by the veneer process, as this is a most economical method of manufacture, and the smooth surfaces are not detrimental, as it is impossible for the shim to slide after the track spikes are replaced on each side of the rail. This immobility tends to greatly lengthen the life of the slotted shim as compared with other sorts.

APPLICATION.

The thin, plain shim is put in place by first starting both the inside and outside spike on the tie and pinching up the rail just enough to slip the shim of desired thickness cornerwise under the inside of the foot of the rail on top of the tie plate. As it is pushed further under the rail, the shim is gradually straightened between the inside and outside spikes, which should be near opposite edges of the tie, until it lies with its longest dimension parallel with the rail and crosswise of the tie. Being of the same approximate width as the rail, the shim will scarcely show when properly placed.

The heavy shim is applied by removing both spikes and tie plate, unless the latter is flush with the tie, and spiking the shim to the tie through the ¾-in. diameter hole provided near each end. Holes are then bored to engage the track spike driven to hold the rail to gage. It is frequently necessary to adze the tie before applying a heavy shim. No brace, of course, is used in this connection.

The slotted shim is constructed so that its slots run with the wood grain. To place it the inside spike is first removed entirely. The outside spike is started and the rail pinched up, as is done in applying the plain shim; the slot is fitted to the spike as the shim is pushed home; and the inside spike redriven, thus fastening the shim in place.

Serviceable, once used shims should be returned to the car house, re-crated and further seasoned in the well-pressed bundle to prevent warping.

BRACES.

High shimmed track, whether straight or curved, should be protected from spreading by substantial braces of metal or hardwood. It is commonly accepted practice on the northern railways, where wood is still plentiful, to use the hardwood brace 2½ in. x 5 in. x 12 in., as shown in one of the figures. As shown in another of the figures the head of the brace is beveled to fit under the ball of the rail while the foot rests on the tie into which two track spikes are driven and drawn tight to the brace. A third spike is driven into the tie through the ¾-in diameter hole bored 4 or 5 in. from the foot of the brace to prevent side slipping. Crossing spike or coach screws are sometimes used instead of this third spike in case of very high shims. On curved track braces should be used to protect all rails on any considerable number of shims ½ in. or more in thickness.

THIN SHIMS.

The mistake of using very thin shims is not uncommon. The impression has gained ground that very thin shims will correct minute discrepancies in elevation and therefore a first-class surface may only be maintained by their use. Many roads buy large numbers of 1/16-in. shims, seemingly on this hypothesis. As a matter of fact a shim of thickness of less than ⅛ in. is not only useless, but a detriment.

It is fair to suppose that a great many railways in this country space track ties at approximately 2 ft. between centers, though it is not admitted to be the best practice. Assume, however, a space 2 ft. between centers and a difference in elevation of the adjacent ties of ⅛ in. This discrepancy work out to a grade of 0.52 per cent. which is not sufficient to produce very great discomfort or any danger whatever. Half that grade corresponds to the difference in elevation which is corrected by a 1/16-in. shim, the use of which is time and labor lost. The 1/16-in. shim is also too thin to endure under traffic. It blows away when loosened from the bundles; it crushes, splits and wears away under the rail; it warps and cracks in the sun when released. It is expensive to make, expensive to use and worse than useless. Yet because they have always had them, many roads continue to use them.

If a track is too smoothly and thoroughly shimmed in early winter, infinite trouble will result when the milder weather of early spring brings alternate freezing nights and warm days, resulting in wet track at midday and frozen track at night. The much shimmed track goes higher and higher until it becomes dangerous to shim further, when the only recourse is slow order movements of traffic.

SUPERVISION.

At best the softening weather of early spring brings to a crisis the matter of shimming track. The hourly alterations in temperature above and below the freezing point, the early rains, late snows and last "cold snaps" cause the trackman much anxiety. Every foot of shimmed track must be constantly watched. It may be down today and up tomorrow. High shims must be exchanged for thinner. The track must be let down gradually, allowing for and following every vagary of the frost. During this period the closest and most varied supervision and the best of good judgment are requisite to the proper adjustment of track to these rapidly changing conditions. The supervisor's place is on the locomotive, the way car and the Pullman car alternately. His duty is to watch for heaved spots, and to wire instructions or drop notes on return journeys, to his section foremen concerning his observations. Locomotive engineers also may be of the greatest help if they will observe and report heaved track. It is not always easy to obtain such reports, for there is often a mistaken idea on the part of the employee that reporting defects out of his direct line of work is tale bearing, whereas it is the most desirable and important information for the well being of all concerned.

MANUFACTURE.

Shims are sawed from hardwood logs by means of vertical and horizontal circular saws, and shingle gang saws, or they are cut with veneer, shingle or stave knives. The thicker shims are sawed, the thinner pieces are cut or split. A small, fairly well equipped mill will produce about 1,000 plain shims of various thickness per day. The shingle gang saw is a series of vertical

saws set at gaged distances in order to saw a block into several thin strips at one pass. The veneer knife is a horizontal fixed blade which cuts a thin sheet from the circumference of a log revolving toward it till a 6-in. diameter core is all that remains. The shingle knife is a vertical framed blade rising and falling very rapidly, while the shim timber is pressed against a stop block set at a gaged distance behind the knife. The stave knife is similar, but of greater power and scope.

Close and systematic inspection of shims is of course necessary to good results. Only live timber, free from knots and shakes, should be accepted. Shims must be inspected before bundling or crating to obtain proper knowledge of their condition. The lengths of bundles must be determined and insisted on.

This whole matter may seem one of the little things, one of the unimportant details of railway operation. In reality, the importance of good shims and good braces and intelligent use of each is of the first magnitude, and an important spoke in the wheel of the exact science of railway maintenance.

ABSTRACT OF ENGINEERING ARTICLES SINCE FEBRUARY 16.

The following articles of special interest to engineers and maintenance of way men, to which readers of this section may wish to refer, have appeared in the issues of the *Railway Age Gazette* since February 16:

Pennsylvania Ore Unloading Dock at Cleveland.—The details of construction of the largest ore unloading dock on the Great Lakes were given in the issue of February 23, page 335. The foundation of this dock rests on concrete piles, a large number of which were used. Extensive experiments were made in the manufacture and use of these piles, which were described in detail in the article. This feature of the construction of the dock was discussed in an editorial on page 324 of the same issue.

Important Bridge Development in the South.—An editorial, commenting upon the announcement by the Rock Island of its intention to build a bridge across the Mississippi river at Memphis, and the announcement by the Burlington, Louisville & Nashville, Chicago & Eastern Illinois and Illinois Central that negotiations were practically completed for the construction of a bridge across the Ohio river near Paducah, appeared in the issue of February 23, page 326.

Sibley (Mo.) Bridge.—The general features of the construction of the bridge which the Santa Fe is now building across the Missouri river at Sibley, Mo., were given in an article appearing in the issue of February 23, page 334.

Improvement in Rail Design and Specifications.—An abstract of the paper presented by W. C. Cushing at the Indiana railway commission hearing on the rail question at Indianapolis on February 20 was given in the issue of March 1, page 374. Mr. Cushing discussed the work of investigation which has been carried on during recent years, especially that by the American Railway Engineering Association.

Indiana Commission Investigation of Rails.—The possibilities and the dangers incident to the inauguration of an investigation of rail failures by the Indiana railway commission were discussed editorially on page 368 in the issue of March 1.

Construction of the Milwaukee, Sparta & Northwestern.—The construction of the new line of the Chicago & North Western, between Milwaukee, Wis., and Sparta, was described at length in the issue of March 1, page 382. The line was built to permanent standards as a low-grade freight and passenger line. An interesting type of bridge piers, the Cushing cylinder pier, which was on this work, was described. Special features of the line were discussed editorially in the same issue, page 365.

Progress on the Grand Central Terminal.—The progress on the Grand Central terminal of the New York Central up to June 30, 1911, was discussed by G. W. Kittredge, chief engineer, before the Public Service Commission in New York. An abstract of Mr. Kittredge's statement appeared in the issue of March 1, page 395.

Bascule Bridge over the Harbor Channel at Copenhagen.—An interesting Strauss double leaf bridge over the busy harbor channel at Copenhagen was described by C. Van Langendonck in the issue of March 8, page 425.

Investigation of New Railway Projects.—This subject was discussed fully by A. M. Van Auken from the standpoint of the investor who desires a method of ascertaining whether proper amounts have been spent for the location and construction of a line before he purchases any of its securities. This article appeared in the issue of March 8, page 427.

HOW THE ROADMASTER CAN PROMOTE EFFICIENCY.*

BY G. LE BOUTILLIER,
Division Engineer, Pennsylvania Lines, Cincinnati, Ohio.

To promote efficiency the roadmaster must, among other things, thoroughly know the district assigned to him and become intimately acquainted with all of the men working under his directions and with him in the maintenance department. Between 40 and 45 per cent. of the expenditures on roadway maintenance is for labor; therefore, he should use the utmost care in properly distributing his forces, in his selection of track, extra gang, and work-train foremen; and in the selection of laborers, giving particular attention to their nationality and condition of health. It is important to see that the laborers who are housed by the railway have sanitary quarters in which to live. During his frequent trips over his district, he should determine whether each gang of men has proper hand and push cars and tools to enable it to carry on its work with despatch.

He should, from personal inspection, make requisitions for material and tools, required for renewals and repairs. As new rail, ties and ballast constitute a very large part of the value of all materials purchased for maintenance, it is particularly important to get the full life out of these materials. In determining what rail is to be renewed, it is necessary for him to consider the class and amount of traffic, and what use is to be made of the rail which will be removed. Frequently it is possible to considerably lengthen the life of main track rail by renewing a greater part, or all, of the angle or splice bars which may have become worn or bent for various reasons. Then again, it is sometimes desirable to renew main track rail, which is only partly worn out, which in turn is used in replacing lighter rail on branch line freight, running, passing and yard tracks.

It is not possible to obtain uniform track by allowing each foreman to determine what ties should be renewed on his section; therefore, the roadmaster should personally, or by a competent inspector, have all main and running track ties examined, and those to be renewed should be plainly marked.

Before the inspection of ties is begun, the inspector should be informed as to where rail and ballast are to be renewed, so as to make proper allowances for disturbing the old ties. The inspector should make a record of the ties marked, as between telegraph poles, to assist the work-train foreman in making proper distribution of new ties, to avoid unnecessary trucking.

The roadmaster should personally inspect all switches, frogs, crossings, switch stands, etc., before their renewal, to determine whether new materials should be furnished, or whether the old articles should be repaired for further use, or should be consigned to the scrap pile. In emergency cases, however, he should allow the foreman to make renewals of this kind. He must see that proper drainage of roadbed is maintained, to prevent damage to ballast and track; and must determine what ballast is to be cleaned. New ballast should be distributed after the old ballast has been cleaned, and only a sufficient amount should be provided for the work in hand, as it is very objectionable to have a surplus of ballast during the winter, either between the track

*From a paper entered in the contest on How the Roadmaster Can Promote Efficiency, which closed July 1, 1911.

or on the shoulder, where it interferes with drainage and often causes snow and ice to collect.

Too much stress cannot be laid on the matter of the proper distribution of labor on work requiring large gangs of men such as laying new rails, making heavy tie and ballast renewals, and distributing and picking up materials with work-trains, to see that no time is lost by poor distribution of labor, and by poor facilities for doing the work.

SECTION MOTOR CARS ON THE CHICAGO GREAT WESTERN.

The Chicago Great Western has gone into the use of motor cars for section forces more fully than any other road and has gradually extended their use until all sections except those in the larger terminals are now equipped with such cars. Their use has resulted in such large savings in track maintenance that President Felton mentioned the motor car as contributing materially to the very favorable showings made in the last annual report. The following statement shows the monthly savings on the four divisions and also the reduction in the number of foremen and laborers necessary to handle the work:

Saving by Introduction of Section Motor Cars.

	Saving per month.	Cost of cars.	Cost of operation and repairs per month.
Eastern Division	$2,016.00	$5,320.00	$88.64
Western Division	3,376.00	5,775.00	191.00
Northern Division	1,998.50	5,710.00	205.00
Southern Division	1,914.00	6,330.80	73.21
	$9,504.50	$23,135.80	$557.85

Reduction in Number of Sections and Foremen by Use of Motor Cars.*

Division.	Number Sections and Foremen. Old Basis.	New Basis.	Reduction.
Eastern	41	32	9
Northern	80	50	30
Southern	61	35	26
Western	59	37	22
	241	154	87

*Does not include yards or sections not equipped with motor cars.

Total Track Forces Before and After Installation of Motor Cars.

Division.	Summer Basis. Before.	After.	Saving per Month.	Winter Basis. Before.	After.	Saving per Month.
Eastern	246	192	54	100	91	9
Northern	342	331	11	161	158	3
Southern	438	361	77	184	168	16
Western	339	220	119	125	106	19
	1,365	1,104	261	570	523	47

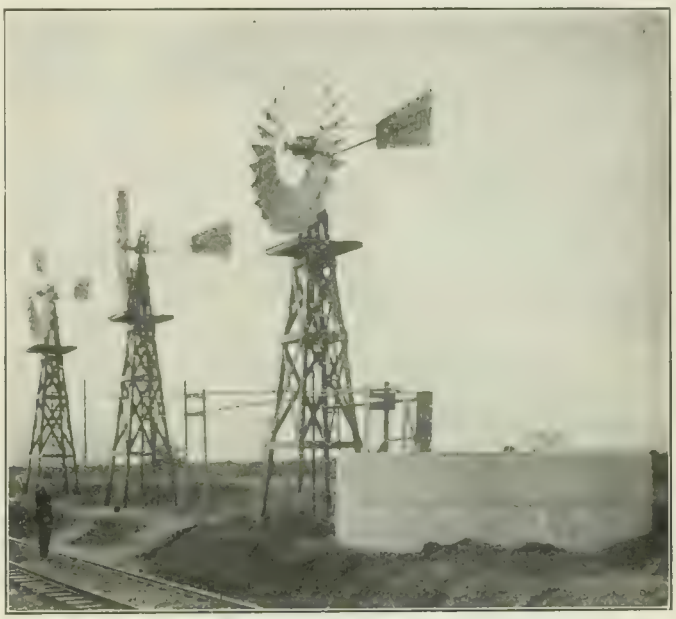
The proposed Mullet Creek-Singleton Railway, New South Wales, would begin at the northern end of the Woy Woy tunnel, about 43 miles from Sydney, and would skirt the eastern slopes of the hills lying to the west of Gosford. The survey has been completed for 24 miles toward Singleton.

AN UNUSUAL AND ECONOMICAL WATER SUPPLY ON THE FRISCO.

BY F. G. JONAH,
Chief Engineer, Construction, St. Louis & San Francisco.

Early in 1911 the Frisco completed an extension of its Fort Worth and Rio Grande division from Brady to Menard, Tex., a distance of 40 miles. At Brady there was a water supply, the source being Brady creek. At Menard the San Saba river furnishes one of the purest water supplies in the state. It was necessary to have an intermediate water station, and the securing of this was a matter of some difficulty.

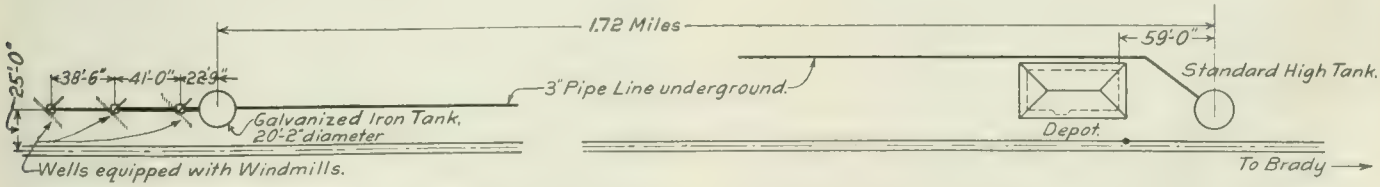
There were no running streams between Brady and Menard,



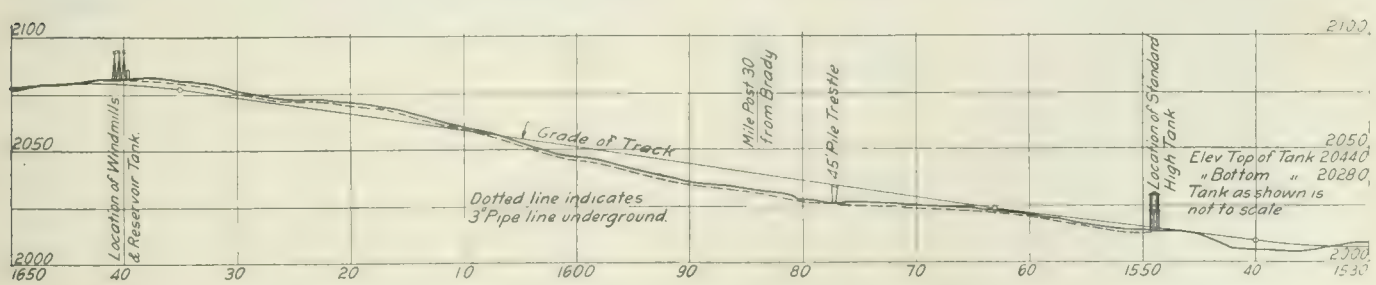
Pumping Plant at Callan Water Station.

neither were there any ravines, suitable for making reservoirs, and had there been, there was not sufficient rainfall to fill them in time for use; so, obviously, the next thing to do was to drill wells. This was done at several points, first at the station nearest midway between Brady and Menard. Here two wells were drilled—a shallow one, and a deep one (600 ft.). Then wells were drilled at the next stations both north and south, but none of them furnished enough water to justify the erection of a tank.

It was noted in traveling over the country that the large ranches were supplied with stock water furnished from comparatively shallow wells, with wind mills, and that these wells were in-



Plan of Water Station at Callan, Tex.; St. Louis & San Francisco.



Profile of Pipe Line at Callan Water Station.

variably located on the summits of rocky ridges. It was decided to profit by the experience of the ranch owners, and develop a supply along these lines.

The main divide separating the drainage areas of Brady creek and the San Saba river was crossed 1¾ miles south of the new town of Callan. On this summit three 8-in. wells were drilled, striking water about 120 ft. below surface, each furnishing about 10 gal. per minute. Over these wells wind mills were erected, pumping in to a galvanized iron reservoir tank 20 ft. in diameter and 6 ft. deep. From this reservoir tank a 3-in. pipe line leads to a 100,000 gal. tank erected at Callan at the foot of the grade 1.72 miles north of the wind mills. The latter tank is filled by gravity. The reservoir tank at the summit is on ground 2,082 ft. above sea level, while the top of the tank at the station is at elevation 2,044.

This arrangement has worked out very satisfactory, the supply being ample at all times for the requirements at that station; and the operating expense is nothing beyond the maintenance of the plant. The cost of the supply was:

Drilling and casing 3 wells	$394.25
Three wind mills, complete	675.00
Galvanized iron reservoir tank	204.40
Tank at station	2,165.00
Cost of pipe line, material and labor	2,231.25
	$5,669.90

The map, profile and photographs illustrate the plant clearly.

CONCRETING IN COLD WEATHER.

A recent bulletin published by the information bureau of the Universal Portland Cement Company contains the following suggestions for concreting in cold weather:

The results of tests made at the Watertown arsenal show that low temperatures practically suspend the hardening of concrete and that its strength increases very slowly under the influence of extreme cold. The same tests show, however, that the strength of concrete which has been frozen and which is thawed out slowly is only very slightly impaired. The longer concrete has been frozen the longer is the time required to overcome the action of the freezing. Since the effect of freezing is bad, precautions should always be taken to keep the aggregate and the mixing water heated and to protect the forms both before and after pouring. One of the most common methods of preventing freezing has been to use a small amount of salt in the mixing water. Even if salt is used, however, it is important that the aggregate be free from frost in order that the concrete may be properly mixed. If there is a possibility of electrolytic action the use of salt is to be discouraged, as it renders the concrete more susceptible to such action. In reinforced concrete there is also the danger that the salt will corrode the steel.

The materials for concrete may be heated in a variety of ways. Half cylinders of sheet steel are often set directly on the ground to form an arch, over which the sand and stone are piled and in which a fire is kept burning. A length of metal culvert pipe, with a piece of smaller pipe for a flue, serves the same purpose. Sections of old boilers have also been used. A portable heater can be made of sheet iron by providing a fire-box under a large pan for the sand and gravel, the whole framework being supported on wheels. The sand and stone may be piled directly on coils of pipe carrying steam, or the steam may be applied directly to a pile covered by tarpaulins. Short pieces of iron pipe attached to the boiler by lengths of hose are often inserted in piles of sand or gravel, allowing the steam to escape through the materials. An improved form of heater of this type has numerous small holes punched in the length of pipe, allowing the steam to escape at numerous points instead of from one large opening at the end of the pipe. With a good steam pressure this system is quite effective and avoids the rehandling of material. On large construction work storage bins provided with heating coils are often built. Mixing water may be heated by steam pipes in a water barrel or by fire in a furnace beneath a tank. Steam for heating the water may generally be supplied from the mixer boiler or, if necessary, from an extra boiler provided for that purpose. In cases where additional precautions are necessary to make certain that the concrete will leave the mixer unchilled, live steam can be turned into the drum of the mixer and the openings kept covered with canvas flaps. One contractor who was obliged to carry the concrete a considerable distance from the mixer burned a cupfull of gasolene in each empty concrete car before filling it, the sudden heat generated being sufficient to warm the metal of the car.

It is important to note in connection with any method of preventing concrete from freezing that heat is always produced in the hardening of concrete under normal conditions, that this heat is of value in the hardening process, and that the amount of heat developed is, within reasonable limits, in direct proportion to the temperature of the mass and its surroundings. The heat of the materials and the mixing water hastens to rise in temperature and increases it somewhat above that attained under normal conditions. Since the rise in temperature is decreased by an increase in the amount of water used, the least water compatible with good work should be used in mixing concrete in freezing weather in order that the maximum internal heat may be developed and the rate of hardening accelerated.

SPECIAL DESIGN FOR RETAINING WALL.

The Lake Shore & Michigan Southern is elevating its tracks through South Chicago, Ill., in connection with the work which is being carried on in the vicinity of Ninety-fifth street and South Chicago avenue to eliminate the grade crossing of the Lake Shore & Michigan Southern and the Pittsburgh, Fort Wayne & Chicago with the Chicago, Rock Island & Pacific, the Chicago & Western Indiana and the Baltimore & Ohio at that point. (See *Railway Age Gazette*, March 24, page 758.) To provide facilities for interchange between the Lake Shore on



Lower Section of High Wall from High Track Side.

the high level and the Rock Island on the low level, an interchange track is being built which, for a considerable distance, is parallel to and only 17 ft. from the nearest Lake Shore track. The grade of the Lake Shore is .3 per cent. ascending southbound and that of the interchange track 1 per cent. ascending northbound. To retain the embankment for the high level tracks and support the interchange track on the lower level, a special design of double retaining wall was adopted, which is illustrated herewith.

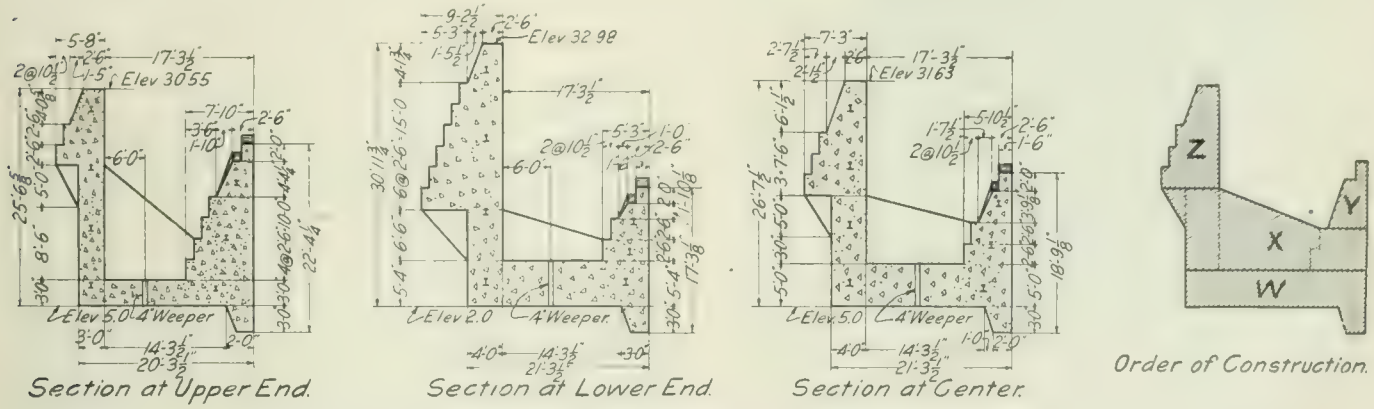
The essential features are the use of counterforts 2 ft. thick connecting the high and low walls and a continuous footing under both walls. This design is used for a distance of 893 ft., the difference in elevation of the tops of the walls being 6.19 ft. at one end and 16.72 ft. at the other end. At the upper end the counterforts are spaced 10 ft. center to center, and the section



Counterforts Connecting High and Low Walls.

of the high wall below the top of the counterforts is only 3 ft. thick. This spacing of counterforts is maintained for one-half the length of the wall, the thickness of 3 ft. being increased in increments of 3 in. at four sections in that distance. At the same points the thickness of the foundation, which is 3 ft. at the upper end, is increased in increments of 6 in. The counterforts on the lower half of the wall are spaced 7 ft. 6 in. center to center, the thickness of the section of the high wall below the top of the counterforts being reduced again to 3 ft. and of the foundation to 4 ft. at the center point. These dimensions are increased at four points in the remaining length, the increments being 3 in. for the wall thickness and 4 in. for the foundation. The only reinforcing used was old rails placed longitudinally in both walls, as shown in the drawing, and short lengths of corrugated bars used for bond between the sections of concrete, as shown in the photograph. Drainage was provided by placing a 4-in. weeper in each section between the counterforts.

The sequence of operations in building the wall is shown in the drawing. The foundation was placed first, then the counterforts, and then the upper sections of both walls, each section being built at one continuous operation. We are indebted to Samuel Rockwell, chief engineer of the Lake Shore & Michigan Southern, for the above information.



Typical Sections, South Chicago, Retaining Wall; Lake Shore & Michigan Southern.

A VISUAL METHOD FOR DETERMINING THE PENETRATION OF INORGANIC SALTS IN TREATED WOOD.*

BY E. BATEMAN.

In the preservative treatment of wood with zinc chloride or other salts it is often desired to know the depth of penetration which has been attained in any particular charge or series of charges. The usual way of determining this is to analyze the wood for its zinc chloride content per inch from the perimeter to the center, a method both tedious and expensive. To obtain a simpler and cheaper method the following, which might be termed the visual method for the determination of the penetration of zinc chloride, has been devised.

It is a well-known fact that the ordinary salts of zinc are all either white or very pale in color, so that all chances of forming a colored salt with this metal are eliminated at the start. Several dyes of various natures have been added to the treating solution in the hope of fixing them in the wood to the same depth as the zinc chloride, but such methods have failed, either because the dyestuffs were insoluble in the treating solution or because they were precipitated on the outside of the wood. Advantage was finally taken of the decolorizing action of soluble zinc salts on uranium ferrocyanide. Zinc salts, in slight excess, will completely decompose the colored uranium ferrocyanide, with the formation of a white precipitate of zinc ferrocyanide. This property of zinc salts has been made the basis of a visual test.

A representative disk of the treated wood is cut as a test piece. The freshly cut surface is dipped for an instant in a 1 per cent. potassium ferrocyanide solution. The entire surface should be moistened, but the disk should not remain in the solution more than 10 seconds. After the disk has been thus moistened the excess of the solution is removed from the face by blotting paper. The moistened block is then dipped into a 1 per cent. solution of uranium acetate and allowed to dry. At first the whole block may have a reddish tinge, but on drying, the untreated portions will have a dark red or maroon color, while the treated portions will be slightly whiter than the natural wood.

On account of the color of the uranium ferrocyanide the test cannot be used on red oak, because the natural color of the wood masks that of the uranium compound.

In order to ascertain the accuracy of this method, a section of a pine tie which had been previously analyzed for its zinc chloride content in each inch from the perimeter was treated by the visual method. The analysis of the block is given in Table 1.

Table 1.—Result of Analysis of a Section of Tie for Determining the Absorption of Zinc Chloride.

Portion from which borings were taken.	Number of borings.	Zinc chloride found. Lb. per cu. ft.
First inch	8	0.77
Second inch	8	.64
Third inch	8	.28
Fourth inch	3	.17

*From Circular 190, U. S. Dept. of Agriculture, Forest Service.

The wood adjacent to all of the outer eight holes shows zinc chloride, and by analysis contains an average of 0.77 lbs. of salt per cubic foot of wood. Four of the next eight holes are in the white (treated) wood, and the other four show only a partial treatment. The average absorption of these eight borings was 0.66 lbs. per cubic foot. Of the third eight holes only two are in the completely treated region, five are in partially treated wood, and one in a practically untreated spot. The average of the borings was 0.28 lbs. per cubic foot. The inner three holes all show partial treatment in the surrounding wood, and the analysis of the borings showed an absorption of 0.17 lbs. per cubic foot. It is therefore evident that the visual test is capable of detecting the presence of zinc chloride in treated wood when present in amounts as small as 0.17 lbs. of salt per cubic foot of wood, or, rounding off the second decimal, 0.2 lbs. per cubic foot.

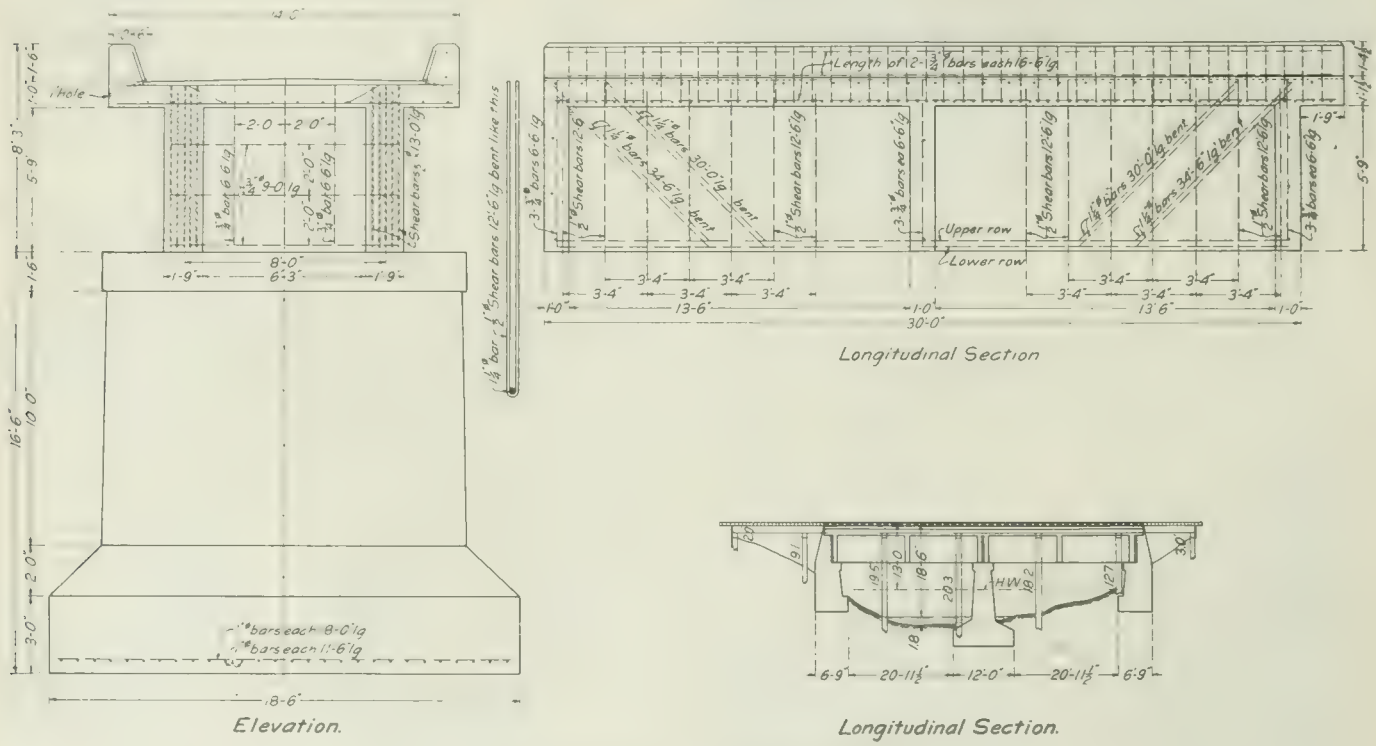
Although zinc chloride is the principal inorganic salt used in the preservation of timber, yet several others have been and are used to a greater or less extent, among them mercuric chloride, copper sulphate, iron salts in various forms, etc. For such salts the same general method of testing the penetration may be applied as for zinc chloride, except that a double dipping process is unnecessary, since all the other common metals form some colored compounds which can be made to show their presence directly. In testing for copper, for instance, it would only be necessary to dip the section under examination in a solution of potassium ferrocyanide. The presence of copper would be shown by a dark red coloration in the treated zone. With salts of iron the same reagent would give a deep blue coloration in the treated zone.

When mercuric chloride is used as a preservative, the depth of penetration can be determined by treating the test disk with a solution of hydrogen sulphide, which can readily be prepared for this test by acidifying a solution of sodium sulphide. The penetration is indicated by a black precipitate of mercuric sulphide.

The work of four-tracking and regrading the South Yarra to Caulfield line, Victoria, at an estimated cost of $1,555,000, has been commenced. This work will take at least three year to complete.

REINFORCED CONCRETE DECK GIRDERS ON THE WABASH.

While concrete decks have been placed on deck plate girders and the girders then moved into place, and while concrete through girders have been built in place, the building of concrete deck girders at one side and then sliding them into place is a new departure. The accompanying drawing shows the design of such concrete deck girders as worked out by the engineering department of the Wabash to replace a pile structure on the Pennsylvania division, near Johnsonville, Ind. These girders and the deck will be built as a monolith on false work at one side and moved into place in the same manner in which plate girders are handled after the concrete is allowed to set a sufficient length of time. While no trouble is anticipated in moving the structure into position, greater care will be required than in handling plate girders. The false work must be stronger and more rigid to withstand the load both during construction and while moving the girders into position, as the danger of injury in moving is greater with the concrete girders than with steel.



Concrete Deck Girder; Wabash Railroad.

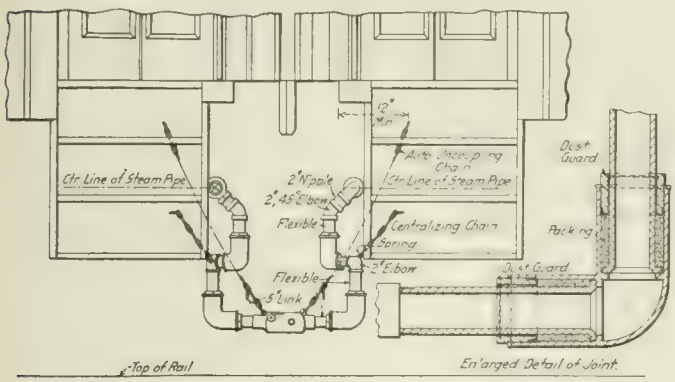
The development of these plates and the construction will be watched with interest. We are indebted to A. O. Cunningham, chief engineer of the Wabash, for the plans for this structure.

A system of railways is proposed in Argentina, so laid out as to form convenient junctions with the various lines of the Buenos Aires Great Southern at Guerrero, Las Flores, Azul and Bolivar, with the Buenos Aires & Western at Trenque Lanquen; and with the Buenos Aires & Pacific at Bragado and Junin. The new lines, which will amount to a total of about 640 miles, will traverse in places the rich lands recently drained by the great canals constructed by the provincial government of the province of Buenos Aires, and also the wheat-growing and cattle-raising camps along their entire distance. By this means the congestion of population and of traffic in and about Buenos Aires, which is rapidly becoming serious, will be relieved, while another outlet will be afforded for districts calculated to contain a population of 1,000,000 within the zone of country served by them, for at present there is a stretch of coast of some 700 miles south of Buenos Aires and La Plata without a deep-water port.

GOETZ FLEXIBLE CONNECTOR FOR STEAM HEAT.

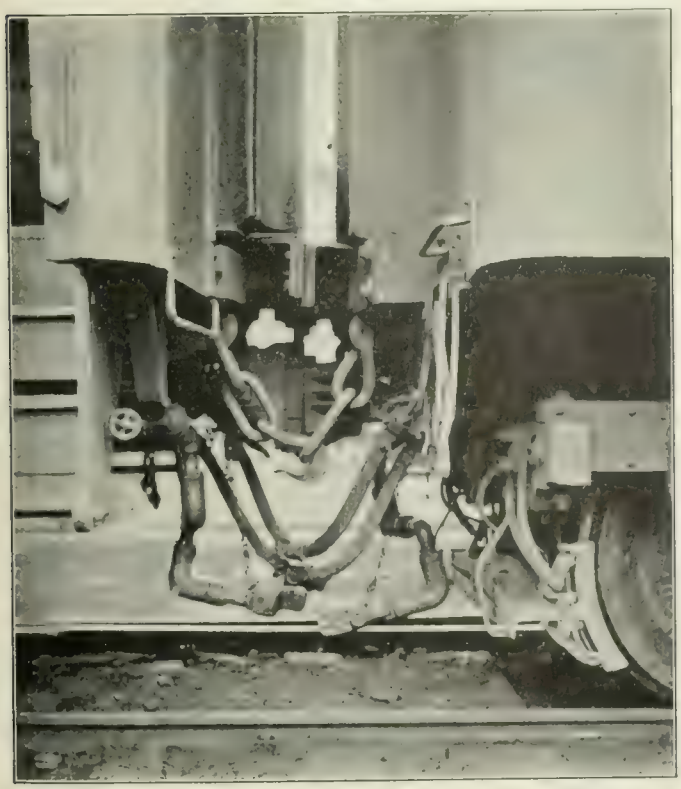
The rapid deterioration of steam hose for car heating is causing a demand for something more substantial and permanent; flexible metal connectors have been proposed and are used to a slight extent. The most familiar form is that which employs a ball joint, such as is used for engine and tender couplers and for the rear of some tenders where steam connection is made to the engine of the electric generator in the baggage car.

The flexible steam connector here illustrated is made of pipe



Goetz Flexible Connector for Steam Heat.

fittings and nipples, with two right-angle elbows which have long stuffing box connections in each arm. The sleeve which enters the elbow has a collar at the inner end, and is held in place by the packing and gland, as shown in the detail view. The movement of the sleeves in these packed elbows furnishes sufficient flexibility, and this is the new and special feature of the connection. The drawing shows the general arrangement with the steam connector so placed as not to interfere with the air or signal hose. It is supported and held in position by chains, and an auxiliary chain is attached to the standard hose coupling for the purpose of parting the coupling automatically when the cars are separated. This flexible connector is patented and is made and sold by the Joseph Goetz Manufacturing Company, Toledo, Ohio. It has been applied to cars on the Wheeling & Lake Erie, Ann Arbor, and Detroit and Mackinac railways, and is being tested by a number of other lines.

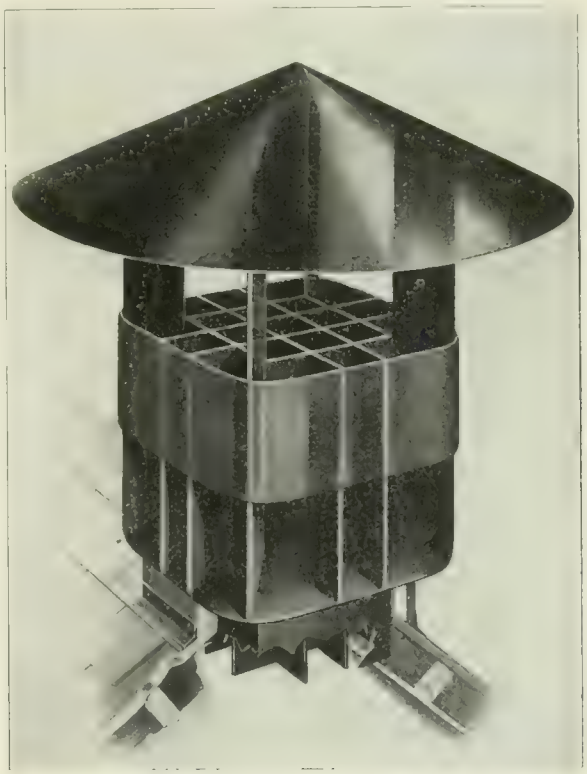


Application of Goetz Flexible Connector for Steam Heat.

GARLAND VENTILATOR FOR BUILDINGS.

The Garland principle of ventilation, which has been used on many passenger cars for several years, is being employed in designing ventilators for shops, power houses, railway stations, freight houses and similar buildings; also for chimney tops and smoke jacks. Around the upper end of the main air shaft, which is divided into flues or air shafts, as shown in the illustration, is a series of auxiliary ducts, so arranged that they raise the cross air-currents and deflect their movement upward and across the corresponding series of flues in the main air shaft. The current of air flowing through the auxiliary ducts produces a positive induction action, always upward through the flues in the main air shaft, and from the interior of the building.

Back or down drafts are frequent in most ventilators which have been designed with the view of overcoming this very diffi-



Garland Ventilator for Buildings.

culty, and this action increases as the size of the ventilator becomes larger. The flow of air decreases in proportion to the increased area of the air shaft to such an extent as to make the upward currents so sluggish that the opposing air currents force their way down through the ventilator. The Garland ventilator has overcome this trouble in two ways: First, by dividing the main air shaft, which has an effect equivalent to the combination of several small ventilators into one large one, making the large single opening unnecessary; second, by the formation of a film of flowing air from the auxiliary ducts across the upper ends of the main air shaft flues.

The air shaft of the Garland ventilator being square instead of round, is easily applied to all kinds of buildings, skylights or smoke stacks; in many cases it can be applied without the use of an expensive and cumbersome base. These ventilators are made and sold by Burton W. Mudge & Company, Peoples Gas building, Chicago.

General News Section.

The New Orleans Terminal Company has made an increase in the pay of its employees who are members of the brotherhood of trainmen.

The New York Public Service Commission has approved the revised plans of the Interborough Rapid Transit for its subways in New York.

The committee on interstate and foreign commerce of the lower house of Congress is understood to have decided to make a favorable report on the bill, introduced by representative Sims, of Tennessee, to abolish the commerce court.

Five sleeping cars on the Twentieth Century Limited, westbound, were derailed just outside of the Collinwood (Ohio) yard on March 7, by the breaking of a wheel. The cars struck a switch shanty near the track, killing a switchman who was inside.

Instead of carrying out the original plan of inviting representatives of the rail manufacturers to attend its meeting on March 20, the executive committee of the American Railway Association will hold its own meeting on that date, and will meet the rail makers in joint conference on the following day.

The report of the New York state commissioner of labor for the third quarter of 1911, gives the number of union laborers out of work in the state as 12,725, which is said to be less than at the corresponding time in any year since 1907. This number is 2.7 per cent. of the membership of the unions from which the reports were received.

The chairman of the house committee on interstate and foreign commerce has introduced in Congress a bill requiring the Interstate Commerce Commission to make physical valuation of all the railways in the country; to make a complete inquiry into the ownership of all railways and other carriers subject to the Federal law, including names of persons who own stock and who serve as directors; what were their original investments and what their present holdings. The commission is directed to have the valuations kept up to date.

The Continental Limited on the Wabash was derailed by a broken rail while rounding a curve on a 30-ft. embankment two miles west of West Lebanon, Ind., at 4:40 p. m. on March 7, and seven cars in the train rolled down the embankment, killing two passengers and a Pullman porter, and injuring a large number of passengers. The train was running at a speed of 35 miles an hour. It is uncertain whether the engine struck a broken rail or whether the rail broke under the engine. The mail car, baggage and express car, parlor car, day coach and three sleeping cars were all badly damaged, but the engine remained on the rails.

Cornell University alumni in attendance at the forthcoming meetings of the American Railway Engineering Association in Chicago have made plans for getting together on several occasions during the week. Tables have been reserved for Cornell men at the anuual dinner on March 20, and tickets may be obtained from H. C. Holloway of the Rail Joint Company, Chicago The Cornell Alumni Association of Chicago will also hold a luncheon on Thursday, March 21, at the Grand Pacific Hotel, at 1 o'clock, it which addresses will be made by President F. S. Porter, J. G. Sullivan, assistant chief engineer of the Canadian Pacific, and Mr. Holloway.

It is announced that beginning with August 1, next, the passenger trains of the Lehigh Valley will run to and from Jersey City over the Central of New Jersey instead of over the Pennsylvania. Since the Pennsylvania has run its own through trains to the new station in Manhattan, the ferry service across the Hudson river from Jersey City has been diminished, the lines to Twenty-third street and to Brooklyn having been abandoned and the boats to Cortlandt street made less frequent. These changes are said to have proved somewhat detrimental to the Lehigh Valley. The Lehigh Valley already has a freight terminus adjacent to the station of the Central of New Jersey. Its line connects with the Pennsylvania at Newark, about 10 miles from New York, and also at Metuchen; and with the Central of New Jersey at several places within a few miles of New York.

In the hearing before the Stanley Congressional committee at Washington this week, G. M. Freer gave figures tending to show that on shipments of steel from Chicago to Kansas City the Elgin, Joliet & Eastern, the originating road, received an exorbitant share of the through rate ($2.75 a ton), the road being controlled by the United States Steel Corporation; and that the Kansas City Southern, on rails consigned to itself, for use in its own tracks, also received an undue share. It does not appear that any official or documentary evidence was presented to substantiate these statements. Statements were also made to the effect that the Bessemer & Lake Erie, which is controlled by steel interests, received an undue share of a through rate on freight carried between Pittsburgh and Buffalo. Testimony was also given tending to show that the Duluth, Missabe & Northern made excessive profits on the transportation of iron ore. On Wednesday of this week Joseph Wood, vice-president of the Pennsylvania lines west of Pittsburgh, appeared before the committee. Asked if it was fair to the public that a short railway, which is a mere facility of a manufacturing plant, should have the privileges and rights of a common carrier, he replied in the negative. Mr. Wood said that the Pennsylvania Railroad acquired control of the Pennsylvania Steel Company and the Cambria Steel Company, because it was feared that the United States Steel Corporation would raise the price of rails.

Some figures showing the amount of work involved in caring for the linen used on the dining cars of a large railway system recently have been compiled by the Southern Pacific. An average of 315,000 pieces of linen are laundered each month in this department, including 100,000 napkins, 100,000 dish towels, and 40,000 table cloths, and each piece is carefully looked over by inspectors to detect tears or signs of wear. At the commissary department at Oakland, Cal., there is maintained a linen repair room where thousands of napkins, table cloths, dish towels and cooks' and waiters' aprons are kept in perfect condition. Fourteen electrically-operated sewing machines are kept running steadily eight hours a day and six days a week. With these machines it is said that a hole in a piece of table linen can be darned so well that it is sometimes impossible to detect the stitches from the original weave. Each piece of linen as it is brought in from a trip is counted and careful count and inspection are continued until it is returned. In employing women for this work the Southern Pacific gives preference to dependent relatives of men who have been injured or killed in the service.

Twentieth Century Limited Derailed.

The Twentieth Century Limited, of the New York Central, eastbound, was derailed near Hyde Park, N. Y., five miles north of Poughkeepsie, on the morning of March 13. A rail broke under the second car, derailing one of its trucks. This car broke away from the car ahead of it, but remained on the right of way, while the five following cars went down the low embankment into the Hudson river, the thick ice supporting them so that they were only partially submerged. The locomotive and one car stayed on the track. Twenty-two passengers and five employees were injured, a few seriously. The rail which broke was 100-lb. section, rolled in 1910. The train, which was two hours late, is believed to have been running at from 45 to 50 miles an hour. The cars, which are all-steel, were but slightly damaged.

The Coal Strikes.

The industrial situation in England and Scotland, resulting from the strike of coal miners, has continued to grow worse during the past week, and on Tuesday it was reported that the stoppage of work by the million of miners had enforced idleness on at least a million persons in other industries, these industries being compelled to close, or to discontinue important branches of their work, on account of the scarcity of coal. The Northeastern Railway alone had suspended 1,369 trains. A situation tending towards a complete deadlock was relieved on Tuesday by the convening of a conference of government officers, coal mine owners and representatives of the miners; but at last accounts this conference had brought forth no definite results.

The most talked of remedial measure is a proposition for an act of Parliament establishing minimum wages for miners. It is said that the men representing the laborers throughout the Kingdom have come to the conclusion that such a law, if passed, might be enforced contrary to the desires of the workers. If the government should decide what constitutes a minimum wage it would also force the workers in the industry to which it applied to accept. The result of this would be compulsory arbitration, to which a majority of the labor leaders are opposed. Widespread inconvenience and privation have been caused by the strike. Reports from Glasgow declare that entire cities in Scotland are without food and fuel.

Press despatches from Germany on Saturday last, reported extensive strikes of coal miners in the Westphalian coal fields, and on Tuesday it was said that at least 200,000 men had left their work in that district. Disorders, calling for interference of the police, occurred at many places in Prussia.

The committee representing the anthracite coal operators of Pennsylvania met in New York on Tuesday of this week and prepared the reply which they were to give to the representatives of the workmen in the anthracite mines, who have asked for an increase of 20 per cent. in their wages besides radical changes in the conditions of their employment. The operators refuse substantially all of the demands made by their employees. The committee proposes that the present arrangement be continued for three years longer (the miners had proposed a one year agreement). To grant the miners' demands would necessitate an increase of 67 cents a ton in the market price of the domestic sizes of coal. An advance could not be made unless the selling price could be increased, for the cost of mining has been increased in recent years because of the exhaustion of the thicker veins and from other causes. Extended reference is made to the agreement of 1903, setting forth the good results of that agreement.

It is said that the quantities of anthracite coal in storage are about the same as usual at this time of year. In anticipation of a possible strike this spring, the companies had mined more coal than usual, but the extra product is understood to have been nearly or quite all absorbed by reason of the increase in the demands of consumers because of the unusually cold weather of the past three months.

Good Roads.

The Department of Agriculture reports that Indiana leads all the States of the Union in mileage of improved roads. The eight leading good roads states, as shown by the data compiled by the director of the office of public roads, are as follows:

	Mileage Improved.	
	1909.	1904.
Indiana	24,955	23,877
Ohio	24,106	23,460
New York	12,787	5,876
Wisconsin	10,167	10,633
Kentucky	10,114	9,486
Illinois	8,914	7,924
California	8,587	8,803
Massachusetts	8,463	7,843

Where decreases are shown, they have been the result of reclassification. New York is the only one of the eight that appears in the list of the eleven states leading in actual progress in road building in the 5-year period. In other words, while the entire eight states maintain their lead, it is merely because of their earlier start, and New York alone is entitled to a place in the list of states making progress in the last five years. The gain in New York is due largely to the fact that the state has bonded itself for $50,000,000, and that $5,000,000 a year or more is being expended by the state, in addition to an equal sum by the counties, in building state highways. New York is leading all the states in actual progress at the present time.

A Strike Sequel.

The Texas railway commission has received a most extraordinary petition signed by S. W. Steele, chairman of a general commitee of blacksmiths, boilermakers, machinists, coppersmiths and carmen, protesting against an application of the Houston & Texas Central, which the committee believes is to be presented, for permission to issue bonds for the purpose of purchasing 50 or more locomotives. The craftsmen's petition makes no reference to the strike of mechanical department employees on the Harriman lines, but states that there are at present in Texas many idle mechanics seeking and needing employment, and that it would be more economical for the company to properly repair its present engines than to purchase new. The petition also states that the company is now employing unskilled non-resident instead of skilled mechanics, as formerly, and a much larger number than would be necessary if skilled mechanics were employed; and that the employment of non-resident labor entails on the company a greater expense than would be required to pay the skilled home labor for the same service.

The Han-Yang Iron and Steel Works.

The following is abstracted from an article in the Quarterly of the School of Mines, Columbia University:

The Han-Yeh-Ping Iron & Coal Company, China, which was established in 1891, has three chief plants; the Han-Yang iron and steel works, on the northern bank of the Yang-Tse river, being separated from Hankow by the Han river and from Wu-Chang by the Yang-Tse river; the Ta-Yeh iron mines and limestone quarry, about 30 miles south of Hankow, near the Yang-Tse river; and the Ping-Hsiang coal mine and coking plant, about 250 miles south of Han-Yang, not far from the Hsiang river. The coal mine is four miles southeast of the city of Ping-Hsiang.

The iron works comprise three modern blast furnaces and produce about 500 tons of pig iron a day, or 180,000 tons a year. About two-thirds of the pig iron produced goes to the steel plant to be made into railway material. A small portion is used in the foundry and some is sold to the native works of the surrounding cities. The rest of the pig iron is exported to Japan and the United States.

The steel plant consists of six Siemens-Martin open hearth furnaces, one mixing furnace, a cogging mill, a beam and angle mill, a rail mill, a plate mill and other plants capable of rolling 1,000 tons of finished steel a day. At present the output is about 300 tons a day.

The approximate cost of producing iron ore in the open cut workings at Ta-Yeh is as follows: Stripping, $0.04 per ton; mining, $0.09 per ton; tramming, $0.02 per ton; powder, steel, etc., $0.01 per ton; superintendence, $0.03 per ton; loading cars, freight to the Yang-Tse, etc., $0.15 per ton; total, $0.34 per ton.

The output at Ta-Yeh is 1,600 tons daily, or about 500,000 tons a year. Of this, 125,000 tons is exported to Japan every year. At the present rate of output, the ore in sight will last about 70 years; the amount at greater depths is not known. The present output of the Ping-Hsiang coal mine and coking plant is 600,000 tons a year, which is expected to increase to 1,000,000. It is estimated that there are about 300,000,000 tons in this field, which should last about 200 years.

The wages of the laborers at the iron and coal mines are as follows: Miners, $0.13 to $0.15 per day; tipple coolies, $0.05 to $0.06 per day; loaders and pushers, $0.05 to $0.07 per day. The wages of laborers at the steel works are as follows: Rollers on mills, $0.17 to $0.35 per day; heaters on furnace and open hearth smelters, $0.27 per day; helpers, $0.17 to $0.25 per day; blacksmiths, $0.35 to $0.50 per day.

Good Results of Government Conciliation.

We can be certain, for the tendency is unmistakable, that more and more will the influence and authority of the government be extended into business pursuits which have hitherto been conducted as purely private enterprises. Broadly speaking, there are already three parties concerned in every labor dispute, the employer, the employee and the public. Unquestionably, the relative interest of the public in these contentions will increase, and some plan must be devised to protect that interest without injustice to either of the other parties concerned.

That section of the Erdman law which provides for federal mediation in disputes between interstate carriers and their employees, when the public welfare was threatened, has produced excellent results. If the efforts of the government representatives at conciliation fail, they may then press arbitration on the warring elements.

The arbitration features of the law are undoubtedly useful, however infrequently brought into play, but the scheme of mediation has been a distinct success. It has been utilized in numerous cases during the past six years, and in no instance yet has a strike followed the intervention of the mediators. The law may, therefore, be regarded as at least a promising and suggestive innovation.

Labor unions are the natural outgrowth of business and commercial conditions. Less than eighty years ago there was seldom to be found more than a few score employees under one employer. Today, with concentration of industry, so that thousands and tens of thousands are under one directing head, the necessary. Labor disputes cannot be adjudicated properly in the regular courts of law. A lawsuit does not look forward, it usually looks backward. But a labor controversy does not ordinarily relate to what has happened, it relates, rather, to what is going to happen. It looks to the future, to the wages to be paid, to the hours of labor to be required, to the conditions of service which shall thereafter obtain. The plan of mediation contemplates that official assistance which will aid the parties themselves to compose their difficulties and reach an amicable understanding. For this reason, it has been the conception of those who have acted in this capacity (Messrs. Knapp and Neill) that their duty is not to determine what settlement they think ought to be made, but to find out what settlement can be made.

Suits at law leave the litigants enemies thereafter, for the victorious one holds that he has been put to expense to vindicate his right, while the loser invariably feels that there has been a miscarriage of justice. This is not the case with the mediation or arbitration plan.—*Judge M. A. Knapp, before National Civic Federation.*

A Man Capitalized.

In a statement issued to the employees of the road, President H. U. Mudge, of the Chicago, Rock Island & Pacific, capitalizes each man earning $83.33 a month, or $1,000 a year, at $25,000, because the man's wages or salary is the interest at 4 per cent. on $25,000. He says a man earning that much is worth as much as a locomotive costs, but he adds:

"You can make yourself worth more, while a locomotive cannot. You can direct your own energies, while a locomotive must be directed by a driver. It rests with you to raise your own capitalization to $50,000, to $100,000, or even to $500,000. Therefore be careful about your food, treat your body decently, and, above all, feed your mind. You are working for a large corporation. In the nature of things it cannot know you very well personally, but it knows you by the work you turn out. It sets a real value on your work, higher than you think. Your value is measured by the quality and quantity of results you produce. Somebody knows your actual worth, appreciates your honest endeavors and has you in mind for better things. It is a business proposition. Each of us is capitalized."

New Passenger Service to Pacific Coast.

Several important changes in through passenger train service from Chicago to the Pacific coast are being planned to take effect about May 1, although all arrangements have not been completed. The Chicago & North Western, in conjunction with the Union Pacific and Southern Pacific, will put in service a complete new five-car train, all-steel, now being built by the Pullman Company, to run from Chicago to San Francisco in 63 hours and 55 minutes, leaving Chicago at 7:15 p. m., and arriving at San Francisco at 9:10 a. m. the third day. This is a reduction of nearly four hours from the present schedule. The train will take the place of the present San Francisco Overland Limited, and the former name, the Overland Limited, will be restored. An extra fare of $10 will be charged.

The Chicago, Milwaukee & St. Paul, whose Overland train has heretofore been consolidated with that of the North Western after reaching Omaha, will have an exclusive through train from Chicago in connection with the Union Pacific and Southern Pacific, with cars for Los Angeles, San Francisco and Portland. The schedule for this has not yet been determined. The North Western and St. Paul probably also will each have exclusive trains from Chicago to Denver via the Union Pacific in place of the trains which are now consolidated after reaching Omaha.

Increased Pay.

The Bureau of Railway Economics, Washington, D. C., reports that there were substantial increases in the wages of railway employees during the fiscal year 1911. Reports filed with the Interstate Commerce Commission show that the total compensation to the employees of railways over 500 miles long was $1,005,277,249. This sum was greater by $41,868,822 than it would have been at the rates of pay in effect during 1910, and greater by $69,297,678 than it would have been at the rates of pay in effect during 1909.

Notwithstanding an increase of 2,108 in the miles of railway operated, there were fewer employees on the payrolls June 30, 1911, than on June 30, 1910, by 31,037, yet the total compensation paid to employees during 1911 was greater than that paid during 1910 by $49,976,216. This is greater than the increase in the gross earnings of the railways by $22,595,121. Net revenues fell off by $40,988,539 during the same period in which compensation increased nearly fifty millions.

The summary of revenues and expenses of the steam railways over fifty miles in length for the month of December, just issued by this bureau, shows that for the calendar year 1911 the total operating revenues were less than for the calendar year 1910 by $27,698,780, and the net revenues less by $22,286,784.

The Steel Corporation's Unfilled Tonnage Report.

The unfilled tonnage report of the United States Steel Corporation shows that on February 29 there were 5,454,200 tons compared with 5,379,721 tons at the end of January. This is an increase of 74,479 tons. New orders during February exceeded shipments by 2,568 tons a day. The daily average of new orders received in January was a little over 37,700 tons, and the daily average in February was 31,034 tons. Shipments in February were about 50,000 tons less than in January, but the average daily shipments were greater in February than in the preceding month.

The Aviators.

Flying from London to Paris on Thursday, March 7, Henri Selmet traversed the distance between those cities, 222 miles, without a stop in two hours, 57 minutes, or at the rate of about 75 miles an hour. The aviator flew at an average height of more than a mile. Most of the time he was above the clouds, and directed his course by means of a compass. He was helped along by a strong breeze; and in the afternoon, when he attempted to make the return journey, was forced to give it up and land near Dieppe on account of the force of the wind. Mr Selmet said that he used his air ship on this trip because, on account of the strike of coal miners in England, railway traffic was uncertain, and it was important for him to be in Paris that day.

This, probably, is the best time ever made by a human being for that distance, though the steam railway locomotives of the Pennsylvania Lines, on October 24, 1905, accomplished nearly the same rate, namely, 74.55 miles an hour for 257 miles.

But scarcely had Mr. Selmet's feat been published when the press despatches reported that Maurice Tabuteau, a French aviator, who already had broken many records, had flown in a monoplane from Pau to Portiers, France (on Monday, March 11), 261 miles, in two hours, 35 minutes, or at the rate of over 101 miles an hour. At this rate the journey from New York to Chicago would take only about one-half the time required by the famous 18-hour trains; and the clocks—an hour apart—would reduce the journey to apparently eight hours.

A Link with the Past.

John Hance, who was fireman of the special train from Philadelphia to Trenton, which carried the news of the death of President Zachary Taylor in 1850, died recently at his home in West Point Pleasant, N. J., at the age of 87. And that was the way in which important news was carried in 1850, six years after Morse demonstrated his telegraph between Washington and Baltimore.

Grievance Committee, Latest Style.

A few weeks ago the division superintendent of one of the large trunk lines suspended an engineman for three months for running past signals. The engineman was a prominent member

of his small community, and the Ladies' Club took the matter up and endeavored to secure his reinstatement. They went to the superintendent; but, receiving no satisfaction, the president of the club took the matter up with the president of the road. He looked the matter up and soon wrote: " . . . I find that this is his fourth offense. If this had been kept up much longer he might have wrecked his train. Unless my attention had been called to this I fear he would have been reinstated by the equally culpable superintendent at the end of his suspension period. In-as-much as we want no men on our road who cannot obey orders, I have issued instructions that Mr. ——— must never again be employed by this company under any circumstances. . . . I have also discharged the superintendent.—*Wall Street Journal.*

Illinois Central Educational Bureau to Assist Employees in Legal Matters.

D. C. Buell, chief of the educational bureau of the Illinois Central, has issued a circular to employees announcing that the bureau is now in a position to assist employees in legal matters to a certain extent. It will endeavor to issue from time to time pamphlets for general distribution or to publish articles in the company's employees' magazine dealing with matters wherein experience has shown that for want of legal aid employees have been imposed upon so that they have suffered either financial loss or worry or unpleasantness which could have been avoided had they known their legal rights. The circular states that it is the desire of the management to safeguard employees as much as possible and to make each employee feel that the company has a personal interest in his welfare and progress. The bureau has already afforded a means whereby employees may better inform themselves about their work, and is now taking steps to assist in the prevention of accidents by means of explanatory lessons and later by means of moving pictures to illustrate right and wrong methods. The circular continues:

"The first step that the bureau will take will be to explain the methods of loan sharks—to tell employees who have suffered from the wiles of these sharks what their rights are, and to offer employees who are at present in trouble as a result of having patronized these loan sharks or companies, aid in straightening out their affairs and getting clear of the clutches of those engaged in the illegal practices by means of which the loan sharks exist.

"While the rules of the company as regard garnisheeing, etc., stand as they have heretofore, nevertheless, any employee of the company may feel free to write to the chief of the educational bureau regarding any complications that he may have gotten into, due to obtaining a salary loan from one of these money-lenders.

"The object in doing this is purely a friendly one. Such employees as are in any trouble of this kind will be protected as far as their position is concerned; their cases will, as far as possible, be handled in confidence, and their record will remain unaffected. The company feels that if it can aid any of its employees in this manner it will be well repaid in better and more loyal service, by having helped to remove such a cause of worry and possible temptation.

"This offer of the educational bureau carries behind it the backing of all of the organization and talent of the company's law department. While it cannot as yet be stated how far the educational bureau will be able to go in offering legal aid to employees, nevertheless it suggests that any employee who at the present time needs legal advice, information, or aid, of any kind (this offer not being confined to loan shark cases), present his case to the educational bureau. This will enable the bureau to find out just what the employees need that it can provide in the way of aid, and may result in the bureau being able to do considerable good even before it can announce the complete plan it hopes to put into effect."

Forestry Conference.

There will be a forestry conference in connection with the Nashville, Tenn., meeting of the Southern Commercial Congress, April 8-10. H. S. Graves, forester of the United States Department of Agriculture, will preside over this conference. The conference will consist of two sessions, the first of which will be held in the afternoon of April 8. At this session there will be a discussion on Losses Suffered in the South Through Forest Fires; The Possibility of Control; What the Timberland Owner and Lumberman Can and Should Do to Prevent Fire Losses, and How Far Conservative Cutting Will Be Practicable for Protection from the Fire Is Assured. The second session of the conference will be held in the morning of April 9, at which there will be a discussion on The State Forestry Laws; Fire Organization; Need of Uniform Legislation, and the Co-operation of State and Private Owners with the Federal Government Under the Weeks Law.

Association of Railway Telegraph Superintendents.

A joint meeting of the eastern and western divisions of the Association of Railway Telegraph Superintendents will be held in the Assembly Room of the Chicago & North Western, at Chicago, on Wednesday, March 20, at 10 a. m., for a general discussion of matters of mutual interest. Among the subjects to be taken up will be the date for holding the annual convention, which will doubtless be changed, owing to the political conventions that conflict with the date originally set.

New York Railroad Club.

At the annual electrical meeting of the New York Railroad Club, to be held March 15, W. J. Harahan, chairman of the committee on electrification, will make a statement in that committee's behalf, following which there will be brief addresses by George Gibbs, William McClellan, W. S. Murray, E. B. Katte, Frank J. Sprague and C. O. Mailloux. Others have been invited, and may participate, including W. B. Potter, B. F. Wood, N. W. Storer and B. G. Lamme.

Cleveland Engineering Society.

At the regular meeting of the Cleveland Engineering Society, which was held March 12, an illustrated paper on Safety as Applied to Engineering was presented by C. Eugene Pittibone, safety inspector of Pickands, Mather & Company.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.; annual, May 7-10, Richmond, Va.

American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass.; annual, May 10-11, San Francisco, Cal.

American Association of General Passenger and Ticket Agents.—W. C. Hope, New York; next convention, Seattle, Wash.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Detroit, Mich.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September; annual, March 17, Chicago.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York. Convention, October 7-11, Chicago.

American Electrical Railway Manufacturers' Assoc.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

American Railway Association.—W. F. Allen, 75 Church St., New York. Next session, May 15, New York.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

American Railway Master Mechanics' Assoc.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

American Railway Tool Foremen's Association.—M. H. Bray, N. Y. N. H. & H., New Haven, Conn. Convention, July 9, Chicago.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Annual, March 28-29, New York.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

American Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Car Accounting Officers.—G. P. Conrad, 75 Church St., New York. Convention, Oct. 7-11, Chicago.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago. Convention, May 22-25, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

Master Car and Locomotive Painters' Assoc. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass. Convention, September 10-13, Denver, Col.

National Railway Appliances Assoc.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railroad Club.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Business Association.—Frank W. Noxon, 2 Rector St., New York.

Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

Railway Gardening Association.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.

Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa. Next meeting, March 18, Chicago.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio. Convention, May 20-22, Buffalo, N. Y.

Railway Supply Manufacturers' Assoc.—J. D. Conway, 2135 Oliver Bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

Railway Tel. & Tel. Appliance Assoc.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. Y., Sterling; September, 1912, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; August, 1912.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The Pennsylvania is to run an agricultural instruction train over its main line in Pennsylvania during seven days, beginning March 22.

The Northern Pacific has established a western immigration and industrial agency, with headquarters at Spokane, Wash., under the direction of Charles E. Arney.

It is announced that the lake steamers of the Canadian Pacific will hereafter make their eastern terminus at Port McNicoll, on Georgian Bay, instead of Owen Sound. Of the five steamers of the company, one only will call at Owen Sound.

Through freight service from Chicago to New Orleans was established on March 1 by the St. Louis & San Francisco in connection with the Louisville & Nashville, New Orleans, Mobile & Chicago and New Orleans & North Eastern, the distance being 1,015 miles.

The shipments of anthracite coal by the Philadelphia & Reading during the month of February were the heaviest in the history of the company, aggregating 784,000 tons. It is said that coal trains were despatched from the yard at Pottsville every half hour during the month.

Railway men of Portland, Ore., have organized the Portland Transportation Club with the following officers: President, L. F. Knowlton, city passenger agent Spokane, Portland & Seattle; secretary-treasurer, E. M. Burns, general agent, freight department, Chicago Great Western.

On Sunday, March 10, the Chicago & North Western train No. 5, which heretofore has left Chicago at 8:30 a. m. for Omaha, was consolidated with No. 13, which formerly left at 10:00 a. m. for Denver and the Puget Sound, and will hereafter leave at 9:30 a. m. The opposite trains were also consolidated, leaving Omaha at 6:35 p. m., and arriving at Chicago at 8:30 a. m.

Rate clerks of the Western Passenger Association have been engaged for some time in working out a readjustment of interstate passenger fares affected by the Minnesota state rates which were recently advanced from 2 cents to 3 cents a mile following Judge Sanborn's decision holding the state law unconstitutional. It is intended to advance the interstate fares about May 1.

The Lumbermen's Club of Memphis, through C. D. Hendrickson, chairman of the river and rail committee, is seeking to establish a separate freight department in that organization. They contemplate seeking an adjustment of rates on lumber into and out of Memphis. It is claimed by them that present classification sheets show discriminating rates against Memphis as a shipping point for lumber.

The agricultural department of the state of Tennessee is preparing to run instruction trains on railways in all parts of the state during the months of July, August and September, next. Widespread interest was manifested in what was done by the department in this line last year. The plans now being made include provisions for displays from the Educational and the Health departments of the state government.

It is estimated that the California lemon crop this year will be one of the largest since the culture of that fruit was begun in the state. The minimum estimate up to date is 5,000 carloads. During January and February 1,341 carloads were shipped. Last year's crop was 6,764 carloads. The usual loss to the lemon crop on account of frost was very small this season. During the last five years 26,208 carloads of lemons have been shipped out of California over the lines of the Southern Pacific alone.

The Denver & Rio Grande, in connection with the Utah Agricultural College, ran a "farmers' special" train over its lines in Utah from February 20 to March 12. Stops of about half a day each were made at stations in the agricultural section, and lectures were given on such subjects as dairy cows, dairying opportunities, stock-raising, stock judging, horticulture, the planting of apple and peach orchards, drainage, sanitation, dry-farming and domestic science. This is the second agricultural demonstration train to be run over the Denver & Rio Grande lines in Utah.

The foreign trade committee of the Chicago Association of Commerce has addressed resolutions to the senate committee on interoceanic canals and the house committee on interstate and foreign commerce, advocating that reasonable tolls be imposed on all vessels passing through the Panama canal, having in mind the competition of the Suez canal; that at present no discrimination of any nature between American vessels whether engaged in coastwise or foreign trade and vessels of any other nations shall exist; that no discrimination in tolls be imposed on vessels engaged in coastwise trade by reason of ownership; and that all vessels engaged in coastwise trade be subject to regulation by the Interstate Commerce Commission.

The Merchants' Association of New York has issued a report advocating a law providing for the passage of coastwise shipping through the Panama canal free of toll. "If," says the association, "our purely domestic, or coastwise, shipping is not involved in our treaty obligations to foreign countries, and therefore is subject only to internal regulation, it should be as exempt from tolls when using the Panama canal as when using the Soo canal, the Port Eads passes of the Mississippi, or any other public improvement belonging to the United States. If the tolls are to be charged in one case, why not in all cases? Why not for using the great Ambrose Channel of the port of New York? In the latter case, if on domestic, why not on foreign shipping?"

E. E. Mote, manager of the Pacific Car Demurrage Bureau, San Francisco, has issued his comparative statement for the month of January showing the benefit derived from a high demurrage rate. In the state of California cars are now charged for at $3 a day as compared with $6 a day during the 22 months ending with April, 1911, and with a rate of $1 a day which is charged on cars used in interstate traffic. Comparing with January three years ago, when the rate on all cars was $1, Mr. Mote finds that if the same percentage of cars had been held over time now as then the aggregate delays would have been 30,434 days instead of 2,706 days, and the demurrage would be $30,434 instead of $8,118. The saving—$22,323—Mr. Mote thinks amply justifies the imposition of a high demurrage rate; and in one sense it is not high; it is no greater than what a car will earn if used in moving freight.

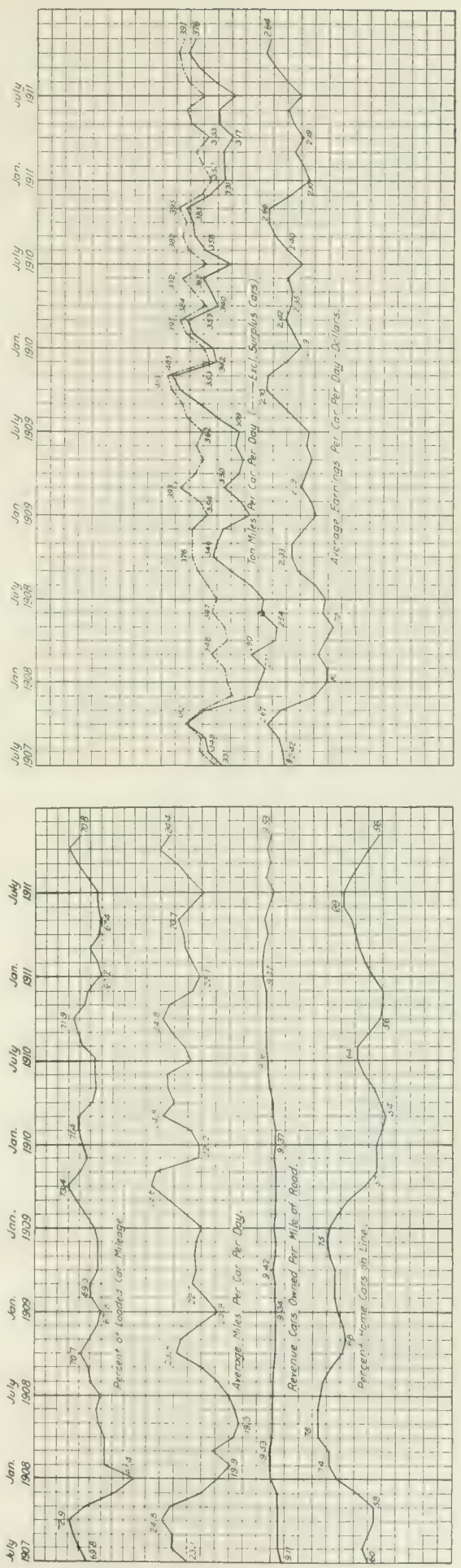
The Department of Electrical Engineering of the Massachusetts Institute of Technology is investigating the adaptability of electric vehicles for trucking purposes, more especially with reference to the conditions in Boston and its vicinity. The inquiry covers cost of service, convenience, difficulties and expenses due to the delays at freight houses and the like, delays caused by drivers, etc. The railways entering Boston are co-operating by studying the conditions at the freight houses, including the time occupied in getting to the loading platform. An appropriation for this work was made to the institution by the Edison Electric Illuminating Company of Boston. The research was begun about the middle of the year 1911. A report will be made on the relative merits of electric vehicles, other mechanical vehicles and horse vehicles for city and suburban delivery, for trucking and other purposes for which vehicles are used in the city and suburbs.

Steamship men in New York City report that trans-Atlantic freight traffic is now heavier than it has been before for ten years, and rates to all European ports have increased from 25 per cent. to 100 per cent., and even more, the higher percentages representing the changes in cotton and grain. The vessel men have taken care not to make heavy advances in the rates on traffic which thereby would be restricted. Because of the dullness, or a tendency to dullness, at home, American manufacturers have been increasing their export trade during the past year. Tramp steamers have not been numerous at American ports recently, many of them having been drawn into the South American and African trade. Also, by reason of the small profit in ocean transportation during the past ten years, the number of tramp steamers has diminished. One of the regular trans-Atlantic lines has recently been compelled to charter 30 tramp steamers at a high price in order to carry out its agreements with shippers.

Freight Car Balance and Performance.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association in presenting statistical bulletin No. 116, covering car balance and performance for November, 1911, says:

"As in previous years, there are decreases in nearly all of the



Car Balance and Performance and Earnings.

CAR BALANCE AND PERFORMANCE IN NOVEMBER, 1911.

	New England.	N. Y., N. J., Del., Md., Eastern Pa.	Ohio, Ind., Mich., Western Pa.	Va., W. Va., No. and So. Carolina.	Ky., Tenn., Miss., Ala., Ga., Fla.	Ill., Wis., Iowa, Minn.	Mont., Wyo., Neb., Dakotas.	Kan., Colo., Okla., Mo., Ark.	Texas, La., New Mex.	Ore., Idaho, Nev., Cal., Ariz.	Canadian Lines.	Grand Total.
Revenue freight cars owned	87,239	472,318	213,354	184,614	170,841	393,355	18,500	135,495	29,112	143,951	110,844	1,959,677
Average number of system cars on line	44,165	274,773	112,620	99,746	92,637	238,409	6,503	71,797	21,234	60,642	73,512	1,100,038
Railway-owned cars: Average foreign on line	53,327	181,093	97,787	65,346	71,580	151,261	13,384	70,871	34,189	65,312	50,158	854,308
Total Railway-owned cars on line	97,492	455,866	210,407	165,092	164,217	394,670	19,887	142,668	55,423	125,954	122,670	1,954,346
Excess	10,199	.....	.....	.....	.....	1,315	1,387	7,173	26,311	.....	11,826	.....
Per cent. of cars on line to total owned:												
Home	51	58	53	54	54	62	35	53	73	42	65	56
Foreign	61	38	46	35	42	38	72	52	117	45	45	44
All railways	112	96	99	89	96	100	107	105	190	87	110	100
Private cars on line	4,261	31,187	11,626	3,935	7,304	15,148	2,411	9,306	4,390	11,875	3,012	104,456
Total, all cars on line	101,753	487,053	222,033	169,027	171,521	409,818	21,798	151,974	59,813	137,829	125,682	2,058,802
Per cent. of cars in shop	6.66	6.98	7.40	6.39	8.69	6.84	5.70	6.20	4.37	5.27	6.46	6.75
No. of freight engines owned	1,430	7,644	3,048	3,150	3,704	6,446	525	2,665	792	2,695	2,157	33,256
Average cars on line per freight engine owned	71	64	73	54	63	64	42	57	76	51	58	62
Total freight car mileage	57,874,603	520,650,431	146,070,088	130,017,764	111,287,880	303,049,582	9,003,884	98,400,179	4,667,373	127,116,453	98,583,610	1,670,527,846
Average miles per car per day	19.0	24.0	21.9	25.6	23.2	24.6	88.9	22.8	23.9	30.7	26.1	24.4
Per cent. loaded mileage	72.8	67.4	71.6	67.7	70.0	71.4	73.6	71.3	70.2	73.8	80.1	70.8
Ton-miles of freight, including company freight	654,782,874	8,431,086,419	2,421,237,584	2,003,035,501	1,609,775,196	5,287,449,883	305,381,511	1,497,497,907	458,083,751	1,870,411,078	1,402,267,097	28,704,458,184
Average ton-miles, including company freight:												
Per car-mile	11.3	16.2	16.6	15.4	13.8	14.1	15.7	14.1	11.6	15.0	16.4	15.3
Per loaded car-mile	15.5	24.0	23.7	25.8	19.2	20.2	21.3	20.0	17.3	20.4	20.4	21.9
Per car per day	215	408	377	397	321	355	229	322	316	460	427	376
Gross freight earnings	$7,191,578	$50,278,202	$13,771,761	$12,267,031	$12,558,540	$32,009,164	$1,002,121	$10,966,963	$5,096,668	$17,967,390	$10,522,884	$176,305,342
Average daily earnings: Per car owned	$2.75	$2.59	$2.15	$2.28	$2.48	$2.72	$5.77	$2.68	$2.98	$4.16	$3.18	$2.77
Per railroad car on line	2.46	2.69	2.18	2.55	2.58	2.71	5.37	2.55	3.13	4.79	2.87	2.78
All cars on line	2.36	2.52	2.07	2.49	2.47	2.61	4.79	2.39	2.90	4.35	2.81	2.64

November performance averages as compared with October, 1911. There is a decrease in the per cent. of cars on their home line from 58 in October to 56 in November, but a decrease in the per cent. of loaded mileage from 72.6 in October to 70.8 in November, indicating the beginning of a movement of empty cars toward home.

"The average miles per car per day decreased from 25.0 to 24.4. The increase of 0.8 tons in the tons per loaded car per day indicates improved loading, but the decrease in average ton miles per car per day for all cars from 382 in October to 376 in November, or 6 ton miles, shows the effect of the decreased percentage of loaded mileage. The earnings per car per day show a decrease of $0.08, having decreased from $2.72 to $2.64."

The accompanying table gives car balance and performance in the month covered by the report, and the two diagrams show car earnings and car mileage and certain car performance figures monthly from July, 1907.

The Traffic Club of New York.

The regular meeting of the Traffic Club of New York will be held at the Waldor-Astoria hotel on March 26. An amateur vaudeville entertainment given by members of the club will begin directly after the business meeting.

Crop Conditions.

The crop reporting board of the United States department of agriculture estimates that the quantity of wheat on farms March 1, 1912, was about 122,025,000 bushels, or 19.6 per cent. of the 1911 crop, against 162,705,000 bushels, or 25.6 per cent. of the 1910 crop on farms March 1, 1911, and 160,214,000 bushels, or 23.4 per cent. of the 1909 crop on farms March 1, 1910. About 56.1 per cent. of the crop will be shipped out of the counties where grown, against 55.6 per cent. of the 1910 crop and 61.1 per cent. of the 1909 crop so shipped.

The quantity of corn on farms March 1, 1912, was about 884,069,000 bushels, or 34.9 per cent. of the 1911 crop, against 1,165,378,000 bushels, or 40.4 per cent. of the 1910 crop on farms March 1, 1911, and 977,561,000 bushels, or 38.3 per cent. of the 1909 crop on farms March 1, 1910. About 20.5 per cent. of the crop will be shipped out of the counties where grown, against 22.9 per cent. of the 1910 crop and 24.9 per cent. of the 1909 crop so shipped. The proportion of the total 1911 crop which is merchantable is about 80.1 per cent., against 86.4 per cent. of the 1910 crop and 82.5 per cent. of the 1909 crop.

The quantity of oats on farms March 1, 1912, was about 289,988,000 bushels, or 31.4 per cent. of the 1911 crop, against 442,665,000 bushels, or 37.3 per cent. of the 1910 crop on farms March 1, 1911, and 365,432,000 bushels, or 36.3 per cent. of the 1909 crop on farms March 1, 1910. About 28.8 per cent. of the crop will be shipped out of the counties where grown, against 30.6 per cent. of the 1910 crop and 32.7 per cent. of the 1909 crop so shipped.

The quantity of barley on farms March 1, 1912, was about 24,760,000 bushels, or 15.5 per cent. of the 1911 crop, against 33,498,000 bushels, or 19.3 per cent. of the 1910 crop on farms March 1, 1911, and 42,602,000 bushels, or 24.6 per cent. of the 1909 crop on farms March 1, 1910. About 57.2 per cent. will be shipped out of the counties where grown, against 50.0 per cent. of the 1910 crop and 52.5 per cent. of the 1909 crop so shipped.

	Wheat.				Corn.			
States.	Per Cent. of 1911 crop.	Millions of Bushels.			Per Cent. of 1911 crop.	Millions of Bushels.		
	1912.	1912.	1911.	1910.	1912.	1912.	1911.	1910.
Pennsylvania	28	4.9	9.3	7.8	34	21.7	22.3	12.0
Ohio	27	9.8	11.0	8.3	35	52.7	56.4	63.0
Indiana	21	7.2	8.8	7.1	36	62.9	79.2	76.2
Illinois	17	7.1	7.7	7.9	36	120.6	172.3	163.9
Michigan	24	4.4	5.6	4.6	30	16.7	18.9	17.5
Wisconsin	28	0.9	1.2	0.8	30	17.4	14.8	16.2
Minnesota	25	11.0	19.2	14.8	35	25.9	19.3	24.4
Iowa	28	3.0	4.0	2.6	40	122.1	151.3	143.5
Missouri	18	6.5	5.7	5.1	30	57.7	104.0	68.9
North Dakota	19	13.9	11.6	29.2	25	1.8	0.2	1.1
South Dakota	25	3.7	11.7	12.2	25	12.7	13.1	21.7
Nebraska	22	9.2	12.8	12.4	37	57.7	84.3	79.3
Kansas	15	7.7	12.6	15.5	26	32.8	71.4	54.1
Kentucky	15	1.5	1.9	1.5	34	31.8	41.6	31.7
Tennessee	19	1.6	1.9	1.2	39	35.5	38.7	25.0
Texas	8	0.5	1.5	0.2	15	10.4	47.6	18.1
Idaho	20	3.2	2.3	2.6	12	....	0.0	0.0
Washington	10	5.1	5.3	7.4	17	0.1	0.2	0.1
Oregon	13	2.2	2.1	1.7	13	0.1	0.1	0.1
United States	19.6	122.0	162.7	160.2	34.9	884.1	1,165.4	977.6

	Oats.				Barley.			
New York	40	15.4	19.1	13.9	20	0.4	0.6	0.5
Pennsylvania	36	11.4	17.3	9.9	34	0.1	0.1	0.0
Ohio	30	16.4	24.4	21.3	12	0.1	0.2	0.1
Indiana	25	11.8	19.0	16.7	17	0.0	0.1	0.0
Illinois	28	34.0	60.8	51.1	19	0.3	0.5	0.5
Michigan	33	14.2	20.1	16.7	14	0.3	0.6	0.4
Wisconsin	38	25.5	28.8	31.4	14	2.9	4.1	6.6
Minnesota	35	23.5	30.8	37.6	17	4.8	5.8	9.1
Iowa	37	46.7	81.0	44.9	20	2.2	3.9	2.7
Missouri	31	5.5	16.1	8.7	25	0.0	0.1	0.0
North Dakota	41	21.0	4.5	30.3	18	3.7	1.5	7.9
South Dakota	24	2.7	12.5	17.4	15	0.8	3.2	5.6
Nebraska	31	10.8	32.6	21.3	14	0.2	0.6	0.6
Kansas	28	8.4	23.4	8.0	20	0.3	1.3	0.8
Texas	13	2.4	4.8	0.8	10	0.0	0.0	0.0
Montana	37	7.8	5.3	5.2	35	0.4	0.2	0.2
Idaho	28	4.1	3.7	3.4	15	0.9	1.1	1.2
California	11	0.8	1.0	0.5	11	4.5	6.5	3.2
United States...	31.4	290.0	442.7	365.4	15.5	24.8	33.5	42.6

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association in presenting statistical bulletin No. 113-A, giving a summary of shortages and surpluses by groups from October 26, 1910, to February 28, 1912, says:

"There is a further decrease of 5,902 cars in the car surplus, the total surplus for this period being 44,984 cars, as against 50,886 cars on February 14, 1912. The decrease in surplus is reported in all classes of cars, the largest decrease being 2,402 box cars, flat, coal and miscellaneous cars show decreases of 580 cars, 1,225 cars and 1,695 cars respectively.

"The total car shortage (37,142 cars), remained practically the same as in the previous period when it was 36,928 cars."

The accompanying table gives car surplus and shortage figures by groups for the last period covered in the report, and the diagrams show total bi-weekly surpluses and shortages in 1907 to 1912.

Summary of Revenues and Expenses in December, 1911.

The following is taken from the Bureau of Railway Economics, Bulletin 29:

The railways whose returns are included in this bulletin operate 230,616 miles of line, or about 93 per cent. of all the steam railway mileage in the United States. The total operating revenues for the month of December, 1911, amounted to $229,720,467. Compared with December, 1910, the total operating revenues of these railways show an increase of $917,511. This increase was due exclusively to the increase in mileage of these roads in 1911, as compared with 1910. Thus total operating revenues per mile of line amounted to $1,005 in December, 1910, and $996 in December, 1911, a decrease for 1911 of $9, or 0.9 per cent. This decrease in operating revenues per mile resulted wholly from a decrease in freight revenue.

Operating expenses amounted to $157,882,490. This was $3,331,466 less than for December, 1910. Operating expenses per mile of line amounted to $685 in December, 1911, as compared with $708 in December, 1910, a decrease for 1911 of $23 per mile, or 3.3 per cent. Each of the five primary operating expense accounts shows a decrease per mile in 1911 as compared with 1910. These decreases amounted to $13.45 in the cost of conducting transportation; $5.33 in the cost of maintaining way and structures; $4.50 in the cost of maintaining equipment, and smaller decreases in the remaining accounts.

Net operating revenue shows an increase as compared with December, 1910, of $15 per mile, or 4.9 per cent. The net revenue for each mile of line for each day in December averaged $10.05 as compard with $9.57 for December, 1910.

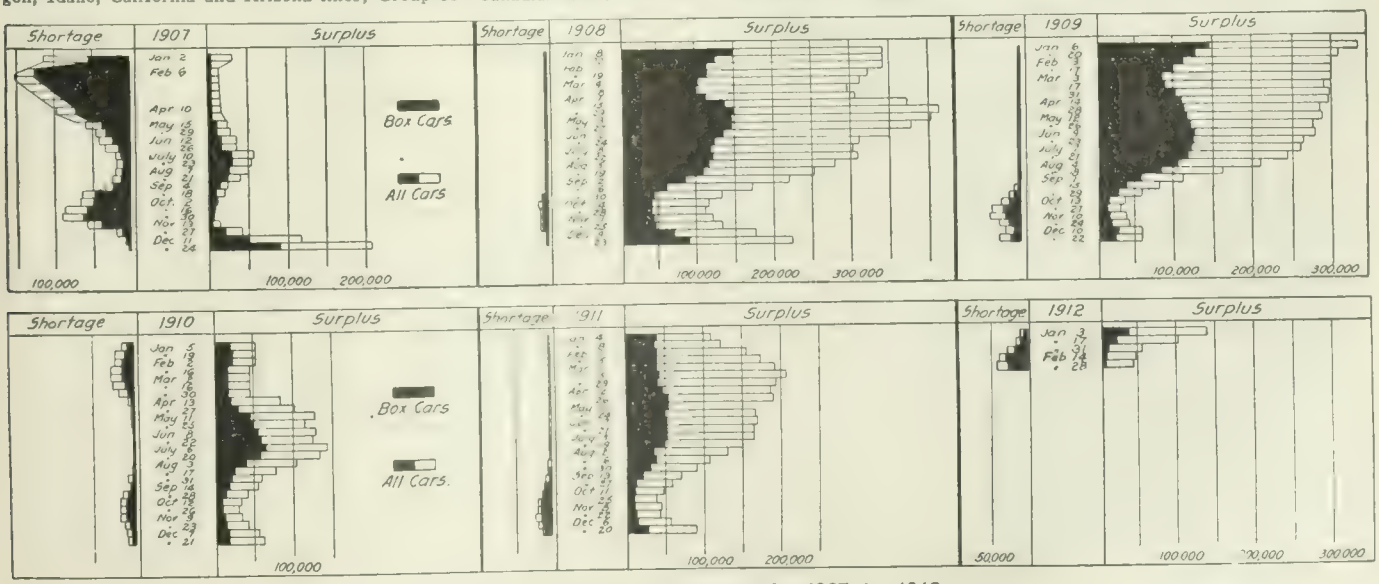
Taxes for the month of December amounted to $10,043,839, or $43.55 per mile, an increase of 8.5 per cent. over December, 1910. The operating ratio for December was 68.7 per cent., as compared with 67.1 in November, 1911, and 70.5 per cent. in December, 1910.

The eastern group of railways shows an increase in total

Car Surpluses and Shortages.

Date.	No. of roads.	Surpluses Box.	Flat.	Coal gondola and hopper.	Other kinds.	Total.	Shortages Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1.—February 28, 1912	7	206	1,464	378	95	2,143	449	30	0	57	536
" 2.— " 28, 1912	26	387	133	1,368	642	2,530	859	6	2,182	430	3,477
" 3.— " 28, 1912	24	0	942	1,056	1,601	3,599	5,115	25	2,186	1,475	8,801
" 4.— " 28, 1912	10	151	44	440	822	1,457	1,730	197	3,200	600	5,727
" 5.— " 28, 1912	18	7	40	4	644	695	3,204	72	326	415	4,017
" 6.— " 28, 1912	23	1,997	436	2,043	2,895	7,371	3,735	191	69	148	4,143
" 7.— " 28, 1912	3	24	117	481	217	839	236	0	0	0	236
" 8.— " 28, 1912	17	1,053	242	1,363	2,134	4,792	771	75	175	4	1,025
" 9.— " 28, 1912	11	2,081	261	409	895	3,646	250	15	15	50	330
" 10.— " 28, 1912	20	3,101	3,171	2,697	8,057	17,026	238	0	0	0	238
" 11.— " 28, 1912	5	17	366	0	503	886	6,927	120	0	1,565	8,612
Total	164	9,024	7,216	10,239	18,505	44,984	23,514	731	8,153	4,744	37,142

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



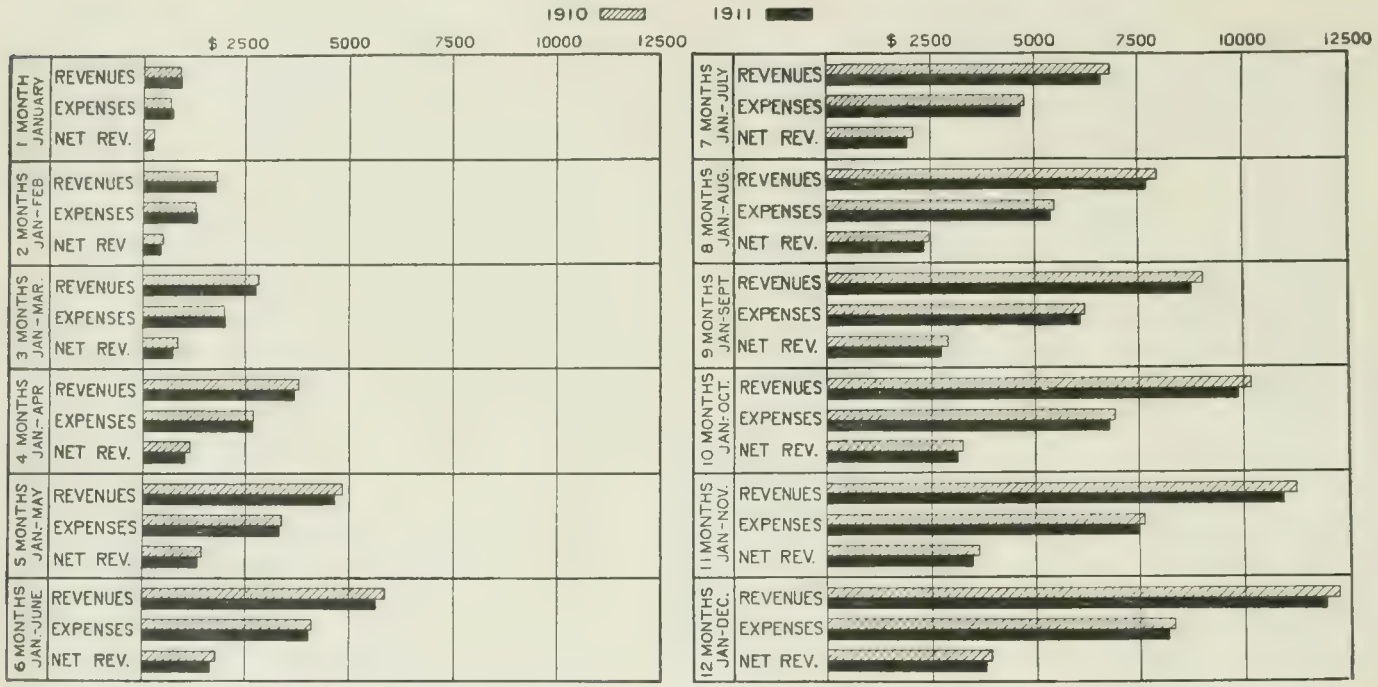
Car Surpluses and Shortages in 1907 to 1912.

operating revenues per mile as compared with December, 1910, of 1.1 per cent., and the southern group an increase of .7 per cent., while the operating revenues per mile of the western group decreased 3.5 per cent. from December, 1910. Operating expenses per mile decreased 3.9 per cent. on the eastern railways as compared with December, 1910, and on the western railways 4.4 per cent., but increased on the southern railways 3.1 per cent. In the eastern group the net revenue per mile increased 16.2 per cent., as compared with December, 1910; in the southern group there was a decrease of 3.6 per cent.; in the western group a decrease of 1.6 per cent. Taxes increased in all the groups as compared with December, 1910, the increase per mile amounting to 3.5 per cent. in the eastern group, 1.5 per cent. in the southern group, and 16.7 per cent. increase in the western group.

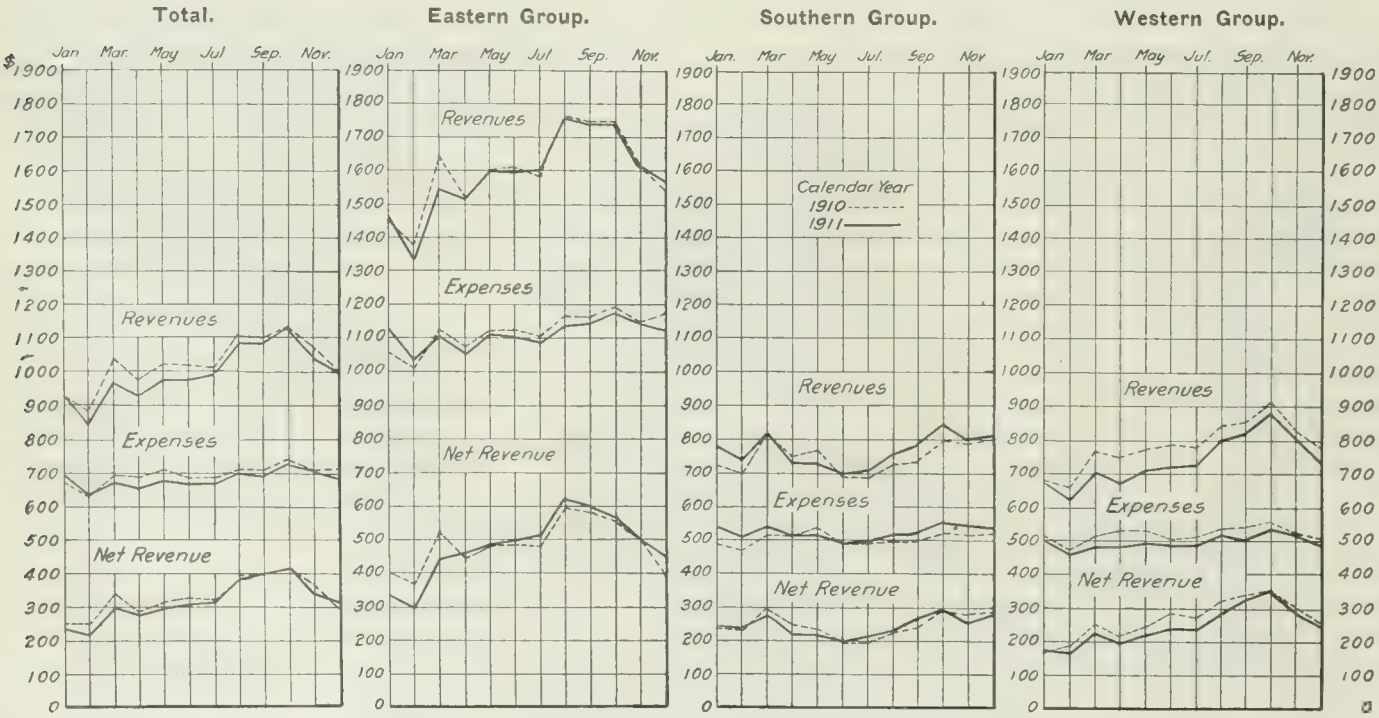
Diagram I shows the variations in operating revenues, operating expenses, and net revenue per mile for the separate months of the calendar years 1910 and 1911. Diagram 11 shows month by month the total operating results per mile cumulatively for both 1910 and 1911. Thus there is shown the total operating revenues per mile, operating expenses per mile, and net revenue per mile, for the periods ending successively with the respective twelve months of the calendar years.

Compilation of December returns makes possible a summary of the conditions for the calendar year, in which 95 per cent. of the steam railway mileage of the United States is represented. Although the situation from a comparative standpoint is not so serious as it was earlier in the year, yet these summary figures show results distinctly less favorable than the results for the year 1910.

Total operating revenues for 1911, amounting to $2,724,554,175, when reduced to a per mile basis, show a decrease from the



Cumulative Earnings and Expenses Per Mile for 1911.



Monthly Non-Cumulative Earnings and Expenses Per Mile.

revenues of the calendar year 1910 of $302, or 2.5 per cent., the decline being wholly in freight revenue. Operating expenses decreased $147 per mile of line, or 1.8 per cent., and net operating revenue $155 per mile, or 4 per cent. Taxes per mile increased 4.1 per cent.

Separating these results by geographical groups, it develops that the most serious situation is to be found in the western group of railways. Whereas there was a decline of only 0.7 per cent. in operating revenues per mile in the eastern group and an actual increase of 2.8 per cent. in the southern group, there was a decrease of 5.7 per cent. in the western group. In this latter group decreases are found in both passenger and freight traffic, although the larger decrease is in the freight revenue. All three groups show declines in net revenue per mile, but they are relatively insignificant in the eastern and southern groups, amounting to 0.7 per cent. in the eastern and 0.2 per cent. in the southern. In the western group, however, the decline amounts to 8 per cent. This decline on the western railways took place notwithstanding a cut in total operating expenses which amounted on a per mile basis to 4.5 per cent., and which in the account of maintenance of way amounted to 10.3 per cent.

Summary for the Calendar Year, 1911.

Account.	Total. Amount, 1911.	Total. Per Mile of Line.	Total. Increase per mile over 1910. Pct.	Eastern Group. Amount, 1911.	Eastern Group. Per Mile of Line.	Eastern Group. Increase per mile over 1910. Pct.	Southern Group. Amount, 1911.	Southern Group. Per Mile of Line.	Southern Group. Increase per mile over 1910. Pct.	Western Group. Amount, 1911.	Western Group. Per Mile of Line.	Western Group. Increase per mile over 1910. Pct.
Total Operating Revenues..	$2,724,554,175	$11,799	d 2.5	$1,285,772,847	$18,787	d .7	$357,660,897	$9,091	2.8	$1,081,120,431	$8,778	d 5.7
Freight	1,869,260,225	8,095	d 3.9	888,323,542	12,987	d 1.7	254,894,137	6,479	1.6	726,042,546	5,895	d 7.7
Passenger	646,028,739	2,798	.4	294,815,014	4,310	1.7	77,985,007	1,982	5.7	273,228,718	2,218	d 2.0
Other transportation	181,640,498	787	1.6	89,114,865	1,303	1.7	20,582,805	523	4.2	71,942,828	584	1.4
Non-transportation	27,624,713	120	3.6	13,519,426	198	3.9	4,198,948	107	20.2	9,906,339	80	d 1.9
Total Operating Expenses...	1,866,256,400	8,082	d 1.8	898,777,783	13,139	d .7	243,701,583	6,194	4.3	723,777,034	5,876	d 4.5
Maint. of way and struct..	350,880,829	1,520	d 6.5	156,102,272	2,282	d 4.6	48,082,476	1,222	1.1	146,696,081	1,191	d10.3
Maint. of equipment	422,383,001	1,829	d 1.0	212,405,639	3,105	d 1.2	59,566,866	1,514	3.6	150,410,496	1,221	d 1.7
Traffic	57,992,854	251	d .7	24,762,802	362	d 4.8	8,386,718	213	.3	24,843,334	202	4.0
Transportation	964,667,627	4,178	d .6	474,253,659	6,933	.9	117,511,404	2,987	6.6	372,902,564	3,028	d 4.0
General	70,332,089	305	2.1	31,253,411	457	3.8	10,154,119	258	1.7	28,924,559	235	.9
Net Operating Revenue	858,297,775	3,717	d 4.0	386,995,064	5,658	d .7	113,959,314	2,896	d .2	357,343,397	2,901	d 8.0
Outside Oper.—Net Rev.	1,415,712	6	...	954,004	14	...	247,882	6	...	213,826	2	...
Taxes	111,262,863	482	4.1	52,028,572	761	6.6	13,030,717	331	9.8	46,203,574	375	.5
Operating Income	748,450,624	3,241	d 5.0	335,920,496	4,911	d 1.5	101,176,479	2,572	d 1.5	311,353,649	2,528	d 9.3
Average miles operated—1911		230,913			68,403			39,344			123,166	
1910		227,444			67,969			38,950			120,525	

d Decrease.

Per Cent. of Different Classes of Expenses to Total Operating Revenues.

	December. 1911.	December. 1910.	Fiscal year ended June 30. 1911.	Fiscal year ended June 30. 1910.	Twelve mos. ended December 31. 1911.	Twelve mos. ended December 31. 1910.
Maintenance of way and structures	11.3	11.7	13.1	13.4	12.9	13.4
Maintenance of equipment	15.7	16.1	15.3	15.0	15.5	15.3
Traffic expenses	2.1	2.1	2.1	2.0	2.1	2.1
Transportation expenses	36.9	37.9	35.5	33.4	35.4	34.7
Total operating expenses	68.7	70.5	68.6	66.3	68.4	67.9

INTERSTATE COMMERCE COMMISSION.

A hearing on complaints regarding alleged irregularities in determining weights of carload shipments will be held before Special Attorney J. T. Marchand of the Interstate Commerce Commission in Chicago on March 25.

The St. Louis Blast Furnace Company has filed a complaint with the commission against the rates on coke from Deepwater, W. Va., to St. Louis, alleging discrimination against St. Louis pig iron manufacturers in favor of manufacturers in Chicago, Gary, Ind., and other points.

The Chicago Board of Trade has filed a complaint with the commission, asking that the Louisville & Nashville be required to comply with the order of the commission in the recent Rosenbaum case and with the transit rules promulgated by the commission. It is alleged that the road charges south of the Ohio river 2 cents per 100 lbs. more on grain passing through Chicago than on grain moving through St. Louis or Peoria, unless the identity of the grain moving through Chicago is preserved.

Testimony regarding the operation of the Muncie & Western, an industrial railway, 2.78 miles long, owned by the Ball Brothers Glass Manufacturing Company of Muncie, Ind., was heard by Examiner Prouty of the Commission at Muncie on March 8, in connection with the commission's investigation of industrial railways. It was testified at the hearing that the road receives an allowance of $2.50 per car on inbound freight and of $3.50 per car on outbound freight, and that it serves the Glass Works exclusively.

Rate on Cotton Seed Reduced.

Memphis Freight Bureau et al. v. St. Louis Southwestern et al. Opinion by Commissioner Clark:

Rates on cotton seed from Missouri and Arkansas points to Memphis, Tenn., found to be unreasonable. (22 I. C. C., 537.)

Complaint Dismissed.

Milburn Wagon Co. v. Lake Shore & Michigan Southern et al. Opinion by the commission:

The rate charged is found to be the legal one and no evidence was presented to show that it was unreasonable. (22 I. C. C., 460.)

Reparation Awarded.

Milburn Wagon Co. v. Lake Shore & Michigan Southern. Opinion by the commission:

The initial carrier furnished a car larger than the one ordered by the shippers and the minimum weight was charged on the larger car furnished. (22 I. C. C., 511.)

Lindsay Brothers v. Lake Shore & Michigan Southern et al. Opinion by the commission:

A joint rate of 23½ cents per 100 lbs. on vehicles in carloads from Elkhart, Ind., to Milwaukee, Wis., found unreasonable and the rate reduced to 18½ cents. The railways are ordered to amend their tariffs so as to provide that when a road is unable to furnish a large car ordered by a shipper, they may furnish two small ones, and the minimum weight on the car ordered will apply to the two small cars. (22 I. C. C., 516.)

Conference Rulings.

The commission is of the opinion that railways refusing to observe specific routing instructions by shippers are liable to prosecution under section 10 and under section 15.

In a case where a railway ships material for repairing one of its own cars over its own line and over the line of a connection to the shop belonging to the connecting line where the repairs were to be made, the line at whose expense the repairs are made is the only one which may move this material free.

A gasolene motor car, moving under its own power and in charge of employees of the manufacturer, must pay a freight rate and tariffs must be filed covering a proper charge. The manufacturers' employees in charge of the car must be charged passenger rates.

Household goods of an inspector of the American Railway Association Bureau for the Safe Transportation of Explosives cannot be carried free by a railway which is a member of the association.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF JANUARY, 1912.

Name of road	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase or decrease compared with last year
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.					
Ann Arbor		$114,[illegible]	$38,417	$157,970	$14,480	$23,685	$4,132	$69,62[illegible]	$7,381	$119,300	$38,670	$8,574	$13,[illegible]	$[illegible],110	—$22,[illegible]
Arizona Eastern	[illegible]	133,[illegible]	34,011	177,894	21,736	13,142	2,382	48,492	5,136	90,888	87,006	218	8,200	7[illegible]4	29,[illegible]
Atlanta & West Point	[illegible]	57,657	37,347	105,252	12,159	22,202	4,684	36,683	4,368	80,096	25,156	83	5,186	[illegible]	—3,[illegible]
Atlantic City	126	46,578	36,334	92,515	20,661	13,474	1,566	79,516	1,519	116,736	—24,221	3,000	7,000	34,[illegible]3	16,4[illegible]
Baltimore & Ohio—Southwestern	4,[illegible]	5,195,917	994,577	6,570,132	741,664	1,331,888	165,305	2,860,461	172,576	5,271,894	1,298,238	—[illegible],[illegible]4	281,[illegible]0	950,[illegible]9	79,[illegible]
Buffalo & Susquehanna R. R.	2[illegible]	139,[illegible]4	7,346	151,[illegible]9	26,525	30,622	1,482	61,552	5,951	126,[illegible]2	28,227	[illegible]	[illegible]6	22,627	14,[illegible]
Buffalo & Susquehanna R. R.	91	41,179	6,560	49,777	7,176	28,045	474	24,873	2,746	63,314	13,537	[illegible]	1,400	—14,[illegible]6	3,[illegible]
Central of New Jersey	671	1,598,796	359,741	2,074,078	181,968	321,211	29,596	697,747	45,383	1,275,905	798,173	11,056	180,504	606,[illegible]3	—160,0[illegible]
Chesapeake & Ohio Lines	2,180[3]	2,146,215	378,124	2,633,993	258,273	591,074	51,347	907,447	64,387	1,872,528	761,465	—5,684	84,750	671,[illegible]1	—148,9[illegible]
Chicago & Erie	269	276,888	48,161	367,663	43,743	84,560	20,723	244,303	11,733	405,062	—37,399	[illegible]	16,450	53,849	—76,260
Chicago Great Western	1,4[illegible]	566,842	200,364	843,608	102,652	152,784	47,764	513,697	33,610	850,507	[illegible],899	—328	33,037	40,[illegible]9	—152,09[illegible]
Chicago, Rock Island & Gulf	476[7]	172,439	50,436	240,019	33,099	63,225	9,644	99,630	9,180	214,778	25,241	—192	8,[illegible]2	16,927	58,508
Chicago, Terre Haute & Southeastern	351[9]	160,426	13,818	177,955	17,999	31,335	2,810	64,118	8,040	124,30[illegible]	53,653	1,[illegible]7	8,[illegible]9	45,080	25,614
Cleveland, Akron & Cincinnati	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Colorado Midland	337	105,438	14,145	135,738	15,600	28,744	6,761	64,066	5,636	120,807	14,931	—63	8,000	6,868	7,0[illegible]
Delaware & Hudson Co. & R. R. Dept.	851[8]	1,467,776	181,012	1,697,169	111,570	287,939	21,729	671,909	46,986	1,140,133	557,036	4,997	47,0[illegible]	504,968	29,297
Detroit, Toledo & Ironton	441	120,706	10,738	142,062	28,449	19,711	2,739	77,940	5,814	134,653	7,409	[illegible]	6,000	1,409	23,093
Duluth, South Shore & Atlantic	674[1]	132,519	54,623	200,348	32,807	34,370	6,750	106,990	13,108	193,025	6,323	612	18,000	—12,289	—17,636
El Paso & Southwestern Co.	901	57,778	83,992	685,225	84,706	85,452	12,809	193,699	24,697	401,363	283,862	1,452	[illegible]38	260,172	33,260
Erie	1,995	2,779,161	595,335	3,680,666	364,036	730,460	96,167	1,517,777	90,753	2,799,193	881,473	—55,[illegible]3	163,0[illegible]	662,[illegible]4	—231,[illegible]
Georgia	307	181,577	70,222	273,086	24,244	45,197	12,964	127,334	8,272	218,011	55,075	[illegible]	7,110	52,[illegible]5	—26,210
Georgia Southern & Florida	395	97,922	71,433	195,096	18,102	40,013	8,254	83,55[illegible]	8,814	158,735	36,361	[illegible]	9,803	[illegible],558	—2,885
Hocking Valley	352[10]	484,097	61,313	566,839	54,752	90,513	8,224	195,038	16,562	365,090	201,749	[illegible]	30,000	171,74[illegible]	119,104
International & Great Northern	1,159	645,978	165,068	881,817	107,623	106,865	24,333	399,894	30,95[illegible]	669,667	212,150	—[illegible]42	33,000	179,[illegible]08	[illegible]
Iowa Central ‡	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Kanawha & Michigan	178	202,581	23,957	231,529	27,385	45,161	2,271	73,703	6,903	155,423	76,106	—6	8,674	67,426	—18,207
Lehigh & Hudson River	96	120,375	3,120	124,960	10,111	19,437	1,256	51,992	4,498	87,294	37,666	[illegible]	3,500	34,166	—11,536
Louisiana Ry. & Navigation Co.	350	113,165	20,191	144,381	38,667	10,486	6,575	67,655	8,862	132,245	12,136	[illegible]	5,000	7,136	—27,317
Louisiana Western	207	98,828	55,232	162,439	28,757	27,091	8,405	60,843	6,610	131,706	30,733	283	6,902	24,114	—2,419
Minneapolis & St. Louis	1,585	360,382	104,304	508,339	77,325	101,593	17,306	318,977	26,338	541,539	—33,200	79	28,072	61,351	—189,097
Minneapolis, St. Paul & S. Ste. Marie	3,769[1]	1,147,656	429,955	1,713,551	159,481	269,195	39,030	727,043	47,102	1,241,851	471,700	5,497	107,402	369,795	86,586
Missouri, Kansas & Texas	1,744[12]	906,619	389,851	1,326,427	37,223	183,301	34,244	494,315	46,522	795,605	530,822	—3,911	52,051	474,860	17,544
Missouri, Kansas & Texas of Texas	1,345[13]	562,490	278,625	854,038	107,329	102,908	25,309	556,853	37,700	930,099	—66,061	[illegible]9	22,000	—88,052	—196,170
Mobile & Ohio	1,114	729,628	110,975	899,101	106,630	176,484	36,841	340,660	32,180	693,795	206,306	806	26,406	179,094	57,865
Morgan's La. & Tex. R. R. & S. S. Co.	404[14]	343,264	111,878	485,997	70,403	54,015	14,874	192,108	12,590	343,990	142,007	—2,622	18,698	120,687	29,250
New Orleans Great Northern	282	92,101	23,974	125,526	23,508	19,711	2,645	43,358	7,382	96,604	28,922	[illegible]38	2,000	26,884	—17,754
New Orleans, Texas & Mexico	276[15]	123,628	17,147	148,960	32,748	19,944	4,345	67,373	8,204	132,614	16,346	[illegible]	[illegible]	16,346	4,308
New York, Susquehanna & Western	152	171,117	40,828	240,824	18,553	26,244	1,702	108,237	4,238	158,974	81,850	—7,028	17,873	56,949	—21,096
Northwestern Pacific	416[16]	77,807	104,118	203,467	48,037	39,447	3,057	95,985	10,471	196,997	6,470	[illegible]	11,077	—4,607	5,299
Philadelphia & Reading	1,014[17]	3,973,637	540,680	5,684,718	245,715	716,888	39,885	1,341,915	72,918	2,417,321	1,267,397	12,475	90,436	1,189,436	—47,306
Pittsburgh, Shawmut & Northern	278[18]	107,571	7,315	136,917	11,494	26,452	1,069	45,376	4,544	88,935	47,982	[illegible]	1,569	46,413	28,468
Port Reading	21	123,459	[illegible]	124,261	5,762	373	33	50,032	80	56,280	67,981	2,978	3,800	67,159	2,474
Richmond, Fredericksburg & Potomac	83	81,856	86,839	197,440	19,103	22,078	2,647	83,077	6,769	133,583	63,857	[illegible]	1,094	62,763	—864
Rutland	468	137,731	71,962	235,756	30,983	50,821	6,294	114,363	5,622	208,083	27,673	[illegible]	11,018	16,655	5,461
St. Louis & San Francisco	4,731	1,993,445	875,268	3,135,172	310,640	440,767	91,719	1,259,771	105,810	2,208,707	926,465	[illegible]	166,147	760,318	211,006
St. Louis, Brownsville & Mexico	509[19]	110,829	64,189	189,655	41,533	16,843	2,478	71,648	7,741	140,243	49,412	[illegible]	5,150	44,262	—2,477
St. Louis Merchants' Bridge Terminal	9	[illegible]	361	153,311	22,508	9,038	476	90,355	4,816	127,193	26,118	[illegible]	5,600	20,518	15,752
St. Louis, San Francisco & Texas	243	77,998	24,959	109,380	18,928	16,079	3,141	53,004	5,246	96,398	12,982	[illegible]	1,217	11,765	14,180
St. Louis Southwestern of Texas	703	275,767	74,701	379,270	66,834	89,132	11,335	159,286	18,510	345,097	34,173	—366	10,945	22,859	77,334
San Antonio & Aransas Pass	727	220,199	78,402	322,617	69,719	46,570	5,724	148,122	10,589	280,724	41,893	[illegible]	11,000	30,893	37,309
Seaboard Air Line	3,053[20]	1,170,707	426,476	1,809,474	277,755	264,691	72,794	753,915	56,294	1,425,449	384,025	2,[illegible]0	75,000	306,809	198,69[illegible]
Sunset	58	57,009	15,684	75,905	12,852	1,315	26	21,576	1,160	36,929	38,976	[illegible]	3,390	35,586	1,143
Tennessee Central	293	70,517	16,396	104,782	26,175	16,778	5,361	44,134	7,194	99,642	5,140	[illegible]	4,[illegible]7	928	—24,466
Terminal R. R. Ass'n of St. Louis	354[21]	[illegible]	215	228,114	32,215	25,680	751	102,544	4,984	166,174	61,940	11,187	26,000	47,127	—31,117
Texas & Pacific	1,884	1,066,501	315,921	1,464,636	155,540	199,840	30,811	725,665	48,510	1,160,366	304,270	—12,111	48,197	243,962	21,328
Toledo & Ohio Central	440[22]	340,660	43,548	397,520	49,166	81,638	5,680	172,678	8,854	318,016	79,504	—690	21,579	57,235	33,667
Trinity & Brazos Valley	462	207,765	32,380	249,050	50,398	38,183	10,236	136,501	11,924	247,242	1,808	[illegible]	3,500	—1,692	—13,393
Ulster & Delaware	128	33,527	11,712	48,498	7,622	12,207	1,159	31,521	2,564	55,073	—6,575	164	3,300	9,711	—3,544
Virginia & Southwestern	240[23]	136,714	11,217	151,674	16,252	32,849	1,912	48,979	3,544	103,536	48,138	[illegible]	5,332	42,806	3,015
Wabash	2,514	1,401,209	479,330	2,060,365	183,976	392,395	60,903	964,032	64,348	1,665,644	394,721	—3,272	71,655	319,794	—75,725
Washington Southern	35	27,951	41,106	94,415	11,501	10,229	1,239	40,918	2,899	66,786	27,629	[illegible]	3,245	24,384	—5,834
Western Pacific	934	247,939	64,468	327,197	74,530	39,656	26,155	182,282	22,968	345,591	—18,394	—4,068	14,550	—37,013	[illegible]
Western Ry. of Alabama	133	68,254	42,291	120,244	21,894	24,208	5,472	37,901	5,783	95,258	24,986	—37	4,612	20,337	—2,784

‡ Included in Penna. Co., January, 1911. Leased to Mun. & St. Louis, December 20, 1911.

Operated in previous period: [1] 354; [2] 4,434; [3] 631; [4] 2,225; [5] 1,495; [6] 470; [7] 350; [8] 819; [9] 610; [10] 350; [11] 3,763; [12] 1,736, [13] 1,348, [14] 348, [15] 264, [16] 376, [17] 1,022, [18] 240; [19] 501; [20] 3,046; [21] 34, [22] 444, [23] 242.

— Indicates Deficits, Losses and Decreases.

REVENUES AND EXPENSES OF RAILWAYS.

SEVEN MONTHS OF FISCAL YEAR, 1912

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Ann Arbor	291	$845,477	$349,399	$1,274,661	$142,077	$135,009	$31,181	$446,054	$54,914	$809,235	$465,426	—$6,129	$97,899	$361,398	$46,134
Arizona Eastern	366[1]	825,754	230,020	1,121,906	170,023	85,469	15,940	302,485	43,257	617,174	504,732	1,216	70,408	435,540	92,718
Atlanta & West Point	92	395,960	290,437	750,551	87,763	146,973	33,691	229,491	33,891	531,809	224,742	104	36,373	188,523	—10,495
Atlantic City	166	458,666	821,248	1,347,058	183,338	92,519	18,221	638,451	9,511	942,040	405,018	29,601	49,000	326,417	12,223
Baltimore & Ohio—System	4,433	41,177,475	9,117,471	53,492,506	6,643,575	9,699,165	1,132,609	18,700,335	1,155,000	37,330,684	16,161,822	391,626	1,718,806	14,051,390	1,148,071
Buffalo & Susquehanna R. R.	65	979,952	65,659	1,082,293	207,918	200,355	10,637	401,274	44,250	864,434	217,859	.....	18,200	199,659	35,640
Buffalo & Susquehanna Ry.	91	299,190	69,633	383,631	45,583	188,618	3,587	165,983	17,712	421,483	—37,852	357	9,800	—48,009	—18,307
Central of New Jersey	673	11,309,590	3,370,517	15,509,508	1,555,579	2,180,385	221,123	4,513,681	289,836	8,760,604	6,748,904	122,625	754,573	6,116,956	730,624
Chesapeake & Ohio Lines	1,861	15,486,159	3,373,734	19,717,909	2,437,389	3,814,220	358,262	5,908,142	434,149	12,952,162	6,765,747	18,709	593,317	6,191,139	—121,680
Chicago & Erie	96	2,398,337	432,732	3,114,743	471,891	575,837	144,990	1,480,834	75,233	2,748,785	370,958	.....	109,639	261,319	—167,673
Chicago Great Western	1,486	8,271,815	1,812,039	7,633,359	879,146	1,117,064	327,713	3,146,953	242,644	5,713,520	1,909,739	133	231,259	1,678,613	—92,503
Chicago, Rock Island & Gulf	476	1,799,217	384,478	1,777,332	196,846	168,731	69,083	586,490	57,745	1,078,894	693,438	1,549	44,073	647,816	52,690
Chicago, Terre Haute & Southeastern	381	984,610	125,845	1,136,161	162,251	181,776	19,220	347,770	52,526	763,543	372,618	550	60,900	311,168	.....
Cleveland, Akron & Cincinnati	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Colorado Midland	352	1,308	174,750	1,197,334	145,802	218,002	50,196	499,149	37,862	951,011	246,323	- 1,335	56,000	188,988	28,664
Delaware & Hudson Co.	861	23,473,660	1,950,049	31,881,086	862,301	1,743,532	149,857	4,297,348	318,011	7,371,049	5,460,037	—10,757	349,859	5,099,421	378,992
Detroit, Toledo & Ironton	441	880,741	106,384	1,062,856	207,401	133,132	19,302	503,815	38,358	902,008	160,828	23	43,584	117,221	87,207
Duluth, South Shore & Atlantic	624	1,167,197	593,837	1,859,314	289,366	302,134	68,093	712,658	65,900	1,338,150	521,164	8,861	123,666	406,359	—103,064
El Paso & Southwestern Co.	41	760	567,921	4,220,450	548,024	587,709	84,700	1,193,173	160,774	2,574,380	1,646,070	13,861	166,647	1,515,562	- 76,268
Erie	1,[illegible]	3,[illegible],150	5,495,434	26,421,485	3,448,024	4,917,168	657,725	9,810,479	613,312	19,447,608	9,973,877	37,625	1,064,572	8,871,680	162,354
Georgia	307	1,[illegible],453	565,396	2,045,209	169,810	293,988	78,454	846,707	55,813	1,444,772	604,437	.....	14,354	590,083	87,389
Georgia Southern & Florida	325	[illegible]	507,357	1,441,164	140,755	274,782	50,081	551,335	65,500	1,082,353	358,911	.....	72,496	286,415	5,092
Hocking Valley	5[illegible]	[illegible],408	853,482	4,453,042	585,050	693,855	58,562	1,326,343	112,809	2,746,619	1,706,423	.....	272,358	1,434,065	—63,886
International & Great Northern	1,[illegible]	[illegible],483	914,446	4,695,814	414,980	496,725	102,145	1,679,893	138,918	2,832,661	1,865,153	—1,499	148,500	1,715,154	.....
Iowa Central	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kanawha & Michigan	1[illegible]	1,713,51[illegible]	311,538	1,[illegible],256	30,699	322,669	15,632	579,407	46,667	1,195,065	767,321	28	62,749	704,595	—35,320
Lehigh & Hudson River	9[illegible]	[illegible],947	30,335	628,771	111,601	128,773	8,670	315,200	35,339	599,583	324,188	.....	24,500	99,688	7,774
Louisiana Ry. & Navigation Co.	350	[illegible],137	168,046	1,136,066	163,721	99,847	42,305	433,936	48,747	787,076	349,560	.....	33,200	316,360	117,648
Louisiana Western	207	[illegible],215	380,258	1,[illegible],848	139,883	201,524	54,054	370,441	46,775	812,667	313,221	428	50,905	262,744	—125,312
Minneapolis & St. Louis	1,[illegible]	[illegible],[illegible]1	1,096,766	4,[illegible],274	574,748	694,510	146,674	1,106,862	150,720	3,653,514	1,068,760	- 300	204,453	864,007	—445,499
Minneapolis, St. Paul & S. Ste. Marie	3,76[illegible]	11,015,3[illegible]	3,551,01[illegible]	15,449,354	1,509,676	1,927,507	312,986	4,938,996	315,280	9,001,395	6,444,959	88,327	944,087	5,589,199	1,553,824
Missouri, Kansas & Texas	2,744[illegible]	[illegible],[illegible],71[illegible]	[illegible],686,456	10,053,[illegible]6	1,31[illegible],188	1,424,666	245,428	3,211,443	291,967	6,485,692	3,568,104	- 14,342	366,926	3,156,836	—84,253
Missouri, Kansas & Texas of Texas	1,[illegible]4[illegible]	4,3[illegible],281	1,360,485	7,147,697	1,548,864	681,730	171,813	3,519,869	213,323	6,136,599	1,011,098	- 3,129	200,625	807,344	1,047,496
Mobile & Ohio	1,114	5,47[illegible],861	886,549	6,763,196	780,721	1,249,448	233,360	2,371,907	220,498	4,855,934	1,907,262	—6,996	175,511	1,724,755	40,799
Morgan's La. & Tex. R. R. & S. S. Co.	4[illegible]	[illegible],[illegible]38	738,799	3,066,884	376,586	399,878	95,843	1,204,597	86,937	2,157,841	909,043	13,511	130,840	764,692	—276,877
New Orleans Great Northern	8	[illegible]44	207,934	965,257	150,546	127,710	18,262	308,924	50,654	656,096	309,161	—535	14,250	294,376	52,607
New Orleans, Texas & Mexico	7[illegible]	[illegible]70	132,384	558,705	169,[illegible]70	99,328	29,355	379,399	51,562	728,914	129,761	.....	3,473	126,318	5,405
New York, Susquehanna & Western	18[illegible]	[illegible]61	359,916	1,783,056	179,789	161,570	13,614	674,025	35,144	1,064,142	718,914	3,433	15,115	597,232	11,810
Northwestern Pacific	41[illegible]	[illegible]59	1,144,124	2,186,391	342,[illegible]90	286,682	22,935	763,525	66,183	1,481,614	704,777	.....	86,288	618,489	94,185
Philadelphia & Reading	1,01[illegible]	1,0[illegible],[illegible]1[illegible]	4,[illegible],[illegible]90	26,442,133	3,371,[illegible]13	4,853,614	286,559	8,448,02[illegible]	467,877	16,[illegible]7,886	10,014,248	188,349	632,720	9,569,877	189,580
Pittsburgh, Shawmut & Northern	1[illegible]8	[illegible]07	63,395	830,547	95,842	171,784	7,791	341,955	28,077	545,449	285,098	.....	11,041	274,057	128,580
Port Reading	21	[illegible],[illegible]79	.....	727,049	59,424	1,371	218	216,832	815	278,566	448,483	19,034	26,600	440,923	—74,177
Richmond, Fredericksburg & Potomac	6[illegible]	6[illegible],40[illegible]	515,166	1,366,842	142,425	175,462	19,853	512,908	41,664	892,312	474,530	.....	7,658	466,872	27,434
Rutland	4[illegible]	1,[illegible]93[illegible]	752,098	2,078,641	247,342	304,121	51,923	805,989	46,833	1,456,208	622,433	.....	77,645	544,788	7,115
St. Louis & San Francisco	4,731	15,[illegible],[illegible]46	6,890,781	34,022,118	4,977,329	3,109,834	628,714	8,371,144	699,343	15,786,364	8,235,754	.....	1,119,458	7,116,296	54,894
St. Louis, Brownsville & Mexico	509[illegible]	[illegible],506	115,369	1,340,666	285,503	90,353	20,178	460,312	55,593	911,939	428,727	.....	38,785	389,942	203,645
St. Louis Merchants' Bridge Term.	.....	.....	..181	1,000,998	170,905	70,848	3,087	543,969	35,721	824,530	176,468	.....	40,932	135,536	131,406
St. Louis, San Francisco & Texas	47	[illegible],066	104,601	792,560	109,536	110,110	21,380	346,890	32,626	640,542	151,958	.....	7,106	144,852	107,469
St. Louis Southwestern of Texas	7[illegible]	1,[illegible]0,799	660,751	2,761,907	367,[illegible]30	562,966	84,715	1,026,977	122,071	2,158,959	602,048	-1,480	73,661	526,907	354,392
San Antonio & Aransas Pass	7[illegible]	1,[illegible]63,[illegible]74	747,352	2,869,158	455,309	325,423	39,498	1,001,636	69,008	1,890,874	978,284	.....	77,000	901,284	97,136
Seaboard Air Line	3,053	[illegible],[illegible]60	2,959,517	12,961,160	1,891,138	1,872,795	478,878	4,673,127	399,991	9,254,929	3,706,231	7,275	522,000	3,176,956	—281,331
Sunset	5[illegible]	45[illegible],7[illegible]	114,177	590,436	82,930	21,655	331	216,958	23,697	345,571	244,865	.....	23,728	221,137	—115,397
Tennessee Central	2[illegible]	[illegible]06,8[illegible]	240,905	900,039	159,813	125,491	36,658	326,048	59,386	707,399	192,640	.....	29,455	163,185	—116,489
Terminal R. R. Ass'n of St. Louis	38[illegible]	.....	1,715	1,583,632	247,182	163,938	4,9[illegible]	578,251	40,840	1,035,183	548,449	60,532	194,368	414,413	—140,497
Texas & Pacific	1,884	7,[illegible]34,[illegible]00	1,583,433	10,670,311	1,066,617	1,363,138	905,157	4,317,190	313,586	7,265,688	3,404,623	35,519	467,097	2,903,007	373,478
Toledo & Ohio Central	44[illegible]	[illegible]7,[illegible]45	406,530	3,237,892	505,225	420,891	47,287	1,065,769	58,065	2,097,167	1,130,725	6,503	144,116	980,106	—111,153
Trinity & Brazos Valley	46	[illegible],3[illegible],[illegible]86	68,214	1,654,197	262,113	210,675	68,914	745,925	80,409	1,368,035	286,162	.....	32,339	253,823	107,244
Ulster & Delaware	12[illegible]	38[illegible],407	559,984	681,701	92,287	75,964	10,164	174,054	17,556	470,025	211,676	672	23,100	189,248	—13,962
Virginia & Southwestern	240[illegible]	891,138	196,704	1,016,934	121,622	202,598	12,770	298,270	27,558	662,818	354,116	.....	33,592	320,524	85,727
Wabash	2,514	11,5[illegible],9[illegible]8	4,[illegible],712	17,342,886	2,047,143	2,917,145	558,441	6,916,163	524,781	12,963,673	4,379,213	9,093	493,352	3,876,768	- 898,303
Washington Southern	35	234,91[illegible]	[illegible],[illegible]89	640,168	77,448	68,884	8,514	250,430	19,144	424,470	215,748	.....	22,715	193,033	24,474
Western Pacific	935	2,[illegible],[illegible]86	666,714	3,261,369	603,580	291,315	188,744	1,319,518	157,230	2,559,387	701,982	23,302	101,050	577,630	.....
Western Ry. of Alabama	133	470,358	[illegible],[illegible]35	833,550	132,604	154,170	37,456	223,224	42,973	590,427	243,123	33	32,286	210,870	18,976

[1] Included in Penna. Co., January, 1911. [2] Leased to Minn. & St. Louis, December 20, 1911. [3] Figures shown here are for the period September 16, 1911, to January 31, 191[illegible]. Operated in previous period. [4] 354; [5] 4,434, [6] 631; [7] 2,225; [8] 1,495, [9] 470, [10] 350; [11] 819; [12] 610; [13] 350; [14] 3,763; [15] 1,736 [16] 1,348, [17] 348; [18] 264; [19] 376, [20] 1,022; [21] 240, [22] 501; [23] 3,046, [24] 34, [25] 444; [26] 24[illegible].

— Indicates Deficits, Losses and Decreases.

Conference Rulings.

An annual pass cannot be issued to an employee of a boiler compound manufacturing company, although free transportation may be given such employee in specific instances where he is making a trip for instruction of railway employees only.

Neither a railway nor its agents or employees may act as forwarding agents for shippers.

When reparation is awarded informally by the commission after new joint rates and new minimum weight has been ordered, it will be on the basis of the newly established rate and minimum weight.

In the case where two small cars have been furnished where the shipper applied for one large car, all railways party to the joint rate under which the shipment moved must give the shipment all the privileges in transit, reconsignment, switching charges, etc., that would be given it if it moved in one large car.

Employees of a restaurant in a union station are not entitled to free transportation.

Where two railways interchange traffic by using a switching road that makes a physical connection and absorb the switching charge, the switching road does not need to concur in the through rate if its switching charge is on file.

A trainman required by his duties to send or receive orders affecting the movement of trains comes under the hours-of-service law as applied to telegraph or telephone operators, but a trainman who has been on duty for more than nine hours or for more than 13 hours is not prohibited from using the telegraph or telephone to meet an emergency.

Switching Charges of Industrial Railways Discussed.

Alan Wood Iron & Steel Co. v. Pennsylvania Railroad et al. Opinion by Commissioner Clark:

The railways serving the steel plant at Ivy Rock, Pa., having built interchange tracks under an agreement with the complainant, refused to "spot" the cars on the plant tracks, and will make delivery only to the interchange tracks. The commission discusses, but does not pass on, the question of whether or not an allowance for switching charges is lawful, but finds that in the present instance the agreements as to the cost of building the interchange tracks are such that the complainant is not discriminated against because the railways perform the switching service at some of its competitors' plans. If, however, it were not for these special circumstances, the commission insists that if a railway perform the switching service for one industry it must do the same for its competitors. (22 I. C. C., 540.)

STATE COMMISSIONS.

The Arkansas commission has ordered that after May 1 of this year railways must dispense with the public drinking cup.

Charles N. Mann, a member of the Pennsylvania commission, died at his home near Philadelphia March 7, at the age of 72.

The New York Public Service Commission, Second district (up state), has issued a circular calling for information from shippers and consignees of freight as to the practice of railways in the weighing of carload and L. C. L. shipments. The New York commission is co-operating with the Interstate Commerce Commission in a general investigation of this subject.

The Louisiana railway commission has promulgated a rule that no passenger trains operating in the state shall be discontinued without the commission's consent. Another rule which has just been adopted, requires that "all railway companies operating passenger trains in Louisiana shall start and run all passenger trains in accordance with advertised schedules, unless prevented from doing so by accident or wreck, and shall furnish sufficient accommodations on such trains to properly seat all passengers who within a reasonable time previous to their departure offer themselves for transportation; provided, that all main line trains shall be held not to exceed thirty minutes, and all branch line trains shall be held not to exceed one hour at points of origin or junction points for connections with trains on other lines."

Annual Report Oklahoma Commission.

The Oklahoma Corporation Commission has issued its annual report for the fiscal year 1911 containing a review of the work of the commission. The report shows that a large number of orders reducing rates have been enjoined by the courts. The state 2-cent fare law is pending before the Supreme Court of the United States; and reduced freight rates on coal, lumber, grain, cotton, cottonseed, oil, brick, lime, cement, sand, gravel, stone, canned goods and fruits and vegetables also have been enjoined by the federal court and the cases are pending before the Supreme Court. An order reducing express rates by approximately 25 per cent. has been enjoined by the State Supreme court, which also declared invalid the commission's reduction of telegraph rates. A reduction of approximately 25 per cent. in live stock rates has been appealed from, but is still effective. The commission states that it has secured refunds to shippers, amounting to from $15,000 to $20,000, for overcharges in freight rates. Two hundred and nine complaints were filed with the commission during the year, 160 orders were issued and 186 informations, charging violation of the commission's orders, were filed. Penalties were imposed in twenty cases. The report shows that since March 3, 1909, 292.8 miles of railway have been constructed in the state. During the year 112 persons were killed and 1,049 were injured on steam railways; 21 persons were killed and 65 injured at grade crossings.

COURT NEWS.

In the United States Court at Grand Rapids, Mich., the grand jury has returned indictments against the Grand Rapids & Indiana for illegal payment of rebates, and against the Chicago, Kalamazoo & Saginaw for making false entries of freight. Twelve lumber shippers are also indicted.

The United States circuit court of appeals, at New Orleans, March 5, reversed the decision of a lower court which had decided for the defense in a suit against the Vicksburg, Shreveport & Pacific in connection with a lynching which occurred at Tallulah, La., in 1907. The widow of the man lynched sued the railway as one of the conspirators, on the allegation that a special train had been run to carry the mob to Tallulah. The court of appeals now says that the case must be again taken up and be tried by a jury.

The Colorado & Southern and the Chicago, Burlington & Quincy have filed briefs in the Supreme Court of Colorado in the case involving the authority of the state railway commission to reduce rates on coal from northern Colorado to Denver, declaring that the state railway commission law of 1907 is unconstitutional and that even if it is constitutional it does not give the state commission the power to fix rates. The district court, from which an appeal was taken by the Consumers' League, held that the law was unconstitutional.

The district court of East Baton Rouge, La., has given judgment for $1,000 against the Yazoo & Mississippi Valley for violation of the State Railway Commission's rule requiring trains to stop before crossing another railway at grade and to send a flagman ahead to see if the way is clear. This judgment affirms an order of the State Railway Commission imposing a fine on the road because of a collision in June, 1908, near Baton Rouge, when one passenger was killed and a number were injured; but the amount of the fine is reduced from $5,000 to $1,000. The view at this crossing was obstructed by a clump of trees. The same penalty was imposed on the other road, the Louisiana Railway & Navigation Company.

United States Commerce Court—Minority Opinion in Louisville & Nashville Case.

Judge Mack dissenting:

The salient facts briefly stated are that prior to August, 1907, the through rates on certain classes from New Orleans to Montgomery exceeded the combination of rates in force from New Orleans to Mobile and Pensacola, respectively; and from these places to Montgomery. All of the rates had been in force for many years. No change has been made in the rates on that part of the road between Mobile and Pensacola, respectively, and Montgomery, but in August, 1907, the rates from New Orleans to Mobile and to Pensacola, were advanced exactly enough to make the combination on these points equal to the through rate from New Orleans to Montgomery. While

the railway attempts to justify this advance by the assertion that the former rate was unreasonably low, having been put into effect many years before in order to cut out water competition, nevertheless it is admitted that the immediate cause of the advance was the announcement by the commission of the rule that a through rate must not exceed the combination of the locals. To comply with the rule, it was necessary either to reduce the through rate from New Orleans to Montgomery to the sum of the locals or to raise one or both of the latter. The railway chose the latter alternative; the commission, by its order, endeavored to compel it to adopt the former.

The commission could do this only if it found that the new rates from New Orleans to Mobile and Pensacola, respectively, and the unchanged rate from New Orleans to Montgomery were unreasonably high. If, on a review of the record before the commission, this court finds that there was no substantial evidence on which to base such a conclusion, it would be our duty to annul the order, inasmuch as the power of the commission to reduce rates to a reasonable figure is conditioned on the opinion of the commission, formed after a full hearing, that the tariff rate is unreasonably high; not its arbitrary and uncontrolled opinion, but its deliberate judgment based on substantial evidence produced at the hearing prescribed by the act.

While this principle is that adopted in the opinion of the court, I differ with my brethren in the application of it to the facts of this case. Whatever view I might have taken as to the reasonableness of the tariff rates had I been a member of the commission, I cannot find that there is no evidence to support the conclusions reached by it that they are unreasonably high.

Let us first consider the raised rates from New Orleans to Mobile and Pensacola. While, as the majority of the court state, there is no presumption that they are unreasonable merely because the old rates have been raised, yet there is likwise no presumption that they are reasonable merely because the carriers have put them into effect. When a rate is attacked immediately after it is made, there is no presumption either for or against its reasonableness. If it has been in force for some time and traffic has moved freely under it, a presumption does arise that it is reasonable. That presumption would be sufficient to make out a prima facie case in favor of the reasonableness of the rate to which it applied, and therefore to shift the burden of going forward with some evidence that it is unreasonable.

Apply these fundamental principles to this case. There is no presumption one way or the other as to the new rates. The ultimate burden of proof, at the time of this hearing and until the amendment of 1910, was on the shippers to show their unreasonableness. The absence of any presumption that they are reasonable was demonstrated when it was shown that they were put into effect just prior to this complaint; and a prima facie case that the old rates are reasonable and the raised rates therefore unreasonable was made out when it was proved that the former had been in force for many years.

The burden of going forward with evidence that will meet this prima facie case, or in other words, the obligation to give some valid explanation of the increase, now devolves on the carrier. This may be satisfied by showing that the old rates were compelled by water competition and that they are unreasonably low by at least the amount of the increase. But if the shippers prove that these water competitive rates had continued for many years after actual water competition in any real sense had ceased, and under conditions clearly negativing any danger of a recurrence thereof, the presumption of their inherent reasonableness again arises, and may, in the discretion of the commission, be deemed sufficient proof thereof.

The testimony before the commission tended strongly to show that no renewal of water competition was feasible after it had once ceased to be a factor in the transportation situation because of labor conditions, wharf control by the railways, and the justifiable fear that an investment in steamers by the shippers or others would be rendered worthless, inasmuch as the railways would cut their rates to any extent necessary to secure the business. It must be remembered in this connection that at that time and until the amendment of 1910 railways could cut their rates without restraint in order to destroy competition, and after accomplishing that purpose raise them again without the consent of the commission.

On these considerations alone and disregarding any other evidence the action of the commission in finding the new rate unreasonably high to the extent of the increase over the old rate from New Orleans to Mobile and Pensacola, respectively, ought, in my judgment, to be sustained as against the charge of arbitrary or unjustified action.

We come next to the consideration of the New Orleans-Montgomery rate. A presumption of its reasonableness arises from the fact that it had been long in force. To overcome this presumption, the shippers showed, first, that it was customary both on this and other roads not to charge more for the through rate than the combination of locals, although admittedly this custom had not been enforced for this particular through traffic; secondly, that the commission had now adopted a rule in accordance with the custom.

Whatever the concession of the counsel for the government may mean—and in my opinion it does not go so far as the majority of the court believe—the fact alone that the through rate exceeds the combination of locals is, in my judgment, an all-sufficient reason for a reduction to the extent of the excess. There may be peculiar and extraordinary circumstances which will cause the commission to refrain from compelling such a reduction, but ordinarily, and in the present case, the increased cost to the carrier of handling two local shipments and the economic waste involved therein as against a single through shipment, if the shipper should exercise his legal right of shipping from New Orleans to Mobile and then from Mobile to Montgomery on the local rates, amply justified the commission in promulgating its rule and in enforcing it by the reduction of the New Orleans-Montgomery through rate. Congress, moreover, has now, by the amendment of 1910 to section 4 of the act to regulate commerce, given this rule the force of law.

That the reduction ordered by the commission in the New Orleans-Montgomery rate was exactly enough to make the through rate equal the combination of locals as reduced is no more peculiar than that the increase by the carrier in the local New Orleans-Mobile and New Orleans-Pensacola rates was exactly enough to make the combination of locals as increased equal the former through rate. And when the principal witness of the carrier testifies that in his judgment the raised rates "from New Orleans to Mobile are not too low, and I do not think they are too high," in other words, that they are exactly right, and he so testifies notwithstanding his frank admission that the cause of the raise was to check the application of the new rule to the old rates, the commission can not, in my judgment, be said to have acted arbitrarily in not accepting this view of the result effectuated by the raise.

While I differ with my brethren in their criticism of a number of statements made in the report of the commission, it is unnecessary to discuss them here. For example, the view taken by the commission of the Cooley adjustment is fully justified, in my judgment, by the fact that the relation of rates thereby established in 1886, was departed from not as to some, but as to a great many commodity rates and that, too, at many times; even as to class rates, there were departures in 1896 and in 1905.

Even though some errors of fact may be found in the report, these are clearly not the real basis of the order. Moreover, if any inequalities or undue preferences as against other localities result from the order of the commission, they may be remedied on proper complaint, by the proper parties, to the commission.

The majority opinion is confined to a single question, and I have for that reason limited this dissent to a consideration of it. Without, therefore, discussing the many interesting questions of confiscation and jurisdiction presented in the briefs and oral arguments, it suffices at this time to state that, in my opinion, the other grounds urged against the order of the commission are equally unavailing and that the petition should be dismissed.

The estimated cost of the proposed line from Henty, New South Wales, to Daysdale, exclusive of land and compensation, is $1,070,655. This line would be 46 miles long. The route lies for the most part through privately owned land. It is argued that in view of the fact that Daysdale would be only 12 miles from the line now in course of construction to Clear Hills, a better division of the country could be made by deviating the proposed line about eight miles to the east of Daysdale and extend it to Mulwala on the Victorian border. By this route, aided with a cross line from Berrigan via Saverake, the greater portion of the agricultural land and settlement at present unserved will be brought within ten miles of railway communication. The cost of the extension to Mulwala, a distance of 30 miles, is estimated at $690,750.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

George C. Conn, freight traffic manager of the Pere Marquette at Detroit, Mich., has been elected vice-president, succeeding A. Patriarche.

Edgar M. Morsman, Jr., has been appointed general attorney for Nebraska of the Missouri Pacific, with office at Omaha, Neb., succeeding F. A. Brogan, resigned.

E. C. Tarrant, treasurer of the San Antonio & Aransas Pass, with office at San Antonio, Tex., having resigned, H. F. Smith, assistant treasurer has been appointed acting treasurer.

Operating Officers.

M. J. Lynch, general yard master of the Peoria & Pekin Union, has been appointed trainmaster, with office at Peoria, Ill.

F. R. Rockwell, general superintendent of the Denver & Rio Grande at Pueblo, Colo., has had his office removed to Denver, Colo.

W. B. Denham has been appointed general manager of the Georgia & Florida, with office at Augusta, Ga., succeeding J. M. Turner, resigned.

W. D. Danley has been appointed general superintendent of the Ann Arbor Railroad, with office at Owosso, Mich., succeeding K. A. Gohring, superintendent, resigned.

W. A. Mather, resident engineer of the Canadian Pacific at Winnipeg, Man., has been appointed acting superintendent, with office at Kenora, Ont., succeeding to the duties of J. Brownlee, deceased.

R. L. Barrett, trainmaster of the Atlanta, Birmingham & Atlantic, has been appointed assistant superintendent of the Brunswick division, with office at Fitzgerald, Ga., and his former position has been abolished.

Robert E. Mills has been appointed inspector of passenger train and station service of the Illinois Central and the Yazoo & Mississippi Valley, with headquarters at Chicago. His duties will relate to the care and convenience of passengers.

J. R. Neff, assistant trainmaster of the Baltimore & Ohio Southwestern at Chillicothe, Ohio, has been appointed trainmaster, with office at that place, succeeding G. W. Plumly, assigned to other duties; and R. R. Schwarzell succeeds Mr. Neff.

J. A. Small has been appointed superintendent of the Guadalajara division of the Southern Pacific of Mexico and the Sonora Railway, with office at Guadalajara, Jalisco, Mex., succeeding J. B. Sparks, assigned to other duties on account of ill health.

A. T. Lowmaster has been appointed general agent of the operating department of the Chesapeake & Ohio and the Chesapeake & Ohio of Indiana, with headquarters at Chicago, and the office of superintendent of terminals at that place has been abolished.

Frank Hooker Alfred, general superintendent of the Cincinnati, Hamilton & Dayton, has resigned to become assistant general manager of the Pere Marquette, with office at Detroit, Mich., and the office of W. D. Trump, general superintendent of the Pere Marquette at Detroit, will be abolished on April 1.

J. H. Taylor, general superintendent of the Central district of the Great Northern at Great Falls, Mont., has been appointed general superintendent of the Lake district, with office at Superior, Wis., succeeding D. M. Philbin, whose entire time will be hereafter required in connection with the iron ore properties. C. O. Jenks, superintendent of the Butte division at Great Falls, succeeds Mr. Taylor, and P. C. Allen, superintendent of the Dakota division at Grand Forks, N. D., succeeds Mr. Jenks, C. E. McLaughlin, master mechanic at Breckenridge, Minn., succeeds Mr. Allen. W. Clarke, assistant division superintendent at Spokane, Wash., has been assigned to duties in the office of the general superintendent at Seattle.

Traffic Officers.

F. O. Bender has been appointed traveling freight agent of the Baltimore & Ohio, with office at Philadelphia, Pa.

N. H. Reed has been appointed assistant general advertising agent of the Atchison, Topeka & Santa Fe, with office at Chicago.

C. E. Arney has been appointed western immigration and industrial agent of the Northern Pacific, with office at Spokane, Wash.

C. E. Henson has been appointed soliciting freight and passenger agent of the Galveston, Houston & Henderson, with office at Galveston, Tex.

G. R. Angell has been appointed commercial agent of the Rock Island Lines, with office at Dallas, Tex., succeeding T. H. Wilhelm, promoted.

E. M. Jordan has been appointed freight soliciting agent of the Southern Railway, with office at Selma, Ala., succeeding H. G. Duke, resigned.

H. L. McLaughlin has been appointed commercial agent of the Chicago, Milwaukee & Puget Sound, with office at Everett, Wash., succeeding A. G. Bantly.

Tracey Howard has been appointed district passenger and freight agent of the Northern Pacific, with office at Montreal, Que., succeeding G. W. Hardisty, deceased.

William C. Barnes has been appointed assistant general freight agent of the El Paso & Southwestern System and the Morenci Southern Railway, with office at El Paso, Tex.

B. R. Marsales, city freight agent of the Canadian Northern, at Edmonton, Alta., has been appointed contracting freight agent, with office at Brandon, Man., succeeding T. J. Petterson, resigned.

D. T. Berry has been appointed commercial agent of the Chicago, Milwaukee & St. Paul, with headquarters at Los Angeles, Cal., succeeding E. K. Garrison, resigned to become district freight and passenger agent of the Chicago, Milwaukee & Puget Sound at Portland, Ore.

W. A. Lally has been appointed general agent of the New York Despatch Refrigerator Line, the National Despatch Refrigerator Line and the Chicago, New York & Boston Refrigerator Company, with office at Chicago, succeeding F. Meinhardt, resigned to engage in other business.

Roy Terrell, assistant general freight and passenger agent of the New Orleans, Texas & Mexico, the Beaumont, Sour Lake & Western and the Orange & Northwestern at New Orleans, La., has been appointed also general freight and passenger agent of the New Orleans, Mobile & Chicago, with office at New Orleans. N. C. Barnett, commercial agent, and Mark Antony, city passenger and ticket agent of the Frisco lines at New Orleans, have had their jurisdiction extended over the New Orleans, Mobile & Chicago. J. W. McCann has been appointed traveling freight agent and E. B. Wood has been appointed soliciting freight agent, all with headquarters at New Orleans.

Engineering and Rolling Stock Officers.

Walter T. Krausch has been appointed engineer of buildings of the Chicago, Burlington & Quincy, with office at Chicago.

C. K. Stewart has been appointed master mechanic of the Missouri Pacific, with headquarters at Coffeyville, Kan., succeeding T. M. Vickers, resigned.

Edward Thomas has been appointed division foreman of the Oregon-Washington Railroad & Navigation Company, with office at La Grande, Ore., succeeding J. H. Watson.

A. C. Mackenzie, assistant engineer of the Canadian Pacific at Montreal, Que., has been appointed engineer maintenance of way of the Eastern Lines with office at Montreal.

S. J. Rufer, roadmaster of the Rock Island Lines at El Dorado, Ark., has been appointed general foreman of track laying of the Idaho Northern, with headquarters at Nampa, Idaho.

T. E. Cannon, master mechanic of the Lake district of the Great Northern at Superior, Wis., has been appointed general master mechanic of the Lake district, with office at Superior, a new office, and B. E. Osgard succeeds Mr. Cannon. S. J. Fero has been appointed master mechanic, with office at Breckenridge, Minn., succeeding C. E. McLaughlin, promoted.

OBITUARY.

W. J. Healy, auditor of the Atchison, Topeka & Santa Fe Coast Lines, with office at Los Angeles, Cal., died at that place on March 10.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Norfolk & Western is figuring on 25 Mallet locomotives.

The Japanese Government is in the market for a number of locomotives.

The Lake Superior Terminal & Transfer Company has ordered 2 switching locomotives from the Baldwin Locomotive Works.

The Louisiana & Arkansas has ordered 2 eight-wheel locomotives and 2 ten-wheel locomotives from the Baldwin Locomotive Works.

The Western Maryland has ordered 15 consolidation locomotives from the American Locomotive Co., and 10 Pacific type locomotives from the Baldwin Locomotive Works.

The Chicago, Milwaukee & St. Paul, mentioned in the *Railway Age Gazette* of March 1 as having ordered 30 Pacific type locomotives from the American Locomotive Company, has increased this order to 50 Pacific type locomotives. This company is now taking prices on 50 mikado locomotives.

The Delaware, Lackawanna & Western has ordered 15 mikado locomotives and 7 Pacific type locomotives from the American Locomotive Company, and 6 eight-wheel switching locomotives from the Lima Locomotive & Machine Works. The mikado locomotives will have 28-in. x 30-in. cylinders, 63-in. driving wheels, and in working order will weigh 314,000 lbs. The Pacific type locomotives will have 25-in. x 28-in. cylinders, 73-in. driving wheels, and in working order will weigh 281,000 lbs. The Pacific type locomotives will be equipped with superheaters. The switching locomotives will have 22-in. x 28-in. cylinders.

CAR BUILDING.

The Ulster & Delaware is in the market for 75 flat cars.

The New York, New Haven & Hartford has ordered a number of motor cars from the Standard Steel Car Company.

The Wabash has increased its inquiry for passenger equipment from 20 to 24, including 12 combination passenger and baggage cars, 8 chair cars and 4 passenger coaches.

The Western Maryland has ordered 18 coaches, 6 combination mail and express cars, 4 baggage cars and 2 postal cars from the Barney & Smith Car Co.

The Chicago, Milwaukee & St. Paul will build 500 automobile cars at its own shops in addition to the 470 previously reported for the Chicago, Milwaukee & Puget Sound.

IRON AND STEEL.

The Wabash has ordered 20,000 tons of rails from the Illinois Steel Company.

The Interborough Rapid Transit Company, New York, is in the market for 5,000 tons of rails.

The Chicago, Milwaukee & St. Paul has ordered 3,000 tons of bridge material from the American Bridge Company.

The Pennsylvania Lines West have ordered 380 tons of bridge material from the Chicago Bridge & Iron Works.

The Chesapeake & Ohio has ordered 5,000 tons of rails from the Maryland Steel Company, and from 10,000 to 15,000 from the Carnegie Steel Company.

The Chicago & North Western has ordered 3,000 tons of bridge material from the American Bridge Company for the Chicago, St. Paul, Minneapolis & Omaha.

General Conditions in Steel.—The coal strike in England and the fear of a coal strike in this country have tended to unsettle the conditions in the steel industry. It has been expected that there would be an improvement in the buying movement by this time. This is, however, delayed, but probably only for a short time. The Steel Corporation continues to operate at almost 90 per cent. of its capacity and the railways are beginning to enter the market more heavily, especially for bridges.

SIGNALING.

New Installations of Block Signals, Interlocking, Telephones for Train Despatching, Etc.

The United States Electric Company, of New York and Chicago, has delivered to the Norfolk & Western 78 telephone train despatching outfits, with Gill selectors. The same concern has recently delivered 76 similar outfits to the Baltimore & Ohio. Both of these roads were already using large numbers of the United States telephones and selectors.

The New York State Public Service Commission, First district, has ordered a number of electric railways to install "automatic electric block signals" on their single-track lines; six companies on Long Island, one in the borough of the Bronx, and two on Staten Island. The order requires signals at all turnouts and at all points where a double-track line converges into a single track; and evidently contemplates a wire-circuit system with trolley contact, with block sections extending from meeting point to meeting point. The order is to be complied with by June 1, next, but it does not apply to lines which are to be double-tracked within one year.

The Missouri Pacific has decided to instal the block system (manual) on about 3,000 miles of its lines and already considerably over 1,000 miles of road has been equipped. The system has been completed and in operation for some weeks over the entire main line of the Iron Mountain from St. Louis to Texarkana, 490 miles, and also over the main line of the Missouri Pacific from St. Louis to Osawatomie, Kan., 60 miles beyond Kansas City. Work is being rapidly pushed from Osawatomie to Pueblo, Colo., the western terminus of the Missouri Pacific main line, and within the next month or two it will be completed, and thus both the Missouri Pacific and Iron Mountain main through lines will have block signals over their entire length. Other sections equipped or soon to be equipped are: Kansas City to Omaha; Osawatomie via Coffeyville and Fort Smith, to Little Rock, and Little Rock, via McGehee, to Alexandria, La., a total distance of 759 miles from Osawatomie. Another section is that from Dupo, Ill., to Paragould, Ark., 242 miles. This is jointly operated by the Iron Mountain and the Cotton Belt.

The Lehigh Valley now has in use over 700 portable telephones, having bought approximately that number from the Western Electric Company during the past year. A portable telephone set is carried on every train, freight and passenger, and also on every work train; every bridge repair gang has one, and also some of the track repair gangs. The saving in the time of work trains, and in connection with other work on the main tracks has been so marked that an officer of the road says that the telephones already have more than paid for themselves. With all of these telephone sets there is carried a "fish pole" connection, enabling the men in charge to connect with the telephone line at any point along the road. The selector calling apparatus, which is used at the stations in connection with the train wire, is in some cases made available for calling the track foreman at night. At a station where no one is on duty at night in the office, a wire is run to the track foreman's dwelling and a connection made so that in case of need the despatcher can call the foreman, in the same way that the station agent is called during the day time. This arrangement has been adopted on the theory that the track foreman is more likely to be wanted at night than is the station man; but in case of need the track foreman can be called upon to go and notify the station agent.

The proposal for the Minusinsk railway, Russia, has been submitted in two forms—either from Minusinsk to Atchinsk or from Minusinsk to Itakka, on the Siberian railway. The total length of the line will be 245 miles in the former case; 228 miles in the latter. It would be important as a grain-carrying line; besides which it would serve regions rich in timber, salt, gold, copper and iron. The line would also facilitate communication with Mongolia.

Supply Trade News.

Phillip H. Ryan has resigned his position in the mechanical department of the New York Central & Hudson River to enter the railway department of the American Steam Gauge & Valve Manufacturing Company, Boston, Mass.

The U. S. Metal & Manufacturing Company, New York, has changed the name of its one-piece steel ladder for box cars, etc., from "Interstate" to "Safety." This change was made owing to the fact that after marketing a large number of ladders the company found that the name was similar to that of a ladder made by another concern.

The Canton Manufacturing Company, Canton, Ohio, is doubling the floor space of its plant by enlarging the present buildings and by erecting new ones. This work was begun February 15, and it is expected to be completed by May 1. Also, an additional factory has been leased for the manufacture of Multoplex filing cabinets, which were placed on the market last November.

The Detroit Steel Products Company, Detroit, Mich., has received a large government contract for Fenestra windows for all of the shop buildings of the new United States naval station at Pearl Harbor, Hawaii. The contract includes 50,000 sq. ft. of steel windows. The navy department has used Fenestra windows in many of its new shop buildings, and it has become a standard specification for much government work.

Judge Day of the United States district court at Cleveland on March 4 rendered an opinion dismissing the suit of the Railroad Supply Company against the Elyria Iron & Steel Company for alleged infringement of the Wolhaupter patents on railway tie plates. The court agreed with the opinion of Judge Kohlsaat of the circuit court at Chicago in a case involving the same claims and found that the defendant's device did not infringe on the Wolhaupter patents.

Frederick Maley, formerly with the Baldwin Locomotive Works, Philadelphia, Pa., has been made superintendent of the oxy-acetylene department of the Alexander Milburn Company, Baltimore, Md. The Milburn company has recently equipped several locomotive cranes for the Maryland Steel Company, Sparrows Point, Md., with its new steam acetylene generator, which utilizes the waste steam from the boiler, supplying a number of searchlights and allowing night work to be carried on satisfactorily. The Cincinnati, New Orleans & Texas Pacific has also equipped one of its Industrial wrecking cranes with the same system.

The management of the Permanent Manufacturers' Exhibit of Railway Supplies and Equipment in the Karpen building, Chicago, has arranged a program of entertainment, beginning on Saturday night of this week and continuing next week, while the convention of the American Railway Engineering Association is being held. The first meeting of a railway association in the assembly rooms in connection with the exhibit, which have been offered free of charge to railway and supply associations, was held on Monday evening, when the Chicago Car Foremen's Association met there. The Car Clerks' Association will hold its first regular monthly meeting in the rooms on April 1, and the Western Railway Club will meet there Tuesday night of next week.

TRADE PUBLICATIONS.

Wire Rope and Wire.—John A. Roebling's Sons Company, Trenton, N. J., has issued a very complete illustrated catalog, describing its iron, copper, brass and steel wire, galvanized and hard copper telegraph and telephone wire and miscellaneous products, with descriptions of some principal installations.

Cement Poles.—The Standard Cement Pole Company of America, New York, has issued a booklet describing the Rubello-Santi system of making reinforced cement poles. The distinctive feature is said to be the method by which the reinforcement is held in position and uniformly spaced. The reinforcing member consists of a number of metallic rings embedded concentrically in the concrete and united by parallel steel rods running lengthwise and crosswise of the pole through perforations in the rings.

Railway Construction.

New Incorporations, Surveys, Etc.

Atchison, Topeka & Santa Fe.—This company has appropriated $1,125,000 for carrying out betterments and improvements on the Gulf, Colorado & Santa Fe. This is in addition to the amount to be spent for the construction of new lines during the year. The work includes new terminal yards, revision of grades, new rails, bridges, trestles, culverts, elimination of grade crossings, new stations and shops, engine houses and turntables. C. A. Morse, chief engineer, Topeka, Kan.

Batesville & Northeastern.—An officer writes that this company has recently been organized, and that as soon as it receives its charter will begin surveys for a 40-mile line, to be built from Batesville, Ark. Virgil W. Cook, president; N. Adler, vice-president; W. Ramsey, treasurer, and S. Deener, secretary, Batesville.

Black Mountain Railway.—An officer writes regarding the reports that an extension is to be built to Asheville, N. C., that no plans have been made for such an extension. The company is now building about 25 miles of line into the timber section of the Black mountains in North Carolina. C. G. Ruffin, Burnsville, N. C., may be addressed.

British Columbia Electric.—This company is building an extension on Vancouver island, from Victoria northerly through the Saanich peninsula, to Deep Cove, about 23 miles, and a branch will be built to connect with Union Bay, where a wharf is to be built. A contract was given to Moore & Pethick last year for grading 18 miles, and construction work is now well under way. R. H. Sperling is general manager.

Buffalo, Rochester & Pittsburgh.—An officer writes that a contract has been given to the Miller Construction Company, Lock Haven, Pa., for grading and masonry work on a five-mile extension of the Jacksonville Mine line in Indiana county, Pa. The same company has been given a grading contract for revision work on the main line, near West Mosgrove, Pa. E. F. Robinson, chief engineer, Rochester, N. Y.

Canadian Northern.—A bill has been introduced in the Saskatchewan legislature to incorporate the Canadian Northern Saskatchewan, and to grant that company authority to build lines in the province of Saskatchewan as follows: From Kipling west to New Warren; Lampman north to the Brandon-Saskatchewan line of the Canadian Northern; Moose Jaw east to Regina; from a point on the Delisle branch west to the western boundary of Saskatchewan; Chamberlain south to Moose Jaw; Craven northeast to Hudson Bay Junction, with a branch to a point on the Rossburn branch of the Canadian Northern east of Yorkton; Humbolt west to a point at or near Saskatoon; Melfort northeast to the eastern boundary of Saskatchewan; Hudson Bay Junction south to a point on the Brandon-Regina line of the Canadian Northern west of Maryfield; Swift Current north to Battleford; Chamberlain westerly and north of the North Saskatchewan river to the western boundary of Saskatchewan; Prince Albert northeast to the eastern boundary of Saskatchewan; from a point on the Prince Albert-Denholme line of the Canadian Northern west to the North Battleford-Jack Fish line; Moosomin south to the southern boundary of Saskatchewan, and such other lines as may later be authorized. T. Turnbull, assistant chief engineer, Winnipeg, Man.

Canadian Northern Pacific.—A line is to be built from Kamloops, B. C., via Grand Prairie and Vernon to Kelowna, with a branch to Lumby, about 145 miles. The British Columbia government has granted this company $35,000 a mile for the construction of a line on Vancouver Island.

Canadian Pacific.—This company has bought 1,800 acres of land in East Kildon, a suburb of Winnipeg, Man. The site is to be used for new yards. J. G. Sullivan, chief engineer, western lines, Winnipeg, Man.

Additional contracts have been given by the Canadian Pacific as follows: Foley, Welch & Stewart, St. Paul, Minn., for work on about 100 miles from Viceroy, Sask.; John Timothy, Edmonton, Alta., to build from Stirling, Alta., easterly 25 miles, and to W. A. Dutton, Winnipeg, Man., to build from Swift Current, Sask., northwest 80 miles. This branch may eventually be con-

nected with the main line at Bassano. J. G. Sullivan, chief engineer, western lines, Winnipeg, Man.

Canadian Northern Saskatchewan.—See Canadian Northern.

Chestermere-Calgary Suburban.—Work has been started on an 18-mile line to be built from Calgary, Alta. J. A. McCullough, president, general manager and purchasing agent; J. H. Turner, chief engineer, Calgary.

Chicago, Milwaukee & Puget Sound.—An officer writes that contracts are let and work is now under way building a line from Beverly, Wash., down the west side of the Columbia river, through White Bluffs to Hanford. E. O. Reeder, chief engineer, Seattle, Wash.

Chicago, Milwaukee & St. Paul.—An officer writes regarding the report that a connecting line is to be built from Crystal Falls, Mich., west about 20 miles to the Iron River-Stambaugh district that the company has not yet determined to build this extension. C. F. Loweth, chief engineer, Chicago.

Cumberland Valley.—An ordinance has been passed granting permission to this company to change its tracks in the southern section of Newville, Pa. G. C. Koons, engineer, Chambersburg, Pa.

Cuyuna Northern.—An officer writes that this company intends to build lines through Crow's Wing county, Minn., to the Cuyuna Iron range, including a line from a connection with the Northern Pacific at Deer Wood, south to Brainerd, about 20 miles, and from Brainerd northeast to a point between Deer Wood and Aitkin, about 25 miles. Some additional branches and spur lines will also be built. The company at present is affiliated with the Northern Pacific. The principal business of the line will be carrying iron ore from the Cuyuna iron range. C. Adams, president, Deer Wood, Minn. (November 3, p. 931.)

Denver & Rio Grande.—Announcement has been made that this company will spend about $15,000,000 within the next two years for betterments and improvements. The Denver shops are to be enlarged, and a large amount of money is to be spent reducing the grades near Soldier Summit, Utah, at the continental divide, and considerable double-track work will be carried out near that place. J. G. Gwyn, chief engineer, Denver, Colo.

Denver, Laramie & Northwestern.—This road is now in operation from Denver, Colo., to Greeley, 56 miles, and it is the intention of the company to build an extension to the coal fields of Wyoming, in all about 200 miles. Some work on this extension has already been done, including the rock work and the tunnel across the continental divide. W. D. Hodge, general superintendent and chief engineer, Denver, Colo.

Elgin Terminal.—This company has been incorporated in Illinois with $2,500 capital, to build from a point in Will county, Ill., through the counties of Kendall, Kane and Cook, to a point in Lake county. The incorporators include D. C. Dunlap, H. L. Rich, R. S. McCreadie and G. A. Bergtold, all of Chicago.

Elk & Little Kanawha.—An officer writes that a contract has been given to J. J. Boxley & Son, Rosedale, W. Va., to build a five-mile extension from Rosedale to Tanner; contracts have not yet been let for an 18-mile section from Tanner to Russet. There will be eight steel bridges on the new extension, each 40 ft. long. The company now has 22 miles of track laid between Gassaway and Rosedale. The principal commodities to be carried will be coal and timber. Martin Snyder, president, Cleveland, Ohio, and C. P. Peyton, chief engineer, Charleston, W. Va.

Erie.—An officer writes that the new double-tracking work on the Chicago & Erie division consist of the second-tracking of the Lima division, from Marion to Huntington, and of the Chicago division from Huntington to North Judson, a total of about 180 miles. In connection with this work grades are reduced from a maximum of .5 per cent. to a maximum of .3 in both directions. On the Meadville division, it is proposed to construct second track and reduce the grades between Concord and Meadville, between mile post 62½ and 101, a distance of 38½ miles, reducing the ruling eastbound grade from 1 per cent. to .2 per cent., and the westbound grade from .95 per cent. to .3 per cent. The new line will be about the same length as the present line. It is also proposed to second-track the line from Salamanca to Jamestown, 33 miles, and reduce the grades between these places from .7 per cent. in both directions to .2 per cent. eastbound, and .3 per cent. westbound. W. J. Harahan, vice-president, New York.

Farmers Grain & Shipping Company.—According to press reports, this company, which operates a line from Devil's Lake, N. D., north to Hansboro, 66 miles, is planning to build a branch east to Edmore. Joseph M. Kelly, president, Devil's Lake, N. D.

Grand Trunk Pacific.—The Grand Trunk Pacific Saskatchewan will ask for authority to build from a point at or near township nine or 10, range 13, west of the second principal meridian to Weyburn, Sask., thence southwest and west to a point on the western boundary of Saskatchewan in townships two to five, in addition to the lines previously mentioned in these columns. B. B. Kelliher, chief engineer, Winnipeg, Man. (March 1, p. 408.)

Grand Trunk Pacific Saskatchewan.—See Grand Trunk Pacific.

Gulf, Colorado & Santa Fe.—See Atchison, Topeka & Santa Fe.

Karwatha Transportation Company.—Incorporation has been asked for in the province of Ontario to build electric railways in the Karwatha district. One of the lines is to be built from Peterborough, Ont., to Lakefield. The headquarters of the company are at Peterborough.

Kenilworth & Helper.—This company was organized in Wyoming, and operates a four-mile line from Kenilworth Junction, Utah, which is about 1½ miles east of Helper, to Kenilworth, and has six miles of line at the two terminals. The company has also been incorporated in Utah, with a capital stock of $250,000. The plans call for building an extension northwest to Salt Lake City, about 100 miles, and an extension east to Vernal, in Uinta county, about 95 miles. Preliminary surveys have been made for some of this work. C. N. Strevell, president and general manager; James H. Paterson, vice-president and treasurer, and F. A. Druehl, secretary. All of the officers are interested in the Independent Coal & Coke Company.

London & Northwestern.—This company is making plans to build a railway at Rock Glen, near Arkona, Ont., also to build a dam and a power plant at that place. It is estimated that the cost of the work will be $3,000,000. Smith, Kerry & Chase, Toronto, are in charge of the construction work.

Long Fork Railroad.—Incorporated in Kentucky, to build a 20-mile line from a point in Floyd county, through Pike county to the Knott county line. West Virginia capitalists are back of the project.

Mexico Northwestern Pacific.—See Mexico Northwestern Transportation Company.

Mexico Northwestern Transportation Company.—This company has been incorporated in Canada, with $25,000,000 capital, by the Mackenzie and Mann interests, and headquarters at Toronto, Ont., to build and operate railways. Application has been made to Parliament for an act authorizing the company to buy and operate railways, tramways, telegraph and telephone lines outside of the dominion of Canada, and to secure concessions from the United States, of Mexico, also to change the name of the company to Mexico Northwestern Pacific Railway.

Missouri, Oklahoma & Gulf.—The plans of this company call for extensions and branch lines as follows: From Henryetta, Okla., west to Oklahoma City; Wagoner, Okla., to Joplin, Mo.; Denison, Tex., south to Dallas and Fort Worth. William Kenefick, president, Kansas City, Mo.

Montreal Tunnel Company, Limited.—Incorporated in Canada with $15,000,000 capital, to build railways, steamship terminals, tunnels, approaches, etc. The incorporators include D. McDonald, H. Timmins, D. McMartin, J. Carson, P. Dubee, and other Montreal capitalists.

New Orleans & Grand Island.—Incorporated in the province of Ontario, Canada, with $10,000,000 capital, to build railways, canals, etc. Eric N. Armour, Toronto, Ont., is an incorporator.

Oklahoma Roads.—According to press reports, residents of McAlester, Okla., have voted to raise $200,000, for building a 60-mile line from McAlester towards Ada. The work is to be started within two months. C. C. Godwin, Fort Smith, Ark., will build the line.

Ottawa, Smith's Falls & Kingston.—An officer writes that this company was incorporated with $1,000,000 capital, and headquarters at Ottawa, Ont., to build from Ottawa, in the county of Carleton, south via Smith's Falls to Kingston, 106 miles. A branch is to be built from Smith's Falls north to Lanark, about 20 miles. On the first section of 46 miles south from Ottawa, the construction work will be easy, and there will be only one bridge of two 80 ft. spans. On the section from Smith's Falls south to Kingston, 60 miles, there will be considerable heavy rock work, and there will also be one bridge having three 80 ft. spans, one 150 ft. bridge to have either one or two spans, and several smaller bridges ranging from 50 ft. to 70 ft. each in length. The company expects to develop a traffic in dairy and agricultural products, also coal and timber. F. A. Heney, chairman, Ottawa; E. Kidd, vice-chairman, North Gower; G. L. Dickinson, secretary and treasurer, Manotick, and U. L. Upson, general manager, Ottawa.

Ozark Land & Timber Company's Road.—Work is to be started at once on a line to develop timberlands in Benton, Washington and Madison counties, Ark. A camp has been established at the terminal, at Monte Ne, where connection is to be made with the Kansas City & Memphis. The work will include building a bridge over the White river. The Ozark Land & Timber Company was recently organized with $500,000 capital. George D. Locke, Rogers, Ark., is at the head of the project.

Pacific Great Eastern.—Incorporation has been asked for in British Columbia to build from Vancouver, B. C., to North Vancouver, thence along Howe sound and following the general course of the Squamish river northeasterly to Lillooet on the Fraser river and along that river north to a junction with the Grand Trunk Pacific at or near Fort George, 450 miles. It is understood that an agreement has been entered into with the Grand Trunk Pacific for the latter company to take over the line on its completion. The incorporators include T. Foley, St. Paul, Minn.; J. W. Stewart, Vancouver, B. C.; D. McLeod, Vancouver; P. Welch, Spokane, Wash.; D'Arcy Tate, Winnipeg, Man., and V. W. Smith, Hazelton, B. C.

Pacific & Peace Railway Department Syndicate.—Under this name a French syndicate has been incorporated to complete the organization of a company, to have a capital of $5,000,000. The plans call for building from Dunvegan, B. C., to Bella Coola, over the shortest route between the Peace river and the Pacific coast. A charter was granted last year to the syndicate by the Dominion government to build under the name of the Pacific & Peace River from Bella Coola, B. C., on Burke Channel, to a point at or near Dunvegan, via Fort Fraser, Stewart Lake, Fort St. James, Fort Laclede, and Pine Pass, in all about 480 miles. J. A. Ritchie, Ottawa, Ont., was solicitor for the latter company. (March 31, p. 814.)

St. John & Quebec.—An officer writes that the plans call for building from St. John, N. B., northwest following the valley of the St. John river, via Gagetown, Fredericton, Woodstock, Lakeville, Centerville and Andover to Grand Falls, 210 miles. Arrangements are about completed for the immediate construction of 125 miles from Gagetown to Centerville. Maximum grades will be 1 per cent., and maximum curvature 7 deg. The work from between St. John and Woodstock involves handling about 35,000 cu. yds. a mile, of which 15 per cent. will be rock work. From Woodstock north to Centerville, 23 miles, the work involves handling about 18,000 cu. yds. a mile, of which 25 per cent. will be rock work. A number of small bridges are to be built, and a bridge over the St. John river from 1,200 to 2,000 ft. long, the location of the bridge has not yet been definitely fixed. There will also be about 3,000 ft. of tunnel work near the St. John river crossing. A. R. Gould, president, Presque Isle, Me.; Ross Thompson, chief engineer, Fredericton, N. B.

St. Louis, Iron Mountain & Southern.—This company is carrying out a large amount of improvement work on the lines in eastern Arkansas, across the Mississippi river from Memphis, Tenn. The tracks between Memphis and Wynne, Ark., 46 miles, are being reballasted and put in good condition. As soon as this work is finished the company will probably rebuild the line between Wynne and Knobel, 82 miles. E. F. Mitchell, chief engineer, St. Louis, Mo.

St. Louis Southwestern.—An officer writes that there is no truth in the reports that this company is in any way interested in the project to build a line from Hillsboro, Tex., southwest to Whitney, about 12 miles.

San Antonio, Uvalde & Gulf.—An officer writes that a grading contract has been let to Ward & Lee, San Antonio, Tex. All other work will be carried out by the company's men. The plans call for a line from San Antonio, Tex., south via Pleasanton and Campbellton to a point on the Gulf of Mexico, about 140 miles, with a branch to Fowlerton, in all about 200 miles. Maximum grades will be .5 per cent., maximum curvature two deg. The work calls for handling between 12,000 and 15,000 cu. yds. of earth to the mile. E. R. Breaker, chief engineer, San Antonio.

San Diego & Southeastern (Electric).—Incorporated in California with $5,000,000 capital, as a consolidation of the San Diego Southern and the San Diego & Cuyamaca. The San Diego Southern operates a line from San Diego southwest to Tia Juana, 18 miles, and the Colorado Belt Line, 25 miles. The San Diego & Cuyamaca extends from San Diego to Foster, 26 miles. It is proposed to extend the lines to Los Angeles, on the north, and to Ensenada, Lower California, and from San Diego through the Imperial valley to the Gulf of California on the south. John D. Spreckels, Adolph Spreckels, and R. C. Gillis, Los Angeles, are stockholders.

San Diego Southern.—See San Diego & Southeastern.

San Diego & Cuyamaca.—See San Diego & Southeastern.

San Pedro, Los Angeles & Salt Lake.—This company has now under consideration the question of building several branch lines. A contract for building the Ophir branch, 10 miles, in Utah has been let to the Utah Construction Company, and work is to be started on this line at once. The branch from Moapa, Nev., to St. Thomas, 22 miles, will be finished during March. E. G. Tilton, chief engineer, Los Angeles.

Saskatoon Transfer.—Incorporation has been asked for in Saskatchewan to build a railway, to use either steam or electricity for the motive power. The plans call for a line from section 23, township 36 to section 26, township 36, range six, west of the third meridian. Borland, McIntyre & Borland, Saskatoon, are the solicitors.

Southern Railway & Navigation Company.—An officer of this company, which operates a line from Vidalia, La., southwest to Monterey, 22 miles, writes that work is now being carried out by the company's men on an extension of 10 miles. D. K. Jeffris, president and general manager, Pullman building, Chicago.

Southern New England.—This company will start surveys at once to determine the most feasible route for the proposed line from Vermont southeast to Boston, Mass. (March 8, p. 454.)

Southern Traction Company.—According to press reports about $5,000,000 has been raised among St. Louis, Mo., capitalists to finance the construction of an interurban electric line from Dallas, Tex., to Waco, including a street system at Waco. G. H. Walker & Co. and William R. Compton Company, St. Louis, are interested.

Spalding-Springview.—An officer writes that this company has been incorporated in Nebraska with $300,000 capital, to build from Springview, Neb., southeast to Spalding, about 110 miles. Surveys on the section from Bassett to Springview, about 25 miles, is nearing completion. C. E. Lear, Springview, will probably be secretary and treasurer of the company.

Springfield Western (Electric).—An officer writes that this company has just completed a preliminary survey for the first section of the Springfield-Joplin line as far as Paris Springs in Lawrence county, Mo., 28 miles west of Springfield. M. Hollenback, chief engineer, Springfield, Mo.

Sudbury-Copper Cliff Suburban.—Incorporation has been asked for in the province of Ontario, Canada, to build from Sudbury, Ont., west to Copper Cliff; also from Sudbury east to Coniston. W. J. Bell, W. Cochrane, J. Mackey, D. M. Morin and L. Laforest, Sudbury, Ont., are interested.

Texas Roads (Electric).—Residents of El Paso, Tex., are interested in a project to build a line from that place east to Ysleta, 12 miles.

Upalika & Southern.—Incorporated in South Dakota, with $100,000 capital, and offices at Pierre, S. D., at Upalika, Mo., and at Chicago. The company plans to build a 10 mile line connecting Upalika, Mo., and Flintville. The incorporators include T. Graham, E. P. Flint, and E. C. Talmage, Chicago, and J. W. Laughlin, Pierre.

Utah Coal Railway.—According to press reports, this company, which was incorporated in Utah early this year with $125,000 capital, will start work in April on a line from Provo, Utah, via Springville and Huntington, to Mohrland, where connection is to be made with the Castle Valley. The new line will be 90 miles long, and will provide an outlet for coal from the mines of Carbon and Emery counties. W. M. Bradley, president; William Ashton, vice-president, and R. B. Harkness, secretary and treasurer. (February 9, p. 263.)

Western Canada Power Company.—Plans are now under consideration for building along the north shore of the Fraser river from Mission Junction, B. C., west to Vancouver, about 40 miles. Much of the right of way has been secured. W. Neill, assistant manager, Vancouver.

Winnipeg Electric.—This company has plans made for building an extension from Middle Church, Man., north to Stony Mountain and Stonewall, about 15 miles. Wm. MacKenzie, president, Toronto, Ont.

RAILWAY STRUCTURES.

Aberdeen, Wash.—A contract for the construction of a union passenger station, to cost approximately $75,000, to be used by the Oregon-Washington Railway & Navigation Company, the Northern Pacific and the Chicago, Milwaukee & Puget Sound, has been let to Grant, Smith & Company of Spokane, Wash.

Barnesville, Ga.—An officer of the Central of Georgia writes that plans for a new station at Barnesville, Ga., have not been completed, as the size and location have not yet been fully determined.

Barstow, Cal.—An officer of the Atchison, Topeka & Santa Fe Coast Line writes that a 25-stall roundhouse and trackage, water and drainage system will be constructed at a cost of approximately $133,000, to replace structures destroyed by fire June 23, 1911.

Buffalo, N. Y.—The Buffalo Creek has adopted the Strauss bascule bridge design for a 165-ft. single leaf, double-track bridge over the Buffalo river.

Coquitlan, B. C.—The Canadian Pacific will begin work this year on the construction of one unit in the proposed terminal plant at this point, including a roundhouse, car repair shop, paint shop, machine shop and several smaller buildings. The complete plans include four or five similar units.

Denver, Colo.—The shops of the Denver & Rio Grande are to be enlarged.

Doctortown, Ga.—The Atlantic Coast Line has adopted the Strauss bascule bridge design for a 117 ft. 6 in. single leaf, single track span over the Altamaha river.

Goldsboro, N. C.—See Raleigh.

Grand Rapids, Mich.—The track elevation commission appointed by the city of Grand Rapids, Mich., on March 1, 1911, to consider the elevation of the railway tracks through the city and work out plans and estimates for this work, has completed its report and submitted it to the city council. The commission, consisting of City Engineer Cutcheon, representing the city; E. H. Barnes, representing the railways, and Consulting Engineer E. N. Layfield, recommended the elevation of all railway tracks in the city, with the exception of the Michigan Central, Grand Rapids & Indiana and Pere Marquette tracks south of Wealthy avenue, over which tracks viaducts were favored. Eight viaducts were recommended at an estimated cost of $970,000; and the elevation proper is estimated to cost $4,115,000, or a total for the entire grade separation work of $5,085,000. This comprehensive study is the outgrowth of an agitation for grade separation starting about eight years ago, and was undertaken in order to insure that any work done would fit in with a comprehensive plan for the ultimate separation of all grade crossings. It is not expected that actual construction work will be undertaken for some time.

Halifax, N. S.—Plans have been made for putting up a new station and freight sheds for the Intercolonial Railway and the Dominion Atlantic at Halifax. The improvements include an extensive scheme of railway yards, terminals, bridges, freight sheds and a union station, also the construction of subways, the alteration of docks, and the removal of old buildings. (July 28, p. 199.)

Hillsboro, Tex.—Preparations are being made for the construction of a joint passenger station for the Missouri, Kansas & Texas, and the Trinity & Brazos Valley.

Laurel, Miss.—An officer of the Queen & Crescent writes that the company has under consideration the question of building a modern passenger station at Laurel, Miss., but will not take any definite action in the near future.

Los Vacas Mex.—Surveys have been made for the proposed international railway bridge to be built over the Rio Grande, to connect Los Vacas with Del Rio, Tex. This bridge is to be used jointly by the National Railways of Mexico, and the Kansas City, Mexico & Orient. A branch is now being built by the N. R. of M., from Allende north to Los Vacas, about 75 miles, and the Kansas City, Mexico & Orient is building a branch from San Angelo, Tex., south to Del Rio.

Macon, Ga.—An officer of the Central of Georgia writes that improvements, including additional tracks at the Macon yards, have been finished.

Memphis, Tenn.—Work is expected to be started early this year on the construction of a new passenger station to cost approximately $1,500,000 to be used by the Illinois Central, Chicago, Rock Island & Pacific and St. Louis & San Francisco. The contract has not been let. Construction is now in progress on another station to be used by the Louisville & Nashville, Nashville, Chattanooga & St. Louis and the Southern.

Montreal, Que.—The Central Railway of Canada has made plans for putting up a new station and terminals in the eastern section of Montreal. The company recently let a contract to build a line from Montreal to Ottawa.

Prince Rupert, B. C.—Contracts have been let by the Grand Trunk Pacific for excavations for the proposed dry dock, terminals and hotel. The entire plan calls for an expenditure of $5,000,000.

Raleigh, N. C.—Following the announcement recently made by President W. W. Finley, of the Southern Railway, that modern freight terminals would be constructed at Raleigh and at Goldsboro, the company is now asking for bids for the construction of a brick freight warehouse and office building 300 ft. x 50 ft., to be built at Raleigh, and has let the contract for the construction of a brick freight warehouse and office building 228 ft. x 50 ft. at Goldsboro, to J. P. Pettyjohn & Co., of Lynchburg, Va. The improvements to be made at Raleigh, in addition to the building proper, will include the construction of 9,100 sq. ft. of new platform, 3,700 sq. yds. of macadam driveway, the rearrangement of present tracks and the construction of 1,960 lineal feet of new tracks. For the new freight terminal at Goldsboro 5,500 sq. ft. of new platform, 4,800 sq. yds. of macadam driveway and 1,385 lineal feet of new tracks will be provided.

Savannah, Ga.—According to press reports, the Savannah Electric Company will construct a power plant at Savannah, to have a capacity of 11,000 k.w. The work will be begun soon, and it is said will be finished by November.

Simpson, Ind.—Plans are being made by the Cincinnati, Bluffton & Chicago for a combined freight and passenger station to be built at Simpson.

The Longitudinal Railway, Chile, is being built by English contractors. It is expected to be completed within two years. Construction work was begun in January, 1911, and 150 miles have already been completed. This line, which runs from Arica to Pueblo Hundido, will have a total length of about 500 miles. It will run through desert country to a large extent, but at the same time it will open up valuable mineral regions, such as Taltal, Antofagasta and Tocopilla, where there are large nitrate deposits. The cost of this railway is estimated to be $15,000,000.

Railway Financial News.

Atlanta, Birmingham & Atlantic.—It is understood that arrangements are now being completed to take care of the $6,239,200 5 per cent. collateral trust two-year notes of the Atlantic & Birmingham Construction Co., which are due May 1. These notes are a joint obligation of the construction company and of the railway company, and it is probable that they will be renewed for three years and that additional collateral will be deposited to secure them.

Bellingham Bay & British Columbia.—See Chicago, Milwaukee & Puget Sound.

Chesapeake & Ohio.—The New York Stock Exchange has listed $374,000 additional general mortgage 4½ per cent. bonds and given authority to add $1,126,000 bonds on notice of sale. The bonds are issued at the rate of $25,000 per mile on account of double-tracking.

Kuhn, Loeb & Company and the National City Bank, both of New York, have bought $3,500,000 4½ per cent. notes, due 1914. These notes are part of an authorized issue of $25,000,000, of which $16,000,000 have previously been sold. Of the proceeds of these notes, $1,750,000 will be used to pay for 2,000 coal cars and 50 locomotives recently bought, and the remainder will be for general improvement purposes. The double-tracking of the line is nearly complete, it is understood.

Chicago & Western Indiana.—The New York Stock Exchange has listed $1,365,000 additional consolidated mortgage 4 per cent. bonds of 1902-1952. The proceeds of the sale of these bonds are to be used by the company as follows: $540,000 for the bridge over the Calumet river, track elevation, and additions to the Belt division; $398,000 to repay to proprietary companies bonds cancelled in March, 1911; and $426,900 for construction and capital betterments.

Chicago, Indianapolis & Louisville.—Redmond & Company and the Equitable Trust Company, both of New York, are offering $2,500,000 first mortgage sinking fund bonds of the Monon Coal Company, of 1911-1936 at 94, yielding about 5½ per cent. income on the investment. Interest is guaranteed unconditionally by the railway company.

Chicago, Milwaukee & Puget Sound.—Kuhn, Loeb & Company, New York, have bought the Bellingham Bay & British Columbia, 55 miles, in the interests, it is understood, of the C. M. & P. S.

Denver & Rio Grande.—The directors have voted to issue $25,000,000 20-year adjustment mortgage 7 per cent. cumulative income bonds. Bankers have underwritten $10,000,000 of these bonds and stockholders are offered the privilege of subscribing at par. The bonds are callable at 115, but there is no provision for their conversion into stock or other securities. President Bush is quoted as saying that about $7,000,000 will be spent on the property in 1912. Shops will be enlarged at Denver and terminals will be enlarged at Pueblo, Salida, Minturn, Grand Junction and other points. About $1,800,000 will be spent at Soldier Summit, the continental divide. It is estimated that the work of rehabilitation will take until about 1915.

Jonesboro, Lake City & Eastern.—This company, operating through Eastern Arkansas, has recently bought the Wilson & Northern, extending about forty miles northwest from Memphis, Tenn. R. E. Lee Wilson, of Memphis, Tenn., was the owner of the Wilson & Northern.

Kansas City, Mexico & Orient.—Edward Dickinson, vice-president; J. O. Davidson, of Wichita, Kan., and M. L. Turner, of Oklahoma City, have been appointed receivers of the K. C. M. & O.

The Columbia Trust Company, New York, asks the deposit of bonds and stocks of the K. C. M. & O., of the Kansas City Outer Belt & Electric, the International Construction Company and the Union Construction Company with it, in view of the fact that a protective committee has been formed representing both English and American security holders' interests. The protective committee consists of Lord Monson, chairman; C. Braithwaite, Granville Farquhar, Frederick Hurdle, Harry Bronner, Willard V. King, L. F. Loree, H. P. McIntosh, T. P. Shonts, George A. Touche, M. F. Warfield and E. Davis Warfield.

See editorial comments on the receivership in another column.

Lake Shore & Michigan Southern.—See Pittsburgh & Lake Erie.

Missouri Pacific.—J. M. Metcalf and Jay Gould have been elected directors, succeeding H. I. Miller and B. F. Edwards, resigned.

New York Central & Hudson River.—This company has applied to the New York Public Service Commission, Second district (up state), for permission to buy the stock of the Rome, Watertown & Ogdensburg at $128 per share, and has asked permission to buy the outstanding stock of the Utica & Black River at $180 per share. The R. W. & O. has $10,000,000 stock outstanding, of which the New York Central, at last reports, did not own any. The Central leases the road, pays its interest charges and taxes and 5 per cent. on the stock. The R. W. & O.'s funded debt amounts to $10,775,000. The Utica & Black River has $2,223,000 stock outstanding, of which $1,120,000 is owned by the R. W. & O., and is leased to the R. W. & O., which pays interest charges and taxes and 17 per cent. on the stock. The R. W. & O. also leases the Carthage, Watertown & Sackett's Harbor, the Niagara Falls Branch Railroad and the Oswego & Rome Railroad.

To finance its proposed purchases, the New York Central & Hudson River asks the commission to approve of the sale of $16,667,000 4 per cent. debentures of 1912-1942 at not less than 90; or, as an alternative, the sale of $15,000,000 4½ per cent. 3-year notes at not less than 98½.

See also Pittsburgh & Lake Erie.

Pennsylvania Company.—This company has sold to the Union Trust Company of Pittsburgh $10,000,000 series E Pennsylvania Company 4 per cent. collateral trust bonds. The bonds are guaranteed by the Pennsylvania Railroad and are secured by an equal amount par value of Pittsburgh, Fort Wayne & Chicago guaranteed special 7 per cent. stock. The bankers are offering the certificates at 97½, yielding about 4.12 per cent. income on investments.

Pittsburgh & Lake Erie.—This company and the Lake Shore & Michigan Southern have made a joint offer to buy the $3,959,650 outstanding stock of the Pittsburgh, McKeesport & Youghiogheny. The price offered is $65 per $50 share. The road is leased to the P. & L. E. for 6 per cent. on its stock, which 6 per cent. is guaranteed by the Lake Shore & Michigan Southern.

Pittsburgh, McKeesport & Youghiogheny.—See Pittsburg & Lake Erie.

Portland Terminal.—This company has voted to increase its capital stock from $500,000 to $1,000,000. The company is controlled by the Boston & Maine and Maine Central.

St. Louis Southwestern.—The Guaranty Trust Company of New York is offering a block of Stephenville North & South Texas first mortgage 5 per cent. bonds of 1910-1940 at 97½.

Toledo, St. Louis & New Orleans.—Stockholders have voted to sell that part of the road from Effingham, Ill., to Carmi, with a branch line from Clay City to Benton, to the Chicago, Paducah & Thebes Railway, and that part of its line from Carmi to Brookport to the Gulf Lines Connecting Railroad.

FOREIGN RAILWAY NOTES.

An important railway, soon to be built, will run from Tupiza, Bolivia, to La Quiaca on the Argentine frontier, there to connect with the Argentine Central, now in operation, and thus establish a direct service from La Paz to Buenos Aires, Argentina. It is estimated that the Tupiza-La Quiaca line will be completed within two years.

A railway is proposed in New South Wales from Wyalong to Hillston via Rankin's Springs, and another from Ryalong via Ungarie to Lake Cudgellico. The Rankin's Springs route will be 110 miles long and it is estimated it would cost $1,758,675, or $15,935 per mile of 60-lb. rail. The ruling grade would be 1 per cent., and the sharpest curve would have a 440-yd. radius. The Lake Cudgellico route would be 125 miles long, and it is estimated that it would cost $2,176,835, or $17,400 per mile.

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At 9:30 o'clock, the hour for the meeting of the Railway Signal Association to begin yesterday morning, it looked as if the claims of the advocates of Chicago as the permanent location of the annual meeting were not founded on facts, especially as to the probability of securing a greater average attendance in Chicago than anywhere else. There were less than a score of members in the room, and not many more a half hour later. But they came in so rapidly in the next hour or so that at 11 o'clock the attendance was fully up to the standard of the average Chicago meeting, and by noon the room was well filled. It is to be regretted, however, that more careful attention was not paid to the opening hour, for some of the members missed parts of the discussions in which they were interested, and by their absence prevented the committees which reported during the first hour or so from profiting by the suggestions and opinions of a representative number of those who will pass upon the final reports.

A circular accompanying the advance notice of yesterday's meeting announced the publication, on or about June 15, next, of the Railway Signal Association's manual of recommended practice, on which the committees have been working for some time. The form in which it is to be put out is designed for the greatest convenience in practical use, and in keeping the manual up to date by the insertion of the new recommendations as fast as they are approved. The manual will fill a long-felt want. One of the reasons, perhaps, why the R. S. A. standards have not been more rapidly adopted by signal departments has been the difficulty of referring to them. It is true that it isn't much of a task to look them up in the Journal, or keep a list of them in the office. But some departments don't keep their journals complete, and lists get lost; and it is then just enough of a task to find the standards to prevent their being looked up, especially if an easier way is at hand, such, for example, as a catalogue number. The manual is also going to be of considerable value to the association itself in the way of helping the members to form an idea of the work in the aggregate. This is the first time the association's work has been gathered together, and it will undoubtedly be a pleasant surprise to many members to see how much of it there is and how

well it has been done. If the manual is considered as representative of signaling practice, as it will be considered, some weak places will undoubtedly be found, and some standards will appear in their true light as unimportant parts of the ensemble, however valuable they may be in certain specific applications. Seeing the standards in perspective will show better than a study of them separately how substantial a basis has been formed for future work, and what will have to be done to make the whole structure what it should be. The manual is, in a word, a decisive step in the progress toward the time when signal departments can and will universally specify "R. S. A."

The committee on Definitions promises a complete report at the June meeting. Its work has been sub-divided, and the report will cover four kinds of definitions, namely: (1) those of words, terms and phrases peculiar to and used in signaling which have not previously been defined by the association; (2) those of words, terms and phrases which have been adapted to signaling from other lines of work, such, for example, as those employed in connection with the use of alternating current; (3) those of certain words, terms and phrases which have been either improperly defined or improperly applied; and (4) a complete list of the definitions available from these and other sources which can properly be included in the Signal Dictionary. In taking up the work along these broad lines, the committee has evidently put a liberal interpretation on its instructions to prepare definitions for technical terms connected with signaling, with particular reference to terms "which discussions show are not properly defined." But if the intention was to limit its corrective efforts to such definitions as have been formally adopted, the committee would not have much to do, for the Signal Association has not approved very many definitions to date. So, the liberal interpretation would seem to be the proper one. Definitions are based on meanings, and meanings are governed by use. Most technical terms may be considered, therefore, as already defined in a general way by their commonly accepted application. But a good many of them are not correctly used, and thus are "not properly defined." Signaling has borrowed a number of words from allied lines of work; and where it could not borrow has had to invent both new words and new meanings for old ones. Some of the borrowed words have proper applications; others have not. Some of the coined phrases are expressive, and some are arbitrary. Some of the old words fit nicely into their new uses, but others are wrongly applied, a notorious example being the term "failure." The committee's report covering all of these matters is sure to be interesting and, if the discussions following its presentation shall lead to a more satisfactory use of words in signaling, the work incident to the committee's liberal interpretation of its instructions will have proved worth while.

MANUAL BLOCK.

The substitution of the space interval for the time interval is likely to proceed at a much more rapid rate in the near future than it has for many years. The Missouri Pacific's recent installation of 3,000 miles of manual block signaling is significant of the general attitude toward safer methods of operation. Federal legislation requiring the use of the space interval seems probable. A block signal bill is now pending in Congress. In one state, the use of the block system is already compulsory, and it is likely to be made so in others.

As a matter of fact, the extension of the block system, aside from the increase in the mileage protected by automatic signals, has not been very rapid during the last decade. One year even showed a decrease, though that was the result of the replacing of manual blocks with automatic, without an increase in the total mileage protected, and not of abandonment of the manual. Considerably more attention has been given to improving what was already in use rather than to extending it to a greater number of miles.

Under the spur of impending legislation and public opinion, however, and the necessity of avoiding repetitions of the unfortunate conditions which lately turned the attention of the public to the question of safety, the block system will undoubtedly be rapidly extended from now on. It is almost a case of "put it in now or be made to, later."

The adoption of the space-interval system on a large scale will probably mean the installation of some form of manual block on most of the mileage to be protected. Automatic signaling, though less costly now than formerly, especially in its applications to electric roads, is still too expensive for all lines. Thus, the manual block, as a subject for the Signal Association's attention, is likely soon to have a new interest, and before long may even be found at the head of the list of timely and important matters for committee work. Last year the committee on Manual Block failed to submit a report at the annual meeting. The start made this year under Mr. Steven's leadership is gratifying, and indicates that the final report will bring out some valuable information on a subject concerning which there has long been too little known. The investigation as to the relative advantages, safety and cost of the manual, controlled manual and staff systems, which the committee was instructed to make should prove especially interesting.

THE SIGNAL ASSOCIATION MEETING.

Contrary to the custom heretofore followed in Signal Association meetings, only such reports as were published in the advance notice were considered by the members. Those committees that were not represented in the notice were not mentioned specifically, the president calling on them only in a general way. This will spur up the dilatory committees, though it probably was not intended to have that effect, but to permit the committees which do have something to say to take full advantage of the limited time available in a one-day meeting.

Only two matters of much interest were developed by the discussions at the meetings yesterday. One of these was the proper form for presenting the values of operated units, and the other was the proper way to ventilate a relay. The first came out following the report of the special committee on contracts. The committee requested a tentative vote on several propositions relating to the form of the tables, the result being that the meeting favored a subdivision to cover manual and power plants and the including of both maintenance and construction in each. This makes two tables instead of one, but if the vote to shorten the list of units in the tables is put into effect the two can, it would seem, be used conveniently, though some complications may arise in connection with electro-mechanical plants.

The question of proper apportionment of expense at joint plants has been under consideration for a number of years. A settlement of it would help out many difficult situations, and probably go far toward obviating the necessity which some signal departments find occasionally for holding up the bills of another signal department until some minor questions as to the share of expense each shall bear can be argued between them to a satisfactory settlement. The committee will undoubtedly be able to profit by the tentative expressions of the opinions of the members, and the final report will probably more nearly meet the majority opinion. Here, as everywhere, the give-and-take spirit must be shown and an agreement reached between those who think the list should be shortened and the

few who think it ought to be still more specific and detailed.

The sub-committee on relay specifications stirred up a lot of discussion on the ventilation of relays, but nothing developed that will be of any value in completing the report. Several experiences were related, and a number of opinions expressed, but the actual facts are still to be ascertained by experiment and analysis of conditions. It was suggested that signalmen watch their instruments carefully and make note of time, place, and all attendant circumstances whenever they find a relay which shows the effects of the action of moisture. This affords a good way for the members to help the committee, and, though it will involve a little extra work, the results will be so beneficial that the expense and trouble will be well worth while. Where a subject is viewed in different lights by a considerable number and only one or two really have any definite knowledge an agreement will never be reached unless all concerned contribute to it. The suggestion should receive not only consideration but immediate and earnest attention.

PROGRAMME OF AMERICAN RAILWAY ENGINEERING ASSOCIATION CONVENTION.

The following is the programme for the thirteenth annual convention of the American Railway Engineering Association. The programme is subject to change by a two-thirds vote of the convention or by time required for consideration of reports:

Morning sessions, 9:00 a. m. to 12:30 p. m.
Afternoon sessions, 2:00 p. m. to 5:30 p. m.

FIRST DAY.—Tuesday, March 19.

President's Address.
Reports of Secretary and Treasurer.
Reports of Standing and Special Committees.

XII.	Rules and Organization	Bulletin 141
X.	Signals and Interlocking	Bulletin 141
	Minority Report on Signals and Interlocking	Bulletin 141
XV.	Iron and Steel Structures	Bulletin 141
VII.	Wooden Bridges and Trestles	Bulletin 141
XIV.	Yards and Terminals	Bulletin 141
II.	Ballast	Bulletin 141
III.	Ties	Bulletin 141

Adjournment at 4:00 p. m. to visit Railway Appliances Exhibition in the Coliseum.

SECOND DAY.—Wednesday, March 20.

V.	Track	Bulletin 142
I.	Roadway	Bulletin 142
IV.	Rail	Bulletins 143, 144
VIII.	Water Service	Bulletin 142
VIII.	Masonry	Bulletin 143
XIX.	Conservation of Natural Resources	Bulletin 143
XI.	Records and Accounts	Bulletin 143
XVIII.	Electricity	Bulletin 143

Annual dinner at 7:00 p. m.

THIRD DAY.—Thursday, March 21.

XVI.	Economics of Railway Location	Bulletin 144
IX.	Signs, Fences and Crossings	Bulletin 144
VI.	Buildings	Bulletin 144
Special.	Grading of Lumber	Bulletins 133, 144
XVII.	Wood Preservation	Bulletin 144
Special.	Uniform General Contract Forms	Bulletin 145

New Business.
Election and Installation of Officers.
Adjournment.

HOW TO GET TO THE ARMORY AND COLISEUM.

The National Railway Appliances Association has provided four big stage-automobiles for the convenience of railway officials who wish to visit the Armory and Coliseum. These machines will operate on a schedule of about seven minutes headway between the Congress Hotel and the Armory, and are available throughout the day to all members of either the American Railway Engineering Association or the Railway Signal Association. Each car will carry a blue pennant with the letters "N. R. A. A." in white.

ANNUAL MEETING OF THE NATIONAL RAILWAY APPLIANCES ASSOCIATION.

The annual meeting of the National Railway Appliances Association will be held at the Coliseum to-day (Tuesday) at 11 o'clock a. m. in the room at the south end of the building, directly over the Annex. Each exhibitor is entitled to one voting representative. The officers to be elected are president, vice-president, treasurer and six members of the executive committee.

THE SPEAKERS AT THE ANNUAL A. R. E. A. DINNER.

At the thirteenth annual dinner of the American Railway Engineering Association on Wednesday evening, March 20, the following will be the speakers:

L. F. Loree, president Delaware & Hudson and a past president of the American Railway Association; Hon. F. D. Monk, K. C., M. P., minister of public works of Canada; and Ray Morris, a director and formerly managing editor of the Railway Age Gazette. W. C. Cushing, president of the association, will be toastmaster.

The dinner will be held in the Gold room of the Congress hotel at 7 p. m., and will be followed by a smoker.

IMPORTANT POSITION FOR W. S. KINNEAR.

W. S. Kinnear, president of the Kansas City Terminal and one of the founders of the Engineering Association, has been elected president of the United States Realty & Trust Company, New York, effective May 1. This company, in addition to its banking business, owns a large amount of valuable New York real estate, including the Flatiron and other buildings owned by the Fuller Company, which is a subsidiary of the United States Realty & Trust Company. Before going to the Kansas City Terminal, about a year ago, Mr. Kinnear was in charge of the building of the Detroit River tunnel, having resigned as chief engineer of the Michigan Central to become president of the tunnel company.

MINNESOTA COMMISSION ENGINEER ATTENDING CONVENTIONS.

D. F. Jurgensen, chief engineer of the Minnesota railway commission, is here to attend the conventions of both the Railway Signal Association and the Railway Engineering Association. Mr. Jurgensen has been connected with the Minnesota commission for eight years, having been chief engineer since 1908.

CORNELL ALUMNI AT THE CONVENTION.

Cornell University alumni, in attendance at the convention of the American Railway Engineering Association, will be interested to learn that special provision for them to get together has been arranged for. Tables for Cornell men at the annual dinner on Wednesday night have been reserved,

tickets for which may be obtained by addressing H. C. Holloway, of the Rail Joint Company, Chicago. In addition, the Cornell Alumni Association of Chicago desires all Cornell men in attendance at the convention to join at luncheon on Thursday, at 1 o'clock, at the Grand Pacific Hotel. Addresses will be made by F. S. Porter, president; J. G. Sullivan, assistant chief engineer of the Canadian Pacific, representing the railways, and Mr. Halloway, representing the supply men. There are a large number of Cornell men expected to attend the convention, and it is earnestly urged that all make a special effort to be present.

WESTERN RAILWAY CLUB.

The regular monthly meeting of the Western Railway Club will be held on the eleventh floor of the Karpen Building, 900-910 South Michigan Boulevard, on Tuesday evening, at 8 o'clock p. m.

The paper for the evening will be on the subject of "Lubrication of Steam Engines," by Dr. P. H. Conradson, chief chemist, Galena-Signal Oil Company. Dr. Conradson will make practical demonstrations of the lubrication of superheater engines at this meeting. It is hoped that those in attendance at the convention will make special effort to attend the meeting, as the address of Dr. Conradson will be well worth the consideration of everyone.

EXTRA, 5:00 A. M.

Accompanied by Mr. First Robin and Mr. G. Hog, Miss Gentle Spring arrived this morning at the Congress. She said she had come via the Milky Way on a sled. She asked to be shown to her room immediately, as she feared to be abroad in the early morning, and, besides, she was a few hours ahead of her schedule. Timid and retiring, she requested that her early arrival be given no publicity. She did, however, authorize us to publish the following notice: that unless the certain lands, tenements, and hereditaments in which she has a life estate are surrendered to her by to-morrow noon she will start suit in ejectment against one Winter, one March Lion, one Willis L. Moore, et al. She is also contemplating a suit for damages against Father Time and the calendar makers. However, Miss Spring will appear at the Coliseum to-morrow in time for lunch.

THE PERMANENT EXHIBIT IN THE KARPEN BUILDING.

The Permanent Manufacturer's Exhibit of Railway Supplies and Equipment on the twelfth floor of the Karpen building, 900 South Michigan boulevard, is having its formal opening this week. The management has spared no effort nor expense to provide a convenient and attractive place where exhibits of railway supplies may be maintained all the year round for the inspection of railway men on their visits to the city as well as for those who live in Chicago. The booth spaces are uniformly provided with handsome furniture and equipped with steam and electric power, lights, telephones, etc. A large assembly room and committee rooms are at the disposal of railway or supply organizations for their meetings and a club and excellent grill room are on the eleventh floor. A musical programme will be rendered daily this week. The second floor of the building has been set aside for a permanent exhibit of maintenance of way appliances.

F. D. Monk, K. C., M. P., minister of public works of Canada, who will be one of the speakers at the annual dinner of the engineering association on Wednesday evening, is expected to arrive in Chicago this evening. Mr. Monk will be accompanied by his daughter. It is expected that he will attend some of the sessions of the association.

Proceedings.

The stated meeting of the Railway Signal Association was called to order at 9:45 a. m. on Monday, March 18, in the Florentine room of the Congress Hotel, by the president, C. C. Anthony, assistant signal engineer of the Pennsylvania Railroad.

CONTRACTS.

The committee was instructed to (a) continue preparation of forms of contracts for joint interlocking plants; and (b) prepare table of arithmetical values of operated units.



L. R. CLAUSEN.

Chairman Special Committee on Contracts.

The committee submitted a preliminary statement of the relative value to be assigned to the various operated units at interlocking plants as follows:

	Manual Plant. Const.	Manual Plant. Maint.	Power Plant. Const.	Power Plant. Maint.
1. Each one-arm, two-position signal.	3.	1.	7.	1.
2. Each additional arm on same mast.	3.	1.	6.	1.
3. Each one-arm three-position signal.	3.	1.	8.	1.
4. Each additional arm on same mast.	3.	1.	6.	1.
5. Each additional fixed arm.....	.25	.10	.25	.1
6. Each fixed one-arm signal.....	1.00	.10	1.00	.1
7. Each two-position power signal on manual plant	8.	2.		
8. Each additional arm on same manual plant	7.	2.		
9. Each one-arm dwarf signal.....	2.	1.	5.	1.
10. Each additional arm on same mast.	2.	1.	4.	1.
11. Each single switch, two points, no levers, bars or locks.....	2.	1.	2.	1.
12. Each single switch and lever, two points; no bars or locks.....	4.	2.	6.	2.
13. Each derail and lever; no bars or locks	4.	2.	6.	2.
14. Each single slip switch and levers; four points; no bars or locks.	6.	5.	11.	5.
15. Each double slip switch and levers; eight points; no bars or locks.	10.	10.	14.	10.
16. Each set movable points, frogs and levers; four points; no bars or locks.....	6.	5.	8.	5.
17. Each detector bar alone; no lever.	0.5	1.	0.5	1.
18. Each switch and lock movement alone	1.00	1.		1.
19. Each facing point lock alone....	.50	1.		
20. Each detector bar on separate lever	3.5	2.	5.	2.
21. Each facing point lock on separate lever	3.5	2.	5.	2.
22. Each facing point lock, with one detector bar, one lever.....	4.	3.	5.5	3.
23. Each facing point lock, with two detector bars, one lever.....	4.5	4.	6.	4.

24. Each two facing point locks, with one detector bar, one lever....	4.5	4.	6.	4.
25. Each three facing point locks, with one detector bar, one lever.	5.	5.	6.	5.
26. Each torpedo placer, one lever...	4.	2.	6.	2.
27. Each drawbridge coupler, one lever	3.	2.	6.	2.
28. Each drawbridge rail surface and alignment; lock and lever.....	3.5	2.	6.	2.
29. Each drawbridge wedge and machinery; lock and lever.....	3.5	2.	6.	2.
30. Each cantilever bracket.....	.25	10	.25	.10
31. Each telephone circuit and phone.	.5	1.	.5	1.
32. Each switch indicator.....	2.	1.	2.	1.
33. Each outlying switch lock.....	2.	2.	2.	2.
34. Each time release—any kind.....	1.	.25	1.	.25
35. Each tower indicator and control.	1.	1.	1.	1.



C. C. ANTHONY, President.



B. H. MANN, Vice-President.

36. Each electric lever lock with control	2.	1.	2.	1.
37. Each D. C. track circuit, including joints, battery, relay.....	1.	1.	1.	1.
38. Each electric slot for manual signal and control.....	1.	1.		

The committee consists of L. R. Clausen (C. M. & St. P.), chairman; Geo. Boyce (C. St. P. M. & O.), C. A. Christofferson (N. P.), R. L. Davis (M. C.), R. L. Huntley (U. P.), J. B. Latimer (C. B. & Q.), E. B. Pry (P. L. W.), and L. S. Rose (C. C. C. & St. L.).

Discussion on Contracts.

Mr. Clausen: It would perhaps be desirable to have somewhere in our records some mention of the reason for the table of values of operating units. I believe there is nothing at the present time in our proceedings that will indicate why we are so desirous of obtaining such a table of values for maintenance and construction of interlocking plants. The practice regarding the apportionment expense of construction, maintenance and operation of joint interlocking plants has been either to divide this cost according to the number of roads involved, according to the cost of the material assigned to each company, or according to the number of levers in the plant assigned to each company. The first method, the division according to the number of roads, is fair when the same amount of material and apparatus on each road is involved in the joint plant. It is unfair when a different amount of material is involved, when there are, say, three times as many tracks interlocked on one road as on another. This division, according to the number of roads, makes no provision for enlargement of interlocking, and the adjustment according to the number of roads after an enlargement certainly would not be fair, if it were unfair previous to the enlargement. There is some question as to the fairness of dividing the expense for construction and maintenance according to the second method, even if the cost of material which is used on each of the companies' tracks should be equitably determined. It might be a proper and fair division for construction expense, but it would not necessarily be fair for maintenance. At the best such a method of determining expense is a rather rough estimate. It is impractical of determination when you come to enlargements of the interlocking plant. There is so much material that is joint, for use on both companies' lines, that it is a very hard matter to try to divide it up among the separate companies. The amount of time, as well as trouble, involved, is serious. I remember a case when the time and trouble was of such an extent that the interest on the money involved in an enlargement of an interlocking plant was more than the entire maintenance expense of the first year; that is, it took so long to determine what the proper division of maintenance would be that the interest on the many bills held up amounted to more than the entire maintenance of the plant for the first year; and of course the road that made the enlargement was out the interest. The third method, the number of levers, is fair when the same methods of construction are used on the several companies' tracks. It is unfair if there is a different method of construction used on each company's tracks. It would be very easy for one to imagine an interlocking plant where the cost of the equipment on one road's tracks would be twice that on another road's

tracks, and the cost of maintenance might be three times that on another road's tracks, with the same number of levers. This method, though, has an advantage, that it takes care of the enlargements of the plant, and it has been used in a large number of cases with very fair satisfaction. There has recently been felt a need for some other basis of division of expense of construction and maintenance which would more nearly represent the actual cost of installation and maintenance.

The committee on Signaling and Interlocking of the American Railway Engineering Association included in its report three years ago a table of operated unit values. This table was reasonably complete and reasonably fair. It provided for enlargements, and it has been written into quite a large number of contracts. There seems now to be a feeling that this table of operated unit values is not entirely complete, as it ought to be, and not entirely fair; also that it is not sufficiently up to date to cover the recent progress in signal construction. This committee is now asked to submit a revised table of values of units, and we have submitted at this meeting such a table.

The committee, in investigating this matter, finds that in order to comply entirely with the wishes of the members who have expressed themselves, one table of operated unit values will not cover both manual and power plants. It will not cover both construction and maintenance; that is, if we try to make the fine distinctions that some members have expressed themselves as desiring.

The committee asks discussion as to whether the division between manual and power plants is necessary; as to whether a division between construction and maintenance is necessary, and as to whether this list is too elaborate. We feel that the table which we have submitted is rather elaborate and perhaps more than required. It is perhaps true that any table on operated unit values which comes within the bounds of reason is fair between roads which have a large number of joint plants, because the thing that operates against one road at one plant will operate against the other road at another plant. Also, almost any table which will come within the bounds of reason will be fair as between two companies, when you consider a long period of years, and the committee would like to have the members consider those points in discussing this matter.

C. E. Denney (L. S. & M. S.): I would like the chairman to say what was taken as a basis for the value of one, assuming that this must be figured out on the basis of dollars and cents. I assume this must have been figured out in that way, or they could not have found that a fixed one-arm signal has a value of one and a one-arm two-position signal have a value of three for construction, and the maintenance of the one-arm fixed signal is only one-tenth of that of the operative two-position signal, although the fixed signal has a light.

Mr. Clausen: This table was not made up on the basis of dollars and cents. The committee expected to secure some information from outside sources as to the actual value in dollars and cents of the various units that are enumerated here, but we did not get that information in time. This table was made up from previous tables and from the experience of the signal engineers who form the committee.

L. R. Mann (Mo. Pac.): It does not seem right to me that a one-arm three-position signal is three and a one-arm two-position signal is the same, all through the table. It appears that a two-arm two-position signal and a one-arm three-position signal should be of about equal value.

F. P. Patenall (B. & O.): I think, if the chairman can in any way enlighten us as to the basis on which this thing has been prepared, it would be of interest.

Mr. Clausen: The fixed one-arm signal is given the value of one, and everything else is relative to that. It is immaterial what the basis is as long as you make the figures relative.

W. H. Elliott (N. Y. C. & H. R.): It seems to me the values for construction might properly be based on cost. A division on a cost basis or a material basis, would, I believe, be a fair one. Mr. Clausen, in his introductory speech, brought out strongly the fact that the committee believes that a division on a cost basis would be fairer than one on an arbitrary assumption of values for given units. I have found the plan of dividing expense between roads for joint interlocking on a basis of cost of material to be very satisfactory. It eliminates a good many questions as to the distance of functions or the manner in which the various units are connected to and controlled by levers. With a division on the cost basis it would seem that there is no necessity for a table giving units for construction purposes, because the number of units assigned to a given road would be immaterial. I believe that a division on a cost basis is a fairer proposition for maintenance expense, particularly where a plant is now or where there is to be a division with a given plant. Personally, I would favor an arbitrary unit basis, such as is proposed by the table only at those plants where a division has not been agreed upon formally or a plant is in service, and the value of the parts might be in question. In such cases a unit basis might be readily applicable, the same as a lever basis, but I believe any such data would be merely an assumption. This table, to my knowledge, is the fifth or sixth one that the various committees of representative bodies have prepared, and on checking them I find that they vary 100 to 200 per cent in the values assigned to various units.

Mr. Denney: I think we can determine both questions: whether or not we need two function tables, and what the function table should be, only if the committee will secure, from as large a number of roads as they can, figures showing how this would work out in their standard practice; in other words, how much money they think would be charged on the basis of plants installed for each one of the items shown. If then the relative values of the power and the mechanical plants develop to be about the same, one table is certainly advisable if it appears fair. I do not believe in going into too much detail in dividing the plant. For example, a number of roads have agreed recently on tables that are approximately the same, that do not show charges, as this proposed table does, for a tower indicator signal. They do show charges for a two-position signal, a three-position signal, an automatic two-position signal, and an automatic three-position signal.

Mr. Clausen: The signal engineers forming the committee had considerable information as to the cost of installing various units, and that information was used in making up the table covering construction. There was certain outside information which we expected to get before this meeting, which was to be exact, but which has not been received. The table covering maintenance is the result of experience of the signal engineers forming the committee and on the information they have received elsewhere. I, perhaps, did not make clear in my opening remarks that the committee favors a table of unit values rather than a cost of material basis. Mr. Elliott did not understand, evidently, what I did say. The committee feels that the table presented is a much fairer division, both for construction and maintenance, than a cost of material basis for either of those purposes. The reason for that is that it will cost more money to determine what the basis should be if you use the cost of material, than the maintenance of the plant would probably be for two or three months. How are you going to divide the cost of labor of a man that works half an hour on one line and half an hour on another line? How are you going to divide the cost of a common wire used for both lines? How are you going to divide the cost of the stove that heats the interlocking plant? There are a thousand and one items of that character that cannot be divided except on an arbitrary basis, and when you get through you are as far from the correct solution as if you used a table of this kind.

W. H. Arkenburgh (C. R. I. & P.): I think the joint items spoken of by Mr. Clausen could be very easily settled by leaving them out and dividing them afterward on the basis of the other material which is not joint. Furthermore, I believe the maintenance could be handled better on the cost of material basis, with, for example, a wheelage basis. I do not believe it is fair to charge a road maintenance and operation on a certain fixed ratio based on the cost of the plant or the number of units in it when they have, say, only one-tenth the number of trains the other road has.

Mr. Stevens: The great question is whether we are going to make any money. If we are going to spend $20 or $30 to get this information, or possibly $50 or $100, as I know has been spent in one case, we must cover the charge in our operating expenses of determining these very minute values, as to whether we have every pin charged in the bill against the other company. Now, about construction and maintenance, I take it the majority of joint plants are crossing plants. It does not matter whether one railway has an extensive installation and another one has a very slight installation. Each one is interested in the protection of that crossing. To a very great extent the whole plant is joint. Mr. Clausen said that this thing evens up when two roads have a lot of joint plants. That is true. We have made test cases two or three times and found that in 40 or 45 plants, taking their different bases of division of cost, there was not $2,000 difference in the whole bill that would have been paid by one railway. The same is true of another series of plants that I am interested in where a test case of the same kind was made.

J. A. Beaumont (C. G. W.): I agree with Mr. Stevens that the table of operated unit values is the best as the basis for

distribution of the cost, both for construction and maintenance. I would like to suggest to the chairman, however, that they carry the table further to show the basis for operation charges. How is that taken care of in the maintenance charge? We have a charge for construction, a charge for maintenance, and naturally we have to distribute the operating charge.

Mr. Clausen: The committee has not attempted to take care of operating charges. With regard to the question of obtaining information as to the cost of material, I know of a case where a company, in making an enlargement to a mechanical plant, was put to an expense of nearly $1,400 trying to determine what material was used on the various lines. Nine hundred dollars of that was interest, waiting for the bills to be paid. If an interlocking plant was composed of four or five, or eight or ten different kinds of material, and no more, I would be perfectly willing to go into the cost of material basis; but you have probably eight or ten thousand different kinds of material in an interlocking plant, and it is wholly impracticable to try to find out the cost of those various items which are assignable to each company.

Mr. Mann: Several years ago Mr. Balliet appointed several committees to handle this subject. Their reports were taken into the association records. The criticism at that time was that those reports were too complicated; so a harmonizing committee was asked to simplify it. It, of course, was very flattering to those committees to find that the harmonizing committee worked the other way; but, at the same time, I would hesitate to incorporate in a contract for joint facilities this very complicated table. I believe the committee ought to look very strongly to the question of cost. The cost of each of these items should be figured out, and if the costs are reasonably close we ought to have not more than 15 items instead of 38. I know of railways which have, for the sake of simplicity, incorporated each of these tables in every contract of joint facility. I believe this is too much.

J. C. Mock (M. C.): Assuming that the report will be adopted as submitted, on the basis of unit values, I believe the table should be very complete and that it should have two lines, one for manual plants and one for power plants, for the reason that we have plants called electro-mechanical. In that case we would have both the mechanical unit and the power unit. I see no reason why each contract should include every item, but this table shall stand as a complete table, and when making the contract for any particular plant such of the unit values as exist at this plant may be taken from this table.

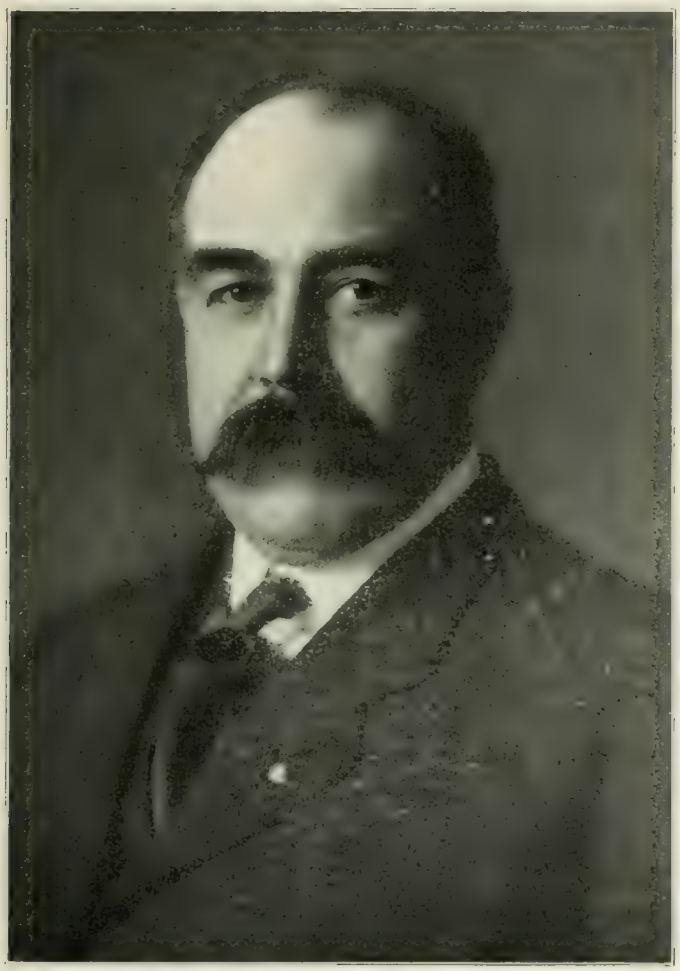
Mr. Denney: I would like to call attention to one charge and ask the committee to give it further consideration. The maintenance charge for one-arm two-position signal, regardless of where it may be, and whether it is a high signal or a low signal, is one, and the charge for the fixed one-arm signal is one-tenth of one. In other words, for a fixed distant signal with a lamp on it, 2,000 feet from a tower, the maintenance charge would be one-tenth of that for a dwarf signal close to the tower. For my information and for the information of the committee, I am going to compare this table with some function tables which we have been using. I don't think many of us are in a position to say whether these values are correct or incorrect.

Mr. Clausen: If Mr. Denney will look a little lower down he will find an item covering dwarf signals, which we call low signals. The lamp does not enter into this problem at all. That is an operating charge.

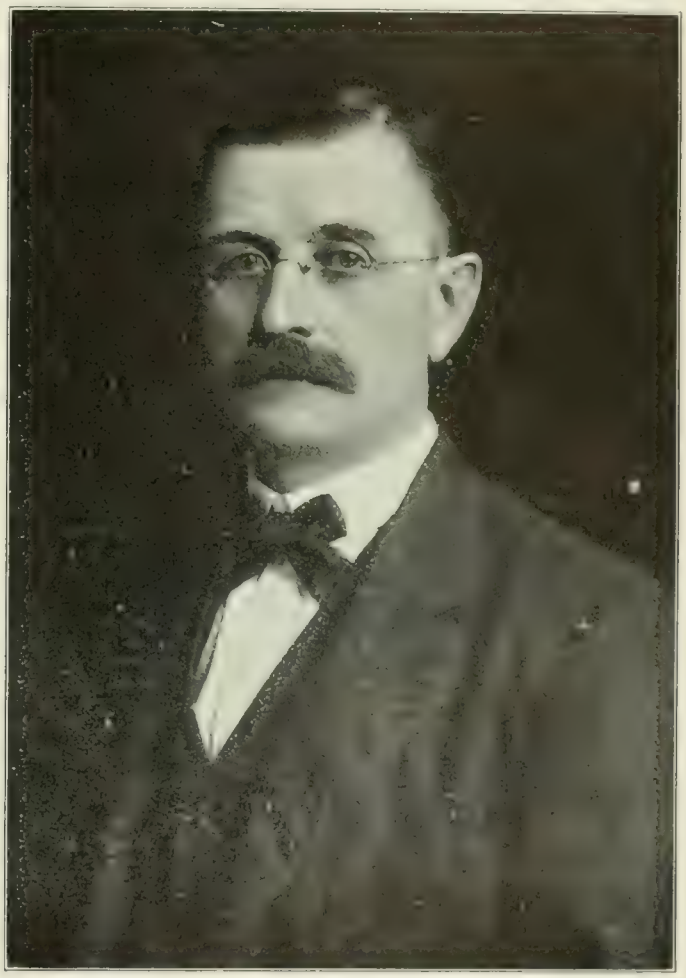
Mr. Mock: Did I understand the chairman of the committee to say that this table did not bear any relation to cost, or just approximate cost?

Mr. Clausen: The table is based on approximate cost. We think it entirely impracticable to draw up a table based on exact cost, as Mr. Denney requests. Of course it is wholly improbable that the cost of installing a derail at one place is the same as the cost of installing a derail at another place. Unless the divisions are exactly the same the costs would be different. Therefore, any table made up on approximate costs is as good as one drawn up on exact costs for any particular plant.

Mr. Denney: There are certain charges in the plant which are really operating charges that ought to be divided on the same basis as the apparatus which is being maintained, for



F. P. PATENALL, Vice-President.



C. C. ROSENBERG, Secretary.

example, lubrication and the care of lamps. An entirely different division is made in a great many cases, and the division of salaries of the levermen, which is an operating charge, is probably determined by some older agreement. So there must be a basis for dividing the operating charges, such as lubrication and the care of lamps, which will probably be the same as the basis for maintenance.

President Anthony: It might be well for the committee to consider that later, to determine what operating charges should or would be divided on substantially the same basis as maintenance.

Mr. Clausen: The committee has not attempted to cover operating charges by this table of operating units. No table that has been drawn up to date has attempted to do that. It is wholly out of the question to assign a value to a fixed distant signal, for example, which will fairly represent the maintenance cost, and at the same time have that value fairly represent the operating cost.

Mr. Shaver: I would ask the chairman to state, if he will, the reason for the large difference between the values assigned to construction and maintenance in the manual plant as compared with the mechanical plant.

Mr. Clausen: The reason for the large difference between the construction and maintenance of the one-arm two-position signal, in line one, for example, is that the fixed one-arm signal is taken as the basis of one for the construction cost and the one-arm two-position signal is taken as the basis of one for the maintenance cost.

Mr. Stevens: I move that one table be used to cover both construction and maintenance for manual plants and power plants.

Mr. Denney: Mr. Clausen asked us if there should be two tables. I would ask him to say why the committee has presented two tables.

Mr. Clausen: Because of the voluminous kicks we have heard at various times from certain engineers to the effect that they have received the worst of it at some particular plant. In order to compile a table which would be large enough to cover all the various points which may be met from time to time, we present this elaborate table. The question is whether that is too elaborate.

Mr. Shaver: I want to call attention to the fact that the operaing expense cannot be separated from the maintenance expense wholly. We do not want to have to keep separate accounts for small plants or large ones if we can aovid it. It is, therefore, desirable to have a basis on which the operating expense can be divided the same as the maintenance expense. I know a number of cases where the operating expense, such as oil and battery supplies, are divided on the same basis as the maintenance charge. Now, if we have to attempt to keep these separate, our accountants would never know where they stood. They are not signal engineers and they must have some basis on which they can simplify the work. In regard to an elaborate table with a distinction between a manual plant and power plant, I think it is desirable. It is a fact that the cost of construction and maintenance which might answer for a manual plant will not answer for a power plant. Furthermore, each year as we have progressed in signaling there have been more details which we have to consider, and I think, therefore, that the committee has done pretty well in covering this matter as they have.

Mr. Beaumont: I second Mr. Stevens' motion.

Mr. Denney: So far as I can see, the maintenance distribution is the same for every plant, so that we have four tables which might be condensed into three tables.

Mr. Mock: I feel that that motion ought not to carry, for the reason that this table ought to be a very complete guide, for a man who wishes to make a contract for a particular plant, to enable him to pick out the things that apply and are proper for that contract. If we combine these two we do not give the information that frequently would be wanted. I am not prepared to discuss the correctness or incorrectness of the relative values as published. I assume this committee will determine that by further investigation, and if it happens that the maintenance of the power plant is in all cases the same as the manual plant, then I think they can be combined, but where it does differ, both columns are needed, and I do not believe it is quite practical to include operation unless you assume ownership and a few things like that. So I am in favor of quite a detailed list, based upon cost of construction, as far as practicable.

Mr. Stevens' motion was withdrawn.

Mr. Clausen: The committee would like to have a vote on three motions: First, as to whether it is necessary to have two tables, one for manual plants and one for power plants; second, as to whether there should be two tables, one for construction and one for maintenance; and third, as to whether this table is too elaborate or not.

B. H. Mann (Mo. Pac.): I hope that Mr. Stevens' motion will be put as it was made, and not defeated. We must have one table to go into the contract, because we do not know the details of the plant complete, in any case which we may have in mind, and we want to have the matter in the most simple form possible.

Mr. Denney: Will the chairman of the committee say if their investigations show that two tables are advisable, or whether the two tables are presented because there seems to be a feeling that some people want two tables?

Mr. Clausen: As was explained some time ago, the table is the result of trying to cover the various complaints registered by those who felt they were getting a deal that was not exactly square at some particular place. That is why we provided two tables, one for the manual plant and one for the power plant, because there has been a very vigorous protest against trying to divide up the construction and maintenance of the power plant on the same basis as the manual plant. We would like an expression of opinion, which we have not yet received, as to whether two tables are necessary.

The President: This discussion has been pretty thorough, and it seems to me that at the request of the chairman it would be entirely proper to take the tentative votes suggested merely for the guidance of the committee. I will ask the active members who are in favor of having separate tables for manual and power plants to rise.

(Twenty-six members voted in the affirmative, and 15 members voted in the negative.)

Those who favor separate tables for construction and maintenance, believing that the values of some items should be different, will please rise.

(Fourteen members voted in the affirmative and 30 members voted in the negative.)

The third question is as to the length of the table. The point is to get the general expression of opinion as to whether the table should be quite full of details or whether it should be condensed as much as posisble, with only a few items. Those who favor the longer table will rise.

(Nine members voted in the affirmative and 27 members voted in the negative.)

Mr. Denney: The question as to whether the table should be longer as shorter would probably not come in the first 25 items relating to s[illegible]rlocking. There is always some question as to how many specials should be put in.

Mr. Mock: I suggest a vote be taken on whether or not the association desires a complete table, one that will set forth conditions which will obtain at every point.

The President: Obviously the association table should be complete to cover all plants.

Mr. Shaver: It looks to me as if this committee had given this question considerable study and had covered the ground pretty well. There is no doubt in my mind they have covered all the details necessary. The members should bear in mind, however, that we have combinations of mechanical and power interlocking, some use switch and lock movements, without bars, others facing point locks with bars, with electric locks, etc. In some places there are automatic block signals through the plant, whose use in the future will be greatly extended. This table should cover in detail everything that is going to exist in a situation of this kind.

Mr. Denney: I move that it is the sense of this meeting that the divisions 1 to 25 are necessary. It is the understanding, while they may be revised, practically the same information should be shown in the table providing the straight interlocking.

(Three members voted in the affirmative and six members voted in the negative on the forgoing proposition.)

PROGRESS OF WORK ON THE MANUAL.

Mr. Eck reported that the committee of the Board of Direction having in charge the preparation of the manual of the Railway Signal Association has had a number of meetings and has the matter in such shape now that it can reasonably promise the issuing of this manual about the 15th of June, or the 1st of July. This manual will consist of all of the specifications of the association which have been approved by letter ballot, all of the typical circuits, all of the standard drawings, and the other matters which have been approved by the association, which, in the opinion of the Board of Direction are of sufficient importance to be included in such a publication.

The manual will be issued in loose leaf form so that it may be kept continually up to date. The binder will be of heavy green canvas so that it will stand a very large amount of wear and be uniform with the other bound volumes of the association, being the same size, and two inches thick, so that it will hold something like 600 pages. At the present

time we assume there will be 425 pages in this manual. The specifications will be printed on both sides of the sheet and all of the drawings and standard designs will be printed on but one side of the sheet. This will make it very convenient for any one who wishes to take any one of the drawings for the purpose of tracing, or anything else.

The manual will be very easy to keep up to date, because new pages can be easily inserted in the binder. We expect to have a portion of the work done and some of the binders on exhibition at the annual meeting. The quality of the paper will be very much better than is ordinarily used in the proceedings, and will stand considerable wear. The cost of the binder to members of the association and manufacturing concerns closely affiliated with the association will be $4, which is practically the net cost to the association.

All of the specifications will be consolidated; that is, the material which has been adopted at the various annual meetings will be brought together and the specifications harmonized so that you will know when you get this manual that you have the very latest practice of the association in reference to every one of the specifications. The association has gone to considerable expense and the members of the manual committee and others have devoted a very large amount of time to this work and it is hoped that every one who can will give the secretary an order for one or more of these volumes. At present we have orders for 250.

The Secretary: I would like to add that there seems to be a question as to how these manuals are to be procured. Some of the signal engineers have taken this matter up with their respective railways asking them to make a purchase. Already a number of orders have been received from the purchasing departments of the railways for these volumes. Signal engineers and others who are interested in securing a copy of the manual might take this matter up with their purchasing departments.

POWER INTERLOCKING.

The committee was instructed to (a) prepare specifications for apparatus and materials used in power interlocking construction; (b) continue investigation of a device or arrangement that will provide protection equivalent to that afforded by the bolt-lock in mechanical interlocking; (c) continue the preparation of typical circuit plans for electric interlocking; (d) prepare plans of wire ducts and terminal boxes; (e) prepare specifications for protection of drawbridges by power interlocking; (f) investigate the use of "battery" indication on semi-automatic, power-operated signals; and (g) to report on a classification of voltage ranges for signal wark, to be prepared by the chairman of this committee and the committees on Automatic Block and on Electric Railway and Alternating Current Signaling. (This committee was asked to have some of its continued work ready for discussion at the March meeting.)

Sub-committee E submitted a progress report offering a number of changes in the specifications for electro-pneumatic interlocking, as printed in Vol. 14, No. 4, of the journal. These changes were in connection with clause 3, drawings; clause 340, detector bars, general; and clause 20, general electric requirements.

The committee consists of B. H. Mann (M. P.), chairman; R. C. Johnson (N. Y. C. & H. R.), vice-chairman; Burt Anderson (A. T. & S. F.), W. H. Arkenburgh (C. R. I. & P.), E. J. Clark (P. R. R.), M. H. Collins (H. & M.), J. R. Decker (M. C.), A. B. Du Bray (Frisco), J. D. Elder (K. C. T.), G. B. Gray (P. R. R.), W. H. Harland (N. Y. O. & W.), H. H. Harman (B. & L. E.), W. N. Manuel (G. R. & I.), G. A. Motry (B. & O.), H. H. Orr (C. & E. I.), W. M. Post (P. R. R.), I. S. Raymer (P. & L. E.), D. W. Rossell (N. Y. C. & H. R.), O. R. Unger (M. P.), F. B. Wiegand (L. S. & M. S.), and G. A. Ziehlke (U. P.).

Discussion on Power Interlocking.

Mr. Johnson: Sub-Committee E has considered a number of changes in the recommended specifications which has been suggested by the Board of Direction or by the chairman of the committee. Three changes are submitted at the present time.

The first relates to clause three, drawings. In this clause the three drawings or exhibits, B, C and D, were omitted from the specifications. After consideration the committee decided to insert these three exhibits. They are the same as in the mechanical and electro-pneumatic specifications.

The second amendment is in clause 340, relating to detector bars, general. The specifications as they were submitted at the Colorado Springs meeting called for detector bars 55 ft. long. It was decided at that meeting that the length of the bar be omitted and the space for the insertion of the length be left blank. The instructions to the committee were to consider this matter further and it is now desired to substitute the following paragraph (b): (b) Detector bar shall be not less than eighteen (18) inches longer than the inside wheel base of the maximum equipment run over the road and shall be arranged to give continuous protection for all switches, derails, movable wing frogs and moveable point frogs.

The third amendment relates to clause 20, general electric requirements. There was considerable objection to the 3000 volt tests on electric apparatus in connection with electro-pneumatic interlocking and we were instructed to consider this. We have had the matter up with the manufacturers of electro-pneumatic interlocking and decided to reduce the requirements to 2000 volts.

Mr. Shaver: With regard to clause 340, it does not seem to be practicable to state the requirements in that way. We ought to give it in the number of feet. If we are going to contract for a job of that kind, we certainly are not going to let the contractor look all over the road to find the car with the greatest space between the wheels, and I think it should be exactly stated what it should be. It is not going to be a hard ship on any railway to take the maximum requirements.

Then, with regard to clause 20—the Sub-committee on Relay Specifications, I think, has discussed this on the basis of using 5000 volts. It seems to me that whatever is used for one test should be used for the other. If at all possible we should have one established voltage for testing the coils and other electric apparatus.

The President: Would not the proper course be to leave the specification blank as to length, and provide a foot note suggesting the association's opinion as to how the length may be determined by each railway?

Mr. Stevens: That will save changing the standard of the association every year or so, as the equipment increases in length.

Mr. Arkenburgh: Sub-Committe A has also had that in consideration and reached the same conclusion as this sub-committee, except that they state the minimum length must not be less than 55 feet.

Mr. Johnson: There are a number of roads whose equipment is such that 55 ft. would be excessive.

W. H. Elliott: I am rather not in favor of putting any note of the kind suggested in the association specification, because I believe if a minimum length of bar should be decided on it might put some of the roads in a bad position, and it would discredit the road in case of an accident, if by any possibility the detector bar should be the cause of the accident. We have been using a 50-ft. detector bar as a standard for a long time. Switches facing each other in a single track have been spaced 50 ft. apart, and to use a 55-ft. detector bar would practically mean the rebuilding of 75 per cent of the switch layouts of the railway. For that reason, we would be very loath to adopt or to use as a standard a 55-ft. detector bar. It would seem wiser to leave it to the individual roads to determine what length of bar each will use and leave out any such foot note.

Mr. Denney: I move that it is the sense of this meeting that the length of detector bars in all specifications referring to detector bars shall be left blank, with no qualifying note.

Mr. Shaver: It seems to me this will add to the complications. I think it is quite necessary to state the length of the detector bar to be used; either minimum or maximum, or some dimensions as a guide.

Furthermore, there is the question of buying detector bar material, getting it the proper length, so that there will be a minimum amount of waste.

It seems to me that this association with the information it has can very well state in a foot note what it believes to be a good length of detector bar. There is no reason why, if one road in this country requires 100-ft. detector bars, all the roads in the country should use 100-ft. detector bars. You can, however, say that good practice is a bar of a certain length. In some of our specifications we have recommended a coil of a certain resistance. We have left the space blank, in the body of the specification, but stated in a foot note that a 500-ohm coil is considered good practice. I think we can do the same thing in regard to this specification.

C. J. Kelloway: The Committee on Mechanical Interlocking has given this question considerable thought, and we do not recommend any specific length for detector bars, but recommend that detector bars shall be arranged to give —— feet of continuous protection for all switches, derails, movable wing frogs and movable point frogs. We do not men-

tion any specific length. Some roads will require bars of longer or shorter lengths. If all bars are made up in 19-ft. sections it will be an easy matter to install bars varying from 38 to 57 feet in length and if bars of intermediate lengths are required one section may be cut to the required length.

The President: It is moved that the length shall be left blank, and no note inserted to show how the length shall be arrived at or what length is recommended.

(Thirty-eight members voted in the affirmative and 5 members voted in the negative.)

Mr. Johnson: Mr. Shaver in commenting on the changes proposed said he thought that 5,000 volts should be required for testing all magnets. The reason for making the change from 3,000 to 2,000 was that one of the manufacturers of electro-pneumatic interlocking plants claimed that it would cause them to redesign a considerable part of their apparatus, and in view of the fact that electro-pneumatic interlocking has not suffered heretofore on account of requiring a test voltage lower than 3,000 volts, the committee thought it was entirely proper to call for only 2,000 volts

Mr. Shaver: If we can arrive at one standard voltage for tests of this kind, it will simplify the question a great deal. If, however, it seems necessary to have a 3,000 or 5,000-volt test on a relay and only 2,000 on an electro-magnet or electro-pneumatic interlocking plant, I presume we will have to let it go at that. It does seem as though we should be able to work that thing out on a uniform basis. I did not mean to criticise the 2,000 volts, but I desired to see if we could not arrive at some standard voltage.

Mr. Arkenburgh: Will the committee also include tests for generators and motors?

Mr. Shaver: I should think that would be practicable.

AUTOMATIC BLOCK.

The committee was instructed to (a) prepare revised specifications for direct-current relays and direct-current indicators; (b) continue preparation of specifications for apparatus and materials used in automatic signal constructions; (c) prepare typical automatic signal circuits for single and double track; and (d) chairman to help prepare a classification of voltage ranges for signal work, to be reported by the committee on Power Interlocking. (This committee was asked to have the relay and indicator specifications ready for discussion at the March meeting.)

The committee submitted, as a preliminary report, specifications for steel crossarm pins, covering the subjects of purpose, material, strain test, galvanizing, packing, marking, sampling, inspection and acceptance. The specifications are accompanied by R. S. A. drawings 1165, 1166 and 1167.

Sub-committee No. 1 offered specifications for direct current relays, lifting armature neutral type. The specifications cover the subjects of definition, purpose, general design, material and workmanship, finish, armature, supports, air gap, nut locks, iron in magnetic circuit, magnet coils, contact fingers, contacts, flexible connections, binding posts, insulation, magnetic iron test, service, calibration test, sealing and calibration record, inspection, packing, and acceptance.

Sub-committee No. 4 presented specifications for copper and tin plate channel pins. These referred to the subjects of purpose, material, malleability, plating, copper plating, tin plating, and the method and solution for testing the tin plating, gauging, sampling, packages, markings, inspection, and acceptance.

The committee consists of A. G. Shaver (C. R. I. & P.), chairman; J. M. Fitzgerald (N. Y. C. & H. R.), vice-chairman; E. L. Adams (L. S. & M. S.), E. E. Bradley (Western Maryland), G. H. Dryden (B. & O.), A. R. Fugina (L. & N.), J. E. Gillmor (P. R. R.), R. E. Greene (M. C.), W. R. Hastings (C. R. I. & P.), W. H. Higgins (C. R. R. of N. J.), B. F. Hines (N. O. & N. E.), E. W. Kolb (B. R. & P.), E. W. Newcomb (O. S. L.), C. W. Parker (C. P.), R. M. Phinney (C. & N. W.), H. J. Rhinehart (D. L. & W.), A. H. Rice (D. & H.), and G. W Trout (P. M.).

Discussion on Automatic Block.

Mr. Shaver: The specification for steel crossarm pins is the specification of the Western Union Telegraph Co., with this exception: It was redrawn to put it on the same basis as our usual specifications in respect to dividing it into paragraphs and supplying paragraph headings; also with the exception of the test for galvanizing. I did not have the Western Union company's requirements for galvanizing, so I substituted the galvanizing test we have for wire in the previously adopted specification of the association. The drawings are exact duplicates of the Western Union company's drawings, with the exception of the spelling of one or two words.

C. H. Morrison (N. Y. N. H. & H.): Did the committee consider locust wooden crossarm pins?

Mr. Shaver: They did not.

Mr. Morrison: Has the iron pin been adopted as standard by the association?

Mr. Shaver: It has not.

T. S. Stevens (A. T. & S. F.): I would like to know if the committee expects to get out specifications for wooden pins?

Mr. Shaver: The matter had not come to us that a specification for wooden pins was necessary. I do not see, however, why the committee should not get out a specification if the association deems it necessary.

Mr. Stevens: It is necessary; particularly so down on the gulf coast, where we cannot use iron pins at all, and have to use wooden pins. I think the same will be true of any seacoast; that the iron pin is not a good pin to use.

Mr. Shaver: The committee will be glad to take that question up. We thought we would describe the iron pin first, because that is now the Western Union standard.

The President: The wooden pin will require a modification of the crossarm design on account of the pin holes.

W. J. Eck (Southern): There does not seem to be any



A. G. SHAVER.

Chairman Committee on Automatic Block.

specification or description of the threads on the spindle. Should not the title of detail 1 in the lower left-hand corner of print 1166 be detail 4? On print 1165 it is marked detail 4.

President Anthony: Does not it say "Fit thread on detail 1?"

Mr. Shaver: Yes, that is right. The cap is detail 4.

Mr. Eck: It is marked detail 4 on one drawing and nothing on the other.

Mr. Shaver: That will have to be taken care of.

H. S. Balliet (N. Y. C. & H. R.): The committee shows a galvanizing specification. This subject has gone to some other committee. Should we not say: "Galvanizing.—See Railway Signal Association Specifications," and eliminate all this printed matter? We have complete specifications.

Mr. Shaver: That is true, yet there are many who want to use this specification and will not want to use the other specification. It would seem to me a good plan to strike a sort of happy medium, and where it is not necessary, not to give the specification in duplicate in its entirety. As this specification was taken, I think, from one of Mr. Elliott's specifications, I assume that it would be agreeable to him to have it used, and there is no need for harmonizing it.

W. H. Elliott (N. Y. C. & H. R.): I am not at all sure that the test for galvanizing given here, which is for iron wire, is sufficiently strong for the testing of galvanizing on a steel pin, on which, as I understand it, the galvanizing is put on very much thicker. It would seem to me advisable for the committee to get the Western Union specification for galvanizing and possibly it would be better to adopt that, or change this wire specification.

Mr. Stevens: We might take the American Railway Engi-

neering Association test for galvanizing bridge bolts and things of that kind. They have a very good specification.

Mr. Shaver: It seems to me the various committees concerned in the galvanizing test should get together, if possible, and harmonize this specification. If we need a different galvanizing test for crossarm pins from what is required for wire, then we ought to have it; but if we do not need it I think we ought to make one test answer in so far as we can.

L. R. Mann (Mo. Pac.): The pin which we are using is the standard of the Western Union and the A. T. & T., who are very large consumers of this pin. If we do not have a specification which calls for a regular article in the market, it will probable mean a rise in price for something which is probably no better than we could get out of stock. I would like the committee to look into the specifications of the Western Union Telegraph Co. for galvanizing, and see whether these specifications are not sufficiently complete to be adopted by this association.

Mr. Shaver: The committee will be glad to accept all the suggestions and look into the specifications further.

E. L. Adams (L. S. & M. S.): The Sub-Committee on Relays has gone over the discussion that was had at the annual meeting at Colorado Springs and they have embodied in this preliminary report as many of the suggestions that were brought out at that meeting as they could approve; that is, we have gone ahead with the idea of being able to approve everything that we put into the specification. Although there may be some things in this one which we were not able to approve, we hope to be able to justify everything at the next annual meeting.

The articles have been revised somewhat, and some of them combined and brought together, so that everything under one subject will be under one paragraph. That was done with the idea of making the specifications shorter, if possible.

There is nothing said in this preliminary report about the most important part of the specification, the test for the iron and operation of a relay service calibration. The committee is doing considerable work along these lines and we have no doubt we will be in shape to submit it at the annual meeting, in all its details, at the meeting in June.

We might bring up for consideration a joint in paragraph 5 on Finish. The committee has had some discussion on that paragraph and it might be well for the members to express some opinion on it. That refers to copper plating the armature and particularly the magnetic core in the concealed portion of the relay.

We have had considerable experience this winter with relay sweating and rusting. In every place where we had a piece of iron that was galvanized or protected by some compound of paint the moisture has gotten under that protection and rusted the iron, so that it seemed to the committee the only thing to do was to properly copper plate the iron in that portion of the relay. That point seemed to be the principal thing for the committee to discuss at this meeting.

Mr. Stevens: I think it is usually quite proper to protect in some way the enclosed portions of the relay from rust, but I doubt the propriety of specifying any special method because, as it seems to me has been brought out previously in the discussions at our meetings, we do not want to stop development by specifying one special way of doing things.

Mr. Denney: I think this protection of the relay core is something that should be definitely specified for two reasons. The iron that is used in the cores must be very carefully handled and certain methods of applying the protection would injure if not ruin the iron. Other methods of applying the protection, while not affecting the iron, would not have the same lasting qualities and I believe that the committee should go into the question very thoroughly and find out which is the best way of doing it and then specify it.

Mr. Adams: The committee has considered this point and found there were four methods which can be used in protecting the iron; galvanizing, painting, copper plating and coating with varnish or shellac.

Mr. Stevens: How about sherardizing?

Mr. Adams: We think zinc plating or galvanizing would cover the two. It seems to me that the copper plating would be as satisfactory. We know that anything properly copper plated will not rust. We know that anything that is sherardized or galvanized or protected in any way with a zinc treatment will rust, and we found that all of the paint processes have been unsatisfactory on account of rusting, so that we decided that copper plating was the best thing to specify.

Mr. Shaver: It is a difficult matter to copper plate and get a test of that copper plating so as to know we are getting a uniform coating. I think the committee will appreciate any information that can be given them on the question of a satisfactory test for copper plating.

Mr. Denney: Do we understand the investigation of the committee along these lines has been closed, or is this subject to be given further consideration?

Mr. Adams: The committee will give the subject further consideration and are making tests now as to whether copper plating will be the best. It is the best we have found so far. There is one process of lacquering, but it seems, when you get into the question of lacquering it is difficult to specify the proper grade of lacquer and it is difficult to determine if the lacquer that is used is the proper grade.

Mr. Stevens: I think there is no question that the committee has acted properly in specifying copper plating. The only question I raised was whether there was not some other process, or whether some other process might not be discovered at a subsequent time, which might be used with less expense. I have always been averse to specifying actual materials or methods.

Mr. Elliott: In reference to the matter of copper plating, it has been my understanding that copper plating, unless burnished is a very slight protection, and rather than stating the requirement that copper plating shall be buffed, it should be burnished, and with the burnishing process you will make it hard and to a larger extent resistent to moisture. We find that moisture will penetrate a thin coating of copper—the thicker the copper the less the penetration. Also, the harder the copper the less the penetration, so that if this coating is made hard, a thinner coating will give a greater protection than one that is thicker and merely buffed for the plating.

Mr. Adams: It is the idea that the iron shall be buffed and not the plating; the buffing is used to get a smooth surface for the plating.

L. Frederic Howard: (U. S. & S.) Our representatives have met the members of the committee and volunteered to co-operate with them in any research work. It is a difficult matter to get a protective coating back of the cores. One of the difficulties is, if you get the proper air gap in the relay, the thickness of the material increases the length. I think there are at least two methods of plating; sherardizing and copper plating. There are difficulties connected with covering these parts with any lacquer, in getting such a coating as will not be affected by moisture or heat, and also securing a coating that will not scale off.

F. L. Dodgson: (G. R. S.) I know the committee is making some investigations and I am making some on my own account, and after these investigations are completed we can speak more authoritatively.

Mr. Eck: The definition, I believe, should be omitted from the specification and referred to the Committee on Definitions, particularly as the definition given here also fits almost exactly an elevator controller. The use of the word "air-gap" in paragraph seven seems to be a little confused. I believe the note under seven should be omitted and the section elaborated in some way so that there will be no confusion as to what is meant in reference to the air gap.

Mr. Balliet: I suggest that it is perfectly proper to refer the definition of a relay and the note in paragraph seven to the Definition Committee for disposition. I believe that it would also be of considerable interest and assistance to the Definition Committee if this committee were to formulate their idea of definitions for Armature Journals and Armature Bearings.

Mr. Adams: The definition of a relay has been taken up with the Definition Committee and they have approved this form with the addition of the words "one or more" after the word "controlling," making it read "A relay is an electromagnetic device with contacts for controlling one or more electro circuits."

Mr. Balliet: The purpose is not to show in any specification or in any of our literature a definition that will be in the Definition Committee's report.

Mr. Adams: I believe that all of the committees on specifications should get together and get a uniform paragraph for the acceptance of material. It seems now there are a number of different paragraphs and I believe they should all read alike.

Mr. Shaver: This clause has been passed by the association in other specifications, and it is intended to mean that the entire shipment can be rejected in case it does not meet the specification.

Mr. Denney: Paragraph 7 specifies that stop pins shall be not larger than one-eighth inch in diameter and the projecting end shall be rounded to a radius not less than half the diameter of the pin. There are some coils made without any stop pins in the cores, and others made with them. The committee having decided there should be stop pins, I would like to find out why they specify they shall be round with a radius which shall not be more than one-sixteenth

inch. It looks like a rather small radius and I do not see just what they expect to accomplish.

Mr. Adams: Since putting that in the specification the committee has considered cutting out the requirements of stop pins in the armature entirely and we prefer having no discussion on this paragraph at this time.

Mr. Shaver: Under paragraph 3 the ventilation of the relays is an important thing to be brought up. In my own experience it has been one of the most troublesome things we had to deal with.

The President: The committee will be very glad to have suggestions as to the means of ventilating the relay and improving the service.

Mr. Shaver: We have ventilated the relays and our general reports are in favor of it, but sometimes we get reports that ventilated relays are not so good as the others. In the opinion of some engineers, it is necessary to close them up as tight as possible to prevent dust entering, but generally the reports are in favor of ventilating.

George E. Beck (L. S. & M. S.): May I ask Mr. Howard if the so-called ventilated relays have openings at the top and bottom or merely at the bottom?

Mr. Howard: I suppose the standard relays have openings at the top and bottom.

Mr. Shaver: I would like to ask Mr. Howard if he has received sufficient information to know what ought to be done with them, or if the whole road is still equipped with them?

Mr. Howard: We have not enough exact data to answer that question, but if I had to pass an opinion now I would say that ventilated relays were desirable.

Mr. Balliet: I assume Mr. Howard means in other places than in tunnels, or protected railways; in other words, out in the open country.

Mr. Howard: Yes.

Mr. Shaver: I have had considerable experience with relays ventilated and not ventilated, and I have not been able to notice much difference between them. I believe Mr. Howard is right, that a ventilated relay will give better service than one that is not ventilated; but I think we must arrange for circulation of air through the relays. In other words, there must be not only ventilation in the bottom, but in the top; and I am going to bring that before the committee and have it discussed with a view to having it included in the specification, unless we find that that theory is not correct.

Mr. Denney: We have had a number of cases, particularly this winter, on account of the weather conditions, where relays ventilated and relays that were supposed to be air tight, have sweat. In a good many cases there was much water in them that, so far as we could determine, did not come from the outside. I believe the term "ventilated relays," as Mr. Shaver says, is a misnomer. They are not really ventilated. They have a little hole in the bottom, and this committee should at least look into the advantages and disadvantages of allowing the air to circulate, practically establishing a draft through the relays. Recently we have had a man going over the entire road to study this subject and bring in data as to the making up of the relay, whether or not it is ventilated, and the peculiar conditions, either as to being in a wooden or an iron relay case, on one side of the right of way or on another, protected during certain parts of the day, or protected or not protected from the sun. We thought that our only chance was to eliminate conditions by finding out the conditions at each place where a relay had given trouble.

Mr. L. R. Mann: I have never seen trouble where the relay case was put on the relay support with U-bolts. I think that that overcomes it.

Mr. Balliet: I have had cases where the relay has been in trouble on account of sweating, fastened with the U-bolt. I believe from observation that a relay contained in a wooden box, that is, a wooden container placed on the side of the right of way, removed from the sun's rays, is the only cure. You cannot afford to establish circulation or breathing through the relay, for the reason that there is a great deal of moisture, under certain conditions, contained in the air, which is dangerous if it gets in the moving parts. Particularly if the temperature changes suddenly.

John J. Craig (P. R. R.): With a ventilated relay you cannot expect anything but moisture on certain parts. I don't think we ought to allow free circulation at the top and bottom of the relay, because that will induce breathing action, and I am afraid the moisture will be deposited on the box and soak through. It seems if there is an accumulation of moisture in the relay it should be allowed to run right out.

J. A. Johnson: (M. K. & T.) I would not recommend the relay ventilated at the top and bottom both. I think there must be some mistake about the relays that are sealed up tight. I do not think they are air tight.

A. R. Fugina: (L. & N.) I have found much less condensation in ventilated relays than in the relays not ventilated. We have rebuilt the majority of our relays, ventilating them with a small hole in the bottom of the case, and have found that that has, to a great measure, remedied our trouble. We still have more or less condensation, but it is only a fraction of what it was originally. We have this trouble in all kinds of cases, wooden cases and iron cases. I am satisfied that we must have a ventilated relay, but I do not believe it should be ventilated at the top and bottom.

E. W. Newcomb: (O. S. L.) We have had cases where relays sweated in one location one winter, and the same relay without any changes made in it whatever, would not sweat the next winter in the same location. I think it is the local atmospheric conditions that cause the sweating in certain locations, depending on weather conditions.

Mr. L. R. Mann: I know of a relay that was sweating in a particular case and it was removed to another case and it did not sweat. They just ventilated the case and there was no more trouble.

G. H. Dryden: (B. & O.) We have no trouble from sweating on our line. Our relays are all located in wooden boxes.

Mr. Stevens: I can also say we have had no trouble reported from this cause, and all our relays are installed in iron relay boxes. I am not sure that we are not having sweating, but I know we are not having failures at all.

G. B. Gray: (Penna.) So far as I know, the only ventilation our relays have is a small hole in the case, and we are not experiencing any trouble that I know of from condensation. Most of our relays are housed in the wooden case; a good many, however, in the iron relay case.

Mr. Adams: It seems to me the members are satisfied that we should have a ventilated relay. Now I think it is up to the committee to find out how to ventilate. I think we will be able to work out something to put in the specifications.

Mr. Balliet: In paragraph seven, referring to stop pins I would suggest "fastened," instead of "riveted."

Mr. Stevens: I think paragraph nine in its present condition is more or less dangerous, because we cannot tell what the iron might do that might be obtainable for this purpose, under certain conditions of the market. I think if nothing better than that can be arrived at, it would better be left out.

Mr. Denney: I understand from what the chairman of the committee has said that they will provide tests which will determine the quality of the iron. In other words, if the iron is not right it will not meet the provisions of the specifications.

Mr. Newcomb: I would suggest that all magnet coils be flexible instead of annealed, and that terminal connections be provided to connect on the binding post.

Mr. Eck: The first word of the second sentence of paragraph 13 on Binding Posts should be omitted and the words "threaded portion of the binding post" substituted, as it is the intention of the committee, no doubt, that only the threaded portion of the post shall be made of No. 14 gage.

Mr. Shaver: I suggest that the various committees concerned with electric apparatus, which requires a test of high tension current, should get together, and, if possible, fix upon some voltage or certain voltages for tests of apparatus that are common to various specifications.

In regard to this paragraph on Insulation I think it is better to leave the last paragraph like this: "Any material that is affected by moisture will not be accepted."

Mr. Shaver: A number of gentlemen do not agree with Mr. Stevens. Some of the manufacturers have objected to cutting out the views on varnished paper or varnished cambric. They say it is not affected by moisture, but there is a difference of opinion there.

Mr. Adams: The opinion on varnished cambric and varnished paper was not put in there because it is affected by moisture, but on account of physical conditions. That is, if you try to use varnished paper for insulation and shove a binding post through it, it makes a dangerous condition.

Mr. L. R. Mann: I would like to ask if the committee thinks that the ⅜-in. air gap is sufficient for the binding post of the conducting line of the circuits for lightning protection? Wouldn't it be best to make that more?

Mr. Adams: Three-eighths inch has been the standard spacing and the committee has not spent much thought on that. I do not think any air gap can protect against lightning.

Mr. Denney: I think the last sentence in paragraph 18—"The purchaser may test all the relays or any portion thereof, as he elects, at destination" ought to be removed—to read, "First, or as many relays."

Mr. Adams: I believe all the specifications for material should have practically the same wording in regard to inspection.

The specifications for copper or tin-plated channel pins were then taken up.

Mr. Fugina: The only specification we have had is the one for tin-plated pins. The instructions were to embody in this specification enough matter to make it apply to copper-plated pins, to correct the design of the present channel pin, and to design a new channel pin guage.

I want to make one correction in the heading. We should specify for copper-plated or tin-plated pins. It might now be misunderstood to mean copper pins. The only point we have had difficulty in arriving at is the copper plating that is to be applied to the pin. We were instructed to embody in this specification a chemical test for the copper plating. We have spent a great deal of time on that and had a good deal of correspondence with the manufacturers, but have been unable to arrive at a satisfactory specification for copper pins. We believe a proper way to take care of it is to specify the amount of copper that is to be used in the plating The manufacturers' idea is that it is an unnecessary refinement to attempt to test chemically the plating on copper pins, and we would like to have some discussion on that point.

Mr. Denny: I suggest that paragraph 4 on Plating be made to read, "The pin shall be plated with ——." That would make it part of the specification rather than instructions.

The Secretary: Wouldn't you change the words "are to be" to "shall be"?

Mr. Fugina: I understand certain manufacturers contemplate putting pins on the market that will be sent out in oil. They have no plating at all. They propose to put them up in boxes and ship them out in oil. The question arises whether that would be satisfactory.

Mr. Denney: I think they should be plated with something. Shipping in oil is theoretically all right, so far as receiving the pins in good condition is concerned, but they cannot be kept dry until the time they are driven, and consequently they will rust.

Mr. Fugina: The idea was to send these pins out in boxes of two hundred or five hundred, having them thoroughly oiled so they could be handed out to the maintainer accordingly, and he was to carry the little box with him.

Mr. Denney: I move it is the sense of this meeting that all pins should be plated.

Motion seconded and carried.

Mr. Stevens: There is absolutely no danger in driving oil pins; in fact they make better electrical contact than if they were not driven in oil.

Mr. Shaver: There is no use in plating the pin if it can be dipped in oil and kept sealed in oil until ready for use.

Mr. Denney: You can ship pins in oil and put a lot of oil around them, but before the men use up the pins they have a lot of rusty ones, and there is nobody that can control the handling of material to the extent that will insure their not being rusty. The plating is not for contact after the pin has been driven, but to protect them from rust before using.

Mr. Fugina: One of the most important points in the paragraph on Copper Plating has not been touched on at all. We specify that the pin plating shall be done by the electric process, in a manner similar to galvanizing. There is considerable difference of opinion as to whether the hot process or the electric process is better. Manufacturers are using both.

Mr. Stevens: I understand that both of these processes are simply to protect the pin between the time of its manufacture and the time when it is driven. After it is driven the entire process is of no use.

Mr. Shaver: At the time these specifications were presented to the association the question of tinning came up, and some pins were purchased and tinned according to the electric process. They did not meet the specifications, and the manufacturers at that time claimed they could not plate pins electrically, and have them meet the specifications. It was found desirable to use hot process pins.

Mr. Patenall: In view of the fact that we expect to plate all pins, it seems to me that the note regarding oiling pins before shipping is superfluous. If the plating is applied to prevent rust, there is certainly no need of pins being dipped in oil previous to shipment, and I would make a motion that that be eliminated.

The motion was seconded and carried.

Mr. Fugina: We would like to have the opinion of the association as to whether the copper plating specified in paragraph 5 is satisfactory or whether we should continue to try to arrive at a specification to test chemically for the copper plating. The manufacturers don't want a specification of that kind and we have left it out of the specification for that reason. I don't believe we need it.

Mr. Shaver: It is evident that the paragraph as it stands, is not satisfactory, because nothing is stated as to the method of testing the copper plating. It may be thin on one side of the pin and thick on the other. I also tried to find a specification that would cover that particular feature. It does not seem possible to get anything that is practicable for testing such a thin coat of copper.

Mr. Elliott: It seems to me that this wording of the specification is sufficient, and it is not necessary to give a more complete specification and test. The pins will sometimes rust, and the slight number saved by more careful methods will not pay for the expense of going to more complete tests.

Mr. Fugina: We have found several faults in the old channel pin drawing. One was that the taper with the axis was incorrect and in changing that, it was suggested that we embody the other changes that we thought advisable. We have presented the drawing for a new proposed design. The pin is longer, and we have tapered the point in order to make it easier to start the driving of the pin. That is one of the difficulties with the present pin. We have adopted a standard channel pin. It is a question whether we want to develop a new plan for it.

J. E. Saunders (A. T. & S. F.): We also found a defect in the old pin and we redrew it. I imagine we have practically what is shown here. We have no trouble whatever to get manufacturers to bid on the new drawing.

The President: Mr. Fugina desires to get an expression of opinion as to whether the design should be changed.

Mr. Shaver: I want to say something in support of this new design. In the use of the old design of pin on the Rock Island we had a large number of broken bond wires. We believe that one cause of the breakage of the wires close to the rail has been the use of this old design of pin. We believe that with the new design of pin we can start the wire and keep it with its axis parallel with the wire, or nearly so, so that it will not nick the wire.

The President: Are the manufacturers satisfied with this new design, Mr. Fugina?

Mr. Fugina: As far as I know.

Mr. Stevens: I would like to ask what is the object in making the thick end smaller than that of the old pin?

Mr. Shaver: The present design of pin was taken from one used by some other railways and one which the manufacturers were making. It was assumed that the taper, when figured out into the thousandths, was all right. I think it was not. It was off about one-thousandth. The fact that decimals were used in one place and fractions in another caused some confusion, and it was only discovered when an inspector checked his pins very close. Then the manufacturer kicked and showed where the trouble was.

Mr. Elliott: I move you that the present design be changed to the new one submitted by the committee.

Mr. Mock: I second the motion.

Mr. Patenall: Before that motion is acted on I think, if there are any manufacturers of channel pins here, we ought to be told whether the change as proposed is going to have any result on the pin or what changes may be necessary on the road. It might lead to something more difficult than we anticipate.

J. M. Walron (I. R. T.): I can hardly see why a design of that sort should be changed without first thoroughly satisfying ourselves that it is going to be an improvement over what we now have. If the present pin is giving good satisfaction and the manufacturers of that pin have large quantities on hand in their shops, it is hardly right that we should at this time change the design and discard the old ones.

Mr. Fugina: The design of the present pin is not correct. There are small errors that were not discovered until after its adoption. We have to make certain changes in the design, and while the drawing itself will not have to be changed, we will have to change dimensions. In that connection, we thought it desirable to go into the thing very thoroughly and change the design of the pin as a whole. We have not had time to try it out to see whether we were right or not.

Mr. Mock: In seconding that motion, it was understood by me that this was merely an expression of opinion to give the manufacturers and the railways a chance to try that out. This pin has not been tried. The other has been tried and some objections have been found. I do not think there has been a complete expression of opinion as to whether the old pin is satisfactory generally or not. This does not mean that it establishes a standard, and does not mean that the manufacturers will lose the product they now have, because I do not think the other pin is so bad that we would not accept it, or the stock that is now made. I think the association ought to be willing to do that. I do not think we ought to say we will not accept the other pin. I seconded the motion because I believe this is an improvement.

Upon vote the motion was unanimously carried.

ELECTRIC RAILWAY AND ALTERNATING CURRENT SIGNALING.

The committee was instructed to (a) continue investigation of the various systems in operation; (b) prepare requisites of apparatus and material for an a. c. automatic block signal system; (c) prepare specifications for those items referred to in the portion of the report made up by sub-committee B, 1911, which, in the opinion of the committee, cannot be covered by reference to specifications prepared by other committees; and (d) chairman to help prepare a classification of voltage ranges for signal work, to be reported by the committee on Power Interlocking.



H. S. BALLIET.

Chairman Committee on Electric Railway and Alternating Current Signaling.

The committee offered an outline of requisites of apparatus, and material for an alternating current automatic block signal system, applicable except where alternating current track circuits are in use on alternating current or direct current propulsion lines. The requisites treat of general design, dimensions and details of electric motor, solenoid, electro-pneumatic, and light type signals, alternating current relays, alternating current supply and distribution—main and secondary, circuit controllers, bonding materials, electrical conductors, wire, conduits, insulations, instrument shelters, line fixtures, switch indicators, electric locks for hand operated track switches, junction terminals, lightning arresters, number boards and numbers, locks, signal lanterns and lamp boxes, concrete and paint.

The committee consists of H. S. Balliet (G. C. T.), chairman; C. H. Morrison (N. Y. N. H. & H.), vice-chairman; W. P. Allen (P. R. R.), W. F. Follett (N. Y. N. H. & H.), E. C. Grant (U. P.), W. F. Hudson (N. Y. C. & H. R.), John Leisenring (Illinois Traction), H. A. Logue (C. V.), W. W. Morrison (N. Y. C. & H. R.), C. R. Peddle (I. R. T.), B. H. Richards (C. R. I. & P.), John Roberts (N. Y. W. & B.), J. E. Saunders (A. T. & S. F.), E. B. Smith (N. Y. C. & H. R.), W. N. Spangler (P. R. R.), F. S. Starratt (S. P.), F. E. Wass (N. Y. C. & H. R.), and J. R. Wills (O. S. L.).

Discussion on Electric Railway and Alternating Current Signaling.

Mr. Balliet: Sub-Committee A is handling all of the alternating current signaling on railways using a. c. propulsion. The next sub-committee is B, which handles the alternating current on roads using d. c. propulsion. We now have Sub-Committee C's report, as we propose to submit it to the annual meeting, to cover so-called steam lines. Acting on the chairman's suggestion, I would say that under "General," two items have been added, namely (h) and (i), incorporating the method of a suspended signal mast and a dwarf signal mast, this being additional to that already approved by the association for the previous sub-committee.

Mr. Stevens: I cannot help recognizing the fact that in paragraph B the association decides for the upper right hand quadrant. I hope the cause of alternating current signaling is not going to be stopped on railways using lower quadrant signals. I know of one very important installation which is being made to-day with lower quadrant signals, and it seems to me that this is an important thing to recognize.

Mr. Balliet: The committee chairman's answer is that the recommended practice of the association is the upper right hand quadrant, and he has no alternative but to incorporate that in the requisites.

Mr. Shaver: Is it the intention of the committee to fill in the blanks?

Mr. Balliet: It was the intention in writing up the requisites for this particular report first to give the manufacturers an outline of what we require, then, as we have developed in the other work, to go back and by a series of conferences to fill in the blanks, not as an order but as a guide or indication as to what is desired. In other words, the alternating current signal installations are not, as we see it, in such shape that we should make rigid specifications, but rather put it in the shape of a requisite and tell them what they must meet or what they should meet.

Mr. Morrison: The development of alternating current signals is such that it would not be desirable to fill in those blanks at the present time. I know that as to each new alternating current installation that we have put in, we have made vast changes in current consumption especially. Do you think it possible that the upper quadrant signal, coated with sleet and ice, would increase the load on the brade 50 per cent? That, it seems to me, would be large.

Mr. Balliet: I might say that it has been tried, and found very close to 50 per cent in one or two cases.

Mr. Morrison: I don't think we will ever get three per cent excess load on the a. c. line.

Mr. Balliet: The committee is ready to say 25 per cent is what should have been inserted there.

Mr. Patenall: I would like to suggest that the committee use the words "Excess weight on the arm" as best defining what they mean.

Mr. Waldron: Under paragraph (b) section D "To be capable of continuous operation at 10 per cent under normal frequency," wouldn't you change that and make it "10 per cent over normal frequency?"

Mr. Saunders: I think we ought to have 10 per cent variation either way. In the construction of signals you are limited to two frequencies, 25 and 60. When you come to get 25, it is a hard frequency to maintain by a motor-generator. You have to select between 23 and 26, on account of the commercial problem. You cannot get a machine that will deliver exactly 25.

Mr. Balliet: The committee will say plus or minus.

Mr. Stevens: I move that paragraph as to the 90 degree indication be eliminated, first, because it cannot be done, and second, for the reason that it has no place in the specifications.

Mr. Patenall: If we accept that paragraph, there is one word which we shall have to leave out; that is the word "guarantee."

The President: It seems to me that that paragraph does not relate to the construction of a signal, but to the construction of a system.

Mr. Stevens: It is a question of practice, and that is the special reason about which I object.

Mr. Balliet: The committee is not willing to eliminate it. We would like to have a vote.

Mr. Beaumont: The word "guarantee" is strong. We can not absolutely guarantee anything. We can strive to make it that way.

Mr. Balliet: There is only one thought that the members should take with them: you cannot put a circuit break on an electric light to control the signals.

Mr. Shaver: I wish to ask if this completes the relay specification or if the committee expects to cover it in the general specification of relays as to contact and the like—general construction?

Mr. Balliet: The committee has in mind, as previously stated, that we are not ready to tie any manufacturer down to manufacturing details. That would without doubt very materially retard the art. The committee prefers to tell the people who propose to sell us alternating current apparatus, for the time being, at least, what we require to perform the work. We are in a little different position from the other committees in that particular field, and it would be a hardship to now limit the manufacturer to rigid specifications.

Mr. Balliet: The committee will submit at the June meeting transformer specifications. We had them ready for this meeting, but we had so much matter that it was not proper for us to submit them.

W. N. Manuel (G. R. & I.): I think in connection with Secondary Supply that it might be well to consider the advisability of the committee getting up some form of contract between the railway company and the company furnishing the power.

Under the head of "Line Wire for Low Voltage Circuits," it is proposed that the cross-arm for the low tension line be left to Committee IV, and it will be suggested that the high tension cross-arms be according to the National Electric Light Association standard. They have a book of specifications that covers practically every state in the Union for high tension work.

Under "Locks," something should be done with the word "purchased." I believe it should be "and shall be furnished by blank," instead of "purchased."

Under "Paint," "including" and "except" between the words "woodwork" and "blades," should be omitted, because we have instructions for painting blades.

WIRES AND CABLES.

The committee was instructed to (a) continue investigation and tests with a view to improving the specifications for mineral-matter, rubber compound, insulated signal wire; (b) prepare specifications for copper-clad steel bond wire; (c) prepare specifications for 30 per cent conductivity, hard-drawn copper-clad steel line wire; and (d) prepare specifications for wire and cables for high-tension circuits. Suggestions as to conditions and requirements to be met should be obtained from the committee on Electric Railway and Alternating Current Signaling. (This committee was asked to have the specifications for copper-clad bond and line wire ready for discussion at the March meeting.)



W. H. ELLIOTT.

Chairman Committee on Wires and Cables.

The committee submitted for consideration a preliminary report comprising recommended specifications for 30 per cent conductivity, hard-drawn, copper-clad, steel line wire; copper-clad steel bond wire; and armored submarine cable for high tension circuits.

The committee consists of W. H. Elliott (N. Y. C. & H. R.), chairman; E. L. Adams (L. S. & M. S.), vice-chairman; W. L. Dryden (S. I. R. T.), A. B. Himes (B. & O.), J. D. Phillips (P. & R.), D. W. Richards, Jr. (N. & W.), E. L. Watson (P. R. R.), J. V. Young (B. & M.), and J. W. Young (Erie).

Discussion on Wires and Cables.

Mr. Elliott: The committee would like to submit recommended specifications for "30 per cent conductivity hard-drawn copper-clad steel line wire." This specification is practically that of the specification for copper-clad steel line wire, with weatherproof breaking, with the weatherproof breaking omitted, with this exception: That the requirements as to breaking strength in pounds, weight per thousand feet in pounds and resistance in ohms per mile at 68 deg. F, has been included for the several sizes of wire. In our opinion this specification is in form to be formally adopted by the association and is satisfactory to the manufacturers.

Mr. Elliott: I move that we eliminate, under paragraph 1, the word "but," so the paragraph will read: "Having 30 per cent of the conductivity of that of pure copper."

Mr. Saunders: There is some criticism about the 30 per cent, that the table figures out an average of 26 per cent conductivity. I think it is misleading to call a specification something that it is not.

Mr. Elliott: I would like to say that this table of resistance is that which was given by the manufacturer and is based not on the exact standard, but on a standard with 98 per cent conductivity of the copper, and the committee thought it advisable to take the resistance which the manufacturer was giving for this trade name of 30 per cent conductivity of the wire.

Mr. Saunders: Figuring on conductivity of 97 per cent standard for hard-drawn copper wire, it averages 27 per cent conductivity, not 30.

Mr. Elliott: The manufacturers claim they are not able to draw wire to the exact conductivity, and they will furnish anything having a conductivity 5 per cent of that specified. They say the difficulty in making to an exact resistance is so great that if it is thirty or thirty-five or forty they will ship it out on an order for thirty or more; that it is too difficult to get the exact resistance.

It is my understanding that if the wire has a lower conductivity than the table it would be satisfactory from the standpoint of conductivity. On the other hand, a wire with lower conductivity, having more copper in proportion than steel, is of slightly less tensile strength, and this table is that which was agreed upon between the committee and the manufacturers, as being what they could meet.

Mr. Denny: As I have understood the situation, there is no difficulty in securing 30 per cent wire; and if that is so, it would seem the last table. "Resistance in ohms per mile at 68 deg. F.," should read "Not more than."

Mr. Stevens: If it is possible that the manufacturing of this wire introduces two difficulties in producing this special conductivity, I should think it would be the duty of the committee to decide on a permissible variation from this conductivity rather than give a conductivity which is not 30 per cent.

Mr. Beaumont: For the past several years we have been using 40 per cent copper wire. The manufacturers have no difficulty in making wire that is actually 30 per cent conductivity. There is no reason why a manufacturer should furnish a 27 per cent wire on a 30 per cent specification. If they are doing that, we want to know it. To my mind this is a case where the manufacturer should be straightened out by the association. I don't believe it is up to us to specify 27 per cent, but to make the 30 per cent specification and compel the manufacturer to come up to it.

Mr. Denney: In the same connection, I call attention to paragraph 9. It means, in substance, that if a coil does not meet the requirements, you can cut off a piece, and see if the piece you have left meets the requirements. I would like to ask if that was put in at the suggestion of the committee or the manufacturer.

Mr. Elliott: This paragraph is satisfactory to the manufacturer. He withholds the privilege to withdraw the coil, or to have the piece cut off until it is of the proper conductivity; the fact of the matter being that in manufacturing copper ingot the practice is to draw down more of it in the center of the length, and the practice at the factory is to cut off pieces from the ends until a proper gauge of copper is had.

Mr. Denney: Are you reasonably sure that the variation exists only at the end of the coil? If that is so, and the manufacturers know that, they could cut off those pieces and give you a coil that was of the resistance specified. The paragraph, to my mind, discredits the proper kind of wire; that is, your conductivity may be the result of various sections of steel and copper through the entire length, and if by chance you happen to strike the right conductivity, the result is satisfactory.

Mr. Elliott: The tests made at the factory show that a certain thickness of copper is reached by cutting off the ends, and that that thickness is continued—it is practically even until you approach the other end.

Mr. Denney: Would the committee consent to withdraw that paragraph?

Mr. Elliott: That paragraph is put in really as a help to the manufacturer, to let him sell such coils as he desires. This particular paragraph is not objected to by the manufacturer, although it was changed in its wording slightly to meet his objection.

Mr. Saunders: The purchaser is protected in the next page, where we have the minimum length of coil guaranteed.

Mr. Waldron: Is there anything in these specifications to guarantee that the wire will be copper clad? As I read them, the manufacturer might make the wire with one side steel and the other side copper. There is no guarantee that the copper was surrounding the steel and that all the parts of the copper would be practically of the same thickness. It would appear to me that the manufacturer could beat the specification at almost any place he saw fit.

Mr. Elliott: The thickness of the copper coating is sufficient to be determined by the eye. It is very readily perceptible on filing an end of the wire. It is also more distinctly brought out by examining the squared end under a magnifying glass. A visual examination is so much more definite and distinct than any chemical test that can be devised, that it is by far the best method to examine the end of the wire and see what the thickness of the copper is.

Mr. Waldron: I am inclined to doubt the advisibility of testing in that manner. The copper being so much softer than the steel, it seems to me that it is liable to overlap the steel and show a thicker coating of copper than would otherwise be the case.

Mr. Elliott: I am sorry I did not bring with me samples I had of 30, 35 and 45 per cent wire, exactly for that purpose. I not only had the ends squared up and polished, but the iron cored out to show the thickness of the copper. There is no difficulty in detecting by your eyesight whether the coating is thin and its approximate thickness.

Mr. Denney: The committee has better covered Mr. Waldron's point in the specification for the copper clad steel bond wires.

Mr. Elliott: The committee will add the word "concentrically" to clause 2 of the specification for bond wires.

Mr. Saunders: I believe there should be some allowable variation in the diameter and weight for any given length.

Mr. Denney: In addition to that the breaking stress should specify that the weight "should not be less than," and the resistance "should not be more than."

Mr. Elliott: There was some difference of opinion in the committee as to whether or not it was advisable to put in different variations, both in the breaking strength and limit of the resistance, and it is deemed best to allow the purchaser to use his judgment if he desires to accept anything else than the exact specification requirement.

Mr. B. H. Mann: I think the committee ought to go a little deeper into the matter covered in section 9. The specification for copper wire was a long standing controversy between the purchaser and the manufacturer as to how much should be cut off from each coil, because they wanted a uniform product. We got a poor quality of wire for a distance of at least 24 feet, because back of the jaws, for a certain number of feet, the wire was not uniform. We buy copper wire to secure in the life of the wire the service and strength which should be given by a copper wire, but if there is a piece that does not have the same thickness of copper as the rest of the wire, that is a weak point, and the life of the wire is equivalent only to the life of its weakest part. I do not see why we should not ask this firm to cut a certain number of feet off each coil, allowing them to try out its conductivity and keep on cutting back until the thickness of copper is enough to give the 30 per cent conductivity.

Mr. Elliott: Clause 9 is put in to help out the manufacturer so that if at his option he desires by any means to make the coil meet our requirements he can do so.

Mr. Mann: I do not think we should put in a clause to help the manufacturer. The paragraph implies on its face that the end of the coil is not the same as the rest. There is a piece on the end of the coil which is apt to have a thin coating of copper.

Mr. Waldron: The manufacturer does not know how much of the end of each coil he must cut off until he gets to the place where the copper is of uniform thickness. And if he does he then certainly can supply coils with this uniform thickness throughout the whole coil as he will cut off as much of the end as may be effective. I think that all parts of the wire should have a uniform thickness of copper, and that some method should be provided for guaranteeing that amount of copper being put on the steel wire.

Mr. Denney: I agree with Mr. Waldron, there should be a specification for a minimum coating of wire. We will presume that the ends of the coil are smaller and there is a little heavier coating of wire than called for by the specification, then you would not detect the thin coating of copper at all, because the coil would be satisfactory.

Mr. Mann: We can cut these ends off in this particular case and there is very little lost; the ends can be sold for bond wires. I do not think the manufacturer can raise the price.

Mr. Elliott: The only points which have been brought up that our committee should seriously consider are the maximum-minimum limits in breaking strength and the addition of "not more than" in the insulation resistance table. If desired, we can check this table and make it specific, exacting 30 per cent.

Mr. Denney: I move that it is the sense of the meeting that paragraph 9 be eliminated. Motion seconded and carried.

Mr. Mann: I move that it is the sense of the meeting that an item be put in the specification that defective ends be cut off before they are put up for test at all.

Mr. Elliott: It is the regular practice of the manufacturers to cut off 20 to 30 feet. It sometimes happens, as previously explained, that the does do draw the material a little finer than intended and that the desired thickness of copper is obtained at a little further distance than the one that is ordinarily obtained. For that reason, clause 9 is expected to cover that contingency. The manufacturer, of course, aims to get wire of the standard conductivity.

Mr. Denney: I ask the chairman if the committee has looked into the matter of the minimum coating of copper at any point on the wire?

Mr. Elliott: We got very complete data on that point and decided that visual examination was sufficient to tell whether copper was evenly distributed around the coil.

Mr. Denney: Will that be embodied in the specifications? I think there should be a specification to show a requirement for a minimum coating of copper.

Mr. Elliott: We did not think it necessary to tell a man to look at it to see if it was evenly placed around the core.

Mr. Elliott: The difference between the 30 per cent and 50 per cent conductivity is only about .015 or .020 of an inch, and it is very difficult to tell what the exact conductivity is on examination of the sample. Suppose we find the product runs very regularly, but that the copper is thinner on the ends, and the manufacturer cuts off sufficient on the end to get the required thickness. That, as I recall it, is obtained by cutting off about 20 feet. The coils for No. 9 wire will run 2,000 feet, so you see that the length in which the wire is slightly thinner than the required thickness, which I believe is $\frac{1}{32}$ of an inch, is very small compared with the length of the wire.

Mr. Waldron: Has the committee investigated the chemical tests in connection with determining the thickness of the copper?

Mr. Elliott: It was found that the amount of copper dissolved was .002 grams, and the amount of copper to one foot of the wire was about 7.5 grams which, with the strength of acid proposed, would require a test of 26 days to show whether the amount of copper had been placed around the wire. We thought it was not a very satisfactory test, particularly as the acid was so weak the iron would scarcely be affected and the thickness of copper and its concentric arrangement around the core could be more readily determined by the eye.

Mr. Denney: Why is it necessary to vary from 30 per cent to 50 per cent in the conductivity of bond wires?

Mr. Elliott: The manufacturers claim that the bond wires are a by-product, that they use the scrap ends of the wire for line wire and other purposes, having a conductivity anywhere between 30 and 50 per cent, and that for bond wire purposes one answers just as well as the other, and that the cost would increase it too much if they had to cut all line wire material to serve the purpose. There is enough of the by-product to supply the demand for the bond wires.

Mr. Denney: I know a manufacturer who said that if the specification started on that basis the idea was obsolete as the requirements had become so great they had to draw a wire especially for bond wires and cut it up.

Mr. Elliott: I have a letter from a manufacturer stating just what I said, and it seemed to the committee that the point was good, that for bond wire purposes a conductivity between 30 and 50 per cent was immaterial, and that on account of the wire being cut up short, it was very difficult to make an insulation test and that they would be accepted without that and that practically it was not worth while to pay a manufacturer a higher cost to cut up material of a good conductivity.

Mr. Saunders: There are two things you require in a copper wire, a certain conductivity and a certain strength, and I notice that the previous specification allows the average of the double test. I think that is right. I think the same applies to paragraph 9 here.

Mr. Denney: Why did the committee specify that the wire shall be put up in bundles of 100 and 300, instead of one size?

Mr. Elliott: That requirement is copied from the iron bond wire specification, which is adopted by the association.

Mr. Elliott: The specification for "Armored Submarine Cable for High Tension Circuits" is practically a combination for the high tension aerial cable, with requirements that apply to submarine low tension cable. This specification is required to accompany it by a part of the a. c. specification regarding submarine cable for high tension circuits, and the only clauses

here which differ from specifications previously adopted are here submitted. It is believed that the requirements are those covering the best practice and would require the giving of a satisfactory article.

Mr. Elliott: The intention of the tables on "Electrical Tests of Rubber Insulation" and "Temperature Coefficient of Resistance" is to make this part of the specification for mineral matter, rubber compound, insulated signal wire so that an inspector in testing wire at the factory may make the curves of the resistance found to standardize the results. If the correct coefficient or standard coefficient is not used in correcting for temperature, the results will so vary as to make the resistance uncertain. Each manufacturer now uses his own temperature coefficient and the results arrived at at each factory are not comparable with those in another factory and for this reason it is desirable that a standard be adopted. This standard is what is being used by the electrical department of the New York Central and has been followed by them for a number of years and has been copied by the manufacturers from whom they have purchased wire, so that we believe we are safe in specifying the table as given here.

STANDARD DESIGNS.

The committee was instructed to (a) continue preparation of standard designs; (b) devise and use on drawings a system of symbols (preferably based on the drawing numbers) for designation of parts; and (c) prepare design of detector bar.

The committee submitted for consideration drawings as follows: terminal block (1056); rocker shaft arms (1060);



J. C. MOCK.

Chairman Committee on Standard Designs.

rocker shaft bearings (1061); rocker shaft, assembly and details (1062); and detector bars for mechanical interlocking (1098 and 1099).

The committee consists of J. C. Mock (M. C.), chairman; J. A. Peabody (C. & N. W.), vice-chairman; G. E. Ellis (K. C. T.), F. P. Patenall (B. & O.), A. H. Rudd (P. R. R.), M. E. Smith (D. L. & W.), R. E. Trout (U. P.), and J. C. Young (U. P.).

Discussion on Standard Designs.

Mr. Mock: The binding post is to supersede plan 1055, which showed a U bolt in the terminal block that was found to be a little too light and rather unsatisfactory.

Mr. Fugina: I do not understand why a U-bolt would not make a better proposition. You are putting extra connections in which you could get away from if you had a U-bolt.

Mr. Mock: In the first place this can be used to separate the circuits and is easier to manipulate, less liable to break when mounting it on the boards, and has the advantage of being able to connect several of the lines. If mounted vertically the top lines can be connected. It is more flexible as a standard and not any more expensive.

Mr. Denney: I move the approval by this meeting of plan 1056.

Mr. Elliott: Would it not be better to show the connecting links above the open space for the wire; with the link in the lower position underneath the wire it is necessary to move the wire each time the link is open to test the circuit.

Mr. Mock: That is the way the draftsman chose to show it. You can place it any way you like. We do not require that you should place the link in the top.

The president put the motion to vote and plan 1056 was approved.

Mr. Mock: This plan of rocker shaft arms relates to the detail of the bending of the arm of a rocker shaft and has been gone into very carefully. The New York Central Lines have a standard which has a straight bend. The Pennsylvania has a rocker shaft arm with a curved bend. This is more or less of a compromise, and gives a greater clearance. It has been tried out and found to be the best bend for this length of arm.

Plan 1060 was approved.

Plans 1061 and 1062 were approved.

Mr. Mock: We have had a specification on detector bars by committee on Mechanical Interlocking, and they recommended a bar as shown on plate 1099. That is a straight bar, with a part of the plate to be counter sunk for rivets and the other part to be straight holed. This committee has had on its program the design of a detector bar, but in the regular program of the work, the committee offers these bars. We have had some criticism from the committee referred to, because we have recommended the bar shown in plate 1098. The reason for our designing this bar with a bend rather than a straight bar is that it is a better mechanical device, has fewer parts and is quite as efficient.

Mr. Denney: These plans show ⅜-in iron bars. Is there any reason why the plans should not give the dimension that is shown as ⅜ inch in letters and then show ⅜ inch, 7/16 inch or ½ inch, as specified if the hole is made longer, with ½-inch bar? I think there should be a provision of some sort for a shorter bar than 55 ft. If you are going to use 50-ft. or 45-ft. bar, there is no reason why two of these sections cannot be kept standard.

Mr. Mock: The other plan, 1098, is a straight piece of variable length, although shown in this diagram as 18 ft. 8 in. The specification which we are permitted to make will be that two of the bars will be 18 ft. 8 in., offset at one end, to be bolted to the other piece, a straight bar of variable length. The two-piece bar will always be as shown in No. 10983.

The committee believes that a mechanical bar ⅜ in. thick is sufficiently heavy. As you add to the weight, of course you add to the work put on the lever, and I think they are plenty heavy enough now with 40-ft. bars. As we increase the length we increase our troubles from operation as well as maintenance. The power mechanism should be all operated with a bar of heavier construction, but then the question comes in whether it would not be better to put in more guides and keep one standard, maintain the number of guides and vary the weight of your bar. We felt that was the right thing for mechanical interlocking, but would be glad to have you give us a guide as to what you prefer.

Mr. Denney: We are using a half-inch bar and I do not see why this plan should not be revised to provide for ⅜-in., 7/16-in. and ½-in. bar, and, also, in place of the 18-ft. 8-inch dimension on the straight bar, to provide for any length of dimension or for the 18-ft. 8-in. or 5-ft. bar that we think necessary. In other words, one plan would do for any weight or any length of bar.

Mr. Elliott: I make a motion to that effect.

Mr. Stevens: Why could not we leave the thickness of the bar blank? Mr. Denney wants three sizes, some one else will want four.

Mr. B. H. Mann: We have been buying R. S. A. bars for three or four years. While perhaps it does not make much difference when you buy bars from the signal company, it makes a good deal of difference in the field, for repairs can be very much better done and done by the average man with a very few tools, if you use this as a standard. A butt straight end splice can be made by a short piece of bar. We have used our present standard for three years and there is no good reason for changing it. The Mechanical Interlocking Committee has gone into the matter thoroughly and the Power Interlocking Committee has tried to conform in this particular.

Mr. Shaver: Is the bevel the same as we have been using?

Mr. Mock: The bevels vary. This one has been in use quite extensiely. If we get enough bevel that is all we need. The stronger the bar the less the bevel. With the lap joint the less bevel the better, because you ought to cut off all the bevel in order to lap and get the full strength of the bar.

Mr. Fugina: Do I understand it is proposed to make the length 55 ft.?

Mr. Mock: There was an error on the part of the drafts-

man in putting the dimension on the last piece—it should have been left blank. The drawing shows with the three sections put together we would get 55 ft.

The president: The motion was that the thickness of the bar should be covered by a note providing ⅜ in., 7/16 in. and ½ in. and that it is considered preferable that no length should be given. This motion was made by Mr. Elliott.

Mr. Shaver: There is a difference of opinion—certainly ⅜ in. is not heavy enough for power plant, and some claim that the ½ in. is too heavy for a mechanical plant; can we compromise on 7/16?

Mr. Mock: If we have a ⅜-in. bar why not go to the ½-in., instead of the intermediate 7/16 in.?

Mr. Elliott: I would eliminate the 7/16 in. and make it ⅜ and ½ in.

The President: Mr. Elliott wants the motion modified; does the seconder agree?

(Seconder agreed.)

The President: The motion will be that the thickness of the bar shall be either ⅜ in. or ½ in. and the length of the straight piece will not be given.

(Motion carried.)

Mr. Manuel: In connection with the driving piece, I believe it would be a good thing to make the ends square, that is, the taper ends square and increase the thickness to, say ⅝ in., so that it would form a stop when used on a bar that is controlled by running plates.

Mr. Mock: The committee hopes to be able to present at the June meeting a complete curve sheet of torque for semaphore spectacle, with the plates, without the plates, with the various kinds of plates, and with the various maximum pitch, combined with the plates, and without the plates. With this information, we think the proper specifications for semaphore spectacles can be arrived at; at least, it will be information upon which a specification can be made with certainty.

A sketch of a scheme suggested by Mr. Mock for attaching relay boxes to terminal posts and a proposed design for the base, was considered informally by the meeting.

STORAGE BATTERY.

The committee was instructed to (a) review in consultation with representatives of manufacturers adopted specifications and designs for storage batteries and recommend such revisions as may be necessary to make them complete; and (b) investigate jelly electrolyte. (This committee was requested to have some matter under (a) ready for discussion at the March meeting.)

The committee held a joint meeting with manufacturers in Buffalo on January 10, 1912. Methods of charging by the charging line system, the portable battery system, and the primary battery system have been investigated. The association was requested to consider corrections in the present specifications for portable storage batteries.

The committee consists of R. B. Ellsworth (N. Y. C. & H. R.), chairman; G. E. Beck (L. S. & M. S.), J. Fred Jacobs (C. R. R. of N. J.), T. L. Johnson (D. L. & W.), A. H. McKeen (O. W. R. & N.), and A. H. Yocum (P. & R.).

Discussion on Storage Battery.

Mr. L. R. Mann: In the progress report it is stated that the preliminary reports received in regard to jelly electrolyte were inconsistent with each other, and further investigation was made. I ask the committee if the reports received on jelly electrolyte were all for automatic block signal service?

Mr. Elsworth: The use of the jelly electrolyte in signaling is very limited. I believe there are certain batteries on the Illinois Central and the Missouri Pacific. We cannot find that they have otherwise been used to any considerable extent, and the theoretical consideration of this type of electrolyte and the opinions of the manufacturers themselves in all cases justify the reports that we have been able to get at this electrolyte in the limited time at our disposal, and the committee wishes to investigate the matter further before making a definite investigation.

L. R. Mann: When we first started the use of the jelly electrolyte some manufacturers discouraged the idea, however we have had the jelly electrolyte in service for three years and absolutely nothing of a detrimental character has occurred yet.

Mr. Beck (L. S. & M. S.): The jelly electrolyte was introduced primarily to prevent leakage in case of broken jars. The trouble with jelly electrolyte has been the drying out of the jelly and while it does decrease the capacity, unquestionably, of the portable cells that are used in the automatic system service, the capacity is not used in any event, so that the decrease of the capacity does not amount to anything.

R. S. A. COMMITTEE MEETINGS.

Committee VIII, on Electric Railway and Alternating Current Signaling, H. S. Balliet, chairman, will hold a meeting in the French room at the Congress Hotel at 2:00 p. m., Tuesday, March 19, and Committee IV, on Automatic Block, A. T. Shaver, chairman, will hold a meeting on Wednesday, March 20, at 11:00 a. m., in room 1125, La Salle street station.

DINNER TO APPLIANCES ASSOCIATION OFFICERS.

R. E. Belknap, president of the National Railway Appliances Association, gave a dinner at the Blackstone hotel last night to the officers and directors of the association. Following the dinner there was informal discussions of the association's past and future work. There were present as Mr. Belknap's guests, A. P. Van Schaick, T. W. Snow, T. R. Wyles, George C. Isbester, N. M. Herch, C. W. Kelly, H. M. Sperry, J. N. Reynolds and Bruce V. Crandall.

PRESIDENT CUSHING'S DINNER.

President W. C. Cushing gave a dinner last night in the English room of the Congress Hotel to the Board of Direction and the Committee on Arrangements. Mr. Cushing's guests were: Charles S. Churchill, Edwin F. Wendt, George H. Bremner, E. H. Fritch, Hunter McDonald, William McNab, L. C. Fritch, W. B. Storey, Jr., J. B. Berry, Robert Trimble, A. S. Baldwin, C. F. Loweth, F. R. Coates, W. A. Christian, J. B. Cox, E. H. Lee and W. A. Wallace. Mr. Churchill presented President Cushing with the special badge of the association, making a brief speech to which the president feelingly responded.

DINNER OF COMMITTEE ON SIGNAL PRACTICE.

The members of Committee I of the Railway Signal Association, that on Signal Practice, which is composed of the same persons as the committee on Signal Practice of the American Railway Engineering Association, had a dinner in the Green Room of the Congress Hotel last evening. Several persons besides members of the committee also were invited. Among those attending the dinner were the following: L. R. Clausen, C. P. Coleman, F. P. Patenall, W. H. Elliott, C. H. Morrison, W. J. Eck, A. R. Fugina, C. E. Denney, B. H. Mann, Frank Rhea, Azel Ames, A. G. Shaver, M. H. Hovey, T. S. Stevens, E. F. Wendt, C. H. Ewing, C. A. Christofferson, C. A. Dunham, G. E. Ellis, H. S. Balliet, J. C. Young and M. D. Hanlon.

FOREIGN RAILWAY NOTES.

In the Ivory Coast Colony, Africa, a railway is being operated from the port of Bingerville to Macouguie, and extensions inland are projected which will almost double the length of the line.

In French Guinea, Africa, a line is already in operation from the port of Konakry to Kindia, an inland town in the northeast of the colony. This line will eventually be extended to Kouroussa, on the Niger river.

In the island of Reunion, near Madagascar, there is a railway system which runs around the greater part of the island, with the exception of the west coast and a short gap on the northeast coast, where it is intended to link up the existing termini on either side. This line when completed will be about 75 miles long. It is also proposed to extend it along the south coast from the present terminus of Saint Perre to Saint Joseph.

The present position of railway construction in French East Africa may be summarized as follows: In addition to the Dakar-Saint Louis Railway, a line has already been

completed in Senegal between Kayes and Baroueli, a considerable distance in the interior of the colony. This line will eventually be linked up to the Dakar-Saint Louis system by the construction of a railway between Kayes, the western terminus, and a point near Thies, which is northeast of Dakar.

THE EXHIBIT.

That the National Railway Appliances Association has fully sustained its reputation for repeated improvements not only in the number and arrangement but in the quality and variety of the manufacturers' exhibits at its exhibitions cannot fail to be the testimony of all who visited the Coliseum and the First Regiment Armory yesterday.

With reference to the magnitude of the exhibit this year's display fully continues the record of progressive development which has been made in each of the past three years. In 1909, the first year in which the exhibit was held in the Coliseum, only the main floor was required for the display of the latest devices of interest to the railway officers in attendance at the convention. In 1910 the exhibits overflowed into the Annex in the south end of the Coliseum; and last year both the main floor and the annex were occupied, and the balcony as well. This year the balcony has been given over to seats for spectators, from which the attractive general arrangement may be observed to advantage, and in addition the entire main floor of the First Regiment Armory adjoining the Coliseum's southeast corner has been taken for exhibits.

The two buildings afford nearly 54,000 square feet of net exhibit space, which has been divided into 297 spaces. The total number of exhibitors, occupying from one to twelve spaces each, is 189.

Probably the first feature of the exhibit display to arrest the attention of the visitor is the unusually attractive appearance presented by the arrangement plan of the Coliseum as a whole. The aisles in which the various exhibit booths are arranged are formed by a series of square columns finished with burlap colored with a tasteful blend of gilt and light green, and surmounted by large spherical electric lights which furnish a peculiarly soft form of illumination. Each column bears the initials of the appliance association, "N. A. R. A.," within a carved wreath.

For the separation of the booths this year, instead of the familiar styles of railing or partition, there has been used a uniform type of fence, made of wood painted black in imitation of iron picket fence. This, together with the absence of railing in front of the exhibit spaces, adds greatly to the open, airy appearance of the entire group of exhibits.

In the center of the main aisle facing the entrance to the Coliseum is an attractive centerpiece of intersecting arches. Mounted in the uniform columns and under the arch is a convenient sanitary drinking fountain with four bubbling cups.

The exhibits themeselves have been grouped in a general way according to the character of the apparatus. For instance, most of the signal exhibits, which are in great variety, are grouped in the northwest corner of the Coliseum, occupying two aisles south of the main entrance, many of them in actual operation. Other signal exhibits are in other parts of the two buildings.

The Annex is given over mainly to the devices and appliances requiring a comparatively large space for their proper display, such as steel ties, special work, hoists and derricks and track scales. The Armory is principally occupied by the heavier track work exhibits, steel ties, switches, frogs and crossings and manganese special work.

Opposite the entrance is a large sign displaying the names of the exhibitors occuping the Armory, which is reached from the southeast end of the Coliseum through a canvas-covered passageway.

A detailed description of the devices collected at the Coliseum for the inspection of the railway men is of course impossible. Excellent as has been the displays in previous years, those in charge of the exhibit and the individual manufacturers themselves have exceeded their previous efforts in bringing to the fore their latest and best improvements in appliances for the construction, maintenance and operation of railways in accordance with the most approved principles of practice from the standpoint of efficiency, economy and safety.

A marked development of the scope of the exhibits is noticeable in the number of mechanical appliances on view which are less directly connected with engineering department work, than the bulk of the exhibits, such as machinery for the operation of coaling stations and water-softening plants, track scales, water tanks, hoists and derricks.

Another noticeable development is seen in the number of exhibits of special ties and rail joints. Eight different types of special ties, of which the majority are of steel, and some of which included a rail joint feature, were counted in a cursory visit to the exhibit. Eight different exhibits of motor track cars also were observed, some of them including many different types of various kinds of service, including cars especially equipped with apparatus for driving screw spikes.

The exhibitors as well as the visitors are to be congratulated on the complete stage of preparation of the exhibits on the afternoon of the first day. Only a very few spaces were not completely equipped with the devices to be displayed, and while the sound of the hammer was still in evidance during the afternoon in a few cases, most of the exhibits not yet complete seemed to be those of small articles to be easily installed.

The Roadmasters and Maintenance of Way Association has a booth this year in the annex and is keeping open house for roadmasters who visit the exhibits.

The Coliseum and the Armory were opened at 1 p. m. yesterday and hereafter will be open from 10 a. m. to 10 p. m.

A musical program will be rendered each afternoon and evening in the Armory by Brooks' Band.

WILLIAM McNAB ON THE PANAMA CANAL.

William McNab, principal assistant engineer of the Grand Trunk, and a past president of the American Railway Engineering Association, who arrived in Chicago yesterday to attend the annual meeting of the association, returned recently from Panama, where he went to see the Panama Canal. His opportunities for inspecting the canal were most favorable, as he was the guest while in Panama of the officials of the United States Government who are in charge of the construction work.

Mr. McNab had many interesting comments to make regarding the canal, the work on it, and the commercial changes its opening will produce.

"The undertaking may be looked upon as possessing at least, two main features," he said, "first, construction work in general; second, future effect in the economics of commerce.

"In regard to the first, even the most conservative mind must admit that it is, as a whole, a stupendous work—one of the greatest in magnitude and cost in the world's records.

"It was a fortunate thing to have seen it in its present advanced and exposed state, for once it is watered, it is obvious that it will never be unwatered, and all that will

afterwards be exposed to ordinary view will virtually be a vast artificial lake, a canyon river, the upper portions of locks and the face of the concrete spillway and earthen dam.

"It is then that in the minds of some, wonder may arise, —and naturally too,—in regard to justification for the expenditure of so much money on such an apparently simple undertaking.

"The difficulties, however, which have been and are still being contended with, the methods of overcoming such physical conditions in order to complete the work involved, the class of materials used in every branch of the undertaking and the systematic and admirable form of accounting,—the details of all of which are at present exposed to view, and at close range,—are elements which ought to destroy any line of reason for such questioning.

"The history of the old French company's plans and proceedings, as well as the after negotiations which led to the present construction and ownership, are still fresh in the general mind. These events, including the views individually and collectively of engineers, subsequently and specially invited by the president of the United States, on the question of 'sea level,' or 'locks' as well as the after discussions in Congress, need not be referred to, beyond the statement that notwithstanding certain advantages claimed by the 'sea level' supporters, it is not quite clear to any one who has seen and studied the general conditions and taken into account the lengthy time which would have been taken to complete, as well as the almost double cost which would have been required over the lock system, that the adoption of the latter was a wise choice.

"It is rarely that one can see a work of magnitude in which the principles of division of labor are better exemplified than in this canal project. The force works automatically, so to speak, and there did not appear to be the slightest bunching of any part of the labor and plant which would produce waste of time in any other part. The value of conditions represented by such a statement will be appreciated, when one takes into account the great force of men and plant that is employed.

"Among many special features which appeal favorably to the engineer or operating officer of a railway," Mr. McNab continued, "is the admirable system of service tracks, including the switching movements and signaling. Those are matters of operation and work train movements. Much of the success and speed of the work has been dependent on this feature. Then there are the movable steel forms for the concrete masonry, the unique system of watering, and unwatering the locks uniformly, the construction features of the great steel gates and method of hanging and swinging the same. There are also the enormous traveling cranes and concrete mixing plants at various places, and the dam and spillway at Gatun, all of which are on an exceptionally large scale. Fluctuations in Gatun lake, due to floods, are to be controlled by means of this spillway and its openings. The surplus water will pass through the spillway into the original bed of the Chagres river.

"On a large scale also, are aerial cable way conveyors, track lifting machines, earth spreaders and Lidgerwood unloaders, the plan of action in each of these cases leaving little room for anything but favorable comment and criticism.

"There can be little doubt but that the Canal will in general create an entirely new commercial situation. Its operation will not only form new geographical features and substantially modify the complexity of the world's commerce, but it will be an element of such importance, that its influence will be universally felt in a more or less degree in every branch of trade. The north will be nearer and in closer relationship to the south and the south will be closer to the north. The Central American Republics, too, which hitherto may have been an uncertain element in modern business and social life, should naturally fall in line with and share in such development. The fruit districts of Central America and the West Indies will also undergo rapid expansion in meeting the new order of things.

"It is unnecessary to quote the savings in distance in certain existing sailing routes which will be effected after the Canal is in use. Reference to a terrestial globe or a graphic diagram will afford any particular information in that respect, but it is obvious, among other things, that rapid growth of Pacific ports may be looked for.

"I was credibly informed that the Canal will be watered by July 1, 1913, and although it will not receive official opening at that date, this formality will without doubt take place some time in 1914."

IMPROVEMENTS PLANNED FOR BELT RAILWAY OF CHICAGO.

Fourteen of the principal railways entering Chicago have joined in a plan for the joint ownership and operation of the Belt Railway of Chicago for the interchange of through freight in the Chicago terminal district, which will require eventually a considerable amount of construction work in the city. Two additional elevated main tracks are to be constructed between Seventy-sixth street and Pullman Junction by the Chicago & Western Indiana, to be leased to the Belt, and an auxiliary clearing yard is to be constructed at or near South Chicago. Additional trackage and yard facilities are to be constructed for the Belt as the traffic requires, including the elevation of tracks to avoid all grade crossings. Under the provisions of the agreement, the Chicago, Rock Island & Pacific; Atchison, Topeka & Santa Fe; Illinois Central; the Chicago, Madison & Northern; Pennsylvania Lines; Chicago, Burlington & Quincy; Wabash; Erie; Chicago, Indianapolis & Louisville; Chesapeake & Ohio; Grand Trunk; Chicago & Eastern Illinois; Chicago & Alton, and Chicago, St. Paul, Minneapolis & Omaha will become joint stockholders of the Belt, which will continue to lease as at present the Belt division of the Chicago & Western Indiana Railway, an inner belt line extending from South Chicago to Cragin and intersecting all roads entering the city. In addition, the Western Indiana will purchase and lease to the Belt the property of the Chicago Union Transfer Company, including the large modern hump clearing yard in the southwestern part of the city, which now has about 100 miles of trackage and a capacity of 5,000 cars per day and property sufficient to expand the capacity to 20,000 cars per day. The expenses and rentals of the Belt are to be paid by the stockholding roads on a per car basis. The plan will greatly relieve the congestion of the Chicago terminal district by removing to outside yards much of the interchange of through freight now handled at downtown terminals. The negotiations were conducted by W. H. Lyford, general counsel of the Chicago & Eastern Illinois, as counsel for the reorganization committee of the Belt.

CONFERENCES ON SIGNALING IN INDIANA.

The Indiana railway commission will hold a series of conferences during the week of March 25 with steam roads in the state, for the purpose of determining what the railways propose to do with respect to the commission's requirements as to block signaling. The Pennsylvania, Erie, Baltimore & Ohio Southwestern, Evansville & Terre Haute, Chesapeake & Ohio of Indiana and Cincinnati Hamilton & Dayton will be represented. M. H. Hovey consulting signal engineer, will be among the representatives of the commission.

REGISTRATION—RAILWAY SIGNAL ASSOCIATION.

ACTIVE MEMBERS.

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Poor, F. A., Rail Joint Co., Chicago, Ill.
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Thompson, H. G., Edison Storage Battery Co., Orange, N. J.
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NATIONAL RAILWAY APPLIANCES ASSOCIATION.

The National Railway Appliances Association, which conducts the railway supply exhibits in the Coliseum and the First Regiment Armory, is a successor of the Road and Track Supply Association, which had its origin in 1894. At the annual meeting in 1910 the name of the association was changed to Railway Appliances Association, and last fall it was incorporated under the name of the National Railway Appliances Association.

The history of the original association was outlined in an article which appeared in the Daily Railway Age Gazette of March 15, 1910. We print herewith the photographs of the officers and members of the board of directors who were elected at the annual meeting on March 21 of last year.



ROBERT ERNEST BELKNAP
President.

The president of the association, Robert Ernest Belknap, is Chicago sales agent of the Pennsylvania Steel Company and the Maryland Steel Company. He graduated from Johns Hopkins University in 1897, and his connection with railway work dates back to 1898, when he was engaged in building the Eighth avenue and Sixth avenue underground trolley conduits for the Metropolitan Street Railway, New York City, as assistant to the engineer for the National Contracting Company. In 1901 he joined the sales force of the Pennsylvania Steel Company and Maryland Steel Company, and after working in all the different departments, especially the rail, frog and switch departments, billet mill, steel foundry and bridge shop, and the forging, machine and marine departments, he was attached to the general sales office at Steelton. In July, 1902, Mr. Belknap was transferred to the new Chicago sales office as assistant sales agent and western representative, and in 1906 was made sales agent. He is also a director of the T. W. Snow Construction Company and is an associate member of the American Society of Civil Engineers. He became a member of the executive committee of the association in 1908.



A. P. VAN SCHAICK.
Vice-President.

A. P. Van Schaick, vice-president of the association, is district sales agent of the Lackawanna Steel Company at Chicago. For four years he was connected with the sales department of the Pittsburgh Plate Glass Company, Chicago. During the succeeding five years he was president of the W. K. Kenly Company, railway supplies, Chicago,



C. W. KELLY.



S. W. HAYES.



H. M. SPERRY.



T. R. WYLES.



T. W. SNOW.



N. M. HENCH.



JOHN N. REYNOLDS.
Treasurer.



GEORGE C. ISBESTER.



BRUCE V. CRANDALL.
Secretary.

OFFICERS AND DIRECTORS OF THE NATIONAL RAILWAY APPLIANCES ASSOCIATION.

and he has held his present position as district sales agent of the Lackawanna Steel Company for the past two years.

John N. Reynolds, who is treasurer of the association and who until last year had been secretary and treasurer since 1902, is western manager of the Railway Age Gazette, The Signal Engineer and the American Engineer.

Bruce V. Crandall was appointed secretary of the association, effective July 1 last year.

The other members of the board of directors, in addition to the officers, are: T. R. Wyles, second vice-president of the Detroit Graphite Company, Chicago; George C. Isbester, representative Rail Joint Company, New York; S. W. Hayes, president Hayes Track Appliance Company, Richmond, Ind.; N. M. Hench, engineer of railway appliances, Carnegie Steel Company, Chicago; C. W. Kelly, Fairbanks, Morse & Co., Chicago; H. M. Sperry, General Railway Signal Company, Rochester, N. Y., and T. W. Snow, president T. W. Snow Construction Company, Chicago.

THE FOUNDERS OF THE ENGINEERING ASSOCIATION.

On October 16, 1897, the following letter, signed by Harry P. Robinson, president of The Railway Age, was sent to representative railway officers:

"The Railway Age has been asked to take the initiative in a movement for the organization of an association of railway officers connected with the engineering and maintenance of way departments. Nearly all other branches of the service have their representative associations, which are of undoubted value in their respective provinces. In these departments, however, there is no organization between the general engineering societies, which only partially interest railway men, and the Roadmasters' Association, which, from its nature, cannot adequately cover the field.

"The new association, whatever its name might be if organized, would include all officers interested in the construction and maintenance of the track and roadway and the structures associated therewith, whatever the titles of such officers might be on individual roads.

"Will you let us know if you would join such an association if properly organized, and if you would endeavor to attend a preliminary meeting if called to meet in Chicago at some date in the near future?"

The responses were encouraging, and on October 21 of the following year a meeting was held at the Auditorium Hotel, Chicago, attended by the following:

Augustus Torrey (chief engineer, Michigan Central, now deceased); H. A. Kennedy (general superintendent, Cleveland, Canton & Southern); F. E. Paradis (chief engineer, Chicago Terminal Transfer, now district engineer, New York Central and Hudson River); Curtis Dougherty (roadmaster, Illinois Central, now chief engineer, Queen & Crescent); G. W. Merrill (roadmaster, C. M. & St. P.); W. S. Kinnear (principal assistant engineer, Michigan Central, now president Kansas City Terminal, and just elected president United States Realty & Trust Company); J. W. Taylor (chief engineer, Terminal Railroad Association of St. Louis, now deceased); W. E. Emery (roadmaster, C. M. & St. P., now chief engineer Peoria & Pekin Union); E. C. Macy (division engineer, Iowa Central, now with Stone & Webster at Seattle, Wash.); W. M. Duane (roadmaster, Cleveland Cincinnati, Chicago & St. Louis, now a consulting engineer at Cincinnati, Ohio); J. B. Dickson (roadmaster, C. & N. W., now general agent, Erie); L. C. Fritch (superintendent, B. & O. S. W., now chief engineer, C. G. W.); C. A. Wilson (chief engineer, C. H. & D., now a consulting engineer at Cincinnati, Ohio); G. S. Cheyney (general roadmaster, Indianapolis, Decatur & Western); H. W. Church (roadmaster, L. S. & M. S.); G. H. Bremner (assistant engineer, C. B. & Q., now district engineer, C. B. & Q.); and H. P. Robinson (Railway Age).

Of these 17, eight are now members of the American Railway Engineering Association. They are: Messrs. Dougherty, Kinnear, Macy, Duane, Dickson, Fritch, Wilson and Bremner.

A preliminary organization was effected at this meeting, and the name American Railway Engineering and Maintenance of Way Association was chosen. On March 30, 1899, a second meeting, called by The Railway Age, was held at Buffalo, N. Y.; a constitution was adopted and the following officers elected: President, John F. Wallace (assistant second vice-president, Illinois Central, now vice-president, K. C. M. & O., and chairman of the board, Westinghouse, Church, Kerr & Co.); first vice-president, P. A. Peterson (chief engineer, Canadian Pacific, now retired from active service); second vice-president, W. G. Curtis (engineer maintenance of way, Southern Pacific, now deceased); treasurer, W. S. Dawley (chief engineer, C. & E. I., now building the Yunan-Szechuan & Tengyueh, in China); secretary, L. C. Fritch; directors, Augustus Torrey, Thomas Rodd (then, as now, chief engineer, Pennsylvania Lines), D. J. Whittemore (chief engineer, C. M. & St. P., now retired), F. H. McGuigan (Grand Trunk, now president McGuigan Construction Company, Toronto, Ont.), W. K. McFarlin (C. R. I. & P., now with the T. A. Gillespie Construction Company, New York), and Hunter McDonald (then, as now, chief engineer, N. C. & St. L.).

The first convention was held March 14 and 15, 1900, in Chicago, and all subsequent annual meetings have been held there.

OFFICERS AND PAST PRESIDENTS, A. R. E. A.

President—W. C. Cushing chief engineer, maintenance of way, Southwest System, Pennsylvania Lines west of Pittsburgh, Pittsburgh, Pa.

First Vice-President—Charles S. Churchill, chief engineer, Norfolk & Western, Roanoke, Va.

Second Vice-President—Edwin F. Wendt, assistant engineer, Pittsburgh & Lake Erie, Pittsburgh, Pa.

Past Presidents—John F. Wallace, vice-president, K. C. M. & O. and chairman, Westinghouse, Church Kerr & Co., 1899-1900 and 1900-1901; George W. Kittredge, chief engineer, N. Y. C. & H. R., 1901-1902 and 1902-1903; Hunter McDonald, chief engineer, N. C. & St. L., 1903-1904 and 1904-1905, Howard G. Kelley, vice-president, G. T., 1905-1906 and 1906-1907; A. W. Johnston, general manager, N. Y., C. & St. L., 1907-1908; William McNab, principal assistant engineer, G. T., 1908-1909, and 1909-1910; L. C. Fritch, chief engineer, C. G. W., 1907-1911. Walter G. Berg, chief engineer, Lehigh Valley, was elected president for the year 1908-1909, but never presided over a convention, having died in May, 1908.

Directors—A. H. Rudd, signal engineer, Pennsylvania Railroad, Philadelphia, Pa.; W. B. Storey, Jr., vice-president, Atchison, Topeka & Santa Fe Railway System, Chicago; A. W. Thompson, general manager, Baltimore & Ohio, Baltimore, Md.; J. B. Berry, chief engineer, Chicago, Rock Island & Pacific, Chicago; F. S. Stevens, engineer maintenance of way, Philadelphia & Reading, Reading, Pa.; Robert Trimble, chief engineer maintenance of way, Northwest System, Pennsylvania Lines west of Pittsburgh, Pittsburgh, Pa.; J. A. Atwood, chief engineer, Pittsburgh & Lake Erie, Pittsburgh, Pa.; A. S. Baldwin, chief engineer, Illinois Central, Chicago; C. F. Loweth, chief engineer, Chicago, Milwaukee & St. Paul, Chicago.

Treasurer—Geo. H. Bremner, engineer, Illinois District, Chicago, Burlington & Quincy, Chicago.

Secretary—E. H. Fritch, Chicago.

Editor of Publications—W. D. Pence, professor of railway engineering, University of Wisconsin, Madison, Wis.

Committee on Arrangements—F. C. Coates, chairman; Geo. H. Bremner, W. A. Christian, J. B. Cox, L. C. Fritch, E. H. Lee, William McNab, W. A. Wallace.

At the Coliseum

LIST OF EXHIBITORS.

The following is a complete list of all exhibits in place or being installed in the Coliseum and the First Regiment Armory. Spaces numbered from 1 to 224, inclusive, are in the Coliseum, and unless otherwise indicated, the space numbers in the list are in the Coliseum. Exhibits in the Armory are so indicated:

Adams & Westlake Company, New York, Chicago and Philadelphia.—Signal lamps of every description, long time burners, heat resistance glass, etc. Represented by Walter H. Baldwin, G. L. Walters, A. S. Anderson, C. B. Carson, H. G. Turney, W. J. Pierson, F. N. Grigg. Spaces 83-84.

Allith-Prouty Company, Danville, Ill.—Door hangers, floor hinges, store ladders, fire door hardware, merchandise carriers, and hardware specialties. Represented by L. H. Mason, J. E. Moyer and G. A. Miller. Space 96.

American Casting Company, Birmingham, Ala.—National lock joint cast iron culvert pipe. Represented by D. B. Dimick, E. E. Weaver and H. V. Dimick. Space 53.

American Concrete Pile & Pipe Company, Chicago, Ill., and New York, N. Y.—Reinforced concrete culvert pipe and piles. Represented by Charles Gilman, C. F. Quincy, T. W. Snow, A. E. Stokes, W. A. Wallace, O. J. West, H. W. Wilder. Space 48.

Alexander Continuous Rail Crossing Company, Clinton, Ill.—Full-sized crossing. Represented by C. R. Westcot, L. Alexander, P. J. Malon, S. Wagner, Robert Johns. Spaces 231-232-233-234.

American Guard Rail Fastener Company, Philadelphia, Pa.—Vaughan guard rail clamps, anchor guard rail clamps, Vaughan automatic rail anchors, tie plates, guard rail fasteners and splice and rail straighteners. Represented by D. F. Vaughan, Chas. Z. Vaughan and David L. Vaughan. Space 119.

American Hoist & Derrick Company, Chicago, Ill.—Standard and bridge erectors' hoisting engines, moving picture exhibit American railway ditcher. Represented by Frank J. Johnson, W. O. Washburn and W. L. Manson. Spaces 146 and 217-218-219.

American Iron & Steel Manufacturing Company, Lebanon, Pa.—Track bolts, screw-spikes, cut spikes, tie rods, castellated nuts. Represented by Francis T. West and Chas. J. Gadd. Space 109.

American Nut & Bolt Fastener Company, Pittsburgh, Pa.—Bartley fasteners and Bartley self-locking fasteners. Represented by Edwin M. White and Christopher Murphy. Space 146.

American Rail Joint Company, Niagara Falls, N. Y.—Rail joints. Represented by Thos. D. Beddoe. Space 19.

American Railway Signal Company, Cleveland, O.—Electric interlocking apparatus, electric automatic signals, dwarf signals, electric relays and switch locks. Represented by Geo. L. Weiss, H. M. Abernethy, H. D. Abernethy, S. J. Turriff and R. Eiseman. Spaces 21-22.

American Rolling Mill Company, Middletown O.—American ingot iron, corrugated culverts and other pure iron products, sheets, plates, boiler tubes, rivets, etc. Represented by Paul T. De Frees, Ray Fraser, H. W. Force, G. H. Clark, G. F. Ahlbrandt. Spaces 99-100.

American Steel & Wire Co., Chicago, Ill.—American railroad fences, steel fence posts, signal wire, American rubber-covered wire, railroad switching rope, American wire rope, rail bonds and tie-marking nails. Represented by J. W. Meaker, H. A. Squibbs, L. A. Dietrich, Ben. Ryder, A. W. Sprague, A. W. Froude, S. F. Deems, C. H. Longman and L. P. Shanahan. Space 245

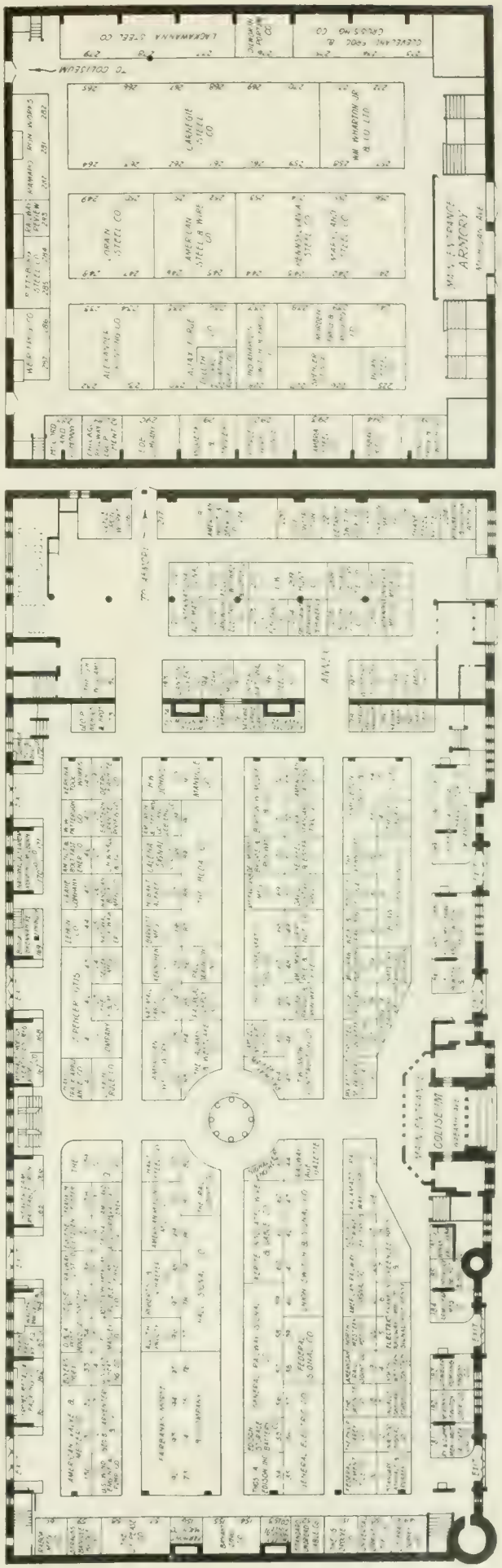
American Valve & Meter Company, Cincinnati, O.—Poage automatic water columns, Fenner drop spouts, Anderson Economy and Buckeye switch stands, Anderson interlocking switch stands and safety switch appliances. Represented by J. T. McGarry and F. C. Anderson. Spaces 130-131-132.

American Vulcanized Fibre Company, Wilmington, Del., and Pittsburgh, Pa.—Original vulcanized fibre for rail joint insulation, steel cross tie insulation. Represented by John Barron. Space 117.

American Well Works, Aurora, Ill.—Deep-well pumps, irrigation pumping machinery, centrifugal pumps, turbine pumps. Rrepresented by Geo. W. Igo, C. B. Spier and A. W. McLean. Spaces 102-103.

Armspear Manufacturing Company, New York, N. Y.—Railway signal lamps and lanterns. Represented by C. K. Freeman and F. A. Buckley. Space 184.

Ajax Forge Company, Chicago, Ill.—Manganese frogs, Ajax manganese guard rail, adjustable switch rods, detector



Floor Plan of Coliseum and Armory, Showing Arrangement of Exhibits.

bars, braces, Ajax rail steel braces. Represented by F. B. Bradley, H. G. Elfborg and H. C. Hutchins. Spaces 230-235-236, Armory.

Asphalt Ready Roofing Company, New York—Protection brand roofing, Hudson brand asphalt felts. Represented by H. H. Huested, W. A. Hemenway and B. Blackwell. Space 167.

Atlas Preservative Company of America, New York, N. Y. —Atlas "A" advertising matter. Represented by R. N. Chipman and B. G. Thompson. Space 177.

Barrett Manufacturing Company, New York, N. Y.—Barrett specification roofs, bridge waterproofing, ready roofing, dampproofing, waterproofing, freight house and machine shop sub-floors. Represented by H. B. Nichols, W. S. Babcock, H. Olmsted Jr., Jack Caldwell, Chas. Gage, A. B Faison, C. T. Bilyea, J. B. Walker. Space 106.

Beaver Dam Malleable Iron Company, Beaver Dam, Wis.— Malleable tie plates, rail braces and general castings. Represented by F. Bell, J. V. Cowling, F. S. McNamara, E. A. Hawks and D. P. Lamoreaux. Spaces 165-166.

Blaw Steel Centering Company, Pittsburgh, Pa., New York, N. Y., Chicago, Ill.—Steel forms for retaining walls, culverts, concrete pipe, cattle passes, buildings and houses. Represented by J. B. Blaw, A. P. Wilson, Edw. Wilson, T. M. Avery, W. M. Venable, H. B. Loxterman and C. H. Lehman. Spaces 11-12-13.

Blocki-Brennan Refining Company, Chicago, Ill.—Structural iron paint. Represented by James C. Cleary, Gordon Douglass, R. L. Bracher and W. F. Brennan. Space 169.

Bowser & Co., Inc., S. F., Fort Wayne, Ind.—Oil storage systems, self-measuring long-distance pumps, filtration system, etc. Represented by W. T. Simpson, F. T. Hyndman and E. H. Barnes. Space 186.

Brach Supply Co., L. S., New York, N. Y.—Railway signal and telephone lightning arresters, non-air-gap and vacuum types; highway crossing bells, automatic flagmen indications, Solderall and soldering appliances. Represented by Leon S. Brach, Alexander G. Brach and Henry E. Gifford. Space 149.

Bryant Zinc Company, Chicago, Ill., and New York, N. Y.— Locomotive type bells, highway crossing signals, relays, annunciators, channel pins and fibre conduit tools, etc. Represented by Stanley C. Bryant, M. J. Costigan, J. W. Cremerius, A. F. Klink, P. W. Herbst. Space 154-155.

Buda Company, Chicago, Ill.—Motor cars, velocipede cars, electric crossing gate, jacks, track drills, crossings, frogs and switches, bumping posts, replacers, etc. Represented by L. Hamill, J. L. Artmaier, J. J. Gard, J. T. Harahan, Jr., A. R. Dyer or M. E. Towner. Spaces 87-88-89-90.

Buyers' Index Company, Chicago, Ill.—Book "Railway supply index—Catalogue." Represented by Lloyd Simonson, H. E. Frame, Alexander Smith, Norman F. Rehm, D. J. Beaton and F. B. Cozzens. Space 133.

Cambria Steel Company, Johnstown, Pa.—Rails, 100 per cent rail joints, Morrison guard rails, wire and wire products, heat-treated axles. Represented by J. Leonard Replogle, E. F. Kenney, Andrew Morrison, C. B. McElhaney, C. J. Ellis and H. P. Hubbell. Space 293, Armory.

Canton Culvert Company, Canton, O.—Acme and Imperial corrugated No-Co-Ro metal culverts, Duro perforated corrugated No-Co-Ro metal railway drains, etc. Represented by Perry Van Horne, Charles W. Davis and J. A. Laird. Space 193.

Carey Company, Philip, Cincinnati O.—Carey's flexible cement roofing application of waterproofing materials to concrete work, damp-proofing of concrete walls, asbestos and 85 per cent magnesia products, roofing paints, metal paints, etc. Represented by D. R. Warfield, Frank Carter, N. S. Kenny and E. S. Main. Space 17.

Carnegie Steel Company, Pittsburgh, Pa.—Carnegie steel switch ties, frogs, switches, etc.; Duquesne rail joints, steel sheet piling, steel wheels. Represented by N. M. Hench, C. F. W. Rys, A. R. Archer, Robert Coe, G. E. Dix, C. B. Friday, L. S. Thomson, G. W. Landrus, P. W. O'Brien, J. B. Arnold, W. H. C. Carhart, H. C. Griswold, D. E. Sawyer, E. B. Eddy, O. W. Baker, B. E. Hamilton and Fred R. Ohl. Spaces 259-270, Armory.

Carpenter Company, Geo. B., Chicago, Ill.—All kinds of bell rope, transmission rope, wire rope blocks, chain hoists, belting, packing and wire rope. Represented by W. Sosthein, C. H. Gleason. Spaces 112-113.

Chicago Bridge & Iron Works, Chicago, Ill.—Elevated tanks, bridges, retorts and coal chutes. Represented by M. J. Trees, E. G. Ladd, C. M. Ladd, C. S. Pillsbury and G. T. Horton. Space 47.

Chicago Pneumatic Tool Company, Chicago, Ill.—Rockford railway motor cars for section, inspection and signal work, motor car with generator for driving electric drills for spike driving, electric drills for spike driving. Represented by C. E. Walker, J. T. Hume, C. B. Coates, C. B. Stevenson, T. E. Buck, E. S. Cole and E. Aplin. Spaces 66-67-68.

Chicago Railway Equipment Company, Chicago, Ill.—Brake beams, Monitor bolsters, Creco side bearings. Represented by C. H. Williams Jr., F. T. De Long, Geo. N. Van Sweringen, E. F. Leigh, R. S. Deacon, C. S. De Long and Ernest Le Beau. Space 289.

Chicago Steel Railway Tie Company, Chicago, Ill.—Steel railway tie. Represented by J. F. Inglesby, W. E. McKee and J. A. Pement. Space 208.

Cleveland Frog & Crossing Company, Cleveland, O.—Hard Service frogs and crossings, rolled manganese frogs and crossings, switch stands, guard rail clamps, switches, guard rails, tie rods, rail braces. Represented by G. E. Lucas, George Stanton, L. G. Parker, George Arnold, G. A. Peabody and S. Balkwill. Spaces 273-274-275, Armory.

Clyde Iron Works, Chicago, Ill.—Erectors' hoist, drag line bucket model, blocks and sheaves. Represented by A. E. Holcomb and G. P. Miller. Space 5.

Columbia Nut and Bolt Company, Inc., Bridgeport, Conn.— Columbia lock nuts, castle nuts. Represented by Fred Atwater and John E. Eipper. Space 172.

Conley Frog & Switch Company, Memphis, Tenn.—Conley patent frog, Dixie rail brace, manganese track work. Represented by J. E. Conley, F. W. Lange and Fred C. Taylor. Space 295, Armory.

Cook's Standard Tool Company, Kalamazoo, Mich.—Cook bonding drill, Climax heavy duty track drill, Magic grinder, Magic chuck, Magic bits, Standard jacks, Standard guards. Represented by Eugene Cook, F. C. Butler, H. M. Buck and Edw. B. Cook. Space 52.

Crane Company, Chicago, Ill.—Special valves for creosote, zinc, chloride, Crane tilt steam traps, special valves for railway and locomotive service, malleable and cast iron fittings. Represented by F. D. Fenn, G. S. Turner and F. C. Sabin. Space 145.

D. & A. Post Mold Company, Three Rivers, Mich.—"D. & A." 10-post machine, anchor post molds, special line post molds, "D. & A." cement posts and sections, post reinforcement, tie wires, etc. Represented by G. H. Dougherty, L. R. Dougherty, A. E. Armstrong. O. Dougherty and J. W. Armstrong. Space 134.

Dietzgen Company, Eugene, New York—Complete line of transits, levels, rods, tapes, poles, filing devices and other supplies used by engineers. Represented by W. E. Cook, W. O. Phillips, W. H. Lerch, G. C. Moore, C. F. Cole and T. D. McElhiney. Space 137.

Detroit Graphite Company, Detroit, Mich.—Paint for buildings, bridges, boats, cars, etc. Represented by T. R. Wyles, L. D. Mitchell, E. Booth, A. H. Kuerst, J. J. Hogan, B. O'F. Randolph and J. T. Dinkgrave. Space 129.

Detroit Switch Lock Company, Detroit, Mich.—Self-locking switch stand. Represented by A. Kaltschmidt. Space 221.

Des Moines Bridge & Iron Company, Pittsburgh, Pa., and Des Moines, Ia.—Photographs of water towers, formed spherical sections of tank bottoms and slide rule calculators. Represented by Robert W. Baily, W. W. Hendrix, W. H. Jackson, G. A. Smith. Space 70.

Paul Dickinson, Inc., Chicago, Ill.—Dickinson cast iron smoke jacks, Dickinson sheet iron ventilators, Dickinson cast iron chimneys, Dickinson cast iron ventilators. Represented by J. A. Meaden, A. J. Filkins, Geo. M. Kenyon and Wm. H. Dayton. Space 86.

Dilworth, Porter & Co., Ltd., Pittsburgh, Pa.—Tie plates and spikes. Represented by Wm. Goldie, Jos. Dilworth, T. C. Coleman, W. F. Schleiter and Chas. Johnston. Space 276.

Jos. Dixon Crucible Company, Jersey City, N. J.—Graphite paint, crucibles, graphite productions. Represented by E. R. Smith, H. W. Chase and R. R. Belville. Space 116.

Drouve Company, G., Bridgeport, Conn.—"Anti-Pluvius" puttyless skylights, "Straight-Push" sash operator. Represented by William V. Dee and R. S. Adam. Space 151.

Duluth Corrugating & Roofing Company, Duluth Minn.— Corrugated galvanized iron culverts, portable steel tool house. Represented by James W. Walker and M. J. McMartin. Space 229.

E. D. E. Co., Chicago, Ill.—Anti-creeper tie plate with lock device, refrigerator and passenger car ventilator made in both steel and wood. Represented by Frank M. Gilmore and Frank J. Burns. Space 290.

Eastern Granite Roofing Company, New York, N. Y.— Granite roofing, "Evertite" roofing, "Tisbest" roofing, Palmoid roofing. Represented by H. Henning, C. F. Barstow and W. F. Sachs. Space 128.

Economy Separable Switch Point Company, Louisville, Ky. —"Economy" separable switch point, "Economy" adjustable

head rod, "Economy" foot guard, "Economy" separable claw bar, positive rail anchor and Betts combination rail anchor and tie plate. Represented by W. M. Mitchell, W. M. Mitchell, Jr., J. C. Haswell, R. H. Johnson and George A. Johnson, also J. F. Newhouse. Spaces 187-188.

Edison, Inc., Thomas A., Orange, N. J., and Chicago, Ill.—Edison "B. S. Co." primary batteries and accessories and Edison dictating and transcribing phonographs. Represented by E. E. Hudson, E. W. Brown, P. A. Garrity and F. J. Lepreau. Space 54.

Edison Storage Battery Company, Orange, N. J.—Edison storage battery. Represented by H. G. Thompson. Space 55.

Electric Railway Signal Company, Boston, Mass.—The Chapman automatic signals for electric railways. Represented by Charles N. Wood. Space 5.

Electric Storage Battery Company, Philadelphia, Pa.—Chloride accumulator batteries for bridge operation, car lighting and signal interlocking plants, "Exide" batteries for automatic block signal work and storage battery cars, storage batteries for railway work. Represented by Godfrey H. Atkin, Taliaferro Milton, H. M. Beck, R. I. Baird, P. G. Downton and T. A. Cressey. Space 23.

Enright-Frey Railway Equipment Company, New Orleans, La.—Enright boltless rail joint, tie plate and anchor combined; rail anchor, guard rail brace, self-grinding gauge cock. Represented by J. W. Enright and C. V. Frey. Space 163.

Fairbanks, Morse & Company, Chicago, Ill.—Nine h. p. generating outfit, 10 h. p. oil engine and pump, electric turntable tractor, telescopic standpipe, chain hoists, rail drills, jacks, motor cars, scales, cattle guards. Represented by A. A. Taylor, L. H. Matthews, E. M. Fisher, D. K. Lee, C. T. Fugitt, D. J. Higgins, L. Norvell, H. D. Smith, S. F. Forbes, H. E. Vergosen, W. K. Conard, C. W. Kelly, F. M. Condit, J. L. Jones, W. W. Adams, Geo. J. Akers, F. H. Douglass, E. E. Pendray, F. V. Roy, Robert Elder and J. T. Gratiot. Spaces 73-74-75-76-92-93-94-95.

Fairmont Machine Company, Fairmont, Minn.—Handcar equipped with gasoline engine; one engine and equipment for handcar. Represented by F. E. Wade and H. E. Woolery. Space 156.

Federal Cement Tile Company, Chicago, Ill.—Roofing tile: special tile used on the Kansas City Union Station. Represented by I. H. Freund, LeRoy Baumgardtl, L. H. Tobey and Cheri Freund. Space 16.

Federal Signal Company, Albany, N. Y.—Interlocking and signal apparatus. Represented by John T. Cade, H. E. Thompson, C. Hurze, W. H. Richard, H. C. Ware and J. J. Hubbard. Space 38-39.

Franklin Manufacturing Company of Pennsylvania, Franklin, Pa.—Asbestos lumber smoke jacks, asbestos shingles, asbestos corrugated roofing and siding, asbestos and 85 per cent magnesia locomotive and stationary boiler lagging and steam pipe boiler coverings, journal box packings. Represented by R. J. Evans, H. S. Hayden, E. R Rayburn, L. B. Melville and F. S. McNamara. Space 6.

Frank M. Foster, Columbus, O.—Foster interlocking switch stands. Represented by Frank M. Foster. Space 138.

Fruit Growers' Refrigerator & Power Co., Anna, Ill.—Reinforced concrete railroad culvert. Represented by A. Christ, Jr., W. H. Leland and D. A. Faut. Space 204.

Galena Signal Oil Company, Franklin, Pa.—Perfection signal oil, Galena railway safety oil, ("B") Galena long-time burner oil. Represented by John W. Bunn and J. J. Bunn. Space 108.

John Gearon, Sr., Chicago, Ill.—Composite steel railway tie. Represented by Edward Gearon, John Gearon, Jr., M. V. Gearon, J. J. Gearon and F. F. Gearon. Space 198.

General Electric Company, Schenectady, N. Y.—Gasoline electric generating sets, steam air and water flow meters, portable air compressors, mercury arc rectifiers, motor generator sets, motors, transformers, lightning arresters, meters, switches, relays, rheostats and control panels. Represented by A. W. Jones, H. K. Ferguson, Frank Rhea, H. M. Jacobs, R. A. Lewis, L. W. Shugg, R. E. Woolley, W. O. Kellogg, J. W. Johnson, F. N. Boyer, W. H. Colman, O. E. Turner, L. A. Crawford, A. P. Jenks, C. A. Ives, C. H. Jones, A. I. Totten and H. L. Monroe. Spaces 35-36-37.

General Railway Signal Company, Rochester, N. Y.—Electric-dynamic interlocking system, electric interlocker, model 4 switch machine, high semaphore signal, dwarf semaphore signal and electric interlocking accessories, mechanical interlocking and accessories, direct and alternating current block signal apparatus, line and track relays, switch and tower indicators, transformers, reactances, etc. Represented by W. W. Salmon, G. D. Morgan, M. Wuerpel, Jr., W. K. Howe, F. L. Dodgson, H. M. Sperry, F. W. Moffett, L. Thomas, C. O. Poor, W. R. Young, M. R. Briney, W. S. Henry, A. Thomson, S. N. Wight, R. C. Leake, W. S. Workman and A. C. Holden. Spaces 56-57-58-59.

Greenlee Bros. & Company, Rockford, Ill.—Gasoline screw spike driving machine, hand-screw spike driving tools, automatic tie adzing and boring machines; other small tools. Represented by J. A. Lounsbury and F. Beitel. Spaces 7-8.

Grip Nut Company, Chicago, Ill.—Grip nuts, "Monogram" ladder fastenings, combination wrenches. Represented by E. R. Hibbard, J. W. Hibbard, W. E. Sharp, W. G. Willcoxson, Ed. Wilhelm, DeF. Lillis, Ben. Klein, Thos. P. Swan and C. Beaumont. Space 49.

Hall Signal Company, New York, N. Y.—Automatic signal appliances. Represented by W. J. Gillingham, Jr., and W. H. Lane. Spaces 77-78-79-80.

Hart Steel Company, Elyria, O.—Tie plates. Represented by W. S. Miller, W. T. Bentz, G. S. Wood and A. W. DeRocher. Space 101.

Handlan-Buck Manufacturing Company, St. Louis, Mo.—Signal lamps, lanterns, semaphore lamps. Represented by A. H. Handlan, Jr., and R. L. Cairncross. Space 126.

Hayes Track Appliance Company, Richmond, Ind.—Hayes derails, models A, C, CX and E, with operating and target stands. Represented by S. W. Hayes, W. Harding Davis, E. L. Ruby, E. C. Knapp, S. W. Wallace, Wellington B. Lee, Arthur Gemunder and F. C. Stowell. Space 140.

Hobart-Allfree Company, Chicago, Ill.—Smyth derailers, Freeland derailers, Newton car replacers and Newton divided car replacers. Represented by E. H. Allfree and W. H. England. Space 107.

Hoeschen Manufacturing Company, Omaha, Neb.—Batteryless system of highway crossing bells, magneto-mechanical generators for crossing bells, annunciators and signal devices. Represented by H. A. Holdrege, H. A. Hoeschen and H. P. Ryner. Space 168.

Hubbard & Co., Pittsburgh, Pa.—Railway track tools, track shovels and locomotive scoops. Represented by R. L. Mason, John J. Brooks and James A. MacLaughlin. Space 294, Armory.

C. W. Hunt Co., West New Brighton, N. Y.—Moving pictures showing coal handling machinery, working model of an automatic railway, narrow gauge car for carrying locomotive axles and wheels, full sized section of industrial railway track, models of coal valves and coal conveyors. Represented by C. T. Anderson and J. P. Maxwell. Spaces 209-210.

Indianapolis Switch & Frog Co., Springfield, O.—Frogs, crossings, switches and general track work, R-N-R frogs and crossings, model and full size working designs; "Eymon" continuous crossing, unit drilled special work of all types. Represented by E. C. Price, W. H. Thomas, O. E. Minnick, T. L. Hanley, W. B. Zittle, A. Murray, W. L. Walker, E. R. Burke, R. A. Boyd, G. S. Shaw, J. H. Eymon and W. E. Harkness. Spaces 228-237, Armory.

Ingalls-Shepard Forging Company, Chicago, Ill.—Standard mechanical interlocking parts. Represented by W. E. Foster and W. A. Stone. Space 3.

Inland Steel Company, Chicago, Ill.—Track bolts, spikes, rivets, concrete reinforcing bars, "Vismera" sheets. Represented by H. L. Hart, A. C. Roeth, R. C. Coombs. Space 225, Armory.

Interlocking Nut & Bolt Company, Pittsburgh, Pa.—Clark nut lock. Represented by R. A. Clark. Space 185.

International Automatic Signal Company, Chicago, Ill.—Electric cab signal with automatic stop. Represented by C. B. Teller, C. H. Corson, Yorke Burgess, H. Anderson, F. J. Brown and J. W. Clark. Spaces 201-212.

International Harvester Company, Chicago, Ill.—Oil and gas engines, pumping outfits, pumps. Represented by A. T. Young, C. C. Mangrum, F. W. Heiskell, F. S. Davis, W. D. Zarley and E. N. Wood. Spaces 189-190-191.

International Steel Tie Company, Cleveland, Ohio.—Composit railroad twin cross ties for light and heavy traffic. Represented by V. A. Oswald, J. J. O'Donnell, W. P. Day, George Harpham. Spaces 195-196.

Jerome Metallic Packing Company, Chicago, Ill.—Jerome metallic packing, Ruby portable steel houses, Stickley track sander. Represented by Geo. C. Jerome, Wm. H. Wilkinson. Spaces 161-162.

Johns-Manville Company, H. W., New York, N. Y.—"Transite" asbestos wood smoke jacks and ventilators, asbestos built-up and prepared roofing, wool felt roofing, corrugated asbestos roofing, "Transite" asbestos shingles, roof coatings, asbestos pipe coverings, packings, electrical materials, "J-M" sectional conduit, "J-M" fiber conduit for electrical wiring, and other building materials. Represented by J. E. Meek, J. C. Younglove, W. R. Jones, F. W. Doty, C. D. Folsom, C. W. Gearhart, H. A. Waldron, H. R. Wardell, W. H. Lawrence, H. B. Sewell, F. J. Horne, L. E. Hassman, E. A. Hurlbut, R. A. Hamaker, W. J. Hennessey, P. C. Jacobs, J. H. Trent,

D. L. Jennings, H. L. Leach, H. T. Morris, C. E. Murphy, H. M. Newell and H. G. Newman. Spaces 91-110.

Joyce Cridland Company, Dayton, O.—Railway jacks. Represented by Geo. W. Llewellyn, Frank S. Joyce, N. Irving Clock and Chas. D. Derby. Space 28.

Jordan Company, O. F., Chicago, Ill.—Jordan spreader. Represented by M. J. Woodhull. Space 14.

Kalamazoo Railway Supply Company, Kalamazoo, Mich.—Hand, push and velocipede cars, track drills, track jacks, gauges, levels, wheels of various sizes, both all steel and wood center wheels, also motor cars. Represented by J. McKinnon, D. A. Stewart, C. A. Wallace, W. N. Sidnam, Wm. Winterly, W. D. Waugh, F. E. McAllister and L. L. Okey. Spaces 24-25.

Kellogg Switchboard & Supply Company, Chicago, Ill.—Railway telephone apparatus. Represented by Archibald Wray and W. P. Booith. Space 211.

Kennicott Company, Chicago, Ill.—Model of water softener, model of water weigher. Represented by Herman Nieter, F. S. Dunham, T. G. Windes, G. E. Pratt and W. D. Hawkins. Space 32.

Kerite Insulated Wire & Cable Company, New York, N. Y., and Chicago, Ill.—Kerite insulated wires and cables. Represented by R. D. Brixey, Azel Ames, P. W. Miller, J. A. Renton, J. W. Young, New York; B. L. Winchell, Jr., and G. A. Graber. Spaces 60-61-62.

Kernchen Company, Chicago, Ill.—Ventilating apparatus for cars and buildings. Represented by A. F. Roth, K. D. Heitt, F. J. Guignon and J. A. Gilmore. Space 105.

Keuffel & Esser Company, New York, N. Y.—Engineering instruments of all kinds, slide rules, drafting room supplies, etc. Represented by Rudolph Link, H. B. Huster and J. N. Gastfield. Space 51.

Lackawanna Steel Company, Buffalo, N. Y.—Structural material, rails, rail joints, rail joint plates, track construction, tie plates, steel sheet piling. Represented by Arthur P. Van Schaick, C. H. Hobbs, J. L. Hench, F. E. Abbott, A. H. Weston, John Chandler and C. R. Robinson. Spaces 277-278-279, Armory.

Lebanon Engineering Company, Lebanon, Pa.—Forged steel rail brace tie plates for steam and electric railways, head support washers for screw spikes, collet lock washers for track bolts. Represented by Francis T. West. Space 109.

Lehon Company, The, Chicago, Ill.—Roofrite roofing, Roofrite fabric-back roofing, plastic car roofing; waterproof canvas for passenger coach, cab and caboose roofing; Mulehide roofing and Mulehide car roofing, Per-Bona insulating paper, Dry-art insulating paper, Polar Bear insulating paper, Niagara weatherproof sheathing, Texproof brattice cloth and fireproof cloth, Staylastic and Damptite paint, etc. Represented by Tom Lehon, C. H. Fresher and D. B. Wright. Space 144.

Lidgerwood Manufacturing Company, New York, N. Y., and Chicago, Ill.—Excavator engine, excavator swinging engine, boom swinging engine. Represented by Frank B. Knight, E. C. Reeder, W. G. Wilmot, G. N. Crawford, Sr., G. N. Crawford, Jr., and W. R. Elden. Space 206.

Lorain Steel Company, Johnstown, Pa.—Track material, frog, crossing and switches of hardened center and solid manganese types; guard rail, clamps, switch throws, etc. Represented by W. W. Kingston, H. C. Evans, A. L. Verner, Carroll Burton, George Reese, H. C. Stiff, Wm. Lynam, A. S. Littlefield, C. G. Donnell and S. P. McGough. Spaces 247-250.

Lufkin Rule Company, Saginaw, Mich.—Tapes and rules of all descriptions. Represented by S. B. McGee and E. M. Eadie, Jr. Space 121.

Luitwieler Pumping Engine Company, Rochester, N. Y.—Non-pulsating pumps, water supply apparatus, electric and gasoline pumping apparatus, deep-well electric and gasoline pumping apparatus. Represented by Frederick D. Rich and S. W. Luitwieler. Space 183.

Lupton's Sons Company, David, Philadelphia, Pa.—Lupton steel sash for side walls, Pond continuous sash for monitor and sawtooth roofs, Pond operating device, special designs for lighting and ventilation of power houses and shop buildings. Represented by Clarke P. Pond and R. A. Sanborn. Space 50.

Lutz-Lockwood Manufacturing Company, The, Aldene, Union County, N. J. (P. O., Roselle, N. J.)—Gordon primary cells, "SX" ignition dry cells, Aldene dry cells. Represented by George Marloff, W. M. Kinch and G. A. Nelson. Space 175.

Walter Macleod & Co., Cincinnati, O.—Carbide lights, patent rail, patent spike. Represented by Oscar P. Gwinner and Walter Macleod. Space 164.

Massey Company, C. F., Chicago, Ill.—Concrete oil-house; visual and audible highway crossing signal, concrete battery wells, concrete cable posts, mile posts, marker posts, lamp posts, battery chutes, junction boxes, trunking, curbing, concrete pipe, telephone booths and watchmen's houses. Represented by C. F. Massey and E. M. Hatheway. Space 1,5.

McCord & Co., Chicago.—Locomotive mechanical lubricator for valve cylinders and driving boxes in operation, McCord pinless lid journal box. Represented by W. J. Schlacks, R. L. McIntosh, W. C. Reed and H. E. Creer. Space 288.

McFarlane Manufacturing Company, St. Paul, Minn.—Quick weight indicator to be used on scales. Represented by Robert McFarlane and F. E. Kaeppel. Space 69.

McGraw Publishing Company, New York, N. Y.—Weekly editions of Electric Railway Journal, Engineering Record and Electrical World. Represented by Hugh M. Wilson, J. A. Kucera, L. E. Gould, E. J. Hunt, E. M. Haas, F. J. Phelps, L. S. Louer, W. W. DeBerard, C. L. Williams, W. E. Keily, H. L. Fishacher and S. F. Cicero. Space 29.

McKinnis Switch Lock Company, Chicago, Ill.—Switch point lock. Represented by Victor Kohn, C. E. Rosenfels. Space 182.

Alexander Milburn Company, Baltimore, Md.—Portable acetylene construction, wrecking inspection and emergency lights, steam acetylene generators for locomotive headlight, wreckers and hoisting cranes. Represented by Charles R. Pollard, A. Frederick Jenkins and J. Schligher. Space 171.

Merden Frog and Crossing Works, Chicago, Ill.—Frogs, switches, switch stands, crossings, guard rails, guard-rail clamps, rail braces, etc., solid and built-up manganese steel work. Represented by Irving T. Hartz, Arthur C. Smith, Harry M. Mache, Dennis H. Cusic, William J. Mirden, Joseph F. Karcher and W. Homer Hartz. Spaces 238-239-240 Armory.

Modjeski & Angier, Chicago, Ill.—Laboratory equipment for complete chemical analysis and physical tests of cement and concrete. Represented by T. O. Brosted, H. N. Hirlihy, J. Dunraven Young, C. A. Bergendahl, A. W. Peters, Byron J. Carter, A. T. Holmgren and J. C. Reeves. Space 291, Armory.

Moore & Sons Corporation, Samuel L., Elizabeth, N. J.—Two pumping units consisting of Crescent fuel oil engines direct connected to pumps, one combined Crescent fuel oil engine and air compressor. Represented by William H Yetman. Space 65.

Burton W. Mudge & Co., Chicago, Ill.—Mudge-Adams motor car. Represented by Burton W. Mudge, Herbert Green, Thos. H. Garland, Robert D. Sinclair, George W. Bender and W. E. Adams. Spaces 71-72.

Nachod Signal Company, Philadelphia, Pa.—Track plan connected with operative signals, high speed trolley contactors, miscellaneous signal parts. Represented by Carl P. Nachod and Frederick W. Kulicke. Space 2.

National Carbon Company, Cleveland, O.—Columbia track batteries, dry batteries, multiple batteries. Represented by E. L. Marshall, Chas. S. Pflasterer and M. H. Moffett. Space 179.

National Lock Washer Company, Chicago, Ill., and Newark, N. J.—Nut locks and methods of testing. Represented by F. B. Archibald, R. L. Brown, H. J. McGinn and John B. Seymour. Space 125.

National Malleable Castings Company, Chicago, Ill., and Toledo, O.—Track appliances. Represented by H. I. Hiatt, Thos. Blogden, J. J. Byers, Claude Johnston and J. W. Stephenson. Space 104.

National Surface Guard Company, Chicago, Ill.—Metal surface stock guards, steel grain doors, ratchet track wrenches. Represented by I. L. Bolinger, J. T. Hall and C. H. Luthman. Space 176.

Geo. P. Nichols & Bro., Chicago, Ill.—Electric turntable tractor. Represented by Geo. P. Nichols, S. F. Nichols, Henry Fries and Nicholas Fries. Space 173.

Northwestern Construction Company, New York—Banks' signal cells (R. S. A.), Banks' track circuit cells, N-W binding post. Represented by W. C. Banks and R. C. Wood. Space 4.

Northwestern Manufacturing Company, Milwaukee, Wis.—Motor generator sets, motors for operating semaphores and switches, general line of motors and dynamos. Represented by Wm. Stark Smith, Frederick W. Ells and Walter J. Aitken. Space 4.

Ogle Construction Company, Chicago, Ill.—Coal chute, bucket hoisting machine. Represented by R. A. Ogle and C. F. Bledsoe. Space 220.

Okonite Company, New York, N. Y.—"Okonite" insulated wires and cables of all styles and sizes for electrical service, "Okonite" and "Manson" tapes for insulating joints in electrical conductors, etc. Represented by J. D. Underhill. W. G. Hovey, J. M. Lorenz and R. N. Baker. Space 18.

Spencer Otis Company, Chicago, Ill.—Economy tie plates, "Au-Tra-Kars," American "Kron" dial scales. Represented by W. L. DeRemer, Carter Blatchford, H. H. Hart, T. W.

Blatchford, O. M. Olson, Hunter Michaels, A. L. Hammond, C. E. Latta, W. D. Thompson, L. D. Rockwell, A. S. Flowers, A. J. Odegaard, George Ringshausen, Charles Bank, George H. Goodell, J. L. Connors, C. H. Wilson and Clive Hastings. Spaces 122-141-142-143; Armory, 226-227.

P. & M. Company, Chicago, Ill.—P. & M. rail anti-creeper, Crane guard rail retainer, bond wire protector. Represented by D. T. Hallberg, R. D. Hawley, J. H. Hubbell, G. E. Johnson, L. W. Kent, R. J. Mercur, Philip W. Moore, F. A. Preston, J. Ritchie, A. R. Sutter and F. C. Webb. Space 123.

Patterson Company, W. W., Pittsburgh, Pa.—Hand-made tackle blocks, wood or steel, for manila rope or wire cable. Represented by W. W. Patterson, Jr. Space 147.

Payson Manufacturing Company, Chicago, Ill.—Mechanical devices for operating sash in series; ball bearing steel wheels, railway velocipedes. Represented by W. E. Peters, E. T. Harris and F. E. McClimans. Space 222.

Pease Company, C. F., Chicago, Ill.—Automatic blue print machines, washing and drying machines and trimming tables, blue print paper coating machines. Represented by C. F. Pease, P. M. Morgan, Thomas Lord, T. K. Murney and H. E. Thompson. Spaces 157-158.

Peerless Wire Fence Company, Adrian, Mich.—Galvanized self-raising gate. Represented by W. H. Burnham and W. Niblack. Space 292, Armory.

Pennsylvania Steel Company-Maryland Steel Company, Philadelphia, Pa.—Crossings, frogs, switches, knuckle rails, switch stands, rails and joints. Represented by G. S. Vickery, W. M. Henderson, C. A. Langdon, G. W. Parsons, C. A. Alden, W. H. Allen, R. E. Belknap, D. Allen, J. F. Hennessey and George K. Reel. Spaces 241-242-243-244-253-254-255-256, Armory.

Pittsburgh Steel Company, Pittsburgh, Pa.—Railroad fencing; barbed wire, plain wire; wire nails, etc. Represented by M. E. Johnson, E. Sidney Lewis, Geo. A. Dickson and E. D. Findlay. Spaces 284-285.

Pocket List of Railroad Officials, New York, N. Y., and Chicago Ill.—Pocket lists. Represented by J. Alexander Brown, Charles L. Dinsmore and Harold A. Brown. Space 26.

Potter Winslow Company, Chicago, Ill.—Battery vaults and other railway supplies in concrete. Represented by G. H. Macdonough, A. C. Heidelberg and G. H. Davis, Jr Space 174.

Q. and C. Company, New York, N. Y., and Chicago, Ill.—Bonzano joints, step joints, anti-creepers, guard rail clamps, rail benders, rail saws, rail-laying machine. Represented by C. F. Quincy, F. F. Kister, G. L. Hall, T. B. Bowman, J. J. Quinn, J. A. Bodkin, A. E. Stokes, A. R. Horn, E. M. Smith and J. V. Wescott. Spaces 120-139.

Rabok Manufacturing Company, St. Louis, Mo.—"Rabok" preservative paints. Represented by D. C. Wray and J. Y. Martyn. Space 160.

Railroad Supply Company, Chicago, Ill.—Tie plates, derailers, highway crossing bells and electric railway signal appliances. Represented by E. H. Bell, C. P. Cogswell, Jr., E. W. Vogel, M. J. Comerford and A. H. Smith. Space 85.

Railway and Supplymen's Mutual Catalog Company, Chicago, Ill.—The Railway and Supplymen's Mutual Catalog, exhibition of Hollerith sorting and tabulating machines. Represented by Albert MacRae, F. R. Goehler and Clarence H. Struble. Space 181.

Railway List Company, Chicago, Ill.—Monthly publications: Railway Engineering and Maintenance of Way, Monthly Official Railway List. Represented by W. E. Magraw, C. S. Myers, L. F. Wilson, W. R. Toppan, K. L. Van Auken and C. C. Zimmerman. Space 136.

Ramapo Iron Works, Hillburn, N. Y.—Automatic safety switch stands, rolled steel shoulder switch slides, guard rail clamps, manganese reinforced switches and frogs. Represented by J. Edgar Davidson, Arthur Gemunder, W. C. Kidd, Wellington B. Lee, William Wait Snow and James B. Strong. Spaces 280-281-282, Armory.

Roadmasters and Maintenance of Way Association, Sterling, Ill.—Literature. Represented by L. C. Ryan, Harry Clark and W. A. Kannally. Space 224.

Roberts & Schaefer Company, Chicago, Ill.—Photographs of installation of Holmen balanced bucket coaling stations and Sauerman coaling stations with working models. Represented by Warren R. Roberts, E. E. Barrett, Clyde P. Ross, E. P. Stewart and James S. Shannon. Spaces 97-98.

Rail Joint Company, New York, N. Y.—Continuous, Weber and Wolhaupter rail joints. Represented by L. F. Braine, P. Holbrook, V. C. Armstrong, W. E. Clark, F. A. Poor, F. C. Webb, E. A. Condit, E. L. Van Dresar, H. C. Holloway, G. C. Isbester, R. W. Smith, F. M. Hill and W. S. Boyce. Spaces 81-82.

Railway Age Gazette (Maintenance of Way Daily) and The Signal Engineer and American Engineer, New York, N. Y., and Chicago, Ill.—Represented by Edward A. Simmons, Samuel O. Dunn, Lucius B. Sherman, Henry Lee, John N. Reynolds, Frank S. Dinsmore, Cecil R. Mills, Arthur E. Hooven, Bradford Boardman, E. T. Howson, William Forsyth, W. E. Hooper, A. D. Cloud, H. H. Simmons, Harold F. Lane, F. H. Thompson, W. D. Horton, Kenneth G. Cloud, Harold D. Horton and T. E. Crossman. Space 44.

Rich Tool Co., Chicago, Ill.—High power drill press, high speed twist drills, reamers, rivet sets, track bits, flue expanders, beading tools. Represented by George R. Rich, W. L. Anderson, Paul Harders and Oscar F. Shubert.. Space 205.

Sandwich Electric Company, Sandwich, Ill.—Selective train despatching apparatus, selective order boards, cordless jack boxes, cordless test panels. Represented by E. C. Hennis, M. E. Launbranch, J. G. Moore, H. O. Rugh and C. S. Rhoads. Space 202.

Scherzer Rolling Lift Bridge Company, Chicago, Ill.—Models, literature, photographs, plans, etc., of Scherzer rolling lift bridges. Represented by Albert H. Scherzer, Fayette F. Soule, C. L. Keller, John T. Dickerson and James I. Vincent. Space 178.

Sellers Manufacturing Company, Chicago, Ill.—Sellers anchor bottom tie plate. Represented by John M. Sellers, Joseph T. Markham, Leslie S. Gordon and Rex S. Gay. Space 124.

Shane Steel Railway Tie & Appliance Co., Denver, Colo.—Shane steel, railway tie and fastening. Represented by R. H. Dwyer and G. F. Kiser. Space 223.

Signal Accessories Company, New York, N. Y—Signal and track devices. Represented by F. C. Lavarack and W. F. Bossert. Space 118.

Signal Engineer, The, New York and Chicago.—See Railway Age Gazette. Space 63.

Jesse R. Smith, Benton, Ill.—Railway tie pullers. Represented by W. W. Whittington. Space 135.

Snow Construction Company, T. W., Chicago, Ill.—Coal chutes, standpipes, engines, pumps. Represented by T. W. Snow, R. E. Gurley and Marshall Miller. Spaces 45-46.

Standard Asphalt & Rubber Company, Chicago, Ill.—"Sarco" waterproofing and asphalt floor materials. Represented by Norman Malcolm, Charles V. Eades, Robert F. Trumbull and R. E. Kartack. Space 1.

Standard Underground Cable Company, Pittsburgh, Pa.—Various forms of wires and cables for all electrical purposes, junction boxes and terminals. Represented by J. R. Wiley and Russell E. Green. Space 152.

Stark Rolling Mill Company, Canton, O.—Black and galvanized "toncan" metal sheets and formed products. Represented by A. T. Enlow, J. T. Hay and F. E. Newell. Space 194.

Stotts Signal Company, Marion, Iowa—Automatic signal. Represented by A. W. Caul, J. I. James, W. A. Weaver and J. F. Sparks.

Strait Scale Company, Kansas City, Mo.—Registering beam scale 200,000 pounds capacity. Space 180.

Strauss Bascule Bridge Company, Chicago, Ill.—Models of Strauss trunnion bascule bridges and Strauss direct lift bridge. Represented by J. B. Strauss, Gunni Jeppesen, J. R. Hall, Phil L. Kaufman and A. F. Bruss. Space 159.

Templeton, Kenly & Co., Ltd., Chicago, Ill.—Simplex car and track jacks. Represented by Alfred E. Barron, J. H. Hummel, Arthur C. Lewis and W. B. Templeton. Spaces 15-33-34.

The Railway and Engineering Review, Chicago, Ill.—Publications. Represented by Willard A. Smith, W. M. Camp, Clyde F. Barus, John M. Lammedee, J. E. Sample, R. R. Greig, Harold A. Smith, Parker G. Stevens, Drusus H. Nichols, F. C. Barton. Spaces 64 Coliseum and 283 Armory.

The National Roofing Company, Tonawanda, N. Y.—Security wide-weld gravel surface roofing. Represented by D. A. Bonitz, P. E. Sinnett, C. L. Cockrell and S. E. Baldwin. Space 170.

Trussed Concrete Steel Company, Detroit, Mich.—Kahn building products, reinforcing steel, Kahn trussed bars, rib bars, rib metal "Hy-Rib," column hooping, "Hy-Rib" and rib lath for roofs, sidings, partitions and ceilings, United steel sash for windows, side walls and monitors, United steel partitions and United steel doors. Represented by H. J. Stambaugh, E. G. Roberts and V. L. Page. Space 27.

Tweedy, Hood & Finlen, Inc., Chicago, Ill.—Shovels, belting, rubber pump valves, locomotive stack netting, brass and steel wire cloth. Represented by R. E. Derly and S. C. Frerich. Space 153.

Union Switch & Signal Co., Swissvale, Pa.—Sales department. Interlocking and signaling apparatus. Represented by Col. H. G. Prout, J. G. Schreuder, S. G. Johnson, J. A.

Hobson, G. A. Blackmore, H. W. Griffin, H. A. Wallace, T. H. Patenall, Aaron Dean, W. M. Vandersluis, J. L. Brastow, J. P. Coleman, L. F. Howard, M. D. Hanlon, W. H. Cadwallader and J. D. Taylor. Spaces 40-41-42-45.

United States Electric Company, New York, N. Y., and Chicago, Ill.—Gill selectors for railway telephone and telegraph, railway telephones and accessories, safety lanterns for railway trainmen, storage batteries. Represented by W. L. Cook, W. E. Harkness and H. E. Merrell or C. N. Sigison. Space 203.

United States Light & Heating Company, New York, N. Y.—All lines of pasted and Planté plates and cells. Several cells show sectional views: Cells for power, lighting, propulsion and ignition. Represented by W. P. Hawley, Bertram Smith, W. F. Bauer, J. E. Widner and Joseph Wren. Space 114.

U. S. Wind Engine and Pump Company, Batavia, Ill.—Mansfield and U. S. rigid, telescopic and adjustable spout water columns; fir, pine and cypress water tanks; flat, round and half-round hoops; Halladay outlet valves, tank fixtures, Curtis pumps, water station material, pumping windmills, switch stands and semaphores. Represented by L. E. Wolcott, C. E. Ward, J. P. Prindle, Jr., and G. E. Vermilyer. Space 111.

Universal Concrete Tie Company, New Orleans, La.—Reinforced concrete tie and rail-fastening device for steam and street railroads. Represented by M. W. Carrico and H. E. Percival. Space 150.

Universal Metallic Tie Company, Salt Lake City, Utah.—Metal railway tie. Represented by B. S. Rupp. Space 207.

Verona Tool Works, Pittsburg, Pa., and Chicago, Ill.—Track tools and nut locks. Represented by H. Fischer, W. H. Remmel, E. Woodings and Geo. Shapland. Space 148.

Vinan's Improved Patent Rail Joint Company.—Samples of rail joints. Space 185½.

Weir & Craig Manufacturing Company, Chicago, Ill.—Represented by Fred G. Whipple and R. W. Young. Space 30.

Weir Frog Company, Cincinnati, O.—Railroad switches, switch stands, guard rail clamps, frogs. Represented by N. O. Goldsmith and Charles E. Hogan. Spaces 286-287, Armory.

Western Electric Company, Chicago, Ill.—Telephone train despatching apparatus, Habirshaw wire, flaming arc lamps, W. E. interphones for railway shops, sunbeam train lighting lamps, miscellaneous supplies. Represented by G. H. Porter, J. F. Finley, E. W. Hamlin, E. V. Adams, F. A. Ketcham, L. A. Muttart and H. B. Hutchings. Space 197

Whall & Co., C. H., Boston, Mass.—Railway fiber and fuses. Represented by F. R. Whall and J. B. Given. Space 127.

Wm. Wharton, Jr., & Co., Inc., Philadelphia, Pa.—Switch points, guard rails with guard-rail clamps attached, manganese steel frogs, switch stands, manganese steel crossings, models, etc. Represented by V. Angerer, L. R. Ashhurst, Jr., W. B. Cooke, George B. Lyman, H. F. McDermott, R. C. McCloy, W. McLain and Arthur S. Partridge. Spaces 257-258-271-272, Armory.

Williams Company, The, G. H., Cleveland, Ohio—Clam shell dredging and excavating buckets, derricks, etc. Represented by G. H. Williams. Space 192.

Young Continuous Rail & Boltless Angle Bars Company, The J. D., Oklahoma City, Okla.—Boltless angle bar. Represented by J. D. Young, R. E. Brittain, L. A. Brittain and L. C. Adkisson.

A SECTIONAL CONCRETE PILE CASING.

Foundation and underpinning work for heavy buildings in the larger cities very frequently involves problems which severely tax the resources of the ablest engineers. Wood piles were formerly used and have been found satisfactory as long as covered with water, but owing to the constantly varying conditions this water is being drained from one point to another, allowing the piles to decay and the buildings to settle. Concrete in one form or another has proved an excellent material, but the methods of getting concrete properly into place have frequently been difficult of application. One of the methods of placing concrete which is meeting with much favor is with the use of a hollow steel pipe or casing. A steel pipe of any required diameter, corresponding to the size of an ordinary pile, and of any convenient length is driven directly with a driving head. This casing is made of ¼-in. to ⅜-in. steel, and when driven to place provides a hollow steel tube ready for concrete. A cast iron shoe is used for a point and is fitted with a hole for jetting if required. In some soils, such as sand, the pipe may be driven without a point and the sand removed through the pipe as the driving proceeds.

For underpinning where head room is limited, the sectional concrete pile casing is of great advantage. By adding additional sections, piles of any ultimate length can be built up in the process of driving. It is claimed that there are over 200,000 ft. of these piles supporting structures in New York City, and that a pile has been driven over 80 ft. without buckling or losing its alinement.

The following data are submitted by the manufacturers as tests of their product: A 12-in. pile, consisting of five sections, was jacked down in sand strata to bedrock a distance of 33 ft. and filled with concrete. It supported 135 tons dead weight without any deflection or change whatever and with a depression of but 1/32 of an inch. In another test, eight 7-ft. sections of a 9-in. casing to carry a live load were driven with a hammer until a resistance of 80 tons was shown. The column was tested with an electric bulb in the interior before filling with concrete and the alinement was found to be perfectly true. It is said that piles have been driven from 30 ft. to 85 ft. under the above conditions. This type of pile is made by the John Simmons Company, New York.

CAST-IRON GUTTERS.

The cast-iron gutters exhibited by Hitchings & Co., Elizabeth, N. J., are especially adapted to stations, train sheds, etc. These gutters are now being tried out on some of the stations of the Pennsylvania Railroad. They are said to be more durable than sheet metal or wood gutters and more easily erected. They are intended to replace the sheet-iron or copper, or tin or copper lined, hanging gutters. Cast-iron gutters are claimed to be stronger than other gutters and are less liable to injury through snow, ice and rust. Some cast-iron gutters which were installed 20 years ago, in other than railway service, are still in perfect repair and giving excellent service. These gutters require no soldering and are easily erected by any mechanic, being secured to the facia with ordinary wood screws. The half-round gutter is also supported by a bracket. It is claimed that it is not necessary to place these gutters on a grade, as any water that may remain standing in them does no harm.

SWITCH STANDS.

The new type of switch stand shown by The Pennsylvania Steel Company, Steelton, Pa., known as model 60-A, shows a drop forged crank, fitted to the squared end of the target spindle, to which crank the connecting rod is attached. The hub of the segment gear, which is acuated by the lever pinion, extends through the bottom of the stand and carries on its squared end a shear crank. Between this shear crank and the rod crank, connection is established by a cast iron shear pin resting in a pocket between the two cranks. When the stand is run through with its lever locked, the cast iron pin is sheared off, releasing connection between the target spindle and the gears; the switch points are thrown, carrying with them the target which is still attached to the points by means of the connecting rod and crank.

With this stand is furnished the company's new adjustable connecting rod which gives the stand the advantages of switch adjustment found in the adjustable New Century

switch stand, model 51. This is a departure in adjustable rods, inasmuch as it is adjustable not only as to the length of the rod, but it also enables each switch point to be adjusted in relation to the stock rail, independently of the other point, without disconnecting the rod.

This connecting rod does away with all types of expensive switch bar adjustment, and all other forms of high priced adjustable switches. It may be applied to any switch or stand already installed by increasing the throwing capacity of the stand and by adapting it to the stand connection. For facility and quickness in stand installation, this connecting rod is most advantageous.

SCHERZER ROLLING LIFT BRIDGES.

The recent business of the Scherzer Rolling Lift Bridge Company, Chicago, includes a number of notable foreign orders, among which is one for a double track combined railway and highway bridge for the Great Central Railway of England across the River Trent, having a movable span of 160 ft. and a width of 53 ft. 6 in. out to out. This bridge will be the widest and heaviest movable bridge yet constructed in Great Britain. Two Scherzer bridges have recently been completed for the Dublin Port & Docks Board, Dublin, Ireland, and a large railway and highway Scherzer bridge is nearing completion for the Swansea Harbor Trust at Swansea, Wales. The very large Scherzer rolling lift bridge under construction across the Nile River at Cairo, Egypt, is rapidly nearing completion and is expected to be in service within a few months. The Buenos Ayres Great Southern has recently placed under construction the fourth Scherzer bridge in the process of modernizing and extending its terminal facilities at Buenos Ayres. The South Indian railway, in the process of extending its line toward the Island of Ceylon, is constructing a double leaf Scherzer bridge having a movable span of 225 ft.

Within the United States and Canada more than one hundred and fifty Scherzer rolling lift bridges have been constructed and placed under construction. The more recent railway bridges placed under construction include a double track bridge for the Central Railroad of New Jersey, a double track bridge for the New York & Long Branch railway, and bridges for the Southern, Savannah; the Atlantic Coast Line, Navassa, N. C.; the Aransas Harbor Terminal Railway, the Wildwood & Delaware Bay Short Line, the Canadian Pacific at Fort William, Ont., the Canadian Northern across the Salmon River and another across Rideau Canal.

DETROIT FENESTRA WINDOWS IN THE PREST-O-LITE BUILDING COLLAPSE AT INDIANAPOLIS.

The Prest-O-Lite building, at Indianapolis, Ind., which has attracted considerable attention from builders and engineers during the past two months, owing to its sensational collapse after three stories had been erected, and in which ten men



Detroit Fenestra Windows, Taken From the Ruins of the Prest-O-Lite Building, Indianapolis.

lost their lives, has also been the means of drawing attention to several features of building construction, exposing their weaknesses or accenting their merits in a very effective way. One of the building materials, which, while not directly connected with the cause of the accident, was seriously involved in the effect of it and which came through the ordeal in excellent shape, was the steel windows supplied by the Detroit Steel Products Company, Detroit, Mich.

Strength or rigidity is necessarily a fundamental requirement of steel windows and incidentally one of the most difficult to retain in ordinary processes of manufacture. The ordinary steel window is built up of a number of small pieces, and any injury to it in shipping or erection permanently weakens the frame. Furthermore, considerable strength is required to enable the light steel frame to resist wind pressure or expansion in case of fire.

The manufacturers of Detroit fenestra windows, which were installed in the Prest-O-Lite building, claim that the patented "fenestra joint," by which their windows are distinguished, adds greatly to the strength or stability of the frame. It would appear that this test furnishes rather convincing evidence in support of the manufacturer's statement. As will be seen from the photograph reproduced herewith, the windows which came down with the walls as they collapsed, though badly distorted, have not in any case been broken or pulled apart.

NOTES ON WATERPROOFING DESIGN FOR BRIDGE FLOORS.

BY NORMAN MALCOLM.

During recent years the importance of waterproofing railway structures has become so much better understood and more generally attempted that at the present time a specification is seldom drawn up for new construction without requiring waterproofing in some form or other. Specifications have very frequently called for waterproofing, leaving the details to the contractor who may select the waterproofing on the basis of lowest cost, to the superintendent, or to a subordinate who, lacking information as to the best material or method, may be led to select something entirely inadequate.

Rapid progress is being made in effective waterproofing construction as applied to railway work, and to bridge floors in particular. Subway bridges offer great difficulties and great demands for satisfactory waterproofing.

In the absence of definite information regarding the best method and material to use, attempts have been made to secure results with literally hundreds of materials and schemes. Since ineffectual waterproofing is just the same as, or may be, worse than no waterproofing at all, large sums of money have been uselessly expended in these generally unsuccessful attempts and experiments, but it is encouraging to note that as a result of past experience it is now pretty well recognized that waterproofing a bridge floor or viaduct is not an easy matter to be readily accomplished by any material, but is a difficult problem, requiring for successful solution the use of the very best obtainable product which must be especially adapted to resist the action of water and other oxidizing agents, undergoing wide temperature extremes with slight change of form or character, and withstanding contraction and vibration of the structure without rupture either in the body of the waterproofing or at the edges, where an effective seal must be maintained to prevent the entrance of moisture.

Another encouraging feature of waterproofing work is the better understanding that drainage and waterproofing go hand in hand. To render the waterproofing engineer's problem more easy and certain of successful solution, the structural engineer must give due consideration to waterproofing and drainage requirements. Many structures have been so constructed as to be practically impossible to make waterproof. A slight change in design or easily provided modification during construction might have rendered the waterproofing a comparatively easy matter. It is in this connection that the waterproofing engineer finds his most frequent opportunity to render valuable service.

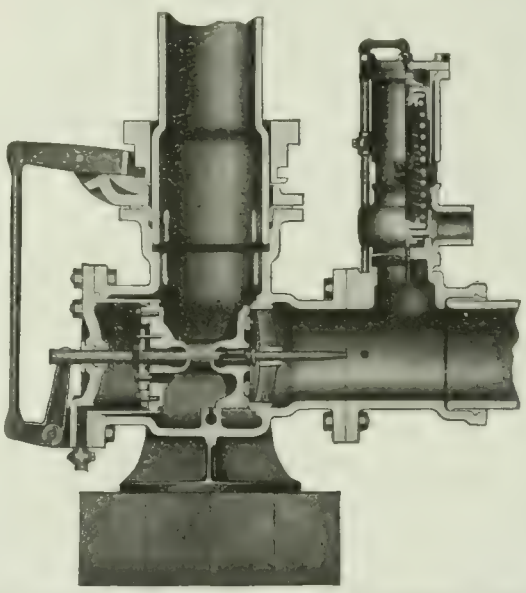
Supplementing the conclusion that the waterproofing problem is difficult, even for the best available material, is the growing conviction that success results from both quality and amount of waterproofing compound used rather than from the number of plies of fabric, felt or other material employed in the construction of the waterproofing membrane. There is a consequent tendency to reduce the number of layers. While 10-ply waterproofing used to be, and 5 or 6 ply still is, common enough, one of the most successful waterproofing companies now uses a standard specification of 3-ply, and is at the present time testing out a 2-ply membrane, but using the same amount of waterproofing compound as before and with very satisfactory results.

TELESCOPIC SPOUT STANDPIPE.

One of the most marked changes in railroading as observed by the general public is the difference between the size of the locomotive of to-day and of a few years ago.

The large locomotives, with their proportionately large tenders, which are in use at the present time, require a standpipe that will deliver a large amount of water in a short time, in addition to being suitable for watering locomotives with smaller tanks which are still in service.

To meet these conditions, Fairbanks, Morse & Co., of Chicago, have designed a new type of standpipe with a telescopic spout, styled the "No. 10 Telescopic Spout Standpipe." This spout has a vertical range of 5 ft., so that the highest



Sectional View of Main Valve and Connections With Automatic Relief Valve.

and lowest engine tender can be filled with no waste or dripping of water.

The main valve is water balanced, the water on both sides of it, when closed, being under the same pressure as in the main, insuring no leakage and minimum wear. The pipe is regularly furnished with an automatic relief valve which prevents "water hammer," so destructive to pipe lines and tanks. Operating rods are all on the outside, insuring easy adjustment and repair. The No. 10 is a one-man pipe and

does not require anyone on the ground to assist the fireman on the tender. It is securely locked parallel with the track and will automatically lock in this position when swung back from the tender. One of these standpipes is on exhibit at the Coliseum.

THE HALL STYLE "K" SIGNAL.

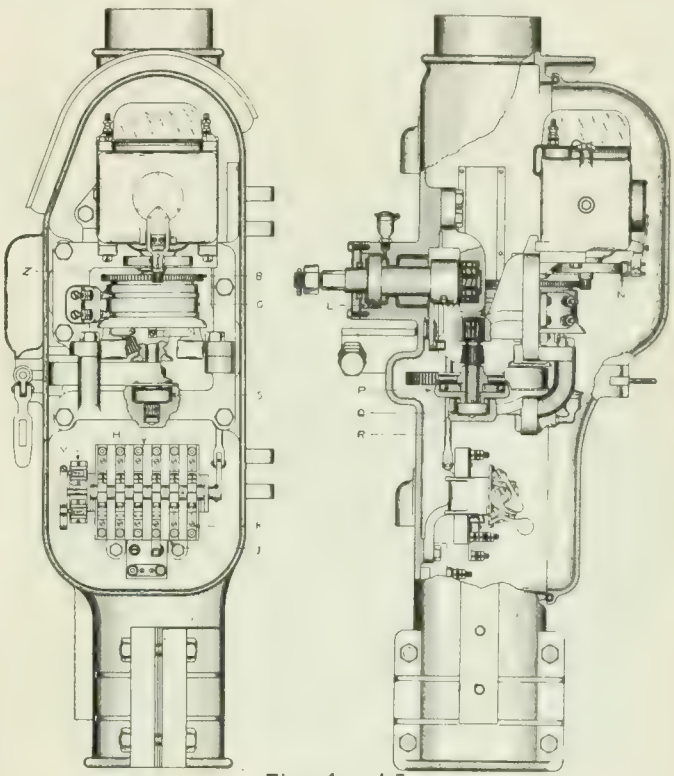
In the Hall Signal Company's style "K" automatic signal the retardation is effected by a pair of governors attached to the hold-clear armature, which rub against the insulated portion of the hold-clear magnet, and provide friction in proportion to speed. No dash pot of any description is used in this signal, no mechanical latches are used, and the motor armature does not reverse. There is no friction provided by these governors with the blade at rest in the clear or stop positions, and the governors are effective only when in returning to the stop position the speed of the blade reaches a predetermined rate.

The friction of these governors increases proportionally to the speed of the blade returning to danger, so that the control is entirely automatic, and the friction of the governors is effective only when required. One governor alone will retard the signal sufficiently to prevent damage.

The feature of signal design that is probably next in importance to the method of retardation is the construction of the bearings for the shafts and in the mechanism. All the bearings on the style "K" signal are either roller or ball bearings. The main shaft is supported on the blade end by an "S K F" ball bearing, and on the inside end by a "Hyatt" roller bearing. The "S K F" ball bearing is constructed of a double row of balls fitted in a brass cage, with steel supporting rims inside and outside. It is self-aligning, withstands a thrust strain of 25 per cent of its radial capacity, and is very accurately manufactured. It may be floated in oil, yet very little oil is actually required to keep it in good condition. Exhaustive tests made with this bearing in a blade shaft, extending throughout an entire winter, have shown that these bearings may be operated almost indefinitely without oil. The "S K F" bearing is also used at all points in the mechanism where a thrust and radial bearing is required, as at "L."

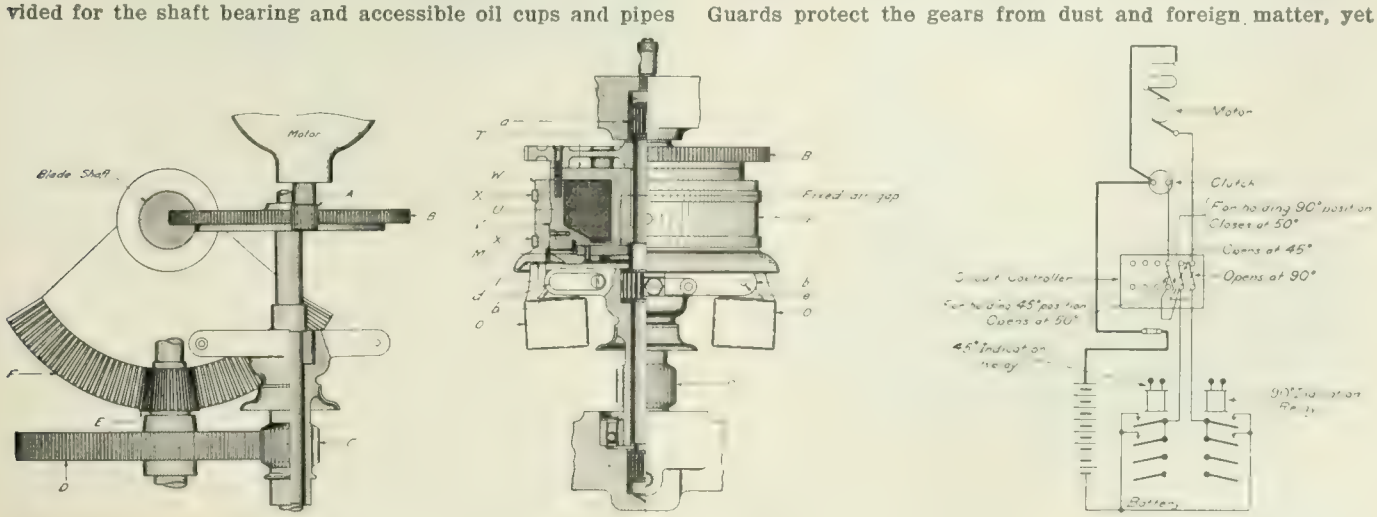
The Hyatt roller bearing has been used on the Hall style "H" mechanism for the past two years and has given perfect service. For the lesser requirements, where the shaft does not reverse, and where the strain is slight, a roller bearing made of steel rollers and supports is used. Protection to the bearings and provision for oiling has also been given proper attention. The ball bearing on the outer end of the blade shaft is protected by a weather plate, with a soft gasket between it and the main casting. A substantial oil cup is provided for the shaft bearing and accessible oil cups and pipes are provided for all important bearings in the mechanism. The essential bearings are also provided with space so as to allow the bearings to float in a continuous oil bath, which insures against rust.

The hold-clear magnet on the style "K" signal is of the disc type similar to the design used in the Hall electric slot. In the latter device the armature is nickel plated to provide an air gap equivalent, but in the style "K" signal in addition to the plating of the armature, an actual air gap is provided. A phosphor bronze outer ring is fastened to and made a part of the Norway iron armature, and when the magnet is energized, the bronze ring bears against a steel piece on the magnet, which provides the friction required to hold the signal clear. The torque of the blade and blade grip are very heavy on this armature, the frictional surface is small, and the armature is well protected.



Figs. 4 and 5.

Steel pinions and bronze gears are used. The gears and pinions are placed in such manner that the teeth are vertical, and the clearance between gear and pinion teeth is sufficient to prevent clogging by ordinary particles of dirt. Guards protect the gears from dust and foreign matter, yet



Figs. 1, 2 and 3.

all the gears may be plainly observed during the operation of the signal.

The motor used in the style "K" signal is of an improved design. The motor will operate an upper quadrant blade, R. S. A. design, with R. S. A. blade grip, with an ordinary 10-volt battery, through an arc of 90 deg., and using a maximum of 2½ amperes of current in eight seconds.

The operation of the style "K" signal is as follows: Motor pinion A, Fig. 1, is geared to the blade shaft through gears

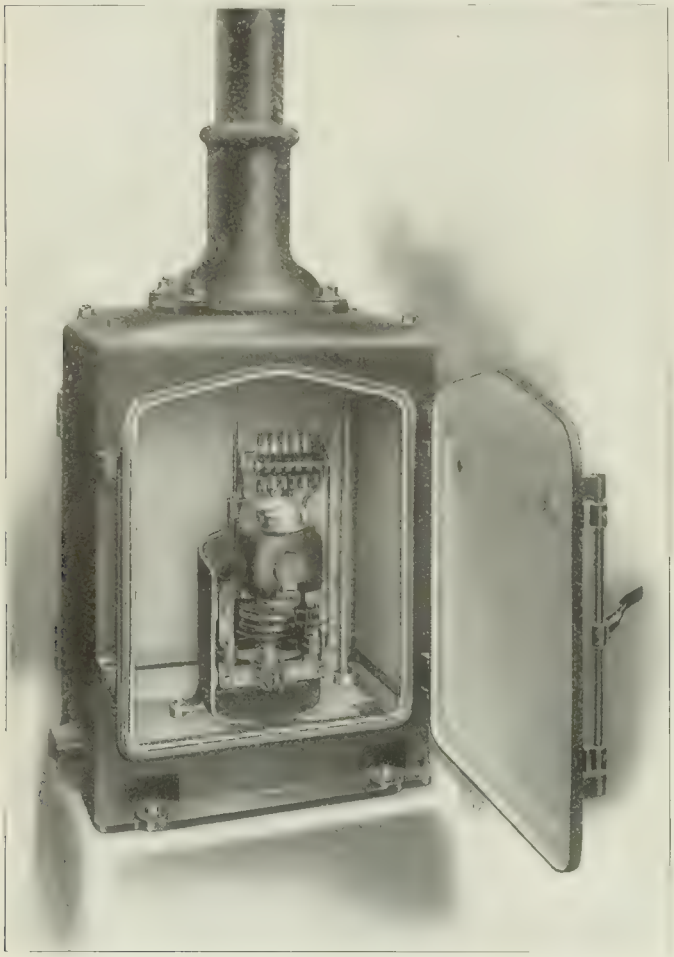


Fig. 6. Style K Mechanism, Bottom-Post Type.

and pinions, B, C, D, E and F. Gear wheel B, Fig. 2, is rigidly attached to hold-clear magnet G. The armature of the hold-clear magnet is supported on a separate shaft from the magnet and gear wheel B, and revolves independently of the magnet. When the current is applied to the motor and hold-clear magnet, the blade shaft is rotated by means of the gear connections in the usual manner. Contact J on circuit breaker H, Fig. 4, normally closed, is adjusted to open when the blade is in the 45-deg. position, and contact K, also normally closed, is adjusted to open when the blade reaches the 90-deg. position. A typical circuit plan of the mechanism wiring for three-position operation is shown in Fig. 3. The operation of clearing the blade and holding it at clear is dependent upon the energization of clutch magnet G, Fig. 2. After the blade is moved to the caution or clear position, it is held at rest by the friction of the outside bronze rim on the hold-clear armature M, Fig. 2, against the steel surface on magnet G, which friction is caused by the energization of the clutch magnet. The clear or caution position of the blade is also maintained by motor brake N, Fig. 5, which prevents the reversal of the motor armature. There are, accordingly, two requirements for holding the signal clear: the energization of the hold-clear magnet, and the application of the motor brake. When the circuit of the hold-clear magnet G is opened, as by a train in the block, the armature of this magnet is released, and the torque of the blade and its casting causes the blade shaft, gears and pinions F, E, D and C, Fig. 1, and hold-clear armature M, Fig. 2, to reverse and the signal to return to its normal position. The governors, O-O, Fig. 2, are attached to the hold-clear armature, and as the speed of the blade in its return to the stop position increases, the governors are thrown outwardly by centrifugal force, and the upper surfaces rub against the surface 1 of the insulated portion of the hold-clear magnet which remains stationary. The friction of the contact of these surfaces retards the movement of the blade; the amount of friction is dependent upon the weight of the governors and the speed of rotation of the armature. The governors are designed so that they regularly check the movement of the blade, and no adjustment is required.

A view of hold-clear magnet, armature and governors is shown in Fig. 2. The magnet is composed of iron core T and winding U; the iron core is fastened to outside shell, which is moulded into insulation piece W and serves as a frictional bearing at surface 1 for the governors. Brass collector rings X moulded into insulation piece W are connected to the terminals of the magnet winding, the electrical connection between the magnet winding and outside battery being made through these collector rings and spring brushes Z, Fig. 4. Armature M, Fig. 2, with the governors, rotates with hollow shaft gear C independently of magnet G and its

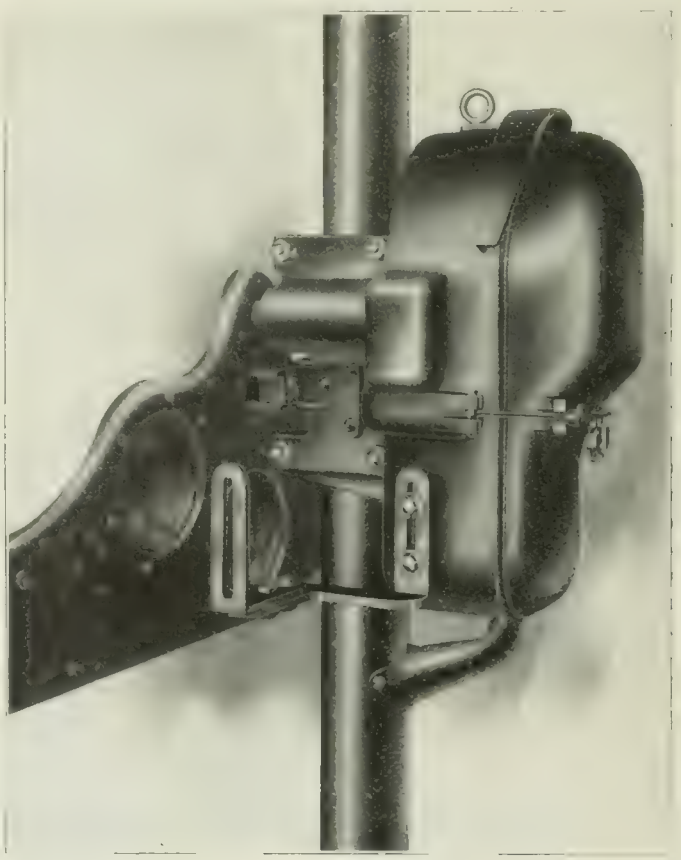


Fig. 7. Top-Post Style K Signal.

shaft. The governors are supported on armature M through lugs b by bronze pins e which are held in place by snap springs d. These snap springs are used on the mechanism in place of cotter pins which are liable to drop out of place if not properly split.

At point F on shaft Q, Fig. 5, a ratchet arrangement shown in Fig. 7 is inserted to prevent shock to the mechanism when the blade grip strikes the stop.

The circuit controller is attached to the blade shaft by di-

rect connections of a most positive character. The contacts which control the operation of the signal blade are made on the principle embodied in our style "G" switch box, with the positive worm gear adjustment, which is a guarantee against slipping cams, and which provides means for the most delicate adjustment.

The counter attachment Y, Fig. 4, is not the least ingenious feature of the mechanism. This provides, in a substantial manner, for registering separately the number of 45-deg. and the number of 90-deg. movements of the signal arm.

This mechanism was designed originally as a top-post type; its adaptability, as such, is evident in its various applications: (1) In a case sulphured or leaded on a pipe post; (2) in a case clamped on top of post, and (3) in a case clamped on the side of a post. The flexibility of design is further demonstrated in its applications as a bottom-post type of signal operating one or two blades in the upper or lower quadrant, in two positions or three position, and pull clear or push clear type. All these types are furnished, moreover, to operate with alternating or direct current. In all these applications, the same principles of operation are employed, in fact, the greater number of the parts are interchangeable in all types.

Since the inception of the style "K" signal these signals have been installed on a large number of the leading railways in the United States and Canada; some of them were subjected to two winters' service test, a larger number had a full year's service test. The signals have operated successfully on railways in every climate, including the rigorous weather of Eastern Canada and the northwestern section of the United States, in sections south of the Mason and Dixon line, and along the eastern and western coasts of this country.

PEASE DIRECT PRINTING PROCESS.

For the past four years the C. F. Pease Company, Chicago, has been developing a process of electric printing which is called the "Pease direct white" or "direct blue line process," which is finding favor for many purposes in the railway service. This process was primarily intended for the engineering department and while it is being used very largely by engineers for diversity of work, in fact for any purpose for which blue prints may be used, it is also meeting with favor with other departments and is being found valuable where a number of duplicate copies are required. Especially is this true in the auditing department for tabulation and the various reports which it is necessary to make from time to time to the Interstate Commerce Commission. The process can also be used by the freight and passenger departments for miscellaneous tariffs where, say, only 200 copies or less may be required.

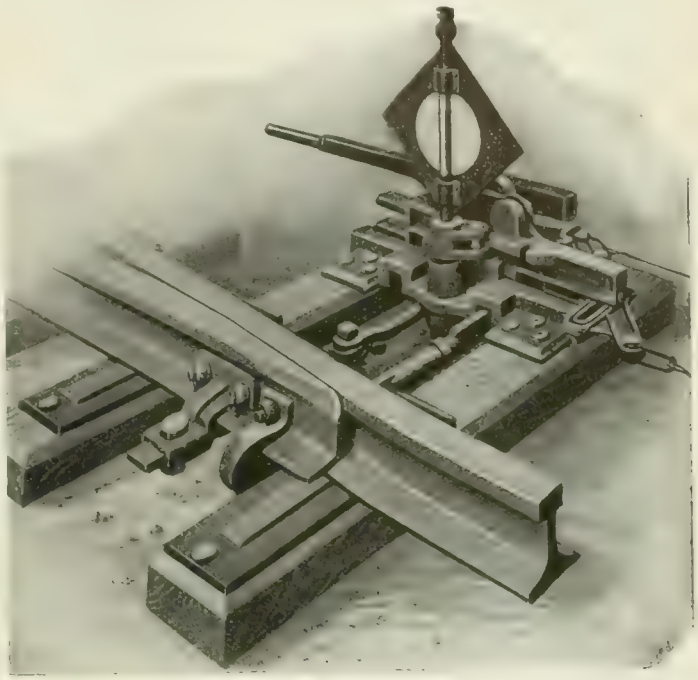
This process can be made on a highly-sized paper, giving good folding and wearing qualities and allowing notations to be made either with pen or pencil. One of the special features is that "every copy is an original." Each is as clear and distinct as every other one and there is no danger of error or misunderstanding by reason of indistinctness. All that is necessary is that the original copy be on transparent cloth or paper and that the work be dense enough for electric printing. The original typewritten copy should be made on a good quality of transparent paper, using a black ribbon and backing up the sheet with a fresh black carbon reversed. With such an original, it is possible by this process to make any number of clear prints. The cost of making these direct blue line prints should not exceed the cost of mimeograph or carbon copies if the work is done by the railway itself.

The equipment is equally suitable for making a high grade of blue prints and when not engaged on the direct blue line work, can be used for this purpose, thus keeping it steadily employed.

The Pease Company has one of these machines in operation at the Coliseum.

PROTECTION OF FACING POINT SWITCHES.

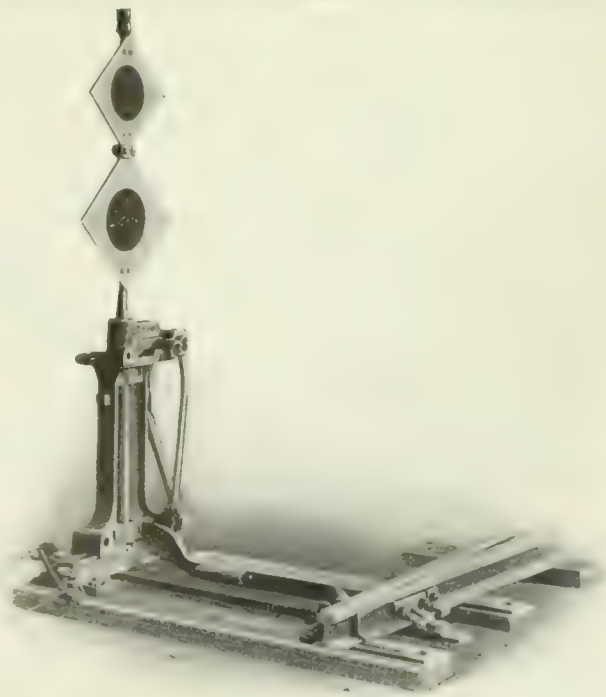
The problem of proper protection for facing point switches is one which has been given much thought in recent years by railway engineers. One of the most certain methods to properly protect the switches is to provide an independent lock rod connecting the switch points to the stand, together



The "Unity" Switch Stand.

with a distant signal, either electrically controlled or wire connected. In the accompanying cuts are shown two styles of switch stands which embody these features. Both of these stands operate the switch, an independent bar lock and a distant signal, with a single lever.

In the high stand, called the "Security," the arrangement of



The "Security" Switch Stand.

parts is such that the raising of the handle out of engagement with a notch or lock throws the distant signal to danger and sets the notch in barlock ready for the movement of the switch. By rotating the handle the bar attached to the switch point engages the distant signal operating bar and simultaneously with movement of switch, locks the distant signal in the position to which it has been set. When the switch has been thrown, all parts are properly interlocked.

If it is desired to do switching while the distant signal is set to danger, the operation is the same as that of an ordinary stand. It is impossible, however, for the switchman to padlock the stand in the main track position without first setting the signal and switch to "safety."

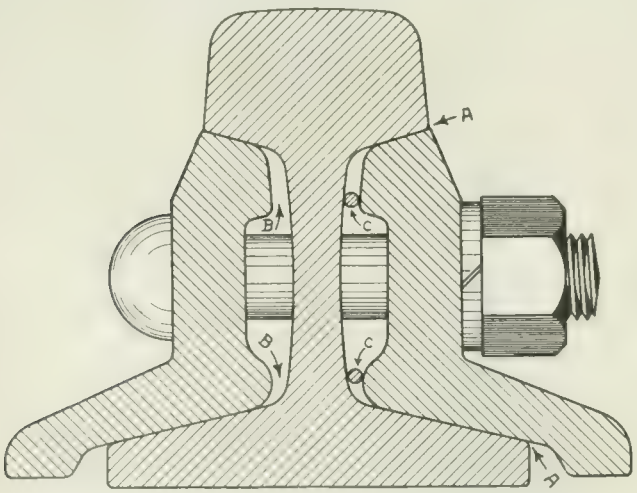
The low stand shown in above cut is called the "Unity" and is a single lever ground throw stand. The lever moves through 180 deg., in the first 90 deg. of which it operates the distant signal and releases the point lock, the final movement throwing the switch. Returning, the first movement closes and locks the switch before the distant signal can be cleared.

The switch may be operated to allow a train to drill in and out of the siding without disturbing the distant signal, which remains at "danger" and protects the movement.

Both of the switch stands described above are designed to operate either wire connected or electrically controlled distant signals, and are being shown by the Morden Frog & Crossing Works, Chicago, at their space in the First Regiment Armory.

A BOND WIRE PROTECTOR.

The purpose of the bond wire protector in general is pretty well known, and it is quite widely used by roads having installations of automatic signals. The manufacturers, however, are calling attention to the point which is not generally thought of in connection with their use and which is of interest to the track man as well as the signal maintainer. To the signal man, the chief feature of bond-wire protectors lies in the fact that they prevent breakage of bond wires, either by malicious persons, by vibration or at the hands of the track men. In the past, and to some extent to-day, signal men have attempted to prevent this breakage by placing the bond wires behind the splice bar next to the rail web, and it is when this action occurs that the matter becomes seriously of interest to the track man and not wholly without interest to the signal man.



P. & M. Bond Wire Protector.

The track man primarily is interested in keeping his angle bars tight. To this purpose the track is patrolled daily by men whose business it is to watch the bolts and tighten them as they come loose. Not infrequently, when bond wires are placed behind the joints, the supervisor or roadmaster has been puzzled by his inability to keep the joints tight, never thinking that the bond wire is responsible.

By reference to the cut it will be seen that the point at which the splice engages the rail head and base is beveled so that by tightening the splice the wear which occurs at "A" may be taken up by the drawing in of the splice bar. To permit this drawing in, a space is left between the bar and the web. This space is smaller at the top and bottom of the bar than at that point at which the bolts pass through. It is, of course, the intention of the signal man that the wires shall remain in the large space near the bolts, but vibration and expansion and contraction cause them soon to work into space "B," in the position shown in the cut. In this position they prevent the proper tightening of the splice bar. The track man may tighten his bolts until the bar comes up against the wire and seem perfectly tight, but let any trains pass over and slightly change the position of the wires and all the connections are loose again.

The signal man is not wholly clear of trouble when the wires are placed behind the splice. Moisture gathers in the space and rapidly corrodes the wires. The wires which work up into space "B" are frequently chewed to pieces by the splice bar, and it is not an uncommon thing to take a wire out of this space and find it worked down almost to the size of a knitting needle for its entire length. On a large number of the roads this trouble has been recognized and the wires placed outside the splice.

Bond wire protectors are in their fifth year of service and their use is extending rapidly, a number of roads having adopted them in the past year as standard. Several forms are shown on a section of rail exhibited by The P. & M. Company, Chicago, at the Coliseum.

ALL-STEEL COALING STATION.

The accompanying cut shows a 150-ton all-steel coaling station recently built for the Chicago, Rock Island & Pacific at Clinton, Okla. The coal is dumped into a concrete pit under the shed at the left of the photograph. From this pit the coal is hoisted up the conveyor tower to the top of the tank. This tower is double with two buckets, one of which goes up as the other goes down. The spouts are so arranged as to feed locomotives on both tracks. Such a steel station has the advantage that it does not burn, its maintenance cost is low and presumably it will have a long life. That these advantages are recognized by many of the railways is attested by the fact that a number of all-steel coaling stations have been built during the last year. The T. W. Snow Construction Company had the general contract for this station, and the steel work was furnished by the Chicago Bridge & Iron Works, Chicago.



All-Steel Coaling Station.

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NOTICE OF COPYRIGHT.

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It is due to our readers, and especially to the members of the American Railway Engineering Association, that explanation should be made of our action in copyrighting the contents of The Daily. It is well known that we have from year to year incurred much expense for the purpose of furnishing our readers with early, complete and properly edited stenographic reports of the proceedings of the conventions of these associations. It has likewise been the custom of other publications boldly to appropriate column after column of these edited reports of the proceedings and republish them. They have not said "by your leave;" they have given no credit whatever to the Railway Age Gazette. This habitual pirating of the fruits of our labors and expenditures has become intolerable; and we have copyrighted all of the reading pages of The Daily for the purpose of stopping it.

We desire in this connection expressly to disavow any desire or purpose to interfere with the publication or use by the association or its members of either its own reports of the proceedings, or of the reports made by the Daily Railway Age Gazette. So far as the proceedings of the convention are concerned, our copyright covers them only as they are reported by the Daily Railway Age Gazette. And the association and its members individually are hereby authorized to make any use they desire of our reports, except that they must not be republished without the express permission of the Simmons-Boardman Publishing Company, in any publication or periodical except those issued by the American Railway Engineering Association.

It is probable that the decision of Committee No. X, on Signals and Interlocking, to present its report on subject No. 1 of those assigned to it was reached only recently, and that the committee was influenced by the action of the Signal Association in rejecting the report of its own committee on Signaling Practice, the membership of which is practically identical with that of Committee No. X. The decision, however, was undoubtedly the proper one. The favorable vote of the Signal Association, while it failed to reach the two-thirds required, nevertheless was sufficiently large to indicate a more thorough understanding and appreciation of the report than has existed in previous years. The difference between the majority and the minority sentiment in both committees appears to be more than ever a difference merely in point of view, and not an inherent incompatibility of view. The present report, based on the rejected report of the Signal Association, is the result of several years' hard work, during which the various propositions offered by both sides have been argued to the point where further argument can do little good. In fact, to reopen some of the old discussions would undoubtedly put the whole subject back where it was several years ago, without helping to settle the matter. It is better to "let well enough alone," as the committee has done. A unanimous report, which will receive the indorsement of a two-thirds vote next year, is much more likely to result than if another course were taken.

One of the most important duties of the American Railway Engineering Association, and one to the performance of which a large part of the time of the various committees is now being devoted, is the preparation of specifications governing the design, manufacture and use of different materials. With the large representative membership which this association has, a specification prepared as a result of careful committee study, and then discussed before the entire convention, should represent the best recommended practice of the most of the roads of the country. Among the committees presenting specifications this year are those on Track, Iron and Steel Structures, Rail, Water Service, etc. The use of these specifications just as they stand will very probably not be found practicable by any one road, for the specifications prepared by an association of this kind should be sufficiently general to cover all conditions, and should be modifiable to meet local conditions. But as the chairman of the committee on Iron and Steel

Structures emphasized Tuesday morning, any clause which cannot be applied to one road can be eliminated by a stroke of the pen; and, therefore, a standard set of specifications may be used to advantage as the basis on which specifications applicable to local conditions on any road can be readily drawn. Without such a guide the preparation of specifications is a difficult problem, and at best numerous contingencies will very probably be unforseen. One of the most valuable results of the association's work is this preparation of specifications to cover the common problems, and it should continue until the field is well covered.

The American Railway Engineering Association is a great technical organization. It is doing as important work to promote the development of economy and efficiency in transportation as any other organization in the world. It ought, therefore, to be given not only the moral but the generous financial support of the railways that are benefited by its labors. President Cushing's address yesterday morning shows that this is not the case. The association's expenses have within recent years been increasing faster in proportion than its receipts. The increase in its expenditures has been due chiefly to an increase in the amount of printed matter issued. For the purpose of reducing its expenses, the association has adopted various means, which were set forth by Mr. Cushing. To add to its receipts it has adopted the plan of employing an advertising agent to secure advertisements for its bulletins and program. The report of the committee on Publications indicates that this plan promises to be less successful than was anticipated. President Cushing clearly indicated that, as a matter of principle, the membership of the board of direction is opposed to the solicitation of advertising for the bulletins and reports, and that it hopes to abolish it at a future date. The scheme is objectionable because, in the first place, a great railway organization such as the Engineering Association, cannot, without a sacrifice of dignity —and, as Mr. Cushing recognizes, of principle also—ask the supply concerns to help pay its expenses, either through advertising or in any other way. Furthermore, the experience of some other organizations that have had advertising agents solicit for their publications has shown that the agents, in order to get business, are apt to make promises which the association cannot properly keep, and thus to involve it in embarrassments. If, as is only fair to assume, all the expenses the Association has incurred have been necessary to carry out its high and important purposes, it is the duty of the railway companies to supply sufficient funds to enable it to meet all of its reasonable and necessary expenses. It would seem, therefore, that to meet the conditions which Mr. Cushing described the American Railway Engineering Association should turn, not to the supply concerns, but to the American Railway Association. Probably there is no good reason why the railways should not bear all of the expenses involved in the work of the Engineering Association; and there is clearly no reason why they should not supply whatever funds are needed in addition to those that the Engineering Association can obtain through the channels that have been used in the past.

PROPER SIZE OF TIES.

The size and length of ties necessary to withstand the loads imposed upon them by the motive power and equipment in use now is a subject of much interest, on which widely varying views are expressed by men who have closely studied it. As the weight of equipment, the speed of trains and the density of traffic have increased, it has been necessary to increase the strength of the entire track structure. Embankments have been widened, heavier rail laid and more ballast used. The number of ties has likewise increased from 16 to 20 for a 33-ft. rail. While probably it would be theoretically advisable to use even more ties, it is not practically possible because of the difficulty of tamping them. This difficulty makes it impracticable to decrease the distance between ties to much below 12 in.

As it is not possible to use more ties, the problem is to increase the bearing area by increasing their size. This may be done by adopting either longer ties or wider ties. Very little has been done in either direction, but of the two, the use of longer ties would probably be regarded with more favor. Here, again, there are practical objections. Longer ties are in more danger of breaking if unevenly tamped. Furthermore, some men question whether any additional length of tie over 8 ft. carries its proportion of the load. The use of longer ties retards drainage in some cases, owing to the use of more ballast for properly surfacing. However, upon a well-ballasted road this objection will not apply.

A larger tie requires more timber, and in some parts of the country this might be a serious objection because of insufficient timber at present. The increased cost, however, is the principal objection. Many engineers refrain from recommending the use of longer ties for this reason, and this, possibly, is the explanation of the apparent discrepancy in the table presented in the report of the committee on ties, in which, although 59 per cent. of the mileage voting believed a 6 x 8 x 8 ft. tie too small, only 4 per cent. thought a larger tie desirable. However, it would be equally logical for an engineer to advocate, on the ground of expense, the use of a 66 or 75 lb. rail in a heavy line. Ties 9 ft. long have been used in a few locations, and good results have been reported in most cases. It is said that the Louisville & Nashville uses 10-ft. ties with sand ballast and has no difficulty with drainage or with ties breaking under the rail. This road now uses blast-furnace slag for ballast, and a 9-ft. tie is standard. In a report presented to the Canadian Society of Civil Engineers in January, D. MacPherson, assistant chief engineer of the National Transcontinental Railway, reported an instance in his personal experience about ten years ago, where a great deal of trouble was met in maintaining to line and surface on 8-ft. ties a piece of track about one-half mile long, extending over a muskeg on the Canadian Pacific. As an experiment, ties 12 ft. long were tried, and ties of that length have remained in use at this point ever since with entirely satisfactory results. The roadmaster recently advised that he had had no trouble with the long ties breaking and that during the past summer he had treated another muskeg the same way with the result that a half mile of the 7-mile section, which, with 8-ft ties had taken 50 per cent. of the section gang to keep in order, had since scarcely needed any attention and had remained in good line and surface.

A number of roads have experimented with 9-ft. ties recently, and are obtaining good results. The Burlington is making such an experiment a short distance west of Chicago and the results so far are strongly in favor of the longer tie.

A theoretical solution of this problem is not practical because of the inter-relation existing between the rail, the tie, the ballast and the roadbed. The weakness of any one of these component parts places an additional strain upon the others, while the reverse is also true. The use of a heavier rail decreases the load upon the individual tie by distributing it over more ties. A good depth of ballast receives the load from the tie evenly and distributes it to the roadbed. The increased use of tieplates in recent years has done much to protect the tie from mechanical wear by distributing the load on the rail over a larger area. Because of this close relation it is not yet possible to consider the tie problem separately, but it must be considered in connection with the track structure as a whole. The entire

problem is essentially an economic one, and it must be decided whether it is cheaper to adopt a heavier rail section, use a larger tie, or use more ballast. There is room for improvement in all of these features, and each will probably be improved from time to time until the practical limit is reached in each case. If, after these developments, loads continue to increase beyond what the track can bear, it will become necessary to consider some other type of track construction.

SHOULD RAILWAYS DICTATE RAIL MAKING METHODS?

Doubtless most of the members of the American Railway Engineering Association have read the able paper on the rail situation that was read by President W. C. Cushing at the hearing on the rail question before the Indiana railway commission on February 20. In that address, which was published in the Railway Age Gazette of March 1, Mr. Cushing raised one point the importance of which promises to loom constantly larger the more the rail problem is considered. This relates to the extent to which the railways should seek to control, or even influence, the specification or the methods of manufacture to be used in the making of rails.

Mr. Cushing recalled that for some time the railway engineers believed that it was best for the roads to specify a definite amount of discard, while rail makers took the opposite view. He quoted the engineer of one of the steel companies as saying some years ago that no association should state definitely how much should be sheared from the bloom. "The matter is entirely one-sided." Mr. Cushing quoted, this engineer as saying, "If we agree here that 25 per cent shall be sheared from the bloom, we might assume that would settle it, but it would not. If the manufacturers can remove the piping by shearing 15 per cent they will not agree to shear 25 per cent. The object in shearing is to get rid of the piping, and the only matter of agreement will be to reach the point where sufficient shearing is done to remove the piping." The railway engineers who then opposed this view now accept it, because, as Mr. Cushing said, "the records of rail failures which have been kept for a number of years disclose the incontrovertible fact that where a 15 per cent discard might do for one ingot 50 per cent would not be adequate for another."

Does not the reversal of the attitudes of the rail makers and railway engineers on this point and the causes of it have a significant bearing on the entire rail problem? Ought the railway engineers to try to specify to the rail makers either the chemical composition or processes of manufacture that must be used? Ought they not rather simply to tell the rail makers that they do not care how they make rails, just so they make good ones, and that the main things that the railways want are tests of the finished product to determine if it is good and a guarantee of the service that the rails will give? It is unusual in commercial affairs for the buyer to try to tell the seller how to make the commodity that the buyer wants. Ordinarily, the buyer simply insists that he shall be given value received for his money. He does not ordinarily know or care how the article he is buying is produced.

When the buyer does tell the seller how the commodities he buys shall be made he necessarily thereby assumes responsibility for the results of the adoption of the method of production which he dictates. Now, the buyer of an article is less apt to know how it can best be made than the manufacturer with his long experience in, and intimate knowledge of the making of it. This point is illustrated by the modest amount of success that the railways have thus far had in their attempts to tell the steel makers how they should make rails. The rails have not been improved as much as conditions demand. When the reasons for this have been inquired into the rail makers have put the blame on the specifications drawn up by the railways, in spite of the fact that they have refused to accept certain of these specifications; and in the circumstances it has not been practicable for the roads effectively to disavow a considerable share of the responsibility.

The fact that the quality of the rails turned out by different mills while using the same specifications varies widely demonstrates that the process of manufacture is as important, and probably more so, than the chemical composition; and while the railways can control the matter of chemical composition it is very doubtful if they can control, or to any very considerable extent influence, the methods of manufacture, except by insisting that whatever the specifications, whatever the process of manufacture, the railway must have good rails.

The end to be attained in any case is better rails, and we believe the opinion is growing among railway engineers that the best means for attaining this end is not to try to tell the rail makers how to do their work, but simply to insist that the results of it must be satisfactory and to try, by insisting on proper tests and guarantees of the quality of the product, to cause it to be made satisfactory.

A CORRECTION FROM MR. McNAB.

To the Editor of the Railway Age Gazette:

In the account of a conversation you had with me yesterday, in regard to the Panama Canal, and which is recorded in your Daily edition of March 19, I regret to note a typographical error which completely nullifies the sense of a paragraph.

On page 548, twenty-sixth line from the top, the word "not" should be the word "now," in order that the paragraph should read—"it is now quite clear," etc.

Will you please refer to this correction in your next edition? William McNab.

[Mr. McNab in his interview indicated that developments show that the United States government was justified in adopting the lock system, while the unfortunate typographical error to which he calls attention caused him to be incorrectly represented as saying that developments had not vindicated the policy adopted by the government.—Editor.]

PROGRAM.

Convention Program.

(Order may be changed by a two-thirds vote of the convention, or by time required for consideration of reports.)

Wednesday, March 20.

XIV.	Yards and Terminals	Bulletin 141
I.	Roadway	Bulletin 142
IV.	Rail	Bulletins 143, 144
XIII.	Water Service	Bulletin 142
VIII.	Masonry	Bulletin 143
XIX.	Conservation of Natural Resources	Bulletin 143
XI.	Records and Accounts	Bulletin 143
XVIII.	Electricity	Bulletin 143

Annual Dinner.

Reception at 6:30 p. m. in Francis I room, Congress Hotel; annual dinner at 7:00 p. m. in Gold room.

TICKETS FOR ANNUAL DINNER.

Tickets for the annual dinner, at $3.50 each, will be on sale to-day up to 5:00 p. m. in the lobby opposite the entrance to the Convention Hall.

AN INVITATION FROM THE ENGINEERS' CLUB.

The president and directors of the Engineers' Club have extended to the members of the American Railway Engineering Association who are attending the convention the use and privileges of the club. The new club house is located at 314 Federal street, just south of the Union League Club.

THE ANNUAL DINNER.

The annual dinner of the American Railway Engineering Association will be given in the Gold room of the Congress Hotel to-night. There will be a reception beginning at 6:30 in the Francis I room, adjoining the Gold room, and the dinner will begin promptly at 7:00 o'clock. Those who arrive after 7:00 o'clock will have difficulty in finding their places, as the numbers will be removed from the tables after the dinner begins.

W. F. SCHLEITER INJURED.

W. F. Schleiter, a former president of the Railway Appliances Association, is unable to be in Chicago at the time of this year's convention because of an injury received recently. While he was playing squash tennis he was hit in the face by a ball. His eyes were injured and he is now in a hospital in Pittsburgh, where he has undergone three operations.

CHANGES IN C., H. & D. ENGINEERING OFFICERS.

H. V. Hynes, division engineer of the Cincinnati, Hamilton & Dayton at Dayton, Ohio, has been appointed engineer of maintenance of way, with office at Cincinnati, Ohio. I. F. White, division engineer at Indianapolis, Ind., succeeds Mr. Hynes, and H. A. Cassil succeeds Mr. White.

C. W. P. RAMSEY PROMOTED.

C. W. P. Ramsey, division engineer of construction of the Canadian Pacific at Montreal, Que., has been appointed engineer of construction for the eastern lines of that road, with office at Montreal.

BLOCK SIGNAL COMMITTEE MEETING.

The Joint Committee on Block Signaling, of the American Electric Railway—engineering, transportation and traffic—Associations, held a meeting yesterday at 11 a. m., at the Congress Hotel. The full committee was present and a number of manufacturing companies were represented. Among the subjects considered were standard aspects for signals for the different conditions of electric line operation, and the extent to which these should be covered by the committee's recommendations.

J. M. Waldron, signal engineer of the Interborough Rapid Transit, New York, and C. D. Emmons, vice-chairman and general manager of the Chicago, South Bend & Northern Indiana Traction Co., South Bend, Ind., are co-chairmen of the joint committee, the former representing the Engineering Association, and the latter representing the Transportation and Traffic Association. The other members are: C. H. Morrison, signal engineer of the New York, New Haven & Hartford; John Leisenring, signal engineer and superintendent of overhead, Illinois Traction System; B. E. Merwin, general superintendent, Aurora, Elgin & Chicago, and C. F. Conn, vice-president and general manager, Lackawanna & Wyoming Valley Railroad Co.

ANNUAL MEETING OF RAILWAY APPLIANCES ASSOCIATION.

The annual meeting of the National Railway Appliances Association was held Tuesday morning at the Coliseum. President Robert E. Belknap's report for the year showed that the association had succeeded in collecting one of the largest exhibitions of railway material ever held under the auspices of the organization. Last year there was used 36,000 sq. ft. of space for exhibits in the Coliseum, whereas this year over 50,000 ft. in the Coliseum and Armory were occupied and from ten to twenty applications for exhibit space were refused on account of the lack of room.

Mr. Belknap also called attention to the new method of representation on the board of directors by the selection of two men for a three-year term, two men for a two-year term and two men for a one-year term. He stated that the steel companies and the steel and track appliances companies paid towards the cost of the exhibition approximately 43 per cent, signal appliances companies 12 1-3 per cent, miscellaneous exhibitors 29 1-3 per cent, exhibitors of gasoline engines, pumping machinery, coaling stations, etc., 8 per cent, and the exhibitors showing material of right-of-way excepting track material exhibitors 7 1-3 per cent. This would seem to justify, Mr. Belknap added, that the steel companies and track appliance companies have two representatives on the Board of Directors, the signal appliance companies one representative, the miscellaneous and right-of-way exhibitors two representatives, the gasoline engine companies one representative; and among the officers it would seem that there should be at least one representing the steel companies, one the miscellaneous companies and one the different railway publications who do so much to help the Board of Directors and to bring the devices of the exhibitors before the different railway officers and who in this connection are as important exhibitors as any.

The president of the association also pointed to the ever increasing interest on the part of railway officers throughout the country in the annual exhibition in the Coliseum. The secretary had received, he said, letters of praise without number from railway men who have seen the exhibition in previous years.

Treasurer John N. Reynolds reported receipts for the year ending April 12, 1911, of $21,463.14, disbursements, $20,235.95, leaving a surplus at the end of the year of $1,227.19.

Officers for the year were elected as follows:

President, A. P. Van Schaick, Lackawanna Steel Co., Chicago.

Vice-President, T. R. Wyles, Detroit Graphite Co., Chicago.

Treasurer, John N. Reynolds, Railway Age Gazette, Chicago.

Board of Directors, L. R. Ashurst, Jr., and W. H. Baldwin for one year, C. W. Kelly and N. M. Hench for two years and H. M. Sperry and P. W. Moore for three years.

FOUND.

Gold locket, with monogram on one side. Owner may recover by calling at the office of the Daily Railway Age Gazette and identifying.

H. W. Belnap, chief inspector of safety appliances, Interstate Commerce Commission, and James E. Howard of the Bureau of Standards, Washington, D. C., are in the city to-day for the purpose of attending the convention at the time of the discussion on the report of the rail committee.

Proceedings.

The first session of the thirteenth annual convention of the American Railway Engineering Association was called to order at 9:20 a. m. on Tuesday, March 19, in the Florentine room of the Congress Hotel, by the president, W. C. Cushing, chief engineer maintenance of way, Southwest System, Pennsylvania Lines West.

The minutes of the last convention were approved as printed.

PRESIDENT'S ADDRESS.

At the last annual convention we numbered 967 members, honorary members and associates. During the year we have passed the 1,000 mark, although, naturally, our rate of growth has not been quite so rapid as in former years. As the date of our fiscal year has been changed from March to December 31, it is difficult to make exact comparisons. The largest number of accretions in any one year was 124, in 1901, while in 1904 we had 104, and in 1911, 98 new members. From last March to December 31, 1911, only part of a year, 37 new members have joined.

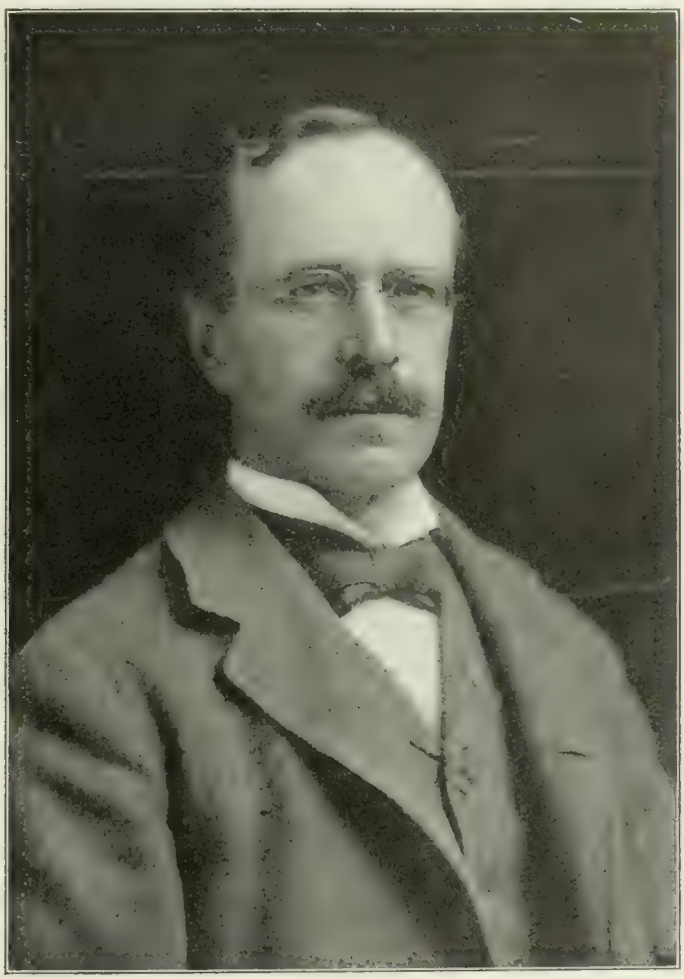
During the first few years of the existence of the association a comfortable cash surplus was accumulated, but in the last three years the amount of printed matter issued has grown to such an extent that our expenditures have been in excess of our receipts, and the surplus has been drawn upon. The following table gives approximately the number of printed pages issued in each year since the beginning.

	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	Totals
Constitution	54													54
Bulletins		172	513	430	1124	794	1028	1074	848	1302	2234	1990	1470	12979
Proceedings	244	825	598	602	1000		980	942	768	970	1778	1412	1982	12101
Manual							210		316				522	1048
Program			44	36	36	44	48	48	80	78	62	82	558	
Miscellaneous				24	8					26	34	34	32	158
Totals	54	416	1338	1072	1786	1838	2262	2064	1980	2378	4124	3498	4330	27140

You will observe from this that during the last four years, 14,330 pages, or more than half the total, have been printed, exceeding the number issued in the preceding nine years.

It was clear to your Board, therefore, that either the printing bill must be reduced, or the revenue increased, or both.

So far as increasing the revenues are concerned, your Board has been unwilling as yet to recommend an increase in annual membership dues, but is arranging for the present to obtain additional revenue by employing an advertising agent to secure advertisements for the bulletins and program. It is estimated that this arrangement will net about $4,000 annually. The advertisements and methods of obtaining them will be closely supervised, but, nevertheless, the members of the Board are opposed to the principle, and would not resort to it except in a case of emergency. It is hoped that the plan can be abolished at a future date, as in the case of the American Society of Civil Engineers.



W. C. CUSHING, President.

With reference to reducing the expenditures, the Board has given a great deal of study to the question during the past year, and has made some changes through the careful and energetic investigation of the publication committee and the secretary.

First in importance is the secretary's plan to avoid a reprinting of the reports for the proceedings, after the convention, by having a sufficient number of pages for the proceedings printed at the same time as the bulletins. The only disadvantage is that the discussions will be collected together at the end of the volume, instead of appearing at the end of the reports to which they refer, as in the past. This objection, however, was not considered of sufficient importance in comparison with the saving in printing, which is estimated to be about $1,000.

In addition to the above, but 10 bulletins a year instead of 12 will be issued, the May and June numbers being omitted. This is done because it is usually difficult to obtain articles for them, and the secretary is very busy during those months in preparing for the publication of the proceedings. It is hoped that it will result in their earlier appearance. Moreover, a reduction in the number of bulletins to be printed will be made, so that it will be necessary for members to bring their copies with them to the convention. Some extra

ones will be provided for those who prefer to purchase them at cost.

Further economy is expected in postal rates by obtaining the second-class mail privilege, application for which has been made to the Postmaster-General. All the prescribed details have been complied with, among which is the altered appearance of the cover of the bulletins. In this connection it was necessary to establish regular subscription rates for our bulletins, and we are also now advertising in them the established prices for all of our publications. The estimated reduction of expense for postage by this arrangement is about $500. It is of interest to know that we could not come under the regulations for this privilege till our association numbered 1,000 persons.

The question of the use of a thinner and lighter weight paper for our publications is now before the Board, and its adoption will probably result in some economy of postage expense. The transactions of the American Society of Civil Engineers are hereafter to be issued in one volume printed on India paper, but its use would not be economical for this association, because a special paper is required for the illustrations.

For a good while the Board of Direction realized that the number of subjects reported on by committees was apt to be too many for thorough discussion on the floor, considering the large number of standing committees, and introduced Rule 8-b for the preparation of committee reports, which limited the number to two for action by the convention. A large number of subjects has always been assigned each year, so that the committees could be collecting subject matter for other reports to be presented a year or more hence. When the increase in expenses became alarming the Board found it necessary to have the president issue a special circular to committee chairmen, calling attention to the necessity for enforcing the rule strictly this year. The several committees have responded heartily to the request, and the results of their conscientious and painstaking work is apparent in the valuable reports presented.

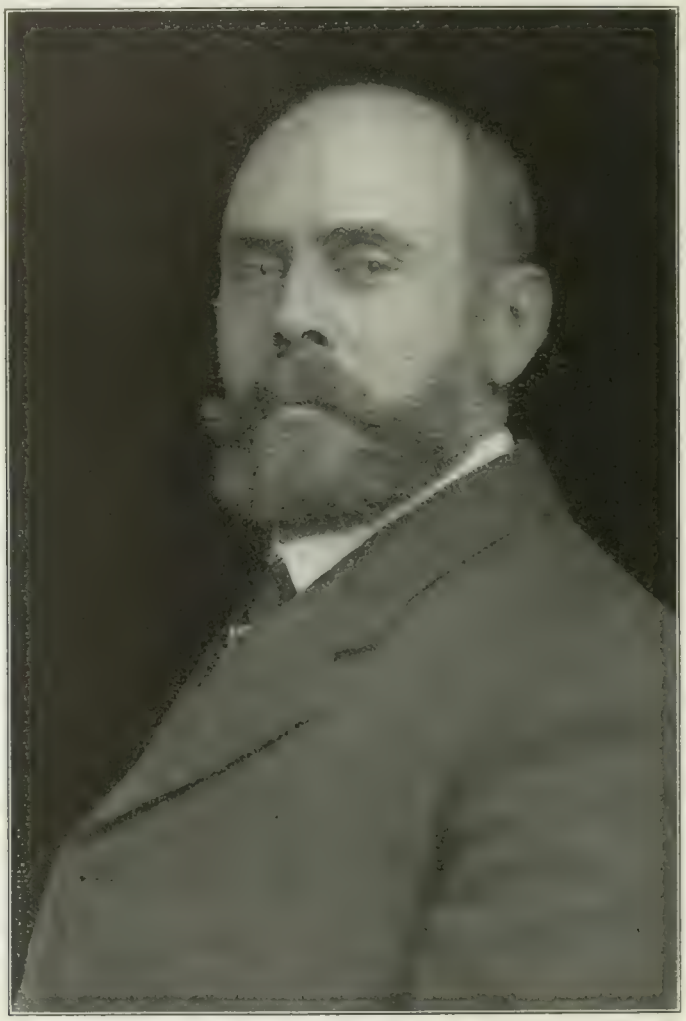
The ideal method of increasing our revenues (without resorting either to the augmentation of the annual dues or to advertising) would be to secure a larger membership, approximately double the present number, as the expense involved in issuing the bulletins and proceedings is not much more for a membership of 2,000 than for one of 1,000, while the revenue would be doubled. While we are pleased with the present number of members, yet it is evident that many who are eligible and who would be most desirable confrères have not yet identified themselves with the association.

In view of the unauthorized use of extracts from our proceedings for advertising purposes by commercial agencies, your Board arranged for copyrighting all of our publications in the United States. It was not expedient to do so in Canada.

At the last convention important changes in our constitution were adopted, among which were the shortening of the name, the establishment of a nominating committee, in order to place a larger share of the management in the hands of the members, and the addition of three members to the Board of Direction. During the past year it has been found desirable to make some changes in the "General Rules for the Preparation, Publication and Consideration of Committee Reports," and the "General Rules for the Publication of the Manual," in order to make the work of the association more expeditious and the papers and reports more valuable.

An invitation to send five delegates to the Third National Conservation Congress at Kansas City on September 25, 26 and 27, 1911, was extended to the association, and W. S. Kinnear, John V. Hanna, John R. Leighty, H. S. Moore and J. A. L. Waddell were named.

An invitation was issued to your association through the sub-department secretaries of the Department of Commerce and Labor to participate with them, the government engineers, and other engineering societies, in a conference for the purpose of unifying specifications for Portland cement, and the invitation was accepted, the matter being put in the hands of Committee VIII—Masonry. We were advised by



CHAS. S. CHURCHILL, First Vice-President.

the special committee of the departmental conference that, on January 8, 1912, all parties had agreed to the preliminary specifications, except there was a difference of opinion as to whether the Vicat or Gilmore needles should be used for determining the time of setting. On January 17, the committee of the American Society of Civil Engineers presented its final report, recommending the continued use of the Vicat needle for determining consistency and time of setting, which was accepted.

The assistant purchasing agent of the Isthmian Canal Commission has written our secretary for our rules covering creosote treatment of lumber and piling

An invitation was also sent to this association to send a representative to the convention of the International Association for Testing Materials, to be held in September, 1912, and we will accept it.

Prof. W. F. M. Goss, dean and director of the University of Illinois, has tendered the use of data collected by the university and the assistance of its staff, in the work of Committee XVI—Economics of Railway Location.



EDWIN F. WENDT, Second Vice-President.

In 1910 the amount of money contributed by the American Railway Association for experiments and other work in connection with the study of the rail problem was $6,213.57, while the amount authorized by that association for 1911 is $10,000. The results of the study are published in the bulletins as fast as completed. In this connection you are informed that the following letter has been received by your president from Judge Wm. J. Wood, chairman Railroad Commission of Indiana:

"The Railroad Commission of Indiana has about decided to commence a formal inquiry into the condition of steel now being put into the railroad tracks of this state, involving, of course, a comparison of the steel now being constructed and that formerly used on the railroads of this state.

"I understand that your association has had this matter up more than once, and I wish to have a conference with you about it in order, among other things, to have a suggestion from you, as to some person who could address a conference of railway managers and engineers, and other persons interested, held at Indianapolis under the direction of this commission. Will you be in Chicago this week? I will thank you to advise me in reference to this subject, and whether or not I could meet you if I shall come there for that purpose.

"Yours very truly,

(Signed) "W. J. Wood, Chairman."

Your president called upon Judge Wood, and explained to him the work which Committee IV—Rail has been doing.

At the meeting subsequently held on February 20, 1912, papers concerning the question of improvement of rail design and specifications were read by P. H. Dudley (by representative), Thos. H. Johnson and W. C. Cushing, and, in addition, addresses were made by F. A. Delano, E. J. Buffington, R. Montfort and Dr. Benjamin.

While speaking of the rail question, it is important to mention the admirable editorials on that subject in the Railway Age Gazette during the past few months, the specific numbers being those for October 6 and December 15, 1911, for January 12, February 9, February 16 and March 1, 1912. In two of them, those for October 6, 1911, and March 1, 1912, especial mention is made of the part taken in the study of the problem by our association.

Your attention is called to the kindly expression of appreciation of our work in the editorial of the Railway and Engineering Review of October 28, 1911, page 940, and the statement on Railway and Engineering Literature, page 944. These words should be a stimulus to further effort.

In the "Regulations adopted on December 28, 1911, by the superintendents of buildings of all five boroughs of the City of New York," relative to reinforced concrete, clause No. 9 says that "Steel for reinforcement of concrete shall meet the requirements of the standard specifications for steel reinforcement of the American Railway Engineering Association."

In addition to the above, three authors of new books to be published have asked the authority of your Direction to embody information contained in our proceedings in their books.

From these instances it will be apparent that your work has attained such a value that information from it is now sought. The knowledge ought to spur us on to constant improvement.

During the past year the third edition of the manual has been issued. The comments on this volume by members and others have been quite complimentary. These compliments are deserved by the committees, Edwin F. Wendt, the reviewer, Prof. Pence, the editor, and your secretary, E. H. Fritch.

It is our sad task to announce that we have lost several of our fellow-members by death during the past year:

Benjamin Douglas, late tunnel engineer, Detroit River Tunnel Company, a charter member and an active worker on committees, was accidentally killed while inspecting a bridge in Brazil, South America.

W. D. Taylor, late chief engineer, Chicago & Alton, a brief sketch of whom was given in Bulletin 138.

Frank E. Simar, late division engineer, Canadian Northern, at Duluth, Minn.

N. P. Curtis, late instructor, University of Wisconsin, at Madison.

N. J. Gibbs, until recently engaged in construction work on the Panama Canal. He was accidentally killed at Tomkins Cove, N. Y.



E. H. FRITCH, Secretary.

H. Pierce, late engineer of construction of the Chesapeake & Ohio Railway.

Lewis Kingman, late office engineer of the National Railways of Mexico.

John S. Metcalf, president of John S. Metcalf Company, Chicago.

PROGRESS IN ENGINEERING WORKS.

The year 1911 has witnessed the continued progress, and in some cases the completion of vast works of engineers. Governments, whether federal, state or municipal, continue their works in times of depressed business as well as in prosperous times, and, therefore, the three greatest government undertakings, the Panama Canal, the Catskill Aqueduct and the Erie Canal, have been pushed steadily forward.

Of these the Catskill Aqueduct, estimated to cost $162,000,000, is of high importance, for it is expected to carry ultimately the water supply for 20,000,000 people. It is a stupendous undertaking, measuring 92 miles in length, from the Ashokan Reservoir in the Catskill Mountains to New York City, and, in time, to be extended into Brooklyn and Staten Island. The daily delivery of water is to reach 500,000,000 gallons. In addition to the 55 miles of cut and cover, there will be 24 grade tunnels, aggregating 14 miles, 6 miles of steel pipe siphons and 17 miles of pressure tunnels, 7 in number. The pressure tunnels are circular, about 14 ft. diameter, and the one of greatest magnitude and difficulty is that under the Hudson at Storm King Mountain, 1,150 feet below the surface of the ground. It was holed through last month in the presence of the Mayor of New York City and many others.

Another important government enterprise, which was brought to successful completion last March, is the Roosevelt Dam, in the canyon of the Salt river, about 70 miles east of Phoenix, Ariz., as it is for the purpose of impounding 418,000,000,000 gallons of water for irrigation. It is 276 ft. high, with a crest length of 1,080 ft. It was begun in September, 1906, and was estimated to cost about $3,850,000. Owing to its isolation, the cement used was manufactured at the site in a mill especially constructed for the work. The cost per barrel was $1.96, whereas, if shipped in, it would have been $9 per barrel.

Notwithstanding the depression in business, the year witnessed the continued progress, and also the completion, of some magnificent engineering works in the railway world.

The erection of the enormous and palatial station of the New York Central Lines in New York City has been finally started, after carrying on since 1903 a large amount of preliminary work of excavation, tracklaying and office building. This work has embraced about 3,000,000 cu. yds. of rock excavation, carried on under great difficulties, about 250,000 cu. yds. of concrete and about 60,000 tons of steel.

The tracks are on two levels, the suburban, 20 in number,

about 49 ft. below the street level, and the express or through tracks, 22 in number, 20 to 25 ft. above them.

On June 4, 1911, the large new passenger station of the Chicago & Northwestern Railway in Chicago, costing about $24,000,000, was opened for service. Its style is Italian Renaissance, and it is built of gray Maine granite. The train shed has 16 tracks, and belt conveyors are used for conveying some of the incoming mail.

Identified with the name of one man, Henry M. Flagler, an enterprise entirely different from any other was brought to successful completion in the last week of December, 1911, so far as the placing of the last batch of concrete was concerned. This is the famous ocean railway from Miami to Key West in Florida, 154 miles, of which 74 miles are on land, 25 miles on swamps and 55 miles over water or on the long line of islands that make up the Florida Keys. There are about 500 reinforced concrete segmental and semi-circular arches from 45 to 60 ft. span. The longest viaduct is 10,500 ft., between Long Key and Conch Key. It is a wonderful piece of work and several disasters from storms during the construction have been experienced. It was opened for public service, January 22, 1912.



GEORGE H. BREMNER, Treasurer.

Another great railroad enterprise, estimated to cost $9,500,000, is the line and grade improvement of the Delaware, Lackawanna & Western Railroad, between Slateford, Pa., and Hopatcong, N. J., which was opened for traffic Christmas, 1911. The old line was shortened from 39.57 miles to 28.45 miles, the grade reduced from 1.14 per cent to .55 per cent, and the curvature from 6 deg. 54 min. to 2 deg., except in the case of one of 3½ deg., saving 1,500 deg. of central angle. It was an unusually bold piece of work, and of great magnitude. The grading consisted of 7,890,000 cu. yds. of earth excavation, 6,502,000 cu. yds. of rock excavation, and 16,000,000 cu. yds. of embankment. The Pequest fill, containing 6,625,650 cu. yds. of material, is probably the largest railroad embankment ever constructed, being 3 miles long and from 75 ft. to 110 ft. high. The total quantity of concrete is 266,900 cu. yds., and two of the bridges are magnificent reinforced concrete arch viaducts, one over the Delaware river, and the other over the Paulins Kill. The first is 1,540 ft. long and 64 ft. high, and consists of five spans of 150 ft., two of 120, one of 53 and one of 50½ ft. The Paulins Kill viaduct is 1,100 ft. long and 117 ft. high, and has five spans of 120 ft. and two of 100 ft.

The Southern Pacific also completed a line and grade change up the western slope of the Sierras from Rocklin, Cal., to Colfax, 30.8 miles, on a 1.5 per cent grade. There are 17 tunnels on the line.

The Galveston causeway, estimated to cost $1,615,000, was begun in 1909, and is a structure a little more than 2 miles long, connecting Galveston island, on which the city of that name stands, with the mainland, its main feature being a reinforced concrete viaduct 2,455 ft. long, consisting of twenty-eight 70-ft. arch spans and a lift span with a clear waterway of 109 ft. The viaduct portion is 66 ft. wide, and carries 2 railway tracks, 1 electric railway track and a roadway of 19 ft. clear width. On the causeway embankment approaches there are more tracks, and the roadway widens to 40 ft. About 9,808 concrete sheet piles, making a continuous strip 35 miles long, were required.

The work of introducing electric power on steam railroads was continued, although in this case, the Hoosac Tunnel, it was of but limited extent. The work was begun October 3, 1910, and finished May 18, 1911, at a cost of 1¼ million dollars. The electric system is the same as used by the New York, New Haven & Hartford, and the zone extends from a small tunnel just west of the North Adams station to a point just east of the Hoosac Tunnel station, 21 miles of track being electrically operated. The tunnel is 4.75 miles long, and was opened in 1875. But lately the New Haven company has made known its plan to change the main line from Stamford to New Haven to electric traction at an early date, at an estimated cost of $7,000,000.

Last April it was announced that a beginning had been made on the last of the $160,000,000 worth of improvements started in 1903 by the Pennsylvania Railroad, viz.: the New York Connecting Railway, which will link the Pennsylvania and New Haven roads together. This link will be 12 miles long, the principal feature of which will be the four-track bridge

from Astoria on Long Island over Hell Gate, Ward's and Randall's Islands, to Mott Haven or Port Morris. The bridge over Hell Gate and its approaches will be about 3 miles long, and will be of most massive construction, costing about $20,000,000. The main span is a steel arch 1,020 ft. long and 140 ft. above mean water level, making an imposing gateway for the East River entrance to New York Harbor.

Great engineering works are not confined to this country. The Swiss railway engineers have been obliged, by the rugged nature of their country, to resort to long and ingenious tunnel building, in order to prevent their land from becoming a barrier to international transportation. The world's longest tunnels have been built there, the Simplon, 12.4 miles long; the St. Gothard, 9.5 miles long, and the past year witnessed the piercing of the third longest, the Loetschberg, 9 miles long. They also have the first, Mont Cenis, 7.5 miles long, begun in 1857, and the Arlberg, 6.5 miles long. In the case of many of these tunnels, gain in elevation in short distances has been obtained by the use of the spiral, making the journey over the railway most fascinating, interesting and beautiful.

The Loetschberg tunnel is built to put the capital, Bern, on the main line from Milan, Italy, to Paris and Calais in France, while at the same time the distance is shortened by 80 miles to 675 miles. It was originally planned to be straight, but a disastrous inrush of water from the Kander river, burying 25 men, compelled the contractors to wall it up and build a detour with two short curves. The record of tunnel driving has been made in this work, a start being made November 1, 1906, while the headings met March 31, 1911.

The increased daily rate of tunnel driving due to improved methods and machinery is well illustrated in these Swiss tunnels.

The rate at the Mont Cenis, begun in 1857, was 7.75 ft. per day, two headings.

The rate at the St. Gothard, begun in 1872, was 18 ft. per day, two headings.

The rate at the Arlberg, begun in 1880, was 27.25 ft. per day, two headings.

The rate at the Simplon, begun in 1893, was 36 ft. per day, two headings.

The rate at the Loetschberg, begun in 1906, was 29.5 ft. per day, one heading, while a maximum for one day with one heading was 36 ft.

The Panama Canal continues to be the most costly and most stupendous enterprise now in progress, and its engineers are earning a monument of fame for themselves. The special commissioner to "The Engineer" of London, Mr Percy F. Martin, F. R. G. S., who visited the canal in 1910, makes this statement in the issue of June 9, 1911: "When the canal shall be pronounced completed, and the huge lock gates swing open for the first time to receive the earliest vessel, a chorus of acclamation and congratulation will ascend such as probably no human achievement has ever yet called forth. And justifiably so."

In Engineering News for February 17, 1910, the following appeared:

THE COMPLETE ENGINEER OF 300 YEARS AGO.

"Wrapped in the stoutest of manila paper and deposited on the shelves of the library of the American Society of Civil Engineers is a book, the gift of W. A. Haven, M. Am. Soc. C. E., which is probably one of the earliest of printed books in the English language treating of the art or science of engineering. On a curiously embellished title page is the following caption:

"'A Practical Abstract of the Arts of Fortification and Assailing * * * Written for the benefit of such as delight in the Practice of those Noble Arts. By David Papillon Gent: * * * London Printed by R: Austin and are to be sould at the south side of the Exchange & in Popes head Alley 1645.'

"Engineering in that day, and for a century or so after, was entirely a military accomplishment, and so the science discussed by the author did not embrace any of the civil arts which were later a part of the engineer's knowledge, but prefacing the more serious work there is a chapter on (The True Character of a Complete Engineer) which will appeal even to the modern engineer. Especially will the last paragraph of this chapter touch a tender spot in the heart of every engineer who has had to argue against all reason with the lawyer, director or business man who can see in engineering only a superior sort of craftsmanship which, in its fundamentals, should be knowledge easily deduced by themselves. The major portion of this first chapter follows:

"'OF THE TRUE CHARACTER OF A COMPLETE ENGINEER.

"'(1) He is to be religious for the fear of the Lord is the beginning of wisdom.

"'(2) He is to be a souldier for none can better judge of the sufficiency or insufficiency of fortification. * * *

"'(3) He is to be a traveller; for he that hath not seen variety of works, and the excellency of foreign fortifications, cannot perceive the defects of ours, nor give directions to rectify them.

"'(4) He is to be well versed in the arithmetike for his calculations; in the geometry, for the setting out of all superficies; in the architecture, for to direct all manner of artificers; and in the other parts of the mathematikes, for the taking of distances, depths and elevations, and for the inventing and contriving of all manner of engines and machines.

"'(5) He is to be wise in all his proceedings, punctual in all his promises, careful and diligent in his calling, and rather inclined to austerity with lenity, or otherwise he will never be respected, served or obeyed.

"'(6) He is to be of solid judgment and quick of apprehension to judge aright of the defects and advantages of places. * * * He is not to give account of his actions to any, but to the generall, or to the lieutenant generall of the Ordnance if he be in an army, or in a garison, only to the grand committee, and to the governour; and as for all other kinds of men, inhabitants, souldiers or officers; he is not bound to expostulate the case, if they demand of him reasons for anything he directs or commands to be done; neither ought he if he regards his reputation, and makes conscience of his ways, to comply * * * with the humour of the greatest in authority, or be led to assent to any resolution, that is against the maxims of his art, by the logical and sophisticall reasons and arguments of scholars or churchmen; for some of them are now a days overbusie in things that go beyond their element, and endeavor to over-sway artists by rhetorike, considering not that their reasons are no reasons at all to the reasons of Art. And this last quality is the essentiall part of a good Engineer; for all the other are but to small purpose without this.'"

Fellow members: Many of the engineers engaged in the huge enterprises briefly outlined in the foregoing pages, and in other work, too, not mentioned, will measure up with "The Complete Engineer of 300 Years Ago."

Reports of Secretary and Treasurer.

The secretary's report is published on another page of this issue.

The treasurer made the following report:

Balance cash on hand March 15, 1911....		$13,216.62
Consisting of:		
Ten railroad bonds, as follows: Four St. Louis Southwestern bonds, par value $1,000 each, at cost.....	$ 3,319.31	
Six L. S. & M. S. Ry. bonds, par value $1,000 each, at cost.....	5,660.25	
Cash in bank.....	4,237.06	
Total	$13,216.62	
Receipts from all sources, March 16, 1911, to December 31, 1911.....		$23,716.69
Receipts from all sources, January 1, 1912, to March 15, 1912.....		10,538.44
Total receipts for the year.....		$34,255.13
Expenditures, paid on audited vouchers:		
March 16, 1911, to December 31, 1911..	$25,602.96	
January 1 to March 15, 1912.....	3,766.70	
Total for the year.....		29,369.66
Balance to credit.....		$ 4,885.47
Less proceeds from sale of four L. S. & M. S. bonds.....		3,797.33
Net excess of receipts over expenditures		$ 1.088.14
Balance, March 15, 1912:		
Cash in bank.....		$ 8,836.43
Cash on hand, checks, etc.....		286.10
Four St. Louis S. W. bonds, at cost..		3,319.31
Two L. S. & M. S. bonds, at cost.....		1,886.75
Total cash assets.....		$14,328,59

The secretary reported the following details of receipts for the year:

	March 16, 1911, to December 31, 1911.	January 1, 1912, to March 15,1912.	Total.
From members (dues, etc.)....	$ 5.274.48	$ 8,567.35	$13,841.83
From others (sales of publications, advertising, etc.).....	6.853.59	1,394.91	8,248.50

From American Railway Association, account Rail Committee expense	6,495.57	508.56	7,004.13
From interest	295.72	67.62	363.34
From loan	1,000.00	.....	1,000.00
From proceeds of sale of bonds	3,797.33	.....	3,797.33
Total	$23,716.69	$10,538.44	$34,255.13

RULES AND ORGANIZATION.

Last year's report of this committee embodied revisions of the rules as then published in the manual and additional rules of the same general character, all relating to the government of employes of the maintenance of way department.

For this year's work the committee was instructed to: Continue the compilation of rules for the government of maintenance of way employes, and to formulate rules in the nature of specifications or instructions regarding the conduct of work, making use of the recommendations of the various committees dealing with these subjects and of the best practice of railway companies, as embodied in their books of rules.

Some progress has been made with rules falling under the first of the instructions, but this year's report deals only with the work falling under the second of the instructions.



J. O. OSGOOD,

Chairman Committee on Rules and Organization.

The committee recommends that no change be made in the General Rules for the Government of Employes of the Maintenance of Way Department heretofore adopted by the association, and that to the rules heretofore adopted by the association be added instructions, as follows:

Cross-Sections.

(1) The roadbed, ballast and track shall conform to the standard plans. No changes in the sections shown shall be made without proper authority. (It is understood that cross-sections for wet cuts will be included in the standard plans.)

Drainage.

(2) All ditches, including intercepting ditches on the upper side of cuts, must be kept clean.

(3) Where heaving or wet spots develop, special drainage shall be provided.

Ballasting.

(4) Before re-ballasting track, line and grade stakes shall be set by the engineer. All unsuitable material shall be removed and the roadbed widened to proper section, the waste material being used to widen banks or otherwise, as may be directed.

(5) Track must be kept in good line and surface while ballasting, open track avoided as far as practicable, and such track carefully watched.

(6) After ballast is distributed it shall be trimmed, and the track lined and surfaced to conform to the standard plans.

(7) Where track is bonded, ballast must be kept at least one inch below the base of rail. At road crossings, platforms, etc., where this is not practicable, only clean gravel or rock ballast shall be used.

Ties.

(8) Ties stored along the right-of-way shall be piled to conform to the standard plan. (The standard plan should show the minimum distance to the nearest rail.)

(9) The ties in track must be inspected at stated times each year, and those which will not last until the next inspection marked for renewal.

(10) The renewal of ties shall be started when directed by the .....(Title)..... When ties are being renewed, the line and surface shall be corrected and ballast trimmed.

(11) All defective ties removed from track shall each day be placed for burning or loading on cars.

(12) The .....(Title)..... shall frequently inspect ties removed from track to see if any have been removed which might have remained in the track with safety until the next inspection.

(13) Ties shall be spaced according to the standard plans. All ties shall be placed square to the line of rails. The outside ends on double tracks, and the ends on one side throughout on single track, must be lined parallel with the rail.

(14) The heart side of ties must be turned down. The largest and best ties shall be selected for use at joints. Twisted or badly hewn ties must not be notched, but the bearings must be made true with the adze.

(15) Whenever spikes are drawn from ties, wooden tie plugs must be driven into all holes except in ties which are to be renewed that season. In replacing spikes they should be driven into the plugs.

Rail.

(16) In unloading rails from cars they should be skidded or otherwise carefully lowered to avoid injury. Where it is necessary to drop them, both ends must be dropped together and the greatest care taken to avoid their falling on hard and uneven surfaces.

(17) The bottom of the new rail and the bearing surface of the tie shall be cleaned before the new rail is laid.

(18) When replacing rail with rail of the same section, only two rows of spikes shall be drawn; in replacing with rail of a different section, three rows of spikes shall be drawn.

(19) In laying new rail, standard expansion shims shall be used. The temperature of the rail shall be taken by placing the thermometer on the rail. The openings between 33 ft. rails shall be as follows:

Temperature (Fahrenheit).	Amount of Opening.
−20 to 0 deg.	5/32 in.
0 to 25 deg.	1/4 in.
25 to 50 deg.	3/16 in.
50 to 75 deg.	1/8 in.
75 to 100 deg.	1/16 in.

Over 100 deg. to be laid close.

The rail should be laid without bumping and, when practicable, laid rail by rail.

(20) The rails shall be brought squarely into line and at least two bolts tightened before spiking. All joint bars shall be securely fastened with the full number of bolts, tightening those at the center first. At permanent connections of rails of different sections step chairs and off-set splices must be used.

(21) All spikes must be driven vertically with the face in contact with the base of the rail. They should not be straightened while being driven. The rail must be full spiked and the spikes staggered so that the outside spikes shall be on the same side of the tie and the inside spikes on the opposite side.

(22) In making temporary connections in main tracks an old rail should be cut and fastened to the new rail, using compromise joints when necessary. Switch points shall be used for this purpose only during the presence of the track foreman.

(23) After new rail is laid the track must be lined and surfaced.

(24) All kinked or crooked rails must be straightened before being laid; if bent in service they must either be removed or straightened.

(25) Rails for curves of 2 deg. and over should be curved before being laid. In curving or straightening rails, the rail bender must be used.

Surfacing.

(26) When surfacing (picking up low points or other low places), the general level of the track must not be disturbed.

The report is signed by Jos. O. Osgood (C. R. R. of N. J.),

chairman; G. D. Brooke (B. & O.), vice-chairman; F. D. Anthony (Q. M. & S.), C. Dougherty (C. N. O. & T. P.), F. P. Gutelius (C. P.), Jos. Mullen (C. C. C. & St. L.), S. E. Coombs (N. Y. C. & H. R.), J. B. Carothers (B. & O.), Kenneth Hanger (C. R. I. & G.), J. A. Gordon (C. G. W.), J. B. Dickson (Erie).

Discussion on Rules and Organization.

In the absence of Mr. Osgood, the report was presented by F. D. Anthony (Q. M. & S.).

Mr. Anthony: It is the opinion of myself and of one other member of the committee that the rule in paragraph 6 is not right. Ballast is usually distributed in anticipation of a lift. It seems to me the lift is the first thing after the distribution of the ballast, and I would suggest this reading: "After ballast is distributed and the track lifted, the track should be lined and surfaced and the ballast trimmed to conform to standard plans."

A motion to that effect was seconded and carried.

E. E. R. Tratman (Eng. News): I move that the word "electrically" be inserted before "bonded" in paragraph 7. We all know what that word "bonded" means, but as these are rules to be sent out for track men and track officials, I think that should be explained more fully.

The President: The acting chairman says there is no objection to making that change.

H. M. Church (B. & O.): I would like to change the last word in the last sentence of paragraph 10, so that it shall read, "unsuitable material removed and ballast trimmed."

Mr. Anthony: There is no objection to that.

Mr. Tratman: I think paragraph 12 could be simplified a little in the second line, by saying "if any of them have been removed," instead of "if any have been removed which might have remained."

Mr. Anthony: There is no objection to that correction.

W. L. Webb (C. M. & St. P.): I think the last sentence of paragraph 14 is a little indefinite. It says: "Twisted or badly hewn ties must not be notched, but the bearings must be made true with the adze." I suppose what is intended is that ties shall be hewn so that there is a good surface, instead of being a mere notch. It seems to me the reading could be improved a little, to bring out the real meaning, for even a notch may have the surface true, which evidently is not what is intended. It might be made to read, "Twisted or badly hewn ties must not be notched, but must be hewn for the full length of the tie," or words to that effect.

Mr. Anthony: The intention of the committee is that they shall be properly adzed, but not notched.

E. R. Lewis (M. C.): I assume we all realize the importance of the proper method of laying ties. The first sentence of this Rule 14 reads: "The heart side of ties must be turned down." As far as I know, that is the dogma of the railway rules. These are positive orders, leaving absolutely nothing to the judgment of practical track men who may have been laying ties for fifty years. This rule vitally concerns the whole track structure. I opposed this rule because I believe it is wrong and I do not believe it can be done. I have investigated many hundreds of thousands of ties with this point in view, and on the very roads whose rule books contain this rule the ties in many cases are not laid according to the rule. The definition of a tie given in the manual is: "The tie is that transverse member of a railway track which supports the rails and by means of which the rails are retained in position." The purpose mentioned in this definition will not be best served by placing the tie heart side down. The heart wood of the tie is denser than the sap wood. Its cells are thicker and have less moisture when the wood is green. Therefore, it loses less moisture when the wood is cured. The cells of the sap wood are thinner than the cells of the heart wood, and the cells are larger. Sap wood is not so dense, and cannot hold the spike as well. With the sap side up, only the point of the spike reaches the densest wood. In the less dense sap wood the neck of the spike has a tendency to work out of gauge and move a little more than the point does. What we especially want is to get the neck of the spike, that part of the spike nearest to the rail, where it will do the most good and hold the gauge best. When any timber starts to check, it checks from the sap side first, because the sap side loses sap first, loses more of it, and allows the shrinkage to take place more quickly and it shrinks more than the heart side. The heart wood being denser contains less moisture, and, absorbing less moisture, is longer lived than the sap wood. The sap wood will dry out, check and warp away from the heart. This applies to all sorts of timber. In the town where I live, we cut something like one hundred million feet of timber every year, and every lumberman in Saginaw Valley has told me that timber will warp away from the heart; every lumberman in every other valley will tell you the same thing. Therefore, I say that the tie should be laid heart side up, because any shrinking and warping of the tie warps away from the heart, and the heart is the convex side. Now, you cannot get a good bearing for a tie unless you lay it with the convex side up. If you lay it with the concave side up, you have a rocking chair and not a railway. Any good, practical laborer will tell you to lay a tie "belly up." I think that 90 per cent. of the ties that are laid in the track are perceptibly warped or crooked. They are not precisely straight. There is a choice of bearing. I do not think any track foreman ever should allow a tie to be put in the track without choosing the bearing and the side which should go up, irrespective of sap side or heart side. He must get the convex side up.

According to statistics, 80 per cent. of the 125,000,000 ties bought by the railways of the United States in 1911 were hewn ties. The hewn tie is a pole tie. A man going into the business of making ties is not going to pick out timber which has to be split and worked out on four sides. He picks out pole timber that requires working on only two sides. The other timber is worked up into something else. In making sawed ties, all the boards possible are made of the outside of the log, which leaves a box heart tie. You can put the heart side up or the heart side down. The same applies to the pole tie. Besides being wrong in principle, I believe this sentence is unnecessary. Only 5 or 10 per cent. of the ties have the heart on one side, and even that 5 or 10 per cent. ought not to be laid wrong side up. I move that this part of the rule be made to read: "Ties must be laid so as to obtain the best bearing."

Robert Ferriday (C. C. C. & St. L.): I second the motion.

The motion was carried.

L. A. Downs (I. C.): I think we should make some reference to the use of treated plugs in treated ties by adding to paragraph 15, "When spikes are withdrawn from treated ties, plugs of treated material should be used."

Mr. Anthony: That rule is general. It does not refer to either treated or untreated ties. These rules may be supplemented by such special rules as local conditions may require.

Mr. Lewis: I move that the last sentence of paragraph 16 be eliminated. I think if we say, "In unloading rails from cars they should be skidded or otherwise carefully lowered to avoid injury," we have said all that is necessary.

Mr. Downs: I second the motion.

H. T. Porter (B. & L. E.): As I understand it, the second sentence is provided for those cases where they have not the equipment to carefully lower the rails. On a sandy roadbed, with reasonable care, you can drop the rails without danger of breakage, and I would judge that a very large percentage of the rails in this country are unloaded without their being skidded or lowered carefully with some device.

The motion was lost.

Mr. Anthony: A correction to strike out the word "new" in the first sentence of paragraph 17 has been accepted.

Mr. Ferriday: In clause 18, I don't think the section should determine whether two rows of spikes shall be left or three rows. It depends upon certain parts of the section. I know that in a great many cases but two rows of spikes are drawn, in laying rails of different section. It depends upon the gauge of the track, the difference in sections, the width of the base and the width of the head. I move to add, after that paragraph, "if necessary."

The President: That is accepted by the committee.

Mr. Tratman: In paragraph 20, the terms "step chairs" and "offset splices" are used. In the 22d, the term "compromise joints" is used. Those are three names for one device, and I think in No. 20 the words "compromise joints" should be used.

The President: The committee will accept that suggestion.

Mr. Downs: I move that we eliminate the last sentence of paragraph 22.

Motion seconded and carried.

L. W. Baldwin (I. C.): Paragraph 24 says, "If bent in service, they must either be removed or straightened." After straightening, I think it is unsafe to lay them back in the main track.

Mr. Anthony: This does not say they shall be laid back in the main track. They may be laid in the siding.

Hunter McDonald (N. C. & St. L.): Does Mr. Baldwin mean that a rail is necessarily unsafe because it has been straightened? If that is true, the curving of rails is bad practice. I recall having straightened as many as 2,000 rails, some of which are still in service after twenty years.

Mr. Baldwin: It is true that curving a rail is bending it, but when curved by the roller rail bender the process is very gradual. I have seen cases where service bent rails

in the main track were taken out and straightened and then relaid in the main track, and I have found they were liable to breakage at the point where that straightening had been done. It seems to me it is not a safe practice to take a service bent rail and straighten it and put it back into the main track, under heavy service.

Mr. Porter: A service bent rail means a rail that is bent vertically. Any power that is sufficient to bend it is liable to damage the structure of the rail, but a rail can be bent sideways or horizontally, because, on account of the section, it is not so stiff in that direction. So it can be bent sideways and straightened again and put back in the track without taking any great chances. I don't think this is intended to refer to service bent rails. It means rails bent out of line.

C. A. Morse (A., T. & S. F.): It seems to me these rules are rather too general, for the reason that we have first, second, third and fourth class track. We build light branches for the development of a country and lay most anything on them. To make a rule that you can't straighten a bent rail is impracticable, because none of us follow it.

Mr. Baldwin: I think after a rail has been kinked, as referred to in the first part of this paragraph, and then straightened, it should be treated as if it were a second quality rail.

Mr. Lewis: I move that Rule 24 be adopted.

Motion seconded and carried by a rising vote; affirmative, 41; negative, 24.

H. E. Hale (Mo. Pac.): I move that paragraph 25 be changed to read 4 degrees instead of 2.

Mr. Morse: The rule says that the rail bender must be used. I understand there are some roads in the country that have not been using a rail bender on the outside rail. They curve the inside rail and then spring the outside rail to gauge. We have done that in a few cases and have found it very satisfactory, rather tending to get away from the short kinks that are there, whether you can see them or not, when the rail bender is used.

Motion seconded and carried.

Mr. McDonald: Does the manual show whether any action has been taken on this matter in the past? I think it has already been fixed at two degrees.

The President: A hasty examination of the manual does not show any action to have been taken, but the chair rules this will be a matter for the editor of the manual to take care of. Paragraph 25 has, therefore, been changed to read "four degrees" instead of "two," unless there is a vote requested.

J. G. Sullivan (C. P. R.): The word "the" in that paragraph would lead one to believe that the committee had a special bender in mind. I would suggest "a rail bender."

The President: The committee accepts that.

J. B. Berry (C., R. I. & P.): I move to strike out everything in the parentheses in paragraph 26. There cannot be two different kinds of low points. Surfacing means picking up the track, and it is covered by the balance of the rule.

The President: The committee accepts that.

Mr. Morse: Paragraph 26, as amended, would read, "When surfacing, the general level of the track must not be disturbed." I think that is misleading. If you are surfacing to face, you certainly must disturb the surface of the track, and any track has got to be surfaced to face occasionally.

Mr. Porter: I would like to offer an amendment to 26, as follows: "When picking up low joints or other low places, the general level of the track must not be disturbed."

Motion seconded.

Mr. Porter: The word "surfacing" is a general term and applies to lifting track, when you are simply lifting one side or lifting joints, or when you are lifting out a foot in order to put on new ballast. This clause, however, is to warn the foreman that when he is simply picking up low joints and other low places they must not disturb the general surface of the track. That is a source of a great deal of difficulty on track maintenance. Old experienced foremen can often go through a section, in the spring and early summer, and put it in first-class shape with little or no effort, whereas a younger foreman, when it is only necessary to pick up joints at low places, may do more harm than he does good by attempting to do what this rule says he must not do, namely, disturb the general level of the track.

C. H. Stein (C. R. R. of N. J.): This reads, "when picking up low points"—a typographical error, no doubt. I think this would read better, "when picking up joints or other low places the general level of the track must not be disturbed," and not duplicate the word "low," because that is very clear by inference.

Mr. Porter: I accept that.

C. H. Ewing (A. C. Ry.): I hope the motion will not carry. I think all of us know that surfacing simply covers picking up low joints and low spots. Raising track is an entirely different proposition; so that the rule as agreed to by the committee should stand.

Motion carried.

A motion was made and carried to adopt the rules as amended.

SIGNALS AND INTERLOCKING.

Four subjects were assigned for consideration:

(1) Continue investigation of outline and description of a comprehensive and uniform signal system, suitable for general adoption, conferring with proper committee of the American Railway Association.

(2) Revise mechanical interlocking specifications, and include wrought-iron pipe as well as steel.

(3) Revise electric interlocking specifications and submit statement of the results from experience.

(4) Report on the effect of treated and metal ties on track circuits.

Last year the committee presented revised specifications for various kinds of insulated wire, which the association



A. H. RUDD.

Chairman Committee on Signals and Interlocking.

adopted. In order to bring these specifications into conformity with those adopted by the Railway Signal Association, a new insulation resistance table is herewith submitted.

CONCLUSIONS.

(1) The following table of insulation resistances in megohms per mile at 60 deg. Fahrenheit for the various thicknesses of insulation in fractions of an inch and the various sizes of wire is made a part of the specifications for mineral matter, rubber compound, insulated signal wire for current of 660 volts or less, appearing in Vol. 12, Part 1, pp. 101 to 104, inclusive, and the insulation resistance in megohms per mile, shown on page 108, is revised to conform with this table.

	3	2	5	3	7	4	5	6	7	8
B. & S. G.	64	32	64	32	64	32	32	32	32	32
0.....	....	....	900	1100	1200	1300	1500	1800	2000	2200
1.....	....	....	1000	1200	1400	1500	1800	1900	2200	2400
2.....	....	1000	1100	1400	1500	1600	1900	2200	2300	2600
3.....	....	1100	1200	1500	1600	1800	2000	2300	2600	2700
4.....	....	1200	1400	1600	1800	1900	2200	2400	2700	2800
5.....	....	1300	1500	1700	1900	2000	2300	2600	2800	3100
6.....	....	1400	1600	1800	2000	2200	2600	2800	3100	3400
8.....	1400	1600	1900	2200	2300	2600	2800	3200	3500	3800
9.....	1500	1800	2000	2300	2600	2700	3100	3400	3600	3900
10.....	1600	1900	2200	2400	2700	3000	3200	3600	3900	4200
12.....	1800	2200	2500	2800	3100	3200	3600	4000	4300	4600
14.....	2200	2600	2800	3200	3500	3600	4200	4400	4800	5100

(2) The above table of insulation resistances in megohms per mile at 60 deg. Fahrenheit for the various thicknesses of insulation in fractions of an inch and the various sizes of wire is made a part of the specifications for mineral matter, rubber compound, insulated aerial braided cables for current of 660 volts or less, shown on pp. 105 to 109, inclusive, of the same volume, and the insulation resistance megohms per mile, shown on page 108, is revised to conform thereto.

(3) The above table of insulation resistances in megohms per mile at 60 deg. Fahrenheit for the various thicknesses of insulation in fractions of an inch and the various sizes of wire is made a part of the specifications for mineral matter, rubber compound, insulated, lead-covered, armored submarine

cables for 600 or lower voltage service, shown on pp. 110 to 114, inclusive, of the same volume, and the insulation resistance megohms per mile, shown on page 113, revised to conform thereto.

The committee does not report this year on subjects Nos. 2, 3 or 4. It reports on Subject No. 1 as follows:

UNIFORM SIGNALING.

This subject was referred to the Committee on Transportation of the American Railway Association by the 1910 convention. In 1911, progress was reported.

The amended report of the Committee on Transportation, accepted by the American Railway Association, as informa-

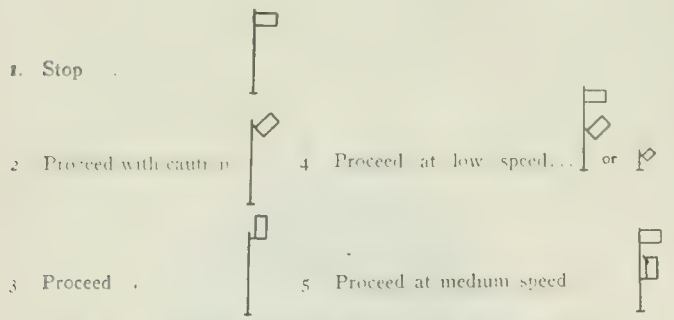


Fig. 1. Simplest Aspects for A. R. A. Indications.

tion, May, 1911, and transmitted to Committee X through the secretary, is as follows:

Memorandum on the Essentials of Signaling.

(Incorporated in the report of the Committee on Transportation of the American Railway Association, May, 1911.)

The reports of various committees of the Railway Signal Association and of the American Railway Engineering and Maintenance of Way Association on the subject of signaling have been submitted to this committee, with the request that the essentials of signaling be outlined or defined for the future guidance of their committees.

The subject has been carefully analyzed and considered.

Scheme No. 1.

FUNDAMENTALS.

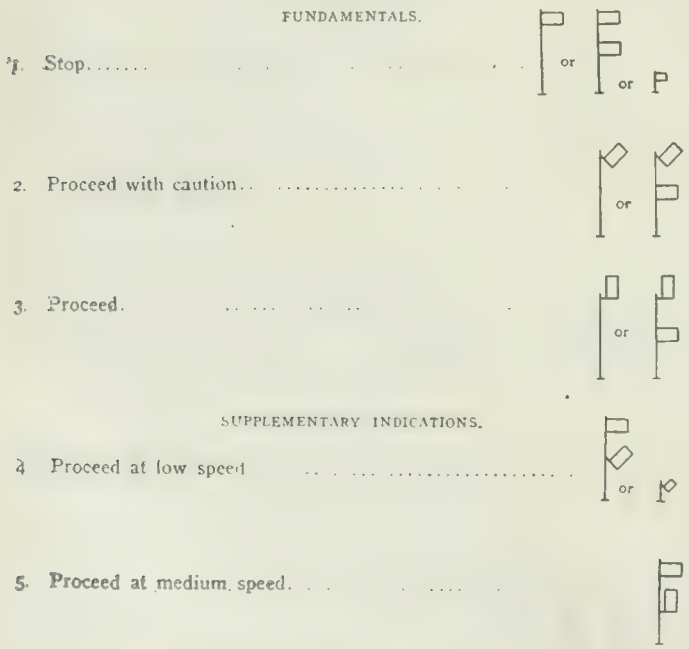


Fig. 2. Aspects Recommended for Roads Desiring to Use Simple Indications With Combinations.

There are three signals that are essential in operation and therefore fundamental, viz.:

(1) Stop.
(2) Proceed with caution.
(3) Proceed.

The fundamental, "Proceed with caution," may be used with the same aspect to govern any cautionary movement, for example, when

(a) Next signal is "stop."
(b) Next signal is "proceed at low speed."
(c) Next signal is "proceed at medium speed."
(d) A train is in the block.
(e) There may be an obstruction ahead.

There are two additional indications which may be used where movements are to be made at a restricted speed, viz.:

(4) Proceed at low speed.
(5) Proceed at medium speed.

Where automatic block system rules are in effect, a special mark of some distinctive character should be applied at the stop signal.

The committee therefore recommends as fundamentals:

(1) Stop,
(2) Proceed with caution,
(3) Proceed,

and as supplementary indications to be used where required:

(4) Proceed at low speed,
(5) Proceed at medium speed.

Stop signals operated under automatic block system rules should be designated by some distinctive mark, to be determined by each road in accordance with local requirements.

Recommendations of Committee X.

The simplest aspects for the three fundamental indications are shown as 1, 2 and 3, Fig. 1.

Having in view, and not desiring to depart from, the established practice of indicating diverging routes and incidentally low and medium speeds, the committee recommends that the medium and low speed indications be given by an additional arm or arms. The simplest method (although incapable of

Scheme No. 2.

FUNDAMENTALS.

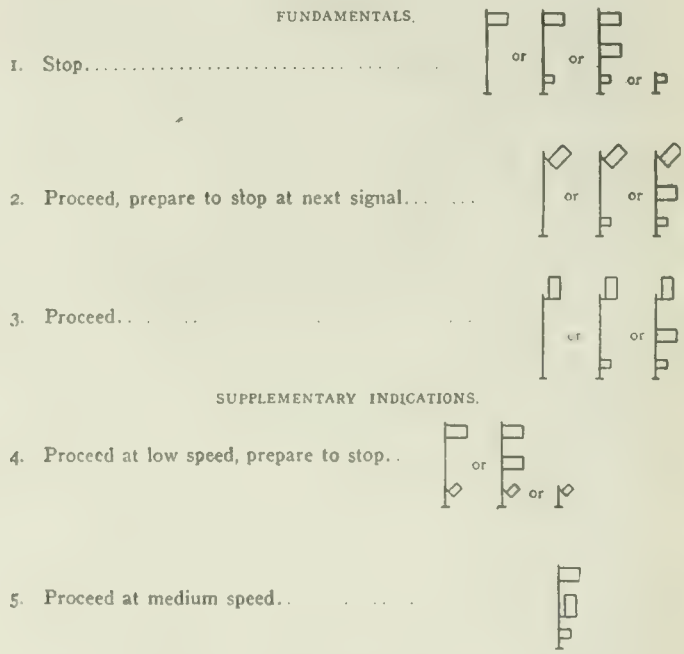


Fig. 3. Aspects for Combinations of Fundamental and Supplementary Indications.

expansion to provide additional aspects or even combinations of the fundamentals and supplementaries) is to use a second arm for both of these indications. The Committee on Transportation rules that the fundamental, "Proceed with caution," may be used to govern any cautionary movement. Therefore, for those roads which desire to operate under this plan and deem the five indications entirely sufficient, two additional aspects are necessary, shown as 4 and 5, Fig. 1.

At interlocking plants which are also block stations it may be desirable, even on such roads, to give passenger trains caution signals for diverging movements, but not for entering occupied block sections; this would, with the system outlined above, require a separate signal beyond the interlocked switches. It may frequently also be desirable to display the fundamental, "Proceed with caution," on the medium-speed route, and to logically and consistently apply the fundamental aspects for "Proceed with caution" and "proceed" to those signals indicating medium speed and low speed, the 45-deg. position should be used for caution and the vertical for proceed.

Again, as the Committee on Transportation merely makes optional the combination of various indications under caution and as several roads have found it desirable to differentiate between such indications, the committee recommends for

such roads a low arm as a low-speed arm and a middle arm where the indication of medium speed is desired.

The Committee on Transportation states that "stop signals operated under automatic block system rules should be designated by some distinctive mark to be determined by each road in accordance with local requirements." The instructions to this committee are to design a uniform system, which end is defeated if each road uses a different method of designating the automatic home signal. Therefore, the committee recommends as follows:

Conclusions.

(1) On roads desiring to operate with the three fundamentals and the two additional indications without expansion or combination of these indications, the aspects shown in Fig. 2 may be used.

(2) On those roads desiring combinations of the fundamentals and supplementary indications and different aspects for the various caution indications permissible under the



Fig. 4. (a)—Conclusion 3. (b)—Conclusion 4. (c)—Conclusion 5. (d)—Conclusion 6.

ruling of the Committee on Transportation, the aspects shown in Fig. 3 should be used.

(3) When it is desired to indicate "Proceed at medium speed, prepare to stop at next signal," the aspect shown at (a), Fig. 4, should be used.

(4) When it is desired to indicate, "Proceed at low speed," one of the aspects shown at (b), Fig. 4, should be used.

(5) When it is desired to indicate, "Proceed, prepare to pass next signal at medium speed," one of the aspects shown at (c), Fig. 4, should be used.

(6) Where in manual block territory, it is desired to indicate "Proceed with caution, block occupied," the aspect shown at (d), Fig. 4, should be used.

(7) That the arms of automatic signals be pointed and the arms of other signals giving the stop indication have square ends; that, on roads using Scheme No. 1, a number plate be added on the automatic signal and, on roads using Scheme

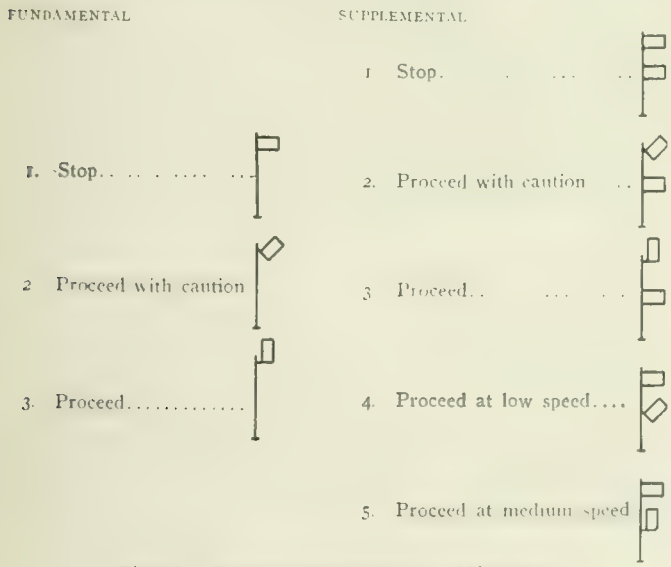


Fig. 5. Recommendations of Minority.

No. 2, a red marker light below and to the left of the active light be provided.

The report is signed by A. H. Rudd (P. R. R.), Chairman; L. R. Clausen (C. M. & St. P.), Vice-Chairman; Azel Ames, C. C. Anthony (P. R. R.), H. Baker (C. N. O. & T. P.), H. S. Balliet (N. Y. C. & H. R.), W. B. Causey (C. G. W.), C. A. Christofferson (N. P.), C. E. Denney (L. S. & M. S.), W. J. Eck (Southern), W. H. Elliott (N. Y. C. & H. R.), G. E. Ellis (K. C. Term.), W J. Harahan (Erie), M. H. Hovey (Wis Ry. Com.), A. S. Ingalls (L. S. & M. S.), J. C. Mock (D. R. T.), F. P. Patenall (B. & O.), J. A. Peabody (C. & N. W.), Frank Rhea (General Electric Co.), W. B. Scott (U. P.), A. G. Shaver (C. R. I. & P.), T. S. Stevens (A. T. & S. F.), H. H. Temple (B. & O.), Edwin F. Wendt (P. & L. E.), J. C. Young (U. P.).

MINORITY REPORT.

Messrs. Baker, Clausen, Scott, Stevens and Young do not approve the report on Subject No. 1 and believe that the indications provided by the American Railway Association are sufficient for the operation of any railway and are all for which the association should provide aspects.

They, therefore, recommend that the indications specified by the Committee on Transportation of the American Railway Association and the aspects shown in Fig. 5 to represent them, be accepted and approved as recommended practice.

(Stop signals operated under automatic block system rules shall be designated by a number plate.)

The specific objection to the additional indications and aspects provided by the majority are the same as previously presented to the association and are in accordance with the arguments presented before the Transportation Committee of the American Railway Association at Niagara Falls in June, 1910.

They are as follows:

1. It is impracticable to provide a separate signal for each of the conditions on a railway requiring cautious running and to maintain the fine-haired distinctions necessary to their interpretation.

2. It is unnecessary, and, in fact, dangerous, to tell the engineman by fixed signal how he shall control his train at some point in advance.

3. Advance information so given is misleading and unreliable, as it is subject to change without notice, and therefore the engineman cannot safely use it. If he does so use it, it is done at the expense of safety.

4. The conditions of modern railway operation do not require trains to be run at full speed past caution signals, and any time gained by this practice is at the expense of safety.

5. Each signal should indicate "Stop" or "Caution" or "Proceed," and have no relation to signals in advance or in the rear.

6. Each signal should be observed in turn as the train comes to it, and not at some point in advance at the option of the engineman.

7. With signals properly located, it is time a train should be run with caution if it has reached a point so close to preceding trains or stop signals in advance that a caution signal is received.

8. No proceed or caution indication should "imply or assure clear track to a point in advance." Railway signaling devices and our methods of communication have not reached the perfection that will admit of this being done. We cannot know positively if the track is clear, and further, it may not stay clear. We are under a moral obligation not to give such misleading information.

9. The giving of information by signal indications about conditions in advance, whether it be regarding the next signal or the next station, or any other object or condition, is wrong practice, productive of laxity and a fruitful source of danger and accident.

10. It will be difficult, if not impossible, to maintain discipline and proper observance of the great variety of caution indications proposed by the majority, because of the fine distinctions involved.

A number of serious and fatal accidents in the past few years, wherein the engineman failed properly to observe the caution signal, but fully intended to stop at the next signal, testify most conclusively to the correctness of this position.

Discussion on Signals and Interlocking.

In the absence of the chairman, L. R. Clausen (C., M. & St. P.) presented the report.

Mr. Clausen: The committee was assigned four subjects and has a report only on subject 1. We have also submitted a revised table of insulation resistances for rubber-covered wires, which is changed as the result of investigations of the committee of the Railway Signal Association. It was submitted to that association at its annual meeting last October and was approved by letter ballot. The changes are comparatively slight and in order to make the American Railway Engineering Association specifications conform to the Railway Signal Association specifications, the committee desires to have this revised table approved by this association. I make a motion to the effect that the revised table of insulation resistances be adopted by this association.

Mr. Elliott: I second the motion.

Mr. McDonald: I move that the table of insulation resistances be adopted in accordance with paragraph 16 as provided in the general rules.

Mr. Clausen: We accept the amendment.

The President: The motion is that this revised table be adopted for publication in the manual.

Motion carried.

Mr. Clausen: The adoption of the table of insulation resistances carries with it th e approval of the same table

for the specifications of cables, both braided and lead-covered. I would, therefore, as representing the committee, move the adoption of this same table, to be included in the specifications for mineral matter, rubber compound insulated aerial cables, braided cables, and also for rubber compound insulated lead-covered cables.

The motion was carried.

Mr. Clausen: The first instruction to the committee was: "Continue investigation of outline and description of a comprehensive and uniform signal system, suitable for general adoption, conferring with proper committee of the American Railway Association." A report of the Signal Practice Committee of the Railway Signal Association has been submitted to the Railway Signal Association and has been rejected by that association. In view of that fact, the committee presents a report on this subject and I move that report be received as information.

Motion carried.

The President: The chair understands that that motion includes the minority report also.

IRON AND STEEL STRUCTURES.

The committee reports as follows:

Subject No. 1.—Investigation on impact and secondary stresses: Appendex B contains a report from F. E. Turneaure, chairman of the Sub-Committee on Impact, giving an outline of the work done by the committee during the past year.

Subject No. 2.—Influence of theory, experiment and experience on bridge design: It was unanimously decided by the committee that it was unable to report adequately on this subject, and the request is therefore made that the subject be dropped.



C. H. CARTLIDGE,

Chairman Committee on Iron and Steel Structures.

Subject No. 3.—Rules for instruction and guidance of inspectors in mills, shop and field: The committee reports progress. The chairman of the sub-committee received discussion from two of the members of his sub-committee, and will probably be able to submit a paper giving the results of their findings during the next few months.

Subject No. 4.—Design of built-up columns: The tender of the services of this committee to collaborate with the joint committee of the American Society of Civil Engineers was made and very promptly accepted. Sufficient time has not yet elapsed to permit the organization of any actual work on this subject. The program proposed by the A. S. C. E. committee is very elaborate and comprehensive and when carried out will immensely increase our knowledge of the subject. In order that this committee do any practical work on this subject, it will be necessary to have funds. The committee understands, of course, that none of the funds of the association are available for this purpose. It feels warranted, however, in recommending that individual roads be asked to contribute for the purpose of making these tests. This work and that of the Impact Committee are original research work and it is hardly necessary to point out the ultimate value of work done in the manner in which it has been done. It will probably be necessary in the near future to take cognizance of these experiments in our specifications for design, but the committee does not recommend that any change be made at present, nor until further experiments on secondary stresses have been made, and if possible, considerable work on columns. The committee will present later a more definite report of the probable amount of money needed for the first year's work. It is expected that this will be very small and that it can easily be raised.

Subject No. 5.—Specifications for erection of steel bridges: In Appendix A the committee presents for the consideration of the association a set of specifications, revised in accordance with the discussion at the last convention and with the written discussions from members and others received since the convention.

CONCLUSIONS.

The recommendations of the committee are:

(1) That the specifications for bridge erection be adopted and printed in the manual.

(2) That the report of the Impact Committee be received as information.

(3) That no change be made at present in the specifications printed in the manual.

The report is signed by C. H. Cartlidge (C. B. & Q.), chairman; A. J. Himes (N. Y. C. & St. L.), vice-chairman; J. A. Bohland (G. N.), Charles Chandler (C. G. W.), C. L. Crandall (Cornell Univ.), J. E. Crawford (N. & W.), J. E. Greiner (B. & O.), J. M. Johnson (L. B. & I. Co.), C. N. Monsarrat (Quebec Bridge), W. H. Moore (N. Y. N. H. & H.), Albert Reichmann (Am. Bridge Co.), A. F. Robinson (A. T. & S. F.), C. C. Schneider (Consulting Engr.), O. E. Selby (C. C. C. & St. L.), C. E. Smith (M. P.), I. F. Stern (Consulting Engr.), F. E. Turneaure (Univ. of Wisconsin).

APPENDIX A.

Specifications for the Erection of Railway Bridges.

1. Work to Be Done.—The contractor shall erect, rivet and adjust all metal work in place complete, and perform all other work hereinafter specified.

2. Plant.—The contractor shall provide all tools, machinery and appliances necessary for the expeditious handling of the work, including drift pins and fitting up bolts.

3. Falsework.—The method of erection and plans for falsework and erection equipment shall be subject to approval by the engineer, but such approval shall not relieve the contractor from any responsibility. Falsework will be built by (insert "railway company" or "contractor"). Falsework material of every character will be provided by the (insert "Railway Company" or "Contractor").

The temporary structure for use during erection and for maintaining the traffic shall be properly designed and substantially constructed for the loads which will come upon it. All bents shall be thoroughly secured against movement, both transversely and longitudinally. The bents shall be well secured against settling, and piles used wherever firm bottom cannot be obtained. Upon completion of the erection, the temporary structure, if the property of the railway company, shall be removed without unnecessary damage, and neatly piled near the site or loaded on cars, as may be directed. If the property of the contractor, it shall be removed in a manner subject to the approval of the engineer.

Falsework placed by the railway company under an old structure or for carrying traffic, may be used as far as practicable by the contractor during erection, but it shall not be unnecessarily cut or wasted.

4. Conduct of Work.—The work shall be prosecuted with sufficient force, plant and equipment to expedite its completion to the utmost extent and in such a manner as to be at all times subordinate to the use of the tracks by the railway company, and so as not to interfere with the work of other contractors or to close or obstruct any thoroughfare by land or water, except under proper authority.

Reasonable reduction of speed will be allowed upon request of the contractor.

Tracks shall not be cut nor shall trains be subjected to any stoppage except when specifically authorized by the engineer.

The contractor shall protect traffic and his work by flagman furnished by and at the expense of the railway company. The contractor shall provide competent watchmen to guard the work and material against injury.

5. Engine Service.—If under the contract, work train or engine service is furnished the contractor free of charge, such service shall consist only in unloading materials and in transferring the same from a convenient siding to the bridge site. Other engine service shall be paid for by the contractor at the rate of $..... per day per engine, the time to include the time necessary for the engine to come from and return to its terminal. When engine service is desired the contractor shall give the proper railway officials at least 24 hours' advance notice and the railway company will furnish the service as promptly as possible, consistent with railroad operations.

When derrick cars are used on main tracks, their movements shall be in charge of a train crew, and the expense of the crew and any engine service other than as noted above shall be charged to the contractor.

6. Transportation.—When transportation of equipment, materials and men is furnished free over the railway company's line, it shall be subject to such conditions as may be stated in the contract.

7. Masonry.—The railway company will furnish all masonry to correct lines and elevations, and unless otherwise stated in the contract, will make all changes in old masonry without unnecessarily impeding the operations of the contractor and railway company's engineers will establish lines and elevations and assume responsibility therefor, but the contractor shall compare the elevations, distances, etc., shown on plans, with the masonry as actually constructed as far as practicable, before he assembles the steel. In case of discrepancy, he shall immediately notify the engineer.

8. Handling and Storing Materials.—Cars containing materials or plant shall be promptly unloaded upon delivery therefor, and in case of failure to do so the contractor shall be liable for demurrage charges. Material shall be placed on skids above the ground, laid so as not to hold water, and stored and handled in such a manner as not to be injured or to interfere with railroad operations. The expense of repairing or replacing material damaged by rough handling shall be charged to the contractor. The contractor, while unloading and storing material, shall compare each piece with the shipping list and promptly report any shortage or injury discovered.

9. Maintenance of Traffic.—When traffic is to be maintained it will be carried on in such a manner as to interfere as little as practicable with the work of the contractor.

Changes in the supporting structure or tracks required during erection shall be at all times under the direct control and supervision of the railway company.

10. Removal of Old Structure.—Unless otherwise specified, metal work in the old structure shall be dismantled without unnecessary damage and loaded on cars or neatly piled at a site immediately adjacent to the tracks, and at a convenient grade for future handling, as may be directed. When the structure is to be used elsewhere all parts will be match-marked by the railway company; when the old bridge is composed of several spans the parts of each shall be kept separate.

11. Metal Work.—Material shall be handled without damage. Threads of all pins shall be protected by pilot and driving nuts while being driven in place.

Light drifting will be permitted in order to draw the parts together, but drifting for the purpose of matching unfair holes will not be permitted. Unfair holes shall be reamed or drilled.

Nuts on pins and on bolts remaining in the structure shall be effectively locked by checking the threads.

All splices and field connections shall be securely bolted prior to riveting. When the parts are required to carry traffic, important connections, such as attachments of stringers and floor beams, shall have at least 50 per cent of the holes filled with bolts and 25 per cent with drift pins. All tension splices shall be riveted up complete before blocking is removed. When not carrying traffic, at least 33⅓ per cent of the holes shall have bolts.

Rivets in splices of compression members shall not be driven until the members shall have been subjected to full dead load stresses. Rivets shall be driven tight. No recupping or calking will be permitted. The heads shall be full and uniform in size and free from fins, concentric and in full contact with the metal. Heads shall be painted immediately after acceptance.

Rivets shall be uniformly and thoroughly heated and no burnt rivets shall be driven. All defective rivets shall be promptly cut out and redriven. In removing rivets the surrounding metal shall not be injured; if necessary, the rivets shall be drilled out.

12. Misfits.—Correction of minor misfits and a reasonable amount of reaming shall be considered as a legitimate part of the erection.

Any error in shop work which prevents the proper assembling and fitting up of parts by the moderate use of drift pins, and a moderate amount of reaming and slight chipping or cutting, shall be immediately reported to the engineer and the work of correction done in the presence of the engineer, who shall check the time expended.

The contractor shall render an itemized bill for such work of correction for the approval of the engineer,

13. Anchor Bolts.—Holes for all anchor bolts, except where bolts are built up with the masonry, shall be drilled by the contractor after the metal is in place and the bolts shall be set in Portland cement grout.

14. Bed Plates.—Bed plates resting on masonry shall be level and have a full even bearing over their entire surface; this shall be attained by either the use of Portland cement grout or mortar, or by tightly ramming in rust cement under the bed plates after blocking them accurately in position.

15. Decks.—The (insert "railway company" or "contractor") will frame and place the permanent timber deck.

16. Painting.—The paint will be furnished by (insert "railway company" or "contractor") and shall be of such color, quality and manufacture as may be specified.

Surfaces inaccessible after erection, such as bottoms of base plates, tops of stringers, etc., shall receive two coats of paint before assembling in place. After erection, the entire structure shall receive two coats of paint, allowing enough time between coats for the first coat to dry before applying the second. No paint shall be applied in wet or freezing weather, nor when the surface of the metal is damp. Painting shall be done in good and workmanlike manner, subject to strict inspection during progress and after completion, and in accordance with special instructions which shall be given by the engineer. All metal shall be throughly cleaned of dirt, rust, loose scale, etc., before the paint is applied.

17. Clearing the Site.—The contractor, after completion of the work of erection, shall remove all old material and debris resulting from his operations and place the premises in a neat condition.

18. Superintendence and Workmen.—During the entire progress of the work the contractor shall have a competent superintendent in personal charge and shall employ only skilled and competent workmen. Instructions given by the engineer to the superintendent shall be carried out the same as if given to the contractor. If any of the contractor's employes by unseemly or boisterous conduct, or by incompetency or dishonesty, show unfitness for employment on the work, they shall, upon instructions from the engineer, be discharged from the work, nor thereafter be employed upon it without the engineer's consent.

19. Inspection.—The work of erection shall at all times be subject to the inspection and acceptance of the engineer.

20. Responsibility.—The contractor shall assume all responsibility for loss or damage to his own work, materials or plant, due to any cause; also, for all loss or damage to the railway company's materials or property, and to other property adjacent to the railroad, due to causes within his reasonable control.

The contractor shall assume all responsibility for injury to the workmen and the public, or to any individual; and in case of accident or suit he shall defend the suit in person and relieve the railway company from all costs and expenses, and pay any judgments that may be recovered thereon.

The contractor shall comply with the laws and ordinances affecting the manner of doing work; shall take out all necessary permits and comply with their requirements, and shall take such precaution as may be necessary to protect life and property.

21. Insurance and Bond.—The contractor shall carry such liability insurance as is necessary to protect himself and the railway company against loss or damage caused by injuries to his men, and shall furnish the railway company a bond in form and of a surety acceptable to the railway company, providing for the faithful performance of the work and all matters pertaining thereto, in such sum as shall be specified in the contract.

22. Engineer.—The term "engineer," as used herein, shall be understood to mean the chief engineer of the railway company, or his accredited representative.

APPENDIX B.

Secondary Stresses.

A brief report of progress is submitted relative to tests of secondary stresses, which were carried out during the past summer by the Sub-Committee on Impact and Secondary Stresses.

Through the assistance of the mechanician's shop at the University of Wisconsin the sub-committee was able to develop and manufacture a special form of extensometer for use in measuring secondary stresses. An important requirement of such an instrument is freedom from friction of all moving parts and, in general, a high degree of sensitiveness, combined with stability and strength of framework, convenience of adjustment and manipulation. An instrument was developed along the line of the extensometers used for impact tests, but to secure sensitiveness the principal bearings were made of knife edges, and instead of using a pencil for securing a continuous record, a ray of light is allowed to pass through a minute perforation in a disc at the end of the long lever, and a path of this ray of light is photographed on a moving slip of sensitized paper.

The apparatus proved satisfactory in practical operation, and the method of obtaining the record was found to be very good indeed. The sensitized paper was developed in the field

so that results could quickly be obtained. Four of these extensometers were made by the University of Wisconsin and were used by the committee on its tests.

About three weeks were spent in the field and tests were made on the following bridges: On the Chicago, Milwaukee & St. Paul Railway, a 160-ft. riveted span and a 176-ft. pin-connected span at Bryon, Ill., a 104-ft. pony truss span at Rockton, Ill., in which eye-bars were used for the diagonal members, and a span of the same length at Brodhead, Wis., in which all members were riveted. On the Chicago & North-Western Railway, a 182-ft. riveted truss, a 75-ft. deck-plate girder, and a through riveted lattice truss, all on the new Belt Line at Milwaukee. In all of these tests the railway company furnished a special train, and such other facilities in the way of mechanics as were needed.

The field work was carried out by C. L. Crandall and F. E. Turneaure, members of the sub-committee, assisted by W. L. Conwell and W. A. Axtell, of Cornell University, and W. S. Kinne, O. L. Kowalke and J. B. Kommers, of the University of Wisconsin.

Discussion on Iron and Steel Structures.

A. S. Baldwin (I. C.): I would ask the object of the third clause of paragraph 3 of the Specifications for the Erection of Railway Bridges, which provides that "falsework placed by the railway company under an old structure or for carrying traffic, may be used as far as practicable by the contractor during erection, but it shall not be unnecessarily cut or wasted." That, it seems to me, is a special case and does not apply here. You cannot make a rule of that kind to apply to all cases.

Mr. Porter: It is not an uncommon thing to put bents under a truss that has become light. In a case where I had to do that, I took up the question with a bridge company as to a plan of falsework which had been used in the erection of a new structure, so they put the falsework under our old bridge and there used it when they came to erect a new bridge. In another case, where the old bridge was wrecked by a washout and an engine going onto it, we had to build a trestle across the river in order to keep the traffic open, so we built our trestle over the ditch and it was used for falsework by the contractor in erecting a truss. This is a specification for erection, and it covers cases that do happen in ordinary experience, and I see no objection to leaving it in here.

Mr. Baldwin: There are no two cases alike, in all probability, and consequently it cannot be covered by a general rule. I move that this clause be modified as follows:

"If falsework has been placed by the railway company under an old structure, or for carrying traffic, the use of it by the contractor must be subject to a special arrangement to be made by the engineer of the railway company."

O. E. Selby (C., C., C. & St. L.): I think that the clause as it stands does not represent a special case, but a very usual case. It very frequently happens that falsework has been placed for the purpose of strengthening a weak bridge to enable the bridge to carry the traffic, and it would be unwise to throw it away and not take advantage of it for erection purposes. I do not see how it could lead to complications with the contractor, because it represents an existing condition at the time the contract is let and bids are asked for. If the falsework is there it is there when the bidder examines the job, and be is expected to take note of all the existing conditions.

J. M. Meade (A., T. & S. F.): The Santa Fe has done a great deal of work, almost exactly as outlined in this report, and I believe we should leave that paragraph as it is written.

Mr. Cartlidge: In making these specifications we desired to adapt them as widely as possible to any conditions which are to be met with. It seems to the committee that any clause such as this, which does not meet with the approval of the engineer or the railway company letting the contract, can very readily be eliminated in the draft of the contract made at the time the work is let. These specifications are not intended to be used verbatim, but as a model or guide for drawing up the specifications.

Mr. Baldwin: I think the members have misunderstood the object that I had in view in making this motion. It is not that the falsework should not be used, for it is, of course, in the line of economy that anything existing on the railway should be used, but I wanted to have the clause so worded that the railway company would be sure to get proper credit for it. Take a case in which a railway company is about to let a contract for the erection of all its bridges for a year. The contractor in figuring on these bridges, would figure on the falsework for every one of the bridges; then, at any point where he found falsework, there would be that much net gain to him to which he was not entitled, whereas, if the provision is made in the way I have proposed where the contractor comes to a bridge for which the falsework has been provided, it becomes necessary for him to make a special arrangement for that bridge with the railway company and the railway company gets credit for the material put in there.

Mr. Porter: If this clause is left in the specification, then it does not have to be handled as a special matter, and if a railway is letting a contract for all of its bridges for a year, and takes competing bids, if this clause is in the specification, the chances are that some of these contractors, at least, will take this into consideration, in making their bids, and the railway company would get a lower bid than if this clause is left out. If the clause is left out of the general specification the engineer may omit to take it into consideration when he calls for bids, so I think it is the proper place for it and it should remain.

F. J. Bachelder (B. & O.): This clause seems to be covered in the forepart of the section. It says: "The method of erection and plans for falsework and erection equipment shall be subject to approval by the engineer, but such approval shall not relieve the contractor from any responsibility. Falsework will be built by ..... Falsework material of every character will be provided by the ....."

That, it seems to me, covers these particular cases, and we could eliminate the latter clause.

Mr. Baldwin's motion was put to vote and lost.

E. A. Frink (S. A. L.: The second paragraph of section 4 reads: "Reasonable reduction of speed will be allowed upon request of the contractor." That means that upon the request of the contractor the railway company will issue a "slow order" limiting the speed over the structure to a certain degree. I think there should be a clause added specifying that the railway company will not be responsible for any injury to the property or structure of the contractor, due to failure on the part of the railway company to carry out the "slow order." In one case on the Seaboard we had a "slow order" over a structure and the contractor was engaged in building a cofferdam which he tied up to the structure. Some of the trains over the structure exceeded the speed limit and the contractor thereupon set up a claim, which he substantiated in court, that the Seaboard was responsible for the damage to his work because it did not maintain the slow order. I move to amend that paragraph by adding: "The railway will not thereby in any way incur any responsibility for damage to the work or materials of the contractor for failure to maintain such reduction in speed."

Thomas Earle (Penna. Steel Co.): It seems to me that the addition of this clause would nullify the balance of the paragraph. What is the advantage to a contractor of a slow order if he knows beforehand that he is not to expect that slow order to be fulfilled; and, in addition, if there is a slow order of thirty miles and a train goes through at sixty miles, and his entire plant is destroyed, and he has to pay for it, it will add a burden on the contractor, but in the end the railway company will pay for all such clauses, because the contractor must eventually be reimbursed for all such expenses by his customers, who, in this particular case, are the railways.

J. L. Campbell (E. P. S. W.): I do not believe that you can release a railway company from proper responsibility by the insertion of such a clause and I believe it would impair the force and effectiveness and dignity of the work of this association to put such a clause as that in the specification.

Mr. Bachelder: This clause does not specify the speed restriction which is to be placed on the structure. It simply provides for a reasonable reduction of speed. I think the clause should stand as written.

Albert Reichmann (Am. Br. Co.): I think the words "reasonable reduction of speed will be allowed" are sufficient. In my opinion, the word "reasonable" takes care of that.

Mr. Sullivan: Would it not be better to say "a reasonable reduction of speed will be allowed on the recommendation of the company's engineer"? He is responsible for the work, and if the contractor is going to fail by running trains at sixty miles an hour he is not going to allow it.

Mr. Stein: I believe the point that has been raised is practically covered by a succeeding paragraph which reads: "The contractor shall protect traffic and his work by flagmen furnished by and at the expense of the railway company." It is the business of the contractor to see that these flagmen carry out their instructions and hold the speed of these trains down to the limit placed on them by the engineer in charge and the operating department, so that I do not think it is necessary to introduce any additional clause in these specifications.

Mr. Porter: I offer an amendment to read as follows: "Reasonable reduction of speed, upon request of contractor, can be provided for in the contract."

The President: That is so different from the amendment already proposed that it cannot be received.

Mr. Porter: The point I want to make is that in some contracts you do not want any reduction of speed whatever, and you require the contractor to take out the old bridge and put in a new one between trains, without either stopping or delaying traffic. This being a general specification, the contract let under this specification entitles the contractor to a reasonable reduction of speed if he should so request.

The amendment proposed by Mr. Fink was put to vote and lost.

E. G. Brown (Carnegie Steel Co.): Is it not a fact that some railway companies do not admit of any reduction whatever in the speed?

Mr. Cartlidge: The specification attempts to cover all cases and such clauses as apply to particular cases, which are not required at the time of letting the contract, may be very readily eliminated.

Mr. Baldwin: I think it is good practice to require the contractor to pay part of the cost of the work train service. Where the full expense of the work train service is paid for by the railway company the contractors call for work trains where they could be avoided and are negligent in letting them go, and I have made it a practice to give a price for the service of the work train per day that will about divide the cost between the railway company and the contractor.

Mr. Cartlidge: The committee spent more time over that clause than any other in the specification. It is a very difficult one to cover. The practice differs widely on different roads. If the specification does not set forth the conditions under which the contractor must make his bid he is likely to add something for good measure to cover the question at issue. If he has an indefinite amount of train service to pay for he is going to put in his estimate a flat price to cover all that he will have to pay for, certainly, and it is necessary either to put all of it on the railway company or all of it on the contractor in the general specification. It would be very easy to amend these specifications for particular cases, but it would be very difficult to make a wording which would provide for all cases in practice.

E. F. Wendt (P. & L. E.): For some years our company followed the practice of furnishing free transportation for materials and other work train service. There is so much difficulty in connection with this practice that we found it convenient to abolish that practice, and at the present time we compel all contractors to bid on just one condition, namely, the bid shall include all transportation of both men and materials and all cost of work train service. Where this practice can be followed the engineer has a great deal less trouble in connection with his field work and his accounts, and I believe that is the practice to which we are rapidly tending.

Mr. Earle: The fourth paragraph of Sec. 11 reads: "All splices and field connections shall be securely bolted prior to riveting. When the parts are required to carry traffic, important connections, such as attachments of stringers and floor beams, shall have at least 50 per cent of the holes filled with bolts and 25 per cent with drift pins." I think 50 per cent with drift pins and 25 per cent with bolts will give better results. Drift pins absolutely fill the hole, and if you have both drift pins and bolts, in the same splice, the drift pins will carry all the stresses, as they are the only ones actually in contact.

Mr. Cartlidge: I think it is conceded that not all rivets fill all the holes and that a good many of our structures are being carried on friction.

Mr. Cartlidge: The style of drift pins with which I am familiar are tapered and the largest diameter of the pin is the diameter of the $\frac{1}{16}$-in. rivet hole. As that diameter occurs in only one place in the length of the drift pin it is a little difficult to see how that action of a tapered drift pin in a cylindrical hole can be any better than a bolt.

Mr. Selby: These specifications are intended to represent recommended practice, and to a great extent common practice, and I would ask Mr. Earle if he knows of it being common practice, to use $\frac{2}{3}$ drift pins and one-third bolts?

Mr. Earle: That is practically the way we do work where we carry heavy traffic, although it is seldom we have to carry heavy traffic on steel work of that kind. It has the approval of our engineer.

Mr. Cartlidge: It is the opinion of the committee that common practice and better practice is for the bolts to be in the larger proportion and the drift pins in the minority.

After talking over Sections 20 and 21 with the committee, I move their elimination from the specification.

Motion carried.

A motion to approve these specifications for publication in the Manual was carried.

A motion to receive the report of the Sub-Committee on Impact and Secondary Stresses as information was carried.

WOODEN BRIDGES AND TRESTLES.

The work assigned was as follows:

(1) Report on the formulas for use in determining the strength of sheet piling.

(2) Report on equipment required for pile driving.

(3) Collect information on special methods of driving sheet piles in cofferdams where conditions do not permit the use of ordinary equipment.

(4) Collect information on actual experience on the bearing power of piles and on the practical results of the use of formulas.

(5) Report on the use of guard rails for wooden bridges and trestles.

(6) Report on fire protection of wooden bridges and trestles.

Subjects Nos. 1, 4, 5 and 6 were selected for consideration this year. The committee reports progress as follows:

(1) The committee did not think this subject could be reported on this year, as an experimental investigation, which it was hoped Cornell university would make, could not be completed in time for report if undertaken. It was thought that the result of these experiments would be of much service in making up its final report to the association. The committee has since been advised that Cornell could not undertake these experiments, but the committee hopes that some other institution may find it desirable that they be carried out.

The procedure suggested for these experiments was that a strong concrete open top box be made, across which at its middle a vertical plate diaphragm of tempered spring steel could be set; this diaphragm being held in place against horizontal motion at its top and bottom. On both sides of this diaphragm the box would be simultaneously filled with the material to be tested, as sand; thus, when the box is full, representing sheet piling driven in sand. The sand was then to be removed from one side of the diaphragm, as would occur when a trench is excavated protected by sheet piling. After the diaphragm had assumed the curve due to the pressure of the sand its curved shape was to be accurately determined and a closely fitting template made to record its curvature.

In order to determine the amount and distribution of the sand pressure, the diaphragm would then be removed from the box and placed horizontally, supported at its ends at the same points it was supported by when vertical in the box. A number of metal strips should be provided, each long enough to reach across the diaphragm, but of varying thickness to make up any required weight, and of equal width. These would be piled at equal intervals on the diaphragm until the curve of flexure is again exactly reached by it which was given it by the sand and recorded by the template; bearing in mind that the tops of the successive piles of metal strips must be on a curve of some uniformity, which may be called the curve of load, without such irregular outline as that of a battlement, and carried over the supports on the line indicated by the curve approaching them. The total pressure, and the center of pressure, would thus be determined, it is thought, with considerable accuracy.

As a check, the flexure curve of the diaphragm already found could be plotted to a convenient scale, and successive differentials taken thereof up to and including the fourth. As the equation of this flexure curve is unknown, the differentiation would be done graphically, remembering that the first differentiation gives the curve of tangents to the flexure curve; the second the curve of moments; the third the curve of shear, and the fourth the curve of load, which should agree with the curve of load determined by the first method—that of weights superimposed on the horizontal plate.

Other materials than sand need testing, such as a heavy semi-fluid mud, and ballast. In each case the angle of repose would be noted of the unretained material, and its weight per cubic foot.

In order to obtain definite conclusions the concrete box and steel diaphragm should be of rather large size; and to prevent the friction of the retained material on the sides of the box from affecting the result materially, narrower steel plates could be placed on each side of the main diaphragm, observations being taken on the main plate only.

The investigation could be extended to determine the pressure on abutments, which are generally filled against gradually on one side only, though this is not part of the work of this committee. It seems probable that under such mode

of filling, the total pressure would be greater, and its center lower, than in the case of sheet piling.

(4) Pile Formulas—F. E. Bissell, F. H. Bainbridge, R. D. Coombs and W. F. Steffens, sub-committee:

A large number of requests for information were sent out, but the chief matter to be noted from the replies received was the very small number of roads keeping record of their pile driving in form for use in this investigation.

It seems to the committee that while a pile driving formula should be based on theoretical considerations, there are so many modifying conditions to be allowed for that the result is a formula more or less empirical in its final make-up. These modifying conditions can best be noted from actual experience in pile driving; and members are urged to keep record of the behavior of piles during driving and after loading. This record is especially valuable in the case of test piles loaded to failure.

(5) Guard Rails—H. Ibsen, H. S. Jacoby, I. L. Simmons and H. Rettinghouse, sub-committee:

Replies were received from members and others representing a mileage of 119,314. These replies were tabulated and considered, but recommendations were not reached for presentation to the association. It seems that there are two types of guard rail in use. In one type the two rails are brought together at their ends at the middle of the track; in the other, two similar rails are not brought together at their ends, but remain parallel to the stock rail, and a third rail, also straight, is put in the middle of the track; all three rails in the latter case being deflected at their ends below base of rail.

(6) Fire Protection—I. L. Simmons, F. H. Bainbridge, F. E. Bissell, H. Ibsen and J. A. Lahmer, sub-committee.

Replies to a circular letter of inquiry were received from members and others representing 110,214 miles of railway. Of this mileage 62 per cent, when using fire protection, adopted either full ballast decks, floors protected by a thin covering of ballast or other like material, or by sheet metal.

The report is signed by C. C. Wentworth (N. & W.), chairman; W. F. Steffens (B. & A.), vice-chairman; F. H. Bainbridge (C. & N. W.), F. E. Bissell (A. C. & Y.), W. S. Bouton (B. & O.), R. D. Coombs (Consulting Eng'r), E. A. Hadley (M. P.), Hans Ibsen (M. C.), Henry S. Jacoby (Cornell Univ.), J. A. Lahmer (K. C. S.), H. Rettinghouse (C. & N. W.), I. L. Simmons (C. R. I. & P.).

Discussion on Wooden Bridges and Trestles.

Mr. Wentworth: The present committee does not wish to make any recommendation at this meeting. I move that this report be accepted as a progress report and information.

Motion seconded and carried without discussion.

BALLAST.

THE PROPER DEPTH OF BALLAST TO INSURE UNIFORM DISTRIBUTION OF THE LOADS ON THE ROADBED.

The report of the committee on the proper depth of ballast submitted during the year 1910 was in the form of a progress report, accompanied by a table showing the approved depth of ballast on various railways, but on account of the lack of sufficient information on which to base definite recommendations, no action was taken on this subject by the association.

Depth of ballast should be defined as the distance from the bottom of the tie to the top of the subgrade.

The committee feels that very valuable information was given to the association in the report of the Pennsylvania Railroad committee on the necessary depth of stone ballast, published in Bulletin 136, through the kindness of W. C. Cushing, president of the association, and L. R. Zollinger, chairman of the committee appointed by the general manager of the Pennsylvania Railroad. The details of the test were published in the *Railway Age Gazette* of July 21. The conclusions concerning the proper depth of ballast which will insure uniform pressure on the subgrade are as follows:

With an axle load of approximately 75,000 lbs. passing over test ties on the test ballast at five miles per hour the subgrade practically reached a permanent settlement. Where the ballast was materially less than 24 in. the settlement of the subgrade (loam) under the ballast was not uniform, but showed a greater settlement under the ties than between the ties. When stone ballast was placed 24 in. deep under the ties the settlement of the subgrade (loam) under the ballast was practically uniform, and therefore the pressure must have been approximately uniform. A combination of stone and cinder ballast 24 in. deep under the ties (lower layer of cinders 18 in. to 14 in. deep, upper layer of stone 6 in. to 10 in. deep) gave nearly as good results, although the deformation of the subgrade was greater than with 24 in. of stone ballast.

The result of this series of tests, which indicated that approximately 24 in. of stone ballast is required to produce a uniform pressure on the subgrade, with the ties spaced 24 in. to 25.5 in., center to center, agrees very closely with the formula given by Thos. H. Johnson in the proceedings for 1906, which was derived from the experiments of Director Schubert, namely, that with ties spaced 23 in. apart, center to center, stone ballast should be 22 2-3 in. deep to produce uniform pressure on the subgrade.

Conclusion.

From the data available the committee finds that with 7 in by 9 in. by 8½ ft. ties spaced approximately 24 in. to 25.5 in., center to center, a depth of 24 in. of stone ballast is necessary to produce uniform pressure on the subgrade, and a combination of a lower layer of 18 in. to 14 in. of cinder ballast and an upper layer of 6 in. to 10 in. of stone ballast a total depth of approximately 24 in. with the same spacing of the ties will produce nearly the same results.

PHYSICAL TESTS OF STONE FOR BALLAST.

The physical tests of stone for ballast adopted by the association and described in 1910 were the first tests of this character adopted by the association, and the question of revising them, if necessary, or adding other tests to those adopted, was again referred to the Ballast Committee for further investigation and consideration. The committee



H. E. HALE,

Chairman Committee on Ballast.

ascertained that the railways as a rule have no uniform practice in making physical tests of stone for ballast. Some of the roads select their stone for ballast by simply observing the character of the stone, and then ascertaining its durability and fitness for ballast by the actual results obtained in track. Some roads require a compression test in their specifications, but only one railway was found to have used the physical tests made by the United States Government previous to their adoption by the association as above referred to.

The committee does not recommend any changes in the physical tests already adopted, but feels that the tests would be more complete if the compression test were added. With this in view the question was taken up with the Department of Agriculture of the United States Government and they have agreed to add the compression test to those adopted by the association.

The description of the compression test, which the Government will make, is as follows: A cylinder 2 in. in diameter and more than twa in. long is drilled from the specimen of stone to be tested by means of a diamond core drill, and sawed to a length of 2 in. by a band saw fed with emery. The specimen is finally faced off on each end by means of a power-driven grinding lap, on which water and emery are continuously fed.

The cylinder then has both ends embedded in plaster of paris, the bed being mad- as thin as possible and both ends being made parallel. It is next mounted on an Olsen test machine on a special bearing block between blotting papers,

three thicknesses being placed at each end, between the cylinder and the steel-bearing faces of the machine. The load is applied at a speed of 0.152 in. per minute, the machine being kept balanced during the application of the load.

The committee believes that with the physical tests of stone for ballast, which the association adopted, and the compression test above described, sufficient information will be given by which to compare the character of stone from the various quarries from which it is proposed to obtain ballast.

Name of Railway	Location of Gravel Pit	PERCENTAGES					Remarks
		Dust and Clay	Sand	Gravel	Rock	Voids	
A. T. & S. F.	Chillicothe, Illinois	2.2	51.0	38 0	No Data	No Data	Good gravel ballast.
C. B. & Q.	Atchison, Kansas	10 0	12.7	77.3	0.0	No Data	Per cent. by weight. Main track.
C. B. & Q.	O'Neill, Neb.	8.5	57.5	34.0	0.0	No Data	Per cent. by weight Branch line.
C. B. & Q.	Ballantine, Montana	7.0	4.9	52.5	35.6	No Data	Per cent. by weight. Main line.
C. B. & Q.	Peetz, Colorado	4.8	51.5	42.5	1.2	No Data	Per cent. by weight. Main line.
C. R. I. & P.	Chillicothe, Illinois	6 0	60.0	40.0	0.0	No Data	Per centage arrived at by volume.
C. R. I. & P.	Grattinger, Iowa	16.4	41.4	53.7	No Data	No Data	Percentage arrived at by volume.
C. R. I. & P.	Benton, Arkansas	23.3	20.8	79.2	No Data	No Data	
C. R. I. & P.	On St. Louis Division	5.8	22.0	80.0	No Data	No Data	
C. R. I. & P.	Nydia, Ark.	16.3	11.8	90.9	No Data	No Data	
G. R. & I.	Big Rapids, Michigan	6.0	32.0	78.0	No Data	No Data	Shown as good quality of ballast.
G. R. & I.	Sand Lake, Michigan	18.0	44.0	63.0	No Data	No Data	Shown as fair quality of ballast.
G. R. & I.	Leroy, Michigan	5 0	30.0	80.0	No Data	No Data	Shown as poor quality of ballast.
G. R. & I.	Belmont Pit	0.5	15.0	91.0	No Data	No Data	Shown as good quality of ballast.
G. R. & I.	M., G R. & I.	0.0	40.0	75.0	No Data	No Data	Shown as fair quality of ballast.
G. R. & I.	Paris Pit	15.0	40 0	70.0	No Data	No Data	Shown as poor quality of ballast.
G. R. & I.	Grapo	11.0	36.0	72.0	No Data	No Data	Shown as poor quality of ballast.
G. R. & I.	Reed City.	5.0	40.0	72.0	No Data	No Data	Shown as poor quality of ballast.
G. R. & I.	Tustin	8.0	42.0	72 0	No Data	No Data	Shown as poor quality of ballast.
G. R. & I.	K. S. Tower Pit, Oden	13.0	60.0	48.0	No Data	No Data	Shown as poor quality of ballast.
G. R. & I.	K. S. Tower Pit, T. C. Sect. 2.	18.0	49.0	55.0	No Data	No Data	Shown as poor quality of ballast.
G. R. & I.	K. S. Tower Pit, T. C. Sect. 3.	15.0	56.0	50.0	No Data	No Data	Shown as poor quality of ballast.
G. R. & I.	K. S. Tower Pit, T. C. Sect. 4.	16.0	55.0	50 0	No Data	No Data	Shown as poor quality of ballast.
G. R. & I.	Suttons Bay Pit	15 0	36.0	67 0	No Data	No Data	Shown as poor quality of ballast.
I. C.	Forreston, Illinois	4.8	17.2	72 0	6 0	20.0	
I. C.	Riverton, Indiana	7 9	23.5	68.6	0.0	13.4	
I. C.	Gravel Switch, Kentucky	7 0	6.2	85.0	1.8	18.8	
I. C.	Memphis, Tennessee	3.3	17.8	77.7	1.2	17 3	
Mo. Pac.	Fowler, Colorado	2.0	65 0	23.0	0.0	No Data	Fair results.
Mo. Pac	Ft. Gibson, Oklahoma	5.0	4.0	94.0	0.006	No Data	Clay included in percentage of sand.
Mo. Pac	Bethel, Arkansas	4.0	34.0	76.0	0.0	No Data	
N. Y. C. & H. R.	Beaver River	18.0	55.0	27 0	No Data	No Data	Sample No. 16.
N. Y. C. & H. R.	Yosts	5 0	20 0	75.0	No Data	No Data	Sample No. 17, first quality.
N. Y. C. & H. R.	Glenfield	18 0	57.0	25.0	No Data	No Data	Sample No. 19, coarse sand, very good but dusty.
N. Y. C. & H. R.	Todds	10.0	35.0	55 0	No Data	No Data	Sample No. 18.
N. Y. C. & H. R.	Fishers	8.0	27.0	65.0	No Data	No Data	Sample No. 21.

Percentage of Sand, Clay, Etc., in Gravel Ballast.

As a matter of information the committee has, during the past year, requested a number of railways to send samples of their stone ballast to the Government for test, and through the assistance and courtesy of these railways is enabled to present a tabulated statement of the results of these tests. While this statement is not as complete as was desired, we feel it will be of considerable value in studying this question.

The advantage of using approved physical tests of stone for ballast to determine the character of the stone and its fitness far ballast is that without some method of determining this by physical tests, railways will undoubtedly be put to considerable expense by opening quarries and applying stone ballast, which in some cases will have to be replaced with better ballast from other quarries.

Conclusions.

The committee recommends that in addition to the physical tests of stone for ballast, which have been adopted by the association, that the "compression test," above described, be adopted and included in the manual.

The committee also recommends that the following reference be made in the manual to the description of the tests and the action necessary to have tests made:

"For the description of the physical tests of stone for ballast as recommended by the association and full instructions as to how the samples should be obtained and shipped to the Government, see Proceedings of the American Railway Engineering and Maintenance of Way Association, Vol. II, Part 2, pp. 910-914, and report of Ballast Committee of 1912. If blueprints of the machine used in making the tests are desired, they can be obtained from the Department of Agriculture, United States Government, Washington, D. C."

COMPLETE REVIEW OF GRAVEL BALLAST AND RECOMMENDED METHODS FOR GRADING THE DIFFERENT QUALITIES.

In the proceedings for 1910 a classification of gravel ballast was adopted by the association, which depended on the amount of sand and dust found in the gravel, the size of the sand, and the size of the gravel, being determined in accordance with the definitions of sand and gravel given in the manual. This subject was again referred to the Ballast Committee for a complete review.

During the year the committee requested a number of railways to test their gravel ballast and determine the percentage of sand, gravel, dust, etc., in the ballast, following the definitions of sand and gravel given in the manual. A statement is presented showing the percentages as found in ballast now in use, and a brief of the reports obtained from the railways in regard to the use of these deposits of gravel for ballast is as follows:

The Santa Fe reports that it is using the Chillicothe gravel almost entirely and finds it to be very satisfactory, giving good results on the roadbed, as it comes from the pit, using 12 in. under the ties.

The Chicago, Burlington & Quincy reports show gravel being taken from four different places, and put under the tracks as it is loaded from the pits, which makes excellent track, binds well and is easily worked.

The Chicago, Rock Island & Pacific reports gravel taken from five different places, the best being from Benton, Ark., on their southern lines, but not equal to the glacial gravel of Iowa and Illinois. The gravel was used on the track as it came from the pits, and not washed.

Twelve tests of pits on the Grand Rapids & Indiana are shown in the tabulated statement. The ballast is not washed, but is put in the track as it comes from the pit.

In the case of the Illinois Central the tabulated statement shows tests from four different places, and the ballast from each is used in the track as it comes from the pits, except in the case of the Memphis gravel, which is taken from the bed of the Mississippi River and washed.

The Missouri Pacific reports tests from three different places, and like the other roads the ballast was used on the track as it came from the pits.

It will be seen from the reports of the six different roads that no expense was incurred in washing or screening the gravel, which was used upon the tracks as it came from the pits, except in the case of the Illinois Central, for gravel secured at Memphis.

A report from the chief engineer of the Intercolonial of Canada states that he is of the impression that if they screened their gravel they would not get as good results as if they took the sand with a coarser material combined.

A report from the engineering department of the Canadian Pacific states that they are ballasting with gravel taken direct from the pit, without any cost of treatment.

The committee further endeavored to determine the maxi-

mum amount of clay which would be permissible in good cementing ballast, and by reference to the data we have on this subject we find that most of the tests that have been made of gravel ballast give very meager information as to the amount of clay in cementing ballast. From the best information at hand the committee is of the opinion that where the clay amounts to over 10 per cent, it would be quite objectionable.

The committee wishes to give a high indorsement of the report on "Gravel as Ballast," by C. Bräuning, which W. M. Dawley had translated from "Zeitschrift für Bauwesen," Vol. LIV, Berlin, 1904.

Conclusions.

The committee recommends further investigation of the amount of sand, dust and clay, permissible in good gravel ballast, since reports obtained this year from various railways, and attached hereto in a tabulated statement, indicate wide variations in the amount of these materials found in gravel ballast in actual use, yet reported as giving good results.

The report is signed by H. E. Hale, (M. P.) chairman; J. M. Meade, (A. T. & S. F.) vice-chairman; W. J. Bergen (N. Y. C. & St. L.), A. F. Blaess (I. C.), T. C. Burpee (Intercolonial), F. T. Darrow (C. B. & Q.), J. M. Egan (I. C.), T. W. Fatherson (C. R. I. & P.), H. L. Gordon (B. & O.), G. H. Harris (M. C.), C. C. Hill (M. C.), S. A. Jordan (B. & O.), A. S. More (C. C. C. & St. L.), J. V. Neubert (N. Y. C. & H. R.), S. B. Rice (R. F. & P.), E. V. Smith (B. & O.), F. J. Stimson (G. R. & I.), S. N. Williams (Cornell College).

Discussion on Ballast.

Mr. Hale: The committee would like to have the association approve the definition of "depth of ballast," first, and then the conclusions of the three sub-committees.

A motion to adopt the definition of "depth of ballast" was carried.

A motion to adopt the conclusion as to the proper depth of ballast to produce uniform pressure on the sub-grade was carried.

Mr. Morse: Regarding the Pennsylvania experiment on the value of cinders to help make up the 24-in. depth of ballast, I had an experience ten or fifteen years ago on a piece of line about twenty miles long with 1½ or 2 ft. of cinders for ballast. We replaced that with slag, and for at least four years we were having to work on that slag ballast continuously on account of the settlement of the cinders under it. While it showed up well as an experiment, it did not show up well in practice.

C. E. Lindsay (N. Y. C. & H. R.): I am sure the committee, in using the words "cinder ballast," does not preclude gravel ballast or better ballast.

The President: The committee would be glad to add gravel if that would tend to make it more acceptable to the association.

C. S. Churchill (N. & W.): While the test of stone for ballast may be all right, it is one that the railways cannot ordinarily make, because they do not have at hand a diamond drill of this size, and do not have the means of cutting this core required in the test. We have been conducting, for several years, a test by means of a cube cut with a chisel and the relative strength of every stone can be determined in that way, just as well as it can by means of the cores. Therefore, while I do not wish to suggest that this test be not agreed to, I think there should be some latitude given for another form of compression test, such as can be readily made by any railway without going to the Government.

Mr. Hale: The physical tests of stone which are recommended in the manual are covered by a description in the proceedings of the association and are made by the government at Washington. They were originally started for testing material for wagon roads, and they were the most complete set of physical tests for stone that the committee could find, and the fact that the Government makes them at Washington for any railway or corporation or individual free of charge on sending the sample made it, in the opinion of the committee, very advantageous to accept these tests as described by the Government and use them altogether. It makes a very uniform test and is readily comparable with other stone known to the railways.

A motion to adopt the first paragraph of the sub-committee's conclusions was carried.

A motion to incorporate in the manual the recommended reference to these tests was carried.

TIES.

SIZE OF CROSS-TIES REQUIRED FOR THE STRESSES TO WHICH THEY ARE SUBJECTED.

The stresses to which ties are subjected cannot be considered as having no interrelation to the other parts of a roadway. On the contrary, the size of the rail, the load above and the bearing beneath the tie, the subsoil, the character of the material between ties, the presence or absence of tie-plates, the use of screw or common spikes, and many other conditions, actual and theoretical, must be considered. It was thought best to obtain from various members opinions along certain lines and for that purpose a set of questions was prepared by the sub-chairman and sent out by the secretary to all members.

(1) What percentage of a rail length should have a bearing on the ties? Does the per cent mean per cent of linear distance or bearing area?

(2) Has this percentage any relation to (a) Kind of timber used for ties? (b) Kind of ballast? (c) Character of sub-grade? (d) Tangent vs. curve? (e) Minimum distance between face of ties?



L. A. DOWNS,

Chairman Committee on Ties.

(3) If the percentage is capable of mathematical deduction, please give the method, etc.

(4) Is crushing hastened by natural checking of ties?

(5) Which class of wood checks most?

(6) Does preservative treatment tend to increase the tendency to check?

(7) Does preservative treatment affect the natural crushing unit stresses?

(8) (a) With the increased tie consumption and the decreased available tie supply, can the demand for larger sectional area of ties be met? (b) If a larger sectional area of the tie is not available, what would you recommend as next best thing to do—use steel or composite or what not?

(9) Has the application of screw or square spikes any effect on crushing?

(10) Relation of kinds of ballast to tie crushing?

(11) Relation of character of sub-grade to tie crushing?

(12) Relation of axle load to tie crushing?

(13) Relation of frequency of maximum axle load as applied to a tie to tie crushing?

(14) Relation of maximum axle load to weight of rail and consequent tie crushing?

(15) Relation of impact at joints to tie crushing?

(16) Relation of size of tie-plates to crushing of ties?

Forty replies, representing about four per cent of the membership, or 32 per cent of the mileage represented in the association, were received and tabulated.

The table prepared by the tie committee in 1905 shows that at that time a preponderance of the mileage and membership (42.7 and 38 per cent, respectively) represented in the association was in favor of 16 ties to the 30-ft. rail or 2,816 per mile of main track. During the six years since 1905 the railways seem to have increased the number, for the general average of rail-bearing area, shown by the replies to this year's letter, is about 40 per cent, whereas in 1905 it was about 35½ per cent. In 1905, however, 17 (2,992 per mile) and 18 (3,168 per

mile) ties per 30-ft. rail (bearing area of 38 per cent and 40 per cent, respectively, based on 8-in. ties) were in strong favor.

In 1905, 59 per cent of the mileage voting believed a 6x8x8 ft. tie was too small, whereas 96 per cent thought a larger tie not undesirable. Twenty-two sizes of crossties were in current use, with 47 per cent of the mileage and 48 per cent of the membership reported as using 6x8x8. There is no doubt that the sentiment is in favor of a larger tie, but the sentiment stage has not been passed.

The length of tie apparently has not been considered so much as width and depth. In 1905, of 139,029 miles represented, 25,112 miles or 18 per cent reported ties 8 ft. 6 in. in length. The length of a tie between recognized limits has a great influence on the distribution of the superimposed load over the ballast and consequent tie crushing as well as the amount of maintenance work required with poor ballast, poor



Effect of Derailment on Steel Ties on Bessemer & Lake Erie Near Queen Junction, Pa.

sub-grade, or both. Ten and three-tenths per cent reported in favor of a 7x9x8 ft. 6 in. and none in favor of a 6x8x8 ft. 6 in.

The committee has been unable to find any data in the publications of the association bearing on the crushing strength across the grain of the various woods used for tie purposes, except that it is lightly touched upon on pp. 853-4, Volume II, Part 2. Table 1 gives the average of tests for various woods to show the effect of preservative treatment on crushing strength at the elastic limit.

The natural crushing strength at the elastic limit given in Table 1 does not compare favorably with similar results obtained by the United States Government. The director of the Forest Products Laboratory, Madison, Wis., furnished the subcommittee blueprints showing crushing strength at the elastic limit of timber—air dry and green, from which Table 2 is extracted. This table illustrates well why green timber for ties should be shunned.

The committee was of the opinion that further investigation should be made to ascertain the relation of tie spacing to different depths of ballast.

O. E. Selby, in Bulletin 80, October, 1906, treats of the stresses in ties. His recommendation is 12 in. of stone ballast directly under tie, superimposed on 12 in. of gravel, with ties spaced 20 in. center to center (45 per cent.).

Thos. H. Johnson's formulæ for depth of ballast and tie-spacing for gravel and stone ballast appear in Bulletin 76, June, 1906.

Conclusions.

So far as the committee is able to determine it is not feasible to lay down any fixed rule for the size and spacing of ties based on the A, B and C classification of density of traffic, for the following reasons, each of which in itself has a certain definite restriction, as well as an interrelation with all others, viz.:

(1) Character of sub-grade varies radically on the same road and in different parts of the country.

(2) Kind of ballast varies widely.

(3) Necessary depth of ballast varies with weight of axle loads, as well as density of traffic.

(4) Necessary distance between face of ties varies with weight of axle load, as well as density of traffic.

(5) Kinds of timber used for ties vary in different sections of the country.

(6) Width of base of rail, or weight of rail, and use of tie-plates.

(7) Treated or untreated ties, crushing stress and durability.

(8) Amount of labor spent on track maintenance.

(9) Drainage.

However, in general it may be considered good practice for Class A and perhaps B roads to space ties 10-in. to 12-in. face to face; the width of tie is not so important if 10-in. to 12-in spacing face to face is followed; provided, however, the minimum width of face of tie is limited to 7 in.

TIE RENEWALS IN CONTINUOUS STRETCHES VERSUS SINGLE TIE RENEWALS.

The sub-committee appointed to investigate the comparative merits of "Tie renewals in continuous stretches versus single tie renewals" issued the following letter to the heads of the proper departments of the principal railways operating in the United States and Canada:

"It is desired to obtain information as to the comparative merits of "Tie renewals in continuous stretches versus single tie renewals." Will you kindly give us your practice and opinion in reply to the following questions:

"(1) What is the practice of your road in renewing ties; tie renewals in continuous stretches or single tie renewals?

"(2) Do you think it advisable to renew ties in continuous stretches?

"(3) What would be the advantage of this latter method of tie renewals?

"(4) What are the advantages or disadvantages of single tie renewals?

"(5) Which practice would you recommend?"

Fifty of these letters were sent out and 35 replies were received. All who replied gave the subject the most careful attention, and thereby furnished the committee with some valuable information. Among the replies received were the following:

George W. Kittredge, chief engineer, New York Central & Hudson River:

1. The practice of our road is to renew ties under the method termed "single tie renewals."



Effect of Derailment on Steel Ties on B. & L. E. Near Jamisonville, Pa.

2. No.

3. There are no advantages in renewing ties in continuous stretches, except that possibly for the first year or two you might get better track than by renewing singly.

4. The advantages of single tie renewals far outweigh the disadvantages; in fact, I know of no disadvantages. The advantages are:

(1) You are able to let a single tie remain in the track until entirely worn out, since it has the advantage of the ties on each side of it being sound.

(2) The track is always kept safe by having a large proportion of good and comparatively new ties in the track. With continuous renewals there comes a time when, even before the ties are entirely worn out, the track is not safe, and, in order to maintain safety, it is necessary to take the ties out of track before they would, under other conditions, need to be removed, thus shortening their lives.

5. Unhesitatingly I recommend the practice of single tie renewals.

F. S. Stevens, engineer maintenance of way, Philadelphia & Reading:

1. The practice of our road is to "spot in" or renew only such ties as will not do their work another year on account of being too soft to carry the load.

2. Yes, if the track where ties are to be renewed can be taken out of service while work is being done.

3. Advantages of this method are: That by doing this work without interruption the labor costs less, by removing the ballast to sub-grade and forking it back, dirt is removed and good drainage restored. By retamping on fresh ballast the greatest trouble is removed; i. e., the constant care of looking after and retamping "spotted in" ties for about two years after being placed in track.

4. The sole advantage of "spotting in" ties where track can be taken out of service while renewals are being made, is that when ties have been taken out of track they are very liable to be wasted or destroyed prematurely. If track cannot be taken out of service to permit tie renewals without interruption, the increased cost of labor to renew "out of face" makes this method prohibitive. Therefore, under these conditions the "spotting in" method is most economical. As far as consistent with economy, ties should then be renewed in pairs, as labor costs nearly as much to renew one tie as two. In any event, ballast should be renewed at same time with ties, as this will make good drainage. This is important, for, unless air can reach the under side of ties, water will, and then trouble begins in earnest.

5. Under the conditions which we generally have to work I recommend the practice of "spotting in." However, when conditions permit I would renew ties "out of face" and would

	Natural		Treated		
	No. of Tests	Crushing at P. L.	No. of Tests	Crushing at P. L.	Remarks
Red Oak	4	[illegible]	4	1980	
Loblolly Pine	5	612	5	791	1. Crude oil, 529.
Shortleaf Pine	3	640	4	618	1. Crude oil, 373.
Longleaf Pine	2	688	2	725	
Red Gum	5	830	5	791	1. Crude oil, 655.

Crushing Strength of Various Woods, Treated and Untreated.

place every tie which will render further service in some track where its remaining life will be used to best advantage.

C. W. Johns, engineer maintenance of way, Chesapeake & Ohio:

1. Until recent years it has been the practice of this road to renew ties in continuous stretches. For the past two or three years we have tried to get all of our section foremen on double track to work one track one year and the other track the next, putting in single ties where required. On single track the foremen work half the section one year and the other half the next, putting in single ties where required.

2. No. This method necessarily allows a portion of the track to become unsafe before the ties are renewed; at least, the ties get so soft it is impossible to maintain good surface, while by slipping in single ties this condition does not exist and there are always sufficient sound ties under each rail to maintain proper surface and gage.

3. I know of no advantage of renewing in continuous stretches.

4. Advantage of this method is that you never have any stretches of rotten or unsound ties and there are always enough sound ties to maintain proper surface and gage.

5. I prefer the single tie renewals.

W. C. Cushing, chief engineer maintenance of way, Southwest System, Pennsylvania Lines:

1. The practice on our Lines is to renew ties as worn out or decayed, and not in continuous stretches.

2. No, except, possibly, between station platforms or in street crossings where the labor of getting at the ties is great.

3. I believe the following advantages might be claimed for the method of renewing in continous stretches: (1) Track could be given uniform lift, and, when new ties were in place, uniform support would be furnished them; (2) Cost of laying in continuous stretches would probably be less than laying them singly.

4. Advantages of single tie renewals are: 1 The track, as a whole, is kept in a more uniform condition, as to the quality of the supporting ties; (2) Only ties that should be removed, account of wear or decay, need be removed. Disadvantages of this method are: (1) The old bed of the tie must be dug up to get the new tie in place, or entire track given sufficient raise to accomplish this result; (2) Where platforms, planking or interlocking fixtures must be disturbed to remove ties, this disturbance takes place oftener under the single tie renewal system; (3) The cost of renewal per tie is probably somewhat higher under this system also.

5. We would recommend the renewal of ties singly. Because: (1) The general safe condition of the track is greater; (2) The average life of the ties, we believe, will be lengthened by the single tie renewal method, as, when renewing in continuous stretches, many ties are necessarily taken out and lost which might safely be left in the track a year or two longer if the adjoining ties were good.

W. L. Breckinridge, engineer maintenance of way, Chicago, Burlington & Quincy:

1. We practice the system known as "single tie renewals."

2. No, except in special cases.

3. Only advantage I know of in renewing in continuous stretches is in cases where the life of the rail under heavy traffic about equals the life of the ties; that is, in renewing rail where the traffic is heavy, ties should be renewed in full and unless ties under old rail are almost new, they should all come out. You will then have a track which will not have to be disturbed during the life of the new rail on account of tie renewals.

4. Single tie renewals is all right, especially on less important main lines where the life of the rail exceeds that of the tie. We are also able to keep yearly check on our gage and hold a track to a more perfect gage, since the average efficiency of a proper single tie renewal track is almost constant, while with a continuous renewal track the holding power of spikes and general efficiency is on the decrease. Disadvantages of single tie renewal are: (1) Frequent disturbance of roadbed; (2) Inability to get a firm and equal bearing on the new ties; (3) Taking up too much time in the spring for this sort of work when the track needs picking up; (4) Keeping right of way littered each year with new and old ties.

5. I would recommend continuous renewal only when relaying rail on main line heavy traffic road. In such cases the life of the rail does not exceed that of the ties. In all other cases I recommend single tie renewal, as the life of tie timber varies too much to consistently renew in continuous stretches.

W. J. Towne, engineer of maintenance, Chicago & Northwestern.

1. Tie renewals based upon actual condition of tie, except joint and center ties; these are usually renewed together, and if any ties removed are serviceable elsewhere, they are properly utilized.

2. No, not as a general proposition. In slag or rock ballast I think it economy to renew continuous to the extent that any ties that will not last two years or more be taken out.

3. Principal advantage would be in securing more uniform rail bearing and economy when the life of the tie would not offset the labor charge for renewal and less disturbance of track bed result in general economy, in rail, etc., as well as improved roadbed.

4. Advantage of single tie renewals consists wholly in conservation. Disadvantages mentioned in reply "three."

5. Depends on character of line, volume of traffic, ballast, rail and roadbed. In gravel ballast with light traffic would recommend single tie renewals; in rock or slag ballast with heavy traffic would recommend renewal joint and center ties together, and renewal of all ties that would not last two years, both as a matter of economy and other reasons before named.

F. R. Layng, engineer of track, Bessemer & Lake Erie:

1. Single tie renewals.

2. No, I do not think it advisable to renew in continuous stretches.

3. The cost of renewals per tie (labor only) would be less when ties are renewed "out of face." This is on account of the fact that only about half as much ballast per tie would have to be dug out to make renewals. Disadvantage: In renewing in stretches, when it is decided that renewals should be made, track is in weakened condition. This being so, chances are either taken to run the ties a little longer, or, if the responsibility rests with a man who is timid, renewals are ordered at a time when most of the ties would last two or three years longer, if not disturbed. Neither of the above conditions tends to good practice. The ideal, to my mind, is to get the longest possible life from a tie, consistent with safety, without disturbing it.

I am quite sure the tendency of the average man would be to remove the ties in ample time so that the result would be to reduce the life per tie to about five years. This would increase the cost of tie renewals from 15 to 20 per cent. Inasmuch as tie renewals make up the largest single item in maintenance expense, most roads would hesitate to increase same unless some very decided advantage resulted therefrom.

Another disadvantage: It is practically impossible to select ties which would decay so uniformly that any great length of

track could be renewed without taking out some ties still fit for service. Some use would have to be found for these ties and they would no doubt be used in sidetracks. Assuming the following:

Cost of first-class tie delivered along track...$0.70
Cost of second-class tie delivered along track .60
Average life of first-class tie in main track..7 years
Average life of second-class tie in siding..7 years
Average life of first-class tie removed from main and used in siding.....3 years

We arrive at the figures given below:

Cost of tie removed from main and put in siding 3 years at 10 cents per year.....$0.30
Cost to remove from main track..... .03
Cost of putting in siding..... .08

Total cost $0.41
Average cost per year in siding.....$0.13 2-3
Cost of second-class ties.....$0.60
Cost of putting in siding..... .08

Total cost $0.68
Average cost per year in siding.....$0.09 5-7
Cost of first-class tie in siding.....$0.70
Cost of putting in siding..... .08

Total cost $0.78
Average cost per year in siding.....$0.11 1-7

The above shows clearly, if my assumption is correct, that it does not pay to remove ties from main track to be used in sidings.

4. Advantages of single tie renewals: (1) Effective life of tie is longer; (2) Average condition of track as to safety is better; (3) Single track renewals disturb roadbed less; (4) Trackmen can arrange work to better advantage in single tie renewals; (5) Cost of tie renewals considerably in favor of single tie practice. (Net cost, including everything connected with this item.)

Disadvantages: I can see no particular disadvantage in the method of renewing ties singly. The most expensive thing we have is labor and least amount of labor per tie is expended.

5. Usual argument against single tie renewals, I presume, is that after making same, track does not ride smoothly or is spotty. This is usually the case, but it is the result of poor maintenance and is not a necessary evil which follows the practice of single tie renewal. If the trackmen will properly tamp new ties a week or ten days after they have been put in, this trouble can easily be taken care of.

From the information received it is evident that the general practice is to renew ties singly, except in unusual cases at station platforms, highway crossings, narrow tunnels or interlocking plants where it requires much labor to get at the ties or to uncover them for the purpose of renewal.

Conclusion.

The committee recommends the practice of single tie renewals.

METAL, COMPOSITE AND CONCRETE TIES.

The committee was directed to prepare a report on the use of metal, composite and concrete ties.

In connection with the following report the committee wishes to point out that it is of the opinion that no single design of substitute is going to meet all the conditions to be found on railway track and there should be at least two designs or types, one for heavy service, and the other for light service, both to be insulated or not, as required.

It is desirable that any type of non-insulated tie should be capable of being insulated without having to be removed from the track. As far as we can see, very few designers have recognized this distinction and as a result attempt to meet all conditions with a single design. We believe this is neither desirable nor economical, and that much better results will be obtained if the tie be designed for special service.

The committee has been somewhat disappointed with the results obtained with the concrete tie, the concrete and metal tie and the asphalt and metal tie, for reasons given in our conclusions.

In regard to steel ties, the committee was impressed with the number of steel ties in use on the Union Railroad and the Bessemer & Lake Erie. The total number of steel ties on these two roads is over one million, or enough to lay 312 miles of track, using 3,200 ties to the mile.

We desire to call attention to the widespread interest that is now being taken in finding a substitute for the wooden tie. This is not confined to any particular section of the country, nor to the steam railways.

In addition to the personal inspection made by the committee, reports have been received from railways using substitute ties, among which are the following:

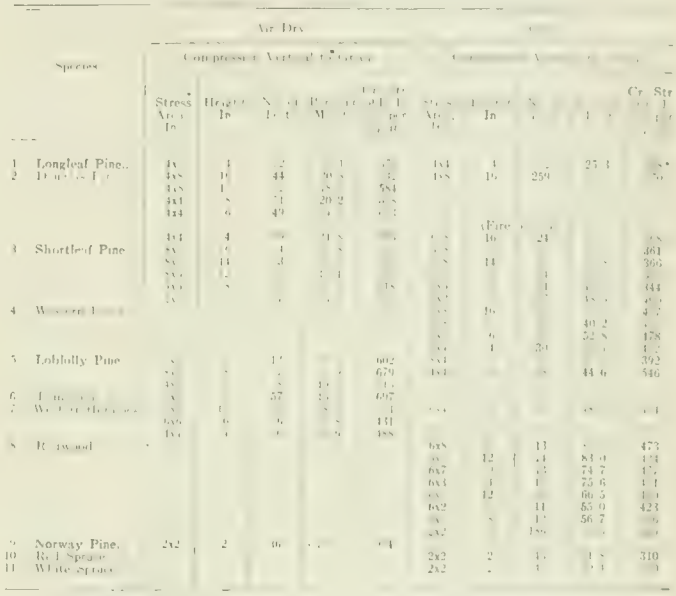
Bessemer & Lake Erie Railroad:

"Up to January 1, 1911, this company had purchased 563,555 Carnegie steel ties and during 1911 we will receive 138,000, making a total of 702,355 ties to be received by January 1, 1912. The ties if laid continuously 3,200 to the mile (our standard spacing on main line) would give 219.5 miles of steel tie track. During the year we also received 20 sets of steel switch ties.

"We have very little, if any, additional information to report this year. The ties put in at Claytonia in 1904 are still in and there has been no change in their condition since our last report. The 1,000 insulated ties installed in June, 1906, at Conneaut, Ohio, are still in and have given no trouble whatever.

"This road will continue to use this type of steel tie in maintenance and construction work.

"Accompanying this are two photographs, one showing scene of a derailment near Queen Junction, Pa., and one near Jamisonville, Pa. Both derailments were caused by a broken flange; in each case but one pair of trucks was derailed and the car derailed was a steel car loaded with 55 tons of ore, so that the gross weight of the car was about 73 tons. These



Crushing Strength of Timber at the Elastic Limit.

derailments happened in August, 1910, and the ties are still in the track."

Cornwall & Lebanon Railroad:

"With reference to our experience with the 200 Snyder steel ties which were installed in our road about five years ago, these ties are located on the southbound track of our double track, lying about one mile west or south of Mount Gretna in a two-deg. curve and on a 1.5 per cent. descending grade. One coat of tar paint was applied when the ties were put in and another coat during the past year. This is about the only expense we have been put to in the matter of maintenance.

"A few months ago in passing over this part of the road it was noticed that the asphalt concrete filling showed signs of disintegration at the open ends of the ties and upon investigating we found as far back as the hand could be placed that the filling was loose and in particles. In order to ascertain how far in this extended the tie was taken out of the track and in pulling the tie out the filling was left on the ground under the rails, simply a mass of particles. We imagine that as a result of this condition whenever the ties are tamped some material will be dropped from the bottom through the slight raising due to the tamping. The track foreman reported that he had noticed the material loosened in this manner several months ago. The track at this point is laid with 80-lb. rail and on stone ballast.

"Approximately half a million tons of freight per year pass over this track in the southward direction, our heaviest locomotives being 75 tons in weight, not including the weight of the tender. During the summer season eight or ten passenger trains pass over this track daily and four passenger trains the remaining portion of the year, probably at a speed of 40 or 50 miles per hour.

"There has been no trouble at all in connection with these

ties as stated, except the recent crumbling of the asphalt filling. Just what the effect of this would be eventually we are not prepared to say."

Duluth, Missabe & Northern Railway:

"We have about 22,400 ties of the Carnegie Steel Company's Section M-21. They were purchased in the summer of 1908 and we started to put them in the track in the fall after the ore business closed, but the work was not completed until the spring of 1909. Two miles of these were placed on the hill between Duluth and the yards at Proctor, being placed in the double track, one mile in each track. This portion of the road had been previously ballasted with crushed granite and consequently required less work to place them than it did the others, which were placed where the track crosses the big muskeg swamp about 50 miles north of Duluth. This is also double track and we have two and one-half miles of these ties in each track. This portion of the road had been ballasted with gravel and had always cost us a great deal to maintain during the summer season on account of the nature of the soil underneath the roadbed. It was necessary to keep the track lined with men during the ore season to keep the track in shape and to keep the rails spiked to line, although we were using tie-plates, but owing to the shaking and trembling of the ground underneath which set up a vibration in the train the rails were continually spreading and it was necessary to line spike this track every season, and more or less would have to be lined up two or three times during the summer.

"We removed the old ballast and replaced it with crushed granite, leaving the original roadbed underneath the granite sloping from the center between the two tracks. Owing to this work having been done in the winter when there was a great deal of snow on the ground and more or less ice, these tracks required considerable attention during the summer of 1909, but by the time winter set in they were in elegant shape and during the summer of 1910 we did no more work on them whatever. Of course, the section men passed over them going to and from their work, but no work was done in either surfacing or lining during the entire summer, which was something very unusual for that track. It kept in very good shape until late in the fall, at which time by careful inspection you could see that some places were slightly depressed, but it was scarcely noticeable in the running of trains. Early in the season of 1911 we sent an extra gang over this track and brought it to surface again. Since that time no work has been required on it, although we have had a large amount of rain in that district this summer.

"We would say that with these ties, placed 18-in. centers as we have them, carrying 100-lb. rail, it is impossible for a small section crew to line and surface the track to a great extent, but needs a small extra gang to handle it, as it is exceedingly heavy and hard to move. However, it requires so much less attention than our old track with the wooden ties and 80-lb. rail that we feel there is economy in the use of these ties, notwithstanding the difference in first cost of the steel and the wood.

"The two miles on the hill between Duluth and Proctor have required scarcely any attention since they were put in place, but the soil underneath the roadbed at this point is solid clay and has never caused the trouble the tracks across the big swamp have. There are two light curves on the latter two miles and we have worn out the new rail which was placed with the ties in some instances on these curves, but the cost of surfacing and relining the track has been very light as compared with the tracks on the wooden ties."

Lake Shore & Michigan Southern Railway:

"At one time we had steel ties on several divisions of the road in experimental stretches, but a few years ago they were all taken out. One of the chief troubles we had with them was the insulation. A number of them have now been put in on our Sandusky pier branch where the speed is limited, and we have no need of insulation, and where we run in streets part of the way and good permanent construction is needed. They are well adapted for this service.

"These ties are mostly of the Buhrer pattern, made by the Carnegie Steel Co., with four clip fastenings for each tie. They have been in track for about six years and are in first-class condition at this time. The roadmaster is of the opinion that they will last from ten to fifteen years longer. They hold the track in line, surface and gage very well, but our people are not yet convinced that they are the tie for our main line with its heavy high speed traffic."

Pittsburg & Lake Erie Railroad:

The following is the cost of maintaining Carnegie steel ties which were installed August, 1907 (bolt and clip fastenings), as compared with a like stretch of wood ties:

Calendar Year.	Length of Experimental Track Section.	Carnegie Steel Ties, Cost of Labor.	White Oak Ties, Cost of Labor.
1908.....	4,400 ft.	$280.00	$417.00
1909.....	" "	153.00	95.00
1910.....	" "	428.00	128.00
1911.....	" "	184.00	116.00

These experimental sections of track were built with new material and new limestone ballast in 1907. The maintenance record begins with the calendar year 1908.

These ties were laid in the main line freight tracks, equipped with electric circuits in connection with automatic signals. Tracks are used by freight trains only, which run at a speed of about 30 miles per hour.

During 1911 it was necessary to resurface the steel tie track three times and the white oak track once. During the year 1911, fiber plates were removed from track on account of being cut by rail base. Twenty bolts in steel tie clips were found to be loose.

It is now 52 months since these steel cross-ties were laid in the track and the record of the insulations shows that no fibers were renewed previous to 1911, and in that year only 17 were found defective. There has been, practically speaking, no signal trouble whatever.

Conclusions.

The committee respectfully submits the following conclusions:

1. The concrete tie, a combination of concrete and metal tie, or a combination of asphalt and metal tie has not yet proved a success because of fracture caused by vibration, excessive weight and consequent difficulty in handling, and deterioration of asphalt filling.

2. A combination tie of steel and wood gives promise of developing an economic substitute.

3. The all steel tie has proved a satisfactory substitute for the wood tie under heavy medium speed traffic. It is durable; line and surface can be maintained, has sufficient resiliency and can be insulated. The fastenings so far in use can and no doubt will be improved.

The report is signed by L. A. Downs (I. C.), chairman; G. W. Merrell (N. & W.), vice-chairman; H. W. Brown (P. L. W.), W. J. Burton (M. P.) L. C. Hartley (C. & E. I.), E. D. Jackson (B. & O.), F. G. Jonah (St. L. & S. F.), H. C. Landon (Watauga R. R.), F. R. Layng (B. & L. E.), D. O. Lewis (C. N.), Duncan MacPherson (Transcontinental), L. M. Perkins (N. P.), J. G. Shillinger (C. C. C. & St. L.), G. D. Swingly (B. & O.), D. W. Thrower (I. C.), H. K. Wicksteed (C. N. Q.), H. S. Wilgus (P. S. & N.).

Discussion on Ties.

L. C. Fritch (C. G. W.): It occurs to me that the committee has left out a very important consideration in regard to the stresses to which ties are subjected. I think they should give us some information on what stresses ties are really being subjected to with our heavy wheel loads. Before we adopt these conclusions we ought to have some information on that line. The conclusions given are not definite and they do not give much information except in the last paragraph and I doubt very much whether all the members of the association will agree with the committee on that clause. There are many members who think that the width of the tie is an important question, even if the spacing is 10 to 12 in., and it occurs to me that the conclusions as they now stand are hardly suitable for adoption.

Mr. Downs: The first nine paragraphs of the conclusions are restrictions, rather than conclusions. The last paragraph is a conclusion that the committee saw fit to make, after taking into consideration the nine reasons why a fixed rule cannot be set for A, B and C traffic. It is a very hard matter to determine the stresses in ties, and we enumerated nine objections, after carefully considering the proposition, as to why a fixed rule cannot be adopted for the railways to follow.

Mr. Fritch: In designing a bridge we assume a certain load, and I think the time has come when we should pay more attention to the designing of track structure, just as we do to the designing of the bridge structure. We should assume certain heavy wheel loads and ballast conditions and design the track structures to conform to these, just as we do in the case of the bridge structure. I assume that this is an important subject for the railways. I am of the opinion that many of us think that the ties are too small, and are being subjected to too heavy stresses, and we should have more information on that line.

Mr. Downs: In designing a bridge, you have an absolute

foundation, which is solid. You build the abutments and design the bridge for certain wheel loads. You have absolutely known factors to work on. In designing a track structure you must figure on subgrade which is an uncertain quantity. As we enumerated in these nine paragraphs, we cannot lay down any fixed rule on account of the nine reasons given—the kind of ballast varies, the depth of ballast varies, the kind of timber used for ties varies, and there are various other reasons.

Mr. Fritch: We can assume conditions which we can hope to reach. While the bridge structure is a different proposition, the principle is the same. We can assume certain conditions of ballast, foundation and load, and design the rest of the structure accordingly.

J. L. Campbell (E. P. S. W.): Many of the railways are still carrying their track across steel bridges and wooden bridges on wooden ties, and it seems to me if we should assume the conditions which undoubtedly exist, or nearly exist on the bridges, we might arrive at some conclusions along the lines which Mr. Fritch suggested. I believe it would be a good thing to determine just what the unit stresses are in a case of that kind.

Mr. Morse: It seems to me we should not put anything in the manual except what would be of particular benefit. As I understand the conclusion offered by the committee, it practically gives no recommendation at all.

Mr. Lindsay: Assuming a stable condition of subgrade and a desirable condition of ballast, the maximum spacing of the ties would be determined by the height of rail and the weight of it. The minimum condition would be established largely by the method of track work and kind of tool used for tamping. Between these two conditions there would be a wide range of possibilities. I believe it is possible to assume a set of conditions and determine with reasonable accuracy what is the best type of construction.

The President: In assigning this subject to this committee the Board of Direction had in mind that the report would be made on two lines, one line which the committee has reported on and the other line in harmony with what Mr. Fritch has stated. We knew when the subject was assigned that it required a number of assumptions to come to conclusions. A great many European engineers have already made studies on this line, and the Board thought it was about time that the engineers in this country took it up and tried to furnish some additional light on the subject.

The Board feared in going over this matter yesterday that a misinterpretation of the subject had been made by the committee, and they, therefore, proposed a rewording of the instructions in line with what Mr. Fritch has already stated, namely, that they would like to have a study of possible stresses in the ties, and from that work to a possible design or size for a tie.

The committee admits that they have been unable as yet to draw any conclusion from the collection of facts sent by the railways. It is, therefore, a very interesting subject for the committee to pursue, and the Board would very much like to have the committee do that if the association after this explanation feels that it is a good thing to do.

The motion to adopt the committee's conclusion was lost.

Mr. Fritch: I move this portion of the committee's report be referred back to it for further consideration; that it be received as information as at present submitted, and that the committee give additional study to the subject along the lines of the remarks on the subject. Motion carried.

Mr. Downs: The second subject referred to the committee was "Tie Renewals in Continuous Stretches vs. Single Tie Renewals." I move the adoption of the conclusion, viz., "The committee recommends the practice of single tie renewals."

Hunter McDonald: I rise with a good deal of timidity to take issue with the committee. I did not receive the committee's circular. If I had done so, what I have to say now would have been printed in their report. I do not think the fact that it is the common practice in this country is sufficient reason to adopt this method of tie renewal as the policy of the association. The replies received by the committee to its circular and the statements of the committee, do not show that there have been any very deep investigations as to cost and other factors. They simply express the opinion that it is the best policy without giving any facts to back up that opinion. I think this habit of single tie renewals has grown up because of a condition of affairs for which none of us are responsible. The managements of the railways are unwilling to incur the initial expense necessary to introduce any other policy. If it should be shown to be desirable to have 12 inches of ballast under the track, and the ties all put in at one time, on a given stretch of track, so that it would require very little work to be done for five or six years, it would entail necessarily a large initial expense, which would continue until the entire division had been so overhauled. After that time I am firmly convinced that the cost of maintaining the track would be very much less than it is under the present policy.

Another reason why this habit has grown up is because of the waste of ties that occurs under this renewal plan. There would undoubtedly be ties in the track that would last at least two years, and the roadmaster would criticise the section foreman for taking them out. On the other hand, if such ties were left in the track, in order to secure the additional length of life, which would probably represent 30 cents in value for each tie, I believe it would require at least $1 in labor to keep the tie in condition. This is a concealed loss.

I realize that this problem is one that depends on a good many indeterminate conditions, among which are the life and price of ties, cost and efficiency of labor, density of traffic, depth and care of ballast, care of the underlying roadway and the standard of excellence to which the track has to be maintained. I have endeavored to ascertain what the labor costs are for maintaining the track in accordance with the plan recommended by the committee. I have sought from our own accounts and from those of other roads to find it out. I have found an utter lack of uniformity in the method of keeping accounts and it is simply impossible to make any comparison between the present method and any other method. I think we need a much closer analysis of our labor costs than we are now securing under the I. C. C. distribution of costs. I think it would be well for our Committee on Accounts to endeavor to formulate some standard subdivision of roadway and labor costs in order that we may arrive at some definite knowledge by which we may compare these things.

For the past eight or ten years one of our roadmasters had been very diligent in observing the small amount of labor required to maintain stretches of track on which all the ties had been renewed at one time and he was so much impressed with the reduction in the labor cost that he received permission to try one experimental mile, which was put in in 1908. We were paying 40 cents for first class white oak ties. The track was laid with 80-pound rails, and had 53.5 per cent of 2 deg. curves running in opposite directions, with 450 ft. of tangent between them. The grades were slightly undulating There was an annual freight tonnage of 2,000,000 tons, with ten regular passenger trains per day, running at a speed of 75 miles an hour. The heaviest freight engines weigh 346,000 pounds, with a maximum axle load of 48,300 pounds. The heaviest passenger engine weighs 314,000 pounds with a maximum axle load of 51,300 pounds. There are nine inches of clean ballast under the track and a three-inch additional lift was given. The cost was:

3,000 ties at 40 cents	$1,200.00
1,263 cubic yards of ballast at 50 cents	631.50
Labor putting in ties and ballast and dressing up	844.00

Total $2,675 per mile.

A close account has been kept on the cost of maintaining this mile of track. The section foreman has been given special instructions to report each month the amount of labor expended in maintaining this track to surface. For the first year the cost was $23; second year, $29.80; third year, $35.20. We have just gone through the winter of the fourth year. We estimate the expense for the fourth year not yet completed will be $50; the fifth year not to exceed $75; and the sixth year, $110. In other words, we do not expect to renew any of the cross ties in that mile of track inside of six years. This opinion, I think, is borne out by a committee of engineers from an eastern road who visited our line. The cross ties are all of first class white oak. The average cost of maintenance of the track per year would be $53.83.

Assuming that this track would run six years without any serious overhauling, one-sixth of the initial expense to put it in would be $445.83, and with the estimated annual expense for maintenance of $53.83 the average cost per year per mile would be $499.66.

We do not know how this compares with results on other roads or even on our own line. We hope, however, to be able to tell you something about it in the near future. Since this mile was put up the results have been very flattering and we are now carrying out the same policy on 45 miles of track on that division.

From the best information I can get I believe the annual cost of carrying out the policy recommended by the committee, putting the price on the same basis, would be about as follows:

Ties	$154.44
Labor putting in	77.22
1½ in. of ballast every two years	118.50
Labor surfacing and applying ballast	250.00
Labor of maintaining	100.00
Total	$700.16

This, as you see, would make a difference of about $200 a mile. Naturally, we assume that the ballast is clean to start with. I have taken no account of the fact that at the end of the first six years the necessary raising of the ballast, after it is overhauled again, would not require as much as 3 in., and the annual cost would, therefore, be somewhat reduced.

We lack some standard method of comparing the excellence of our tracks. We can send out a dynamometer car, and get some idea as to what the surface condition of the track is, but if we could devise some simple method of comparing the condition of the tracks with some standard, it would greatly simplify the matter of comparing cost of maintenance.

Mr. Morse: On the Santa Fe we have a stretch of 55 miles of what we call an experimental track. Upon 22.5 miles we dug the track out and laid the ties to face, as Mr. McDonald suggests. We put in 12 in. of rock ballast, used creosoted ties, 3,200 to the mile, 90-lb. rail, and we have arranged our sections to have them divide at either end of this stretch, with an idea of keeping an account of the cost of renewals and repairs to see how it will compare with the renewal of ties individually. We expect to get at least ten years out of these creosoted pine ties. On the basis that our rail has to be renewed at the end of ten years, it has seemed to us that the proper way to carry on the renewal of ties would be to renew the face at the time you renew the rail.

W. L. Seddon (S. A. L.): I think the results mentioned by Mr. McDonald and Mr. Morse are predicated on a much more uniform basis than exists on the average railway, and that the committee's conclusions are based on the average results secured by the average railway. I think it is the uniform experience that, when a new track is laid, it is very much more expensive to keep this track in condition by renewing all the ties at one time than it would be to replace the ties one at a time. In the South, where we use pines ties and cypress ties, we begin to take out some of the ties from the track four years after the track is laid, while some of the ties remain in service fifteen years. I do not think it is fair to criticise the committee's results by comparing what they propose with track laid with selected ties or treated ties. I think the committee's conclusions are correct.

The motion to adopt the committee's conclusion was carried.

Mr. Downs: The third subject assigned to the committee was the use of metal, composite and concrete ties. I move that conclusion No. 1 be adopted.

Motion carried.

TRACK.

The subjects assigned were:

(1) Present general specifications covering material and workmanship for frogs, crossings and switches, including the use of manganese and other special alloys.

(2) Present general specifications for track bolts, nut locks, tie-plates, common track spikes and screw spikes.

(3) Study designs for main line turnouts.

(1) FROGS, CROSSINGS AND SWITCHES.

The committee has revised the plans for Nos. 8, 11 and 16 rigid frogs, No. 11 spring frog and for 11-ft., 16½-ft., 22-ft., and 33-ft. switches and submits them for adoption as general plans representing good practice. The committee has also revised and combined the "General Specifications for Frogs, Crossings and Switches" adopted by the convention of 1910, and the "General Instructions for Ordering or Contracting for Frogs, Crossings and Switches," submitted to the convention of 1911 and received as information, and submits them for adoption as representing good practice.

At the convention of 1909, the association instructed the track committee to recommend three standard lengths of switches and three standard numbers of frogs; such a recommendation was made, with the modification that a fourth length of switch was added for special cases requiring frogs of large angle; the recommendation was embodied in conclusion 4 of the committee's report, which was adopted by the convention of 1910, but was referred back to the committee by the board of direction for reconsideration.

The committee reconsidered and reaffirmed its former action; the conclusion was not resubmitted, however, excepting as the proposed lengths of switches and numbers of frogs were embodied in the "General Instructions for Ordering or Contracting for Frogs, Crossings and Switches" which was received only as information by the association at the convention of 1911.

In determining the lengths of switches the committee considered it necessary to provide for the following general classes of turnouts:

(a) Turnouts to be operated over the divergent route at the maximum practicable limited speed.

(b) Main line turnouts and crossovers to be operated over the divergent route at low speed.

(c) Yard turnouts.

(d) Turnouts requiring frogs of large angle.

The second point considered was the economical cutting of a 33-ft. rail; the question of using the full 33 ft. as one of the lengths of switch was very fully discussed by the committee at meetings held in three successive years. The main objections to the use of a 33-ft. switch are (1) the length being the same as that of the stock rail unless a special length of stock rail is used, one joint of the latter must necessarily come near the point of the switch and the other joint ahead of and near the heel of the switch, often necessitating the clipping of the angle bars, and (2) the great length of laterally unsupported rail.

The committee is of the opinion that the location of the joints of the stock rail 40 inches ahead of the point and heel of switch is not seriously objectionable and the clipping of the angle bars is not an expensive operation and does not seriously weaken the joint, and that switches 33 ft. and even 45 ft. long have been successfully used to such an extent that there seems to be little ground for apprehension on account of the length of laterally unsupported rail.

Twenty-seven ft. and 30-ft. lengths have been suggested in lieu of a 33-ft. length; the angles would be respectively 22 per cent. and 10 per cent. greater than that for 33 ft.

The longest switch points are to be used in those turnouts where the highest speed is desired. These switch points will necessarily get severe usage, therefore they should be made from the very best rail. If made from the second or third rail from the top of the ingot, you have eliminated as far as possible any chance of defect in the rail. These rails are as a rule 33 ft. in length. The lengths of switches recommended can be made from 33 ft. rails without any waste.

These and other considerations led the committee to recommend the following length of switch points for the four general classes of turnouts named above:

(a) 33 ft.; (b) 22 ft.; (c) 16½ ft.; (d) 11 ft.

A purely theoretical investigation of the rate of turning of a locomotive at the switch point and of the angle between the stock rail and a line passing through truck centers of a car leaving the switch indicates that an approximate balance between the deflection through the switch point and the deflection through the lead is attained when the switch angle equals one-fourth the frog angle. This proportion has been found to work out well in practice. It seems to be certain that when the switch angle exceeds one-fourth the frog angle, the switch point presents the worst feature in the alignment of the turnout and there is an economic loss both in the space occupied by the turnout out and in the cost of the turnout.

With a 6¼-in. heel distance and ¼-in. thickness of point, the above relation between switch angle and frog angle would make the length of the switch in feet equal to twice the frog number.

In 1908 the frogs most used appear to have been numbers 10, 7, 8, 9, 6, 15, 12, 20, 11, 14 and 16 in the order named; number 10 frogs being used by 55 per cent. of the roads tabulated and number 16 by only 5 per cent. But the roads using No. 11's included the Chicago, Burlington & Quincy, the Great Northern, the Michigan Central and the Northern Pacific and those using No. 16's the Baltimore & Ohio, the Erie and the Lake Shore & Michigan Southern.

No. 7 frogs are rapidly disappearing, being supplanted by No. 8's; the relative number of No. 10's is also diminishing, with a corresponding increase in the proportion of frogs of higher numbers.

It seems desirable for class (a) turnouts to use the highest number of frog which is economically consistent with the longest switch point; for class (b) the great preponderance of present practice is in favor of No. 10 frogs, but the choice of this frog would leave an unfilled gap between this and the highest number frog; besides, a No. 10 turnout with a 16½ ft. switch is little better in its worst feature than a No. 8 turnout with the same switch, while a 22-ft. switch would unduly increase the degree of lead curve; for class (c) the trend of present practice, if not the preponderance of practice at this date, is in favor of No. 8 frogs; for class (d) no number of frog can be specified, as this class includes a multitude of special cases.

The committee presents its former recommendation in a modified form:

Switch points 16½ ft. long are recommended for frogs over No. 6 up to and including No. 10; 22-ft. points for frogs over

No. 10 up to and including No. 14; 33-ft. points for frogs over No. 14 and 11-ft. points for No. 6 and under where they are required.

Nos. 8, 11 and 16 frogs are recommended as meeting all general requirements for yards, main track switches and junctions; new work should be laid out, so far as practicable, for these three frogs, so as to effect the gradual elimination of frogs of other numbers, lessen the cost of manufacture and decrease the amount of stock carried.

(2) No attempt was made to prepare specifications for tie-plates and track fastenings, but the committee attempted to formulate principles as to the functions, material and form of tie-plates and track fastenings. The work has not progressed far enough at this time to be embodied in a report.

(3) The work of the committee on the designs of main line turnouts is necessarily held in abeyance pending the adoption of standard numbers of frogs and lengths of switches.

VERTICAL CURVES.

In order to get the benefits of experience in the use of vertical curves, a series of questions was asked members of the association and the replies tabulated.

Under apparently like conditions, widely different results were obtained; this leads to the conclusion that the conditions were only apparently alike and that there must be other unknown conditions. The data in its present form seems to give very little information of value. The committee will continue its investigations.

CONCLUSIONS.

The committee recommends:

(1) That the "General Specifications for Frogs, Crossings and Switches" be adopted as representing good practice.

(2) That the plans of No. 8, 11 and 16 rigid frogs, No. 11 spring frog and 11 ft., 16½ ft., 22 ft. and 33 ft. switches be adopted as general plans representing good practice.

(3) That the committee's recommendation as to lengths of switches and numbers of frogs be adopted.

J. B. Jenkins (B. & O.), chairman; G. J. Ray (D. L. & W.), vice-chairman; Geo. H. Bremner (C. B. & Q.), A. Bruner (N. & W.), Garrett Davis (C. R. & I. P.), Raffe Emerson, E. G. Ericson (P. L. W.), J. M. R. Fairbairn (C. P.), T. H. Hickey (M. C.), J. R. Leighty (M. P.), Thomas Maney (L. & N.), Curtiss Millard (C. G. W.), P. C. Newbegin (B. & A.), R. M. Pearce (P. & L. E.), H. T. Porter (B. & L. E.), W. G. Raymond (Iowa St. Coll.), S. S. Roberts (I. C.), L. S. Rose (C. C. C. & St. L.), R. O. Rote (L. S. & M. S.), H. R. Safford (G. T.), F. A. Smith, C. H. Stein (C. R. R. N. J.), F. S. Stevens (P. & R.), W. J. Towne (C. & N.-W.), R. A. Van Houten (L. V.).

GENERAL SPECIFICATIONS FOR FROGS, CROSSINGS AND SWITCHES.

General Instructions.

The company will furnish to the manufacturer specifications and drawings. The drawings will show rail sections, splice drilling, angles, alinement, general dimensions and such details as the company may desire.

When requested, manufacturers shall submit for approval detail drawings showing construction and dimensions of all parts to be furnished in accordance with these specifications. Conventional shading shall be used in sectional drawings. All dimensions and distances shall be shown plainly in figures. The title shall be placed in the lower right-hand corner.

The detail drawings shall be on sheets 22 in. wide, with a border line ½ in. from the top, bottom and right-hand edge, and 1½ in. from the left-hand edge. The standard length of sheets shall be 30 in. except that, when necessary, longer sheets may be used and folded back to the standard length. Drawings of one subject only shall appear on a sheet. Scale of general drawings shall be 1½ in.=1 ft.; details not less than 3 in. = 1 ft.

The drawings of the company and the manufacturers' drawings approved by the company shall be a part of the specifications. Anything which is not shown on the drawings but which is mentioned in the specifications, or vice versa, or anything not expressly set forth in either but which is reasonably implied, shall be furnished the same as if specifically shown and mentioned in both. Should anything be omitted from the drawings or specifications that is necessary for a clear understanding of the work or should any error appear in either the drawings or specifications affecting the work, it shall be the duty of the manufacturer to notify the company and he shall not proceed with the work until instructed to do so by the company.

Inspection.

Material and workmanship shall be at all times subject to inspection by a duly authorized representative of the company, who will examine the material before it is worked in the shop. He will inspect the work during progress and will also inspect the finished product, with power to reject materials and workmanship found to be unsatisfactory. He shall have free access to the shops and mills at any and all times during the progress of the work.

The acceptance of any material by an inspector shall not prevent subsequent rejection if found defective after delivery or during the progress of the work and such defective material if furnished by the manufacturer shall be replaced by him at his own expense.

All facilities, labor and tools necessary for the shop inspection shall be furnished at the expense of the manufacturer.

When the manufacturer furnishes the rails, he shall supply the company with a certificate of inspection made by some competent person acceptable to the company.

Material.

Rail.—No. 1 rail, of the section ordered, as called for by the specifications, shall be used.

Fillers.—Fillers between the main and wing rails and between the main and easer rails shall be rolled steel. Throat filler blocks, not presenting a running surface, may be cast-iron.

Raiser Blocks.—Raiser blocks shall be hard cast steel.

Foot Guards.—Metallic foot guards shall be either cast-iron, malleable iron or cast steel, except that strap foot guards shall be rolled steel. Wooden foot guards shall be of best quality hard wood.

Bolts.—Bolts shall be of double refined iron or mild steel. Bolt metal shall have a tensile strength of not less than 50,000 lbs. per sq. in. and an elongation of not less than 15 per cent. in eight inches. When nicked and then broken, the fracture shall be free from flaws and unwelded seams.

Rivets.—Rivets shall be made of steel which may contain a maximum of 0.04 per cent. basic phosphorus, 0.04 per cent. acid phosphorus and 0.04 per cent. sulphur. It shall have an ultimate tensile strength of 50,000 lbs. per sq. in. It shall bend flat upon itself without fracture and when nicked and bent around a bar of the same diameter as the rivet rod it shall give a gradual break with a fine silky uniform fracture.

Reinforcing Bars.—Reinforcing bars shall be of wrought-iron or mild steel.

Plates.—Plates shall be of rolled steel.

Springs.—Springs shall be of the best quality spring steel and of dimensions and capacity shown on the plans. They shall meet the following tests:

(a) Each spring shall be placed on the testing machine and forced down solid four times.

(b) After the foregoing, each spring shall be placed on end on a flat plate, and the distance between the plate and the other end of the spring measured by means of the standard depth gage; this measurement being the free length of the spring. The free length must conform to the plans within ⅛-in.

(c) Double springs shall be assembled and a load at least 25 per cent. greater than the rated capacity of the spring shall be applied for thirty seconds. Upon release neither spring must vary from its original free length. If either one does so vary, it shall be rejected.

(d) The inner and outer coils of springs shall be coiled in opposite directions.

Spring Covers.—Spring covers shall be made of malleable iron.

Braces.—Braces shall be made of (insert "malleable iron" or "forged steel").

Stops and Hold-downs.—Stops and hold-downs shall be made of mild steel.

Anti-creeping Device.—Anti-creeping device shall be made of mild steel.

Switch Lugs.—Switch lugs shall be mild steel.

Switch Rods.—Switch rods shall be mild steel.

Workmanship.

Workmanship shall be first-class. All bends shall be made accurately in arcs of circles and without injury to the material. Welding will not be permitted in any part of the frogs or in the switch rails. Planing shall be such that abutting surfaces will fit accurately together. Ends of rails shall be cut at right angles to the axis of the rail except where otherwise specified. All burrs shall be removed.

No paint, tar or other covering shall be used before inspection.

The alinement and surface of all finished work shall be even and true, and shall conform to the angles specified.

Frogs.

Fillers.—Rolled fillers shall fit the fishing angles and the web of the rail for a distance of ½-in. above and below the base and head, respectively, and shall maintain the required flangeway. Throat filler blocks shall fit the rail sufficiently

well to maintain the required spacing. Where the brand of the rail interferes with the fit of the filler the brand shall be chipped off. Fillers shall be grooved or cut out to fit over rivet heads.

Heel Raiser Blocks.—Heel raiser-blocks shall fit the head, base and web of rail as provided under rolled fillers.

Foot Guards.—Solid foot guards shall fit the rail sufficiently well to maintain the required spacing. Strap guards shall have a minimum thickness of ⅜-in., of the width shown on plan and shall be fastened to the web of the rail by bolts or rivets not less than ¾-in. in diameter.

Bolts.—Bolts must be round and true to size, with square heads and nuts. Threads must be accurately cut and nuts must have a wrench-tight fit. Each bolt must be provided with an approved head lock and a nut lock of approved pattern large enough to give full bearing for the nut. A ¼-in. cotter pin shall, when required, be placed outside of and close up to the nut after it is tightened. Beveled washers must be used wherever necessary to give the head and nut a full, square bearing. Separate head lock shall be of material not less than $\frac{3}{16}$-in. thick. Washers used under heads may be of such design as to act as head locks. Bolts must be long enough to allow the nuts to be brought out from under the head of the rail, with a suitable washer not less than ½-in. thick, so that the nuts may be readily tightened with an ordinary wrench.

Rivets.—The diameters of the rivets shall be of full size shown on plan, and the diameters of the rivet holes shall be not more than $\frac{1}{16}$-in. greater than the diameters of the corresponding rivets. The rivets shall be of sufficient length to provide full, neatly made heads when driven. They shall be driven tight, bringing all adjacent parts into contact.

Rivets, when not countersunk or flattened, shall have standard button heads of uniform size for the same size rivets. The heads shall be full and neatly made and concentric with the holes. When the rivet heads are countersunk they shall be flush with the plate and fill the holes.

Reinforcing Bars.—Reinforcing bars shall fit the fishing angles and web of rail throughout their length.

Plates.—Plates shall be flat and true to surface.

Springs.—Springs shall have the ends square with the axis, so that when the spring is placed on end on a flat surface it will stand perpendicular thereto.

Spring Covers.—Spring covers shall be of such dimension as to permit a proper working of the springs and shall be provided with a spring bearing for each end of the spring.

Braces.—Braces shall fit the head and web of rail accurately.

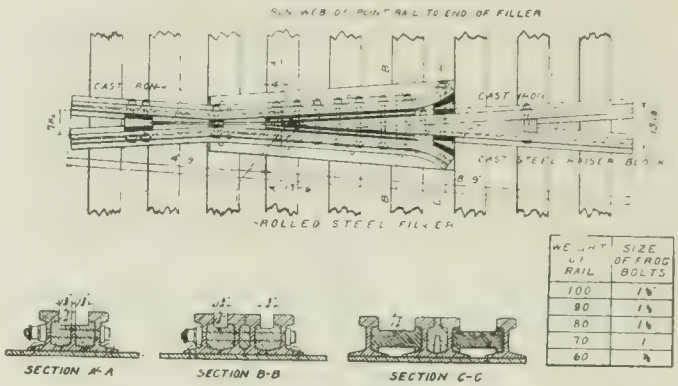
Stops and Hold-downs.—Stops shall be so placed on plates as to hold the wing rail at 1⅞-in. opening at the ½-in. point. Hold-downs shall fit stops so as to allow at least 2-in horizontal play and not more than ⅛-in. vertical play.

Anti-creeping Device.—The anti-creeping device shall fit accurately to the parts of the frog or angle bars.

Holes for Main Bolts.—Holes shall be drilled from the solid. No punching will be permitted except of bottom plates and washers. Drilling shall be accurately done, on bevel where necessary, and holes shall be made $\frac{1}{16}$-in. less in diameter than the bolt to be used. Then the parts shall be assembled and the holes reamed so they are straight and true, with no offsets between the adjacent parts and of such size as to give the bolts a driving fit for their entire length.

In lieu of the above specification for drilling and reaming, the manufacturer may assemble and accurately fit all the parts, before any drilling whatever is done; after the parts are securely clamped in their correct positions the holes may be drilled of such a size as to give the bolts a driving fit for their entire length.

Marking.—The number of the frog, maker's name, weight of rail and the date shall be plainly stamped with ¾-in. figures and letters on the flare of one wing rail for rigid



WEIGHT OF RAIL	SIZE OF FROG BOLTS
100	1⅛
90	1⅛
80	1⅛
70	1
60	⅞

No. Eight Rigid Frog.

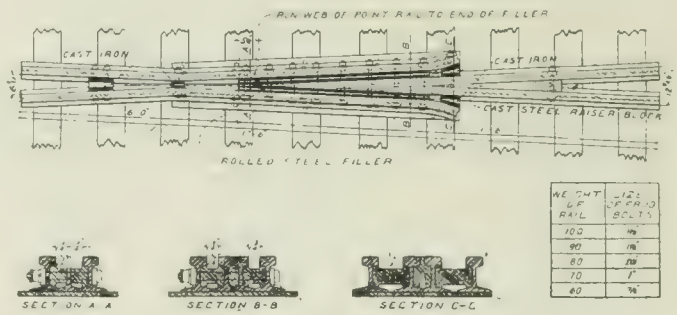
frogs and the flare of both wing rails for spring frogs, or a plate shall be fastened to the frog with the same information.

Switches.

Throw.—5 in. at center line of No. 1 rod.

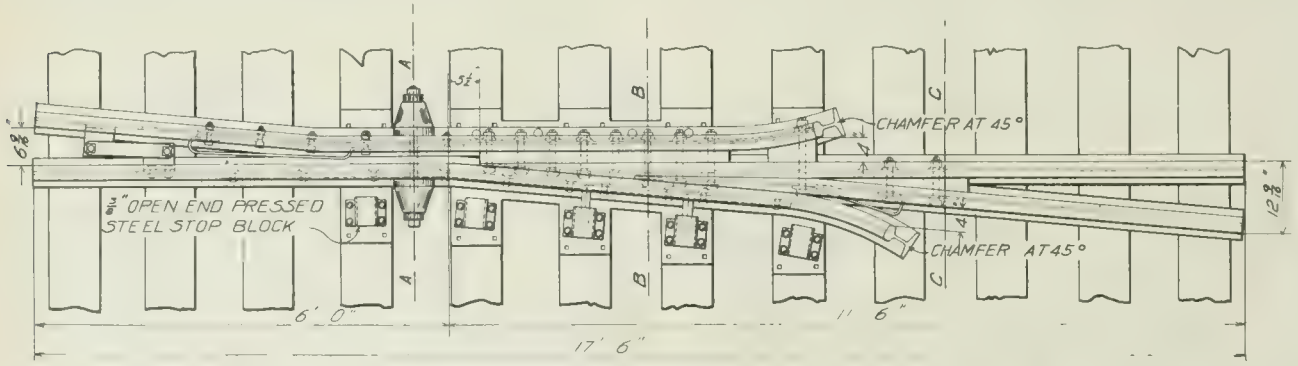
Gage of Track.—4 ft. 8½ in.

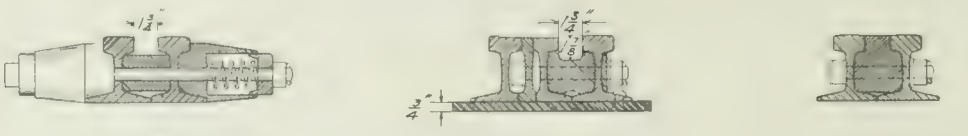
Switch Rails.—Side planing and bending shall conform to a spread at the heel of 6¼ in. between the gage lines of the stock rail and the switch rail and a thickness of



No. Eleven Rigid Frog.

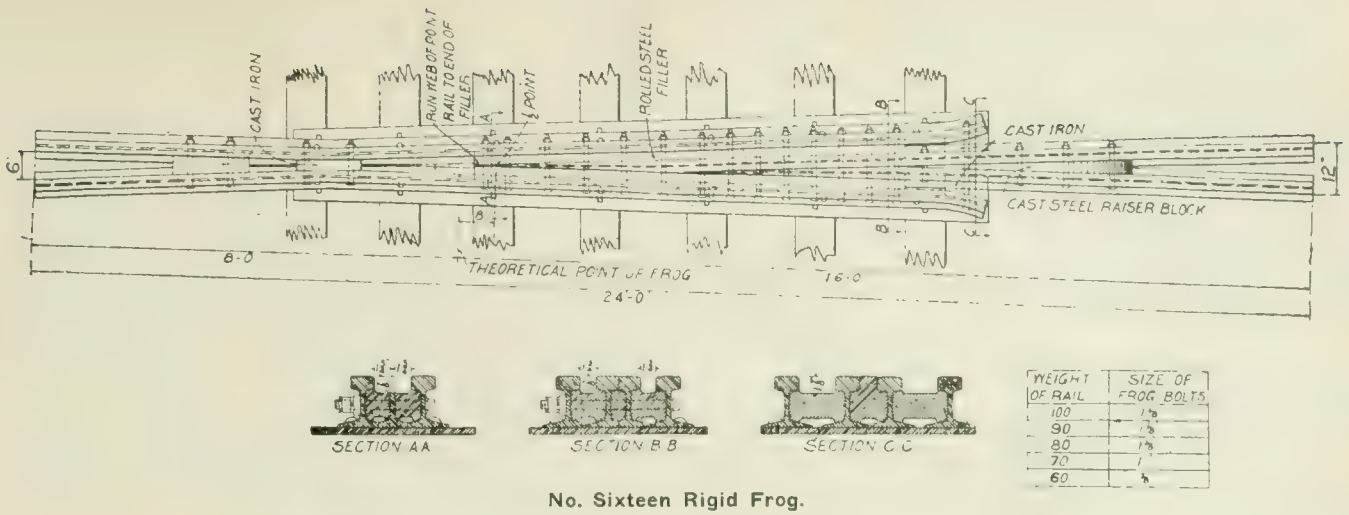
¼ in. at the point. The bending and planing shall be done so as to give a straight gage line to the switch rail. The switch rail shall afterward be ground down to a thickness of ⅛ in. at the point, beginning 2 ft. back from the point of the switch; the point of the switch shall then be ground





WEIGHT OF RAIL	SIZE OF FROG BOLTS
100	1⅛"
90	1⅛"
80	1⅛"
70	1"
60	⅞"

No. Eleven Spring Frog.



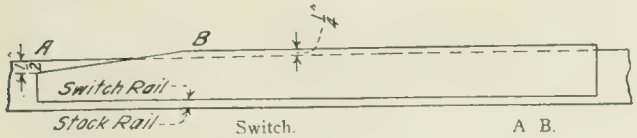
No. Sixteen Rigid Frog.

down to a sharp edge with a radius of 1½ in. The head of switch rail shall fit neatly against the head of stock rail from point of switch rail to point of divergence. The inner edge of the head of the stock rail and the outer face of the web of the switch rail at the point shall be in the same vertical line when the switch rail is fitted against the stock rail.

Top planing shall conform to the measurements shown in the accompanying figure and table.

Bottom of switch rail shall be planed to fit neatly on base of stock rail where bases overlap.

The point of switch rail shall be as shown in the detail drawing herewith.



Switch.	A	B.
33 ft	12	ft
22 ft.	9	ft.
16 ft 6 in.	5	ft.
11 ft.	5	ft.

Planning of Switch Point and Stock Rail.

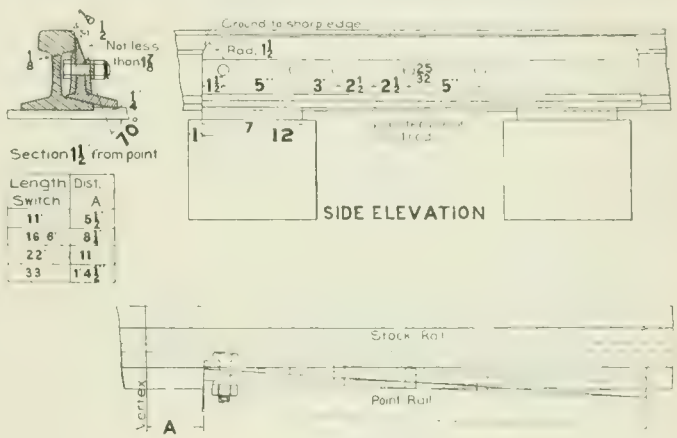
Holes for switch rod lugs and stop blocks shall be $\frac{25}{32}$ in. in diameter and 5 in. center to center. Holes for reinforcing bars shall be $\frac{13}{32}$-in. diameter. Number and location as provided under "reinforcing bars."

Lugs.—Lugs shall be as deep as the section of rail will permit.

Distance between centers of holes for bolts running through the web of the rail shall be 5 in. Diameter of holes shall be $\frac{25}{32}$ in. Switch rod bolt hole shall be $1\frac{1}{32}$ in. in diameter.

Switch Rods.—Switch rods shall be ¾ in. by 2½ in. and shall be held in a horizontal plane. Bolt holes shall be $1\frac{1}{32}$ in. in diameter. There shall be at least 1½ in. of metal at end beyond bolt holes.

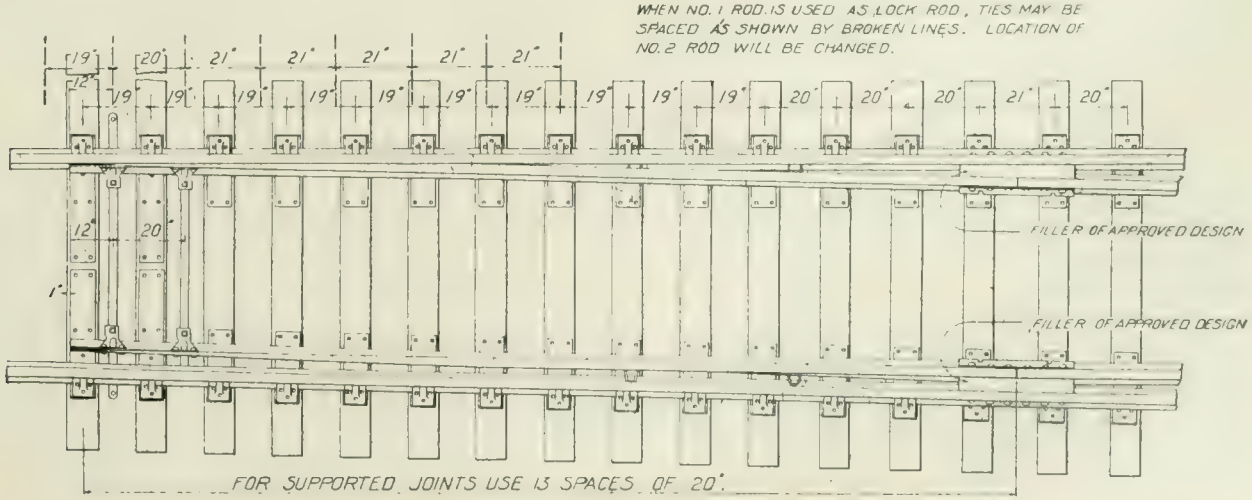
Reinforcing Bars.—A reinforcing bar ⅜-in. thick shall be riveted to each side of each switch rail and point ends shall be made flush with point of switch rail. The bars shall be as long as the heel connections will permit. Bars shall fit against web of rail and shall fill the space between



Details of Point.

head and flange of rail. There shall be ½-in. clearance between outer bar and head of stock rail where the bar projects under the head of stock rail. Top of inner bar, where it projects beyond the head of switch rail, shall not be less than 1⅞ in. below the top of stock rail. The reinforcing bar shall be beveled to an angle of 45 deg., where it projects beyond the head of the rail.

Bars shall be fastened to rail with ¾-in. (insert "rivets"



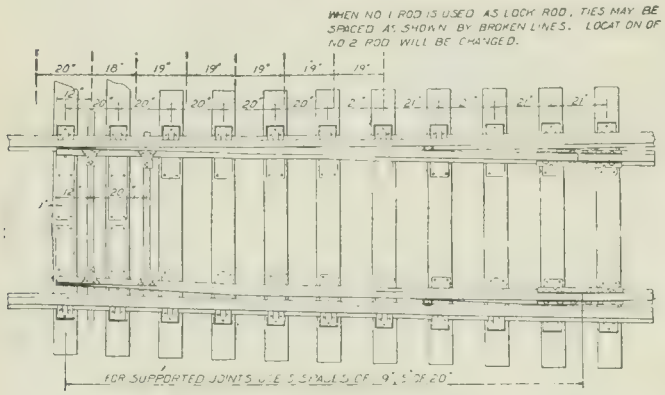
Twenty-Two Foot Switch.

or "bolts"), except that at the first, second and fifth holes, and the holes through which the lugs are fastened, they shall be bolted. Center of first hole shall be 1½ in. from point and center of last hole in bar shall be 2 in. from heel end of bar. Intermediate (insert "rivets" or "bolts") shall be spaced so that there shall be fastenings at intervals not greater than 12 in.

Stop Blocks.—Stop blocks shall be of approved design with holes $\frac{13}{16}$ in. in diameter. Stop blocks shall be spaced as nearly as practicable at equal intervals between the end of planing and heel of switch.

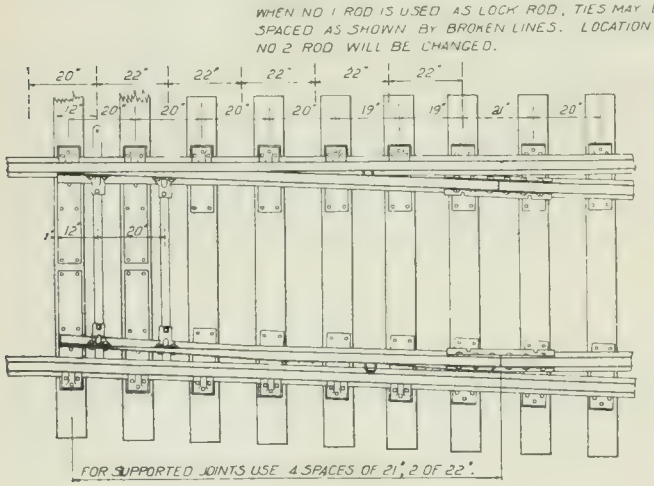
Heel Blocks.—Heel blocks shall be of approved design with standard rail drilling.

Bolts and Nuts.—Bolts fastening lugs, stop blocks and foot guards to switch rails shall be ¾ in. in diameter.



Sixteen-Foot Six-Inch Switch.

Bolts connecting the lugs with switch rods and the switch-stand connecting bolt shall be 1 in. in diameter and machine turned. All bolts shall be provided with nut locks



Eleven-Foot Switch.

and cotters. ¾-in. bolts shall have hexagonal nuts and 1-in. bolts shall have square nuts.

Rivets.—The diameters of the rivets shall be of full size shown on plan, and the diameters of the rivet holes shall not be more than $\frac{1}{16}$ in. greater than the diameters of the corresponding rivets. The rivets shall be of sufficient length to provide full, neatly made heads when driven. They shall be driven tight, bringing all adjacent parts into contact.

Rivets, when not countersunk or flattened, shall have standard button heads of uniform size for the same size rivets. The heads shall be full and neatly made and concentric with the holes.

When the rivet heads are countersunk they shall be flush with the plate and fill the holes.

Plates.—There shall be on each tie two plates of suitable length ⅞ in. by 1 in., planed down to receive the stock rail and braces. Three holes outside and two inside are required for ⅞ in. lag screws or screw spikes, or for ordinary spikes, as may be specified, on all switch ties, except the two head ties, where there shall be three outside and five inside, one of the inside holes to be in position for spiking the switch.

Braces.—Braces shall be of such a design that 2½-in. clearance for detector bars may be obtained. Three holes for ⅞-in. lag screws or screw spikes shall be provided.

Foot Guards.—Strap foot guards shall have a minimum thickness of ⅜ in. and shall be fastened to the web of the rail by ¾-in. bolts or rivets.

Note.—The following members of the committee approve the report as submitted herewith: J. B. Jenkins, Chairman; L. S. Rose, Garrett Davis, J. R. Leighty, Curtiss Millard, T. H. Hickey, Raffe Emerson, J. M. R. Fairbairn, H. T. Porter, P. C. Newbegin, W. G. Raymond, S. S. Roberts, F. A. Smith, R. A. Van Houten, W. J. Towne, H. R. Safford, R. H. Pearce, C. H. Stein, Thos Maney.

The following members approve the report conditionally: G. J. Ray, A. Bruner, F. S. Stevens.

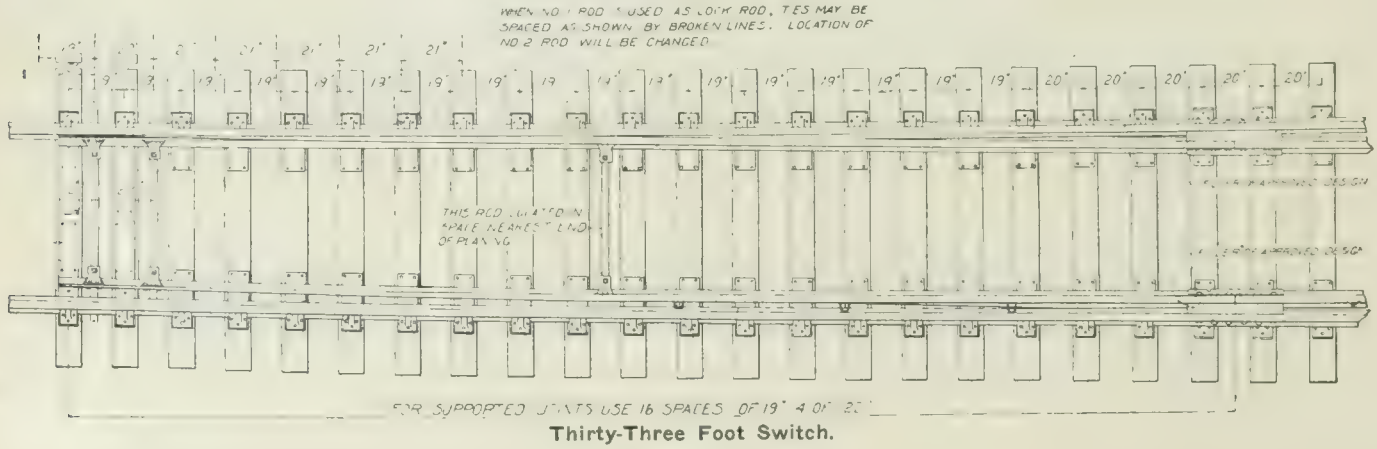
The following members dissent from portions of the report: Geo. H. Bremner, R. O. Rote.

Discussion on Track.

Mr. Jenkins: We originally had our specifications and plans for frogs and switches together and there has been some objection on the part of some members of the association on account of the plans being in too great detail, and on the part of others because they are not in sufficient detail. Part of the association considered that the plans should not be a part of the specifications, another part, apparently, that thought the specifications should be accompanied by complete and detailed plans. The committee, at the last convention, submitted plans for these frogs and switches, which we have gone over carefully and revised, and we also revised and combined the general specifications for frogs, crossings and switches, which were adopted in 1910, with the general instructions for contracting frogs, crossings and switches which was submitted in 1911, and received only as information. We have not only combined them but revised them, and we wish to submit them for adoption. We wish to submit the specifications without the plans and submit the plans separately.

At the request of the president the committee will ask action on conclusion No. 2, that the plans of No. 8, No. 11 and No. 16 rigid frogs, No. 11 spring frogs, and 11-ft., 16½-ft., 30-ft., and 32-foot switches be adopted as general plans representing good practice, and published in the manual. The adoption of this plan has no bearing on No. 3, which recommends these lengths of switches. The adoption of conclusion 2 only carries with it the recommendation of these plans for these numbers. The plans, it may be stated, are general plans, principally for dimensions.

Conclusion No. 2 was adopted.



Thirty-Three Foot Switch.

Mr. Campbell: Referring to the plans for the 33-ft. switch, I would like to ask if the committee came to any conclusion in relation to the joints in the main line rails. As far as I see this plan does not show the location of any of the joints. Also, has the committee considered special rail lengths for these turnouts? How does the committee propose to handle turnouts in case the proper length does not make up commercial lengths of rails? Where would we put the joints in the main line for this switch?

Mr. Jenkins: The committee has considered both questions raised in regard to the joints for the 33-ft. switch. We considered the best practice would be to use a 30-ft. stock rail. The plans for the switches are general. In the specifications we say, "Heel blocks shall be of approved design, with standard rail drilling." On the plan itself it says: "Filler of approved design." We could not indicate more than one heel block on the plan, so we only indicated one.

Mr. Lindsay: On the drawing of the switch point the first pair of holes, 5 in. apart, are 1½ in. from the point. That, I believe, is done at the behest of some of our friends who desire to put on the modern type front rod for the lagging apparatus at interlocking plants, and that requires alternate spacing of ties on the plans of switches required. If it is safe to allow the switch point to project, as it will for the use of the head rod of that type in those holes, to project over a foot from the first rod, it would be better, it seems to me, to adopt the alternate spacing of ties shown here, rather than the primal one, because it would be safe to fasten a head rod to these first two holes and at or between the ties. I do not consider the alternate spacing of the ties shown on the plans as necessary in any way whatever.

Mr. Jenkins: We do not think that all roads would want the first spacing of ties shown, and some of them would prefer the alternate spacing and we have put on both of them for that reason. If any road desires to use the first spacing altogether and considers that the best practice, there is no reason why they should not follow that throughout.

A vote on the motion to adopt the second conclusion showed: affirmative, 23; negative, 13.

Mr. Jenkins: The committee was asked by the Board of Direction to recommend three frogs and three lengths of switches. We thought it necessary to include the fourth length of switch for industrial sidings, and short turnouts, where such turnouts are required. In recommending these three lengths of switches, with one additional length, we took the 33-ft. rail and cut that economically so as to make the lengths 33, 22, 16½ and 11. Our principal reason for doing this is that for the longest turnout we want the very best rail, and we can probably get the best rail by using a 33-ft. rail. We will probably also want to specify that this rail shall come from a certain part of the ingot. As to the frogs, we are perfectly aware that there are very few No. 11 frogs in use at the present time; that more roads use No. 10 than any other number of frog, but if we adopt a No. 8 for yards and No. 10 for main line turnouts, that only leaves us one other turnout to use for the low and the highest restricted speed. While the No. 11, with the 22-ft. switch point, will answer for the low speed controlled by interlocking, just about as well as the No. 12, the No. 16 will answer fairly well for the highest restricted speed, because the deflection of an engine through the lead of No. 16 is about the same as that through the 33-ft. switch point, so the No. 11, if we are confined to three numbers, will answer the purpose of the present No. 10 and No. 12. The No. 16 will answer the purpose of the 14, 15, 16, 18 and possibly the 20. I think the present practice for yard turnouts is tending very strongly towards No. 8, so that our recommendation in that regard is not at variance with practice. Another reason for the No. 11 is that if we adopt a standard for general use, we want to take that number of frog which will give the most economical use of the rails, and if you will refer to the table of practical leads in the manual, you will find that No. 11 is the best suited to that purpose.

Our committee would like definite action on this, either adoption or rejection, with further instructions, because our study of main line turnouts depends on your action on this. If the association thinks that three numbers of frogs are not sufficient, we can very readily take up a recommendation for a greater number; but the committee itself feels that these three frogs are sufficient, and of course every railway which uses No. 10 would not want to tear out all the No. 10 and put in No. 11. But I do not think there is any necessity for doing so. When new work is laid out it can be done with No. 11, and eventually the railways will come to these three standards, which will be economical. I move the adoption of conclusion 3, and that the recommendation be published in the manual.

G. W. Kittredge (N. Y. C. & H. R.): I am not altogether satisfied with the reasons given why we should go from No. 10 to No. 11. I know a great many roads that use No. 10 quite generally, and it was only a few years ago that a No. 10 frog was considered one of the maximum numbers to be used in any location.

Mr. Morse: On our road we adopted 8, 10 and 14. I think 8, 11 and 16 are all right. In regard to Mr. Fritch's proposition to add to that a new frog, I don't believe any road that has adopted a set of standards is going to change them to go with this, but there are a good many roads I presume, that are about up to the point where they have got to change their standards, the same as we were a few years ago when we were using 6½ and 9. We finally adopted 8, 10 and 14. I favor the recommendation.

Mr. Fritch: I suggest that conclusion 3 be subdivided into two parts, one governing recommendation in regard to length of switches, and one in regard to number of frogs. It is possible that some of them can agree on the number of frogs, who would not agree on the switches, and vice versa.

The President: There is no objection to that; so the motion will be revised to include frogs only.

The President: We will wait until we come to that part.

Mr. Kittredge: We have, as I understand, already adopted the plans for No. 8, 11 and 16 frogs. It might be a little inconsistent if we vote any other way than to follow the motion of the chairman, to adopt the frog, the plans for which we have already accepted.

The President: We are not adopting the numbers in adopting the plan.

Mr. Jenkins: The No. 11 frog, with 22 switch point, takes 33-ft. rails for the lead curve, one of which is cut to 32.85, 1⅞ inches cut off of one of the four rails.

Motion carried.

Mr. Jenkins: I move that the committee's recommendation in regard to lengths of switches be adopted, with the recommendations published in the manual.

Motion carried.

Mr. Fritch: I move to amend the recommendation by specifying the switches 11 ft., 16½ and 26 ft.

Mr. Jenkins: It is the opinion of the committee that 26½ ft. does not give quite a small enough angle for the highest restricted speed for junctions; that we should use as long a switch point as possible, and that in addition we want to use the full length of rail in order to have every possible assurance of getting the best rail for that switch point.

Mr. Porter: Several years ago, when the matter was brought before the committee, they came to the conclusion that for high speed crossovers and turnouts, it was desirable to have as long a switch point as practicable, under the conditions that we were working with. After conferring with the rail makers of this country, we found that 93 or 94 per cent of the rail which they sent out was to a standard of 33-ft. lengths. If you accept the 33-ft. rail, then you can specify just the part of the ingot it comes from. The rails being rolled now are marked A. B. C, D, depending on whether they are rolled from the top of the ingot, the middle rail of the ingot, or the bottom of the ingot. So we can put it in the power of the engineers to specify where that rail shall come from, and they can do that with the 33-ft. length switch, or with switches made out of 33-ft. length rails. Five per cent of the rails are of shorter lengths, dropping down according to the various specifications, either a foot at a time or two feet at a time, so if you have a 26-ft. switch the chances are you will get it out of a shorter rail. Another object in having the longest rail we could get was to make the curve in the lead as light as possible. In France tey are using now, at junctions, a rail 39-ft. and some inches long, and they are using them successfully and are maintaining a speed through the switches, even on the branch lines, of 62 miles an hour without a shock. That seems to be the tendency in France, and I believe in some of the other European countries they are making experiments in the same direction. So we feel that we ought to at least go as far as 33 ft. in order to get as light a curve as possible.

After adopting the switch point that gave us the lightest curve in the lead, it was figured out by one of the members of the committee that a No. 16 frog gives the curve that produces the least deflection as an engine passes through that point. So for the purpose of getting the best rail, the lightest curve, and a point that would give the same deflection through the curve as a No. 16 frog, we feel that we ought to use a 33-ft. point.

The President: The remaining subjects will be discussed at the opening of the session Wednesday morning.

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PRESENT MEMBERSHIP OF THE A. R. E. A.

The secretary's report, presented yesterday, showed the following membership figures:

Membership March 15, 1911		967
Additions during the year		95
		1,062
Deceased	7	
Withdrawals during the year	13	
Dropped for non-payment of dues	12	
	32	32
Total membership, March 15, 1912		1,030
Net increase		63

There are now 939 members, 4 honorary members and 87 associates.

Geographical Distribution.

The geographical distribution of the membership is indicated in the following table:

United States	899	Korea	1
Dominion of Canada	83	Panama	1
Mexico	9	Australia	1
Cuba	5	Great Britain	1
China	6	Peru	2
New Zealand	4	Russia	1
Philippine Islands	3	Central America	2
India	2	Porto Rico	1
Bolivia	1		
Japan	8		1,030

Classification of Members.

Presidents	22
Assistants to president	2
Vice-presidents	27
General managers	20
Director maintenance and operation	1
Assistant general managers	8
General superintendents	16
Assistant general superintendent	1
Division superintendents	38
Chief engineers	121
Assistant chief engineers	16
Principal assistant engineers	14

Chief engineers maintenance of way	6
Assistant chief engineers maintenance of way	5
Engineers of construction	14
Engineers maintenance of way	86
Bridge engineers	27
Engineer surveys	1
Division engineers	86
Assistant engineers	111
District engineers	13
Electrical engineers	2
Inspecting engineers	14
Supervising engineer	1
Architects	4
Locating engineers	3
Engineers track economics	1
Engineers track and roadway	4
Maintenance of way accountant	1
Engineers bridges and buildings	7
Office engineers	5
Chief draftsmen	4
General roadmasters	2
Roadmasters	16
Master carpenters	2
Rail expert	1
Superintendents bridges and buildings	9
Supervisors	2
Resident engineers	36
Signal engineers	18
Assistant signal engineer	1
Managers timber department	6
Chief timber inspector	1
Foresters	3
General foreman water works	1
Supervisor materials	1
Chemists' and engineers' tests	4
Metallurgical engineers	4
Professors in colleges	19
Associate professors	16
Civil engineers	50
Consulting engineers	89
Contracting engineers	13
Engineers grade elimination	4
Purchasing agent	1
Receivers	3
Editors	3
Inspectors maintenance	3
Masonry engineer	1
Assistant superintendents	2
Engineers valuation	2
Drainage engineer	1
General agent	1
Engineer water service	1
Municipal engineers	6
Commercial engineer	1
Miscellaneous	5
Total	1,030

THE USE OF DYNAMITE IN TRACK DRAINAGE.

When giving consideration to the best ways and means for improving track drainage, certain new methods of draining and ditching with dynamite which have been successfully applied lately in land reclaiming operations are of interest. In this work, two comparatively new principles are applied.

By taking advantage of the fact that water and wet ground are excellent conductors of the detonating wave, ditches may be dug with dynamite at a low cost and with a minimum of labor when conditions are favorable, because it is necessary to prime only one charge, no matter how long a ditch may be blasted.

When draining swamps, ponds and other low ground by the dynamite method, the impervious subsoil which is responsible for holding the surface water is so shattered and broken by blasting it in a few places that surface water will sink into the earth and flow away along natural underground drainage channels.

Ditches can be blasted through comparatively open and dry soils, but here it is sometimes necessary to prime each charge and accordingly increase the expense somewhat, though this is offset to a certain extent by spacing the charges farther apart.

The cheapest ditches may be blasted through wet clay when water covers the surface or rises almost to the surface in the holes which are punched for the charges of dynamite. Here only the middle charge of the long line is primed, but little labor is required to punch the holes and no tamping of the charges is necessary, as the water serves this purpose. One row of charges is sufficient to blast a ditch 5 to 7 ft. wide, while two parallel rows are necessary for ditches 8 to 14 ft. wide and three rows for those from 16 to 20 ft. wide. The rows are spaced from 2 to 4 ft. apart and the holes in each row from 18 in. to 2 ft. apart. Sometimes the holes are vertical, but generally they are put down at an angle of 45 deg. to 60 deg. to the horizontal, all pointed toward the side of the ditch on which the material excavated is to be thrown and all put down to a depth about 6 in. less than the grade of the finished ditch. The material thrown out is not heaped up along the side of the ditch, but is spread by the blast evenly over the ground for some distance.

The charge in each hole is usually one 1¼ in. x 8 in. cartridge, weighing a half pound, of 50 or 60 per cent nitroglycerin dynamite. Old-fashioned nitroglycerin dynamite is said to be the only kind that can be depended on to transmit the detonating wave properly from charge to charge, as it is more sensitive than the modern brands having low freezing properties and other advantages. This makes it necessary to blast ditches only at those seasons when the earth, water and air are at temperatures higher than 45 deg. or 50 deg. F.

The middle hole of the row is charged last, a double quantity of dynamite being used in this charge, so that the initial detonation will be heavy. This is the only charge primed, and a No. 6 blasting cap and piece of waterproof fuse are used for this purpose. The effect of the explosion of this charge is transmitted to the adjoining charges in both directions and thus relayed almost instantaneously to the opposite ends of the ditch, the result being a perfectly formed ditch with all of the material cleaned out and spread over the adjoining land some distance away. If there is more than one row of holes, it is only necessary to prime the middle charge in one of the rows, but if the rows are spaced more than 2 ft. apart it is best to charge an extra hole between the primed charge and the nearest charge in the other rows.

In reclaiming land, ditches 20 ft. wide at the top and 5 ft. deep are said to have been dug with dynamite at a total cost of less than 10 cents per cu. yd. This includes all labor and explosive charges and is for a satisfactorily shaped-up and cleaned-out ditch. Smaller ditches from 3 to 4 ft. deep, 3 ft. wide at the bottom and from 5 to 7 ft. wide at the top usually cost about 2 cents to 4 cents per lineal foot. Among the great advantages of digging ditches with dynamite are low cost, minimum time and labor, no previous clearing necessary even when ditching through land covered with thickets, brush, trees, stumps or fallen timber.

Swamps and ponds are often drained permanently by fracturing and shattering with dynamite the impervious substratum under them. In this work, test or proving holes are first put down to determine the thickness of the clay stratum and what is under it. If the clay is thoroughly broken through in three or four of the lowest places and a little ditching done, many acres can often be permanently drained, the water all settling into the deeper strata through the

blasted sections. These places once properly opened, rarely close up again, the water flowing through them having more of a tendency to keep them open.

To blast these drainage openings, the charge of explosives should be located several feet above the bottom of the clay stratum if sand, gravel or other open material is under it. If the clay stratum is directly underlaid by rock, the holes should be bored down onto this rock, so that the explosion of the dynamite may open fissures between the clay and the rock or through the rock itself. The boring and charging of these holes is often done from roughly constructed rafts, a popular tool for the purpose being a Pugh blasting auger with rod or pipe extension. Gelatin dynamite, of the 40 per cent grade, in cartridges 1¼ in. x 8 in., is the explosive said to be best suited for this work, and the quantity required for each charge is naturally governed by the thickness and nature of the clay stratum. As a general rule, about seven of these cartridges, which weigh a little more than a half pound each, may be considered the approximate charge when the clay stratum is from 7 to 10 ft. thick. If it is 20 ft. thick, seventeen cartridges should be used, if 30 ft., twenty-five cartridges, and if 40 ft., thirty-five cartridges. The charges are always exploded electrically in this blasting, and specially waterproofed electric fuses should be used.

RELATIVE COSTS OF MAINTAINING ANCHORED AND UNANCHORED TRACK.

It is of interest to compare the cost of maintaining track which is anchored against creeping with similar track which is unanchored, whenever it is possible to secure accurate records showing these differences. An instance in which such records had been kept was recently found. In this case, fortunately, part of the stretch of track was anchored and part not anchored on the same line of railway and the several portions were adjacent to each other, thus insuring the same condition of traffic and roadbed.

The observations were made on three and one-half miles of double-tangent track running north and south, with practically no grade, light gravel ballast, 85-lb. rail and broken joints. The heavy traffic was northbound; consequently, all data are based on the northbound track, as the creeping tendency here was decided. This track had been put in service 14 months before, and one mile in the center of the stretch was anchored, leaving one and one-half miles on the north and one mile on the south end not anchored. Where the track was anchored, 640 anti-creepers were applied, two per rail length, opposite joints against opposite end of joint ties. The anti-creepers have received no maintenance and have shown no failure, although they had been in service 14 months at the time of inspection.

The character of the work done on the two pieces of track in 14 months is stated in the parallel columns below:

ANCHORED TRACK.	UNANCHORED TRACK.
Track resurfaced once.	Track resurfaced twice. Ties spaced twice. Rail driven back twice.

The total maintenance cost for the mile where the anti-creepers were applied, including the cost of anti-creepers, is as follows:

Cost of anti-creepers, 640 at 17½c each	$112.00	
Applying 640 anti-creepers at ½c each	3.20	
Resurfacing, 10 men working 16 days, at $1.55 per day	248.00	$363.20

The total cost of the next mile north of the mile where the anti-creepers were applied, subject to the same conditions of traffic, roadbed, etc., but unanchored, is given below:

Cost of resurfacing twice, each time 10 men, 16 days, at $1.55 per day. $248	$496.00	
Cost of respacing ties twice, each time 10 men, 17 days, at $1.55 per day, $263.50	527.00	
Cost of driving back rail twice, each time 10 men, 2 foremen, 6 days, at $1.55 per day, $111.60	223.20	$1,246.20

Showing a net saving in 14 months' time for one mile of track in favor of the anchored track of $883.

It will be noted that the original cost of the anti-creepers and of their application have been included in the first 14 months. These costs are properly chargeable over the total number of years anchors are in service, which in all cases is at least as long as the life of the rail on which they are applied. This would make the saving considerably greater than has been estimated. Furthermore, this maintenance cost does not include injury done to ties, spikes and joints, which was considerable where anchors were not applied, as the creeping had pulled the ties badly askew, bending or



Condition of Unanchored Track Seven Months After Ties Were Spaced.

completely destroying the spikes and often causing broken joints. Where the anti-creepers were applied, this wear and tear were hardly worth considering.

The above figures were obtained directly from the railway, and the roadmaster stated that he could have maintained this 3½ miles of track in better shape with three men less per year had he been allowed to anchor the balance.

This illustration is taken from a point where creeping has been severe, but cases are not infrequently cited where the use of 500 anchors to hold a crossing at an expense of



Condition of Anchored Track at End of Fourteen Months, During Which Track Had Not Been Touched.

$87.50 for the anchors, has held the crossing so that where formerly it was driven back every six weeks, after it was anchored, the crossing had not been touched for ten months, thereby saving the cost of the anchors in that short length of time because the crossing did not have to be driven back.

Most roads have some points of severe creeping, and it is now generally recognized that all double track creeps. Each year makes it more and more apparent that a double track road is not completely equipped as regards its track until it has anchored it against creeping. This not only prevents the rail moving, bending and kinking, but also allows the ties to remain on their original tamping, thereby holding the track in better surface.

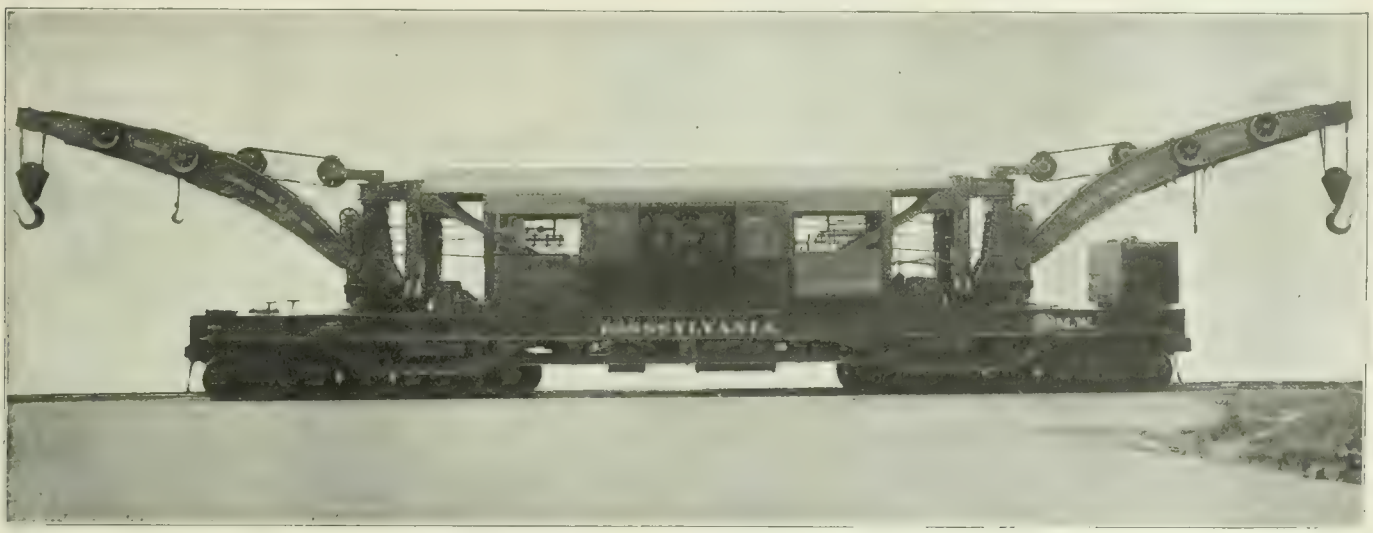
ELECTRIC WRECKING CRANE FOR PENNSYLVANIA TUNNELS.

The construction of the tunnels of the Pennsylvania Railroad under the East and North rivers at New York City has been followed with great interest, but the equipment of these tunnels has been an important matter and has involved radical departures from current practice. Among the new equipment installed is an electrically-operated wrecking crane. The peculiar requirements of the Pennsylvania terminals call for a crane to be electrically operated under all conditions, whether the third-rail is in service or not; and also to be able to operate with equal efficiency at either end. Practically no overhead room is available above the top of the rolling stock, and the right of way is confined so closely by the side walls that there is practically no room at the side of the tracks to work. It became evident early in the design of a crane to meet these requirements that the capacities desired and the manner of operation would call for a very heavy crane. It was therefore necessary to use the highest grade of materials throughout, lighten the construction thereby as far as possible and distribute the weight over as many wheels as consistent, arranged in trucks giving a long-wheel base.

While wrecks are never made to order, and hardly any two call for the same equipment, the possibilities of what might occur in case of derailment or accident in the tunnel have been carefully considered in the design of this crane There would seem to be no chance for the rolling stock to get far off from the rails, and regardless of the character of the accident, whether from broken axles or wheels, failure of the locomotive, or even from collision, it was believed that the same general plan for handling the crippled units would always be feasible. This plan is to carry on the deck of the crane one or more trucks which could be placed under the disabled car so as to bring it in safety out of the tunnel. To accomplish this, it would be necessary to raise up one end of the car or locomotive and, while holding it suspended with the main hoist mechanism, lower the spare truck on to the tracks by means of the auxiliary hoist and roll it in place, if this is possible. After this is done the plan would be for the crane to propel itself with whatever suspended loads were necessary and drag the broken cars or locomotive out of the tunnel to the terminal.

In practically every wreck it would be necessary to disconnect the third-rail at a point perhaps 500 to 1,000 feet away and provision is made in this wrecking crane to connect with the third-rail at this point, and thus be supplied with power as described later on.

The requirements outlined above were successfully met in the design and construction of the crane shown in the accompanying cut. The car is exceptionally heavy, approximately 61 ft. long, mounted on two sets of articulated trucks, so that each end of the car is mounted on 8 wheels, all properly equalized. The two ends of the car are duplicates, and at each end is mounted a curved boom made of structural material and of the same general shape as is used in standard wrecking cranes. This boom, however, is mounted on a structural steel "A" frame and mast, with roller and ball bearings of unusual size and design, and with manganese and vanadium steel bearing plates. These booms will swing to 90 deg. either side of the center, as described later on. The car body is supplied with swinging outriggers or jack arms, which can be readily hauled up out of the way. These arms cannot be used in the tunnel while the crane is at work, as the full capacity must be reached without their use. They are provided, however, for such further use as may be found for the crane in construction work and ordinary yard service. Machinery is all massed in the center of the car body and mounted in cast steel housings. The gearing for the various motions is practically duplicated for the two cranes described above, although contained in the same frames and performing the same functions for each crane. One motor of 250 h. p. is so connected to these trains of gearing that either end may be operated independently from the other end, or both may be operated together. The gearing throughout is all cut steel, and all of the brackets, drums and other parts are of the same material. Vanadium steel is very largely used in the shafting, gears and many of the forgings to reduce the weight and insure absolute safety under all conditions of service.



Electric Wrecking Crane for Pennsylvania Tunnels.

In addition to the main hoist, which controls the heavy lifting block, there is a fast-running auxiliary line with arrangements in the boom so that this line may be dropped down in any one of three places. This is necessary owing to the fact that the boom cannot be raised to any height when in the tunnel. Winch heads are also provided on both sides of the frames, operating independently of the two drums, and with arrangements on the booms so that the lines may be run down at any one of four points. With these three methods of hoisting, a great variety of operations can be effected, as the clutches are so arranged as to make each motion independent of the others. Swinging the booms with their suspended loads is effected by means of a train of cut steel spur and bevel gearing, thrown in operation by means of double friction clutches. The arrangement is such that swinging may be done in either direction regardless of the direction of the rotation of the motor.

The propelling feature of the crane is an extremely important one, as the crane must handle itself under full load

in the tunnel and, if necessary, move out into the terminal with loads suspended from it. The capacity requirements of the propelling feature are that it shall be able to travel at a rate of three miles per hour up a 2 per cent grade with 65 tons hanging suspended from the boom, and pulling in addition to this a load of 83 tons. This specification would enable the crane to take out successfully a crippled locomotive unit or any piece of rolling stock. To accomplish this, a train of vanadium steel gearing is connected from the main 250 h. p. motor to the inside axles of all of the four trucks, two at each end of the car. To allow proper equalizing, the swiveling of the four trucks required a somewhat elaborate design, which, however, has worked out successfully in practice. This gearing can be readily disconnected by means of a lever arrangement so that the crane can be hauled at high speeds.

It will be readily appreciated that with so many motions to be cared for and such a large amount of machinery, the lever arrangement must be carefully designed and constructed so as to avoid unnecessary complications and enable the operator to put the crane through all its functions with ease and certainty. The arrangement provided is such that there are two locations for the operator, one for each end of the crane, each system being complete for that particular crane.

The main motor, operating all of the motions described above, is controlled by a master switch, which operates the main contactors on the switchboard. Dynamic braking is also provided so that the motor may be quickly stopped as desired, and there is sufficient resistance in circuit so that the motor may be run indefinitely at a very slow rate of speed, and thus give better control for all of the motions

All of the clutches are operated by air cylinders, located in close proximity to the clutches themselves, so that it is only necessary to lead the piping to a bank of three-way and four-way valves conveniently located for the operator. This system has been found very satisfactory, and as the clutches can be handled with ease, the operator is greatly assisted in performing his work expeditiously and accurately. An engineer's valve is also provided, operating the air brakes of the car, so that the whole equipment is entirely under the control of the engineer.

To provide necessary air for operating these clutches, and also for operating the braking system on the trucks, an electric air compressor is installed, controlled automatically, and with a large reservoir to give ample supply for the purpose.

As indicated above, the crane is ordinarily operated through the third-rail, ordinary locomotive type of contact shoes being supplied for this purpose. When the rail is dead, however, as is usual in the case of a wreck, connection is made to the circuit by means of an extra flexible cable, 1,000 ft. of which is wound on a drum located on the car body and can be led off down the side of the tunnel through suitable fiber-lined guide sheaves. This system is operated automatically by means of a motor, so wound and so connected to the drum by means of suitable gearing that a constant torque is exerted on the drum at all times. By this means the cable is paid out or wound up on the drum automatically, as the case may be; or, if the crane is standing still, the winding motor remains stationary but with current still on it. The winding and resistance are such that no injury is done by this plan of operation. To avoid abrasion of the insulation of the cable when winding on and off, an automatic device is provided which shall wind the cable on evenly and prevent one layer climbing on another. The above arrangement is very necessary in practice and is convenient and efficient.

The capacities of the crane vary, depending on the position of the boom and the conditions of operation; but for work within the tunnel it is impossible to swing the booms farther than 15 deg. to either side of the center, so that the most important capacities are those within this range.

A portable counterweight, intended to be handled by the boom not actively in service, is provided, which materially lightens the wheel loads and brings them within the limits required by the specification. This counterweight is not required except in extreme cases, however.

Capacities 15 deg. each side of center of track: Without counterweight, main hoist, 40 tons at 22 ft. 6 in. radius; auxiliary hoist, 15 tons at 17 ft. 6 in. radius; with counterweight, main hoist, 50 tons at 22 ft. 6 in. radius; auxiliary hoist, 15 tons at 17 ft. 6 in. radius.

In each case both of the above loads may be handled or carried suspended at the same time.

Capacities up to 90 deg. each side of center of track: Without counterweight, main hoist, 45 tons at 17 ft. radius; with counterweight, main hoist, 50 tons at 17 ft. radius.

The above capacities are all given without the use of any jack beams or other side support.

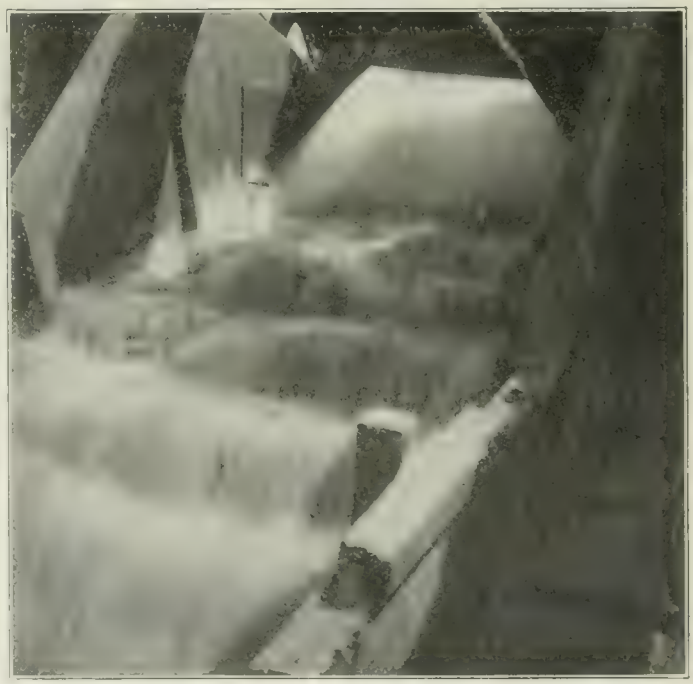
The total weight of this crane in working order is 326,000 lbs., the axle loads being arranged so that under maximum working conditions the load on any axle shall not exceed 74,500 lbs.

The crane was built by the Industrial Works, Bay City, Mich., and was thoroughly tested before shipment.

GRAVEL WASHING PLANT OF THE RICHMOND, FREDERICKSBURG & POTOMAC AND WASHINGTON SOUTHERN.*

By S. B. Rice, engineer maintenance of way.

About the time the double tracking of the Richmond, Fredericksburg & Potomac and the Washington Southern had been completed in the latter part of July, 1907, the officials were discussing the matter of using stone ballast to make the line first-class in every respect, as it is a through trunk line between Richmond, Va., and Washington, D. C., with a very heavy traffic. An average of 24 through passenger and 10 local trains are handled daily during the heavy season and an average of 20 through passenger and 10 local trains daily during the light season, the through trains consisting of from six to twelve cars and the local trains of from four to five cars. We also have an average of 20 freight trains daily throughout the year. The weight of the heaviest engine is 156,730 lbs. on drivers; and the total weight, 373,200 lbs.



Ballast and Water Passing Over Bars.

About this time a heavy deposit of very excellent gravel was discovered at Massaponax, Va., 57 miles from Richmond and midway between that point and Washington. The gravel lies in a bed from 10 to 20 ft. in depth, about 800 ft. wide and 4,000 ft. in length. The pit was estimated

*From report of committee on ballast in bulletin 141 of the American Railway Engineering Association.

to contain about 1,000,000 cu. yds. of serviceable material, and was opened on August 22, 1907.

The pit-run gravel from this pit was used on portions of our track and made an excellent track, but in dry seasons it was found to be very dusty, and in wet spells the track became sloppy. In the latter part of 1907 we conceived the idea of washing and screening this material, as was done by the Lake Shore & Michigan Southern at Roupel and Pleasant Lake. In July, 1908, W. D. Duke, assistant to president; S. B. Rice, engineer maintenance of way, and E. M. Hastings, resident engineer, made a trip to the Roupel plant to look into the advisability of duplicating this plant, also to inspect track that had been ballasted with washed gravel. Mr. Duke was so much pleased with the condition of the track and plant that he at once recommended the installation of the washing plant at Massaponax at the earliest possible time. The authority for this work was given in the latter part of July, 1908. Work was at once started on this plant and pushed as rapidly as possible to have it completed before bad weather set in. The first shipment of washed gravel was made on November 20, 1908.

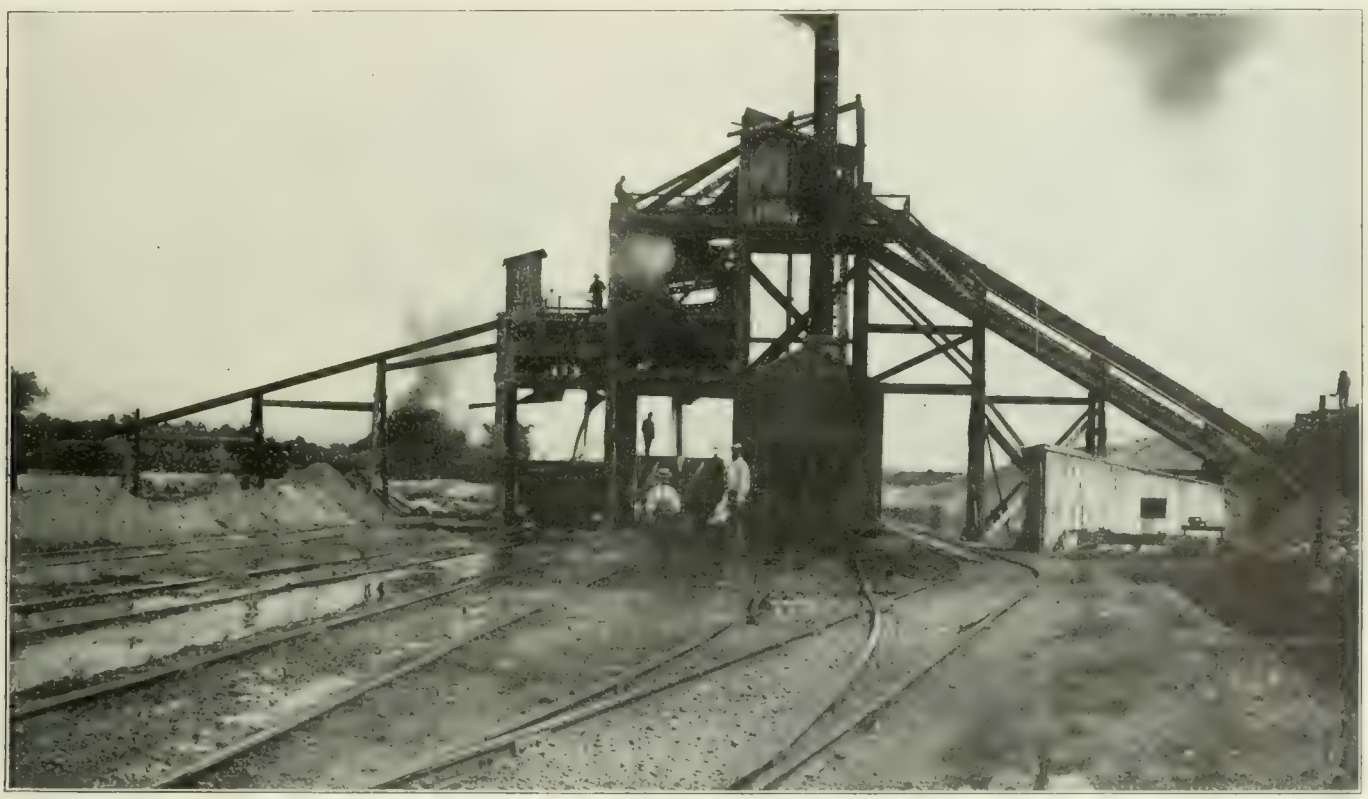
The plant consists of a large concrete hopper into which the pit-run gravel is dumped and from which it is carried by a pan conveyor having a speed of 30 ft. per minute, or 120 to 150 cu. yds. per hour, on an incline of 30 deg., to the top of the trestle some 45 ft. high, where it is discharged into a steel-lined box, 6 ft. by 3 ft. in plan and 1 ft. deep in front, or at the chute. The water is discharged from a flat nozzle, 1 in. wide and 24 in. long, connected to a 6-in. discharge pipe, and strikes the gravel as it falls into the box, washing it over a steel-lined chute, 6 ft. wide and 8 ft. long, with a slope of 3 in. to the foot. It was found necessary, in order to more completely wash the gravel, to place a series of rods across the chute, making the gravel tumble over them, thereby retarding its progress and obtaining a more complete washing.

At the end of the chute a double screen is placed at an angle of about 45 deg. with the chute. The screens are about 9 in. apart, and are of double-crimped tool steel wire. The first screen is of No. 6 wire, one mesh to the inch; the second of No. 10 wire, two meshes to the inch. All gravel that does not pass these two screens falls into the ballast bin, which is 36 ft. long, 12 ft. wide and about 12 ft. deep. The lower 6 ft. of this bin is sloped toward the center, so that the gravel will fall by gravity through the openings in the bottom.

All of the material which passes these two screens along with the water falls upon a second steel-lined chute which is 8 ft. wide, 9 ft. long, and has a slope of 2 in. to the foot. From this chute the material is discharged against another screen of double crimped tool steel wire No. 12, four meshes to the inch. This screen takes out practically everything larger than ⅛ in. in diameter. All material which does not pass this screen falls into the ballast bin also.

The material passing the screen is carried over another steel-lined chute about 10 ft. wide and 7 ft. long, where it is discharged as sand into a settling tank about 12 ft. by 13 ft. and 3 ft. deep. On the side of the tank opposite this chute is the waste flume where the muddy water is carried off and discharged on the bed of gravel where the gravel had been previously excavated.

The settling tank is water-tight and is fitted at the bottom with two conical steel hoppers, 6 ft. in diameter at the top and 10 in. in diameter at the base, 5 ft. deep. The bottoms of the steel cones are fitted with a steel cone plug which makes them nearly water-tight. The plugs or cones are operated from the top. The idea of having two of the conical hoppers was to grade the sand, the coarse sand settling in the first hopper and the fine sand in the farther one, there being a distinct difference in the two grades of sand. For this sand we have found ready sale, as it is of excellent quality for building purposes and concrete work, the finer sand making excellent engine sand.



Loading Both Sand and Ballast at Gravel Washing Plant.

The ballast bin is steel-lined throughout and has three openings at the bottom, fitted with 20-in. by 20-in. rack and pinion valves, spaced so as to empty into the center and two ends of the ballast car, giving a uniform loading without necessitating the moving of the car. The material is distributed in the ballast bin about equally over the three openings.

The water is brought from Massaponax creek through a gravity canal, 900 ft. long, to a concrete-lined well, 7 ft. by 5 ft. and 11 ft. deep; the bottom of the well being 4 ft. lower than the creek at the intake. This canal is a 20-in. by 20-in. open wooden flume for 500 ft. where it runs into a 20-in. by 20-in. wooden box, covered by some 8 ft. of earth. This box is about 370 ft. long. Connection is made with an 18-in. terra cotta pipe, which runs under the engine foundation and the pull-out track into the well, which is located close to the engine; this flume is always submerged. The pump is an Emerson No. 4 pump, with a 6-in. suction, and is rated for a 5-in. discharge. The rated capacity is from 800 to 1,200 gal. per minute. To overcome friction it

was fitted with a 6-in. discharge. The steam is furnished by a 90 h. p. return tubular boiler, which is under the same roof as the engine and pump. There is also a No. 5 pulling pump, rated at 350 gal. per minute, to pump water into a 25,000 gal. tank about 1,400 ft. distant, for the use of ballast and spotting engines. This tank is located on the pull-out track, just north of the coal bin. At this point office and bunk houses are provided for both white and colored help, the bunk houses being separated. Steam shovel and spotting engine crews are provided with both lodging and board.

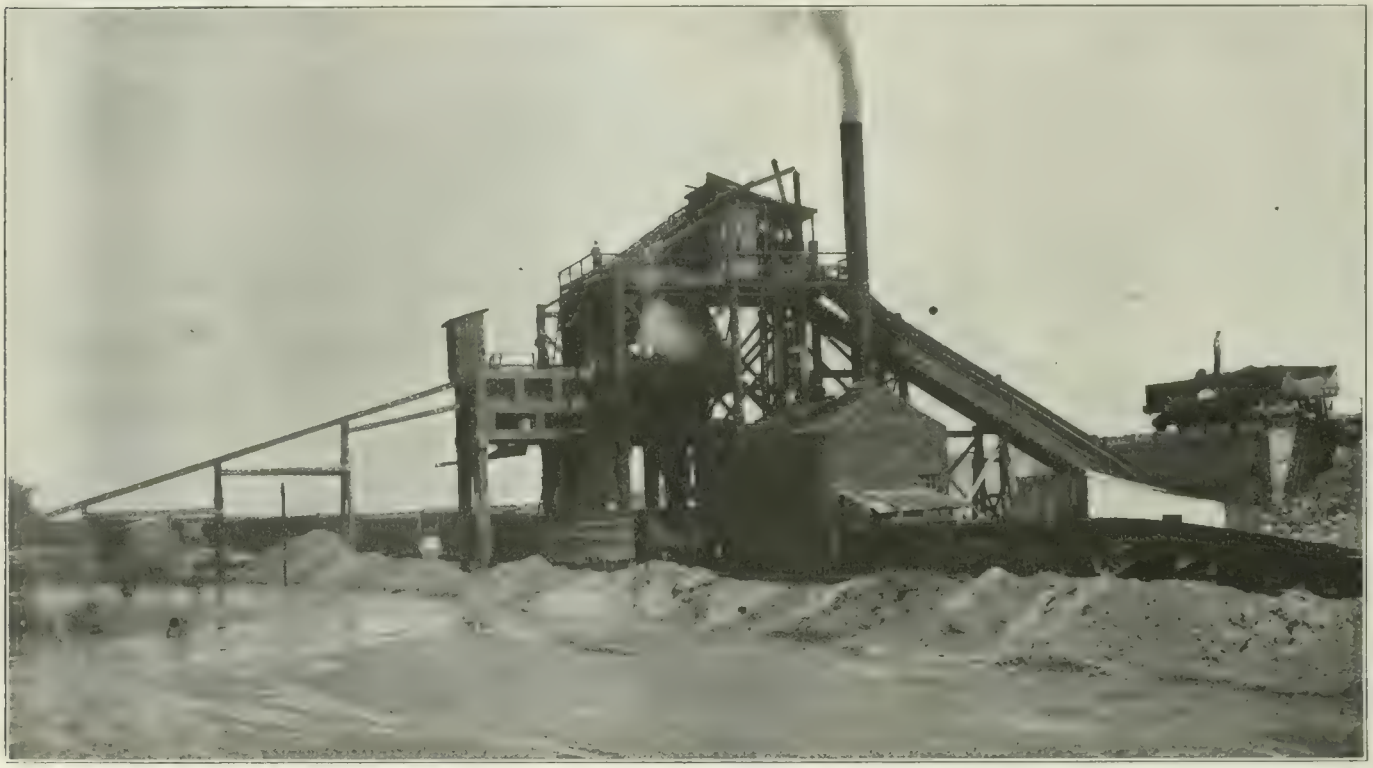
The concrete hopper, into which the pit gravel is dumped preparatory to washing, is 18 ft. above the foundation, 36 ft. long and 12 ft. wide inside, the outside walls being 2 ft. thick. The inside of the hopper slopes from the top on all sides toward the center opening, which is 18 in. by 20 in., and provided with a steel sliding door which governs the feed on the conveyor. The slant sides of the hopper are 6 in. thick, reinforced with from ½ to 1½-in. iron rods, spaced 18 in. on centers and bent over into the 2 ft. outside walls. They are fastened together with ½-in. rods spaced about 12 in. apart. The track on the hopper is carried on 12-in. by 14-in. wood stringers, one of which is immediately over the outside wall, the other carried on 12-in. by 14-in. cross stringers, spaced 6 ft. center to center, and imbedded in the outside walls. The track over the hopper is fitted with a bar screen, bars spaced 4½ in. apart, so as to prevent roots, stumps, boulders, or large lumps of clay from being carried to the washing plant.

The approach to the hopper is on a 2 per cent grade ascending, to a point 150 ft. from the end of the hopper, thence on a 1 per cent descending grade, over the hopper, after which is breaks into a 2.5 per cent descending, then to a 5 per cent descending grade for about 150 ft., then to an 18 per cent ascending grade. At the junction of the 5 per cent and 18 per cent grades a spring switch is located, the track leading away from the switch being on a descending grade to the pit level, the idea being to do most of the shifting by gravity. After being pushed up the 2 per cent approach to the hopper the loaded cars are unloaded, dropped down the 5 per cent grade by gravity, and up on the 18 per cent grade which gives them a kick back through the spring switch and down to the pit level, where they are taken by the engine to be reloaded.

It is intended to cover the 112 miles of double track with washed gravel, thereby securing a dustless roadbed. In order to accomplish this new grades were given, making a lift in track from 3 to 16 in., taking out some slight sags. Of course, where the track was lifted as much as 6 in. the old ballast could be worked under the ties, but at the other points the old sand and gravel ballast was thrown out to make roadbed. Ballast was loaded into the Rodgers drop bottom ballast cars and delivered in the track, using a Rodgers plow for leveling down. This work was carried on by an extra force, renewing all ties that were not good for two years, regaging track and properly spacing ties ahead of new ballast. The renewal of ties and regaging was charged to maintenance; surfacing track was charged to reballasting. It required from 3,200 to 3,800 cu. yds. of gravel to the double track mile. The force employed at the pit consists of the following: One general foreman, one clerk, one shovel engineer, one craneman, one shovel fireman, four men at shovel, one engineer in charge of plant, one towerman who operates the machinery at the top of the plant, also looking after the screens, one foreman on hopper, one hopper and two helpers, one sand loader, one gravel loader and two droppers of cars. In addition to this there are three men on cars closing them up and calking and getting them ready for sand. Shifting track is generally done by the section force and is, of course, charged to pit expense.

Since the starting of the washing plant 371,877 cu. yds. of washed gravel have been shipped, of which 354,439 cu. yds. were used for ballast and 17,438 cu. yds. for concrete and other purposes. From this total amount of gravel has been taken 78,232 cu. yds. of sand, most of which has been sold for building purposes. Of course, the hauling of this has been revenue to the company. The cost per cubic yard of loading rough gravel was 8.95 cents; cost per cubic yard of washing gravel, 11.34 cents; cost per cubic yard for hauling, 11.11 cents; cost per cubic yard for placing in track, 26.15 cents; or a total cost of 57.55 cents per cubic yard of finished track. This cost includes hire of all engines, train crews, coal and supplies; rental of shovel, coal, supplies and repairs; 1 cent per cubic yard to cover cost of gravel in pit and 10 per cent depreciation on plant and tracks; but no credit is taken in these figures for sand sold.

We have found by actual test that the washed gravel is nearly self-draining; it will not retain over 11½ per cent of water, while the pit-run gravel will retain 55 per cent. It has been demonstrated that the washed gravel will withstand any amount of continued rain and not slop, while the pit-run would, causing rough track in continued wet spells. Aside from the better condition of track we estimate to add at least two years to life of the ties. It makes a dustless roadbed and reduces the cost of maintenance.



View of Gravel Washing Plant, Showing Gravel Car and Hopper.

At the Coliseum

A NOVEL CALCULATOR.

A unique adaptation of the principle of the slide-rule as a labor-saving device for hydraulic and structural engineers is on exhibition by the Des Moines Bridge & Iron Co., at the Coliseum. Given any loading on any span, the required section may be determined by a simple operation of the calculator. The proper thickness of steel plates for tanks, boilers and pipes subjected to any pressure or head of water may also be ascertained by means of this device.

The calculator is made of a cardboard slide, working in a celluloid envelope or sleeve. One side is used to show the proper sizes of Bethlehem or standard beams and channels, used singly or in multiple, for any system of loading and for a considerable range of spans. The other side is employed for calculations in designing stand-pipes, tanks and boilers. A typical stand-pipe calculation is made as follows: Setting the calculator for the known head of water and diameter of pipe, the necessary thickness of plate may be read direct for any assumed unit stress and joint efficiency, tables for the latter being shown.

The Des Moines Bridge & Iron Co. also shows a slide-rule which is designed for a number of special uses. As an example of what may be done with it, the total weight of 25 plates 42 in. x ¼ in. x 15 ft. 6 in., and, if desired, their value at $1.20 per cut may be obtained at one setting.

IMPROVEMENTS IN THE ROCKFORD MOTOR CARS.

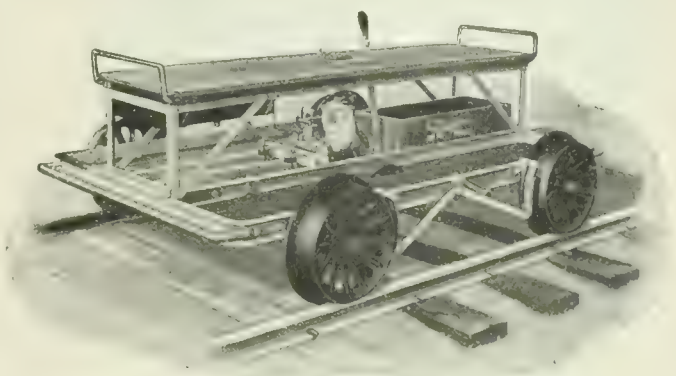
The development of the Rockford motor car has been continued steadily by the manufacturers, the Chicago Pneumatic Tool Company, Chicago, and a number of important improvements have been added recently.

One of these is the use of steel frame construction. These cars have been built with this type of construction for about eighteen months and it has been found that this is more satisfactory for service than the old-fashioned wooden frame. The Rockford cars were originally built with wooden frames; and, while they were satisfactory, it was found that long service tended to loosen the frames and get the working parts out of alignment. With the idea of remedying this the makers decided to build the frames of steel channels. The first frames put into use were riveted together and, while they were found to be much stronger and more satisfactory than the wooden frames, they were not perfect because it was found to be practically impossible to so rivet the frames as to prevent them from gradually loosening. It was then that oxy-acetylene welding was applied to the building of the frames, and it was soon demonstrated that this would overcome the former difficulties. Being one solid piece, the frame cannot shake loose in service, and will hold the working parts of the car in perfect alignment for the full life of the car. Its use also enables the cars to be built with lower and more easily accessible platforms and longer wheel base than formerly. The frame takes up less space and materially lessens the number of pieces used for the platform. For the No. 4 and No. 5 cars 3-in. channel is used for frames, while 2-in. channel has been found amply strong for the No. 2 or inspection car.

Another improvement has been made by the adoption of a new connecting rod. This rod has a pocket formed near the crank end of the rod are die cast babbitt, and a slot lubricating oil when the car is in use. The bushings on the crank end of the rod are die bast babbitt, and a slot is left in one bushing. Two holes are drilled through from the chamber containing the oil into the slot in the babbitt bushing and a felt wick is inserted to carry the oil from the chamber to the bearing surfaces on the bushing, thus providing a positive lubrication for this bearing. All the operator of the car has to do is to see that there is oil in the chamber, which has a knurled and slotted plug easily removable for filling and easily accessible to the operator. The chamber in the rod is large enough to hold an amount of oil sufficient to amply lubricate the bearing for 300 miles of travel. On test it is claimed that Rockford cars equipped with this type of connecting rod have run as much as 330 miles on one filling of the oil chambers.

This manner of oiling does away with the necessity of using oil cups on the connecting rods, and provides a more simple and reliable lubrication for the bearing. The chamber in the connecting rod holds two or three times as much oil as the average connecting rod oil cup and consequently requires filling less frequently. It cannot waste the oil; every drop put into it is fed to the bearing, and there is no possibility of breakage in ordinary service. It feeds the oil continually from the inside outward to the bearing and this tends to wash out any dirt, grit or other such matter as might work into the bearing from the outside. The oil pocket has a drain plug on the lower side which is easily removed at any time, and which enables the user of the car to flush out the pocket and drain off any dirt which might have been in the oil. No grit, dirt or any sort of foreign matter can reach the bearing surface from the oil pocket because it cannot pass through the oil wick.

The application of gears to the driving of the cam shaft on the engine which propels the Rockford cars is another recent development. Having the engine direct connected



New Rockford Motor Car.

to the drive axle of the car, these cars have never used chains for any purpose except for driving the cam shaft, and the substitution of gears and shaft for this drive consequently does away with all necessity for sprockets and chains on the cars. The cam shaft of the engines is now driven by spiral gears and an intermediate shaft. The gears and shafts are entirely enclosed and run in oil, insuring lubrication and protection from water and dirt, and it is claimed that there is no possibility of the car getting out of time because of wear.

The gear driven cam shaft is now in actual service on a large number of cars, and it is stated that it has been found to be entirely satisfactory in every respect. On the older types of Rockford section cars some trouble in connection with chain driven cam shafts was experienced owing to the fact that the distance between centers was considerable, and it was absolutely necessary that the chain remain tight. Wear on the chain and its consequent elongation resulted in throwing the car slightly out of time when run in a reverse direction and thus prevented the engine from operating at its maximum efficiency. With the gear driven cam shaft this cannot happen, and much more service can be gotten from the car without replacements.

A fourth development is the adoption of the magneto ignition which is now being applied to these cars. The manufacturers have been putting out their cars equipped

with high tension magnetos for several months and find that the demand for cars with such ignition is much greater than that for battery ignition equipment, and is constantly increasing.

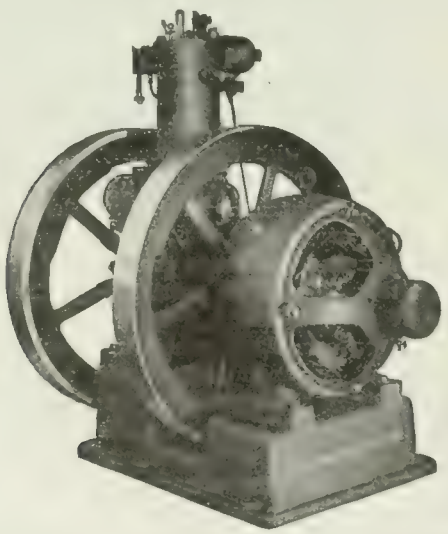
The application of the magneto to the Rockford car permits its makers to eliminate entirely dry cell batteries, spark coil and timer; and to have the whole ignition system in one unit. They use a magneto of the high tension type which is operated by a double throw cam on the cam shaft of the engine. This magneto is simple in design and operation, does not require the use of either a switch or a timer and has no electrical contacts. It requires no adjustments—in fact has no parts which can be adjusted—and produces a very hot spark which is quite independent of the speed of the engine. The strength of the spark, and its consequent ignition value, is the same at any speed at which the car may be running. The magneto has only two parts which can be said to be subject to wear at all. On test one of the magnetos was run 5,000 miles on a No. 4 Rockford car without showing any appreciable amount of wear on any parts.

The working parts of the magneto are all entirely enclosed, making the whole ignition system both dirt and water proof. The space taken up by the magneto is approximately 10 in. x 6 in. x 3 in. and its weight 12 lbs. It is a cost reducer, as the necessity for the constant buying of dry cells for battery replacements no longer exists and the usual item of spark coil repairs is also eliminated. The magneto is so located as to be easily accessible to the operator of the car at all times.

OIL ENGINES.

Fairbanks, Morse & Co., Chicago, have an innovation at their exhibit at the Coliseum this year, in that they have two engine outfits running under their own power. Both of these engines are interesting to railway men because they show a new way to "Economy" in railway maintenance and operation.

Not many years ago, the internal combustion engine to operate on gasoline was advocated as being more economical for power plants, pumping stations, charging outfits, etc., than steam, and its rapid adoption proved the manufacturers' claim. Gasoline then was cheaper than now, due principally to the present extensive use of automobiles. The manufacturer, looking ahead, saw this coming, and the result is the "oil engine."

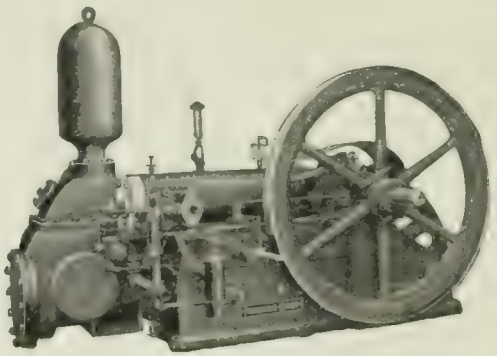


Fairbanks-Morse Combined Oil Engine and Pumper.

The generating outfit consists of a nine H. P. special electric oil engine, vertical type, direct connected to a 5½ K. W. generator. This is a straight oil outfit, starting and operating on oil, but it will operate also on gasoline, kerosene, naphtha, or any of the lighter distillates. The outfit is being used for additional lighting at the Fairbanks-Morse exhibit.

The 10 H. P. combined engine and pump is operating on the same oil as the generating outfit, and is pumping water from a large tank in the basement of the Coliseum, discharging it back into the tank.

The water supply is one of the most important questions in railway work. Locomotives must have water, no matter what the cost, and the management must get an adequate supply at the least possible expense. The gasoline pumping engine has saved thousands of dollars in water station expense, and it is claimed that the oil pumping engine will save even more. Oil suitable for use in these engines can be purchased in most any part of the United States at from two cents to four cents per gal., in tank car lots. Comparing this with the cost of gasoline makes the saving that can be accomplished at once apparent. A varied assortment of the oils is shown at the exhibit, and the localities where they can be purchased are given.



Fairbanks-Morse Type T Special Electric Oil Engine, Direct-Connected to Fairbanks-Morse Dynamo.

SELF-CLEANING TANKS.

The Chicago Bridge & Iron Works, during the past year, have brought out an all-steel tank, designed especially for locations where the water contains a large amount of sediment.

The tank illustrated was built for the Chicago & Northwestern at Boone, Ia. It has a combined conical and ellipsoidal bottom with a conical mud drum. The whole tank tapers down to the bottom of the mud drum, where the blow-off valve is located, and there is no possible chance for any accumulation of sediment elsewhere. Instead of emptying the tank to clean it, all that is necessary is for the operator to turn the handle of the blow-off valve. It is claimed



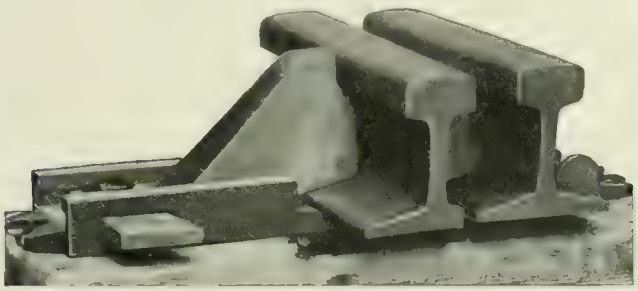
Self-Cleaning Tank.

for this tank also that it has the advantages of an all-steel construction with no wood frost casing, viz., long life and low maintenance charges.

CRANE GUARD RAIL RETAINER.

The Crane guard rail retainer is a new device which seems to receive considerable favorable comment. It is a departure from the clamp type of retainer, in that it is an adjustable brace tie plate. It has been in trial in the track under severe conditions for the last four or five years. However, during the past twelve months, special attention has been devoted to the development of this guard rail retainer into a shape permitting its marketing under advantageous conditions as to durability, strength and price.

The device is very firmly constructed, and consists of five large parts. It has no bolts or small delicate parts to break. The tie-plate portion is banjo-shaped and provides a large wearing surface for the traffic rail and a smaller wearing surface for the guard rail, which carries no direct vertical load. Heavy jaws grasp the outside edge of the traffic rail and substantial ways, or guides, are provided to retain the brace, which bears against the inside of the guard rail. Suitable spike openings are provided in the plate to spike it to the tie outside the traffic rail and also at the point inside the guard rail, thereby fastening the plate to the tie independent of any of its adjustable portions. It is possible, if desired, to lag-screw the plate to the tie, and this method of attaching it is recommended as one which will add to the life of the tie and in general increase the ability of the plate to properly perform its purpose. Through the ways near the end of the smaller portion of the plate are provided openings in which the wedge is driven to force the brace against the guard rail, locking the whole device into proper working position.



Crane Guard Rail Retainer.

The brace which operates in the ways on the plate is a substantial malleable iron rail brace of approved design. The foot portion of the brace beyond the rail is formed at a proper angle to act in conjunction with the adjusting wedge. The adjusting wedge is a simple piece of malleable iron provided with three spike openings and a wedging surface formed to act with the wedging surface provided on the brace above mentioned. By means of the three spike holes in the wedge and the two spike holes provided in the tie plate, it is possible to obtain four adjustments of the guard rail as its head wears. The usual adjustable chocks are provided, except that the serious objection of these chocks jarring out of their place under vibration has been overcome by providing them with exceptionally deep teeth and with a simple means of anchoring to the tie plate.

The study of the device set up in place reveals it as a slight departure from the old non-adjustable method of fastening a guard rail in place by means of rail braces and bolts, as well as combining the desirable features of a heavy tie plate and a strong clamping device reinforced by the heavy switch timber.

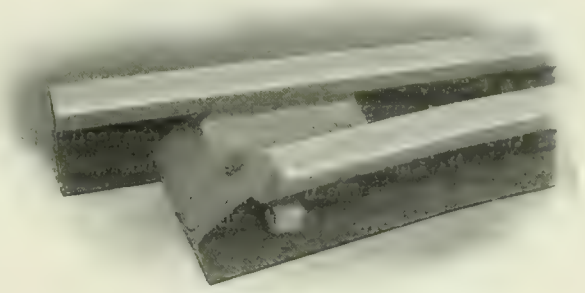
The Crane guard rail retained is simple to put into service. The tie plate is firmly seated on the tie, as any tie plate is. The brace, wedge and chocks are applied in the only manner it is possible to apply them, the whole device being tightened up and spiked home. When only one retainer is used to hold a guard rail, it should be placed substantially opposite the point of the frog. When two are used they should be spaced on either side of the frog point along the track about that distance from the point in either direction.

Every part of this device is made of malleable iron, heavily and substantially designed. It is made by the P. & M. Company, Chicago, and is on exhibition at the Coliseum.

TWO NEW GUARD RAIL CLAMPS.

A very large portion of guard rail troubles arise from insecure and poorly held guard rails. While the proper design of the guard rail itself is of the utmost importance, it is essential that it be rigidly held in position with the required throat, or, to be more exact, to the proper distance from the opposite frog point.

An easy and economical method of meeting these requirements is by means of a good, strong, adjustable guard rail clamp. The two clamps here illustrated are die forged from a single piece of 1¾ in. x 3½ in. wrought iron and aside from their strength and simplicity, there being only four parts in each, they have the additional advantage of being so designed that they can be readily placed in position and tightened up to any required throat without disturbing the guard rail itself,—a point of considerable merit and one that simplifies the application of the clamp, particularly where they are applied to guard rails already spiked in position, as is frequently the case.



Adjustable Guard Rail End Block.



Detector Bar Clamps.

These clamps are made in two forms, "Standard" and "Detector Bar." In the standard clamp the metal of the clamp proper is forged to fit the fishing and in addition is carried up outside the head to within about ¾ in. of the top,—a feature which gives a strong grip on the rail.

The detector bar type is, as its name implies, especially designed to permit its use in interlocked or signal territory where detector bars are employed, and while the clamp on the stock rail side is necessarily depressed to clear the detector bar, the strength is maintained by spreading or flaring out the metal to a width of over three inches and in such a way as to give an accurate fishing fit.

It is claimed that one clamp at the center of an 11-ft. guard



Standard Guard Rail Clamp.

rail is all that is required, especially if adjustable cast blocks are used at each end. These blocks act as foot guards, besides adding to the strength and rigidity of the guard rail, and by a simple method of staggered holes, can be readily adjusted to give any required width of throat.

The two clamps described above in connection with the standard 11-ft. guard rail with adjustable end blocks are manufactured by the Morden Frog & Crossing Works, Chicago, and may be seen at their exhibit in the First Regiment Armory.

SCHERZER ROLLING LIFT BRIDGE.

The advantages and economy of the Scherzer rolling lift bridge are illustrated by the recently completed bridge of the Scherzer type across Rainy River at Pither's Point, for the Duluth, Rainy Lake & Winnipeg railway. The general design of the movable bridge and approach spans is shown in the accompanying drawing, while the photograph shows a view of the completed structure.

After making a very careful comparative study of the cost of a center pier swing bridge and of the Scherzer rolling lift bridge, the railway decided to adopt the Scherzer bridge, as it not only involved a less expenditure for construction, but also a less expenditure for maintenance and operation. The center pier swing bridge would have to be long enough to span two channels, although one channel is all that is required for navigation. This effected a large saving in structural steel. A further saving is effected because only a partial opening of the Scherzer bridge is required for the maximum size vessels navigating the river, this advantage resulting in a considerable saving in machinery.

The structure consists of a simple truss to which is directly and rigidly attached the segments or rockers characteristic of the Scherzer type of bridge, the counterweight to balance the structure being plain concrete encased in a steel box, also firmly and rigidly attached to the segments and trusses—the entire movable structure forming one piece. The Scherzer rolling lift bridge is operated by rolling forward and backward on smooth and level tracks. The friction is so slight and the balance so perfect that the bridge can easily be operated by hand power. The rail lifts and end lifts necessary with the center pier swing bridge are entirely dispensed with in the Scherzer rolling



Scherzer Rolling Lift Bridge Across Rainy River for the Duluth, Rainy Lake & Winnipeg.

lift bridge. The rails are firmly and rigidly attached to the movable bridge structure.

The Scherzer Rolling Lift Bridge Company of Chicago, Albert H. Scherzer, president and chief engineer, furnished the designs, plans and specifications for the bascule span, and maintained a general consulting engineering supervision over the construction and erection of this portion of the bridge, the entire work being in charge of H. T. Hare, chief engineer of the Duluth, Rainy Lake & Winnipeg Railway.



General Plan of Scherzer Rolling Lift Bridge Across Rainy River at Pither's Point; D., R. L. & W.

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AT THE COLISEUM 657

The committee on Water Service has devoted considerable study during the past two years to the subject of concrete water tanks and presented general plans for the design of these tanks in its report. The American Railway Bridge and Building Association has also gone into this subject, and a very complete report was presented at its convention in St. Louis last October. This latter association very wisely did not attempt to duplicate the work being done by the American Railway Engineering Association, but rather devoted its attention to describing tanks already erected and the service results secured. From the two reports very complete information may be gained concerning recommended design and progress in the use of the reinforced concrete tank. Such tanks have been built in a number of places throughout the country, although in most cases they have been erected as standpipes and storage reservoirs for municipalities rather than as service tanks for railway locomotive water supply. In fact, the adoption of concrete for the latter purpose has been very limited, the Pennsylvania having recently erected in Ohio one of the few concrete tanks built to date. While the reinforced concrete tank has, by the very nature of its construction, a number of marked disadvantages for general railway service, it will doubtless be found of advantage under certain limited applications, and its use will increase as the construction of the railways becomes more permanent.

Mr. Howard's discussion on Rail Specifications seemed to discredit the drop tests as insufficient and furnishing but a very limited indication of the resistance of the material. The test is made under favorable conditions, as the outer fibres are under maximum stress, while in the rail in service the cold rolled effect may cause greater stresses in the interior of the section. It is probable that the most useful function of the drop test will be found in the opportunity to inspect the fracture and discover whether the rail is made of sound steel, and the new specification is valuable in providing for the testing to destruction under the drop, so that the fracture may be inspected. It remains to be seen whether this feature of the specification will be acceptable to the manufacturers for rails at the standard price. So many tensile tests of rail steel have been made that the relation between carbon content, ultimate strength and elastic limit have been fairly well established, and this information could be applied to drop tests of steel of various carbon contents, so that, as Mr. Churchill remarked, "we may soon be able to predicate the chemical contents from the drop test."

The importance of the work of the committee on Electricity in studying the subject of third-rail clearances and in preparing standard clearance lines for equipment and structures should be fully realized. It is most advisable that equipment and track structures be standardized in the early stages of the development of heavy electric traction, which is certain to go forward very rapidly within the next few years. Any delay in adopting such standards now will cause heavy expenses for reconstruction later. The problems connected with the operation of electrified steam lines, or of electric feeders of steam railways, are different from those of an independent interurban line, because a large part of the business must necessarily be interchanged between lines which are partly steam and partly electric. The relation between steam and electric roads is growing closer each year. Steam roads now operate a considerable mileage of electric lines as feeders for both passenger and freight traffic. The New Haven electric lines in New England are the largest development of this kind, while the Southern Pacific's network of electric lines about Los Angeles is also important. Another type of line which will increase rapidly is the main line, which will be electrified for all classes of service. The longest main line electrified for all classes of service is that of the New Haven, extending from New York to Stamford, Conn., a distance of about 35 miles. This company recently has announced that electric operation is to be extended to New Haven, a further distance of 35 miles. Another phase of this electric development is the increasing tendency toward the interchange of freight and passenger traffic between steam and interurban electric lines. A number of important interurban lines are now exchanging traffic regularly with steam lines. All these examples indicate the necessity of providing such standard clearances that the equipment of any road may be freely operated over another road.

COMMITTEE WORK.

The successful prosecution of committee work is essential to the welfare of any technical organization. Strength of such an organization is very largely measured by the quality of the work done by the various committees. From the detailed nature of the investigations undertaken it is necessary for the different committees to go carefully into the various phases of the subjects assigned them to the exclusion of all other subjects. With proper committee work the committeemen become specialists, and their reports become invaluable sources of information to the membership at large. Furthermore, continued service on one committee from year to year, as is the case with many members of the American Railway Engineering Association, is of mutual value to the committee members and to the association.

Committee reports may roughly be divided into two classes, those submitted as information and those embodying definite recommendations evolved from definite study. Most committee reports are too apt to be of the former class. A large number of studies must necessarily be based on the replies received from circular letters asking for the practice of different roads upon a certain subject in order to base satisfactory conclusions on them. From the standpoint of the committee, the easiest way to handle such material is to present replies to this letter at length in a report and allow the reader to draw his own conclusion. To a certain extent this is fully justified. However, the committee are better able to summarize the results and give the proper weight to the different reports than the individual members. Furthermore, without making a detailed study, the average member will become confused by the apparent conflict in the data and ideas presented. The most effective and valuable committee work can be done by boiling down the reports and drawing the conclusions which the information justifies. Being a busy man, the average member of the association desires to know the results, and is not willing to spend the time to conduct his own investigation. Rather, the object of committee work should be to save him this labor.

For these reasons, the action of the board of direction in limiting the scope of individual committee reports this year to two subjects and concentrating attention on them is wise. The board went a step further and requested that the report be boiled down more than has been the case in some previous instances, so that the summary might be presented concisely and clearly without sacrificing any of the material. A number of reports this year show a decided improvement over those of previous years. Because a report is short is not an indication that a committee has done but little work. Brevity frequently indicates more laborious and conscientious work in arranging the essential facts in a report than prolixity. A distinguished newspaper editor used to say to his subordinates: "If you are in a hurry, write a column; if you have plenty of time, write a paragraph."

The limiting of a report to two subjects also tends to improve the work on these subjects. It has frequently been the case that committee work has been diffused over a wide area to the resulting detriment of the entire report. The general subjects on which a great amount of information is readily available have been largely covered, and the work of the association in the future will be a more detailed investigation of matters requiring extended and minute studies. Such studies will necessitate a large amount of individual work on the part of committees in proportion to the number of subjects covered in the reports, but such investigations are even more important than those pertaining to subjects the information regarding which is readily at hand. The work of the committees on Rail, Economics of Location, Electricity, etc., are indicative of what the committee work of the future should, and doubtless will, be.

UNIONISM AND MAINTENANCE OF WAY LABOR.

The paper by Mr. Loree on Labor Unionism, which was read for him by George H. Burgess, at the dinner of the American Railway Engineering Association last night, was one of the most instructive, scholarly and timely addresses ever heard by the members of this association. Probably Mr. Loree somewhat magnified the faults and minimized the virtues of labor unionism; but with this qualification it may be said with confidence that the views expressed by him will receive the approval of most students of the labor problem. There is nothing intrinsically objectionable in the organization of labor, and in efforts by it through its organizations to secure reasonable wages and conditions of employment. On the other hand, it is true that many unions have used, and often still use, methods for attaining their ends that are both illegal and immoral, which deserve condemnation by every good citizen, and which society must suppress for its own protection.

Probably the most interesting feature of Mr. Loree's paper to railway men, and particularly to engineering and maintenance officers, is the concluding part, in which he calls attention to the failure of the Railway Engineering Association to give adequate attention in past years to the labor problem, and urges that to the present list of regular committees there be added a committee on Maintenance of Way Labor "whose duties shall be to investigate the conditions of employment of and the relation of maintenance of way labor to seasonal supply and demand; to consider questions of economy, organization, discipline and equipment of forces for various kinds of work and such other questions as shall from time to time be assigned by the usual authority." Engineering and maintenance officers have a peculiar opportunity to make investigations and adopt measures regarding the wages and conditions of employment of labor which will be beneficial alike to the employees and the railways. The labor employed in track work is organized to a less degree now than any other large body of labor on railways. Employees concerned in the handling of trains have very strong brotherhoods and make many demands and indulge in much conduct of which operating officers complain. There is a tendency toward organization of track employees, and every once in a while there is a strike of such employees somewhere because of refusal of the railways to recognize organizations of them and accede to their demands. Any railway man who does not see that in a comparatively short time the track employees will organize and employ the same methods that are used by the train employees, unless the railways adopt measures which will make it to their interest not to do so, is simply closing his eyes to the facts. Up to this time most roads have done almost nothing to prevent the spread of unionism among maintenance of way employees except to fight it wherever it has appeared. In the long run this method will prove ineffectual unless supplemented by other and better methods.

Aside from their fighting of unionism among track employees wherever it appears, the present policy of most railways in dealing with this class of labor is adapted to encourage its organization. The roads have yielded to the ever recurring importunities and demands of organized employees for increases in wages and easier conditions of employment. At the same time in wages and easier conditions of work they have failed voluntarily to treat their unorganized track employees proportionately well. Furthermore, railway managers have protested against the insistence of organized labor on flat wage scales, and yet have generally followed the policy of fixed flat scales of

wages for track foremen, instead of adopting the policy of systematically basing their wages on the quantity and quality of work done by them individually. It is true that some roads award prizes to maintenance officers and employees for especially good work, but, in the long run, this will not be sufficient to retain their loyalty and prevent them from becoming unionized. Perhaps entire prevention of organization is not desirable, but if the managers regard it as desirable there is but one way for them to accomplish their object, and that is to so treat the unorganized employees as to make them feel that they have little to gain by organizing. By continuing their present policy, the managers are apt to give to employees in the maintenance and engineering department the impression that they have little to lose and much to gain by organization.

In view of existing conditions, it would seem that there can be little serious question as to the wisdom of the recommendation made by Mr. Loree. The Railway Engineering Association ought squarely to face the problem of maintenance of way labor in all of its phases and undertake to deal with it in a just and scientific spirit. No doubt, railway managers think that they have enough labor problems already, and that so far as maintenance labor is concerned it might be a good plan to follow the old adage of "letting sleeping dogs lie." But this policy would be unjust and cowardly, and the railways have often in the past lost a great deal by following a timid policy in dealing with labor questions. They have failed to do justice to some classes of employees simply because these classes have not demanded and insisted upon justice. On the other hand, they have done more than justice to some classes because these have demanded and insisted on having more than justice. In both cases the effect has been to demoralize the labor situation, and, in the long run, to cause loss to the roads.

The Railway Engineering Association and its members individually have a better opportunity to-day to deal intelligently and equitably with labor conditions with a view to securing a maximum increase in efficiency, with a maximum of benefit to both employees and the roads, than any other organization or class of railway officers. Will they take advantage of their opportunity?

PROGRAM.

(Order may be changed by a two-thirds vote of the convention, or by time required for consideration of reports.)

Thursday, March 21.

XVI.	Economics of Railway Location	Bulletin 144
IX.	Signs, Fences and Crossings	Bulletin 144
VI.	Buildings	Bulletin 144
Special.	Grading of Lumber	Bulletins 133, 144
XVII.	Wood Preservation	Bulletin 144
Special.	Uniform General Contract Forms	Bulletin 145

New Business.

Election and Installation of Officers.

Adjournment.

INCREASED AUTOMOBILE SERVICE TO THE COLISEUM.

The National Railway Appliances Association has put in service another automobile to carry convention visitors between the hotel and the exhibit, in addition to the two that were in service on Monday and Tuesday. Instead of the 15-minute schedule that has been observed, an automobile will leave the Armory and the hotel as soon as another arrives.

One of the signal companies exhibiting at the Coliseum has orders for, and work under way on, a total of 800 miles of automatic block signals.

Proceedings.

The Wednesday morning session of the American Railway Engineering Association was called to order at 9:10 o'clock, by President Cushing.

The further consideration of the report of the Committee on Track, carried over from the Tuesday meeting, was taken up.

Discussion on Track.

J. B. Jenkins (B. & O.): No definite action was taken yesterday on conclusion 3. Some question was raised as to the particulars in which the dissenting members of the committee disagreed with the majority. George H. Bremner disagreed, not in regard to the conclusions, except that he wished the conclusions presented merely as representing good practice, instead of for adoption as recommended good practice, but he objected to some portions of the presentation of the facts in connection with the choosing of the number of frogs and length of switch points, evidently taking that part of the report as an argument for the committee's conclusion.

R. O. Rote writes: "I am willing to agree that the report of the committee represents good practice, but I am not willing to agree to a report favoring the raised switch rail for the solid plated frog over a flat switch with a frog on individual tie plates. As you perhaps know, this company uses the flat switch and does not use a single solid plate under ordinary frogs, and, therefore, I do not approve of the findings of this committee in this respect."

G. J. Ray writes: "I am willing, of course, to go on with the committee, assuming that the majority are in favor of the report as submitted. I do not agree, however, with the committee on the recommended length of switch for frogs over No. 14, that is, 33 ft. switch points. I do not believe that the 33 ft. point is in every way practical. Your plan does not indicate how the stock rail joint is to be made or where it is to be placed. Furthermore, I do not see the advantage of a No. 11 over a No. 10 frog for ordinary yard work. You are given permission to sign my name to the report with the understanding that I do not agree with the recommendations referred to above."

I do not think there is any disagreement between Mr. Ray and the rest of the committee regarding the No. 10 and No. 11 frogs for ordinary work. The Lackawanna uses No. 10 almost entirely for yards, while most roads use 7's and 8's and some roads 6's in similar places.

A. Bruner writes: "I subscribe to the committee report, excepting the detail drawings of frogs and switches and frog numbers."

F. S. Stevens writes: "In relation to the report of the Track Committee, I have crossed and marked out such portions of the proposed text as in my opinion should be omitted and have signed a copy and returned it to you by mail."

The portions marked by Mr. Stevens are several slight changes in the reading part of the report which precedes the conclusions, and three paragraphs following "(d) Turnouts requiring frogs of large angle." Mr. Stevens wishes me to omit these three paragraphs as not being a proper portion of the argument. I consider this an introduction rather than an argument for the position of the committee. Mr. Stevens wanted the conclusion in regard to switch points to read 22 ft. points for No. 10 frogs instead of 16½ points. He wanted conclusions No. 1 and 2 to read: "The committee recommends General Specifications, etc., as representing good practice," and "The committee recommends the General Plan, etc., as representing good practice."

The question of 33-ft. switch points has had a great deal of discussion in the committee covering a period of about three years, and the committee is very nearly unanimous that 33-ft. switch points are desirable. At the time the 33-ft. switch point was introduced, I don't think we had any rails rolled longer than 30 ft., and it was not possible to have a stock rail without a joint. Now, with the 33-ft. switch point, we can very readily obtain a 60-ft. stock rail, when it is desired to have a No. 1 track. However, I don't think a 33-ft. stock rail, with a 33-ft. switch point, will make a bad job in main track under fairly high speed if the switch is properly looked after.

J. B. Berry (C. R. I. & P.): This committee was intending to incorporate in the manual the recommendation in regard to frogs and switch points, with five dissenting members. To me that is a very important thing. We, nearly all of us, in times of doubt, go to the manual to see what is best to do, and I know positively that a great many people outside of this association take whatever they find in the manual as the best practice there is and find fault with people who don't use it.

This report says that 55 per cent. of the railways—not of

the mileage—use No. 10 frogs. It says nothing about the length of switches, but 15 ft. is the usual length; so, you see over one-half of the roads in this association are still using a No. 10 frog, with a split switch presumably 15 ft. long. It is justifiable to go to a 16½-ft. split switch and, incidentally, to a No. 11 frog? We can readily see why we go to the shorter split switch in a No. 8 frog, because we have had a great deal of trouble in maintaining a No. 7. You can also understand why it is desirable to use a 30 or 33 ft. switch with a 16-ft. frog, because they are on high-speed lines, but a 14-ft. split switch with No. 10 frog is a different proposition. We have had no trouble maintaining it, and it is simply a question whether, in changing between those two extremes, you will change from No. 10 to No. 11.

Every railway in this association that has from five thousand to ten thousand miles has in stock anywhere from five to ten million dollars' worth of suplies. The storekeepers and the executive officers are continually objecting to getting so many different parts. If a 15-ft. split switch is good enough and a No. 10 frog, why add, even on new work, No. 11? It makes simply so much additional material to carry in stock.

L. S. Rose (C. C. C. & St. L.): This is not a question of safety. The lengths of switches and the numbers of frogs are figured out, we think, on a scientific basis. It is not anything very radical. It will not put anybody in court if we do not adopt it, because it is a question of standards, not of safety. We might have a switch that conformed to these standards that would not be as safe as some switch that did not. It might be a question of the size of the rail or some other detail. Mr. Berry says that we carry large stocks. I submit that the frog and switch stocks change very rapidly on a well-regulated railway. They are worn out. We were instructed to give a recommendation for three lengths of switches, for three lengths of frogs, in order to keep the stock down. If a road adopted this recommendation there would be only three to carry and that would take care of all needs. We tried to give four, but the convention said, "No, only three."

I further think that we have the best three. We can take care of junctions the best that anyone can take of them, up to our present art. We might change our plan, on switches a little; might have curved switches, but we don't think we are up to that yet. The roads don't want to carry so many different kinds in stock. They want a switch that they can use anywhere.

Mr. Bremner: This report was very carefully considered by the committee, and I think the chairman is to be congratulated that he got as near a unanimous opinion from the committee as he has. There is no dissent in the committee, as I understand it, from the fact that the practice recommended in these conclusions is good practice. Conclusion No. 1 is almost unanimously agreed to. In the other two conclusions there is considerable difference of opinion, and a number of members of the committee do not agree that this is the best practice, although they all agree that it is good practice.

In regard to the question of the number of frogs to be submitted as the best practice, it is very questionable whether a No. 8, a No. 11 and a No. 15 will fulfil all conditions. I doubt if there is more than two or three roads in the country that have frogs of these numbers as their standard, not but what many roads have some of them as standards, but the combination as presented by the committee will probably change the practice of nearly every road of the United States to some extent. I am inclined to think that by a full study of the situation on the various roads, a combination of frog numbers could be adopted which would only change a part of the practice. The No. 15 frog, for instance, is not the only frog that is used for terminals. Some roads use 20, some roads use 24 or possibly 22, and frogs lower than No. 8 are very common; in fact, they are general in a yard where it is necessary to save room and where the work is all done by switch engines, so that the limits prescribed by the numbers of the frogs submitted is inside of what is today good practice and may be the best practice. Frogs are constantly becoming sharper, as you know, on account of the high speed, stiffer engines and longer equipment, so that where today the committee recommends a No. 8, a few years ago they would have recommended a No. 6. Possibly a No. 9 may be better in the very near future, and likewise a No. 15 is likely to be replaced by a No. 20, or even higher frog. The practice is constantly changing and the track material is being improved upon very rapidly at the present time.

In regard to the length of switch points, the points recommended are good practice, but they are not the only good practice, and the same arguments in regard to those lengths will apply that apply to the numbers of the frogs. I doubt if there are very many roads in the United States today that are using 33-ft. switch points to a very great extent, not but what they can be used. I see that the German roads are beginning to use switch points even longer than that. To a large extent they have been trying switch points with a fixed heel. The heel on all of our switch points is pivoted. By the use of this fixed heel they get a curved switch point, which, if it can be properly made, I think is very desirable, and it is very likely to come, if we can find a construction that will make the proper fit for the point against the stock rail. They have a special shaped rail for this switch point, and I see no reason why the practice may not become the practice in this country. The use of a special shaped head, and of hardened steel or toughened steel, for our switch points is surely within the lines of economy, if a proper design can be made by which we can get a curved switch point for high-speed trains. I think it is within the province of this convention to adopt these resolutions, not as recommended practice, but as good practice.

Mr. Jenkins: Two of the dissenting members dissented more from the text of the argument than from anything else; they objected to my introducing matter which weighed against the committee's report. My intention, and I think the wish of a great many members of the committee was to present the full information to the association, so that the subject could have proper consideration, and two of the dissenters were simply dissenting because my argument was not strong enough.

A motion to amend the committee's recommendation to combine the lengths of 22-ft. and 33-ft. switch points into one of 26 ft. was lost.

A vote on the motion to accept the committee's recommendation as to switch points showed 58 in the affirmative and 14 opposed.

A motion to reconsider the question of the number of frogs recommended by the committee for adoption as representing good practice was lost.

Mr. Jenkins: I move that this conclusion be printed in the manual.

The substance of the specifications is practically the same as was considered last year. I move that we consider the specifications as a whole.

C. E. Lindsay (N. Y. C. & H. R.): Under "Bolts," the specifications differ from the specifications previously submitted in omitting the "U. S. Standard." The previous specification required that the bolts must be round and true to size, with the U. S. standard square heads and nuts, and the thread should also be specified.

Mr. Rose: That was done so that we could use a special bolt.

Mr. Lindsay: I think that the word "spring" should be substituted for the word "wing" in the paragraph on "Stops and Hold-downs."

Mr. Jenkins: It may be either "spring rail" or "wing rail," but the committee will accept the suggestion.

Mr. Lindsay: In the table which shows the length A. B. for different lengths of switches, if the planing is figured out in feet per inch, the first one is 1 in. in 16 ft., the second 1 in. in 12 ft. and the remainder 1 in. in 6 2-3 ft. I think for the 16-ft. 6-in. switch, that length of planing would better be longer. I move the substitution of 7 ft. for 5 ft. in the length A. B. for that switch.

Motion carried.

A motion to adopt the specifications as amended was carried.

YARDS AND TERMINALS.

The following subjects were assigned:

(1) Report on typical situation plans of passenger stations, of both through and stub types, with critical analyses of working capacity, and include a review of the different methods of estimating their capacity.

(2) Report on developments in the handling of freight by mechanical means.

(3) Report on developments in the design and operation of hump yards.

(4) Report on typical situation plans for a division engine terminal.

(5) Report on methods of handling baggage, express and mail, at passenger terminals.

The committee was also instructed to consider revision of the manual; if no changes were recommended, to make statement accordingly, and to make concise recommendations for next year's work.

After careful consideration of the present manual, the committee has no recommendation for further changes at the present time.

(1) The sub-committee has accumulated a large amount of data with respect to existing terminals. The subject assigned, however, is so broad and important that it is desirable to continue work on it through another year.

(2) Considerable progress has been made at different points in the development of freight handling by mechanical means since the committee's last report, and during the past year inspection was made of the new Missouri, Kansas & Texas Railway freight handling plant at Broadway Station, St. Louis, Mo., the Baltimore & Ohio Railroad telpher system at Pier No. 8, Locust Point, Baltimore, Md., the power conveyor system in one of the new warehouses of the Texas City Transportation Company, at Galveston, Texas, and of the electric truck system at Dock No. 6, Jersey City, N. J. As nearly all of these systems are practically new and sufficient time has not elapsed since installation to enable all points as to their utility to be definitely determined, both as to economy of operation and practical utility, full report on these systems is held over for future publication.

(3) Additional data on existing hump yards have been secured by the sub-committee, and is held for future report.

(4) typical situation plans for division engine terminal.

In treating this subject, the committee understood its work to be the making of recommendations as to the best arrangement of facilities for the handling of locomotives



C. H. SPENCER,

Chairman Committee on Yards and Terminals.

at terminals rather than specifications for exact designs of the various structures involved excepting as in a general way the characteristics of such structures seem to be more or less suited to the arrangement recommended. It is also understood that the scope of the committee's work does not include the consideration of shop or repair yard locations.

A typical plan or layout was submitted for an engine terminal whose characteristics permit of application equally well to larger or smaller demands practically without limit and without respect to whether the locomotives cared for are all freight or passenger, or in both kinds of service.

A number of plans of recently constructed engine terminals were examined. The best ideas of all were adopted and the manifest errors of at least some of these plans were avoided. It must, of course, be recognized that in any case of actual construction, physical limitations as to space and shape of the ground site will impose more or less modification of the plan recommended, but this will come more generally within the possibility of any given set of conditions than any other typical plan that could be suggested.

In locating an engine terminal, the facilities should be placed with reference to the yards and main line in the most advantageous position possible, that is, so that the distance between the engine terminal and the points where engines begin and end their service shall be a minimum, and so that reverse or conflicting movements shall be avoided as much as practicable.

The idea to be kept in mind is the most direct and convenient, that is, rapid and economical performance of those things required for an engine in its terminal in that sequence which answers all requirements in the order of their urgency. It appears to us that on the arrival of a locomotive at its terminal, the first imperative demand is likely to be for water, and that this demand is likely to be the last when leaving the terminal for service. For this reason the typical plan provides for the location of watering facilities accordingly.

After an incoming engine has been protected by receiving water, the next step appears logically to clean its fires or remove it entirely, according to need, and place the engine as quickly as possible in the engine house where it may be cleaned and the repairs necessary to prepare it for new service may be made. The cinder pit should be located as close as practicable to the engine house and permit at the same time of engines moving off the cinder pit in the normal direction, being switched direct to an outbound track without using or fouling the turntable, as may often be desired.

It appears logical that the process of coaling should be reserved, if practicable, until just before the engine re-enters service in order that it may do so with a maximum supply of fuel, and also because the cleaning or removal of fire on cinder pit, as well as the repairs of the engine tank or other repairs, can be accomplished without the interference that might result from having the tender filled with coal. This reasoning dictates that the location of the coaling station should be primarily to serve the outbound tracks. Inasmuch, however, as it may often occur that incoming engines will require coal, the coaling station should be located as indicated on the typical plan, so that coal may also be taken by an engine on an inbound track.

The trestle type of coal dock may be used if desired, if only two coaling tracks are required, and can be located between the inbound and outbound tracks in the same relative position as shown in the typical plan.

The most convenient and economical arrangement for storing and drying sand is at the coal station, where it may be handled by the same attendants. Sand should ordinarily be delivered to engines passing on the inbound tracks.

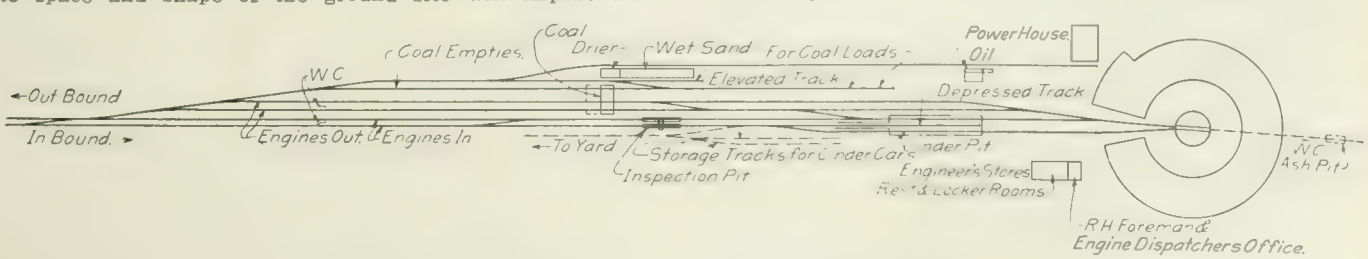
It will be observed that the arrangement of facilities permits of large increase in capacity of cinder pit, coaling station, etc., and in this connection the idea of having the coaling station at a busy terminal comprising two independent units makes a strong appeal for approval in view of the possibility of one of the hoisting plants suffering temporary disability from breakdown, or other cause.

The location of storehouse, oil house and enginemen's tool and locker rooms need not be arbitrarily prescribed, but should be as close as practicable to the engine house and the cinder pit. However, where any of these buildings are served by their own tracks, those tracks should be so located and connected as not to interfere with the uninterrupted free use of the engine tracks.

A system of ample lighting facilities is important, with lights distributed so as to avoid, as far as practicable, darkness or shadow where men are engaged in work upon engines.

CONCLUSIONS.

(1) The engine terminal should be so located as to afford easy access to both main line and yards, with the



Typical Situation Plan for Division Engine Terminal.

fewest possible reverse or conflicting movements.

(2) The facilities provided should be arranged to permit of the most direct and rapid handling of an engine in its terminal in the order of its needs.

The committee recommends for next year's work a continuation of Subjects Nos. 1, 2 and 3, enumerated above.

The report is signed by C. H. Spencer (Washington Terminal), Chairman; E. B. Temple (P. R. R.), Vice-Chairman; Hadley Baldwin (C. C. C. & St. L.), W. C. Barrett (B. & O.), M. S. Blaiklock (G. T.), G. H. Burgess (D. & H.), A. E. Clift (I. C.), A. L. Davis (I. C.), H. T. Douglas, Jr. (W. & L. E.), A. C. Everham (K. C. T.), D. B. Johnston (D. L. W.), H. A. Lane (B. & O.), L. J. McIntyre (N. P.), B. H. Mann (M. P.), A. Montzheimer (E. J. & E.), W. L. Seddon (S. A. L.), A. Swartz (Erie), J. E. Taussig (H. & T. C.), E. E. R. Tratman (Engineering News), W. L. Webb (C. M. & St. P.), J. G. Wishart (C. R. I. & P.).

Discussion on Yards and Terminals.

Conclusion No. 1 was adopted without discussion.

Mr. Lindsay: I agree with Conclusion No. 2 except that it does not state in what order the facilities should be provided for. The committee provides that coal shall be taken when going out. From a motive power standpoint, that is desirable, but from an operating standpoint, and considering the question of time after the engine is ordered, it is desirable to coal an engine coming in, so that there will not be any necessity for its delay after it is ordered in going to its point of departure. The plan does not provide any facility for coaling an engine coming in, and if the plan were modified so that it might be possible to coal the engine coming in or going out, in the same manner that they take water coming in or going out, the conclusion would be much more desirable.

The President: This is simply offered as information and the conclusions need not affect the plan at all.

Mr. Rose: I call attention to the fact that provision is made in the plan for coaling on the inbound track, one track is placed next to the coal port for that purpose.

Mr. Lindsay: Side coaling arrangement?

Mr. Spencer: Yes.

Conclusion No. 2 was adopted.

RAIL.

Reports have been submitted during the year, as a part of the Rail Committee's work as follows:

(A) A Study of Seventeen Good Service Rails, by Robert Trimble and W. C. Cushing, with notes by M. H. Wickhorst. These rails contained carbon within or a little above the usual limit for 85-lb. rails, namely, 0.45 to 0.55. With this carbon the phosphorus was close to 0.10 or above, the manganese was mostly within the usual limits of 0.80 to 1.10. Some of the rails were of fairly uniform composition throughout the section as indicated by the etching, but others were more or less segregated. This study did not perhaps lead to any very definite results, but indicates that under some conditions segregated rails high in phosphorus, and possibly also in carbon, may give long service, although it does not define these conditions either of track or material.

(B and C) Rail Failure Statistics for the Year Ending October 31, 1910, and Segregation and Other Rail Properties as Influenced by the Size of Ingot, by M. H. Wickhorst.

Mr. Cushing made a study of the Rail Failure Statistics and below are his comments on the subject:

(1) Study of these general statistics does not furnish accurate and specific information so as to determine the value of different sections of rail, because:

(a) The conditions of traffic are different.

(b) The conditions of roadbed are different.

(c) The conditions of ingot making and rolling practice are so different that the quality of the material varies widely, and, at the present time, this difference in quality of the material eliminates differences in section; nevertheless, when the time comes that the difference in quality of material will be less, the influence of the section will be more apparent, for there is no doubt that one section is stiffer and stronger than another according to the distribution of the material. Inasmuch as we are endeavoring to eliminate the differences in quality of material and bring it to a high state of perfection, we should not, in the meantime, lose sight of the desirable features of the rail section, but keep them constantly in mind, so that when we arrive at a good quality of metal, we will also have a desirable rail section.

(2) A study of these general statistics tends to disclose unusual results, and were it not for their compilation, we would not have much information relative to the difference between Bessemer and Open-Hearth steel and concerning the various alloys.

(3) The general statistics are also important, in showing a relation between broken rails and failure of head, web and base.

(4) Their tabulation discloses the difference between steel companies when the sections and chemical composition are practically the same.

The report by Mr. Wickhorst covers an investigation made at the South Works of the Illinois Steel Company, to throw light on the relation of the size of ingots of Bessemer rail steel to the segregation of the metalloids, locations of pipes and blow holes, and the properties of the rails. This investigation showed that under the conditions of the tests, the carbon, phosphorus and sulphur collected or segregated toward the interior and upper part of the ingot and that, in a general way, such segregation increased as the size of the ingot increased. The manganese also segregated some, but to a much smaller extent, while the silicon showed little or no tendency to segregate.

The elements which segregated as described also showed a lowering in the top part of the ingot, below the average composition of the steel, and this lowering extended downward along the sides of the ingot. The "negative" segregation increased in general as the size of the ingot increased and also extended down further along the sides of the ingot. There was also a region of negative segregation in the interior and lower part of the ingot, but the lowering of the elements was not as great in this region.

This investigation also indicated that the material was distributed in the rail bar about the same, relatively, as it was in the ingot from which the rail bar had been rolled.

(D) Tests of Rail Steel Ingots and Derivative Shapes Made at Watertown Arsenal, being a review by M. H. Wickhorst of the report published by the Watertown Arsenal.

This report covers a digest and analysis of the government investigation at the Watertown Arsenal of rail steel ingots and derivative shapes as embodied in the Report of Tests of Metals, etc., made at the Watertown Arsenal for the year 1909.

The work indicated that the interior cavities of an ingot cooled directly after pouring are about the same or slightly less than in a similar ingot placed in the soaking pit and then cooled. This same result was also indicated as true of blooms made from such ingots.

It was shown that almost the full tensile strength and ductility of the metal of the lower part of the ingot were obtained by rolling to about one-tenth of the original cross-section, but with the metal of the upper part of the ingot it was necessary to reduce the cross-section to one-twenty-fifth or less of the original amount.

A great many etchings were made and it was shown that the structure of the cross-section as developed by etching varies from the top to the bottom of the ingot and that each structure finds its counterpart in succeeding shapes and at about the same proportionate distance from the top end. It was also shown that the structure was considerably altered by changing the position in which the ingot was allowed to cool, as for instance allowing it to cool on its side after stripping.

(E) Influence of Rolling Temperature on the Properties of Bessemer Rails, by M. H. Wickhorst.

This report covers an investigation made at the works of the Carnegie Steel Company to determine the influence of the temperature of rolling on the properties of Bessemer rails. This work indicated that the ductility and deflection in the drop test were influenced little, if any, by the rolling temperature. The number of blows that it took to break the rails in the drop test was uninfluenced by the temperature of rolling. The yield point and tensile strength in the tension tests were influenced little, if any. The elongation in the tension test decreased some as the temperature increased. The influence of temperature showed most prominently in the tension test, in the reduction of area, which decreased as the temperature of rolling increased. The size of the grain, as shown by the microscope, increased as the temperature increased.

In this report it is also pointed out that the ductility in the drop test with the head of the rail in tension more nearly indicates the ductility of the interior metal as measured in the tension test, than does the ductility in the drop test with the base of the rail in tension, which is usual in inspection work.

Each report mentioned above gives a short summary of the matter contained in it, but the main principles that seem to have been brought out by the year's work are brought out in the brief reviews above.

The general plan of research work during the year has been to direct attention to some one item which enters as a factor in the properties of the finished rail and attempt to obtain definite information concerning its influence by the experimental method of obtaining as great a range as practicable in the one item under consideration, but leaving all other conditions as near alike as obtainable in the several experiments. It is thus hoped to establish in the course of time

the metallurgical principles and laws that apply to the manufacture of steel rails.

The following subjects were assigned for 1911:

(1) Recommend changes in the specifications for steel rails.

Considerable work has been done during the past year in the preparation of specifications, and the specifications submitted herewith are recommended by the committee. Some paragraphs, such as Nos. 5, 6, 14 and 15, are not to be considered as final, it being thought that the committee did not have sufficient information in its possession to make these sections in the specifications mandatory.

One of the sections in question, No. 14, refers to the ductility test. The requirements, in the specifications, for ductility are somewhat lower than some members of the committee think desirable, and it is hoped that sufficient information will be obtained during the coming year to enable the committee to make some revision in these respects.

Paragraph No. 15, referring to deflections as a method of classifying rails, is also tentative. It is the intention when sufficient data is at hand to prescribe maximum and minimum limits for deflections under the drop test.

(2) Present recommendations on standard rail sections.

The committee reports progress.

(3) Continue investigation of the breakage and failure of rails and present summary of conclusions drawn from reports received.

Bulletin No. 137 contains the rail failure statistics for the year ending October 31, 1910, and the conclusions in regard to the matter are presented in that report.

(4) Report on the results obtained from the use of Open-Hearth and Special Alloy steel rails, and the chemical composition of such rails.

Bulletin No. 137, referred to above, containing the report of the rail failure statistics, also gives all the information that the committee has in regard to Open-Hearth and Special Alloy steel rails.

In regard to the remaining part of the outline of work for the year 1911, the committee reports no progress.

The committee desires to call attention to the valuable services rendered by M. H. Wickhorst, engineer of tests for the committee. Mr. Wickhorst has succeeded in winning the confidence of the manufacturers and has thereby succeeded in securing their co-operation in the work which is being done. Considerable light has been thrown upon the subject by these investigations of Mr. Wickhorst, and it is hoped that in the future considerable good will be accomplished as a result of the investigations.

The committee desires to acknowledge the very generous manner in which the various rail manufacturers have offered us the material and facilities of their mills to carry on this research work. The condition of co-operation that we are working under is very gratifying and, it would seem, must work toward the best interests of the railways, the steel mills and the general public.

The committee recommends the following lines for investigation during the coming year:

(1) Recommend changes in specifications for steel rails.

(2) Present recommendations on standard rail sections.

(3) Continue investigation of the breakage and failure of rails and present summary of conclusions drawn from reports received.

(4) Report on the results obtained from the use of Open-Hearth and Special Alloy steel rails, and the chemical composition of such rails.

(5) Present reports on the results of tests made on the various kinds of rail in conjunction with the manufacturers' committee on the revolving machine at South Chicago.

(6) Report on standard drilling for rails.

Special investigations by Mr. Wickhorst.

(1) Test Open-Hearth steel in ingots of various sizes.

(2) Influence of height of ingot with usual cross-section—

(a) Bessemer steel;

(b) Open-Hearth steel.

(3) Influence of temperature of rolling on high carbon Open-Hearth steel.

(4) Drop Tests. Influence of temperature of test piece on ductility and deflection in drop test.

(5) Tests with reciprocating machine, especially to determine influence of interior segregation.

(6) Influence of Titanium—

(a) Bessemer steel;

(b) Open-Hearth steel.

(8) Influence of methods of cooling on the cooling beds, especially with high carbon steels; also the effects of cold straightening.

(9) Influence of the temperature of the liquid steel when poured into molds.

(10) Experiments with methods of casting ingots for improvements as regards blow holes, pipes, etc.

(11) Drop Tests, Permanent Set, Ductility, etc.

(a) Influence of carbon.

(b) Influence of phosphorus.

(c) Influence of manganese.

(d) Influence of span of supports.

(e) Influence of moment of inertia.

The report is signed by Chas. S. Churchill (N. & W.), Chairman; R. Montfort (L. & N.), Vice-Chairman; E. B. Ashby (L. V.), J. A. Atwood, A. S. Baldwin, J. B. Berry, M. L. Byers, W. C. Cushing, F. A. Delano, P. H. Dudley, C. H. Ewing, C. W. Huntington, John D. Isaacs, Thos. H. Johnson, Howard G. Kelley, C. A. Morse, George W. Kittredge, J. T. Richards, J. P. Snow, A. W. Thompson, Robert Trimble, M. H. Wickhorst.

SPECIFICATIONS FOR CARBON STEEL RAILS.

Inspection.

Access to Works.

1. Inspectors representing the purchaser shall have free entry to the works of the manufacturer at all times while the contract is being executed, and shall have all reasonable facilities afforded them by the manufacturer to satisfy them that the rails have been made in accordance with the terms of the specifications.

Place for Tests.

2. All tests and inspections shall be made at the place of manufacture, prior to shipment, and shall be so conducted as not to interfere unnecessarily with the operation of the mill

Material.

Material.

3. The material shall be steel made by the Bessemer or Open-Hearth process provided by the contract.

Chemical Requirements.

Chemical Composition.

4. The chemical composition of the steel from which the rails are rolled, determined as prescribed in Section 7, shall be within the following limits:

	For Bessemer Process		For Open-Hearth Process.	
	70 lbs. and over, but under 85 lbs.	85-100 lbs. inclusive.	70 lbs. and over, but under 85 lbs.	85-100 lbs. inclusive.
Elements				
Carbon	0.40 to 0.50	0.45 to 0.55	0.53 to 0.66	0.63 to 0.76
Manganese	0.80 to 1.10	0.80 to 1.10	0.60 to 0.90	0.60 to 0.90
Silicon not to exceed	0.20	0.20	0.20	0.20
Phosphorus not to exceed	0.10	0.10	0.04	0.04

Modification of Carbon for Low Phosphorus.

5. When the material used at any mill is such that the average phosphorus content of the ingot metal used in the Bessemer process is running below 0.08 and in the Open-Hearth process is running below 0.03, and if it seems mutually desirable, the carbon may be increased at the rate of 0.035 for each 0.01 that the phosphorus content of the ingot metal used averages below 0.08 for Bessemer steel, or 0.03 for Open Hearth steel.

Average Carbon.

6. It is desired that the percentage of carbon in an entire order of rails shall average as high as the mean percentage between the upper and lower limits specified.

Analyses.

7. In order to ascertain whether the chemical composition is in accordance with the requirements, analyses shall be furnished as follows:

(a) For Bessemer process the manufacturer shall furnish to the inspector, daily, carbon determinations for each heat before the rails are shipped, and two chemical analyses every twenty-four hours representing the average of the elements, carbon, manganese, silicon, phosphorus and sulphur contained in the steel, one for each day and night turn respectively. These analyses shall be made on drillings taken from the ladle test ingot not less than one-eighth inch beneath the surface.

(b) For Open-Hearth process, the makers shall furnish the inspectors with a chemical analysis of the elements, carbon, manganese, silicon, phosphorus and sulphur, for each heat.

(c) On request of the inspector, the manufacturer shall furnish drillings from the test ingot for check analyses.

Physical Requirements.

Physical Qualities.

8. Tests shall be made to determine:

(a) Ductility or toughness as opposed to brittleness.

(b) Soundness.

Method of Testing.

9. The physical qualities shall be determined by the Drop Test.

Drop Testing Machine.

10. The drop testing machine used shall be the standard of the American Railway Engineering Association.

(a) The tup shall weigh 2,000 lbs., and have a striking face with a radius of 5 in.

(b) The anvil block shall weigh 20,000 lbs., and be supported on springs.

(c) The supports for the test pieces shall be spaced 3 ft. between centers and shall be a part of, and firmly secured to the anvil. The bearing surfaces of the supports shall have a radius of 5 in.

Pieces for Drop Test.

11. Drop tests shall be made on pieces of rail not less than 4 ft. and not more than 6 ft. long. These test pieces shall be cut from the top end of the top rail of the ingot, and marked on the base or head with gage marks 1 in. apart for 3 in. each side of the center of the test piece, for measuring the ductility of the metal.

Temperature of Test Pieces.

12. The temperature of the test pieces shall be between 60 and 100 deg. Fahrenheit.

Height of Drop.

13. The test piece shall, at the option of the inspector, be placed head or base upwards on the supports, and be subjected to impact of the tup falling free from the following heights:

For 70-lb. rail.....16 feet
For 80, 85 and 90 lb. rail.....17 feet
For 100-lb. rail.....18 feet

Elongation or Ductility.

14. Under these impacts the rail under one or more blows shall show at least 6 per cent. elongation for 1 in., or 5 per cent. each for two consecutive inches of the 6-in. scale, marked as described in Section 11.

Permanent Set.

15. It is desired that the permanent set after one blow under the drop test shall not exceed that in the following table, and a record shall be made of this information.

	Rail.		Permanent Set, measured by Middle Ordinate in Inches in a Length of 3 Ft.	
Section.	Weight per Yard.	Moment of Inertia.	Bessemer Process.	O.-H. Process.
A.R.A.-A	100	48.94	1.65	1.45
A.R.A.-B	100	41.30	2.05	1.80
A.R.A.-A	90	38.70	1.90	1.65
A.R.A.-B	90	32.30	2.20	2.00
A.R.A.-A	80	28.80	2.85	2.45
A.R.A.-B	80	25.00	3.15	2.85
A.R.A.-A	70	21.05	3.50	3.10
A.R.A.-B	70	18.60	3.85	3.50

Test to Destruction.

16. The test pieces which do not break under the first or subsequent blows shall be nicked and broken, to determine whether the interior metal is sound.

Bessemer Process Drop Tests.

17. One piece shall be tested from each heat of Bessemer steel.

(a) If the test piece does not break at the first blow and shows the required elongation (Section 14), all of the rails of the heat shall be accepted, provided that the test piece when nicked and broken does not show interior defect.

(b) If the piece breaks at the first blow, or does not show the required elongation (Section 14), or if the test piece shows the required elongation, but when nicked and broken shows interior defect, all of the top rails from that heat shall be rejected.

(c) A second test shall then be made of a test piece selected by the inspector from the top end of any second rail of the same heat, preferably of the same ingot. If the test piece does not break at the first blow, and shows the required elongation (Section 14), all of the remainder of the rails of the heat shall be accepted, provided that the test piece when nicked and broken does not show interior defect.

(d) If the piece breaks at the first blow, or does not show the required elongation (Section 14), or if the piece shows the required elongation but when nicked and broken shows interior defect, all of the second rails from that heat shall be rejected.

(e) A third test shall then be made of a test piece selected by the inspector from the top end of any third rail of the same heat, preferably of the same ingot. If the test piece does not break at the first blow and shows the required elongation (Section 14), all of the remainder of the rails of the heat shall be accepted, provided that the test piece when nicked and broken does not show interior defect.

(f) If the piece breaks at the first blow, or does not show the required elongation (Section 14), or if the piece shows the required elongation, but when nicked and broken shows interior defect, all of the remainder of the rails from that heat shall be rejected.

Open-Hearth Process Drop Tests.

18. Test pieces shall be selected from the second, middle and last full ingot of each Open-Hearth heat.

(a) If two of these test pieces do not break at the first blow and show the required elongation (Section 14), all of the rails of the heat shall be accepted, provided that these test pieces when nicked and broken do not show interior defect.

(b) If two of the test pieces break at the first blow, or do not show the required elongation, or if any of the pieces that have been tested under the drop when nicked and broken show interior defect, all of the top rails from that heat shall be rejected.

(c) Second tests shall then be made from three test pieces selected by the inspector from the top end of any second rails of the same heat, preferably of the same ingots. If two of these test pieces do not break at the first blow and show the required elongation (Section 14), all of the remainder of the rails of the heat shall be accepted, provided that the pieces that have been tested under the drop when nicked and broken do not show interior defect.

(d) If two of these test pieces break at the first blow or do not show the required elongation (Section 14), or if any of the pieces that have been tested under the drop when nicked and broken show interior defect, all of the second rails of the heat shall be rejected.

(e) Third tests shall then be made from three test pieces selected by the inspector from the top end of any third rails of the same heat, preferably of the same ingots. If two of these test pieces do not break at the first blow, and show the required elongation (Section 14), all of the remainder of the rails of the heat shall be accepted, provided that the pieces that have been tested under the drop when nicked and broken do not show interior defect.

(f) If two of these test pieces break at the first blow or do not show the required elongation (Section 14), or if any of the pieces that have been tested under the drop when nicked and broken show interior defect, all of the remainder of the rails from that heat shall be rejected.

No. 1 Rails.

19. No. 1 classification rails shall be free from injurious defects and flaws of all kinds.

No. 2 Rails.

20. (a) Rails, which, by reason of surface imperfections, or for causes mentioned in Section 30 hereof, are not classed as No. 1 rails, will be accepted as No. 2 rails, but No. 2 rails which contain imperfections in such number or of such character as will, in the judgment of the inspector, render them unfit for recognized No. 2 uses, will not be accepted for shipment.

(b) No. 2 rails to the extent of 5 per cent. of the whole order will be received. All rails accepted as No. 2 rails shall have the ends painted white and shall have two prick punch marks on the side of the web near the heat number near the end of the rail, so placed as not to be covered by the splice bars.

Details of Manufacture.

Quality of Manufacture.

21. The entire process of manufacture shall be in accordance with the best current state of the art.

Bled Ingots.

22. Bled ingots shall not be used.

Discard.

23. There shall be sheared from the end of the bloom, formed from the top of the ingot, sufficient metal to secure sound rails.

Lengths.

24. The standard length of rails shall be 33 ft., at a temperature of 60 deg. Fahrenheit. Ten per cent. of the entire order will be accepted in shorter lengths varying by 1 ft. from 32 ft. to 25 ft. A variation of ¼ in. from the specified lengths will be allowed. No. 1 rails less than 33 ft. long shall be painted green on both ends.

Shrinkage.

25. The number of passes and speed of train shall be so regulated that on leaving the rolls at the final pass, the temperature of the rail will not exceed that which requires a shrinkage allowance at the hot saws, for a rail 33 ft. in length and of 100 lbs. section, of 6¾ in. and ⅛ in. less for each 10 lbs. decrease in section.

Cooling.

26. The bars shall not be held for the purpose of reducing their temperature, nor shall any artificial means of cooling

them be used after they leave the finishing pass. Rails, while on the cooling beds, shall be protected from snow and water.

Section.

27. The section of rails shall conform as accurately as possible to the template furnished by the Railway Company. A variation in height of 1/64 in. less or 1/32 in. greater than the specified height, and 1/16 in. in width of flange, will be permitted; but no variation shall be allowed in the dimensions affecting the fit of the splice bars.

Weight.

28. The weight of the rails specified in the order shall be maintained as nearly as possible, after complying with the preceding section. A variation of one-half of 1 per cent. from the calculated weight of section, as applied to an entire order, will be allowed.

Payment.

29. Rails will be accepted and paid for according to actual weights.

Straightening.

30. The hot straightening shall be carefully done, so that gagging under the cold presses will be reduced to a minimum. Any rail coming to the straightening presses showing sharp kinks or greater camber than that indicated by a middle ordinate of 4 in. in 33 ft., for A. R. A. type of sections, or 5 in. for A. S. C. E. type of sections, will be at once classed as a No. 2 rail. The distance between the supports of rails in the straightening presses shall not be less than 42 in. The supports shall have flat surfaces and be out of wind.

Drilling.

31. Circular holes for joint bolts shall be drilled to conform accurately in every respect to the drawing and dimensions furnished by the railway company.

Finishing.

32. (a) All rails shall be smooth on the heads, straight in line and surface, and without any twists, waves or kinks. They shall be sawed square at the ends, a variation of not more than $\frac{1}{32}$ in. being allowed; and burrs shall be carefully removed.

(b) Rails improperly drilled or straightened, or from which the burrs have not been removed, shall be rejected, but may be accepted after being properly finished.

Branding.

33. The name of the manufacturer, the weight and type of rail, and the month and year of manufacture shall be rolled in raised letters and figures on the side of the web. The number of the heat and a letter indicating the portion of the ingot from which the rail was made shall be plainly stamped on the web of each rail, where it will not be covered by the splice bars. The top rails shall be lettered "A," and the succeeding ones "B," "C," "D," etc., consecutively; but in case of a top discard of twenty or more per cent., the letter "A" will be omitted. Open-Hearth rails shall be branded or stamped "O. H." All markings of rails shall be done so effectively that the marks may be read as long as the rails are in service.

Separate Classes.

34. All classes of rails shall be kept separate from each other.

Loading.

35. All rails shall be loaded in the presence of the inspector.

Discussion on Rail.

The President: We have with us at our invitation, James E. Howard, of the Bureau of Standards.

Mr. Howard: The work your committee has in hand is advancing the subject very materially, and so far I think they have succeeded in a highly satisfactory manner.

I never feel like tying myself down very closely to specifications. They are necessary, but not all that is needed. In regard to the influence of ductility, I will take up a few features by reading a few paragraphs in your specifications. As to this question of ductility and the deflections in the drop tests, when we come to analyze the case it seems that the drop test simply gives us an indication of well-worked metal. I do not know that it does very much more. If we have the composition of the steel and know that it was cast in an ingot and reduced 30 or 40, or 50 times, we have good evidence when it reaches the form of a rail that it has been well worked. I do not know that we could secure better evidence that it has been well worked than the fact it has become a rail, so that the drop test, in that respect, merely shows we have secured what we know we have.

In regard to the deflection, what does that mean further than that one ordinate of a stress-strain curve has been determined? If we make a tension test of steel we get its elastic limit, and its stretch is measured at different intervals beyond that point. We are not usually content with just one ordinate. I would raise a question for your consideration, whether the drop test goes quite far enough. We all like to know something about the elastic limit of the material.

That goes right back to the question of what elastic limit is needed in steel rails. Then it comes to the definition of what fiber stresses you have in rails. So far as I am concerned, I do not know what the fiber stresses are. Some of the gentlemen present may give you a better idea of that, but I doubt it. Earlier tests which I had the pleasure of conducting show that the fiber stress varied with different types of engines and different wheels on the same engine, so I feel that in general the specifications and tests have not yet quite touched some of the vital points.

In regard to the extension due to the drop test, we are stretching the metal in the most favorable direction. If we had the same ductility in the crosswise direction that we have longitudinally, I do not think we should see so many base fractures. The crescent-shaped fractures are due to a want of structural soundness, which is very evident when the bases are bent in a crosswise direction, but these defects are not apparent when we stretch the material lengthwise.

As to the question of chemical analyses, the few observations that I have made show that the analyses of the rail in its cross section may vary considerably. One case now before me showed the carbon at the outer portions .44 to .45, which must be a case of bad segregation, you might say, and at the center of the head it was as high as .77. That variation is pretty wide, but do you find in the test ingot very much clue to what actually exists in the rails? Should not the rails now and then be scrutinized in that manner for the purpose of determining whether any parts of the ingot were exposed to segregation, whether the outer portions are not in a measure decarbonized? There are reasons for thinking that there is need for such procedure.

These are the salient features which to me seem desirable to consider, and I thought they might aid us in securing a better material.

The President: Have you any criticism to make on the chemical proposition proposed for these specifications?

Mr. Howard: The chemical composition carries with it the idea of certain physical properties. We have to go right back to the fiber stresses which are involved and until they are defined we cannot reach a definite conclusion; that is, considering the rail as a beam subjected to bending stresses. When it is subjected to wheel pressures, cold rolling on the running surface of the head, that is still another question. It seems that, in general, a lower carbon steel responds very quickly to the cold rolling of the wheel pressures and we do not have a very high fiber stress before the elastic limit is reached. Higher carbon steel than a very mild one is certainly necessary. Then there is danger in going too far lest there should be some brittleness introduced, so that I am inclined to favor a moderate, a medium carbon; I think the zone of safety lies around .65 to .70. You might go a little outside of those limits, but I think that is reasonably safe.

The President: For open hearth, Mr. Howard?

Mr. Howard: For open hearth. I am not prepared to make a distinction between the two grades of steel at the present time.

This feature of ductility is one to be considered and we do know that when a material is subjected to repeated stresses it will fail without the display of any ductility whatever. Now, if we have a very low carbon steel, with great ductility at the outset, when subjected to a low fiber stress, in alternate directions, it very quickly reaches a brittle condition. That metal will fail without any display of ductility, and the hardest steel cannot do any less, so that we must have considerable stiffness or strength in the material to resist the bending stresses. The ductility which you find in the drop test is inherent to the new material and not to that material which has been repeatedly strained. The overstraining force may not ordinarily reach the elastic limit of the material, when this final state of brittleness is introduced. If the metal is a strong one, a higher stress can be endured repeatedly without impairing the final ductility or the ductility which may incidentally be called upon to display itself. That leads to the higher carbon and, to be conservative, I think around about .65 to .70 is a fair limit.

The dangers of higher carbon, as I see them, are along these lines: With higher carbon steel, and high wheel pressures, we reach an unsatisfactory condition. To follow the action of the high wheel pressures, they move the metal on the sur-

face of the head and induce internal strains of compression. These internal strains of compression may be of considerable magnitude, and when they exist there must be a tensile component in the steel below it, so that we have just below the running surface of the head, metal which is put into tension, and if structurally slightly unsound, there is an opportunity for an incipient fracture to develop in that tensile part of the steel. Now, to show that the stresses from a disturbing cause like that are considerable, I would mention an instance of this kind, referring to a steel forging which had walls 3 in. thick. The metal of that cylinder was so disturbed by light hammering with a hand hammer that the bore was enlarged. The dimensions of this cylinder were 8-in. bore, 15-in. outside diameter, leaving a 3½-in. thickness for the walls. Hammering the outside surface of that cylinder stretched the bore. Turning off ⅛ in. of metal on a side restored the diameter of the bore to its original dimension. That showed that the internal strains in a zone only ⅛ in. thick were capable of stretching the balance of 3½ in. and making its effect measurable. It means a good many thousand pounds pressure per square inch to do that, so that you can see the cold rolled surface of the head of the rail may have internal strains amounting to many thousand pounds per square inch induced. These strains, coupled with the fact that we may have a decarbonized exterior and hard center, the decarbonized exterior responding easily to the rolling of the wheels, and the hard interior, through its natural ductility, not being able to respond so well, furnish the opportunity of starting a fracture in the hard steel by reason of the lack of uniformity of the metal from the outside toward the center.

These are the things which we recognize as important in considering what the composition of the steel should be and would lead to limiting it to about the figures which I have mentioned, and to the exercising of care to see that the steel in the finished rail is fairly uniform in its composition from the exterior surface to the center of the head.

Mr. Churchill: Do you not think that the lowering of the phosphorus that we get in the open hearth process is a very valuable item to balance the large amount of carbon in the Bessemer?

Mr. Howard: I think that is undoubtedly true, but the effect of these metalloids, which is well recognized, does justify us in keeping them to the minimum.

Robert Trimble (N. W. Sys., P. L. W.): Mr. Howard has talked about the large internal stresses which are set up. Take a steel with an ultimate tensile strength of about 150,000 pounds per sq. in., how much internal stress can be set up in that steel without causing a fracture?

Mr. Howard: The internal stresses set up in steel can easily reach the elastic limit of the steel, so that if that steel had an elastic limit of 75,000 to 85,000 pounds per sq. in., we could closely approach that stress.

Mr. Trimble: You could not go over that?

Mr. Howard: No. When the steel is disturbed by cold working internal strain is certain to result. The intensity of the internal force may coincide very closely with the elastic limit of the material.

Mr. Lindsay: I would like to ask Mr. Howard if in his opinion the process of annealing would permit the parts to adjust themselves against the internal strain?

Mr. Howard: Annealing certainly does restore the equilibrium. Steel responds very readily to annealing temperatures. The annealing to be efficient has to be carried on at such a temperature that the metal does not have any elasticity. At the higher temperatures of annealing, the metal is in a viscous, plastic state.

Mr. Churchill: So far as Mr. Howard's statement refers to paragraph No. 4 of the specifications, I would state that the chemistry is the best we have in service to-day. It is not the extreme, one way or the other. The carbon content is the limit prescribed in a number of both manufacturers' and other specifications that have been used recently, and it is the limit which the manufacturers say they can work in.

Mr. Churchill: I want to call attention to the fact that we mark the gage specified in section 11 on either the head or the base, which allows it to be tested either with head up or down. Undoubtedly, rails break oftener from the top down. Hence, a test with top down is safe.

Mr. Fritch: The maximum temperature of the test pieces, specified in section 12, was changed from 120 to 100, was it not? I would like to know the purpose of that change.

Mr. Churchill: It was felt by many that 120 deg. was too high a limit, that would result in not giving a correct gage on the results of the test.

Mr. Churchill: Section 14 is an important addition to the specifications heretofore issued. Diagrams presented with the specification show the elongation and ductility to vary with the other tests. One of the best tests of structural steel is the elongation or contraction in 8 in. We want to use a test for rail that can be made quickly and at the same time bring out this same comparative information. The ductility test shows a very fair correspondence with the tensile test, for example. In other words, this gives us a quick means of finding the toughness or ductility of the material, the same as we find in a longer method, impracticable in a rail.

Mr. Sullivan: Now, is it not a fact that the elongation bears a direct ratio to the middle? Can you not measure elongation by the middle ordinate for a 3-ft. cord, rather than by these gage points?

Mr. Churchill: We don't agree that there is a direct ratio between the two. We started out a few years ago with the idea that the permanent set would be something of a guide, to give an idea of the character and uniformity of material, but last year's report showed that there is very great variation in the permanent set measurements. The minimum ductility is a better gage, and it is for that reason that it is suggested.

Mr. Fritch: The committee, in commenting on section 15, says that it is the intention, when sufficient data is at hand, to prescribe maximum and minimum limits for deflections under the drop test, and that this method of classifying rails is only tentative. I do not think any of us would reject rails on this specification, and it occurs to me that that paragraph could just as well be left out until we have reached definite conclusions as to where the maximum and minimum should be fixed.

Mr. Churchill: It is an extremely easy thing to measure the permanent set at the time the elongation is measured, and the permanent set becomes the check on too soft material. We want this information and we hope it will be taken. It is not an item mandatory or a basis for condemning the rail, but we think that we will have, at least, in time, a figure for the maximum set to determine when a rail is too soft.

Mr. Churchill: The test specified in section 16 shows, whether or not the material is too brittle, or in other words, whether enough discard has been made to secure sound material. The method of testing, specified in section 17, or rather the additional number of tests, are made first to discover anything that is defective, and, second, to prevent throwing away any good material. We have proved, in the last two years, that the making of tests in this manner is very quickly done and is not a costly affair. The result of these three trials, on a Bessemer heat of steel, will reduce to a minimum the amount of material that is thrown away. It is conceivable that the full ductility of the metal is not secured under one blow, therefore we make a second blow in that case. If the rail does not break in two blows, for example, we want to go on with another test, which is the breaking to destruction to find out the character of the inner metal as far as the eye can determine, to find out whether there are any interior flaws.

Mr. Seddon: I would like to ask the committee whether they have considered at all the breaking of a piece from the top of each ingot. The drop test is all right so far as that ingot goes, but it does not seem to me that that would necessarily tell us anything about the soundness of the top rails of the other ingots.

Mr. Churchill: This method carries out the general practice in all steel testing. We do not test every ingot of any structural steel. We think it would not be possible to keep the mills running and test every individual ingot. We do not say that as a finality. It is certainly in the right line to test more ingots.

Mr. Fritch: It seems to me we ought to quit taking a chance on accepting a lot of rails about which we know nothing in regard to the soundness of the material. The only way we can arrive at that is to take a test piece from each ingot and test it to destruction. It need not be a test piece of the full length, as specified here. A shorter test piece can be taken, and if it does involve a slightly additional cost it certainly will be worth the trouble. The specifications are a great advance over previous specifications, especially in the open hearth, where they take a test piece from three ingots, but if there are sixteen ingots you must take a chance on them. You know nothing positively about them, and while the primary test is all right, as far as it goes, we should have some secondary test made for soundness, about as follows:

"In addition to the primary tests above provided, the remaining ingots not tested shall be subjected to the following tests, to insure sound rails from each individual ingot.

"A test piece shall be taken from the A rail and if when nicked and broken it shows no interior defect, all the rails of that ingot shall be accepted. If, when nicked and broken,

it shows interior defects, the A rail of that ingot shall be rejected and a test piece taken from the B rail. If the test piece, when nicked and broken, shows no interior defect, all the remaining rails of the ingot shall be accepted. If the test piece, when nicked and broken, shows interior defects, all the rails above and including the B rails of the ingot shall be rejected, and a test piece taken from the C rail and tested in the same manner, and this process shall be continued until the remainder of the rails of the ingot are tested wherever the presence of interior defects is developed."

Mr. Churchill: We would prefer that you turn that suggestion over to us and let us work on it. We don't think it can be carried out just at present. The whole intent of Sections No. 17 and No. 18 is to encourage tests. This association was responsible, a few years ago, for increasing the number of tests from one in five heats to one in each heat. I believe, as we use these specifications, we will soon be in hearty accord in multiplying tests. The same force is there constantly at the drop-testing machine, and I see no reason in the world why, if any question is raised about any ingot or any test, an inspector should not say, "We will go on and test the next ingot;" and especially is that true in open-hearth steel, where the heats are larger.

Mr. Sullivan: A number of our Canadian mills have proposed voluntarily to sell us rails on the test of the top piece of every ingot, at 50 cents per ton extra. Did I correctly understand Mr. Churchill to state that he would keep hammering a rail until he got the required ductility?

Mr. Churchill: I think it would be a mistake to say that a 100-pound rail must show a given ductility as a minimum, with an 18-ft. drop. If that rail will stand the 18-ft. drop, we have no measure of its ductility. It has shown that it is not brittle, and there is every indication from the first that the bloom has been properly discarded, but we haven't the measure of the ductility.

Mr. Sullivan: The drop test is the physical check on the chemical composition. If one rail did not bend and other rails bent at the first drop, it would indicate it was either high in phosphorus or carbon. Have any rails been accepted under that specification?

Mr. Churchill: Yes.

Mr. Kittredge: The specifications of the New York Central have required subsequent blows. It is the universal practice with our rail inspectors.

Mr. Fritch: It occurred to me that Section 29 would read a little better if it were changed to read, "Rails accepted will be paid for according to actual weights."

Mr. Churchill: We accept that.

A motion that the specifications, as amended, be adopted, and printed in the manual, was carried.

ROADWAY.

(1) FORMULAE CAPABLE OF GENERAL APPLICATION FOR DETERMINING WATERWAY AREAS.

The committee has been considering for several years the possibility of preparing, or of selecting from the various formulæ in common use, one that can be recommended for general application. The investigation made since the report to the annual convention in March, 1909, does not warrant the committee in varying from the opinion then expressed and accepted by the association:

"(1) In determining the size of a given waterway, careful consideration should be given to local conditions, including flood height and flow, size and behavior of other openings in the vicinity carrying the same stream, characteristics of the channel and of the watershed area, climatic conditions, extent and character of traffic on the given line of road and probable consequences of interruptions to same, and any other elements likely to affect the safety or economy of the culvert or opening.

"(2) (a) The practice of using a formula to assist in fixing the proper size of the waterway in a given case is warranted to the extent that the formula and the values of the terms substituted therein are known to fit local conditions.

"(b) Waterway formulæ are also used as a guide in fixing or verifying culvert areas where only general information as to the local conditions is at hand.

"(c) The use of such formulæ should not displace careful observation and the exercise of intelligent judgment on the part of the engineer.

"(d) No single waterway formula can be recommended as fitting all conditions of practice."

To the above the committee added the following conclusions in its report to the annual convention in March, 1911:

"(1) There is a general relationship between the best-known waterway and run-off formulæ. This relationship may be expressed by two terms, a varying co-efficient and a varying exponent.

"(2) The extent of this relationship for large and small areas is indicated by the Dun waterway data."

The committee's work since the twelfth annual convention has been directed toward the consideration rather of the hydraulic features of the culvert, and while some progress has been made, the committee is not prepared now to make any definite recommendation.

(2) UNIT PRESSURES ALLOWABLE ON ROADBEDS OF DIFFERENT MATERIALS.

The committee has been collecting information for two years for the purpose of formulating a conclusion as to what unit pressures are allowable on the roadbed, and has come to the conclusion that since the available data treats of the sustaining power of soils below the surface, rather than of that of soils peculiarly exposed as the roadbed is to moisture, to the action of frost, and to the loadings peculiar to train service, it will be necessary to make experiments to determine the magnitude and distribution of the loads transmitted to the roadbed through ballast of various kinds and also to determine by test the bearing power of various materials under varying conditions ordinarily attained in the construction of the roadway. The committee submits as information the following memorandum prepared by W. M. Dawley, vice-chairman, after adjournment of the November, 1911, meeting:

"The safe bearing power of soils depends upon their character or composition, depth of strata, amount of water



J. E. WILLOUGHBY.

Chairman Committee on Roadway.

they contain or are liable to receive and the degree to which they are confined.

"Practically all of the published data in relation to the bearing power of soils is in connection with foundation work for bridges and buildings and the bearing values given are for loads applied at varying depths below the surface of the ground, hence on soils more or less well confined, and serve merely as a rough guide to the bearing power of soils other than rock when the load is applied at the surface and the soil is unconfined.

"The accompanying table from 'Data' gives the safe bearing value in tons per square foot of soils and rock which may be placed on uniform strata of considerable thickness and well confined.

"Elmer L. Corthell has tabulated various existing pressures of stable structures which have shown no settlement. Data were obtained from 178 separate works, in response to a letter sent to prominent engineers throughout the world, requesting their experiences. The average value given, Mr. Corthell says, is low, and a safe one lies between the average and maximum. (See 'Allowable Pressures on Deep Foundations,' Corthell, 1906.)

"G. F. Gebhardt gives values which are an average of maximum loads allowed in most cities under the building laws.

"Richard Delafield, Brevet Major-General, Corps of Engineers, United States Army, member of Light House Board,

in 'Memoir on Foundations in Compressible Soils,' Washington, D. C., 1881, says, on page 13:

"'The compressibility of oolitic clays can only be overcome by piling, deep sinking, heavy ramming or heavy weighting. The point of bearing must be carried below the possibility of upward reaction. The depth of a foundation in compressible ground ought not to be less than one-fourth the intended height of the building above ground; that is, for a shaft of 200 ft., the foundation should be made secure to a depth of 50 ft. by piling or by well-sinking and concrete.' (Engineer and Architectural Journal, for 1837.) Masses of concrete, brick or stone, placed on a compressible substratum, however cramped and bound, may prove unsafe. *Solidity from a considerable depth alone can be relied upon.* Mere enlargement of a base may not in itself be sufficient.

"In experiments made by Hugh Leonard (M. A.) at Akra for the purpose of testing the ordinary undisturbed alluvial soil of Calcutta, 'The results showed that for Calcutta the weight on the foundation should not be more than one ton to the superficial foot.' (Journal of Royal Institute of British Architects, 1900, pp. 390-394.)

"In Cunningham's Dock Engineering, page 183, speaking of foundations for masonry dock walls, it is stated that 'The maximum intensity of pressure, at any point, should not exceed a certain limit, dependent upon the nature of the ground. The safe intensity of pressure on natural foundations has been determined as follows:

On hard rock	9 to 10	tons per sq. ft.
On soft rock and hard clay	2 to 3	tons per sq. ft.
On sand and gravel	1½ to 2	tons per sq. ft.
On compact earth	1 to 1½	tons per sq. ft.
On soft, uncertain ground	½	ton per sq. ft.

Character of Soil	Authority											
	I. O. Baker		G. B. Francis		Elmer L. Corthell			G. F. Gebhardt		W. W. Christie	
	Min.	Max.	Min.	Max.	Min.	Max.	Av.	Min.	Max.	Min.	Max.
ROCK—Granite, etc., in hard, compact strata	200		Ledge Rock	30				Solid Bed Rock up to 20% of net Crushing Strength		Solid Bed Rock	200
ROCK—Limestone, equal to best ashlar masonry	25	30									
ROCK—Sandstone, equal to poor brick masonry	15	20									
ROCK—Soft and pliable as shale, equal to poor brick masonry	5	10									
ROCK—Broken and well compacted								10 0	15 0	5 to 25	
HARD PAN—Gravel and sand well cemented with clay	8	10	8		3	12	8 7				
CLAY—Thick beds and dry	6	8	3		2	8	5.08	3 0	4 0		4
CLAY—Thick beds and moderately dry	4	6						2 0			
CLAY—Soft, wet, or confined	1	2	2					1.0			1
GRAVEL—Coarse and dry, well compacted and confined			5		2 4	7 75	5 1	6.0	8.0		8
SAND—Dry, compact, well cemented with clay	4	6			2.5	8 5	4 9	1.5			4
SAND—Clear and dry, confined in natural beds	2	4	4		2.25	5 8	1.5	2 0			2
QUICKSAND—Marshy and alluvial soils, silt, etc., confined	0.5	1	1		1.5	6 2	2 9	0.5			0 5

Safe Bearing Pressures Per Square Foot of Different Soils.

"'In the case of natural foundations, care must be taken that there is no possibility of lateral escape,' and again at page 247, speaking of Lock Foundations:

"'As a general rule, hard rock and stiff clay, in which there are no springs, do not call per se for any artificial covering, except such as may be judged necessary to protect their surface from the softening and scouring action of water. On the other hand, alluvial deposits, sand, gravel and other incohesive strata, need the confinement afforded by a superimposed mass in addition to the lateral support of sheet-piles.

"'Earth of a porous nature, moreover, is not only unsuitable for a natural floor, but is equally undesirable as a foundation for an artificial floor, owing to its efficacy as a medium for the transmission of water pressure, on which account any covering laid upon it should be both strong and impervious.'"

Alfred C. Prime reports as follows:

Rock Subgrade.—"A good quality of rock will stand up under the heaviest axle loads and under Class 'A' traffic it is sustaining axle loads on one pair of drivers of 61,500 lbs. without any signs of failure. Considering this load as distributed over two ties, gives a unit pressure of 850 lbs. a sq. ft. As stated previously the limit of bearing is unknown, but a good quality of rock will probably sustain, with proper ballast, the highest axle loads that can be placed upon it.

Clay Subgrade.—"I never had any satisfaction in maintaining tracks where roadbed subgrade was composed of clay. It has always resulted in a high maintenance cost. The track will get out of line and surface and will require from one-third to one-half as much work again as where loam or sand is used. I personally believe that clay should never be used in fills on account of its high maintenance cost.

	Load Per Sq. Ft. Lbs.	Total Load Lbs.	Settlement in Inches		
			Dec. 13-17	Dec. 19	Dec. 24
Pit No. 1	650	6100	3/4	1/8	5/8
Pit No. 2	1000	9280	1/16	1/4	1/2
Pit No. 3	1300	12000	3/8	1/8	1/2

F. T. Llewellyn Tests on Soils at New Orleans.

"A good grade of yellow clay will under Class 'B' traffic and axle loads of 61,500 lbs. with 6 in. of cinder ballast just sustain a pressure of about 900 lbs. per sq. ft. The speed of trains averages 60 miles per hour.

Sandy Loam.—"This has always given me satisfaction where I have used it and had to maintain track. Under Class 'A' and 'B' traffic, speed 60-70 miles per hour, with a proper depth of ballast it will maintain the heaviest axle loads that can be placed upon it. I know it is maintaining pressures of 900 lbs. per sq. ft. and how much more it is capable of sustaining is unknown.

Ocean Sand.—"For Class 'C' traffic this is a satisfactory subgrade for loads up to 700 lbs. per sq. ft., which is about the limit of economical maintenance.

"A sand subgrade can be made to sustain Class 'B' traffic by raising track about 18 in. on engine cinders.

"All figures given above are for a single track roadway 20 ft. wide with slopes of 1½ to 1, and good drainage, with 6 in. of cinder ballast below base of tie, and a tie spacing of 22 in.

"The only cheap and inexpensive method for determining unit pressures on subgrades, known to me, is to spread some pliable substance such as fairly thin sheet lead on top of your subgrade for a length of say 5 ft. As long as this remains straight and undeformed your allowable unit pressure on subgrade is not being exceeded, but the moment it becomes cupped and dished under the ties, the unit pressure for this class of roadbed subgrade is too high.

"In connection with this work the report of the M. W. & S. Committee on Roadbed of the Altoona Railroad Club in May, 1909, on 'Drainage of a Four-Track Railroad,' con-

Location of Tunnel	Date of Installation	Rate of Grade	Location of Fans	Length of Tunnel, Ft	Section Sq. Ft.	Contents Cu. Ft.	Cu. Ft. Air delivered per min. through Tunnel	Remarks
N. & W. Ry. Elkhorn, Coaldale, W. Va	6-01	+1.4%E	Lower End	3000	ST235	705000	400000	Train ton rating inc. in 1901, 100 tons.
C. & O. Ry. Big Bend, E. Hinton, W. Va.	12-02	¾ Lgth. +0.4%E	Upper End	6500	ST250	1625000	300000	Train ton rating inc. 228 tons
P. R. R. Gallitzin, W. Altoona, Pa.	4-05	+0.5%W	Lower End	3600	ST324	1166400	502000	
P. R. R. Washington, D. C., Station	12-07	+0.13%S	Upper End	Tubes 4050 Sta. 760	1 tube 260 2 6 tracks	3371800	640000	2 tubes, 520 sq. ft. Station end variable.
P. R. R. North and East Rivers, N. Y.	9-10	Special installation 14 fans for emergency uses vent. of tubes that are 41 35 ft. to 7357 ft. 225					40000 to 111000	
B. & O. R. R. Kingwood Tunnelton, W. Va.	12-10	+1.0%E	Lower End	4138	ST352	1455000	600000	Train ton rating inc. 450 tons.
C. & O. Ry. Lewis, Alleghany, Va.	6-11	+1.14%W	Lower End	4026	ST318	1280200	508800	
N. Y. C. Lines Weehawken, N. J.	8-11	+0.25%E	Lower End	4365	DT469	2047200	512000	144 trains per day.
P. R. R. B. & P. Tunnel, Baltimore, Md.	9-11	+1.32%S	Upper End	4963	DT432	2150000	500000	193 trains per day

Record of Tunnel Ventilation.

tains some interesting matter, also a paper by M. L. Byers in the Bulletin of the International Railway Congress for September, 1909."

In December, 1898, F. T. Llewellyn made some tests to determine the safe load on soils at New Orleans. Pits 4 ft. x 4 ft. x 5 ft. deep were used, the water surface being 18 in. below the bottom of pit in blue clay. A wood foundation 3 ft. x 3 ft. of 3 in. x 12 in. plank doubled and crossed was used.

O. E. Selby, bridge engineer, C. C. C. & St. L., using the formula derived by Thos. H. Johnson, calculates the average pressure on subgrade to be 2.4 tons per sq. ft., and the maximum to be 3.6 tons for 50,000-lb. axle loads spaced 5 ft. centers, 80-lb. rail, 7 in. x 8 in. x 8½ ft. ties spaced 20-in. centers on 12 in. of gravel ballast.

From what has preceded it will be observed that the safe bearing power of confined soft wet clay, clear dry sand confined in natural beds, quicksand, marshy and alluvial soils, silt, etc., all confined, is less than or very slightly in excess of the pressures calculated by Mr. Selby. If unconfined their bearing powers will all be somewhat reduced.

Semi-fluid soils such as quicksand, alluvium, etc., should be removed where practicable or the foundation carried to a lower stratum, so the bearing power of such need not be considered here.

The bearing power of clay, loam, sand, etc., depends to a great extent on the amount of moisture present.

Professor Schubler of Tübingen found that 100 lbs. of dry soil would retain the following amount of water that would not flow off:

Pure Clay	70 lbs.
Clay Loam	50 lbs.
Loamy Soil	40 lbs.
Sand	25 lbs.

(Drainage Farm Journal, August, 1884.)

The water which destroys the bearing power of such soils may come from below by capillary attraction, the vertical capillary movement per horizontal square foot per 24 hours being as follows:

In fine sand through 1 ft. vertical	2.37 lbs.
In fine sand through 2 ft. vertical	2.07 lbs.
In fine sand through 3 ft. vertical	1.23 lbs.
In fine sand through 4 ft. vertical	.91 lbs.
In medium clay loam through 1 ft. vertical	2.05 lbs.
In medium clay loam through 2 ft. vertical	1.62 lbs.
In medium clay loam through 3 ft. vertical	1.00 lbs.
In medium clay loam through 4 ft. vertical	.90 lbs.

(See page 65, "Movements of Ground Water," by Franklin H. King and Charles S. Slichter, Government Printing Office, Washington, D. C., 1899.)

If, as Professor Baker says, dry clay will sustain a load of from six to eight tons per sq. ft. and soft wet clay will support but from one to two tons per sq. ft., it seems that the bearing power of clays and soils similarly affected by the presence of moisture should in each case be experimentally determined for varying percentages of moisture and such drainage arrangements made, and at such depths, as will always secure a percentage of moisture low enough to bring the bearing power up to the load it is required to carry.

(3) TUNNEL CONSTRUCTION AND VENTILATION.

The committee recommended to the annual convention of 1910 the cross-section to which tunnels should be constructed to conform to good practice. The recommendation was adopted, and the committee has since that convention confined its attention principally to the question of ventilation. No definite conclusion has been reached, but the opinion of the committee leans to a belief that artificial ventilation is usually unnecessary in American steam railway tunnels of less length than 2,000 to 2,500 ft., and that probably the most efficient form of artificial ventilation is to force air into one end of the tunnel by fans powerful enough to drive the smoke out ahead of the train. This method was adopted for the Elkhorn tunnel on the Norfolk & Western and is admirably described by Chas. S. Churchill in the Transactions of the American Society of Civil Engineers, Vol. 54, part C. Plants similar to that constructed for the Elkhorn tunnel have been installed as shown by the accompanying table. The committee has advice that the Baltimore & Ohio is now experimenting on single and double track tunnel ventilation, but the various methods used in the different tunnels are at such great variance that no conclusion has as yet been reached.

(4) AGRICULTURAL DRAINAGE AS IT AFFECTS RAILWAYS.

During the past two years the committee collected information as to the drainage laws of the various states, but has never been able to fix upon a form into which the information can be put so as to make it of value to the assocation. The committee is of the opinion that further work along the line of collecting information as to laws and assessments is futile because the laws are changing constantly, and because the committee's information is necessarily general and not subject to application to specific cases without legal advice; and further, questions affecting the laws and assessments are, in all railway organizations, handled by the railway's attorneys. The committee recommends that it be discharged from further consideration of the subject as to laws and assessments.

CONCLUSIONS

The committee recommends that subjects 1, 2 and 3 be reassigned and that further consideration of subject 4 be confined to the benefits to the roadway to be derived by the construction of agricultural drainage ditches and levees. The committee believes that certain additions can be made to the specifications as now printed in the manual, for example, the sodding of slopes of cuts and fills.

The committee directs attention to a resolution passed at its meeting on November 28:

"Resolved, That the board of direction be requested to set aside an appropriation and to appoint a special committee, consisting of members of the roadway, ballast and track committees, to make experiments to determine the magnitude and distribution of the load transmitted to the roadbed through ballast of various kinds and also to determine by test the bearing power of various materials under varying conditions ordinarily found in the construction of the roadway."

The report is signed by J. E. Willoughby (L. & N.), chairman; W. M. Dawley (Erie), vice-chairman; J. R. W. Ambrose (G. T.), John C. Beye (C. R. I. & P.), D. J. Brumley (I. C.), W. C. Curd (M. P.), Paul Didier (B. & O.), R. C. Falconer (Erie), S. B. Fisher (M. K. & T.), T. H. Gatlin (Southern), C. S. Millard (C. C. C. & St. L.), W. D. Pence (Univ. of Wisconsin), A. C. Prime (P. R. R.), Hiram J. Slifer (C. G. W.), J. A. Spielmann (B. & O.), John G. Sullivan (C. P.), F. L. Wheaton (D. L. & W.), W. P. Wiltsee (N. & W.), R. C. Young (L. S. & I.).

In the absence of the chairman, W. M. Dawley (Erie) presented the report, which was received as a progress report.

WATER SERVICE.

The following subjects were assigned:

(1) Report on the design and relative economy of track pans from an operating standpoint.

(2) Present typical plans and specifications for tank supports.

(3) Report on the use of reinforced concrete for water tanks and supports.

It was decided, since the subject of "Water Tanks," including supports, had been under consideration so long, to request the board to drop subject No. 2 and substitute "Deep Well Pumps," approval of which was given later.

A Sub-Committee on Water Treatment was appointed with the idea that the committee should have such a sub-committee every year whose duty it would be to keep informed of the progress in this subject, and make reports as seemed desirable.

(1) The committee reports progress on the design and relative economy of track pans from an operating standpoint. No further report is made for the reason that such additional data as can be secured is from elaborate tests made by the Pennsylvania Railroad at Atglen, Pa., which are not yet available. The committee also hopes to secure a report prepared for a special committee of the New York Central Lines by G. W. Vaughan, engineer maintenance of way of that railway.

(2) It also reports progress on the study of deep well pumps. This subject has not been developed sufficiently to report otherwise.

(4) The committee reports progress in the study of water treatment.

(3) THE USE OF REINFORCED CONCRETE FOR RAILWAY WATER TANKS AND SUPPORTS.

Reinforced concrete tanks have been built either as standpipes or as elevater tanks on concrete towers.

The advantages are:

(1) Low maintenance cost.

(2) Great durability.

This may be true only of well-designed, well-built and water-tight tanks.

The disadvantages are:

(1) Innovation in railway service.
(2) Imperfections in materials and workmanship.
(3) Greater first cost.
(4) Porosity of the concrete.
(5) Shrinkage of the concrete.
(6) Stretch of the concrete.
(7) Difficulty of waterproofing.
(8) Effect of frost on saturated concrete.
(9) Ugliness.
(10) Immovablity.

No. 1 will be removed in time if the concrete tank develops sufficient merit.

No. 2 is more incidental than fundamental, but the making of a strictly uniform high-grade monolithic concrete construction without local imperfections is difficult and requires highly efficient workmanship.

No. 3 may be justified by the advantages named. It can be shown in some cases that a reinforced concrete tank costs less than a steel tank of like capacity, but in such cases the design is probably sparing in the use of steel and concrete. A thin shell and a high stress in the steel are liable to result in a leaky tank. Generally, when the stress in the steel is low enough and the tank shell thick enough



ROBERT FERRIDAY.

Chairman Committee on Water Service.

to insure against leakage, the cost of a reinforced concrete tank will be greater than that of a steel tank.

No. 4 is the root of much of the trouble with the concrete tank. It is not an insurmountable difficulty. Careful selection and grading of sand and stone, liberal use of cement, complete and uniform mixing and proper placing will make a concrete impervious under the pressures required for railway water service. Serious leaks will be due to local imperfections rather than to porosity if the tank has been well-designed and constructed of a proper grade of concrete.

No. 5 is a more fundamental difficulty. Shrinkage of concrete in setting is inevitable and it is increased by the large proportion of cement required in water tank construction. This frequently produces cracks, especially along the joints between successive courses of concrete. Careful and proper making of the joints and judicious steel reinforcement are necessary to prevent serious shrinkage cracks. The steel dam mentioned in the accompanying general specifications is a desirable thing in the joints when the concrete in the first half of the joint has hardened before the concrete in the second half is placed.

No. 6 is a serious difficulty in the shell of the tank due to elasticity of the steel reinforcement and its stretch under the water load. Any concrete, however dense and impervious in its unstrained condition, can be stretched beyond its breaking strength and fine cracks through which water will flow under pressure may be opened therein by stressing the steel within the elastic limit of the latter. If the tank could be maintained constantly full of water the moderate leakage due to such stretch would generally stop through deposits of suspended matter from the filtering water. In some cases this would be assisted by chemical precipitation. But, under general service conditions there is a wide fluctuation of pressure and the elastic recovery of the steel as the pressure drops appears to break down the plugging action of the leakage above indicated in those cases where the steel is stretched materially beyond the breaking point of the concrete.

Herein appears to lie a formidable handicap of the concrete tank as a competitor of the steel tank on the basis of cost. The effectual remedy appears to be the combination of that low stress in the steel with that increased thickness of the shell which will limit the stretch of the concrete so that cracks permitting the filtration of water will not be opened. That increases the cost of concrete and steel, making the latter approach the cost of steel in a steel tank.

The committee is of the opinion that the ultimate stress of the steel without assistance from the tensile strength of the concrete should not exceed 10,000 lbs. per sq. in., and that the minimum thickness in inches of the concrete at any point should be such that when the total tensile stress due to water load at that point is diminished by 3,000 times the sectional area in sq. in. of the steel at that point, the remaining water load will stress the concrete at that point 300 lbs. per sq. in., provided that in no case shall the thickness of concrete be less than 4 in. The committee does not say that concrete will not break under a tensile stress of 300 lbs. per sq. in., although experiments indicate that concrete of the high grade required for tank construction may have an ultimate tensile strength of 400 to 500 lbs. per sq. in.

This specification as to thickness of concrete is an arbitrary one intended to secure a minimum and reasonable thickness somewhat in excess of the thickness of concrete in tanks already constructed in which the stress in the steel has been 12,000 lbs. or more per sq. in., resulting in some leakage. The primary object is to secure a minimum thickness of wall in which tension cracks, if any, will be localized and minute and through which it would be difficult for water to pass. The size and the arrangement of the reinforcing rods have an important bearing on the minimum permissible thickness of concrete. The shrinkage of the concrete around large rods in a thin wall is liable to crack the concrete.

The trouble from stretch of the concrete raises the question as to the practicability of designing a tank shell to be in compression. This could be accomplished by building the shell as a series of short, flat, abutting arches convex to the center of the tank with the reinforcing steel supported by exterior pilasters forming the abutments of the arches, as indicated in the suggested plan and elevation of a section of concrete tank shell designed to be in compression appearing on the accompanying drawing, showing a general plan and general section for a suggested concrete standpipe. The radius of the arches may readily be proportioned to make the total compression in the concrete equal to the total tension in the steel. The reinforcing rods between the pilasters may be covered by metal lath and cement plaster. The density and imperviousness of the concrete in the arches would be increased by the water load. The polygonal form of the tank with its recessed panels would break the monotony of a plain cylinder and give the tank an improved appearance. Doubtless difficulties would arise in the execution of such a design, but without going into details, the suggestion is offered for what it is worth.

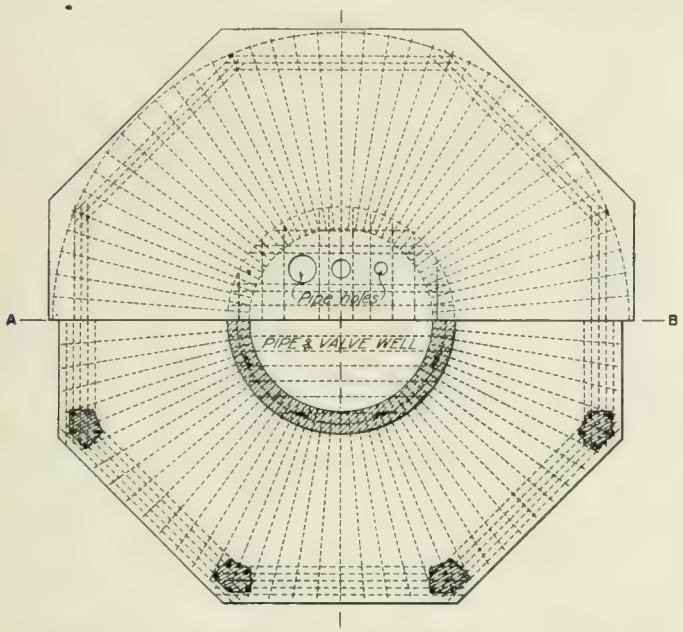
No. 7 arises from 4, 5 and 6. The problem is to find some foreign substance which, when incorporated with the concrete, will close the percentage of voids found even in the best grade of concrete, or, when applied to the surface, will be impervious and will not crack or peel off. In either case the trouble is aggravated and the waterproofing largely nullified by the shrinking and stretching of the concrete unless the latter is properly reinforced against shrinkage and stretch. Tanks in service prove that it is practicable to make concrete impervious under ordinary tank pressures by proper selection, grading and mixing of materials. Soap and alum incorporated with the concrete in the making and applied as washes to the surface are probably the best proved and most efficient materials for effective waterproofing of concrete.

No. 8 is a danger which will be eliminated by successful solution of waterproofing. Since the latter will require as its base a very dense concrete, the quantity of water passing through the latter will be so small that the action of frost can have little or no effect on such close grained and practically dry concrete. It is a fact, however, that in our northern latitudes much disintegration of porous concrete on the water line of lakes and streams due to the annual effect of the frost season is apparent.

Ugliness is a sin chargeable to some railway structures

other than water tanks. Perhaps a little additional homeliness is not unpardonable if saved by the grace of utility. Monolithic concrete, especially a form-marked, joint-marked, leaky efflorescent tank shell possesses a lack of beauty which is not hidden by frills. The attainment of a water-tight tank requires a high grade of material and work which will go far toward making concrete tanks presentable in appearance.

An irremovable objection to the concrete tank is its immovability. A wooden tank and even a steel tank can be and such tanks are moved from place to place to meet changing requirements of railway water supply. Discovery of new and better water supplies sometimes makes changes in locations of tanks desirable. A concrete tank should be



Half Deck and Half Foundation Plan of Substructure for Reinforced Concrete Water Tank.

located only at those points where there is no probability of change.

Considering the obvious merits of the concrete tank, the committee sees no reason why railways engaged in permanent reconstructions for fixed water supplies should not favorably consider a beginning in reinforced concrete tank construction. Water-tightness is the important problem. The stability of this form of construction is well established.

Many existing concrete tanks are practically water-tight. Generally, leakage is immaterial in amount and objectionable principally as a matter of appearance and a possible danger account of frost. It is more often the result of local imperfections, bad joints, and a thin shell and a high stress in the steel than porosity and permeability in a proper grade of concrete.

The committee submits as information:

(1) General Specifications for Reinforced Concrete Standpipe Water Tanks for Railways. No plans of tank are submitted with these specifications.

(2) Suggestive sketches consisting of: An elevation and section of reinforced concrete standpipe tank. A section through valve box in the foundation. A plan and elevation for reinforced concrete tank shell designed to be in compression. An elevation and section of reinforced concrete tank on a reinforced concrete substructure, and a plan, elevation and section of reinforced concrete substructure.

The tank should be located away from the main line track and should deliver water to engines through water columns.

If a roof is required, it should be built as shown. Where ice will not form to an injurious or troublesome extent and sunlight will not cause vegetable growth in the water, the roof may be omitted.

For a given amount of available storage and considering piping, frostproofing, and collection and disposal of sludge, the standpipe is simpler and more economical than a tank on a tower, notwithstanding it is practicable to erect a concrete tower 20 ft. high including foundation at an expense less than the cost of the foundation and lower 20 ft. of a concrete standpipe. This refers to railway service. For quantities of water required only at higher elevations, the concrete tower may readily be more economical than the standpipe.

The construction of the concrete tank on the concrete substructure would not differ materially from that of the concrete standpipe, and the general specifications for the latter may be applied generally to the former.

The substructure may also be used for supporting tanks of wood or steel. Its general design consists of an octagonal foundation slab and an octagonal desk slab, the latter being carried on the reinforced columns and the central pipe and valve well resting on the foundation. The plan shows the general arrangement of the reinforcement. The foundation slab distributes the load under its entire area, keeps the unit load low and is favorable to uniform settlement, if any. On a rock foundation this slab may be omitted. The central well serves for enclosing and frostproofing the piping and valves, helps to support the deck and makes the entire sub and superstructure stable against wind pressure without assistance from the surrounding columns. The plan contemplates a substructure not more than 20 ft. high above the ground, in which case the columns require no lateral bracing. In the construction of the substructure the ordinary approved building loads, stresses, materials and workmanship for reinforced concrete are acceptable and sufficient. The question of waterproofing does not enter unless it is desired to make the deck slab the bottom of the tank when the latter is made of concrete.

These general plans are submitted, not as those which should be adopted, but as suggestions for a number of good designs which could be made.

GENERAL SPECIFICATIONS FOR A REINFORCED CONCRETE STANDPIPE WATER TANK FOR RAILWAYS.

Definitions.

1. The words "company," "engineer," "as shown," "drawings," and "this association," appearing in these specifications, are defined as follows:

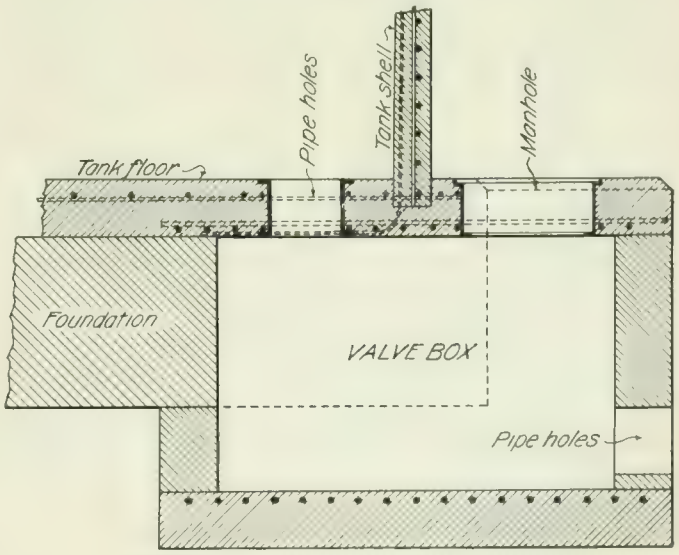
"Company" means the railway company building a tank under these specifications.

"Engineer" means the engineer of the company.

"As shown" means as shown on the drawings.

"Drawings" means the drawings of the tank herein specified and forming a part of these specifications, including such working drawings as the engineer shall prepare or approve.

"This association" means the American Railway Engineering Association.



Suggested Section Through Valve Box.

Kind.

2. This tank shall be of reinforced concrete as shown.

Excavations.

3. In earth, excavation for the foundation should be as deep as the lowest frost line. In rock, only the excavation for the valve box should be carried below the action of frost. In earth, the bottom of the excavations should be thoroughly tamped. If the earth will not sustain the total load, including wind pressure, without material or unequal settlement, the foundation should be supported on piles of the number, size and arrangement as determined by the engineer. Such

piles should conform to the specifications of this association for piling as selected by the engineer.

Foundation.

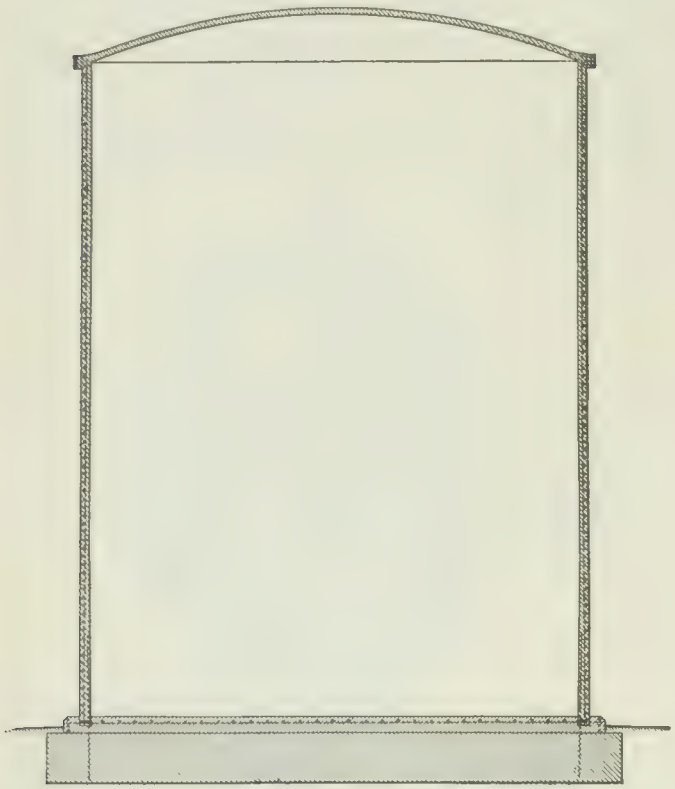
4. The foundation should be monolithic concrete of the form and dimensions as shown. If the depth of frost is excessive the foundation may be carried on broken rock uniformly compacted in the bottom of the excavation. The top of the foundation should be above the surface of the ground.

Floor.

5. The tank floor shall be constructed on the foundation as shown.

Valve Box.

6. The valve box shall be constructed as shown. When low temperatures require to prevent freezing within the



Suggested General Design for a Reinforced Concrete Standpipe.

valve box, an air space should be constructed in the middle of the valve box walls as shown.

Shell.

7. The concrete shell shall be constructed and the construction between it and the floor shall be as shown. Its thickness should have a proper relation to the sizes and positions of the reinforcing rods so that the concrete will not crack in shrinking around the rods.

Piping and Valves.

8. This tank should be equipped with standard iron pipes and stndard gate valves located in the valve box as shown. The pipes should pass from the valve box in iron sleeves with lead joints into the tank as shown. There should be a tank supply pipe, a washout pipe, a water column supply pipe, and if required, an overflow pipe. For a gravity water supply, an altitude controlling valve in the valve box or a float valve in the tank should be placed in or on the tank supply pipe as shown. The tank supply pipe and the water column supply pipe should extend above the floor of the tank, but the water column supply pipe should not rise higher than the top of the water column served. The washout pipe should terminate flush with the floor.

Gage.

9. The tank should be equipped with a gage, indicator and float as shown.

Ladder.

10. The tank should be provided with a ladder as shown.

Concrete.

11. The concrete in the floor, shell and roof shall be a thoroughly uniform and dense mixture of cement, sand, stone and water, made and laid in accordance with the specifications of this association for reinforced concrete. The volume of the sand shall be in excess of the voids in the stone. The volume of the cement shall be in excess of the voids in the evenly mixed sand and stone. The excess of sand and cement shall be such as will give the greatest attainable density in the concrete. The volume of water shall be sufficient to give the concrete a fluidity that will cause it to flow and mold itself into the forms readily and completely. An unnecessary quantity of water shall not be used. The engineer shall determine the above specified voids and proportions.

In the foundation, the concrete shall be mixed in the proportions specified by the engineer and it shall fulfill the requirements of the specifications for concrete of this association.

Mixing.

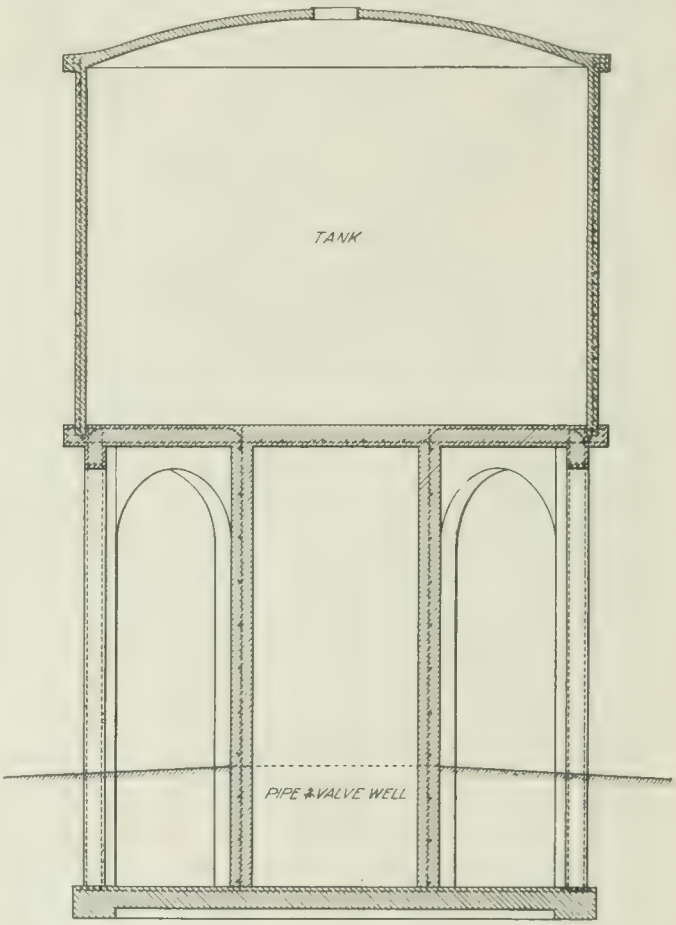
12. The concrete should preferably be mixed by batch mixing machines. The method used shall yield a complete and even mixture.

Cleanliness.

13. All dirt and foreign matter shall be excluded from all materials, concrete and stages of the work.

Pouring and Mixing.

14. This concrete, after mixing, shall be poured and worked into final position in the forms before its initial set



Suggested General Plan for Reinforced Concrete Water Tank and Substructure.

is complete, and it shall not thereafter be disturbed. As it is thus placed, it shall be thoroughly worked throughout by flat thin-bladed tools in a manner that will eliminate all voids and air pockets and produce unbroken mortar faces against all forms and secure perfect contact with every part of all reinforcing rods therein.

Joints.

15. The surface of concrete in joints should be free of laitance and all foreign matter and should be rough, fresh, clean and wet when concrete is laid thereon. The surface

should be covered with a heavy coat of grout or mortar immediately in advance of placing concrete thereon. The surface should be thoroughly tooled, scrubbed and washed preparatory to the application of grout and concrete. The new concrete should be worked into complete contact with the old concrete.

Muriatic acid or equivalent may be used as a help to the tooling and scrubbing, but all of the concrete penetrated by the acid should be entirely removed.

A metal dam of non-corrosive metal like copper should be inserted in the concrete joints intended to prevent the passage of water. The metal should be driven edgewise into the first half of the joint to a depth equal to half the width of the metal before the initial set of the concrete is complete. The contact between the concrete and the metal should be complete and perfect. The edges of the metal should be turned over 90 degrees for anchorage. Joints in the metal dam should be lapped at the ends in a manner that will secure water-tight joints.

This specification for joints does not necessarily and preferably may not apply to the joint between the floor and the foundation.

The entire process of making joints shall be as required.

Wetting.

16. Rapid drying out of concrete shall be prevented by regular, frequent and continued wetting of all exposed concrete surfaces until all danger of arresting setting and hardening is past.

Freezing.

17. Freezing of concrete before it has finally set shall be prevented.

Broken.

18. Any concrete broken or displaced in any manner after having set shall be removed from the work.

Cement.

19. The cement shall conform to the specifications of this association for Portland cement. It shall retain its original purity and qualities until it is incorporated into this work. Deteriorated or otherwise damaged cement shall not be used.

Sand.

20. The sand shall be clean, sound and sharp and it shall be of graded sized grains giving a minimum of voids.

Stone.

21. The stone shall be clean, sound and durable. The word "stone" includes broken rock and gravel. The stone shall be of graded sizes, giving a minimum of voids. All of it shall be able to pass through a circular hole having a diameter of ¾-in.

Water.

22. The water shall be clean and free from anything injurious to the concrete.

Forms.

23. The concrete forms should be made of dressed and matched lumber or of metal. They should be accurately made and erected, be water-tight and should have ample strength and rigidity to prevent bending and warping under the load and action of the concrete. They should be erected in such manner as will permit the concrete to be poured and worked as above specified.

Pointing.

24. Any break in the concrete surfaces, not impairing the integrity of the structure, shall be pointed by cement mortar as the engineer shall direct. Any other imperfections in the concrete shall be treated and remedied as the engineer shall direct.

Reinforcement.

25. The concrete shall be reinforced by metal rods of the kind, form, size, number and arrangement as shown. They shall be maintained in required position as they are buried in the concrete, at which time they shall be free from dirt, paint, oil, grease and scale. Splices in a line of rods shall be lapped far enough to develop the full strength of each rod. Throughout the splice the ends of the rods making it shall be far enough apart to develop maximum total adhesion of the concrete. Unnecessary splicing shall be avoided. No splice shall be opposite a splice in an adjacent line of rods.

Reinforcing Rods.

26. The rods shall be metal rods, plain or deformed. Their tensile strength shall be not less than 50,000 lbs. per sq. in. Their elastic limit shall be not less than 30,000 lbs. per sq. in. Their ductility shall be such that any rod can be bent 180 deg. on a radius equal to 2 diameters or sides of the rod without sign of fracture.

Stresses.

27. Assuming the metal rods to carry the water pressure and other stresses without aid from the tensile strength of the concrete, the stress per sq. in. in the rods should not exceed 10,000 lbs. Vertical reinforcement in the shell, between the shell and the foundation and across joints in the concrete should be ample to prevent opening of cracks in the concrete. Reinforcement in all necessary directions should be ample to prevent as far as practicable the opening of cracks in the concretet due to itts shrinkage in setting and to its stretching under the water load. The minimum thickness in inches of concrete at any point should be such that when the water load in pounds at that point is diminished by 3,000 times the sectional area in sq. in. of the metal reinforcement at that point, the remaining water load will stress the concrete not more than 300 lbs. per sq. in. at that point, provided that in no case shall the thickness be less than 4 in.

Loading.

28. The weight of water should be assumed to be 63 lbs. per cu. ft. Wind pressure, acting in any direction, should be assumed to be, in pounds, 30 times the product of the height by two-thirds of the diameter of the tank in feet.

Waterproofing.

29. A uniformly dense mixture of concrete as herein specified should be the primary expedient to secure water-tight concrete. This may be supplemented by mixing with the concrete some form of waterproofing compound of proved efficiency or by washing the concrete surface therewith, or by both.

The engineer shall select the waterproofing material and determine the proper proportions and methods of application.

Waterproofing by the application of rich cement mortar may be acceptable if the foregoing specification for making joints in concrete work is complied with.

GENERAL SPECIFICATIONS FOR ORDINARY STEEL WATER AND OIL TANKS.

(Revised November, 1911. Submitted with recommendation that they be printed in the manual.)

Ordinary Tanks Defined.

1. Ordinary tanks are those requiring plates not more than ⅝-in. thick.

Scope of Specifications.

2. These specifications cover ordinary steel tanks commonly used by railways for usual service conditions only.

Quality of Metal.

3. The metal in these tanks shall be a special refined steel or open-hearth steel.

The special refined steel shall have a tensile strength per sq. in. not less than 50,000 lbs. and an elastic limit not less than 30,000 lbs. per sq. in. It shall contain of

Sulphur	Not more than .02 per cent.
Phosphorus	Not more than .005 per cent.
Carbon	Not more than .02 per cent.
Manganese	Not more than .00 per cent.
Silicon	Not more than .00 per cent.

The open-hearth steel shall conform in physical and chemical properties to the specifications of this association for steel bridges.

For plates not more than ⅛-in. thick, ⅝-in. rivets shall be used. For thicker plates the diameter shall be ¾-in.

Loading.

4. The weight of water shall be assumed to be 63 lbs., crude oil 56 lbs., and creosote oil 66 lbs. per cu. ft. Wind pressure, acting in any direction, shall be assumed to be, in pounds, 30 times the product of the height by two-thirds of the diameter of the tank in feet.

Unit Stresses.

5. Unit stresses shall not exceed the following:

(a) Tension in plates, 15,000 lbs. per sq. in. on net section.

(b) Shear in plates, 12,000 lbs. per sq. in. on net section.

(c) Shear on rivets, 12,000 lbs. per sq. in. on net section.

(d) Bearing pressure on field rivets, 20,000 lbs. per sq. in.

Cylindrical Rings.

6. Plates forming the shell of the tank shall be cylindrical and of different diameters, in and out, from course to course.

Workmanship.

7. All workmanship shall be first class. All plates shall be beveled on all edges for caulking after being punched. The punching shall be from the surface to be in contact. The plates shall be formed cold to exact form after punching and beveling. All rivet holes shall be accurately spaced. Drift pins shall be used only for bringing the parts together. They shall not be driven with enough force to deform the metal about the holes. Power riveting and caulking should be used. A heavy yoke or pneumatic bucker shall be used for power driven rivets. Riveting shall draw the joints to full and tight bearing.

Caulking.

8. The tank shall be made water or oil tight by caulking only. No foreign substance shall be used in the joints. For water tanks, the caulking shall preferably be done on the inside of tank and joint only; but for oil tanks the caulking should be done on both sides. No form of caulking tool or work that injures the abutting plate shall be used.

Minimum Thickness of Plates.

9. The minimum thickness of plates in the cylindrical part of the tank shall not be less than ¼-in. and in flat bottoms not less than $\frac{5}{16}$-in. In curved bottoms the thickness of plate shall be not less than that of the lower plate in the cylindrical part.

Horizontal and Radial Joints.

10. Lap joints shall generally be used for horizontal seams and splices and for radial seams in curved bottoms.

Vertical Joints.

11. For vertical seams and splices, lap joints shall be used with plates not more than ⅜-in. thick. With thicker plates, double butt joints with inside and outside straps shall generally be used. The edge of the plate in contact at the intersection of horizontal and vertical lap joints shall be drawn out to a uniform taper and thin edge.

Rivet Holes, Punching and Pitch.

12. The diameter of rivet holes shall be $\frac{1}{16}$-in. larger than the diameter of the rivets used. The punching shall conform to the specifications of this association for such work on steel bridges. A close pitch, with due regard for thickness of plate and balanced stress between tension on plates and shear on rivets, is desirable for caulking.

Tank Support.

13. If the tank is supported on steel columns with bracing, the metal in such substructure shall conform to these specifications, and the anchorage and workmanship thereof shall conform to the specifications of this association for the manufacture and erection of steel bridges.

Painting.

14. In the shop the metal shall be cleaned of dirt, rust and scale and, except the surfaces to be in contact in the joints of the tank, shall be given a shop coat of paint or metal preservative selected and applied as specified by the company.

After being completely erected, caulked and cleaned of dirt, rust and scale, all exposed metal work shall be painted or treated with such coat or coats of paint or metal preservative as shall be selected by the railway company.

Plans and Specifications.

15. Under these specifications and in conformity thereto the railway company shall cause to be prepared or shall approve detailed plans and specifications for such tanks, herein specified, as it shall construct. Such plans and specifications shall cover all necessary tank auxiliaries.

CONCLUSION.

That the specifications for steel, water and oil tanks is good practice, and should be included in the manual.

The report is signed by Robert Ferriday (C. C. C. & St. L.), Chairman; J. L. Campbell (E. P. & S. W.), Vice-Chairman: James Burke (Erie), H. M. Church (B. & O.), C. C. Cook (B. & O.), G. M. Davidson (C. & N. W.), A. F. Dorley (M. P.), G. H. Herrold (C. G. W.), E. G. Lane (B. & O.), G. C. Millett (A. T. & S. F.), A. Mordecai (Consulting Eng.), W. A. Parker (St. J. & G. I.), C. L. Ransom (C. & N. W.), Chas. E. Thomas (I. C.).

Mr. Ferriday: I would recommend that we take up the specifications for steel tanks, and I can outline the changes that we desire to make:

First.—Change the title to read: "General Specifications for Steel Water and Oil Tanks."

Second.—Combine paragraphs 1 and 2 to read: "Scope of Specifications. 1. These specifications are intended for steel tanks requiring plates not more than ⅝ in. thick.

Third.—Change the numbering of the paragraphs in consequence of consolidating paragraphs 1 and 2.

Fourth.—Change paragraph 3 as to quality of metal to read:

"2. The metal in these tanks shall be open hearth steel. This steel shall conform in physical and chemical properties to the specification of this association for steel bridges.

Fifth.—Change paragraph 12 to read: "Rivets, rivet holes, punching and pitch. 11. For plates not more than ⅜ in. thick, ⅝-in. rivets shall be used. For thicker plates, ¾-in. rivets shall be used. The diameter of rivet holes shall be $\frac{1}{16}$ in. larger than the diameter of the rivets used. The punching shall conform to the specifications of this association for such work on steel bridges. A close pitch, with due regard for thickness of plate and balanced stress between tension on plates and shear on rivets, is desirable for caulking."

Sixth.—Change paragraph 13 to read: Tank Support. 12. If the tank is supported on a steel substructure, the latter shall conform to the specifications of this association for the manufacture and erection of steel bridges."

Mr. Steffens: I would like to ask the committee why they change from the unit stresses, adopted by the Committee on Iron and Steel Bridges.

Mr. Ferriday: The material is in service, under different conditions from that in steel bridges, and it was felt that the limits named here were as large as was advisable.

Mr. Steffens: I would like to ask the committee if they would be willing to put that in the shape of a factor or constant, referred to the specifications for steel bridges.

Mr. Ferriday: I don't think that would be satisfactory. I don't believe it would be desirable to have to make a computation from the specifications for steel bridges. I think it has been the practice of all the committees, for the sake of brevity, to refer to other specifications, without repeating them in detail.

Mr. Bremner: It seems to me it is proper to refer to the other specifications printed in the manual, but the committee should at some time give us one specification, giving the numbers of the paragraphs in the bridge specifications that refer to the water and oil tank specifications, so that they can be readily accessible to the members without going through the entire bridge specifications.

Mr. Berry: I suggest the preparation of plans and specifications as to tools. When we started to equip steel tanks, it had to be done by our division forces, and we look everywhere for the best and most economical plan by which to erect these tanks. We finally got up a set of drawings of tools, and had them criticized, and I believe it would be a good thing for this committee to collect such information and recommend the best class of tools for the erection of such tanks.

A motion that the specifications, as amended, be adopted and included in the manual, was carried.

MASONRY.

WATERPROOFING MASONRY.

A circular letter requesting information relative to the waterproofing of masonry was sent to the members of the association. The circular followed, in the main points, the circulars issued in former years, adding such additional questions as appeared to the committee called for in the light of present day practice. The replies were quite numerous, but only a limited number contained information on the subject under consideration. Abstracts from the replies containing information pertinent to the subject are appended. A perusal of these brings out the fact that while considerable waterproofing is being done throughout the country, the methods followed and materials used are much the same as described in previous reports of the committee.

From several replies it will be seen that impervious concrete can be made without special waterproofing, by using a suitable gradation of aggregates and the proper amount of cement and reinforcing the concrete to counteract temperature and shrinkage stresses, and also using the proper care and amount of work in depositing to secure a dense concrete.

It will be noticed that in using waterproofing materials such as felt, in connection with coal-tar pitch or asphaltum, fair results are obtained, when the weather conditions are favorable, and when the work can be done without interference or obstructions by working continuously until completed; it is also noticed that when the work is done at

an unfavorable season, or when work is done in distinct separate periods and sections, under difficulties such as track operations, undue haste in completing the work necessitated by special circumstances, the results have generally been unsatisfactory.

The committee has not prepared a final report on the subject of waterproofing.

Illinois Central.

On a double-track steel viaduct, having through girders with I-beam floor encased in concrete, and deck girder approaches with concrete floor, waterproofing was used to protect the steel. The waterproofing consisted of three layers of felt, one layer of burlap, two layers of felt, a mopping of pitch on the concrete, between each layer of felt and burlap and over all. The work was completed in 1908 and is satisfactory with no leak on the last inspection in October, 1911. The waterproofing was protected by a layer of fine crushed stone and screenings embedded in and covered with pitch. Expansion was provided in the concrete, but no provision for expansion was made in the waterproofing. The cost of the waterproofing, including the protection, was 15 cents per sq. ft.

Central of New Jersey.

On bridge No. 34, central division, leaks appeared along the webs of the main girders during last winter, caused by throwing the snow along the webs of the girders during



G. H. TINKER.

Chairman Committee on Masonry.

the flanging of the tracks. When a thaw set in, the melting snow was held in a pocket in such a manner as to bring the water above the flashing angle and back of the waterproofing. This difficulty has been remedied in later bridges by placing the flashing angle and carrying the waterproofing at least a foot above the top of rail. In this bridge the waterproofing was stopped about on a level with the base of rail.

The cost of 40 cents per sq. ft. includes the furnishing and applying of waterproofing materials and the cost of the protecting brick in place. The cost of the brick was $8.00 per thousand, f. o. b. cars at the work.

Bridge No. 136, central division, Hampton, N. J., was waterproofed November, 1910, with four layers of Barret's specification felt and one intermediate layer of Barret's Tartex, cemented together with Barrett's specification pitch, waterproofing carried to the under side of flange angles of main girders. The cost of waterproofing this bridge, including the brick protection, was $0.273 per sq. ft. No leaks have appeared up to the last inspection of May, 1911.

Bridge No. 9, central division, completed September, 1911, was waterproofed with four layers of Barrett's specification felt and an intermediate layer of Barrett's Tartex, cemented together with Barrett's specification pitch. This was protected by brick laid flat with joints poured with pitch. The cost per sq. ft., including brick protection, was $0.123 for materials and $0.066 for labor. The brick cost $8.00 per thousand, f. o. b. cars at the work.

Bridge No. 218, central division, is a double-track, half-through plate girder structure about 45 ft. long, with I-beam floor encased in concrete, completed November, 1910. For waterproofing, the upper surface of the concrete was given two coats of Hydrex waterproofing paint. As soon as the painting was completed the ballast was placed immediately on top with no protection for the waterproofing. Up to the last inspection of May, 1911, no leaks had appeared. The concrete at the main girders was carried up to the flange angles of the girders which were about 20 in. above the top rail. The painting was also carried to that point.

New York Central & Hudson River.

Mr. George W. Kittredge, chief engineer, furnishes the following information:

Trouble experienced in the case of felt and coal-tar pitch is mostly on account of the poor class of labor used. It does not prevent leakage when the body walls are not built continuously. Trouble is also caused by lack of care in joining successive sections of work, horizontally or vertically.

The subway leading from the Buffalo passenger station is of rectangular section, 20 ft. in width and 7 ft. in height inside, serving 12 tracks. The side walls are of monolithic construction similar to ordinary retaining walls, and the floor is extra thick of the same construction. The roof is of 20-in. I-beams, with concrete filling between, covered with three inches of cement, with waterproofing and with a protection of brick on top of this and under the ballast. The entire outside of the walls was covered with waterproofing consisting of 6-ply tarred felt, each layer put on separately, with Sarco compound, and outside of this the side walls and the top are protected with brick laid in cement. The floor is protected by a 6-in. layer of concrete under the waterproofing, the floor itself above the waterproofing being 10 in. thick, the extra weight being given to prevent floatage, and prevent its being cracked by the upward pressure of the water. The waterproofing of the sides and floor was made continuous as far as possible.

The conditions requiring waterproofing were as follows: This construction is in a bed of clay which extends about half way up the height of the subway, the remaining 6 ft. or so is of a loose gravel, so that all of the surface water coming through the porous matter is held by the clay under slight head.

The construction of this work was carried on under considerable difficulty, it being necessary to work while the traffic, which is very heavy at this point, was going on, and it was possible to build only a part of the subway at a time, and not make a continuous job of it. It is probable that at points where one piece of work left off, and another began, the connection between the waterproofing was imperfect, as cracks began to develop, and the water came into the subway in small quantities in numerous places almost as soon as completed. This was remedied by careful application of ½-in. hydrolithic cement by the waterproofing company, on the inside of the subway, so that the structure is now tight, except the roof, where on account of the vibration of the trains, it was practically impossible to insure an absolutely tight job. Great care was taken to find all cracks, dig them out and fill them with hydrolithic cement. The cost of the hydrolithic waterproofing was about 30 cents per sq. ft., and has now been on for two years, and has given good satisfaction.

Referring to the waterproofing of masonry, I can only add a few remarks in regard to the waterproofing which we found on the old Park Avenue tunnel roof where a portion of it was removed at 59th street.

The roof consisted of iron beams with brick arches which were leveled up with concrete. The waterproofing was placed directly on this concrete and was covered with about two ft. of earth which formed the soil for the parking around the openings in the roof of the tunnel. Drains were provided so that the water did not stand in the earth. The materials were of felt and coal-tar pitch, three plies of felt being used. We have no information as to the method of application or the cost of the work. I have understood indirectly that this waterproofing was placed when the tunnel was built, some forty years ago. From recollection of the tunnel for the past ten years the vegetation over this waterproofing was in such a state that the waterproofing must be at least twenty years old. The waterproofing was removed on account of changes we were making last winter, and it was in fair condition. The paper had become somewhat brittle, also the pitch was harder than pitches we apply now, but the sheet of waterproofing was intact and capable of shedding water. Small leaks would not have been detected; the only protection of the concrete was the soil placed over it. The waterproofing covered the tunnel roof from 58th to 59th street,

and presumably extends a good deal farther. There was no provision for expansion joints.

El Paso & Southwestern.

We waterproofed in 1908 about 194,000 sq. ft. of concrete-lined reservoirs, using the Sylvester process of soap and alum, two coats of each, and by painting the surface with asphalt and Elaterite waterproofing. We depended largely upon this waterproofing for water-tightness, and the concrete was not as rich in cement as it otherwise would have been. Theoretically, the mixture was 1:2:4; actually, some of it was not quite that rich. We had considerable trouble with leakage through portions of the concrete and, upon examination, such parts were generally found to be evidently porous.

After a period of three years we find the asphalt and Elaterite coating to be a pronounced failure on account of peeling off in the winter time through the action of frost. We find the Sylvester process of soap and alum quite efficient. Except in places where the concrete is evidently quite inferior, the soap and alum has made the concrete watertight. Where the concrete was good and the work thoroughly done, the water will stand and roll on the surface of the concrete as it will on plate glass. Of course, the concrete is not actually as impervious as the glass, but drops of water on the concrete so waterproofed disappear by evaporation rather than by absorption.

The sand and gravel used in lining these reservoirs were of a fair grade only, the maximum size of gravel being 1½ in. The concrete lining was from 4 to 6 in. thick. The gravel was not as finely graded as it should have been and the larger stones were evidently too large for that kind of work.

The cost of waterproofing with soap and alum was 0.43 cent per sq. ft.; with asphaltum 1.40 cents, and with Elaterite waterproofing 1.50 cents per sq. ft.

A few months ago we completed a reinforced concrete septic tank 30 ft. in diameter and 12 ft. high, with shell 6 in. thick. No waterproofing was used in this concrete. It was theoretically a 1:2:4 mix, but we actually used a somewhat greater percentage of cement. The sand and gravel were good. The specifications for the gravel required it all to pass through a ½-in. screen. This tank is entirely watertight, except at the joints between successive courses of concrete. It appears to be demonstrative of the possibility of making concrete watertight, at least for the light pressure existing in this particular tank.

First-class sand and stone, carefully graded, to reduce the voids, and a liberal margin of cement in excess of the voids in the sand and stone, and thorough uniformity in the mixing and laying are, we believe, more efficient than anything else in making concrete waterproof. The maximum size of the stone should not exceed ¾-in. and we thing that ½-in. is better.

Norfolk & Western.

In a concrete subway for use of passengers under the tracks at Petersburg, Va., a 6-in. layer of concrete was placed on the area of foundation and upon this concrete against the outer forms 4-in. brick walls were built. On the concrete base and against the brick walls the waterproofing, consisting of a coat of Sarco concrete primer applied hot, a heavy swabbing of Sarco No. 6 waterproofing and 3-ply membrane No 16 Sarco Asphalt felt, was placed. The felt was lapped so that there is at no point less than three thicknesses of felt, each thickness being heavily swabbed with hot Sarco No. 6 waterproofing before succeeding thickness was applied.

The membrane was well swabbed with Sarco No. 6 and while this coat was still hot a layer of 8-oz. burlap was applied, this layer also being swabbed with No. 6 Sarco and a second layer of 8-oz. burlap, breaking joints with the first being laid.

The last layer of burlap when dry was swabbed with hot Sarco.

The concrete walls, floor and steps of the subway were then built against the waterproofing above described.

The concrete subway roof reinforced with steel rails and expanded metal, laid with a crown of 1 in. for drainage, was waterproofed by a mat of two-ply burlap and three-ply felt laid as described for sidewalls, except that the burlap is laid first or on the bottom of the mat. The roof waterproofing is protected from cutting by the ballast by a layer of 1¼ in. of Sarco asphalt mastic applied in two coats of ⅝ in. each, with lapped joints.

This work was done about a year ago and has proved satisfactory. The cost of waterproofing complete was about 50 cents per sq. ft.

Pittsburg & Lake Erie.

Five 40 to 50 ft. four-track half deck and through girder bridges, with floor stringers spaced 15 in. center to center, and the space between floor stringers filled with concrete, have been waterproofed to protect the metal work and also to stop dripping to the street under the bridge.

The waterproofing consisted of Sarco No. 6 waterproofing with 8 oz. open mesh burlap; 1¾ lbs. of 1:2 cement mortar protection over the waterproofing.

On the clean dry surface of the concrete floor was applied a coating of Sarco concrete primer thin enough to penetrate the recesses of the concrete. In some cases when the primer was too heavy, it was thinned with gasoline. After the primer dried (requiring about one hour) a heavy coating of hot Sarco No. 6 waterproofing was applied and while the material was still hot a layer of 8 oz. open mesh burlap was laid.

Location	Character of the Structure Waterproofed	Conditions Requiring Water-Proofing Head of Water, if any	Materials Used	Date Applied	Date Examined	Remarks
Albany..	Subway under tracks at passenger station	Surface water	½-in. asphalt	Ap. Ex.	1902 1910	Satisfactory as to walls, roof leaked badly; copper sub-roof put in to take care of moisture.
Brewster.....	Coaling station pit	6-ft. head	6-ply tar and Felt	Ap. Ex.	1910 1910	Leaked badly; repaired by Hydrolithic compound applied by the Hydrolithic company
Buffalo.....	Scajacuada Creek arch, 40-ft. span	Surface water only	½-in. coal tar pitch	Ap. Ex.	1908 1910	Good; the only leaks showing were in vertical joints
Buffalo	Belt Line reinforced concrete arch	Surface water only	Tarred felt coal tar pitch, ½-in. cement mortar	Ap Ex.	1908 1910	Satisfactory
Buffalo.....	Belt Line reinforced concrete arch	Surface water only	½-in. coating straight run coal tar pitch	Ap. Ex.	1908 1910	Satisfactory
Cohoes.....	Reinforced concrete arch, Columbia Street	Surface water only	½-in. plaster of 1:2 cement over 1 layer of tarred felt over ½-in. of straight run coal tar pitch	Ap. Ex.	1909 1910	Satisfactory
Onchiota ..	Concrete arch, 20-ft.	Road bed surface Drainage	½-in. coal tar pitch over 1-in of 1:2 Portland cement mortar	Ap. Ex.	1906 1910	Satisfactory
Poughkeepsie	Back of retaining walls	For surface drainage	½-in. coal tar pitch	Ap. Ex.	1908 1910	Fairly satisfactory
Poughkeepsie.	Back of retaining walls	For surface drainage	Medusa compound	Ap. Ex.	1908 1910	Water stained; walls nearly always let water through at horizontal joints where work ends one day and begins next
Rippleton ..	40-ft. concrete arch..	Surface drainage	½-in. coal tar	Ap. Ex.	1906 1910	Very little value; leaks through intrados every 3 or 4 feet
Troy.....	Subway.....	4-ft. head. .	½-in. asphalt protected by brick	Ap. Ex.	1902 1910	Very satisfactory
Miscellaneous	Retaining walls.....	Ground and surface water behind walls	½-in. coal tar pitch	Ap. Ex.	1900 1910	Leakage found usually at horizontal and vertical joints where work was discontinued

Waterproofing Results on N. Y. C. & H. R.—1002-1911.

To apply the burlap on the hot Sarco, first it was rolled on a 2-in. round stick and unrolled immediately after applying the Sarco, exercising care to keep it straight and free from folds. The unrolling of the burlap was followed closely by brooming with a rattan broom. This method was followed until three layers of burlap was applied.

On top of the last layer of burlap a heavy coating of hot Sarco was applied. As soon as convenient, after the Sarco waterproofing was applied, a 1¾-in. thickness of 1:2 cement mortar was laid.

The cost of labor was $0.026 per sq. ft. treated and $0.044 for material, making a total of $0.070 per sq. ft. treated for 3 bridges on which complete data were kept.

At two of these bridges no leaks in the concrete roof are apparent. A few rivets in the girders show that at some time water must have passed through the waterproofing.

At another water is dropping slowly at three places, at six other places indications are that water has been dropping at some time and at a few other places in girders indications are that water has passed through rivet holes at some time.

At another, five places at the edges of floor-beams indicate that water has come through and at two of these places it was dropping slowly at last inspection.

At the other a good many leaks show at the edges of floor-beams and girders. Water is slowly dropping through at many of the rivets.

The reason advanced for the unfavorable condition of the waterproofing on these bridges is that the concrete was not allowed to set up naturally, artificial heat having been applied to dry it preliminary to applying the Sarco primer, and in some cases the waterproofing was applied in unfavorable weather conditions. Another reason advanced is that the cement mortar cover may be broken under impact of traffic and the ballast may have cut the waterproofing.

A bridge at Aliquippa has just been completed which was waterproofed in the same manner as those above described but with all conditions favorable for a fair test, such as dry concrete on which to apply the first coat and dry and warm weather during the time the waterproofing was applied.

The Third Street Subway, Aliquippa, Pa., is a ballast bridge, 288 ft. wide, and supporting about 20 tracks. The distance between abutments is 40 ft. and a line of columns supports the floor structure at the center. The floor is made of 15-in. 80-lb. I-beams, 44 ft. long, spaced 15 in. center to center and filled between with 1:3:5 concrete.

The structure is waterproofed with Sarco No. 6 waterproofing, with two-ply of 8-oz. open mesh burlap.

The area covered was 14,000 sq. ft.

Sarco Primer, 151 gals. @ $0.35 per gal	$ 52.85
Sarco No. 6, 16,200 lbs. @ $35.60 per ton	288.36
Burlap, 1,560 lbs. @ $0.08 per lb	124.80
Total cost of material	$466.01
Total cost of labor	251.38
Total cost of labor and material	$717.39

Material cost $.033 per sq. ft.
Labor cost $.018 per sq. ft.

The waterproofing was protected by a 1¾-in. cement covering made of 1:2 mortar, the area covered being 13,320 sq. ft.

Sand used, 52 tons @ $0.65	$ 33.80
Cement, 131 bbls. @ $0.85	111.35
Labor	103.00
Total	$248.15

Material cost $.011 per sq. ft.
Labor cost $.008 per sq. ft.

The waterproofing was applied at different times between May and August, 1911, under favorable weather conditions and is in good condition at this date, October 5, 1911.

METHODS OF PATCHING AND REPAIRING PLAIN AND REINFORCED CONCRETE.

The committee was instructed to collect data and prepare a report on "Methods of Patching and Repairing Plain and Reinforced Concrete." A circular letter was sent to members of the association, requesting information on this subject, to which more than one hundred replies have been received.

The various methods may be described as follows:

(1) Wet Method: The surface of the old concrete is thoroughly roughened, cleaned and drenched with water and covered with a cement grout. Then the new concrete is mixed to a sloppy consistency and applied, being held in place till set by forms, as required. From the reports received it appears that many successes and many failures have followed this method. Where it has been successful, that result probably has been due to painstaking care and great expense being employed in the preliminary cleaning and thorough wetting of the old concrete surfaces before the new concrete is applied.

(2) Moderately Dry Method: The surface of the old concrete is thoroughly roughened, cleaned and drenched with water and powdered with cement or painted with cement grout —after which the new concrete is applied and thoroughly tamped against the old surface. Generally, such patches are kept moist by sprinkling them with water for several days. The same comment applies here as to the wet method.

(3) Dowel Method: This is a modification of the two preceding methods and is generally used for other than horizontal surfaces, although it may be applied to the latter. The new concrete may have any consistency to meet the particular conditions or the ideas of the engineer in charge, but usually a fairly wet concrete is used. This method includes drilling holes and setting dowels into the old concrete, with projecting ends to engage into the new concrete. Sometimes steel bars or metal fabric are connected to these dowels to further insure permanency of the patch. This method can be made uniformly successful, but cannot always be applied. Where any considerable mass of new concrete is to be connected to old concrete this is the only safe method to pursue.

(4) Wedge Method: This includes the cutting out of defective concrete in such a manner as to undercut the surrounding good concrete so that the new concrete will be held in place, when set, by the shape of the binding edges of the old concrete. The difficulty of undercutting concrete so as to secure such edges is too great to make this method applicable in ordinary cases, and, except where a considerable depth of new concrete is to be put in, such undercutting could not be successfully done, as concrete cannot be cut so as to leave sharp, clean edges.

(5) Cleaning with Steam: This is a method of cleaning surfaces of old concrete preparatory to putting on a patch of new, or of cleaning the top of a rough concrete floor before applying the "finish coat." The surface of the old concrete is brushed as clean as possible with stiff brushes and then gone over at least twice with a steam jet—an ordinary piece of half-inch gas pipe makes a very satisfactory jet nozzle. This short length of pipe is connected to a steam hose so that it can be readily moved about. The steam is supplied by the boilers of the mixer or hoisting engines. The steam will clean and heat the concrete surface, leaving it perfectly dry, so it is important to thoroughly drench the surface with water after cleaning with steam. In cold weather it is found advantageous to use hot water. Immediately after the surface is thoroughly cleaned and drenched, the new concrete is applied. Excellent results have followed the use of this method of cleaning, but it is essential that the surface of the old concrete be thoroughly drenched with water after using the steam jet, otherwise the new concrete will not adhere to the old.

(6) Cleaning with Acid: This method includes washing of the surface of the old concrete with a solution of hydrochloric (muriatic) acid (one part acid to two parts water), after which the surface must be carefully and thoroughly washed to remove any free acid. This is a very commonly applied method of cleaning old concrete surfaces preparatory to placing new concrete against them, and, by many, is considered the only safe one to use, especially where a "finish coat" is to be put on after the concrete base is set.

Among the replies to the letters are the following:

L. W. Walter, cement inspector, Erie: "The practice of tamping mortar against old concrete surfaces to fill voids caused by air bubbles, or to finish a surface honeycombed or made rough by scabbling, is one which I would personally recommend, as I have tried it under varying conditions and have not had a failure. In tamping mortar to rough surfaces I would proceed in the following manner: Working downward from the top of the area to be treated I would remove all loose particles and would wash the surface of the old concrete with a brush. The sand and cement for use in the mortar should be the same kind and proportions as that used in the concrete, provided it be not richer than 2½ parts of sand to one part of cement, and should be thoroughly mixed dry and water added by sprinkling until a semi-plastic consistency is had. In tamping the mortar against the surface to be treated, I would work downward from the top of the area in order that the water used in wetting the surface of the concrete would not run down over the newly applied coat. When the surface has been brought to the proper plane, it should be floated with a wooden float, and only such amount of water should be used in the final floating as may be necessary to produce a dense surface. This water may be applied by means of a brush or by dipping the float in water.

"It is found in practice that a rather dry mortar, such as may be tamped, and not plastered, on a concrete surface, is less apt to loosen from contraction and expansion due to temperature changes and will more nearly resemble, in color, the adjoining natural surface.

"In such work as renewing the top or wearing surface which has loosened from the base of concrete pavements, on account of its having been placed after the base had set, the tamping process is a success. It is necessary, however, that the base of the concrete be firm, and advisable that the base be washed with a neat cement wash and the new top be well floated. This, in my opinion, is the most difficult patch work to be encountered and is the best argument I have to offer in favor of using, for patch work, a relatively dry mortar.

"For patching honeycombed surfaces I would recommend

tamping to the exclusion of the old practice of plastering."

H. Rettinghouse, division engineer, Chicago & Northwestern: "I have had several cases, when horizontal surfaces, especially bridge seats, have been damaged by frost, to a depth of from 4 to 8 inches. After removing the frozen and spoiled concrete, we chipped the surface down to a nearly uniform level, equal to the deepest frozen spot. In one case which I have in mind, the entire bridge seat of a three track bridge had been severely damaged by frost. We placed dowel pins in squares of 2 ft., securely anchoring them in the sound concrete, then carefully and thoroughly cleaned and washed off the entire surface and placed new concrete. Recent inspection indicates that work of this kind is an entire success.

"During the past three years, we have successfully jacketed with concrete, old masonry, which had badly deteriorated. The method pursued was the use of hook dowel pins and expanded metal, the jackets varying from 10 to 14 in. in thickness. We took great care to remove all deteriorated and loose portions of masonry, cleaning out joints, etc., and have been entirely successful in securing a perfect adhesion of concrete jackets to the old masonry, so much so, indeed, that we are gradually treating all our more or less deteriorated masonry of bridges on the Iowa division in this manner. We have, unfortunately, a great deal of poor stone in bridge masonry. Some years ago, before I came to this territory, there had been a great many back walls of bridges built up with from 4 to 8 in. of concrete on top of old masonry, on account of track being raised by ballasting. In all of these cases no dowels were used and the method proved a failure."

E. B. Temple, assistant chief engineer, Pennsylvania Railroad: "At South Fork, Pa., we built a retaining wall in the winter of 1909-1910. The weather was unusually severe, and before the concrete set properly the surface concrete was frozen. In the spring, the face of the wall showed signs of disintegration; and, after a careful examination, it was decided to remove as much as possible of the faulty concrete. This was done by picking the surface with a small hand pick to a depth varying from 1 to 18 in. The body of the wall thus exposed was good substantial concrete, and was carefully cleaned. Dowels of steel were driven into this surface, the dowels being placed about 6 in. apart, and to these dowels a light reinforcing mesh wire was firmly attached. The forms for the face of the wall were then placed; and, after the concrete had been thoroughly wet, the forms were carefully backfilled with a cement and sand in the proportion of approximately 1 part cement to 2 of sand. This wall has been standing for about fifteen months, and apparently is in as good condition to-day as when put in place."

G. J. Ray, chief engineer, Delaware, Lackawanna & Western: "The only extensive job which we have had to contend with was a concrete bridge consisting of several 33-ft. arches. The concrete in this structure showed signs of either poor cement or acid bearing water used in making the concrete, with the result that it scaled off in large quantities every year. It was an easy matter to dig down into the solid concrete, but if the solid concrete was exposed for any length of time it again would start to deteriorate. The entire structure was repaired by covering it completely with from a foot to 18 in. of reinforced concrete, the new concrete being bonded to the old by a large number of dowel pins, which were drilled into the old concrete and fastened in a substantial manner. This repair job has proved to be very satisfactory. To make the work permanent the entire outside of the old structure was excavated and properly waterproofed."

Conclusions.

The committee presents the following conclusions as to the methods of repairing defective or worn surfaces of concrete:

(1) In all cases the surface to be repaired must first be thoroughly cleaned of all loose material, laitance and dust and the clean, rough, sound concrete exposed to receive the patch. Probably the best method of cleaning is by means of a steam jet.

(2) After cleaning, the surface to be repaired must be thoroughly saturated with water, not simply moistened, but so thoroughly drenched that the old concrete will not absorb water from the new mortar or concrete used in patching. If possible, the surface should be kept covered with water for several hours.

(3) If the repair or patch is to be made on a vertical or sloping surface and is not to be more than 1½ in. thick, the surface of the old concrete, while it is still wet, should be spattered or splashed with a cement grout, following this immediately with a fairly stiff plaster coat of mortar made of the same proportions of cement and sand as was used in the original concrete, but never richer than 1 cement to 2½ sand. This plaster coat should not be thicker than ½ in. and each coat should be forced into the surface, but not dragged with a trowel. The surface of each coat, except the final coat, should be "scratched" to give a bond for the next coat. This plastering should preferably begin at the top and progress downward, and only enough time be allowed to permit each coat to receive its initial set before the next coat is applied. The final coat should be finished with a wooden float and only enough water used to properly finish the surface. This patch should be kept damp and protected from sun or frost till fully set up.

(4) If the repair or patch or "finish coat" is to be made on a horizontal or nearly horizontal surface, the surface of the old concrete should be slushed and broomed with a thin cement grout, following this immediately with a wet mortar made of 1 part cement and 2½ parts sand or granite screenings and of the full thickness required (not less than ½ in. thick, however). When this mortar begins to take its initial set, it should be floated or troweled to such a finish as may be desired.

(5) If the repair or patch is to be made on a vertical or sloping face and is to be more than 1½ in. thick, it will be advisable to embed dowels into the old concrete, as deeply as the thickness of the proposed patch, and spaced sufficiently close together to firmly anchor the patch to the old concrete. The dowels must be wedged into the old concrete and it will be advisable to fasten wires, metal fabric or bars to the dowels, in the case of extensive patching, as an additional safeguard. The patching may then be done with mortar without forms, or with wet concrete supported by forms, depending upon the thickness and the extent of the patch.

(6) If the repair or patch is to be made on a horizontal or nearly horizontal face and of considerable thickness, dowels may be used, or the concrete may simply be reinforced by fabric or bars without using dowels—treating the patch as a block of masonry.

(7) Care must be taken not to have thin edges on patches. To avoid this, it may be necessary to cut out sound concrete around a place to be patched, so as to give deep edges to the patch. If possible, the edges should be undercut.

METHODS OF DEPOSITING CONCRETE UNDER WATER.

Letters and circulars of inquiry were sent to the members of the association, requesting information on the subject of "Methods of Depositing Concrete Under Water." This inquiry embodied the following questions:

(1) Methods used for depositing concrete.
(2) Depth of water.
(3) Results.
(4) Precautions necessary to secure desired results.
(5) A statement of the cost of plant and relative cost of depositing concrete per cubic yard, as compared with concrete deposited by the usual methods, will be of value in this investigation.

Of the 71 replies received, 56 contain information of value, covering nine methods of depositing, viz., bottom-dump bucket, tremie or closed chute, sacks, sacks withdrawn, paper bags, open chutes, open depositing, pneumatic grouting of broken stone, concrete blocks. The following extracts are from the replies received:

W. H. Courtenay, chief engineer, Louisville & Nashville: 1a. A large number of piles in sea water were protected from attack by teredo by covering the submerged portions of piles with concrete 2 to 4 in. thick. Forms were placed around the piles and then the concrete was deposited by pouring it through a tube. b. A bridge pier, built many years ago, was partially undercut by the river, and an attempt was made to fill the space vertically under the pier with concrete. The concrete was mixed moderately dry, and poured through an 8-in. wrought iron pipe from the track level. c. For a bridge foundation recently constructed in 30 ft. of water, the cofferdam was first built of steel piles. Wooden bearing piles were then driven within the cofferdam and cut off at the level of the river bed. The material around these piles was then excavated to a depth of about 4 ft. with centrifugal pumps, and then about 4 ft. of concrete deposited between heads of the piles by running it through iron pipes, the idea being to place a 4-ft. depth of concrete around the piles before attempting to pump out the water from within the cofferdam, for, on account of the nature of the bottom, it was not feasible to pump the water out otherwise. 2a. Water ranged from about 18 ft. down. 3a. Successful. At times, however, mud at the bottom of the

forms became mixed with concrete, greatly impairing the strength of the concrete. Upon examination by a diver, some of this concrete was found to be good and some bad. 3b. During the progress of this work, the surface of the water within the cribs was at all times covered with a thick foamy scum. This work was constructed 20 years ago, and has given no trouble. 3c. After this concrete had been deposited and set, an effort was made to pump out the interior of the cofferdam, which was not successful. Examination by a diver disclosed the fact that the concrete in one spot of limited area was inferior in quality, and the water pressure was such as to create a blowout through this inferior concrete. The poor concrete was excavated by a diver, and good concrete substituted, by lowering it in bags and having it placed by a diver, after which the water within the dam was pumped out, and the remainder of the pier constructed. 4. Although, as a general proposition, it would seem that concrete can be deposited under water at less cost than would be necessary for constructing water-tight cofferdams, and pumping the water out of the foundation before concrete is placed, the experience of the writer leads him to believe that it is generally unsatisfactory and should not be resorted to if foundations can be pumped out at reasonable cost.

A. C. Everham, assistant chief engineer, Kansas City Terminal: 1a. At Detroit, Mich., in the construction of the Detroit River Tunnel, there was deposited about 100,000 cu. yds. of concrete through tremie pipes, the concrete being mixed upon a scow and poured in tremie, the lower end of which was always kept embedded in the soft concrete or in the mud at the bottom of the river. The concrete was placed around the steel tubes which formed the waterproofing of the tunnel and was retained by cross partitions and a wooden form on the outside of the tubes, thus forming a "pocket" which permitted the concrete to set with minimum of disturbance. The mass of concrete for the enclosed tube was about 56 ft. wide at the top, about 32 ft. deep, and, when under water, about 40 ft. below water level. On account of the pockets and lower end of the tremie pipe always being in soft cement, there was little, if any, disturbance of the cement in the concrete. 1b. In Toledo, Ohio, last year there was built by the C. H. & D. an ore dock of reinforced concrete, supported on piles, the lower 3½ ft. of which was deposited in water. Concrete was mixed on a scow and carried by pipe from hopper to point of deposit. The first few batches were deposited in the open water without protection, and possibly some of the cement was lost. 3a. The character of the concrete was ascertained as nearly as possible by taking samples with a calyx drill and obtaining a great many cores, from which several were selected at random and submitted to compression tests in the crushing machine. Of four cores taken thus at random, the concrete being a 1:2:3 mixture, there was found an average crushing strength of 3,239 lbs., the maximum being over 4,000 lbs. In order to compare this concrete with concrete placed under normal conditions in retaining walls, some cores were taken from a retaining wall at Detroit with same grade of concrete. Of four samples, the average was 2,320 lbs., as against 3,239 lbs. of the four samples deposited by tremie. 3b. On examination this concrete was shown to be of excellent quality.

E. B. Temple, assistant chief engineer, Pennsylvania Railroad: 1. Last year there was successfully constructed a truss bridge across the Schuylkill river in connection with the Philadelphia terminal improvements, where was deposited concrete under water for four piers of the bridge. The method pursued was as follows: A cofferdam of 12 in. by 12 in. timbers was built near the shore and sunk at low tide on the site of the pier. All possible excavating was open at the bottom, was placed, a suction hose was used the rock foundation was cleaned as thoroughly as could be done by dredging. After the box, which, of course, was open at the botom, was placed, a suction hose was used to remove material that could not be taken out by the bridge, or that drifted into the tide during the setting of the box. The bottom was also carefully examined by divers. Concrete was then deposited by means of a bottom dump bucket, with a cover on top. The bucket was lowered carefully to within 2 ft. of the bottom, and after resting a moment the bottom was released and the concrete gradually settled into place. The top of the concrete was kept as level as possible by having the buckets dumped uniformly over the entire surface. This concrete was carried up to within 2 ft. of low water and allowed to set for at least a week before the cut-stone piers were started. 1b. A bridge was constructed, in 1902, over the Schuylkill river in about the same depth of water as the one above referred to, by the usual method of pumping out the dam, so that the concrete could be deposited in the open air all the way down to the rock. Several months were consumed in the attempt, and finally from about 6 to 8 ft. of the foundation had to be constructed under water, as it was impossible to keep the dam tight at the bottom and pump out all of the water. 2. The water in the deepest pier was 40 ft., and no trouble whatever was experienced in this method of construction. 5. The cost of a plant for depositing the concrete in this way would practically be the same as for depositing it in the open air. The stone and sand were brought to the site on scows, and the concrete mixer and derricks were also on floating equipment. With such a plant, and following the usual method of pumping out the cofferdams before depositing the concrete under water, the cost would be about $25 per cu. yd. By depositing the concrete, as done in this case, the cost averaged about $21 per cu. yd. These, apparently high prices include excavation or dredging, cofferdams and all cost in connection with the operation.

Job Tuthill, assistant engineer, Kansas City Terminal: 1a. Filled 8 ft. in bottom of a circular sheet pile crib with a cubical box having bottom in halves, hinged to the sides. Box closed and handled with load by one rope, and placed where concrete was wanted, then box dumped by second rope similar to the way orange peel buckets are handled, and pulled in. 2. Fourteen feet. 3. Very satisfactory. The concrete was nearly level and spread out against sides of crib when pumped out. 4. Handle carefully. After the steel tubes forming the river section of the La Salle Street tunnel under Chicago river had been sunk in place, it was necessary to construct a cofferdam at each end of the tubes, behind which the water could be pumped out, permitting connections to be made to the land sections. At each end of the river section there was a timber crib 11 ft. wide, securely fastened to the tubes and reaching 3 ft. above the surface of the river. From the ends of these cribs, pockets, approximately 17½ ft. square, were formed by driving Friestedt steel sheeting of from 50 to 65 ft. in length. Within these pockets the depth of water ranged from 45 to 53 ft. On account of this extreme depth, it was not deemed advisable to fill the pockets entirely with clay, but to fill the bottom with concrete to a depth below water level of about 37 ft., and in the same operation fill the space between the shell of the tubes and the bottom of the excavation. An attempt was made to deposit concrete by the tremie method, by use of a 12-in. diameter pipe, permitting the concrete to spread from the bottom end of the pipe. This method did not prove successful on account of the difficulty of keeping the tremie full of concrete, and the difficulty of manipulating it in this depth of water. An examination by diver indicated a considerable segregation of the sand and stone so this method was abandoned.

The following method was then determined upon: Gas pipes, 1½ in. diameter, were bent to the radius of the tunnel tubes and placed so that they would discharge at varying distances underneath the tubes. Four of these pipes were placed in each pocket and rigidly fastened in position by divers. These pipes did not have well points attached to the ends. In addition to the bent pipes, each pocket contained 12 to 15 2-in. diameter pipes, equipped with well points, stripped of the netting, at bottom ends, and placed so as to be about 2 ft. above the bottom of the excavation. The top end of all pipes was threaded for attachment to the grouting machine. About 5 ft. of broken stone was then spread over the bottom of the pocket and grout under a pressure varying from 35 to 100 lbs. per sq. in. was forced through the pipes to fill the voids in the layer of stone.

In general, the grout consisted of a mixture of about five bags of cement to one barrow of torpedo sand. All lumps, gravel, etc., which would clog the well points, were removed from the cement and sand before mixing. The grout was thoroughly mixed before being put into the McMichael's compressed air mixer. After placing the bottom course as above, a second set of pipes and another layer of broken stone were placed and grouted as before. This process was continued until the desired height of concrete was obtained. This method made use of quite a large number of pipes, as it was impossible to remove them after the grouting was complete. The method used in the south cofferdam was similar to that used in the north, except that in the main section of the pockets, only one set of pipes was used. After these had been put in position, the whole volume of broken stone was deposited. Grout was then forced through the pipes, and as the grouting continued, the pipes were worked up and down through the mass of stone until the voids were filled. This method appeared to be as successful as that used in the north dam, although about

three hundred bags less of cement were used. During the operation of grouting, whenever the grout was flowing freely into the voids, the pressure was from 40 to 50 lbs. per sq. in., but when the voids were practically filled, this pressure became 90 to 100 lbs. The operation at all times continued until no more grout could be forced into the pipes. After the concrete had sufficiently set, the remaining volume of the pockets was filled with clay; the north dam proved in all respects securely water-tight, leaks were slight, and the water apparently flowed along the line of separation between the clay and the concrete. In the south dam, one bad leak developed, the water apparently coming from the river underneath the concrete.

Conclusions.

(1) Concrete may be deposited successfully under water, if so handled as to prevent the washing of the cement from the mixture.

(2) Cofferdams should be sufficiently tight to prevent current through the pit, and the water in the pit should be quiet.

(3) The concrete should be deposited in place either by means of a drop-bottom bucket or a tremie, and should not be allowed to fall through the water.

(4) Where a bucket is used, it should be carefully lowered to the bottom and raised to the surface, so as to cause as little disturbance as possible of the water.

(5) Where a tremie is used, it should be kept filled with concrete up to the water level, and the discharge end should be kept buried in the freshly deposited mass to prevent emptying, and raised a few inches at a time as the filling progresses.

(6) The surface of the concrete must be kept as nearly level as possible to avoid the formation of pockets which will retain laitance and sediment.

(7) Where concrete is not deposited continuously, all sediment should be removed from the surface of the concrete, by pumping or otherwise, before depositing fresh concrete.

(8) The concrete should be a 1:2:4 mixture and of a "quaking" consistency.

(9) Freshly deposited concrete should not be disturbed.

(10) Where the flow of water through the pit cannot be prevented, concrete should be deposited in cloth sacks.

UNIFICATION OF PORTLAND CEMENT SPECIFICATIONS.

Early in the year 1911 two Government boards or committees were appointed to deal with the question of cement specifications. One of these, appointed by the chief engineer of the United States Army, was instructed to revise Professional Papers No. 28; the other was made up of representatives from the various departments, appointed by the head of each department. This committee was instructed to prepare and report to the departments a single standard specification for the Government. This body was known as "The Departmental Committee for the Unification of Government Specifications for Portland Cement."

On September 12 the Army board held a meeting at which representatives from the various engineering bodies interested in cement specifications, from the Association of American Portland Cement Manufacturers and representatives from one or two commercial laboratories, were in attendance. At this meeting the Army board received suggestions for the revision of Professional Papers No. 28.

Following this meeting the departmental committee issued a tentative specification, which was sent out with request for criticism and suggestion.

On November 24 a meeting was held at Washington which was attended by representatives from the departmental committee, the Army board and the American Railway Engineering Association. Committee C-1, American Society for Testing Materials, and Committee on Uniform Tests for Cement, American Society of Civil Engineers, were not represented, though they had previously accepted the invitation to be present. It was apparent that the tendency of the departmental committee was to adhere quite closely to the standard adopted by the American Society for Testing Materials, which is also the standard of this association.

On November 27 a meeting was held in Philadelphia, attended by representatives from the Committee on Uniform Tests for Cement, American Society of Civil Engineers, Standard Specifications for Portland Cement (C-1), American Society for Testing Materials, and through its membership on Committee C-1 this association was represented. The Association of American Portland Cement Manufacturers and the departmental committee were also represented. The principal question before this meeting was that of uniform methods, and an agreement was reached on every point excepting the use of the Vicat needle vs. Gilmore needle in determining time of set, and Vicat needle vs. ball test in determining normal consistency.

On January 8, 1912, representatives from the departmental committee and Committee on Uniform Tests for Cement of the American Society of Civil Engineers met with the Army board to further consider the points of difference in the respective specifications. Agreement had been reached upon all points excepting those previously mentioned, and at this meeting the representatives of the American Society of Civil Engineers expressed preference for retaining the Vicat needle, but offered to compromise and accept the ball method as the means of determining normal consistency if the Government representatives would accept the Vicat needle as the method of determining the time of set.

After due consideration the Government representatives were convinced that the Gilmore needle should be retained in their specifications; also, that the ball test for determining normal consistency is preferable to the Vicat needle, and a specification which agrees with the standard of this association in other particulars was approved by the departmental committee and the board of engineer officers and recommended for adoption as a United States Government standard specification for Portland cement.

The Committee on Uniform Tests for Cement, upon making their report to the American Society of Civil Engineers in January, stated that they had been unable to get together with the Army board and the departmental committee on methods of tests, and, considering their work finished, asked to be dismissed. The committee was accordingly relieved from further duty.

CONCLUSIONS.

The committee recommends:

(1) That the conclusion in reference to "Methods of Patching and Repairing Plain and Reinforced Concrete" be approved as good practice.

(2) That the conclusions in reference to "Methods of Depositing Concrete Under Water" be approved as good practice.

The report is signed by G. H. Tinker (N. Y. C. & St. L.), Chairman; F. L. Thompson (I. C.), Vice-Chairman; G. J. Bell (A. T. & S. F.), H. E. Boardman (M. P.), C. W. Boynton (Universal Port. Cem. Co.), T. L. Condron (Consulting Eng.), L. D. Crear (Erie), L. N. Edwards (G. T.), A. H. Griffith (B. & O.), L. J. Hotchkiss (C. B. & Q.), Richard L. Humphrey (Consulting Eng.), W. H. Petersen (C. R. I. & P.), Philip Petri (B. & O.), J. H. Prior (C. M. & St. P.), F. E. Schall (L. V.), G. H. Scribner, Jr. (Contracting Eng.), A. N. Talbot (Univ. of Illinois), Job Tuthill (K. C. T.), A. A. Wirth (P. L. W.).

Discussion on Masonry.

P. C. Newbegin (B. & A.): Referring to Conclusion 4 as to the methods of repairing defective or worn surfaces of concrete, I ask why in one case the committee recommends mortar of the same standard as the original structure and not in the other?

Mr. Tinker: There is no very good reason for the difference there, except that in both cases a very rich mortar is not successful. It cracks too much. Therefore, we limit it to 1 : 2½. In the case of horizontal surface there is not the tendency for the mortar to fall off that there is on a vertical surface. There is less cracking and less shrinkage if the two mortars are of the same consistency.

A. W. Carpenter (N. Y. C. & H. R.): Does paragraph 6 refer to cracks more than 1½ in. thick? The preceding paragraph refers to a patch more than 1½ in. thick, but paragraph 6 does not give any definite thickness.

Mr. Tinker: This refers more especially to a rather thick block of concrete, in the nature of a replaced bridge seat, which might be from 6 in. to 2 ft. thick. In that case it is a little more than a patch.

E. V. Smith (B. & O.): I notice that in paragraphs 5 and 6 there is no mention of the size of the dowel or the number of dowels to be put in.

Mr. Tinker: That would be regulated by the size of the patch, and the only method to determine that would be to consider the cross section of the patch and the amount of shrinking stress which could be obtained and placed dowels enough to withstand this stress.

Mr. McDonald: I want to know if the committee has made any investigation of the different patented methods that are being so extensively advertised. I refer especially to one which seems to be a modification of what is known as the old rust joint. A mixture of about 48 parts of iron filings, 48 of Portland cement and 2 of sal ammoniac has been patented, and the manufacturers are endeavoring to sell it at the rate of five cents a pound.

Mr. Tinker: The committee has not considered definitely

mixtures of that kind. It is the tendency of the committee to frown on patented mixtures. The mixture to which Mr. McDonald has referred is in the nature of a foreign substance which is placed upon the concrete. It is not strictly a patching of the concrete. There are a number of substances which can be made to adhere to the surface of the concrete and produce a different finish. There are a number of substances which will make a more or less ornamental finish on a concrete floor, for instance, but it is not strictly a patch upon the concrete. The idea of a patch is that of a concrete surface which is either imperfect or broken, and which must have its surface restored, by putting a patch of concrete upon it.

This particular mixture is about one-half Portland cement, about one-half iron filings and a small percentage of sal ammoniac, all comparatively cheap materials, and it is being sold at five cents a pound. This cost figures out about 15 times the cost of Portland cement by the pound. That is one reason why we did not consider it. The cement is plenty good enough.

Mr. McDonald: I did not know that the committee expected this section to be confined to the method of patching concrete with concrete. If they are convinced that they have arrived at the best method of patching concrete, and the plan they propose will work in all cases, then the committee's report is all right. On the other hand, if there are patented methods of patching worn places in concrete surfaces that are superior to the method recommended by the committee, I think we ought to know it, whether they are patented or not.

L. G. Curtis (B. & O.): I inquire if the committee has made any use of what is known as Ransomite for the preparation of the surface of concrete before the application of the new surface is made. The B. & O. has used a great deal of it, and has had good success with it, so far as my information and experience goes.

Mr. Tinker: In the abstracts of the replies to our circular which we give in the report, there will be found a number of methods recommended for preparing the surface of the concrete, one of which is the acid method, which is a good method. That is what the Ransomite mixture is. The committee recommends, as the best method, the use of a steam jet.

The seven conclusions as to the methods of repairing defective or worn surfaces of concrete were adopted as presented by the committee.

Mr. Lindsay: Does section 3 of the conclusions as to depositing concrete under water exclude all methods except the drop-bottom bucket and the tremie?

Mr. Tinker: It does not exclude the other methods. There are instances where the other methods may be used; but we do recommend, from the information received, especially for a work of magnitude, that these two methods are preferable. One of these methods may be preferred in one case and the other method in another case.

R. D. Coombs (Con. Eng.): Is it necessary to specify the exact mixture in No. 8, and would it not be possible in some cases to use a leaner mixture?

Mr. Tinker: It is undoubtedly true that concrete of a leaner mixture might be successful. The danger with concrete under water is that a slight current will remove the cement if it has an opportunity to wash through it, and for that reason it should be a fairly rich mixture. The committee thought 1: 2:4 was fairly rich, and perhaps not too rich.

The ten conclusions as to depositing concrete under water were adopted as presented by the committee.

A motion that the conclusions adopted be printed in the manual was carried.

RECORDS AND ACCOUNTS.

The following work was assigned for the year:

(1) Make a comprehensive study of the forms in the manual which were adopted a number of years ago.

(2) Study the economical way of managing a storehouse so as to assure a minimum stock of materials at all times.

(3) Make concise recommendations for next year's work.

The committee devoted by far the greatest part of its time to subject 2, the first point discussed relating to the scope of the instructions as follows: Should the internal economy of the storehouse be solely considered, or should the effects of storehouse management on the broader economies of maintenance and operation be also taken into consideration? As the first involves a storekeeping rather than a maintenance or operating problem, the committee decided to base its investigation and report on the second interpretation.

Material and labor are required in the construction, maintenance and operation of railways; and since it is impossible to secure materials when, and in the quantities required, by direct purchase, a reserve stock is accumulated which is drawn upon to meet the demands as they arise. The following figures are taken from the report of the Interstate Commerce Commission for the year ending June 30, 1909:

Operating expenses of the railways of the United States for the year ending June 30, 1909, amounted to $1,599,443,410.

Machinists, carpenters, other shopmen, section foremen, other trackmen, other employes and laborers, whose efficiency depends to a great extent on their having proper materials and tools, received in wages $466,138,215, or about 29 per cent. of the entire operating expenses.

The general balance sheet for the same period gives the value of materials and supplies on hand at $206,849,619. Five per cent. per annum on this sum is $10,342,481, about 2.2 per cent. of what was paid during the year to the classes of employes above mentioned.

Assuming that it is possible to reduce the stock on hand to the extent of 50 per cent., the saving per annum would be only 1.1 per cent. of the amount paid annually in wages to the above mentioned employes, so that even a slight loss in their efficiency through failure to secure materials and tools as required, will soon absorb much more than the amount saved by reduced investment in stock. It would seem, therefore,



H. J. PFEIFER.

Chairman Committee on Records and Accounts.

that the most important function of a storehouse is the prompt delivery of materials and tools so that delays to labor resulting from their lack may be reduced to a minimum.

CONCLUSIONS.

It is recommended—

(1) That no changes be made in the forms appearing in the manual.

(2) That the following statement embodies the general principles governing the economical management of a railway storehouse:

Reasons for Maintaining a Storehouse.

The object of a storehouse is to provide material and tools when required so that the cost of work may be a minimum, bearing in mind the factors of delay to work or labor, also interest on investment in stock.

The following essential elements enter into the problem:

(a) Standardization.—The standardization of materials and instructions in regard to their use will reduce to a minimum the number of items of material of the various classes which should be carried in stock. The amount of each item which should be carried in stock will depend upon the rate of consumption, time required for the purchase and delivery of material, and also upon local conditions.

(b) Classification of Material.—This is necessary so as to reduce to a minimum the cost and time of handling. An approved classification should be followed in making requisitions.

(c) Stock Account.—An account should be kept of stock showing at all times a record of receipts, disbursements and amount on hand. Stock should be replenished when the amount of any item has been reduced to a fixed minimum. Inventories should be made at stated periods. A proper stock account furnishes a check on excessive supply and obsolete material.

(d) Distribution.—When material is shipped, notice should

be sent to consignee showing partial or complete filling of requisition and if partial, when final shipment may be expected.

(e) Organization.—The storekeeper's place in the general organization should be so fixed and adjusted that the measure of his efficiency is, primarily, the promptness and accuracy with which he fills requisitions, and, secondly, his ability to hold down the stock investment to the lowest amount consistent with the first requirement.

The report is signed by H. J. Pfeifer (St. L. Term), chairman; M. C. Byers (St. L. & S. F.), vice-chairman; J. M. Brown (C. R. I. & P.), Edw. Gray (Southern), E. E. Hanna (M. P.), Henry Lehn (N. Y. C. & H. R.), J. H. Milburn (B. & O.), C. W. Pifer (I. C.), Guy Scott (P. L. W.), W. A. Christian (C. G. W.), G. J. Graves (A. T. & S. F.), C. W. Cochran (C. C. C. & St. L.), G. T. Warren (B. & O.), H. Stephens (L. S. & M. S.).

The conclusions and the matter under "Reasons for Maintaining a Store House" were adopted as presented without discussion.

ELECTRICITY.

The outline of work for 1911 was as follows:

(1) Continue the consideration of the subject of clearances.

(2) Continue the preparation of standard specifications for overhead transmission line crossings.



GEORGE W. KITTREDGE.

Chairman Committee on Electricity.

(3) Report on effect of electrolytic action on metallic structures and best means of preventing it.

(4) Method of insulation and protection.

In accordance with instructions the committee has confined itself to the following subjects:

(1) Clearances.

(2) Transmission lines and crossings.

CLEARANCES.

At the last meeting of the association, at which our report was considered, it was decided that in view of the fact that the American Railway Association had a Committee on Clearance Lines and the American Electric Railway Engineering Association also had a Committee on Clearance Lines, and because of the fact that the Committee on Electricity had not been able for various reasons to reach conclusions with them to accept the report on clearance as one of progress only, with the idea of agreeing with the other associations mentioned prior to the next meeting.

The chairman of the Sub-Committee on Clearances has subsequently been in communication with representatives of the committees of the other two associations mentioned, with the result that diagram "A" is now submitted as the recommended clearance for equipment and permanent way structures adjacent to third rail and for third rail structures.

It is believed that similar diagrams will be recommended to the American Railway Association by the Committee on Electric Working and by the committee considering the subject of Clearance of the American Electric Railway Engineering Association.

Diagrams have been obtained from all the principal railways in the United States using third rail, showing outlines of their third rail structures and from some of the principal steam railways diagrams showing outlines of maximum equipment. These various diagrams were used as a basis in establishing clearance lines for third rail structures, permanent way structures adjacent to third rail and equipment.

A table is also given showing "Data Regarding Third Rail Clearances," which has been prepared from information recently received from various companies with a view of ascertaining what proportion of track mileage, of roads using both steam and electricity, will clear the recommended clearance lines. From an inspection of this table it will be noted that out of a total mileage of 1,988.04 using steam and electricity, 973.80 miles will clear. It will also be noted that the mileage not clearing is mainly interurban electric roads which handle steam equipment as secondary traffic and elevated roads in cities which do not handle steam equipment.

At the last meeting of the Association the definition for "Third Rail Gage," as follows, was adopted:

"Distance, measured parallel to plane of top of both running rails, between gage of running rail and center line of third rail."

It is now proposed changing the definition to read as follows:

"Third Rail Gage.—Distance measured parallel to plane of top of both running rails between gage of nearest running rail and inside gage line of third rail."

TRANSMISSION LINES AND CROSSINGS.

The sub-committee chairman has been working in conjunction with committees of the National Electric Light Association, American Institute of Electrical Engineers, American Electric Railway Association, Association of Railway Telegraph Superintendents, and representatives of the telephone and telegraph companies, in connection with the preparation of specifications for overhead crossings of electric light and power lines, and the accompanying specification is submitted which is identical with the specifications that have been adopted by the other associations mentioned, excepting in paragraphs Nos. 10, 13, 18, 24, 29, 31, 32, 34, 45, 49, 51, 55, 60 and 61, which changes are in line with more clearly expressing the condition or of making them more satisfactory from the point of view of the railways. For the convenience of the members the paragraphs mentioned are given as Appendix "B" to this report in the form in which they have been adopted by the other associations mentioned above.

CONCLUSIONS.

(A) The Committee recommends for adoption by the association:

(1) Definition: "Third Rail Gage.—Distance measured parallel to plane of top of both running rails between gage of nearest running rail and inside gage line of third rail."

(2) The lines shown on diagram "A" as equipment clearance lines.

(3) The lines shown on diagram "A" as permanent way structure adjacent to third rail clearance lines.

(4) The lines shown on diagram "A" as third rail structure clearance lines.

(5) The adoption of the specifications for overhead crossings of electric light and power lines.

(B) The committee recommends a continuation of work already outlined, particularly consideration of clearance for overhead third rail working conductors, electrolysis and insulation and the consideration of any new information that may develop in reference to maintenance organization and relation of track structures, and asks for such other direction or instructions as seem necessary or desirable.

The report is signed by George W. Kittredge (N. Y. C. & H. R.), chairman; J. B. Austin, Jr. (L. I.), vice-chairman; R. D. Coombs (Consulting Eng.), A. O. Cunningham (Wabash), L. C. Fritch (C. G. W.), George Gibbs (P. T. & T.), G. A. Harwood (N. Y. C. & H. R.), E. B. Katte (N. Y. C. & H. R.), C. E. Lindsay (N. Y. C. & H. R.), W. S. Murray (N. Y. N. H. & H.), J. R. Savage (L. I.), W. I. Trench (B. & O.), H. U. Wallace.

APPENDIX A.

SPECIFICATIONS FOR OVERHEAD CROSSINGS OF ELECTRIC LIGHT AND POWER LINES.

General Requirements.

Scope.

1. These specifications shall apply to overhead electric light and power line crossings (except trolley contact wires), over railroad right-of-way, tracks, or lines of wires; and, further, these specifications shall apply to overhead, electric light and power wires of over 5,000 volts constant potential,

crossing, or constructed over telephone, telegraph or other similar lines.

Location.

2. The poles, or towers, supporting the crossing span preferably shall be outside the railroad company's right-of-way.

3. Unusually long crossing spans shall be avoided wherever practicable.

4. The poles, or towers, shall be located as far as practicable from inflammable material or structures.

5. The poles, or towers, supporting the crossing span, and the adjoining span on each side, preferably shall be in a straight line.

6. The wires, or cables, shall cross over telegraph, telephone and similar wires wherever practicable.

7. Cradles, or overhead bridges, shall not be used.

Clearance.

8. The side clearance shall be not less than 12 ft. from the nearest rail of main-line track, nor less than 6 ft. from the nearest rail of sidings. At loading sidings sufficient space shall be left for a driveway.

9. The clear headroom shall be not less than 30 ft. above the top of rail under the most unfavorable condition of temperature and loading. For constant potential, direct-current circuits, not exceeding 750 volts, when paralleled by trolley contact wires, the clear headroom need not exceed 25 ft.

10. The clearance of alternating-current circuits above any existing wires, under the most unfavorable condition of temperature and loading, shall be not less than 8 ft. wherever practicable. For constant potential, direct-current circuits, not exceeding 750 volts, the minimum clearance above telegraph, telephone and similar wires may be 2 ft. with insulated wires and 4 ft. with bare wires.

11. The separation of conductors carrying alternating current, supported by pin insulators, for spans not exceeding 150 ft., shall be not less than:

Line Voltage.	Separation.
Not exceeding 6,600 volts	14½ in.
Exceeding 6,600, but not exceeding 14,000	24 in.
Exceeding 14,000, but not exceeding 27,000	30 in.
Exceeding 27,000, but not exceeding 35,000	36 in.
Exceeding 35,000, but not exceeding 47,000	45 in.
Exceeding 47,000, but not exceeding 70,000	60 in.

For spans exceeding 150 ft. the pin spacing should be increased, depending upon the length of the span and the sag of the conductors.

Note.—This requirement does not apply to wires of the same phase or polarity between which there is no difference of potential.

With constant potential, direct-current circuits not exceeding 750 volts, the minimum spacing shall be 10 in.

12. When supported by insulators of the disc or suspension type, the crossing span and the next adjoining spans shall be dead-ended at the poles, or towers, supporting the crossing span, so that at these poles, or towers, the insulators shall be used as strain insulators.

13. The clearance in any direction between the conductors nearest the pole, or tower, and the pole or tower shall be not less than:

Line Voltage.	Clearance.
Not exceeding 10,000 volts	9 in.
Exceeding 10,000, but not exceeding 14,000	12 in.
Exceeding 14,000, but not exceeding 27,000	15 in.
Exceeding 27,000, but not exceeding 35,000	18 in.
Exceeding 35,000, but not exceeding 47,000	21 in.
Exceeding 47,000, but not exceeding 70,000	24 in.

Conductors.

14. The normal mechanical tension in the conductors generally shall be the same in the crossing span and in the adjoining span on each side, and the difference in length of the crossing and adjoining spans generally shall be not more than 50 per cent. of the length of the crossing span.

15. The conductors shall not be spliced in the crossing span nor in the adjoining span on either side.

16. The method of supporting the conductors at the poles, or towers, shall be such as to hold the wires, under maximum loading, to the supporting structures, in case of shattered insulators, or wires broken or burned at an insulator, without allowing an amount of slip which would materially reduce the clearance specified in paragraphs No. 9 and No. 10.

Guys.

17. Wooden poles supporting the crossing span shall be side-guyed in both directions, if practicable, and be head-guyed away from the crossing span. The next adjoining poles shall be head-guyed in both directions. Braces may be used instead of guys.

18. Strain insulators shall be used in guys from wooden poles carrying any power wire of less than 6,600 volts, provided the guys are not through grounded to permanently damp earth. Strain insulators shall not be used in guying steel structures, nor required on wooden poles carrying wires, all of which are 6,600 volts or more, provided the guys are through grounded to permanently damp earth.

Clearing.

19. The space around the poles, or towers, shall be kept free from inflammable material, underbrush and grass.

Signs.

20. In the case of railroad crossings, if required by the railroad company, warning signs of an approved design shall be placed on all poles and towers located on the railroad company's right-of-way.

Grounding.

21. For voltages over 5,000 volts, wooden crossarms, if used, shall be provided with a grounded metallic plate on top of the arm, which shall be not less than ⅛-in. in thickness and which shall have a sectional area and conductivity not less than that of the line conductor. Metal pins shall be electrically connected to this ground. Metal poles and metal arms on wooden poles shall be grounded.

22. The electrical conductivity of the ground conductor shall be adjusted to the short-circuit current capacity of the system and shall be not less than that of a No. 4 B. & S. gage copper wire.

Temperature.

23. In the computation of stresses and clearances, and in erection, provision shall be made for a variation in temperature from —20 degrees Fahrenheit to + 120 degrees Fahrenheit. A suitable modification in the temperature requirements shall be made for regions in which the above limits would not fairly represent the extreme range of temperature.

Inspection.

24. If required by contract, all material and workmanship shall be subject to the inspection of the company crossed; provided, that reasonable notice of the intention to make shop inspection shall be given by such company; if such notification is not given, the company crossed shall be furnished with certified reports of shop inspection of material and workmanship made by a properly qualified inspector. Defective material shall be rejected, and shall be removed and replaced with suitable material.

25. On the completion of the work, all false work, plant and rubbish, incident to the construction, shall be removed promptly and the site left unobstructed and clean.

Drawings.

26. If required, by contract, ( ) complete sets of general and detail drawings shall be furnished for approval, before any construction is commenced.

Loads.

27. The conductors shall be considered as uniformly loaded throughout their length with a load equal to the resultant of the dead load plus the weight of a layer of ice ½-in. in thickness, and a wind pressure of 8 lbs. per sq. ft, on the ice-covered diameter, at a temperature of 0 degrees Fahrenheit.

28. The weight of ice shall be assumed as 57 lbs. per cu. ft. (0.033 lb. per cu. in.).

29. Insulators, pins and conductor attachments shall be designed to withstand, with the designated factor of safety, the tension in the conductors under the maximum loading, assuming the conductor to be broken on one side of the structure.

30. The pole, or towers, shall be designed to withstand, with the designated factor of safety, the combined stresses from their own weight, the wind pressure on the pole, or tower, and the above wire loading on the crossing span and the next adjoining span on each side. The wind pressure on the poles, or towers, shall be assumed at 13 lbs. per sq. ft. on the projected area of solid or closed structures, and on 1½ times the projected area of latticed structures.

31. The poles, or towers, shall also be designed to withstand the most unfavorable condition of the loads specified in paragraph 30, combined with the unbalanced tension of two broken wires for poles, or towers, carrying 5 wires or less; three broken wires for poles, or towers, carrying 6 to 10 wires, and four broken wires for poles, or towers, carrying 11 or more wires.

32. Crossarms shall be designed to withstand the loading specified in paragraph 30, combined with the unbalanced

tension of the wire, which, when broken, produces the highest fiber stress in the arm.

33. The poles, or towers, may be permitted a reasonable deflection under the specified loading, provided that such deflection does not reduce the clearances specified in paragraph No. 10 more than 25 per cent. or produce stresses in excess of those specified in paragraphs Nos. 65 to 69.

Factors of Safety.

34. The ultimate unit stress divided by the allowable stress shall be not less than the following:

Wires and cables	2
Pins	2
Insulators, conductor attachments, guys	3
Wooden poles and crossarms	6
Structural steel	3
Reinforced concrete poles and crossarms	4
Foundations	2

Note.—The treating of wooden poles and crossarms is recommended. The treatment of wooden poles and crossarms should be by thorough impregnation with preservative by either closed or open-tank process. For poles, except in the case of yellow pine, the treatment need not extend higher than a point 2 ft. above the ground line.

minute, at an inclination of 45 deg. to the axis of the insulator.

The wet flash-over test shall be not less than:

Line Voltage.	Test Voltage.
Exceeding 9,000, but not exceeding 14,000..	40,000
Exceeding 14,000, but not exceeding 27,000..	60,000
Exceeding 27,000, but not exceeding 35,000..	80,000
Exceeding 35,000, but not exceeding 47,000..	100,000
Exceeding 47,000, but not exceeding 60,000..	120,000
Exceeding 60,000	twice the line voltage

39. Test voltages above 35,000 volts shall be determined by the A. I. E. E. standard spark-gap method.

40. Test voltages below 35,000 volts shall be determined by transformer ratio.

Material.

Conductors.

41. The conductors shall be of copper, aluminum, or other non-corrodible material, except that in exceptionally long spans, where the required mechanical strength cannot be obtained with the above materials, galvanized or copper-covered steel strand may be used.

42. For voltages not exceeding 750 volts, solid or stranded conductors may be used up to and including 4/0 in size;

Name of Company	Plan No.	Top or Under Contact	Protected	Uses Steam Equipment	Structures Clear Prop. Lines	Mileage in Operation	Mileage Planned for Immed. Future	Mileage Using Steam Equipment	Mileage Clearing Proposed Lines
Albany Southern	1	Top	No	Yes	Yes	65.00		65.00	65.00
Aurora, Elgin & Chicago	2	"	"	"	No	95.00		95.00	
Baltimore & Ohio	3	"	Yes	"	Slight	8.70		8.70	8.70
Boston Elevated Ry.	4	"	No	No	No	24.52			
Brooklyn Rapid Transit	5	"	"	"	"	87.99			
Northwestern Elevated, Chicago	6	"	"	"	"	60.00			
Central California Traction	7	Under	Yes	Yes	Yes	45.00		45.00	45.00
Grand Rapids, Grand Haven & Muskegon	8	Top	No	No	No	41.26			
Hudson & Manhattan	9	"	Yes	"	"	17.50	2.35		
Interborough Rapid Transit	10, 11, 12	"	Partly	"	"	203.31			
Lackawanna & Wyoming Valley	14	"	No	Yes	"	44.00		44.00	
Long Island R. R.	13, 18	"	Yes	"	Yes	166.03		166.03	166.03
Metropolitan West Side, Chicago	6	"	No	No	No	49.64			
Michigan United	16	"	"	Yes	"	107.00		107.00	
Northern Electric Ry., Chico, Cal.	17	"	"	"	"	130.00		130.00	
Penna. Tunnel & Terminal Co.	18	"	Yes	"	Yes	94.52		94.52	94.52
Puget Sound Electric Ry.	19	"	No	"	No	37.50		37.50	
Philadelphia & Western	20	Under	Yes	"	"	22.00	12.00	34.00	
Scioto Valley Traction Co.	21	Top	No	"	Yes	65.82		65.82	65.82
*Southern Pacific R. R.									
South Side Elevated, Chicago	6	"	"	No	No	46.41			
West Jersey & Sea Shore	23	"	Yes	Yes	Yes	143.00		143.00	143.00
Wilkesbarre & Hazelton	24	"	"	"	Slight	29.50		29.50	
N. Y. C. & H. R. R. R.	26	Under	"	"	Yes	154.94	90.66	245.60	154.94
N. Y. C. & H. R. R. R., Utica to Syracuse	25	"	"	"	"	105.76		105.76	105.76
Detroit River Tunnel Co.	26	"	"	"	"	19.27		19.27	19.27
Phila. Rapid Transit Co.		"	"	No	No	18.61			
Oneida Railway Co.	25	"	"	Yes	Yes	105.76		96.23	105.76
Totals						1,988.04	105.01	1,531.93	973.80

*Single Catenary construction.

Data Regarding Third Rail Clearances, Revised Feb. 1, 1912.

Insulators.

35. Insulators for line voltages of less than 9,000 shall not flash over at four times the normal working voltage, under a precipitation of water of 1-5 of an in. per minute, at an inclination of 45 deg. to the axis of the insulator.

36. Each separate part of a built-up insulator, for line voltages over 9,000, shall be subjected to the dry flash-over test of that part for five consecutive minutes.

37. Each assembled and comented insulator shall be subjected to its dry flash-over test for five consecutive minutes.

The dry flash-over test shall be not less than:

Line Voltage.	Test Voltage.
Exceeding 9,000, but not exceeding 14,000..	65,000
Exceeding 14,000, but not exceeding 27,000..	100,000
Exceeding 27,000, but not exceeding 35,000..	125,000
Exceeding 35,000, but not exceeding 47,000..	150,000
Exceeding 47,000, but not exceeding 60,000..	180,000
Exceeding 60,000	3 times line voltage

Each insulator shall further be so designed that, with excessive potential, failure will first occur by flash-over and not by puncture.

38. Each assembled insulator shall be subjected to a wet flash-over test, under a precipitation of water of 1-5 in. per

above 4/0 in size, stranded conductors shall be used. For voltages exceeding 750 volts, and not exceeding 5,000 volts, solid or stranded conductors may be used up to and including 2/0 in size; above 2/0 in size, conductors shall be stranded. For voltages exceeding 5,000 volts, all conductors shall be stranded. Aluminum conductors for all voltages and sizes shall be stranded.

The minimum size of conductors shall be as follows:

No. 6 B. & S. gage copper for voltages not exceeding 5,000 volts.

No. 4 B. & S. gage copper for voltages exceeding 5,000 volts.

No. 1 B. & S. gage aluminum for all voltages.

Insulators.

43. Insulators shall be of porcelain for voltages exceeding 5,000 volts.

44. Strain insulators for guys shall have an ultimate strength of not less than twice that of the guy in which placed. Strain insulators shall be so constructed that the guy wires holding the insulator in position will interlock in case of the failure of the insulator.

Strain insulators for guys shall not flash over at four times the maximum line voltage, under a precipitation of water of 1/5 in. per minute, at an inclination of 45 deg. to the axis of the insulator.

Pins.

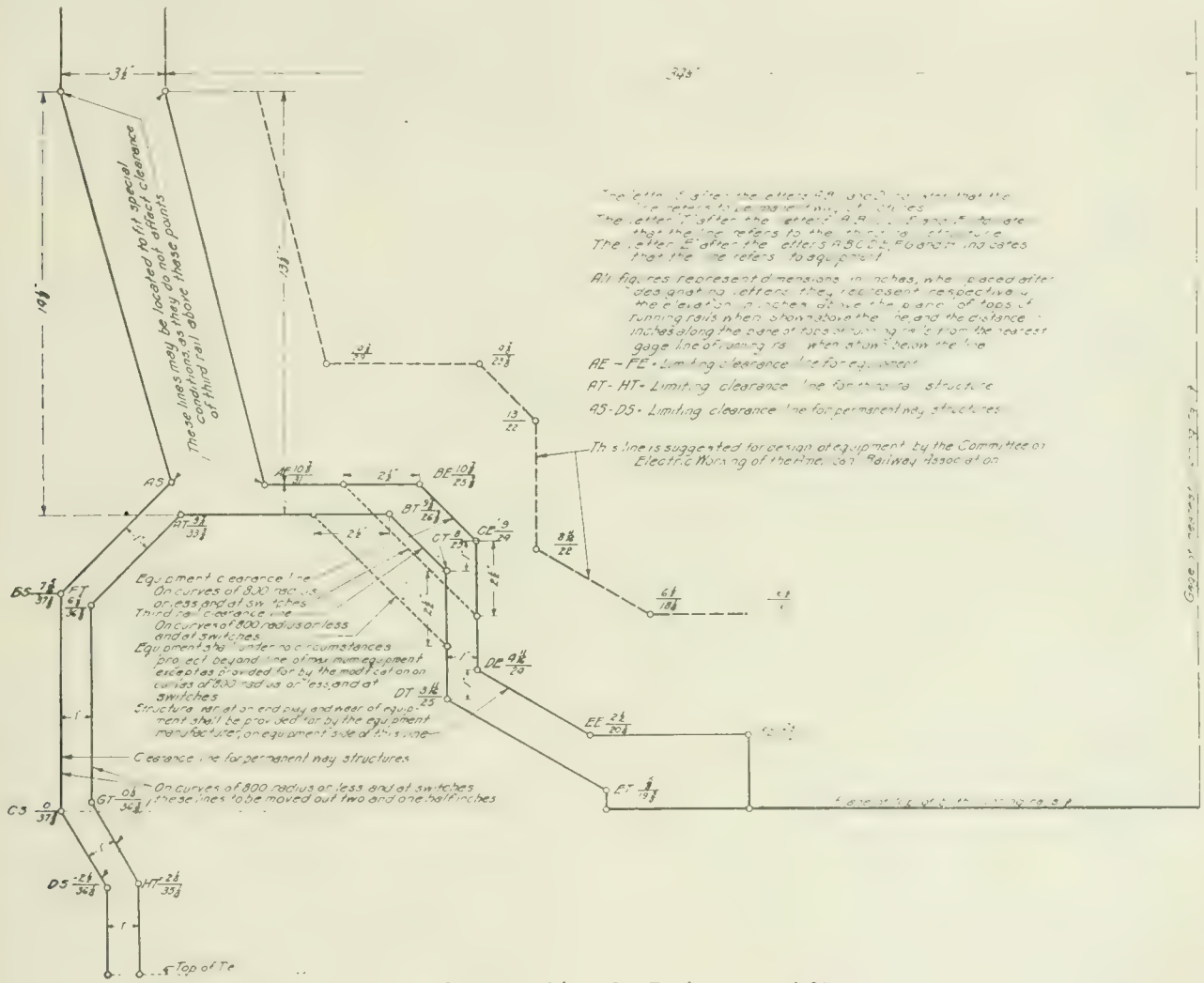
45. For voltages of 5,000 and over, insulator pins shall be steel, wrought iron, malleable iron, or other approved metal or alloy, and shall be galvanized, or otherwise protected from corrosion. Pins shall be locked with cotter, nut, or other device, to prevent raising out of the socket or hole in the crossarm.

Guys.

46. Guys shall be galvanized or copper-covered stranded steel cable, not less than 5/16-in. in diameter, or galvanized rolled rods of equivalent tensile strength.

47. Guys to the ground shall connect to a galvanized anchor rod, extending at least one foot above the ground level.

48. The detail of the anchorage shall be definitely shown upon the plans.



Recommended Clearance Lines for Equipment and Structures.

Wooden Poles.

49. Wooden poles shall be of selected timber of approved species, peeled, free from defects which would decrease their strength or durability, not less than 7 in. minimum diameter at the top, and meeting the requirements as specified in paragraphs 17, 30, 31 and 34.

Concrete.

50. All concrete and concrete material shall be in accordance with the requirements of the report of the joint committee on Concrete and Reinforced Concrete.

Structural Steel.

51. Structural steel shall be open-hearth, in accordance with the Manufacturers' Standard Specifications.

52. The design and workmanship shall be strictly in accordance with first-class practice.

53. The form of the frame shall be such that the stresses may be computed with reasonable accuracy, or the strength shall be determined by actual test.

54. The sections used shall permit inspection, cleaning and painting, and shall be free from pockets in which water or dirt can collect.

55. The length of a main compression member shall not exceed 150 times its least radius of gyration. The length of a secondary compression member shall not exceed 180 times its least radius of gyration.

56. The minimum thickness of metal in galvanized structures shall be ¼-in. for main members, and ⅛-in. for secondary members. The minimum thickness of painted material shall be ¼-in.

Protective Coatings.

57. All structural steel shall be thoroughly cleaned at the shop and be galvanized, or given one coat of approved paint.

Painted Material.

58. All contact surfaces shall be given one coat of paint before assembling.

All painted structural steel shall be given two field coats of an approved paint.

The surface of the metal shall be thoroughly cleaned of all dirt, grease, scale, etc., before painting, and no painting shall be done in freezing or rainy weather.

Galvanized Material.

59. Galvanized material shall be in accordance with the specifications for galvanizing iron and steel.

Bolt holes in galvanized material shall be made before galvanizing.

Foundations.

60. The foundations for steel poles and towers shall be designed to prevent overturning.

The weight of concrete shall be assumed as 140 lbs. per cu. ft. In good ground, the weight of "earth" shall be assumed at 100 lbs. per cu. ft. In swampy ground, special measures shall be taken to prevent uplift or depression.

61. The top of the concrete foundation, or casing, shall

be not less than 12 in. above the surface of the ground or extreme high water.

62. When located in swampy ground, wooden crossing and next adjoining poles shall be set in barrels of broken stone or gravel, or in broken stone or timber footings.

63. When located in the sides of banks, or when subject to washouts, foundations shall be given additional depth, or be protected by cribbing or riprap.

64. All foundations and pole settings shall be tamped in 6-in. layers, while back filling.

Working Unit Stresses.

Obtained by dividing the ultimate breaking strength by the factors of safety given in paragraph 34.

Structural Steel.

		Lbs. per sq. in.
65.	Tension (net section)	18,000
	Shear	14,000
	Compression	18,000 —60— r

Rivets, Pins.

		Lbs. per sq. in.
66.	Shear	10,000
	Bearing	20,000
	Bending	20,000

Bolts.

67.	Shear	8,500
	Bearing	17,000
	Bending	17,000

Wires and Cables.

		Lbs. per sq. in.
68.	Copper, hard-drawn, solid, B. & S. gage, 4/0, 3/0, 2/0	25,000
	Copper, hard-drawn, solid, B. & S. gage, 1/0	27,500
	Copper, hard-drawn, solid, B. & S. gage, No. 1.	28,500
	Copper, hard-drawn, solid, B. & S. gage, No. 2, 4, 6	30,000
	Copper, soft-drawn, solid, B. & S.	17,000
	Copper, hard-drawn, stranded, B. & S.	30,000
	Copper, soft-drawn, stranded, B. & S.	17,000
	Aluminum, hard-drawn, stranded, B. & S. gage under 4/0	12,000
	Aluminum, hard-drawn, stranded, B. & S. gage 4/0 and over	11,500

Untreated Timber.

		Bending.	Compression.
69.	Eastern white cedar.	600 lbs. per sq. in.	$600\left(1-\frac{L}{60\,D}\right)$
	Chestnut	850 lbs. per sq. in.	"
	Washington cedar	850 lbs. per sq. in.	"
	Idaho cedar	850 lbs. per sq. in.	"
	Port Orford cedar	1150 lbs. per sq. in.	"
	Long-leaf yellow pine.	1100 lbs. per sq. in.	"
	Short-leaf yellow pine	950 lbs. per sq. in.	"
	Douglas fir	1000 lbs. per sq. in.	"
	White oak	950 lbs. per sq. in.	"
	Red cedar	700 lbs. per sq. in.	"
	Bald cypress (heart-wood)	800 lbs. per sq. in.	"
	Redwood	850 lbs. per sq. in.	"
	Catalpa	500 lbs. per sq. in.	"
	Juniper	550 lbs. per sq. in.	"

L = Length in inches.
D = Least side, or diameter, in inches.

SPECIFICATIONS FOR GALVANIZING FOR IRON OR STEEL.

These specifications give in detail the test to be applied to galvanized material. All specimens shall be capable of withstanding these tests.

Coating.

(A) The galvanizing shall consist of a continuous coating of pure zinc of uniform thickness, and so applied that it adheres firmly to the surface of the iron or steel. The finished product shall be smooth.

Cleaning.

(B) The samples shall be cleaned before testing, first with carbona, benzine or turpentine and cotton waste (not with a brush), and then thoroughly rinsed in clean water and wiped dry with clean cotton waste.

The sample shall be clean and dry before each immersion in the solution.

Solution.

(C) The standard solution of copper sulphate shall consist of commercial copper sulphate crystals dissolved in cold water, about in the proportion of 36 parts, by weight, of crystals to 100 parts, by weight, of water. The solution shall be neutralized by the addition of an excess of chemically pure cupric oxide (Cu O). The presence of an excess of cupric oxide will be shown by the sediment of this reagent at the bottom of the containing vessel.

The neutralized solution shall be filtered before using by passing through filter paper. The filtered solution shall have a specific gravity of 1.186 at 65 deg. Fahrenheit (reading the scale at the level of the solution) at the beginning of each test. In case the filtered solution is high in specific gravity, clean water shall be added to reduce the specific gravity at 1.186 at 65 deg. Fahrenheit. In case the filtered solution is low in specific gravity, filtered solution of a higher specific gravity shall be added to make the specific gravity 1.186 at 65 deg. Fahrenheit.

As soon as the stronger solution is taken from the vessel containing the unfiltered neutralized stock solution, additional crystals and water must be added to the stock solution. An excess of cupric oxide shall always be kept in the unfiltered stock solution.

Quantity of Solution.

(D) Wire samples shall be tested in a glass jar of at least 2 in. inside diameter. The jar without the wire samples shall be filled with standard solution to a depth of at least 4 in. Hardware samples shall be tested in a glass or earthenware jar containing at least ½ pint of standard solution for each hardware sample.

Solution shall not be used for more than one series of four immersions.

Samples.

(E) Not more than seven wires shall be simultaneously immersed, and not more than one sample of galvanized material other than wire shall be immersed in the specified quantity of solution.

The samples shall not be grouped or twisted together, but shall be well separated so as to permit the action of the solution to be uniform upon all immersed portions of the samples.

Test.

(F) Clean and dry samples shall be immersed in the required quantity of standard solution in accordance with the following cycle of immersions.

The temperature of the solution shall be maintained between 62 deg. and 68 deg. Fahrenheit at all times during the following test:

(1) Immerse for one minute, wash and wipe dry.
(2) Immerse for one minute, wash and wipe dry.
(3) Immerse for one minute, wash and wipe dry.
(4) Immerse for one minute, wash and wipe dry.

After each immersion the samples shall be immediately washed in clean water having a temperature between 62 deg. and 68 deg. Fahrenheit, and wiped dry with cotton waste.

In the case of No. 14 galvanized iron or steel wire, the time of the fourth immersion shall be reduced to ½ minute.

Rejection.

(G) If after the test described in section (F) there should be a bright metallic copper deposit upon the samples, the lot represented by the sample shall be rejected.

Copper deposits on zinc or within 1 in. of the cut end shall not be considered causes for rejection.

In the case of a failure of only one wire in a group of seven wires immersed together, or if there is a reasonable doubt as to the copper deposit, two check tests shall be made on these seven wires and the lot reported in accordance with the majority of the sets of tests.

Note.—The equipment necessary for the tests herein outlined is as follows:

Filter paper.
Commercial copper sulphate crystals.
Chemically pure cupric oxide (Cu O).
Running water.
Warm water or ice, as per needs.
Carbona, benzine or turpentine.
Glass jars at least 2 in. inside diameter by at least 4½ in. high.
Glass or earthenware jars for hardware samples.
Vessel for washing samples.
Tray for holding jars of stock solution.
Jars, bottles and porcelain basket for stock solution.
Cotton waste.
Hydrometer cylinder 3 in. diameter by 15 in. high.
Thermometer with large Fahrenheit scale correct at 62 and 68 deg.
Hydrometer correct at 1.186 at 65 deg. Fahrenheit.

APPENDIX B.

Paragraphs in Specifications for Overhead Crossing of Electric Light and Power Lines as Adopted by Other Associations.

10. The clearance of alternating-current circuits above any existing wires, under the most unfavorable condition of temperature and loading, shall be not less than 8 ft. wherever possible. For constant potential, direct-current circuits, not exceeding 750 volts, the minimum clearance above telegraph, telephone and similar wires may be 2 ft. with insulated wires and 4 ft. with bare wires.

13. The clearance in any direction between the conductors nearest the pole, or tower, and the pole, or tower, shall be not less than:

Line Voltage.	Clearances.
Not exceeding 14,000 volts	9 in.
Exceeding 14,000 but not exceeding 27,000	15 in.
Exceeding 27,000 but not exceeding 35,000	18 in.
Exceeding 35,000 but not exceeding 47,000	21 in.
Exceeding 47,000 but not exceeding 70,000	24 in.

18. Strain insulators shall be used in guys from wooden poles carrying any power wire of less than 6,600 volts. Strain insulators shall not be used in guying steel structures, nor required on wooden poles carrying wires all of which are 6,600 volts or more.

Inspection.

24. If required by contract, all material and workmanship shall be subject to the inspection of the company crossed; provided that reasonable notice of the intention to make shop inspection shall be given by such company. Defective material shall be rejected, and shall be removed and replaced with suitable material.

29. Insulators, pins and conductor attachments shall be designed to withstand, with the designated factor of safety, the tension in the conductors under the maximum loading.

31. The poles, or towers, shall also be designed to withstand the loads specified in paragraph No. 30, combined with the unbalanced tension of: Two broken wires for poles, or towers, carrying 5 wires or less; three broken wires for poles, or towers, carrying 6 to 10 wires; and four broken wires for poles, or towers, carrying 11 or more wires.

32. Crossarms shall be designed to withstand the loading specified in paragraph No. 30, combined with the unbalanced tension of one wire broken at the pin farthest from the pole.

34. The ultimate unit stress divided by the allowable unit stress shall be not less than the following:

Wires and cables	2
Pins	2
Insulator, conductor attachments, guys	3
Wooden poles and crossarms	6
Structural steel	3
Reinforced concrete poles and crossarms	4
Foundations	2

Note.—The use of treated wooden poles and crossarms is recommended. The treatment of wooden poles and crossarms should be by thorough impregnation with preservative by either closed or open-tank process. For poles, except in the case of yellow pine, the treatment need not extend higher than a point 2 ft. above the ground line.

Pins.

45. For voltages of 5,000 and over, insulator pins shall be of steel, wrought iron, malleable iron, or other approved metal or alloy, and shall be galvanized, or otherwise protected from corrosion.

Wooden Poles.

49. Wooden poles shall be of selected timber, peeled, free from defects which would decrease their strength or durability, not less than 7 in. minimum diameter at the top, and meeting the requirements as specified in paragraphs 17, 30, 31 and 34.

51. Structural steel shall be in accordance with the Manufacturers' Standard Specifications.

55. The length of a main compression member shall not exceed 180 times its least radius of gyration. The length of a secondary compression member shall not exceed 220 times its least radius of gyration.

60. The foundations for steel poles and towers shall be designed to prevent overturning.

The weight of concrete shall be assumed as 140 lbs. per cu. ft. In good ground, the weight of "earth" (calculated at 30 deg. from the vertical) shall be assumed as 100 lbs. per cu. ft. In swampy ground, special measures shall be taken to prevent uplift or depression.

61. The top of the concrete foundation, or casing, shall be not less than 6 in. above the surface of the ground, nor less than 1 ft. above extreme high water.

Discussion on Electricity.

Mr. Kittredge: I want to say a word or two in regard to the specifications for Overhead Crossings of Electric Light and Power Lines. Within the last four months committees of the National Electric Light Association, the American Institute of Electrical Engineers, the American Electric Railway Association and the Association of Railway Telegraph Superintendents made a joint report, which corresponds very closely to the report of this committee. The differences are in paragraphs 10, 13, 18, 24, 29, 31, 32, 34, 45, 49, 51, 55, 60 and 61. In some of these paragraphs the changes are simply those of words. In one case I recall the word "practicable" is used for the word "possible," and in another place where it says "Treated poles are recommended," it really means where wooden poles are to be used, that they shall be treated. It does not mean that we recommend the use of wooden poles, but if they are used they shall be treated. In some cases the phraseology in our report has been changed for the better, we think, and this applies to the majority of the differences. There are a few items, which if the various paragraphs come up for discussion, can be enlarged on.

It seems to be a very great advantage to have a report upon these crossings which will be accepted and acknowledged by the principal companies interested in such construction. In New York, we can control the crossings over our right of way, but we have very little to say about crossings which occur in highways. The crossing companies have rights which apparently are co-extensive with those of the railways and almost any old thing does for a crossing in a highway. It is, of course, very desirable in the first place that we get safe construction, and in the second place good construction at the highways as well as at private crossings.

We are led to believe by members of the Joint Committee that if we will accept their report, using their phraseology, we will be in a very much better condition than if we do not, as some of the members of the Joint Committee were brought into line only after a great deal of hard work. They take the position that if this association does not accept specifications which are the same as theirs it will negative their whole work and let things stand as they are at the present time.

The President: We will take up the specifications by paragraphs.

G. A. Mountain (Can. Ry. Com.): I see trolley contacts are excepted in clause 9; with reference to the clearance of 25 feet. Has the committee any recommendation to make on that?

Mr. Kittridge: We have no recommendation.

Mr. Kittridge: The only difference in paragraph 10 is the word "practicable" in the third line. The joint report uses the word "possible."

Mr. Kittridge: I move, for the purpose of getting a contract which is similar in all respects, that we adopt the word "possible" instead of the word "practicable." Motion carried.

Mr. Pfeifer: I notice that the maximum line voltage in paragrhph 11 is put at 7,000 volts. The Terminal Railroad Association now has an application for a line crossing with 10,000 volts. I would like to know what provision could be made for that.

J. R. W. Ambrose (G. T.): I was going to bring up the same point. We have several crossings to-day of 110,000 volts.

The President: That seems to be a subject for further consideration on the part of the committee.

Mr. Kittridge: Section 13 varies from the report of the Joint Committee, in that our report contains one more division. The joint report says for not exceeding 14,000 volts, clearance, 9 in. We have for not exceeding 10,000 volts, clearance, 9 in., exceeding 10,000 but not exceeding 14,000 clearance, 12 in. I recommend the adoption of this paragraph, as shown.

Motion carried.

Mr. Kittredge: Section 18 varies from the paragraph of the Joint Committee in that beginning on the second line we have inserted the words, "Provided the guys are not through grounded to permanently damp earth," and at the end of the paragraph we have added the words "provided the guys are through grounded to permanently damp earth."

This paragraph is important and we believe the revisions we have made are so important that we could not change this

paragraph. In a conference with Mr. Osgood, the chairman of the Joint Committee, he told me, he would undertake to have his association adopt No. 18 as written by us provided we would adopt the others as written by him. I move the adoption of paragraph 18 as written. Motion carried.

Mr. Coombs: The following letter from Mr. Osgood of the Joint Committee was written before the action of the committee to-day was known.

The specification, as written, has been formally ratified and adopted by the National Electric Light Association, the American Institute of Electrical Engineers, the Association of Railway Telegraph Superintendents and the Engineering and Standards Committee of the American Electric Railway Engineering Association (the matter now being up for letter ballot by that association, requiring under their rules a delay of one year), the American Telephone and Telegraph Company, the Western Union Telegraph Company, and the Postal Telegraph-Cable Company.

A study of the changes recommended brings out the rather remarkable fact that alterations are recommended in only thirteen paragraphs out of a specification of some twenty-eight printed pages, and the joint committee which formulated this specification honestly believes that the differences are so slight that they are of no great engineering importance.

The list of names of the joint committee shows that the men are of very wide experience in the field of work under discussion, and are representative of all conflicting interests in overhead construction work, and the fact that so many engineers have agreed upon a specification, and the fact that the associations and large companies represented by these men have approved the specification, is a very strong indication that the specification must be a good one and sufficiently safe for our mutual purposes, and it is such a great improvement over anything which has ever before been offered, that we feel it our real duty to ask you to reconsider this matter in the broadest possible way.

Mr. Kittredge: In paragraph 24 it says: "If such notification is not given, the company crossed shall be furnished with certified reports of shop inspection of material and workmanship made by a properly qualified inspector." These words do not appear in the report of the Joint Committee, and I move the adoption of paragraph 24 of the Joint Committee report.

Motion carried.

A. F. Robinson (A. T. & S. F.): It seems to me that that provision for load in paragraph 27 is hardly sufficient. When ice gathers on wires it seldom forms in a circle. It is oblong and hangs to one side of the wire. That would vitiate the use of a wind pressure of 8 lbs. per sq. ft., because it is striking more nearly on a plane surface than it would if blowing against the cylinder. It also seems to me it would be better if we could arrive at a uniform load per lineal foot, without respect to the size of the wire or size of the supporting cable. It is a matter of very small moment when you work it out. If you take a 1½-in. wire, it means about 1.4 lbs. per lineal foot, and it seems to me we could cut nearly all of that out and put in a provision that the wires shall be figured for 10, 15 or 20 lbs. per lineal foot, and not say anything about the ice. I would offer that as a suggestion, for the consideration of the committee in future revisions of the specification.

Mr. Kittredge: Paragraph 29 also differs from the Joint Committee report and I move the adoption of paragraph 29 of the Joint Committee Report.

Motion carried.

Mr. Kittredge: Paragraph 31 contains the words "The most unfavorable condition," which the paragraph of the Joint Committee does not contain. I move the adoption of paragraph 31 of the Joint Committee.

E. B. Katte (N. Y. C. & H. R.): At the largest meeting the Committee on Electricity ever had we agreed to suggest these modifications. I believe it has been generally accepted by nearly all of the committees, that the modifications are good. I have been told that the Joint Committee would consider these modifications and in all probability would adopt some, if not all of them at their next meeting, six months from now. During the six months following that meeting we will be behind. Our specifications will contain 13 clauses that are, perhaps, ambiguous. If we adopt to-day the specifications as modified, we will be six months in advance of the other specifications and in advance of the other committee. Next fall they will perhaps adopt the specifications that you adopt to-day; then we will have standard specifications six months in advance of the time that we should have them if we don't adopt the specifications as recommended to-day.

Mr. Coombs: The main argument for warning this association not to make changes is to obtain a uniform national standard, and the engineering differences are so slight that personally I do not believe that any construction will be impaired during that six months.

Mr. Katte: The association has already adopted one change in clause 18. The specifications will not be uniform. As long as you have made one change, why not make all the other changes?

Mr. Fritch: If we were independent and could say, "We will adopt our own specifications," the chances are the other associations would throw them out, and at about 90 per cent of the crossings we would have to take whatever they would give us, and, for the sake of uniformity, believe we ought to adopt these specifications, with the exception of clause 18.

The motion to adopt paragraph 31 was carried.

Paragraphs 32, 34, 45, 49, 51, 55, 60 and 61, in which the Joint Committee report differed from the report of the Electricity Committee, were adopted in the form presented by the Joint Committee.

THE ANNUAL DINNER.

The annual dinner of the American Railway Engineering Association was given in the Gold room of the Congress hotel last night. President W. C. Cushing acted as toastmaster, and the addresses were by L. F. Loree, president of the Delaware & Hudson; Hon. F. D. Monk, K. C., M. P., Minister of Public Works of Canada and Ray Morris, of White, Weld & Company, a new York firm of bankers. Mr. Loree was unable to be present, and his address was read by George H. Burgess, chief engineer of the Delaware & Hudson. Almost 400 persons attended the dinner.

After the three addresses, President Cushing expressed the appreciation of the association of the exhibit at the Coliseum, and President Belknap of the Appliance Association thanked the members of the Engineering Association for their interest and attendance.

In beginning the speakers' program President Cushing said:

"Fellow members and guests of the American Railway Engineering Association, the following anecdote is called 'After the Refreshments.' 'Ah say, Miss Mandy, am yo' program full?' 'Lordee, no, Mr. Lumley, it takes mo' an san'wich an' two olives to fill mah program.'

"As I hope you have all finished the task of filling your program, I ask you to begin this evening of enjoyment with a toast to the health of His Excellency, the President of the United States. (A toast was then drunk, with the accompaniment of "Star Spangled Banner" by the orchestra.) Gentlemen, I now offer you a toast to the health of his Royal Highness, the Governor General of the Dominion of Canada. (The toast was accompanied by music, "God Save the King.") Gentlemen, 'The world was sad, the garden was a wild, and man, the hermit, sighed, still woman smiled.' I ask you to drink to her health, beauty, sweetness and nobility." (A toast was accordingly tendered, accompanied by music, "Annie Laurie.") Mr. Cushing then announced the result of the election of officers, which is given on another page. "With those names," said Mr. Cushing, "you can be assured of the continuous success of the association."

The following were the addresses:

Mr. Loree on Labor Unionism.

We boast ourselves in season and out of season upon our freedom of speech. As a matter of fact, we let things go to the devil without saying a word, because, as a people, we conceive a personal dislike for anyone who expresses a difference of opinion. Warned by this characteristic, and coming at the invitation of your president to talk to you about labor unions, I pray you to hear me with an open mind and to judge me for my purpose.

It has been said that books are too often written out of other books and too seldom out of the life of man, but notwithstanding that criticism, in view of the largeness of the subject and the limitations of our time, I have done no more

than to go through the literature, especially the work of the Webbs and the publications of the Johns Hopkins University, to give you from it as clear a picture as I am able to draw.

When the Roman Empire had fallen, society began slowly to evolve for its preservation a government of a feudal structure. This was in its essence an enlargement of the patriarchal type, the feudal chief charging himself with the care of his retainers. As this system slowly crumbled, and as industry developed, there arose craft guilds, formed among the men suffering from this disorganization, in order that they might retain independence and order.

The final disintegration of the feudal system and the rapid development of industry destroyed the guilds, and the dominant industrial policy of the sixteenth century was the establishment of some regulating authority to perform, for the trade of the time, the services formerly rendered by the craft guild, and more and more this fell into the hands of the government. The statesmen of Queen Elizabeth's time had enacted a statute of apprentices, through which they contrived arrangements which would, as they hoped, "yield unto



L. F. LOREE.



F. D. MONK.

the hired persons, both in time of scarcity and in time of plenty, a convenient proportion of wages," and it was the non-enforcement of this statute that gave rise to the trades unions, whose common purpose then was the enforcement of the law on the subject, and appeals to the government to save the wage-earners from the new policy of buying labor, like raw material in manufacture, in the cheapest market.

It is often assumed that trades unions arose as the descendant of the craft guild. There is, in fact, no connection, direct or indirect, between the ancient and modern forms of trade combination. The two organizations are entirely different, both in structure and function. The central figure of the guild organization, in all instances, and at all periods of its development, was the master craftsman, owning the instruments of production and selling the product. He supplied whatever capital was needed in his industry, and that knowledge of the markets for both raw material and product which is the special function of the entrepreneur.

Neither is it true that trade unionism arose as a protest against intolerable industrial oppression, nor that it is a product of the steam engine and the factory system. For whilst industrial oppression belongs to all ages, it is not until the changing conditions of industry had materially reduced the chance of each journeyman becoming himself a master that ephemeral combinations passed into permanent trade societies, recruited for many years from trades carried on exclusively by hand-workers, for the unions had preceded the factory system by half a century.

The modern labor organization rests on the definite separation between the functions of the capitalist and the workman; or, in other words, between the direction of industrial operations and their execution in detail, between the property owner and the brain-worker on the one hand and the manual-workers on the other. The trade union is "a continuous association of wage-earners for the purpose of maintaining or improving the condition of their employment."

The pioneers of the trade union movement were the extensive combinations of the west of England woolen-workers and the Midland frame-work knitters. There would appear to be no evidence of the existence prior to 1700 of continuous association of wage-earners. Throughout the eighteenth century they had a meager and uncertain existence, but the introduction of the factory system was accompanied by a rapid rise in trade combinations, and early in the nineteenth century they would seem to have become very highly developed and firmly established in many trades. The struggle for existence went on until 1825, and they languished through a long period of commercial depression until, with the business revival of 1843, they began to acquire a financial strength and a permanence of membership hitherto unknown, through a combination of the functions of a trade protective society with those of a permanent insurance company, while the leadership shifted from the casual enthusiast and agitator to a class of permanent, salaried officers, which new model had become generally adopted by 1860. Then came a new idea; the use of the combined trade union organization for legislative agitation, the demand that the government take up again its theories of the sixteenth century and regulate in detail conditions of labor; and now, since 1889, we find the whole trade union world permeated with collective ideas and drifting toward Socialism.

It would seem impossible, by a statistical survey, to give

an adequate idea of the trade union organization. It numbers in the United States apparently about 2 per cent of the population and about 10 per cent of those engaged in gainful occupations. What gives it great significance is the massing of trade unionists in certain industries and districts, where the population is comparatively dense and where industry is conducted on a large scale, in such a way as to form a powerful element of the industrial world. Perhaps three-fourths of its members are engaged in building, in mining, in steam and electric transportation, and in the machinists' trades. In certain districts and in certain industries, membership is practically co-extensive with the manual laborers. On the other hand, there are many occupations in which trade unionism is non-existent. In its growth, speaking generally, the strong have become stronger, whilst those that were weak are now even weaker than they were.

The trade union world has, throughout its whole history, manifested an overpowering impulse to the amalgamation of local trade clubs into national unions, with centralized funds and centralized administration. This centralization of administration, involving the adoption of a national trade policy, and above all the constant leveling up of the lower-paid districts to the higher standards set in more advantageous centers, requires, it is clear, the development of a salaried staff, selected for special capacity, devoting their whole attention to the commercial position and technical details of the particular section of the industry that they represent, and able to act for the whole of that section throughout the nation. Besides the active members of the trade union ranks, numbering perhaps 2,000,000, there is a smaller class of non-commissioned officers made up of the secretaries and presidents of local unions, branches and district committees of national societies, and of trades councils. These men number 20,000 or more; they form the skeleton of the trade union world and constitute the vital element in its politics. The actual government rests exclusively in the hands of a class apart, the salaried officers of the great societies, numbering at the present time scarcely more than 600, and these in turn are dominated by an inner circle of a few score. Looking at this development and the present situation, it is an interesting question as to whether we now have a condition of organized labor or a condition of labor professionally organized; whether this great mass is energized from below and consciously seeks its betterment, or whether it responds to pressure from above and is being exploited for the benefit of its rulers.

Notwithstanding their almost infinite variety of technical detail, the activities of trade unionism may be reduced to two economic devices—restriction of numbers and the common rule. To the former type belong the entrance to a trade, the right to a trade, continuity of employment, and new processes and machinery. The latter type includes the more modern rules directly fixing a standard rate, a normal day, and definite conditions of sanitation and safety.

The early efforts of the unions looked to the creation of an artificial scarcity of labor. They sought to restrict the entrance to a trade by the establishment of a long period of apprenticeship; to restrict the right to an apprenticeship to a patrimony to be conferred by the father upon his sons, and to restrict the number of apprentices to one for four or five journeymen; to enforce a limitation of boy labor and of handy-men, and to limit the progression of the latter within the trade; to totally exclude women therefrom; while some, by imposing large initiation fees or other penalties, tried to keep out many possible aspirants. Each union sought to secure for its members the whole of the work which it considered belonged to it according to usage and custom, and to secure for them continuity of employment, while all considered improvements which tended to lessen the demand for human labor as the deadliest curse which could possibly fall on the heads of the working classes.

The later efforts of the unions enlarge this program by the creation of an artificial demand for labor. They seek payment according to some definite standard, uniform in its application, covering equally payment by the piece and payment by time, with guaranteed minimum wage; a uniform maximum working time for all members of the craft as fixing a definite unit of measure, and a constant reduction of working hours as a means of making work to absorb surplus labor; a demand for safe, healthy and comfortable



RAY MORRIS.

conditions of work, compensation for accidents, whether avoidable or unavoidable, and permanent support when out of work, or invalided, and during old age.

If now, we ask how this extensive body, with this ambitious program, is held together, we are able to identify the following forces:

(1) The trade union organization is, as a unit, a lodge with a ritual largely based upon that of the Odd Fellows, and supplies to men with a common experience and who are brought frequently into personal contact, much social attraction, and, to the active and ambitious, opportunity for personal prominence and the exercise of individual power.

(2) The cohesion, the permanence of membership, the continuity of existence, rest upon the method of mutual insurance. But probably by far the most potent force is the pressure brought by the dominant spirits upon the isolated and unprotected individual. Whether this takes the form of the temporary abstraction of the tools of a workman; interference with his work; personal annoyance; the abuse or an ostracism of his family, or other of the manifold ways in which this pressure is exerted,—they are all infringements of personal liberty and an assertion of the right and the intention to make trade unionism compulsory. In their ultimate development, these coercive measures create the closed shop, with its concommitant devices of membership cards and buttons, the "check-off" system, and the union label.

(3) By their opposition to home work, small masters' separate arrangements with particular employers, profit-sharing, pension funds, employes' benefit societies, and similar ef-



forts to bring about mutuality of interest, trade unions are instinctively biased and consistently work to bring about a horizontal cleavage of society. Anyone enmeshed in their particular strata would then find escape impossible; all the worse features of the caste system would be invoked, and the chief merit of democracy, which is the open passage from the lowest to the highest position in the community, would be defeated.

If, further, we look to ascertain the methods by which trade unionism seeks to enforce its claims upon the employer, we find from the beginning of the eighteenth century down to the present day, the continuous employment of the method of legal enactment, whilst only intermittently during the eighteenth century, and not openly and avowedly until 1824, could they rely on the method of collective bargaining.

The method of legal enactment results in the labor unions maintaining at every session of the state legislatures and of Congress a lobby working in their interest. The control of the law is invoked for sanitation and safety, for limitation of the hours of labor, for restriction of labor of women and children and of the age at which youth may be employed, for the creation of parasitic labor, and in many other ways that constitute a great burden upon the community. It has destroyed many efforts that might have been developed to ameliorate conditions. For example, the "company stores" insured the woman the right to use enough of her husband's wages to provide for the full nourishment of the family, and prevented their dissipation in drink or other debauchery. All the arguments that can be urged in favor of the mechanics' lien could be marshalled in support of this institution. Its abuses should have been weeded out and the institution itself carefully conserved, with the incorporation of the profit-sharing principle. This legislation has made the struggle for existence harder for the farmer and the small manufacturer in the country town, and if in the short view it has helped those in whose interest it was passed, which is doubtful, it has in the main been hurtful to the rest of the community.

The method of collective bargaining, which is the form in which these activities are most familiar, has never commended itself to the employer, and where the two parties are more nearly equal in strength, has, after trial, generally been abandoned. The chief difficulties seem to be the lack of responsibility on the part of the labor unions in observing the bargain when made, and the disposition of the unions to assert under their rules the authority to control the shop and the methods used.

As to the strike, with its concomitants, the boycott and other militant methods, upon which the strength of the union appears ultimately to depend, it constitutes industrial war and has all the defects of war. The strike always reveals the use of means that could only be resorted to by those familiar with the technique of the trade. Its effectiveness would appear to depend upon disorder, violence and crime, which have distinguished it in all countries, at all times, and among all unions. The unions have never undertaken to discipline or expel members known to have resorted to violence, nor have they in any way assisted the authorities in preventing such action or in punishing it when committed; and their uniform denunciation of the courts with their injunctions, the navy, the army and the militia, the sheriff with his posse comitatus, the police, and even the boy scouts, indicates a systematic effort to weaken all the resources that civilization has developed for the preservation of order.

Finally, if we seek for the grounds upon which the trades unions base their claim for an existence, there would appear to be two contentions, not necessarily related:

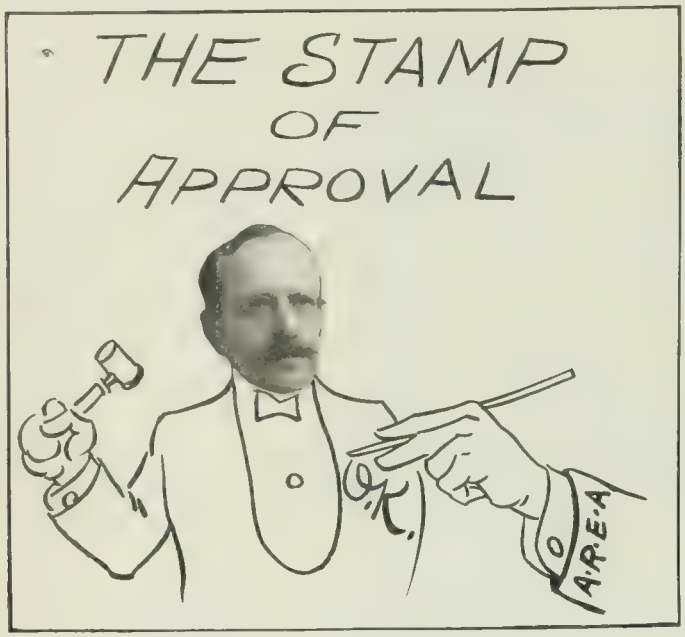
That the actual producers do not obtain their share of the wealth they create; and that the laborer is entitled to a living wage.

No one thing, perhaps, so embitters as a sense of injustice, and I am satisfied that much of the resentment of the workman is due to his belief in the assurances that have been made him by his leaders that he was not getting his fair share of the joint product, and it is highly important that the facts with regard to this be determined and be widely diffused. I am not aware of any considerable body of information regarding the relative contributions to value by the property owners, the brain-workers and the manual-workers. It would seem desirable to undertake a physical valuation of labor. Were this done it would probably be found that in most industries the wages of labor are already substantially in excess of the contribution made by labor to the value of the product. It is a realization of this that is at the bottom of the contention of the Socialists that the instruments of production should be the property of the state.

The continued efficiency of the nation's industry obviously depends on the continuance of its citizens in health and strength, and the maintenance of its workers, unimpaired in numbers and vigor, with a sufficient number of children to fill the vacancies caused by death or superannuation. But to arrange for this through a living wage is not so simple as to state it. A serious difficulty is our lack of precise knowledge as to what are the conditions of healthy life and industrial efficiency. There are practically no scientific data from which we can compute the needs of particular occupations. The customary standards of life differ from class to class to such an extent as to bear no discoverable relation to the waste and repair involved in the respective social functions of the various grades. Even if we could come to some conclusion as to the "normal ration" required to keep each trade in health, we would still be unable to decide how much must be added in each case to compensate for irregularity of employment. If special wages were fixed to meet the special needs of particular trades, neither the employer nor the community would have any guarantee that the extra sum allowed would be spent in extra nourishment, proper recreation, or insurance against periods of unemployment. With regard to the proper limits to be set to the duration of toil, while all would welcome a maximum working day consistent with the healthy existence, home life and citizenship of the average workmen, yet in the final analysis the whole destiny of man must rest upon the use made of his leisure time. It is a sinister experience that a holiday will fill the hospitals with victims whom months of toil have left unscathed.

What is distrusted in trade unionism is not its object nor even its devices, but its structure and its methods; the self-

perpetuating governing oligarchy, the creation of parasitic labor, the laying idle of costly and perishable machinery in plant, the dislocation of business enterprises, the diversion of orders to other communities and other countries, and the absorption in angry quarrels of intellects which would otherwise be devoted to the further development of industry; above all, the reduction to poverty and semi-starvation of thousands of workmen, involve a serious inroad upon the nation's wealth. The right to work is the property of every man, and this property, if Saint Paul was right when he said that "He who does not provide for his own is worse than a heathen," is the first, the most sacred, and the most inalienable of all. If trade unionism is to rest upon collective bargaining, and if this implies in its fullest development compulsory membership, then it menaces the fundamental rights of citizenship. The justification put forward for this compulsion is that it is for the good of the compelled. It is not reassuring to recall that this was the basis for the religious persecutions of the past, and it is significant that the trade unions display the same intolerance, the same extreme claims for superior rights, and the same ferocious cruelty, that characterized the persecuting sects.



It is difficult to understand why, under this constant and great pressure, the employers were not early driven into combinations for purposes of resistance or aggression. In 1902 and 1903 there were formed in numerous cities organizations called "Citizens' Alliances," of which Los Angeles has, perhaps, the most conspicuous present example. A little later there came into existence for the first time continuous associations of employers.

With both parties organized and more nearly equal in strength, we seem likely to enter upon a new phase. Practically every capitalist and captain of industry has had the experience of the laborer, knows thoroughly this phase of life in at least one branch of endeavor, and looks forward to the probability of his great-grandchildren having to make their start from the same level. Practically no laborer has had the experience of the capitalist or of the captain of industry, and usually conceives a radically wrong picture of their activities, environment and motives. It is to these associations of employers, therefore, that we may look with hope for practical solutions of the questions involved.

Your association has now been in existence for nearly twelve years, and has published nearly 9,000 pages of proceedings. It is interesting to note that your activities have been directed in the following proportions:

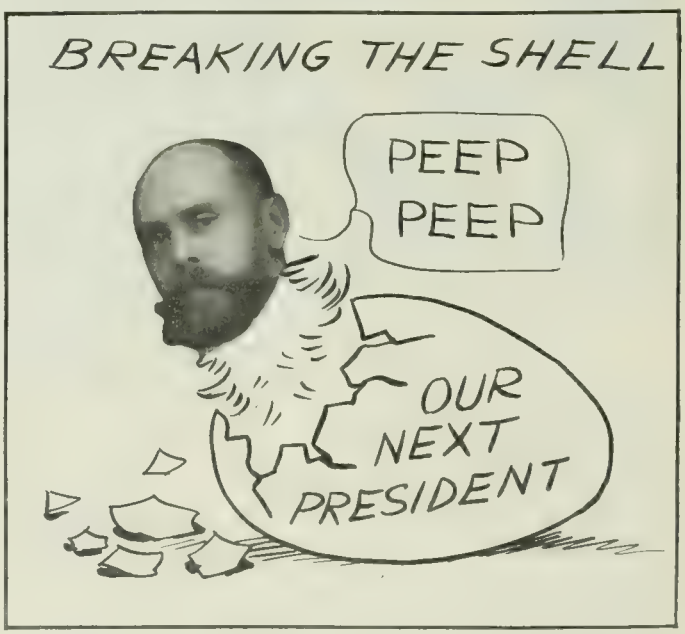
	Per cent.
On the problems of roadway	12
On the problems of track	30
On the problems of major structures	28
On the problems of minor structures	15
On the problems of miscellaneous	15
	100

If we reflect that the total maintenance of way expenses of the roads of the country are about $300,000,000 annually, and that of these expenses the moneys paid out for labor amount to 56 per cent, while all the other expenses amount to but 44 per cent, it would seem to justify the suggestion that your association devote at least a substantial part of your work to the study of labor. I would, therefore, urge that, to the present list of regular committees, there be added a committee on Maintenance of Way Labor, whose duties shall be to investigate the conditions of employment of and the relation of Maintenance of Way Labor to seasonal supply and demand; to consider questions of economic organization, education, discipline and equipment of forces for various kinds of work, and such other questions as shall from time to time be assigned by the usual authority.

Mr. Monk's Address.

I was immensely honored by the courteous and pressing invitation extended to me through your past president, my life long friend, William McNab. (Applause.) It was of a pressing nature, and as Mr. McNab is a Scotchman he could not be gainsaid. The many duties imposed upon me rendered it extremely difficult for me to come so far, but I am delighted to have come. I have been in public life for many years, but have never attended a gathering of such importance and of such a representative character; and permit me to add, coming to a strange country, I have never met with such a warm welcome, and I have never attended a banquet in such a magnificent edifice. There may have arisen some misapprehension as to the verdict rendered by our people in the recent election where the principal issue was the reciprocity matter. I come as a member of the party that fought that projected compact, as a member of the government called into power as the result of that election, and I come to assure you from the bottom of my heart that our people are as eager as they ever have been to maintain with our great neighbors of the south, with our cousins, with our brethren, the very best relations possible that should exist between two such nations. (Applause.) The purely business and economic consideration which we gave to the propositions laid before us are the only reasons which brought about the rejection of that proposition.

I have at times found, that the friendships I have made in this country, gave rise to the frank expression that you find we proceed slowly, at times, and the cause of this has been ascribed by my friends to the fact that we are still, in Canada, living in the colonial stage and under colonial conditions, which, to the mind of many Americans, means something similar to subserviency, and in a certain sense, slavery.



I would be pleased if I could by any words of mine dispel that impression. In our own country, under institutions somewhat different, perhaps, from your own, but in reality just as free, we enjoy at the present moment the same condition of freedom and mastership over our own destinies as you enjoy here in this great republic. It is very natural that you should have conserved a very keen recollection of those —what will I call them?—somewhat serious difficulties that occurred away back in the reign of King George III. Since those remote days the British institutions have undergone a vast change in the mother country and also in the great self-governing dependencies. You know what has happened since

the days when the legislative and the executive power were joined together in England; days of the existence of an aristocracy. During the 18th Century, under the first Reform Bill, under the second Reform Bill and under the final measure of emancipation, which was the Representation of the People Act, the power passed from the upper classes and was wielded in the mother country by the people at large. At the time when you found that the institutions which then ruled you, did not suit you any longer and made the mother country keenly aware of your dissatisfaction in that respect, a great change had begun even then in the mode of administration of the great dependencies of Britain, and that change has been going on ever since and to-day without any written instrument, these dependencies by common consent enjoy the fullest control over their own destiny.

I thought it proper to offer these explanations because we never can tell what are the immediate causes which lead the people to their decision in matters of general election. While we gave every consideration to the economic reasons which led us to reject the proposal, it must not be forgotten that for many years we ourselves had come to you with proposals which we had deemed in the interest of both countries and you had seen fit to reject those proposals.

I may be entitled to offer you some word on the immense natural resources of the great country, great at least in extent and in those resources, from which I have come to be your guest this evening. If there is a paradise in the world for the noble class to which you belong and of which we stand in such great need upon this continent that paradise is surely in my own home of Canada, where we have resources almost limitless, great boundless forests still untouched by man, unexplored, silent, but teeming with riches of lumber, great mineral wealth still undiscovered, vast agricultural resources and problems of all kinds connected with the important question of transportation, the foremost problem before us for solution at the present moment.

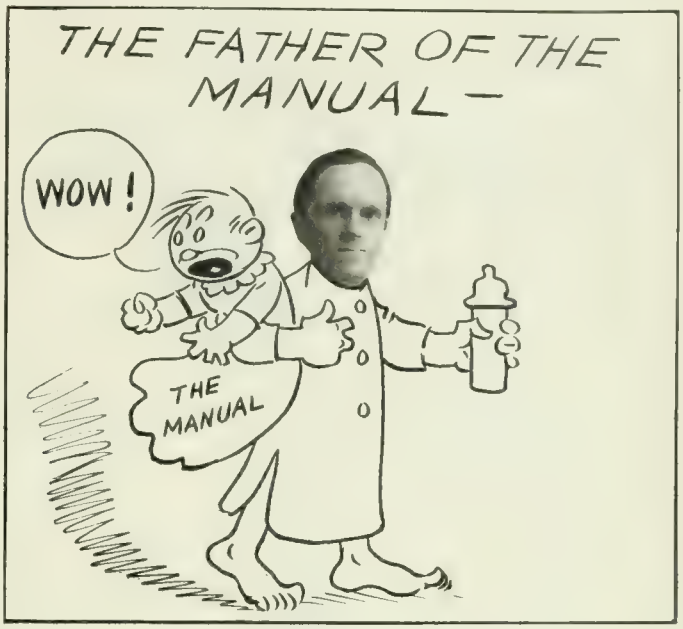
At the present moment we have discovered—and I think this will be news to some of you—that the fertile belt lying to the north of the 45th line of parallel, is not as limited as it was. We have a vast interland where discovery and exploration has made known to us during the last three or four years that we have still boundless territories capable of immense production in an agricultural direction beyond what we formerly deemed land that could only be settled with fruit.



We have immense territory there and we are contemplating, gentlemen, in addition to the three great transcontinental lines which we are at present completing from tidewater of one ocean to tidewater on the other, the building of a great railway to the Hudson Bay to serve and take out the immense crops which we will be able to raise in this new interland of Canada.

We expect to navigate the Bay. It is navigable during six months of the year. The only question offered for solution is whether we will be able to get out through the straits, because that route will bring us nearer the markets of Europe than any other route in America. If we cannot during a sufficient time navigate those straits that are often blocked with ice, we expect by the facilities of navigation upon Hudson Bay to come down to Nottoway Port upon James Bay, a distance of 700 miles from the terminals upon the Hudson Bay for the great railway that will plunge into our new West to bring the products down to our own ports and to American ports. Another great problem which offers for solution is the construction of the Georgian Bay Canal at present engaging the serious attention of our government. You know that the St. Lawrence route is the great waterway extending from the ocean for hundreds and hundreds of miles into the very center of this continent. It is a waterway of supreme interest not only to ourselves, but to engineers of this country in common with us under treaties.

We are contemplating the construction of a deep waterway direct from the Great Lakes, over 20 feet deep, down to tide water of the Atlantic Ocean, which would bring the vessels of the Great Lakes over 700 miles nearer than by



the present St. Lawrence route, and shorten the passage 75 hours. A vessel could leave Chicago, fully freighted, drawing 20 feet of water, and convey, without trans-shipment, the immense loads of grain through the Great Lakes down to tide water and then further on to the ocean, and across the ocean and bring back return cargoes.

Not many years ago, conscious of the immense waste of the vast natural resources, common to both countries, your government initiated the movement of conservation. Delegates from our government, upon the invitation of your executive, went down to Washington to attend a conference, and most interesting measures were adopted there. A movement was started which has for its object the proper conservation and maintenance of these vast resources. After the starting of this epoch-making movement, our government instituted a most important commission called the Commission of Conservation. We divided the work of this commission, one section devoting itself to forestry, another section to public health, another to the study of our immense and still undiscovered mineral resources, another to the inventorying of our great fisheries, and another, with which I was particularly connected, to the study of our great water courses and water powers.

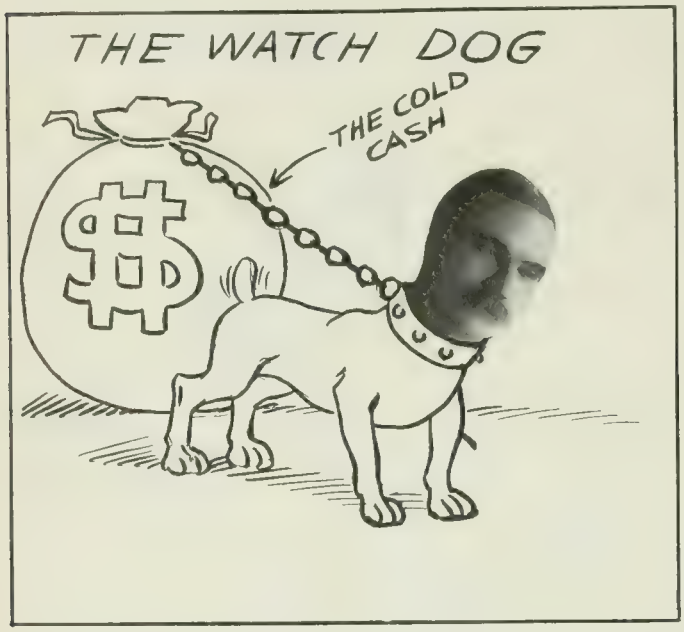
I was chairman of the Water Powers Commission or section and we applied ourselves to the immediate inventorying of those important forces and energies which we have at our disposal. The information regarding the developed water power in Canada is now fairly complete and reliable, and that which I have at hand shows a total of over one million horse power has already been developed. The following table shows how this developed power is divided among the different provinces:

Ontario	532,000 h. p. developed
Quebec	300,000 h. p. developed
British Columbia	100,000 h. p. developed
Manitoba	48,000 h. p. developed
Other provinces	33,000 h. p. developed

Of the different uses made of the water power, the generation of electrical energy heads the list with 75,000 h. p.; the paper and pulp industry has 150,000 h. p., and the remainder is divided among other industries, chiefly lumbering and grist mills. This total of over a million horse power

is being increased very rapidly by new enterprises, and, judging by the size which individual additions are assuming, it is fair to assume that it will be doubled in the course of a few years.

The information regarding the possible development of Canadian water power only covers a certain portion of the country. The total information obtained indicates that there is available 20,000,000 h. p., but as, roughly speaking, the territory covered is less than 50 per cent of the Dominion, it is fair to assume there is an equal amount in the part of the territory not included, which will bring the total for the whole territory to over 40,000,000 h. p. In stating this, however, it should be explained that, while the total horse power may be increased by utilizing storage batteries, many thousands of horse power cannot be utilized because too



small for economical development, and there are millions more of undeveloped horse power which are too far from settlements to be of any use if developed.

With the immense territory which we have, with pulp forest, sufficient, as I am informed, to supply the world with paper during ten centuries; with forty million horse power disseminated over this large territory; and with our great mineral resources, there is an immense field open to the men of your profession. Yours is the profession which we need most in my country.

Mr. Morris on Railway Development From a Banker's Standpoint.

I note with alarm that the program describes me as a banker, and director of the Railway Age Gazette. I don't know which job sounds the more dangerous, but it seems fairly obvious that to be a banker and a director, with an office on Wall street, or near it, renders me so peculiarly liable to imprisonment that I can only hope that no harm will come to your association through sheltering me this evening.

Apart from the directorate, the function of which is to declare dividends, I am sure that no one could work for the Railway Age Gazette as long as I have, without acquiring the most enthusiastic regard for the American Railway Engineering Association and the kinds of things it stands for. I have followed the red-and-white striped switch targets of the Chicago, Milwaukee & St. Paul across the continent, and the broad arrow and graphic whistle posts of the Southern Railway down into the mountains of Tennessee; I have seen the Southern Pacific Coast Lines wrestle with the problem of sticking a railway on top of slippery diagonal rock strata that loses its top layer every heavy rain and hasn't any bottom layer, and I have seen the Yazoo & Mississippi Valley build on brush mattresses and willow sprouts, and get away with it. In fact, I have never traveled over any railway without admiring the skill and courage and the resourcefulness of the civil engineer, under all the kinds of difficulties that this rocky and badly drained world has to offer.

And so, after leaving technical journalism to apply some of the principles learned in the apprenticeship, it is a particular pleasure to me to be the guest of your association—and a particular pleasure on top of that that I do not have to report this speech. Charles A. Dana once remarked to one of his reporters, "A dog bites a man; that isn't news. A man bites a dog; that's news." I am afraid the dog will have to do the biting in most of the comments I can make on a Banking View of Railway Development, but there may be some aspects of the situation which, even if not regardable as news, may be worth reviewing periodically.

My freshman year at college wasn't very long ago, but it ante-dated the automobile era. At that time there used to be in New Haven a pioneer of the industry, whose progress sounded much like a donkey engine running a pile driver. We used to bet whether or not it would pass a given point without stopping, or whether it would have battery trouble and stall, and stand while leaking gasoline. We all liked to see it go by, but I don't think any of us figured out that it typified a new era, not only of mechanical development, but of development in applied extravagance. Yet the increase in luxuries and in the money spent for them, during the fifteen years that have passed since that automobile went down the street, has doubtless been greater than in any other fifteen, or fifty years, in the history of the world.

This has hit railway development from two sides; it has necessitated luxurious cars, immense and costly stations and expenditure on hundreds of details of service not in themselves productive; it has also, with very little doubt, made it harder for securities to be marketed at the prices prevalent a decade ago.

I say "with very little doubt," because there is some ground for doubt as to the relative intensity of various other factors in the situation. The world is producing 450 million dollars' worth of gold a year, now; it is less than thirty years since the production was under 100 millions, and I think the radical increases of the last few years would have tended, anyway, to pull down the purchasing power of the gold dollar, and would have made things worth more, and mortgages and bonds worth less. A bond promises to pay in gold of a certain standard of fineness; not in the services, or coal, or potatoes you have to exchange that gold for.

Moreover, at the same time that the actual buying power of the dollar was growing less, the competition for the use of it was increasing with unheard-of rapidity, and a host of new industrial enterprises were bidding up the interest rate against each other. The railways, offering four per cent, saw the industrials offer five and six, and then the money was spent for a touring car that forthwith came back for more money—and got it.



Carry any discussion of applied economics very far, and the landscape grows monotonous. The sum of the matter is that high grade railway bonds sell on a basis to-day to yield the purchaser about 4¼ per cent on his investment, while ten years ago bonds of the same grade yielded about 3½ per cent, and, at the same time, the current purchasing power of the money obtained by the sale of the bonds isn't a bit more than four-fifths as great as it was in 1902. Combining these two scales, it appears that a road could hire $28.57 in 1902 for a dollar a year. In 1912 it can only get $18.82 worth of supplies and services for a dollar a year, if we assume that the services of a brakeman, or of a keg of spikes, are of the same value now that they were ten years ago.

This comparison ignores on both sides the banker's commis-

sion for the sale of the bonds. He probably didn't get as much as the newspapers said, anyway.

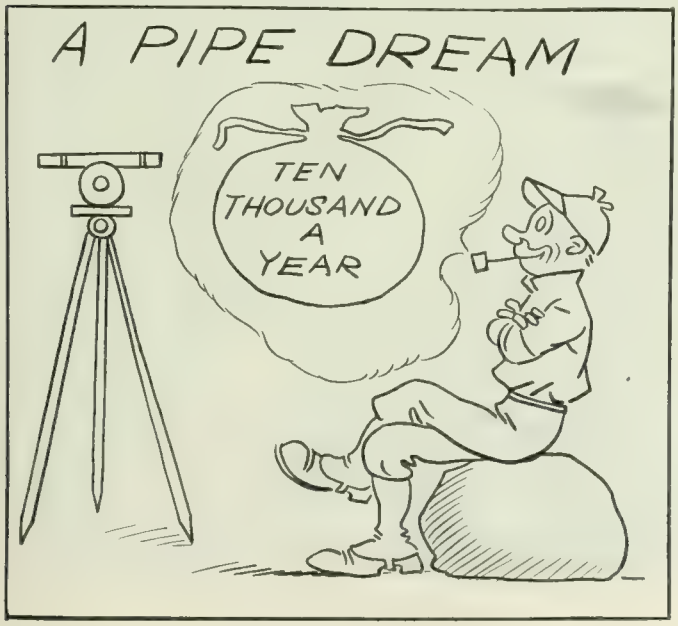
What relation is this statistical curiosity going to have to railway development? I have made it as black as I could, and have voiced the pessimism of many excellent observers, but my personal impression is that the matter will work out somewhat better than would appear, and that there are certain helpful aspects to the situation. I think the railways of the country can say with Josh Billings, that they have had a great deal of trouble in their life, most of which never happened.

It is going to be hard—it is already very hard—to finance speculative railway building, as one great speculative builder has recently found out. He addressed his newspaper advertisements against the Money Trust, when he was really up against automobiles and gold production, along with a habit of mind which a distinguished guest of the evening expressed to me with great clearness a short time ago. He said: "My impressions are that there is a Money Trust, and that it is made up of people who are not satisfied with receiving interest on their investments, but have a sneaking desire to get their principal back at maturity besides."

But there is another side to this situation which doesn't look at all bad for the credit of established railways. There are, in general, two kinds of investors, the man who wants security, and the man who wants yield. The number of roads that have gotten out of the speculative class and into the investment class during the last ten years is amazing, and the difference between those two classes is a lot more than the difference between 3½ and 4¼ per cent. And I think that, in the face of all difficulties, governmental as well as economic, that number is going to keep on increasing very fast, and that many roads, which to-day are struggling, are going to qualify in the investment class and stay there indefinitely. How old is the present credit of the Northern Pacific, or the Union Pacific, or the Southern Railway? Less than ten years, and the credit of the Erie is four years old this spring!

In other words, I think that the alignment between railway and industrial credit is now clearly fixed, and that the industrials are going to attract more and more of the speculative funds, while the railways will keep possession of a different and better market.

The amount of new funds raised for railway work in this country has averaged between 600 and 700 millions per year,



during the past six years. (This is money, not par value of securities.) I see no reason to doubt that the security markets of the world will go right on providing for legitimate work, in spite of the evident tendencies toward reduction of rates and higher operating costs. There has been much discouragement about the rate situation, especially right after 1907, when the national government was not strenuously sympathetic toward increases, while President Roosevelt's attitude toward those who might reduce wage schedules may be parodied by Lewis Carroll's lines:

"I'll take the corkscrew from the shelf,
And go and wake them up myself!"

I think we were all of us looking too close to the ground at our feet in 1908—I know the bankers were! Every decade of American railway development has seen rates on the whole lower and wages on the whole higher, and I guess every decade to come will see the same tendency. The adjustments are frequently painful, but increasing traffic density, which follows population, not legislation, takes care of that automatically. The average rates will be lower, but there will be more coal hauled, and more shirtwaists, and more groceries. And if special times of crisis make the adjustments temporarily unworkable, we can all sit back and bless the weak-sister roads—all the rest of us, that is—which can be relied on to furnish whatever object lessons may be required by an erring democracy, long before dividends are reduced on the strong roads in the same territory.

I am reminded of the district leader who was pointing out the debt we all owe to the poor.

"Let us not be stingy with the poor of our district," he



Mar 20, 1912

H. J. H. – ——— Congress
Placed 18 cars on
Brownsville Trestle, room for
18 more. Please accept my
resignation,
Signed – P. Mickeylore.

said. "Let us be generous—nay, prodigal! And so I propose not one, not two, but three cheers for the poor of the district."

I think it would amuse most of my banking associates and all my Railway Age Gazette associates to hear me defend the Roosevelt administration, and yet there was one feature of it which appears to me to have peculiar weight at just this distance from the last first-class panic. After 1893 the railways were flat on their backs, financially, for nearly five years, because in the halcyon years that preceded 1893 they had overextended themselves tremendously on faith in the future. But nobody did that in the Roosevelt administration, because nobody had any faith in the future! As a natural result, the years of convalescence since 1907 have really borne surprisingly lightly on the railways, and the few—the very few—really big new enterprises of the period, like the Puget Sound extension and the Western Pacific, have, with a single exception, remained solvent.

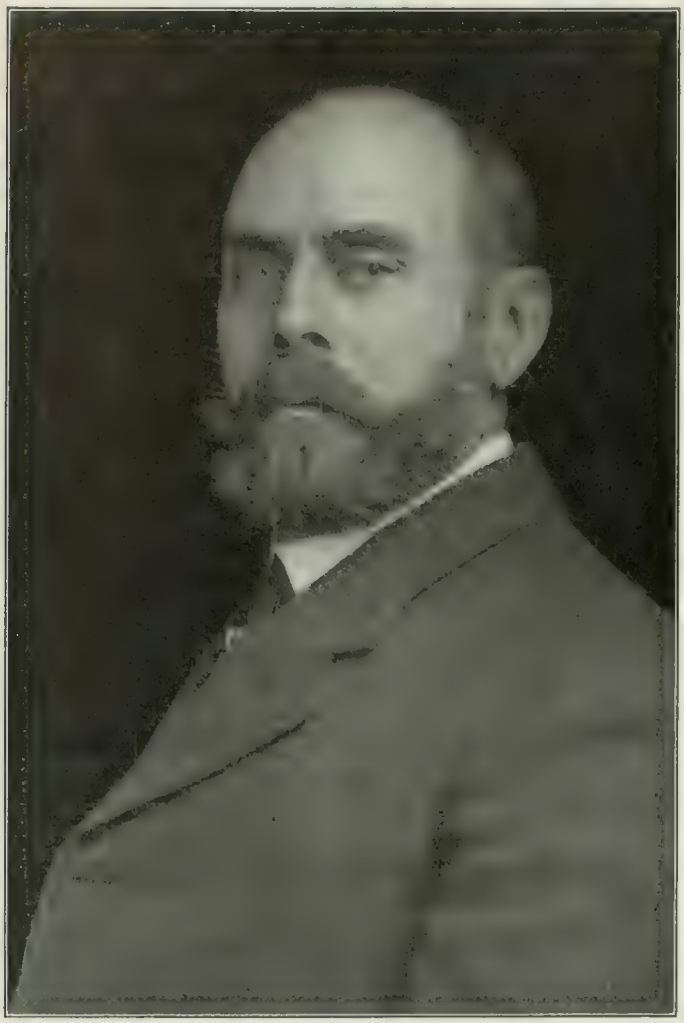
I suppose the long drag following 1907 is now pretty nearly over, and I think that the recovery is apt to be rapid, after the election is out of the way or discounted. The forms that the next high-prosperity period will take, in railway development, are a matter for interesting speculation. It seems to me that we are not likely to see great extensions into new territory, although Washington, Oregon and California are not quarter developed yet, as the rapid absorption of short lines in that territory well indicates. I should suppose that the internal growth of the Pacific states, following the opening of the Panama Canal, would be one of the great developments of the next decade—and I am not a bit afraid of the effect of the canal on railway traffic; quite the contrary, in fact. The recent prosperity of the South, it seems to me, may well foreshadow some realignment of railway interests there, accompanied by a renewal of competitive buying of the lateral lines, but probably not by much important new construction.

I should suppose there would be both construction and absorption in Texas and Oklahoma, and probably some important new family alliances among the roads now in the Gould grouping, together with great development of some of those properties, notably the Missouri Pacific, the Wabash and the Wheeling & Lake Erie. But I think the most important changes of all will be intensive, rather than

extensive, making for better built, better equipped and better signaled roads, and accompanied by materially better public feeling. The safety valve has opened, and the dangerous pressure has blown off. It made a lot of racket, but it didn't burst the boiler!

The Smoker.

At the conclusion of the speechmaking there was a smoker, the main feature of which was the throwing on a screen by means of a stereopticon of a number of cartoons of men whose faces are familiar to those who have attended the conventions of the American Railway Engineering Association. The cartoons were drawn by Artist French, whose work is familiar to readers of the sporting pages of the Chicago Record-Herald, the drawing being done directly on the plates of the lantern, so that the crowd could see it proceed. One of the cartoons was of "An All Star Cast," which included Past Presidents Wallace, Kittredge, McDonald, Kelley, Johnston, Berg, McNab and Fritch. "The Stamp of Approval" depicted the "A. R. E. A." putting its "O K" on President Cushing. Vice-President Churchill, elected to be the next president of the association, was depicted as just "peep, peeping" from the shell.



CHARLES S. CHURCHILL.
President-Elect.

Vice-President Wendt, whose interest in the Manual is well known, was caught in the act of walking the floor with Baby Manual and a bottle of paregoric.

Mr. Bremner, the "bull-dog of the treasury," was represented as on guard protecting the cold cash of the association, while Secretary Fritch's bluff at taking vacations were shown up in their true light. The young engineer's pipe dream of $10,000 and a famous telegram from P. Mickeylore were reproduced and J. G. Sullivan, in the guise of "Officer 666," was represented as one who had "missed his calling." The artist threw on the screen the familiar words of the Missouri "dawg" song,

> "And—every time I come to town
> The boys start kickin' my dawg aroun'
> I—don't care if he is a houn,"
> They gotta quit kickin' my dawg aroun.'"

After the crowd had sung it he prescribed the following remedy: "And if you don't want him kicked around, buy a bull dog."

NEW OFFICERS OF THE ENGINEERING ASSOCIATION.

At the annual dinner last night President Cushing announced the election of the following officers of the American Railway Engineering Association for the ensuing year:



EDWIN F. WENDT.
First Vice-President.

President, C. S. Churchill.

Vice-President, W. B. Storey, Jr.

Treasurer, George H. Bremner.

Secretary, E. H. Fritch.

Directors for three years, F. A. Delano, W. L. Darling, W. B. Scott.

Nominating committee, F. L. Stuart, C. F. W. Felt, J. O. Osgood, G. J. Ray, F. H. Alfred.

FOREIGN RAILWAY NOTES.

In Madagascar, the only railway projected at present is the line from the port of Tamatadi, on the east coast, to Tananarido, the capital. This railway has not yet been entirely completed.

A fairly comprehensive scheme of railway development has been projected in Kamerun, Africa, but up to the present only about 280 miles have been opened to traffic. Two lines start from the coastal town of Duala. One railway is the Duala-Manengubaberge, of which 67 miles are open to traffic and 32 miles are under construction. The Duala-Edea-Widimenge Railway has 210 miles open to traffic and 53 miles under construction. Both these railways are of the 3 ft. 1 in. gage.

In Algiers the majority of the railway mileage is owned by the state. The Oran division is 620 miles long and is of the 3 ft. 3 in. gage. The eastern division has 500 miles of the 4 ft. 7 in. gage and 90 miles of the 3 ft. 1 in. gage.



E. H. FRITCH.
Re-elected Secretary.

In addition, the former western railway system owned 280 miles of the 4 ft. 7 in. gage and 50 miles of the 3 ft. 3 in. gage. These are now operated by the state. The private lines in Algiers are the Algier-Oran, Philipp Eville-Constantine Railway, 314 miles long, of the 4 ft. 7 in. gage, and the Eone-Gulma and its extensions. This latter operates 378 miles of the 4 ft. 7 in. gage and 675 miles of the 3 ft. 1 in. gage, and, although nominally an Algerian line, 684 miles of the line are in Tunis.

CROSSTIES BOUGHT IN 1910.

The Department of Commerce and Labor has issued, under date of January 20, 1912, a bulletin relating to railway crossties purchased in 1910, and giving in considerable detail the latest statistics of ties used by the steam and electric railways of the United States. The following is an abstract of this bulletin:

The number of ties now in use or held for renewals on



G. H. BREMNER.
Re-elected Treasurer.

all classes of railways in the United States is probably not less than one billion.

Table 1 shows the number of ties purchased each year from 1907 to 1910, and their distribution according to the kind of wood, these kinds being arranged in the order of their importance in 1910.

Table 1.—Crossties Purchased, by Kinds of Wood: 1907 to 1910.

Kind of Wood.	Crossties Purchased (Number).			
	1910	1909	1908	1907
All kinds	148,231,000	123,751,000	112,466,000	153,703,000
Oak	68,282,000	57,132,000	48,110,000	61,757,000
Southern pine	26,264,000	21,385,000	21,530,000	34,215,000
Douglas fir	11,629,000	9,067,000	7,988,000	14,525,000
Chestnut	7,760,000	6,629,000	8,074,000	7,851,000
Cedar	7,305,000	6,777,000	8,172,000	8,954,000
Cypress	5,396,000	4,589,000	3,457,000	6,780,000
Tamarack	5,163,000	3,311,000	4,025,000	4,562,000
Western pine	4,612,000	6,797,000	3,093,000	5,019,000
Hemlock	3,468,000	2,642,000	3,120,000	2,367,000
Redwood	2,165,000	2,088,000	871,000	2,032,000
Gum	1,621,000	378,000	262,080	15,000
All other	4,466,000	2,956,000	3,764,000	5,626,000

In 1910 the steam and electric lines together purchased 148,231,000 wooden ties, or 20 per cent more than in 1909, and 32 per cent more than in 1908.

Of the total number purchased in 1910, only 8,635,000 ties, or 6 per cent, were reported by the electric roads. The statistics for 1910, which were secured by correspondence,

cover over 99 per cent of the known mileage of all railways in the United States.

Although by far the greater part of these purchases were for the maintenance of existing track, approximately 22,255,000 ties, or 15 per cent, were for new track. This percentage is the same as that reported in 1907, the year of the greatest total purchases, when 23,557,000 ties were bought for new track. In 1909 only 16,437,000 ties, or 13 per cent of the total number reported, were purchased for this purpose, and in 1908 only 7,431,000, or 7 per cent. Thus the statistics indicate a partial return in 1910 to the economic conditions encouraging track construction which prevailed in 1907.

Of the ties purchased by the electric railways in 1910, 2,656,000 were for new track, which number is slightly greater than those reported in 1909 and 1908, but only about seven-tenths as great as that in 1907, 3,835,000. In each of these years ties purchased for this purpose formed over 30 per cent of the total number shown for the electric railways.

The principal qualities desired in a tie wood are durability, spike-holding power and resistance to mechanical wear. The leading species used for crossties are mainly very durable woods, but the rank of the different kinds of wood thus used does not necessarily indicate their relative desirability for the purpose. The available local supply of timber largely determines the kinds used for ties in different parts of the country.

Many species of oak are first-class tie woods, and as a group they are more widely available than any other kind of suitable timber. As in previous years, oak and southern pine were by far the most important woods, supplying together nearly 64 per cent of all ties purchased in 1910. The number of oak ties reported, over 68,000,000, was the largest ever recorded for any kind of wood, being 20 per cent greater than in 1909. More than 26,000,000 southern pine ties were purchased in 1910, representing an increase of 23 per cent as compared with the preceding year. The proportions of the total formed by each of these kinds of ties were, however, practically the same in the two years.

With the exception of western pine, each of the 11 kinds of wood represented by over 1,000,000 ties supplied more ties in 1910 than in 1909. Except in the case of western pine, only fractional differences occurred between the percentage which each of the nine leading woods supplied of all crossties purchased in 1910 and the corresponding proportion for the preceding year.

Douglas fir was third in importance in 1910, as in 1909 and 1907. Since the supply of this species has scarcely been touched, the number of such ties will probably increase annually for a number of years.

Chestnut and cedar ties, ranking, respectively, fourth and fifth among the ties purchased in 1910, each constituted approximately 5 per cent of the total number. As compared with 1909, increases of 17 and 8 per cent, respectively, are shown for these classes of ties.

The number of cypress ties purchased, 5,396,000, showed an increase of 18 per cent since 1909, while the number of tamarack ties increased from 3,311,000 to 5,163,000, or 56 per cent.

In the purchases of western pine there was a heavy loss, 4,612,000 ties being reported in 1910, as against 6,797,000 in 1909. This decline is due mainly to decreased purchases of this species by one of the large western railroads.

Of the species which supplied less than 1,000,000 ties each in 1909, several showed heavy gains, the number of gum ties exceeding 1,000,000 for the first time in 1910, when 1,621,000 were purchased. Large increases were reported also for beech, maple, elm, spruce and birch.

Among the oak ties are included a number of imported Japanese oak ties. Altogether less than 2,000,000 ties were imported. Ohia lehua, a wood imported from Hawaii, is represented among the ties included under the head "All other." In this group are also included about 134,000 mesquite ties and ties of locust, hickory, cherry, sycamore, hackberry, walnut and several other species purchased in small quantities, principally by the steam railroads.

Of all crossties used, by far the greater number are hewed from the tree, a practice which involves great waste of timber. It is, however, gratifying to note that the proportion so produced in 1910 was the lowest recorded since annual statistics on the subject have been secured. Hewed ties formed 74 per cent of the total in 1910, as compared with 77 in 1909 and 82 in 1908. This decrease in the percentage of hewed ties is due principally to changes in the proportion of such ties among those made of oak and Douglas fir. Among oak ties the proportionate number of sawed ties has gradually increased since 1908, and the large increases shown since that year in the use of Douglas fir have been mainly in sawed ties, the number of hewed ties of this species having remained about the same each year.

A higher percentage of sawed ties in 1910 than in 1909 was shown also for chestnut, cedar, cypress, western pine and other less important woods. In most cases the tendency toward an increase in this class of ties is much more strongly brought out by comparison with 1907.

Douglas fir and western pine are the only woods from which a high percentage of sawed ties is at present produced, ties made by this method forming 88 per cent of the total number shown for the former and 49 per cent of that shown for the latter. It is noteworthy that these woods, which are supplying ties with little waste in manufacture, are likely to become of increased importance as future sources of supply for crosstie material.

The total quantity of ties purchased has not as a whole been much affected by changes in the cost of ties. The average price paid per tie was 51 cents in 1910, which is the same as in 1907, but greater than in 1908 and 1909, when the figures were 50 cents and 49 cents, respectively.

The number of ties of each kind of wood purchased in 1910 by the steam roads and by the electric roads is shown in Table 2:

Table 2.—Crossties Purchased, by Classes of Railroads Purchasing, and Kinds of Wood: 1910.

Kind of Wood.	Crossties Purchased (Number). Total.	Purchased by Steam Railroads.	Purchased by Electric Railroads.
All kinds	148,231,000	139,596,000	8,635,000
Oak	68,382,000	65,095,000	3,287,000
Southern pine	26,264,000	25,096,000	1,168,000
Douglas fir	11,629,000	10,919,000	710,000
Chestnut	7,760,000	6,219,000	1,541,000
Cedar	7,305,000	6,637,000	668,000
Cypress	5,396,000	5,187,000	209,000
Tamarack	5,163,000	4,960,000	203,000
Western pine	4,612,000	4,527,000	85,000
Hemlock	3,468,000	3,442,000	26,000
Redwood	2,165,000	1,501,000	664,000
Gum	1,621,000	1,621,000	.....
All other	4,466,000	4,392,000	74,000

Since the steam roads purchased 94 per cent of the total number of crossties reported, the relative proportions of the different kinds of wood among the purchases of these roads were about the same as in the railroad industry as a whole. In the purchases of the steam railroads, 20 kinds of wood were represented by more than 100,000 ties each, while only 8 kinds of wood were so reported by the electric roads.

Preservation.

The deterioration of timber by preventable decay causes a heavy demand upon the timber resources of the country. In 1910 nearly 126,000,000 crossties were purchased to make renewals. By the adoption of devices to retard wear and methods to prevent decay, however, the present trackage could probably be maintained with approximately one-half the quantity of wood at present consumed annually for this

purpose. To employ measures which increase the average length of time ties may remain in service without decay is equivalent to increasing the supply of timber.

The principal causes of the deterioration of crossties are decay, insect attack, breakage, splitting, mechanical wear and respiking. By treatment of ties and the use of improved fastenings, S irons and similar devices, a mechanical life at least double the present average life of untreated ties may be secured. The treatment of ties to prevent decay, if the methods used are relatively inexpensive, results in a very great saving to the railways. In the United States the preservatives used for the greater number of the crossties are creosote oil or a solution of zinc chloride, although large quantities of ties are treated with a mixture of the two preservatives mentioned or with crude petroleum. Other preservatives are also used.

In general, the most effective method of treatment consists in the application of interior pressure to a cylinder containing the ties and the preservative. Ties are sometimes treated by merely dipping them in the preservative or by subjecting them to long hot and cold baths in open tanks containing the preserving fluid. In the latter process the impregnation of the wood is brought about largely by atmospheric pressure following the expulsion of air from the pores of the wood when heated and the subsequent tendency toward a vacuum when the wood is cooled. The absorption thus secured varies greatly according to the kind of wood treated. The kinds of wood commonly treated by the various methods are southern pine, Douglas fir, western yellow pine, red oak, black oak, beech, birch, maple, gum and hemlock.

Most of the treated ties used by the steam railways are treated in closed cylinders. Of 84 wood-preserving plants of the cylinder type in operation in the United States in 1910, the steam roads operated 21 and the electric roads 1, while the remainder, with a few exceptions, were conducted on a commercial basis.

The numbers of treated crossties reported in the years 1907 to 1910, inclusive, are shown in Table 3:

Table 3.—Crossties Purchased—Number Already Treated or Treated After Purchase, by Classes of Railroads Purchasing: 1907 to 1910.

Class of Railroad Purchasing.	Total Treated.	Treated Before Purchase.	Treated After Purchase.
		1910	
All railroads	30,544,000	11,644,000	18,900,000
Steam railroads	29,359,000	10,770,000	18,589,000
Electric railroads	1,185,000	874,000	311,000
		1909	
All railroads	22,033,000	7,663,000	14,370,000
Steam railroads	21,098,000	7,081,000	14,117,000
Electric railroads	835,000	582,000	253,000
		1908	
All railroads	23,776,000	10,973,000	12,803,000
Steam railroads	23,157,000	10,566,000	12,591,000
Electric railroads	619,000	407,000	212,000
		1907	
All railroads	19,856,000	8,389,000	11,467,000
Steam railroads	19,192,000	7,975,000	11,217,000
Electric railroads	664,000	414,000	250,000

In 1910 the number of treated crossties reported was over 30,000,000, which represents a gain of more than 8,000,000, or 39 per cent, over 1909, and a gain of nearly 7,000,000, or 28 per cent, as compared with 1908, when the figure was higher than in any other year prior to 1910. Since, however, the treated ties in 1910 represented but 21 per cent of the total number purchased in that year, it is evident that there is still a considerable opportunity for the further extension of this economy. Both steam and electric roads show great relative gains in the number of treated ties reported. Only 4 per cent of the treated ties shown for 1910 were purchased by the electric roads. Treated ties formed 21 per cent of the total number reported by the steam railways and 14 per cent of that reported by the electric roads.

Of all treated ties reported in 1910, about one-third were treated before purchase. The purchases of already treated ties had fallen greatly in 1909, but a comparison of the figures for 1910 and 1908 shows a complete recovery and some gain in this respect. The rapid increase in the number of ties treated, however, is due mainly to the increasing numbers treated each year by the steam roads in their own plants. Only 26 per cent of the treated ties reported in 1910 by the electric lines were treated after purchase, while for the steam railways the percentage was 63.

BLOCK SIGNAL INSPECTORS HERE.

Block Signal Inspectors Lyons and Burt of the Block Signal and Train Control Board have been making a study of the many improvements in signaling apparatus on display at the Coliseum, with special reference to automatic signals and their workings.

IMPROVEMENTS FOR THE SANTA FE SYSTEM.

The Atchison, Topeka & Santa Fe system has appropriated $22,700,000 for improvements this year, which will include a very large amount of expenditures in the engineering department.

Although all of the details of the improvement program have not been announced, the budget includes $2,000,000 for double-tracking on the Coast Lines, $1,000,000 for terminal yards and improvements on the Colorado division, and $500,000 for a new office building at Galveston, Tex. For new equipment $5,700,000 will be expended, and the balance of the $22,700,000 will be devoted to general improvement work throughout the system.

Contracts have been let for the double-tracking between Baca and Perea, on the Albuquerque division, 28 miles, and from Needles east 10 miles on the Arizona division. The only new construction planned so far for this year is the line from Dodge City, Kan., southwest 60 miles.

The new equipment will include 75 passenger cars, 2,850 freight and work cars and 75 locomotives.

EXIT WINTER—NOT!

At noon yesterday Miss Gentle Spring officially assumed possession of the city of Chicago and the adjoining states. Winter the March Lion, and Willis L. Moore delivered over the keys, as per the schedule made and provided by the Equinoxes and the Solstices, who regulate the changing of the seasons. Miss Spring's suit in ejectment was, therefore, not necessary and the action was not brought.

Winter and the Lion had just started north, however, when they received the following telegram:

"Medicine Hat, Midnight, March 19.

Tear things up a little before you leave. ..

Storm King."

This they proceeded to do immediately, and all day yesterday they put forth their utmost efforts to make a good job of it. Reinforcements in the shape of a full grown blizzard arrived early in the morning, and all day the three proceeded to tie up traffic, fill the streets with snow, spread pneumonia, and destroy good tempers.

Miss Spring regrets exceedingly this spiteful exhibition, inspired from Medicine Hat, and against her will has been forced to file an action in trespass against the invaders of her domain. If the testimony of character witnesses is to be used the defendants will make a sorry showing, indeed, for in all the length and breadth of the United States they haven't a friend.

Many of the engineers attending the convention who are residents of Iowa, or who formerly lived in that State, attended a banquet of the Hawkeye club at the University Club last evening.

CONFERENCE ON STANDARD INTERLOCKING RULES.

Representatives of the railway commissions of Indiana, Illinois, Wisconsin and Minnesota will hold a meeting to-day at the office of F. G. Ewald, consulting engineer for the Illinois Commission, Chicago, to complete the formation of standard interlocking rules for the railways in those states. These rules will be submitted to the commissions, and will be followed up in the near future by standard automatic block signal requirements. M. H. Hovey, consulting signal engineer, represents the Indiana and Wisconsin commissions, D. F. Jurgensen the Minnesota commission and F. G. Ewald the Illinois commission.

THE FIRST-NAME CLUB.

A new club has been started among railway and supply men. The constitution provides that members shall call each other only by their first names. It contains, also, the provision that members shall be taken in by one name at a time, and until all of that name have been enrolled no one else is eligible. Inasmuch as four "Harolds" originated the idea that name is the first one. Harold Lowry, assistant signal engineer of the Chicago, Milwaukee, & St. Paul; Harold McCready, of the Union Switch & Signal Co.; Harold Brown, of the Pocket List; and Harold Ferguson, of the General Electric Co., held the first meeting of the club Tuesday night. If your first name is Harold write to any one of the above mentioned members and get in.

ELECTRIC RAILWAY MEN IN TOWN.

The fact that the exhibit at the Coliseum includes more electric railway apparatus this year than in previous years has attracted a good many officers of electric roads. Among the visitors yesterday were General Superintendent Kerwin of the Detroit United Railways; Assistant General Manager Gould of the Aurora, Elgin & Chicago; C. D. Emmonds, vice-chairman and general manager of the Chicago, South Bend and Northern Indiana Traction Co.; C. F. Conn, vice-president and general manager, Lackawanna & Wyoming Valley Railroad Co.; and B. E. Merwin, general superintendent, Aurora, Elgin & Chicago. John Leisenring, signal engineer and superintendent of overhead of the Illinois Traction System, and J. M. Waldron, signal engineer of the Interborough Rapid Transit, New York, are also here attending both at the convention and the exhibition.

There is to be a meeting of the Illinois Electric Railway Association at the La Salle Hotel Friday morning. This meeting was postponed from last Friday so that the members attending could take advantage of the exhibition.

ATTENDANCE AT THE COLISEUM.

The blizzard yesterday afternoon cut into the attendance somewhat, and there were not as many railway men present as on the previous day. But those who did come took advantage of the opportunity to study the new developments in apparatus and equipment.

Among the exhibits which seemed to be objects of special attention were those of the signal companies, where some remarkable developments are shown in interlocking machinery, automatic block signal mechanisms and other apparatus. It seems that there are more prime-movers in operation this year than ever before, and the applications of electricity to exhibit apparatus, such as flashing signs, are much in evidence. The decorations and arrangements of the exhibits are effective, and in so far as a collection of machinery can be said to be artistic most of the exhibits may be so characterized. Gasoline engines, generating sets, mercury and rectifiers, automatic signals of half a dozen types, illuminated flashing-light crossing signals, crossing bells, track and tie drilling machines, air compressors, and many other kinds of apparatus are constantly in operation, and in one exhibit something new in the way of lightning arresters actually working in the same manner as they do when installed on signal and telegraph circuits is also to be seen.

Among those who wander in and out, and do not say much but do a lot of observing, quite a number of the executive and purchasing officers of railways in Chicago have been recognized, although in some cases they were, perhaps, a little bit unwilling to admit it. At least four purchasing department officers, four superintendents, two general superintendents and three assistant general managers visited the exhibit yesterday forenoon.

Railway men watched the blizzard all afternoon for fear that it would assume such preportions that they would have to be on hand to keep the tracks open tonight. That is probably the principal reason why the attendance was rather small yesterday.

BROKEN RAILS—A RETROSPECT.

The attention which is now being given to the study of broken rails makes it interesting to look back to the condition of things nearly forty years ago. What that was we may learn from the record of train accidents, which was begun by the Railroad Gazette in 1873. This record was compiled chiefly from the newspapers, and, of course, included few accidents which did not make trouble enough to call for comment by them; that is, its errors were chiefly errors of incompleteness.

Now, in the year 1873 about 67,000 miles of railway were in operation in the United States, with traffic per mile probably much less than half what it is now. Last year more than 245,000 miles were in operation. Yet in 1873 the Railroad Gazette recorded 1,283 train accidents, of which 815 were derailments. The causes were reported for 500 of these derailments, and 111 were occasioned by broken rails. The winter had been unusually severe, and the frequent breakages were charged to the effect of the cold on the rails, then nearly all iron, and for the most part very poor iron. The iron, doubtless, deserved its discredit; but probably more of the breakages were due to the condition of the roadbed, then in many cases unballasted or imperfectly ballasted, freezing like a rock, with uneven bearings under the rails.

The effect of the cold was traced by the Railroad Gazette in its review for 1877, when it showed the number of accidents caused by broken rails in the cold (first) quarter of the year compared as follows with the number in the third quarter (July, August and September):

	1873.	1874.	1875.	1876.	1877.	5 years.
First quarter....	65	20	90	26	26	227
Third quarter...	5	5	3	5	7	25

This showed that on the average there were nine times as many broken rails in the cold season as in the warm one; while in the exceptionally cold winter of 1873 there were 13 times as many, and in that other severe winter, 1875, 30 times as many. In 1877 there was but one exceptionally cold month, yet in that month there were 17 accidents caused by broken rails—more than one-third of the number for the whole year.

This is, of course, ancient history. Roads, rolling stock and traffic all are different now, and a modern heavy locomotive would have broken nearly every rail on some of the rough tracks of 1873. But it may prevent discouragement to realize that, although we have not reached perfection in rails and roadbed, we have at least made progress.

INFLUENCE OF ROLLING TEMPERATURE ON THE PROPERTIES OF BESSEMER RAILS.*

BY M. H. WICKHORST,

Engineer of Tests, Rail Committee.

1. This report covers an investigation to throw light on the influence of the rolling and finishing temperature on the properties of Bessemer steel rails. A series of five ingots from one heat of Bessemer steel was rolled into 85 rails, all in a similar manner, except as to the temperature at which they were rolled. One ingot was rolled "cold" and the temperature was increased with the succeeding ingots, finally rolling the last ingot very hot. The ingots were about 18½ in. by 19½ in. at the bottom, about 51 in. high and weighed about 4,400 lbs. each. After soaking in the usual manner, the ingots were rolled into blooms about 9½ in. square and a smaller discard than usual made from the top. Each bloom was then cut in two, the two parts reheated at the same time, and were rolled into 85-lb. P. S. section rails (Pennsylvania Railroad System), four rails being made from each ingot. In addition one ingot of the same heat was used for splitting open and making a chemical survey, this ingot having been placed in the soaking pit and then cooled down. This work was all done at the works of the Carnegie Steel Company, who kindly furnished all the material and facilities for the test work.

2. The rails were examined by means of drop, tensile and microscopic tests. The comparison ingot was split open to determine the interior condition as regards cavities, and analyses were made of about 75 samples from one side of a longitudinal section near the axis to determine the distribution of the carbon, phosphorus and sulphur.

3. The shrinkage after sawing varied from 6¼ in. in a 33-ft. rail, as the average of the four rails from a whole rail-bar, to 7 in. The temperature of the head of the rail just after leaving the finishing rolls, determined by a heat radiation pyrometer, varied from 940 deg. C. to 1,030 deg. C., a range of 90 deg. C.

4. The upper 15 per cent of the comparison ingot was spongy with blow holes generally distributed, and the central cavity extended downward about one-third way from the top.

5. The axis of the ingot showed considerable segregation of the carbon, phosphorus and sulphur, reaching a maximum at about 15 per cent by distance from the top. The maximum increases found were 72 per cent in carbon, 98 per cent in phosphorus and 79 per cent in sulphur, above the average content of the ingot. The axis also showed a little negative segregation in the lower part of the ingot.

6. The walls or outer part of the section showed negative segregation at the top part of the ingot for a distance of about 15 or 20 per cent down, after which the composition is about the average to the bottom of the ingot. The greatest decreases amounted to 16 per cent in carbon, 27 per cent in phosphorus and 31 per cent in sulphur below the average content of the ingot.

7. The ductility in the drop tests was determined by putting gage marks one inch apart for a distance of three inches each side of the middle longitudinally on the side in tension, and measuring the space which stretched most at failure.

8. The tests covered the rail-bar from about 10 per cent from the top down to about 90 per cent from the top, and the remarks below refer to this part of the rail-bar. In both head tension and base tension tests the ductility, as an average of all the rail-bars, increased continuously along the rail-bar, starting from the top end. With head tension the range was from about 8 per cent to about 27 per cent and with base tension from about 12 per cent to about 24 per cent.

9. The permanent deflection or set was measured under the first blow of a 2,000-lb. tup falling from a height of 18 ft., with a span between supports of 3 ft. The set measured was the distance between a 3-ft. straightedge and the part of the rail where struck by the tup.

10. As an average of the head tension and base tension results, the set at about 16 per cent by weight from the top of the ingot was 1.69 in. and increased continuously down the rail-bar until at 90 per cent down it was 1.81 in., an average increase of about 7 per cent, although the rate of increase varied in different parts of the bar. The set with the head in tension averaged about .04 in. greater than with the base in tension. The results from the bar above 16 per cent from the top were insufficient to allow of conclusions, but it seems that the set was greater than at 16 per cent down.

11. Differences of rolling temperature corresponding to shrinkages of 6¼ in. to 7 in., in a 33-ft. rail, resulted in only small differences in the rails as determined by the drop test. The deflection seems to have increased slightly as the temperature increased, the averages of the bars ranging from 1.73 in. to 1.78 in. The ductility also seems to have increased some with an increase of temperature of rolling, ranging from 18.7 per cent to 21.1 per cent for the averages of the bars. The number of blows that it took to break the rails averaged just about the same for the different bars, namely, 3½ blows.

12. Tensile tests were made along the rail-bars from three locations in the section, the corner of the head, the interior of the head near its junction with the web, and the flange.

13. Considering the average results of the five bars, the yield point and tensile strength were about uniform along the bar in the samples from the corner of the head and the flange, with perhaps a slight upward tendency down to about 20 per cent from the top. The flange averaged about 2,000 lbs. higher than the corner of the head both in yield point and tensile strength, the yield point averaging about 68,000 and 66,000 lbs., respectively, and the tensile strength about 120,000 and 118,000 lbs., respectively.

The yield point and tensile strength of the interior of the head at first increase to above the results from the two other locations, and in the lower part of the ingot they are less, corresponding in a general way to the distribution of the hardening elements, carbon and phosphorus.

14. The elongation and reduction of area of the corner of the head and the flange increased continuously, in a general way, downward of the ingot, the corner of the head showing a little higher in both properties than the flange. In the corner of the head the elongation averaged from 15 per cent in 2 in. to 18½ per cent, between the limits of 10 per cent and 85 per cent down from the top of the ingot and in the flange the results were about 1 per cent lower. The reduction of area in the corner of the head ranged from 21 per cent to 30 per cent in the same region, and in the flange it averaged about 2 per cent less in the upper part of the ingot, but about the same in the lower part.

In the interior of the head the elongation and reduction of area started at upper part of the ingot about the same as in the other locations, but they soon fell off to only a few per cent at about 15 per cent down, after which they increased, and in the lower half of the ingot they were about the same as in the corner of the head and the flange, or were a little higher.

15. Differences of rolling temperature corresponding to shrinkages of 6¼ in. to 7 in. in a 33-ft. rail, resulted in little or no differences in the yield point. The tensile strength was likewise not influenced, except that the flange seems to have increased a little in tensile strength as the temperature of rolling increased.

16. The elongation of the corner of the head and the flange decreased a little with increase of temperature, but the interior of the head decreased more in elongation with increase of temperature, ranging from about 16.5 per cent in 2 in. at 6¼ in. shrinkage to about 12.8 per cent at 7 in. shrinkage.

17. The influence of the temperature of rolling, as determined by the tensile test, is seen most prominently in the reduction of area, which decreased as the temperature increased. The range in the corner of the head was from about 29.3 per cent at 6¼ in. shrinkage down to about 24½ per cent at 7 in. shrinkage, in the flange from about 26.7 per cent to about 23.7 per cent and in the interior of the head from about 24.2 per cent to about 17 per cent.

18. A discussion is given comparing the ductility as developed by the drop test and the tension test. In both tests the ductility increased in a general way, downward of the ingot, except that the ductility of the interior metal in the tension test was at its minimum at about 15 per cent from the top. The exterior metal shows good ductility, as shown by the tension test, along the whole rail-bar, but the interior metal is of very low ductility at about 15 per cent by weight from the top. This seems to show its influence in the drop test, to some extent in the tests with the base in tension, but more prominently in the tests with the head in tension.

19. Microphotographs were made of etched sections from three locations in the section; namely, the upper corner of the head, the interior of the head near its junction with the web, and the flange. As the rolling temperature increased, the number of grains per unit of area decreased, that is, the size of the grain increased. In the flange the

*From Appendix E of report of Rail Committee.

number of grains per .001 sq. in. averaged from 138 with the lowest temperature used to 55 with the highest temperature used. In the corner of the head the range was from 100 down to 56, and in the interior of the head from 59 to 21.

20. Finally, the influence of the temperature of rolling, as ascertained by the tests made, may be summed up, as follows: The ductility and deflection in the drop test were influenced little, if any, by the temperature. The number of blows that it took to break the rails in the drop test was uninfluenced by the temperature of rolling. The yield point and tensile strength in the tension tests were influenced little, if any. The elongation in the tension test decreased some as the temperature increased. The influence of temperature showed most prominently, in the tension test, in the reduction of area, which decreased as the temperature of rolling increased. The size of grain, as shown by the miscroscope, increased as the temperature increased.

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Graves, G. J., Div. Eng., A., T. & S. F. Ry., Dodge City, Kan.
Greiner, J. E., Consulting Eng., B. & O. R. R., Baltimore, Md.
Hanlon, W. B., Civil and Mining Engineer, Cleveland, O.
Hart, E. E., Chief Engineer, N. Y. C. & St. L. Ry., Cleveland, Ohio.
Harwood, G. A., C. E. Elec. Zone Impr., N. Y. Cent., New York.
Hatt, W. K., Prof. C. E., Purdue Univ., Lafayette, Ind.
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Houghton, E. R., Asst. Eng., U. P. R. R., Omaha, Neb.
Howe, Chas. H. R., Asst. Div. Eng., B. & O. R. R., Chillicothe, Ohio.
Hoyt, C. B., Supt. Tr., N. Y. C. & St. L. R. R., Bellevue, O.
Johnson, J. E., Division Engineer, H. V. Ry., Logan, O.
Johnston, A. W. (Past-President), Gen. Man., N. Y. C. & St. L. R. R., Cleveland.
Katte, E. B., Ch. Eng. Electric Traction, N. Y. C. & H. R. R., New York.
Kenly, R. G., Ch. Eng., M. & St. L., Minneapolis, Minn.
Kenney, E. F., Met. Eng., Cambria Steel Co., Johnstown, Pa.
Lehn, Henry, M. W. Acct., N. Y. C., New York.
Michel, Wm., Ch. Eng., Hocking Valley R. R., Columbus, Ohio.
Montzheimer, A., Ch. E., E., J. & E. Ry., Joliet.
Morehouse, W. W., Res. Eng., C., M. & St. P. Ry., Rhodes, Ia.
Myers, J. B., Div. Eng., B. & O. R. R., Cumberland, Md.
Oren, F. B., Roadmaster, I. C. R. R., Mattoon, Ill.
Parker, W. A., Chief Engineer, St. J. G. I. Ry., St. Joseph, Mo.
Parrish, F. J., Eng. M. W., K. & I. B. & R. R., Louisville, Ky.
Petri, Philip, Div. Eng., B. & O. R. R., Parkersburg, W. Va.
Pfeifer, H. J., E. M. W., Ter. R. R. Assn., St. Louis, Mo.
Plumley, G. S., E. M. W., K. & W. Va. R. R., Charleston.
Post, C. C., Jr., Asst. Eng., U. P. R. R., Omaha, Neb.
Prior, J. H., Asst. Eng., C. M. & St. P. Ry., Chicago, Ill.
Purdon, C. D., Ch. Eng., St. L. & S. W. Ry., St. Louis, Mo.
Raymer, A. R., Asst. Ch. Eng., P. & L. E. R. R., Pittsburgh, Pa.
Safford, H. R., Ch. Eng., Grand Trunk Ry. Sys., Montreal, Can.
Senter, S. S., Div. Eng. M. W., W. & L. E. R. R., Canton, O.
Simmons, F. G., Eng. and Supt., Elec. L. & Ry. Co., Milwaukee.
Smith, J. E., Instr. C. E., University of Ill., Urbana, Ill.
Splitstone, C. H., East Orange, N. J.
Sprague, Willson, Div. Eng., N. Y., C. & St. L. R. R., Conneaut, O.
Stelle, C. A., Div. Eng., W. & L. E. R. R., Canton, O.
Stephens, H., Suprv. of Mat., L. S. & M. S. Ry., Cleveland, O.
Stimson, Earl, Ch. Eng. M. W., B. & O. R. R., Baltimore, Md.
Talbot, A. N., Prof. Mun. & San. Eng., U. of Ill., Urbana, Ill.
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Webb, G. H., Chief Engineer, M. C. R. R., Detroit, Mich.
White, R. C., Division Engineer, Mo. Pac. Ry., Little Rock, Ark.
White, R. M., Supt., D. L. & W. R. R., Easton, Pa.
Wiggins, W. D., Div. Eng., Penna. Lines, Pittsburgh, Pa.
Willis, R. W., Eng., Mo. Dist. C., B. & Q. R. R., St. Louis, Mo.

GUESTS.

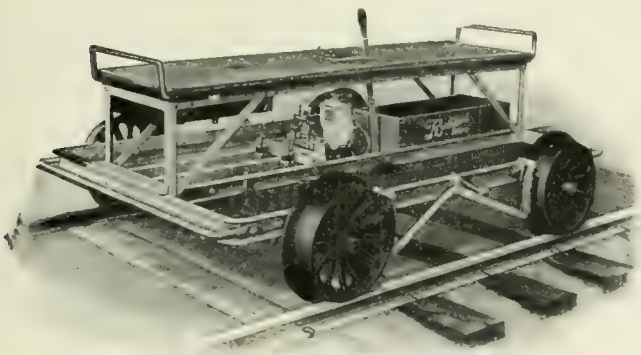
Kimble, W. P., Div. Eng., Erie R. R. Marion, Ohio.
White, R. B., Supt., C., H. & D. Ry., Indianapolis, Ind.
Cossil, H. A., Div. Eng., C., H. & D. Ry., Indianapolis, Ind.
Fletcher, J. E., Supt., Erie R. R., Galion, Ohio.
Cothers, F. S., Asst. Div. Eng., Erie R. R., Marion, Ohio.
McFarland, J. A., Chemist and Eng. of Tests, Frisco R. R., St. Louis, Mo.
Schmidt, Edward C., Prof. of Railway Engineering, Urbana, Ill
Young, J. B., Chemist, Phila. & Reading Ry., Reading, Pa.
Rogers, E. O., Sig. Supt., Erie R. R., Marion, Ohio.
Quick, L. S., Div. Claim Agent, Erie R. R., Marion, Ohio.
Young, C. D., Eng. Tests, P. R. R., Altoona, Pa.
Cuthbert, A. B., Prin. Asst. Eng., P. R. R., Altoona, Pa.
Holtsberry, D. C., Div. Eng., Toledo & Ohio Cent. Ry., Bucyrus, Ohio.
Moses, L. B., Kettle River Co., St. Louis, Mo.
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Hadwen, L. D., Eng. Masonry Construction, C., M. & St. P. Ry., Chicago.
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Dawson, W. R., Asst. Supt., N. & W. Ry., Bluefield, W. Va.
Ayres, L. C., Asst. Supt., N. & W. Ry., Portsmouth, Ohio.
Fowler, H. E., Asst. Div. Eng., B. & O. R. R., Wheeling, W. Va.
Barnhart, E. H., Asst. Div. Eng., B. & O. R. R., Newcastle, Pa.
Shea, John, Roadmaster, D. & I. R. R. R., Two Harbors, Minn.
Williams, A. P., Asst. Div. Eng., B. & O. R. R., Collinsville, Pa.
Stewart, S. G., Kansas City Terminal Ry., Kansas City, Mo.
Sargeant, J. E., Pm. Agt., St. L. & S. W. Ry., St. Louis, Mo.
Williams, W. J., Supt. Telegraph, St. L. & S. W. Ry., St. Louis, Mo.
Mace, M. E., Supr., K. & M. Ry., Charlestown ,W. Va.
Espenshade, E. B., Civil Eng., Chicago, Ill.
Ward, C. H., Roadmaster, K. & M. Ry., Middleport, Ohio.
Eberst, Paul, Foreman, B. & B., K. & M. Ry., Middleport, O.
Millner, E. D., Civil Eng., Chicago, Ill.
Bather, C. S., General Frt. Agent, Texas City Terminal Co., Texas City, Texas.
Brown, George M., Asst. Ch. Eng., Pere Marquette R. R., Detroit, Mich.
Middletown, R. J., Valuation Eng., C., M. & St. P. Ry., Chicago, Ill.
Gennett, C. W., Jr., Robt. W. Hunt & Co., Chicago, Ill.
Osborne, C. G., Ch. Eng., Illinois Steel Co., Chicago, Ill.
Hatbridge, J. T., Con. Eng., Chicago, Ill.
Steenbergen, W., Asst. Eng., K. & M. Ry., Point Pleasant, W. Va.
McCoy, J., Transit Man, A., T. & S. F. Ry., Marceline, Mo.
Walton, N. H., A., T. & S. F. Ry., Marceline, Mo.
Duncan, J. F., Transit Man, A., T. & S. F. Ry., Marceline, Mo.
Dickson, J. H., Supt. Creosoting, Can. Pac. Ry., Winnipeg, Can.
Brennon, C., Asst. Eng., C. & E. I. R. R., Evansville, Ind.
Ray, W. M., Asst. Eng., B. & O. R. R., Cleveland, O.
Kellehar, W. J., Pm. Agt., N. O. & N. Ry., New Orleans, La.

At the Coliseum

ROCKFORD SPIKE DRIVING CAR NO. 6.

The Rockford screw driving outfit is a complete, small power plant for electrically driving spikes. It is entirely self-contained, is self-propelling and has ample carrying power and space for a crew of men and the necessary tools. The outfit consists of engine, dynamo, switch-board, 500 ft. of cable and the necessary electric drills for this service. These parts are mounted upon a frame built of 3-in. steel channel welded autogenously into a solid, rigid unit. This frame rests on four-leaf, semi-elliptical steel springs supported by saddles on the axles of the car. The axles are made of double heat treated, open hearth steel 1¾ in. in diameter. The axle boxes have removable babbitt bushings and are self-oiling from a recess filled with oil. The car is equipped with pressed steel wheels, 16 in. in diameter and having M.C.B. flanges. The platform of the car is 7½ ft. in length inside the channel frame and is 50 in. in width. The working parts are mounted on two channels running the long way of the frame and thus occupy the center of the car.

A two cylinder, double opposed, four cycle gasoline engine supplies power for the entire outfit. It is air-cooled



Rockford Spike Driving Car No. 6.

without fans or any special equipment and develops 10 H. P. running at 1,000 revolutions per minute. Ignition is from a high tension magneto, no batteries, spark coil or timer being used. The engine is equipped with a Schebler carburetor, having a special automatic throttling attachment which takes care of any variation in load by regulating the gasoline supply. Two levers—one for the spark and the other for the throttle—make up the control; and these levers are so located as to be easily accessible to the operator. The engine is lubricated from a large oil cup centrally located over the crank case and having leads to small sight feed cups on the cylinders and bearings. The operator of the car can always determine at a glance whether or not oil is feeding properly.

The engine, as a whole, is strong, compact, reliable, easily operated and designed for continuous service. The gasoline tank has a capacity of 20 gallons and the oil cup holds oil enough for eight or ten hours' running. Every part of the engine is easily accessible to the operator of the car, and it is simple both in design and operation. The carburetor adjustment is automatic when the dynamo is being driven and the high tension magneto used for ignition is the same igniter which is used upon all Rockford cars. It is entirely enclosed, has no adjustments and no electrical contacts and only two wearing parts. The dynamo is direct driven from the engine, through a double friction clutch which permits of running the engine without driving the dynamo when the car is moving.

For driving the car itself there is a sprocket attached to one drum of the clutch between the engine and dynamo. This sprocket carries a short chain which drives a sprocket on the transmission shaft. The shaft is fitted with a forward and reverse gear and a band brake. The gear and brake are controlled by one lever which has three positions. The central position of this lever sets the brake, thus making it impossible, under any conditions, to go from forward to reverse or from reverse to forward without applying the brake. The movement of the lever from either position will set the brake.

The rear or drive axle of the car is driven from the transmission shaft by spiral gears entirely enclosed and running in oil. The clutch, reversing gear and chain are also entirely enclosed. The type of transmission used prevents any violent shock or jar when the car is started, insuring steadiness and reducing wear to a minimum.

A reel holding 500 ft. of cable is mounted on the car. The standard spike driving outfit consists of two Duntley electric spike drivers, four Duntley electric wood boring machines and a Duntley electric grinder for grinding the tools. Seventy-five ft. of cable is attached to each spike driver, giving a range of action of 1,150 ft.

On one of the large steam railways one of these outfits has been driving 3,500 screw spikes per day with a short run record of 540 spikes per hour.

SECTIONAL STEEL STORAGE HOUSES.

The use of sectional steel buildings for the storage of cement and other materials is a recent development in the railway field which should meet with favor. In construction work it is necessary to erect temporary shops for the storage of material, etc. The first cost of such buildings of frame construction, as they usually are, is high, while the expense of erection and the loss and deterioration in material



Sectional Steel Storage House.

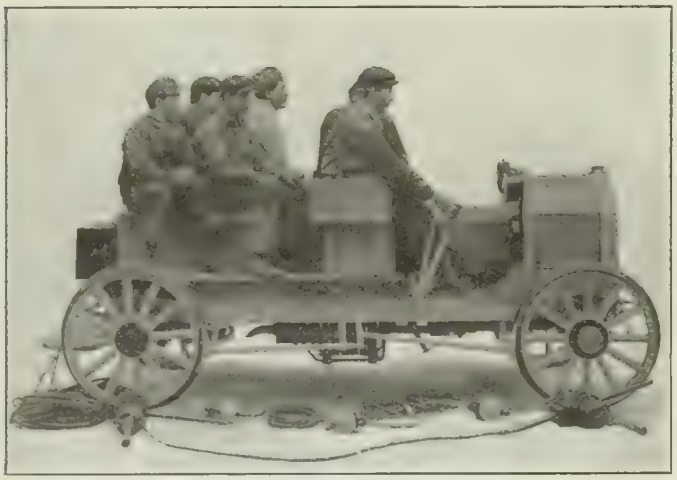
in tearing down and moving to another location is heavy. The use of a sectional steel building, such as that put out by the Ruby Manufacturing Company, Jackson, Mich., which is illustrated here, should prove economical. Being built in interlocking sections it can be readily uncrated and erected where desired, furnishing a rigid and waterproof building. It can be taken down in a short time and moved to a new location and put up again without any loss in material and at a saving in labor over that necessary to move a frame building. This type of building has come into use on sev-

eral electric lines and it should also be of advantage in the steam railway field.

GASOLENE ELECTRIC TOOL CAR.

The Otto Gas Engine Works, Philadelphia, Pa., recently put on the market a section motor car of a novel design. This car is known as the Otto gasolene electric tool car. Its purpose is to convey men and tools to the work on the section with greatest convenience and speed and then supply the necessary power to operate electric tools. The motive power is supplied by a 30-h. p. four-cylinder, four-cycle gasolene engine. An electric generator is operated by the same engine which propels the car. Eight or ten men can be conveniently carried with tools, and additional cars can be readily coupled to carry material, additional tools or men.

The car is operated like an automobile. When the driver throws the clutch into engagement with the engine to run the car, the generator is disengaged; and when the car reaches the point of operation the engine is disengaged from the transmission and engaged to the generator. To eliminate the necessity of constantly moving the car along the track to operate the electric tools, a quantity of cable is carried, which can be laid as far as a quarter of a mile in any direction from the car. About 20 ft. apart on this cable are



Gasolene Electric Tool Car.

plug-in switches, and each electric portable tool is equipped with a special stage plug.

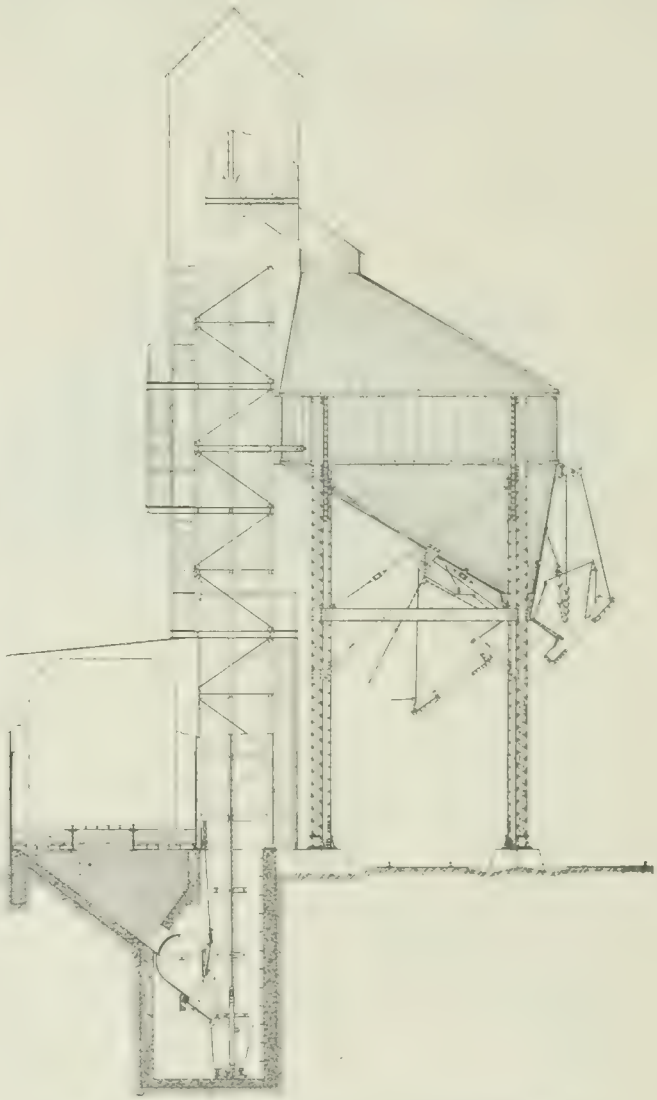
The generator used is the Crocker-Wheeler type, 6½ k. w., 125 volt, 52 ampere, 1,000 r. p. m. The gasolene tank will store 15 gals., sufficient for a day's work. The car runs on track at a speed of from 10 to 40 miles an hour, forward and reverse. A portable turntable with extension rails is provided to move the car to a siding when a clear track is required. This turntable consists of two spare rails, 8 ft. long, and four screw jacks, one under each corner of the car, which are all operated at once by bevel gears by power from the shaft. At the side of each jack at right angles to the track are 10-in. wheels, curved to fit the rails. The car is quickly lowered to the short rails and pushed to the adjacent track or edge of the road.

These cars have been supplied to the Chicago, Rock Island & Pacific and the Pittsburgh & Lake Erie, on which they are used for screw spike work. The Otto Company says that actual tests by the chief engineers of the above-mentioned roads have shown that two men with one electric driver can drive the screws as fast as three men using electric tools can drill the holes. From one and three-quarters to two seconds only are required to drive a spike with an electrical driver as against eight to ten minutes to drive a spike by hand.

The Otto tool car may also be used to operate hoists or vacuum cleaners; for operating lighting apparatus in cases where night work is required for repairs or clearing away wreckage; or for running air compressors which operate riveting hammers or sand blast work. It enables the crew to cover larger sections of track, thus effecting a considerable saving in labor expense.

A STEEL AUTOMATIC BALANCE BUCKET TYPE COALING STATION.

In developing its special line, the Ogle Construction Company, Chicago, has designed an all-steel, fireproof, automatic locomotive coaling station. There is on exhibition at that company's space in the Annex a complete working model of this station, showing the structure and machinery in detail. The model is an exact reproduction



Steel Automatic Balance Type Coaling Station.

of a 200-ton coal chute, with the hoisting machine, buckets and loaders, all reduced to one-eighth full size. The chute is in regular operation, and its demonstration is as satisfactory as a full-size structure.

The main storage bin is in circular tank form, giving it a neat appearance, and at the same time making it an ideal bin for storing coal. The main structure is supported on four lattice columns, with a conical-shaped bottom and top. The object of the cone bottom is to direct all the coal to one point, so that in taking coal the entire volume is

moved each time. Another point is that one or two spouts can be attached to serve that number of tracks without changing the design.

The hopper is located at one side of the main structure, and it can be varied in size or the track elevated to suit the conditions. It can also be housed over in cold climates for protection. The coal is delivered to the hopper track by a locomotive; from there to and from the hopper by the hoisting machine, which is provided with a winch head. After the coal is delivered into the hopper the automatic loaders, which as a rule are in pairs, cut off and deliver a bucket of coal at each trip. The weight of the bucket on the downward movement operates the loaders, one to a filling position, the other to a discharging position, the operation being repeated at each trip.

The hoisting machine is very complete and automatic in all respects. When the bucket reaches the top of the chute and is emptied, the hoisting drum stops, and remains so until the other bucket is loaded, and the hoist automatically reverses itself to elevate the loaded bucket. The hoist is also provided with an automatic lock to prevent a loaded bucket from falling in case of a power failure or an accident.

The apron used for the delivery of coal from the chute to the locomotive is an improvement over the old style, as it is provided with several very essential features, as follows: The cut-off gate is pivoted and closes by gravity; the apron is pivoted, so it has a lateral movement of 7½ ft., making it possible to coal a large locomotive at one spotting; the apron is provided with a breaking joint to prevent serious damage in case the engine moves while taking coal. The spout being perfectly balanced, it is easy to handle, and the valve being equipped with a peculiar compound leverage, to which the pull-rope is attached, the operator can use his own pleasure as to position while taking coal. The lower end of the apron being provided with a deflecting plate, all the coal is delivered to the locomotive, saving the expense of gathering up spilled coal on the ground.

The chutes are built in capacities from 150 to 500 tons, with elevating capacities of 50 to 100 tons per hour, and can be adapted to almost any condition.

A VALUABLE ACCESSORY TO THE BLUE PRINT ROOM.

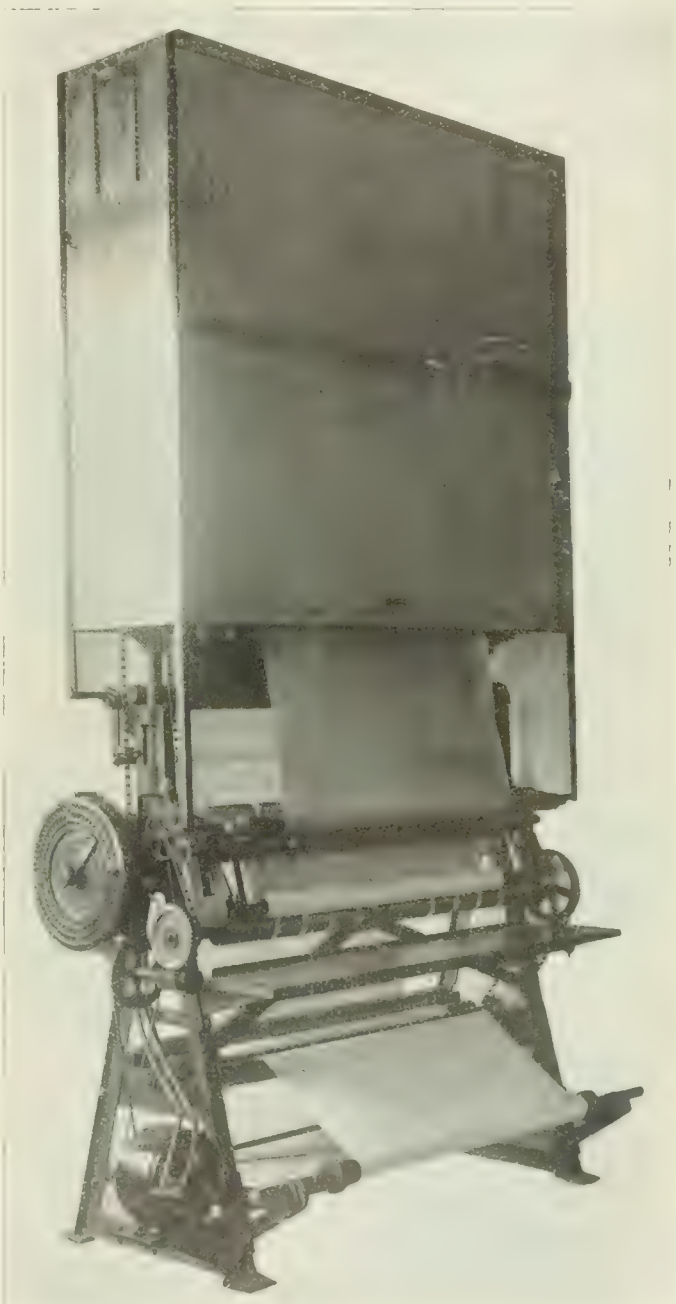
The problem of always having a supply of freshly sensitized paper on hand is one that has caused considerable annoyance to large makers of blue prints. Up to this time, blue print paper coating machines have been large and cumbersome, covering a large amount of floor space and turning out a product far in excess of any one company's requirements, and it has not been practical for the railway engineering departments and manufacturers to coat their own paper.

The C. F. Pease Company, Chicago, is showing, this year, at the Coliseum, a blue print paper coating machine, unique in design, which is thoroughly practical for the large user of blue print paper.

This machine occupies a space of only 3 ft. x 5½ ft. and can be set up against the wall. It is so simple in construction that it can be operated by the same man who operates the blue print equipment and at the same time. The apparatus is entirely self-contained, and is operated by a quarter horsepower variable speed motor, controlled by an electric speed changing device, so that any speed can be instantly secured, according to the quality and thickness of the paper that is being coated.

A roll of uncoated paper weighing 150 lbs. is placed on the receiving spindle. The paper is then carried under the rubber covered coating roller, up through the drying oven, which may be heated either by gas, electricity or steam, after which the sensitized paper is automatically wound up in a tight roll and in any length desired. An automatic measuring device is used, which is so arranged that just before the desired length of paper is reached a bell is struck, notifying the operator in time for him to cut off the paper and start a new roll.

With this apparatus it is possible for the operator, within twenty minutes after the machine is started, to have a fresh roll of paper ready for printing, and every fifteen or twenty minutes thereafter as long as the machine is in operation.



C. F. Pease Machine for Sensitizing Blue Print Paper.

The maximum capacity is twenty-five to thirty 50-yard rolls of paper per day.

The cut herewith illustrates the machine in question, arranged with a gas heated drying oven. The manufacturers claim that the cost of drying by gas does not exceed 5 cents per hour, while the cost of operating the quarter horse-power motor is nominal.

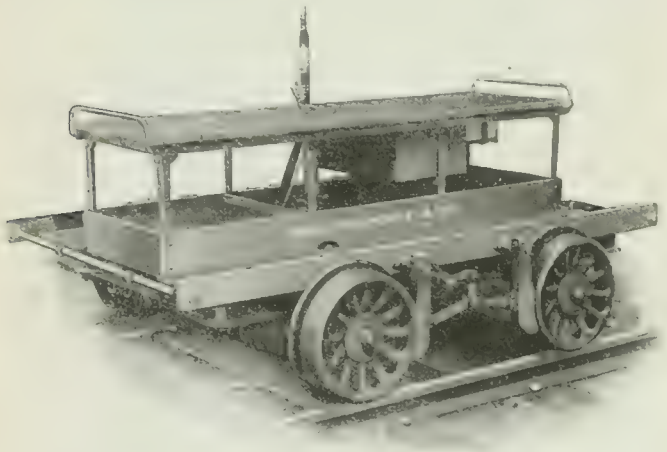
They are prepared to furnish the white paper in large rolls of any quality, also the coating chemicals, ready mixed in dry form in air-tight cans, so that all that is necessary for the

operator to do is to open the can and dissolve the contents in water. This solution will keep indefinitely.

FAIRBANKS-MORSE NO. 32 SECTION MOTOR CAR.

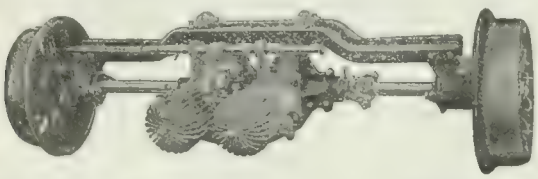
The latest development in gasolene motor cars for section work by Fairbanks, Morse & Co. is a car styled the "No. 32." It is on exhibition at their space in the Coliseum. On account of its lack of the usual many moving parts found on gasoline cars and engines it is styled "the simplicity car."

The engine is two cylinder, two cycle, air-cooled, direct connected to the rear axle of the car, the crank shaft and rear axle being integral, and of nickel steel construction. There are only five moving parts, viz., two pistons, two connecting rods and the crank shaft, and there are no valves, cams, pawls, sprockets or chain. Lubrication is automatic, the gasolene and oil being mixed before placing in the gasolene tank. As the two cycle engine takes the charge first into the



Fairbanks-Morse No. 32 Gasolene Motor Car.

crank case and then into the cylinder, the method of lubrication is thorough and positive as well as having the advantages of insurance against running out of oil, which cannot happen as long as there is gasolene in the tank. The frame is all-steel with a special steel yoke suspension for the engine, so arranged that no weight of the car can come in the center of the crank shaft and cause a possible deflection there, if the car is overloaded. The speed is from



Removable Power Plant Unit of the "Simplicity" Car.

6 to 25 miles per hour, and the car will run equally well in either direction.

As a complement to the No. 32 car, there is also on exhibition a sectionalized engine with which the car is equipped, operated by a small electric motor, so that the working parts of a two cycle engine and the manner in which the gasolene mixture is handled can be plainly seen.

The No. 32 has all the essential features necessary in a motor car for section work where the men in charge of them are not well posted on mechanics. It is now an acknowledged fact that the section motor car presents a great opportunity for economy in railway maintenance, and the only question is to get a reliable car, light enough to be easily handled off and on the track, simple enough for successful handling by the foreman and durable enough to stand up to the work required of it, with a minimum expense for upkeep.

THE SAUERMAN COALING STATION.

The Roberts & Schaefer Company, engineers and contractors, Chicago, the original promoter of the Holmen balanced bucket locomotive coaling station, has this year brought out a new plant which is particularly simple in operation and is known as the "Sauerman single unit coaling station." A general view and several details of the bucket operation are herewith illustrated, and a large view of the plant is exhibited in the company's booths at the Railway Appliances Exhibition.

The particular feature of the Sauerman coaling station is the simplicity of the plant and the rugged construction of the machinery. Some of the advantages over other types of plants are as follows:

First, it omits entirely a measuring feeder of any type

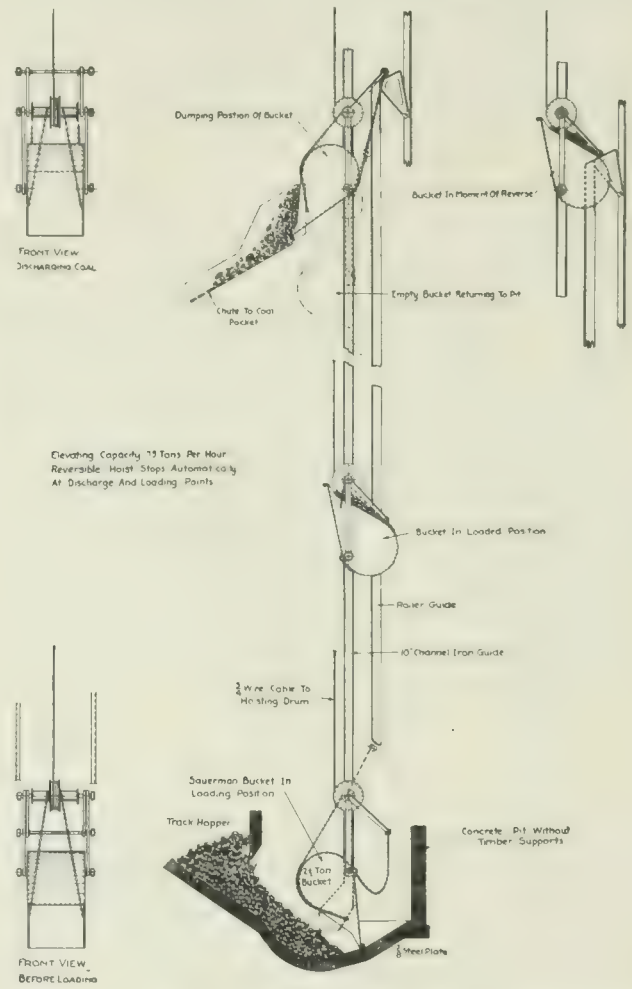
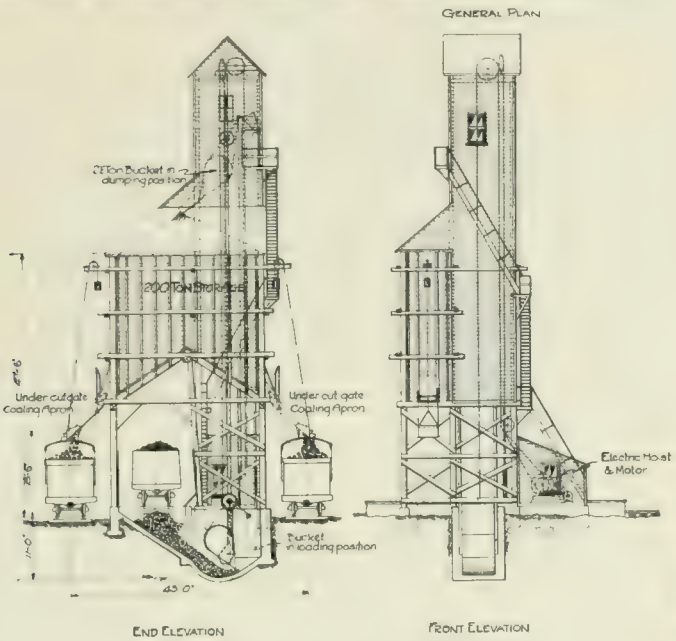


Diagram of Operation of Sauerman Patent Coaling Bucket.

in the bucket pit. Second, the bucket pit is only 11 ft. below the surface of the ground, while other style bucket pits range from 18 to 25 ft. in depth, necessitating the handling of water which usually accumulates in deep pits. Third, the design of the bucket requires only a single unit instead of bucket and feeder. There is no opportunity for spilling coal in loading the bucket, or of getting this coal under the bucket or feeder, as coal is in the pit at all times. The loaded bucket may ascend and reverse and descend to the pit with load, without receiving two buckets full of coal in the pit.

Fourth, the bucket hoist stops automatically at the top, preventing any possibility of overwinding into the sheaves. The hoist always stops automatically when the bucket is in loading position. There is no delay in loading and discharging the bucket, and there are no restricted openings

which prevent handling of large coal. The Sauerman plant eliminates all timber and machinery supports in the bucket pit and track hopper. The entire pit is concrete, with three steel rails at the bottom of the bucket well, and the elevating capacity is 75 to 150 tons per hour. On account of the shallow pit much less concrete is required for



Sauerman Coaling Station.

foundations. With the Sauerman bucket the coal is not dropped at the discharge point, breaking it into slack, but it slides out of the bucket and at the same time the bucket is completely turned over, preventing any wet slack from sticking to it.

PURIFIED WATER SUPPLY.

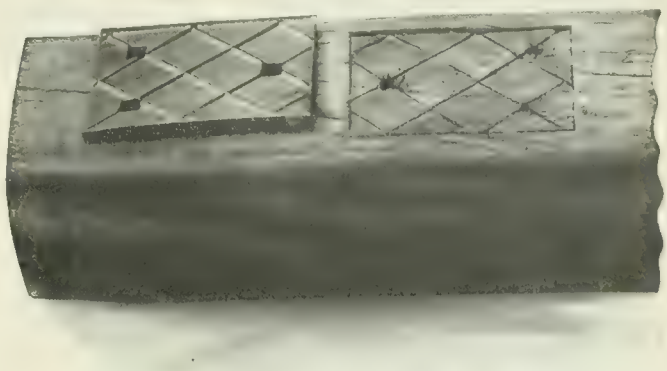
The Norfolk & Western formerly found it necessary to shop its yard engines at Columbus, Ohio, two or three times each week for recaulking the flues. In 1904 a water softener was installed at that point and, following the use of purified water and the removal of old scale deposits from the boilers, the yard engines were able to remain indefinitely at work. This initial installation has been followed by about 30 more, two of which were at points where the company wanted the service for only six months or until a naturally pure water supply became available, knowing that in the six months the softeners would save more than their total cost at those two water stations.

Another railway with experience in locomotive service insurance is the Florida East Coast, its experience having the advantage of being expressed in figures compiled for its annual report. This railway, with an equipment of water purifiers for only a portion of its water stations, increased its locomotive mileage from 30,000 miles to more than 50,000 miles between shoppings for boiler troubles. Mileage per ton of coal was increased from 20.2 miles to 20.5 miles, allowing a saving of 1,565 tons of coal per year. In one year the average freight train was increased from 14.7 cars to 20.5, while the fuel cost dropped from 0.1818 cents to 0.1570 cents per mile, with no change in price of coal. In one shop alone the force of boiler makers on repair work necessitated by water conditions was reduced from 12 men to four, and all overtime work, which had previously been very heavy, was entirely eliminated, making a saving of more than $10,000 a year in labor for boiler repairs. As many as three boiler failures in one day, and on the same train, frequently occurred formerly, but after the use of purified water these failures were reduced to a negligible number, and deadhead locomotive mileage was reduced to a minimum.

The installations mentioned were made by the American Water Softener Company, Philadelphia, Pa. Many other railways in addition to these have had water softeners installed by that company.

AN OLD SELLERS TIE-PLATE.

The Sellers Manufacturing Company, Chicago, is exhibiting at the Coliseum a Sellers anchor bottom tie-plate and a tie, which have recently been taken out of track after 10½ years' continuous service on a 4-deg. curve in the main line of a northern road handling a heavy iron ore and lumber traffic. The accompanying photograph shows a view of this tie-plate, together with a portion of the tie showing the imprint of the plate in the tie, indicating clearly that the plate had not moved from its original position in this period of service, and that there was no deterioration of the tie under the plate, or of the plate itself. This was an



Tie Plate and Tie After 10½ Years' Service in Heavy Traffic Main Line.

untreated cedar tie, cut locally. The plate was made according to standards in use at that time, and was about one-fourth of an inch thick. By a comparison with similar plates rolled to-day, it will be noted that on the later plates the corrugations have been increased to secure greater holding power, and that the newer plates have a shoulder. Otherwise the design is the same as that used by the Sellers Company to-day. This plate was made of wrought iron, which is still being used for the purpose by this company.

FROGS AND JOINTS.

The frog exhibit of the Pennsylvania Steel Company, Steelton, Pa., contains several designs not heretofore displayed by this company. In addition to the design 160 Manard Anvil Face frog, which has been on the market for a number of years, the company shows a solid Manard frog, design 167, furnished with integral base plate and cast to as near a uniform section as can be obtained without sacrificing the strength and durability of the frog; and also a Manard Anvil Face frog, design 169, with the Manard center so cored as to reduce, as much as possible, the cost of the special Manard steel. The point of the frog is part of the Manard center and the heel block runs back between the heel rails and furnishes support to the wheel tread until it strikes the full head of the carbon rail.

The Manard crossing shows a new type of joint. This joint is composed of rails that bind the abutting ends of the manganese castings and are held together by the Never Turn bolt. This bolt fits both the head and the flange of the rail, which feature eliminates the danger of the bolts

turning when the nuts are kept tight. These bolts require very little attention, as the split at the end is opened sufficiently to hold the nut in position.

DURABLE FLOORS FOR SHOPS AND FREIGHT HOUSES.

The difficulties with wood, concrete and other types of floors for railway freight houses and shops have led to the quite extensive use of asphalt floors for these purposes. The accompanying photograph shows the car shop floors of the Canadian Pacific at Winnipeg, Man., laid with asphalt mastic.

The use of asphalt for paving purposes is well known. It has also been used with success for floor construction both in this country and abroad. It is a noteworthy fact that when the proper material is used and the asphalt floor is properly constructed, it approaches very closely to the ideal surface for heavy traffic, but it is also noticeable that when inferior material is used or when the material is not handled properly, the floor comes far from living up to expectations. However, when the material is able to withstand a wide range of temperature without being either too brittle in winter or too soft in summer, the floor can



Asphalt Mastic Floors in Canadian Pacific Car Shops, Winnipeg.

be given a hard finish and still retain the elasticity that makes it so durable and pleasant to work upon.

One distinct advantage of the asphalt floor lies in the entire adaptability for resurfacing worn out concrete or wood floor. It requires only in the latter case that the supports should be sound. The advantages of the asphalt are shown by its very frequent use as a material for repairing and filling holes in worn concrete floors, something which cannot be satisfactorily done with cement, but the asphalt is adhesive and wears much better than the surrounding concrete.

The manner of laying the floor is very simple. The mastic material comes in blocks weighing 80 lbs. each. These are broken up, melted with flux in a kettle, the dry grit, consisting of torpedo gravel or granite or limestone screenings, is then added and the whole mixed with stirring rods and brought to a temperature of 400 deg. F., after which it is removed to the work in wood buckets to hold the heat.

While hot, the mastic is spread evenly and compacted so as to make a jointless surface of very dense material. For ordinarily heavy traffic 1½ in. thickness is sufficient, while for loading docks, driveways or floors subject to the heaviest trucking, 2 in. is better.

The material is laid in 2-ply with lapped joints and the finished surface presents the same appearance as concrete. The purity and elasticity of the asphaltic matrix and flux used, together with care in the mixing and proportioning of the mineral aggregate, determine the character of the completed floor.

The satisfaction resulting from extensive use of asphalt floors to withstand water, as in breweries, trucking, as in packing houses and warehouses, and the heavy service conditions in shops has demonstrated its suitability as a wearing surface.

STRAUSS BASCULE BRIDGE.

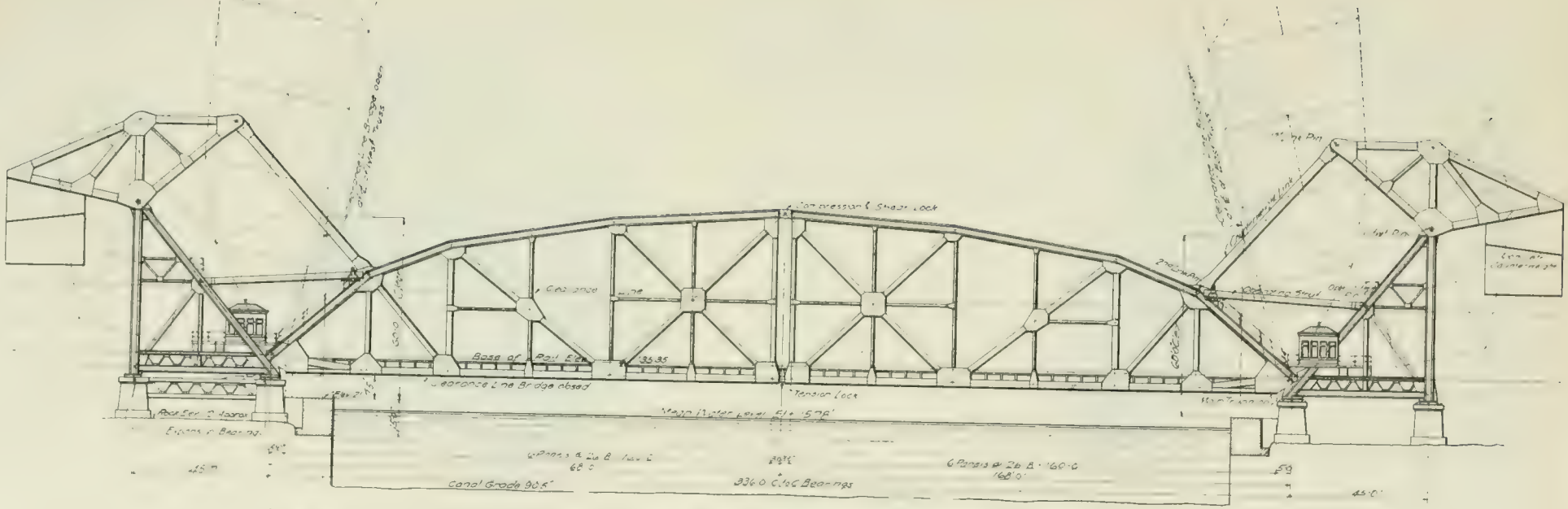
The development of the Strauss bascule bridge has been continued during the past year, and several unusual designs have been worked out, including those for the Sault Ste. Marie bridge of the Canadian Pacific, the longest double-leaf bascule bridge designed up to this time; the Calumet river bridge, at South Chicago, for the Baltimore & Ohio, the longest single-leaf bascule; the Kaministiquia river bridge for the Canadian Pacific, at Ft. William, the first double-deck bascule; and the Portage river bridge at Port Clinton, Ohio, on the Lake Shore & Michigan Southern, the first four-track bascule bridge, the first two of which structures are illustrated in the accompanying drawings.

The Calumet river bridge, for the Baltimore & Ohio, at South Chicago consists of a 50-ft. tower span and a 235-ft. movable span, both riveted throughout. The latter span deviates only slightly from a stationary span of the same dimensions. The trusses are supported directly on the two river piers, and the floor system and top and bottom lateral bracing are identical with those for the ordinary span, with the exception that the end portal at the trunnion end of the bridge is made especially heavy to carry the operating machinery, which is located at this point. In later designs, however, the operating machinery is located on the tower, gaining a considerable advantage.

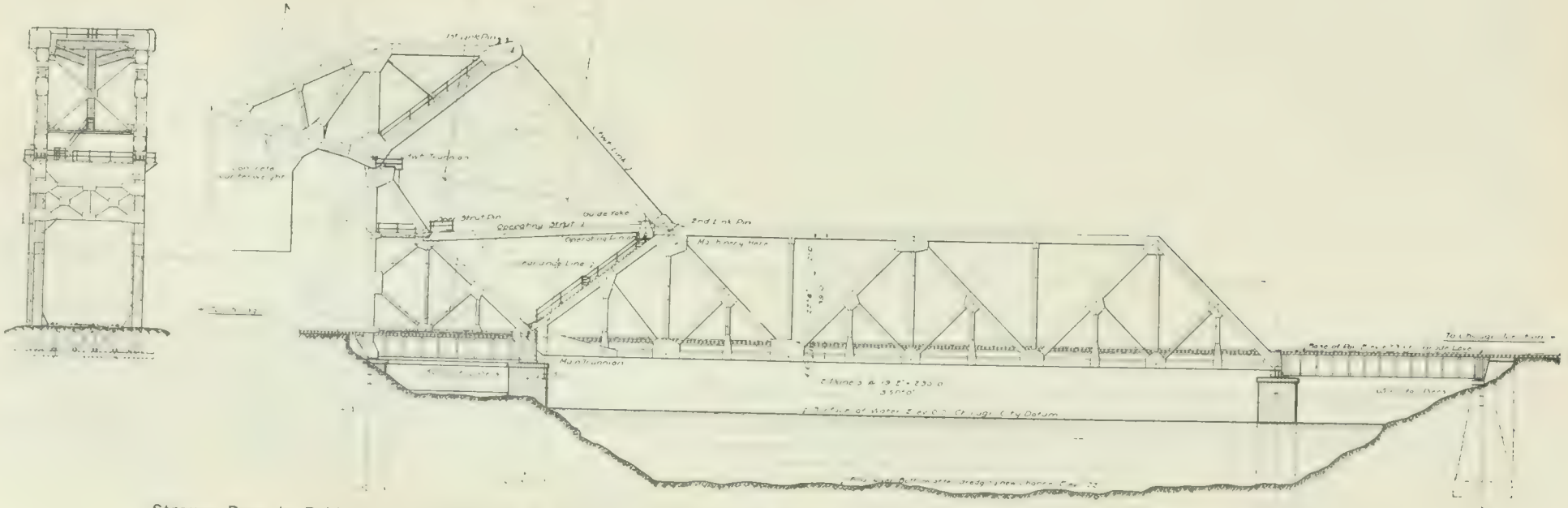
This bridge is similar in detail to the twenty or more heel trunnion bridges which have been built or are now under construction and which vary in length from 108 ft. to this 230-ft. span. This type is identical in principle with the old time, simple trunnion bridge, with the exception that the main trunnion is placed directly on top of the pier and that the tail ends of the trusses and the counterweight, which, with this location of the trunnion, would obstruct traffic in the ordinary trunnion bridge, have been cut loose, so to speak, from the front part of the trusses and mounted separately on trunnions at the top of a low tower, being so connected with the movable span by means of a structural steel link that the angular movement of the counterweight is the same as that of the leaf, and the counterweight action is, therefore, not disturbed.

This separation of the counterweight part from the main span reduces the dead load reactions on the piers and makes the design flexible in that the counterweight may be placed underneath or overhead at will. This flexibility is further attested to by two structures now in course of construction, which, although unusual, embody precisely the same elements as the Baltimore & Ohio bridge. One of these bridges is the double-track single-leaf bridge over the Kaministiquia river for the Canadian Pacific, which, in addition to a double-track railway, carries a highway 29 ft. wide on an upper deck. The second is a four-track structure for the Lake Shore & Michigan Southern over the Portage river at Port Clinton, Ohio, which follows the ordinary design of the heel trunnion type for the center pair of tracks, while the outer tracks are carried on floor beams extending from the bascule trusses to outer plate girders. These plate girders are supported by a heavy cross girder at each end of the span when the bridge opens, but come to rest on the piers when the bridge is closed.

The Baltimore & Ohio bridge is being built under the direction of J. E. Greiner, consulting engineer, who also pre-



Strauss Bascule Bridge of the Canadian Pacific at Sault Ste. Marie, the Longest Double-Leaf Bascule Bridge Built.



Strauss Bascule Bridge of the Baltimore & Ohio Over the Calumet River at South Chicago, the Longest Single-Leaf Bascule Bridge Built.

pared the plans for the substructure. The Foundation Company of New York is building the substructure, while the Pennsylvania Steel Company has the contract for the fabrication and erection of the superstructure.

The single-track bascule bridge for the Canadian Pacific, over the United States ship canal at Sault Ste. Marie, Mich., the plans for which have just been completed, has a span of 336 ft. center to center of channel piers. This structure gives a single unobstructed channel wider than that provided by the longest existing swing bridge. Each half of the bridge conforms in a general way to the standard type of Strauss heel trunnion bridge, and consists of a 168-ft. river arm and a 45-ft. tower carrying the counterweight. Instead of acting as a cantilever for live load, as is ordinarily the case with double-leaf bascule bridges, the two river arms or leaves are so locked together in the center when the bridge is closed that the two halves of the trusses act as one single truss from pier to pier.

The counterweight device on this Sault Ste. Marie bridge is arranged similarly to the Baltimore & Ohio bridge, the dead load reactions on the piers in both cases being vertical and constant.

The locking of the trusses in the center is automatic and is accomplished without the use of movable parts of any kind. The tension hinge in the bottom chord is similar to the ordinary railway coupling, while the top hinge is an adaptation of the common center hinge of a three-hinge arch bridge and transmits both compression and shear. The difficulty which has confronted designers attempting to design a "simple span" bascule, viz., the expansion due to temperature variations, has been overcome by mounting one of the counterweight towers on friction rollers so that when the bridge is closed one end is free to expand as in an ordinary stationary bridge. This type of bridge was adopted by C. N. Monsarrat, then bridge engineer of the Canadian Pacific, who has since been succeeded by P. B. Motley, engineer of bridges.

TWO TANKS AT ONE LOCATION.

The accompanying illustration shows the tanks built at McCook, Neb., by the Chicago Bridge & Iron Works, Chicago, for the Chicago, Burlington & Quincy. It was desired here to have two tanks at one location instead of one larger structure so that, if it became desirable for any reason, one



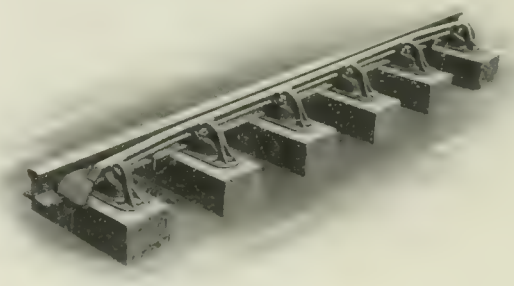
Two Steel Tanks at One Location.

tank could be emptied without interrupting the locomotive water service.

The tanks shown, instead of being provided with cast iron inlet pipes with wood frost boxing, have large riveted steel riser pipes or mud drums which are made of sufficient diameter to prevent interruption of service from freezing. These mud drums also act as settling basins and have blow-off valves at the bottom so as to make the tank practically self-cleaning. Steel tanks are especially attractive at the present time because of the low price of metal.

A NEW GUARD RAIL.

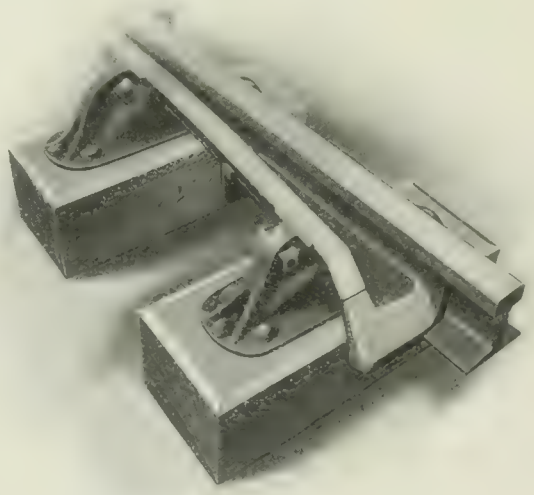
The possibility of greater efficiency and more economy in the design and use of guard rails has been receiving considerable attention from railway engineers in the last two or three years. The accompanying illustration shows a new type of guard-rail construction. While manganese steel has been in use for several years for guard-rail purposes, it has



A New Guard Rail.

hitherto been either as a strip bolted or riveted along an ordinary bent T rail, or else the entire guard rail has been a single manganese casting.

In this type an angular-shaped manganese guard rail, 10 ft. long, is rigidly carried or seated in malleable chair plates, which are formed of single castings passing beneath the running rail. In actual practice it has been found that this guard rail is far more rigid than the ordinary rail guard, and requires little or no attention when once placed in position. The length of 10 ft. permits of long curved flare ends, giving easy entry for the wheels.



A New Guard Rail.

Only the actual part of the guard in contact with the wheels is of manganese steel. The brace plates, being of malleable iron, permit of an economical construction, and, as the guard rail proper can easily be replaced without in any way disturbing the chairs, the economy of this design may readily be seen. The device has just been placed on the market by the Morden Frog and Crossing Works, and may be seen at their exhibit in the First Regiment Armory.

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In the wreck at Warrior Ridge, Pa., February 15, emergency packets for use in first aid to the injured were greatly needed; if there had been one in each car much suffering would have been relieved. This is the testimony of a clergyman who was on the train, and who sent his observations to the Pennsylvania state railway commission. In a temperate and conservative letter, praising the trainmen, including those who were injured, for their energetic attention to the needs of the passengers, he points out this lack, and also the desirability of having an axe and a steel bar in each car. He is an extensive traveler, and also for years has attended the sick in hospitals, so his words are entitled to attention. The Warrior Ridge wreck was somewhat peculiar, the engine, with its emergency box, being brought to a stop a long distance from the cars. Even if it had been near, a single box would not be much in the presence of fifty or sixty injured persons. Again, the occurrence of such disasters is rare. An emergency package in a passenger car would not be needed, in that car, probably, for years. Probably the best thing to do would be to make emergency packages so small that the burden, both of first cost and of care, would be small, and then distribute throughout the train, or at least in half the cars, what is now carried on the engine and the baggage car. Separation of large packages into smaller ones is an improvement which has already been made on the freight trains of the Southern Pacific. This was done primarily to obviate the necessity of disturbing the materials not used in a given emergency.

Railway companies of the country held on June 30, 1910, about $3,952,000,000 of railway securities, about one-third being bonds and two-thirds stocks. But not included in these returns is the large amount of railway securities, estimated at about $2,750,000,000, held by the railway corporations through holding companies and practically for purpose of control the same as though held in a railway corporation's treasury. While, as the Hadley commission has pointed out, these outside holdings "have all the disadvantages of consolidation without getting its advantages," comparative figures are interesting and informative as meaning upward or downward movement toward consolidation. Such figures are indices of a *process* toward consolidation and in a large number of cases mean sooner or later consolidation actually carried through. The figures are suggestive. During the first half of the decade ending with the year 1910 the average annual increase in securities held by the railway companies was about $500,000,000. During the last half of the decade the average annual increase has dropped to about $240,000,000, or more than 50 per cent. The decrease undoubtedly represents the play of several forces, positive or negative. In the first place, there has probably been a natural exhaustion of the movement toward railway control of smaller lines which was so vigorous in the first years of the last decade and some years earlier—if for no other reason than that so many subsidiary or connecting lines had already come under the control of the larger railway systems. Another force has been the decline of the holding company as a device for control, partly as a result of the Northern Securities decision. The device exists still but not with its earlier scope, and certainly with much lessened opportunity for "high" finance. Finally, a more general but also more powerful influence has been the aggressive policy of the federal government and state commissions, which needs only to be stated to be recognized as an obstacle to purchase of stocks and bonds with control and consolidation as their ultimate purpose. The decreased tendency of the railway corporations to buy stocks and bonds for control and mergers raised two interesting questions. Will there be a new drift on the part of our bigger railways toward leaseholds and away from purchase as a means of expansion? And how far will a tendency against intercorporate holdings diminish the argument for federal charter?

The quickest way for a person in a car of a passenger train to cause the stoppage of the train is to exhaust air pressure from the brake pipe, and for this the conductor's valve is provided. To neglect this means, and, instead, to signal the engineman to stop, interposes an appreciable delay. This is wholly unnecessary, if the men in the cars are competent to manage the conductor's valve; and in case of a danger which demands the quickest possible stop the delay may mean an aggravation of the danger; in other words, it may be important to reduce the delay as much as possible. We have long since abolished the uncertainties of the old bell-cord, but we have not done away with its slowness. With the air signal there must be an interval between the two blasts of the whistle, and

another interval to enable the engineman to assure himself that the signal does not mean something else than "stop." And with a fast train every second is precious. These considerations are illustrated in an accident which happened recently to one of the fastest trains on an eastern trunk line. The electric light dynamo under one of the cars became loose and dropped so far as to catch on the plank at a highway crossing, which resulted, after running a few hundred feet, in the dynamo being thrown out to one side and across the adjacent main track. The two trucks next back of this dynamo were badly damaged, but did not run off the track. Riding in this car was the conductor of the train, and, feeling the severe jar, he grasped the whistle cord and gave the two pulls necessary to convey to the engine a stop signal. Seeing that the engineman did not respond, he gave two more blasts; and then instructed the porter to pull the conductor's brake valve, which was done. But the disturbance caused by the accident was also heard or felt by a brakeman in the next car in the rear, and he also pulled the whistle cord twice; and these two pulls, coming between the first two and the second two given by the conductor, made six in all, and six blasts of the whistle was what the engineman received. This is the signal for increasing the supply of steam to the heating pipes, and that was what the engineman did. The whistle was blown a seventh time, however, and so the engineman, although on looking back he could see nothing wrong, concluded that something was the matter, and applied the brakes. By this action, or that of the porter, the train was stopped. From the time that the conductor first pulled the whistle cord it ran about a mile and a quarter.

ELECTRIFICATION OF STEAM ROADS.

THE change in the tone of the New York Railroad Club annual electrical nights during the past few years affords a most interesting and significant study. One would hardly recognize the meeting which was held last Friday evening, if he had not attended the last two or three meetings of this kind and watched the gradual change of opinion on the part of the electrical engineers. Not many years ago the steam railway officer was severely criticized and assailed because, in the minds of electrical engineers, he did not understand his business. Between their attacks upon the railroader they were busily engaged in fighting among themselves as to the best system to use. In the old days an "electrical night" was as much fun to the outsider as a good football game. A great change has come about, however, and now the electrical engineer is willing at least to concede that very few steam roads are ready for electrification and that the railway officer is perfectly justified in not rushing into it. Moreover, they seem to have awaked to the realization that there is more than one good system and that different conditions often require different methods of treatment. While there has been no great progress made in electrification during the past year as far as additional equipment is concerned, there have been some very interesting developments.

While the Friday night meeting was not as spirited as some of the previous meetings have been, a considerable amount of valuable information was brought out. The most important features were the summing up of the present situation by W. J. Harahan; the statement by W. J. Wilgus of the results that have been obtained for the first year of operation of the Pennsylvania terminal, and the remarks by W. S. Murray, of the New Haven, which showed that the improvements which had been made in the single phase system since its installation have not only increased its reliability, but have very greatly reduced the first cost of the apparatus used.

Mr. Harahan directed attention to the fact that very little progress had been made during the year toward the substitution of electricity for steam. Electrification has only been used thus far under very special conditions, such as long tunnels, proximity to water power, etc., but where it has been used it has proved to be thoroughly reliable. A number of roads having ample credit have thoroughly investigated its use, and that they have not adopted it would seem to indicate that they do not consider it a good financial proposition. While a saving may result in the cost of operation, the amount of capital required to make the change is so great that adequate returns upon the investment cannot be guaranteed. When the substitution of electricity for steam can show a good financial return, it will be adopted, for there are progressive railway officers, and operation by electricity has certain advantages which must appeal to them.

George Gibbs, electrical engineer of the Pennsylvania Railroad, referred to the paper which he had presented at the Berne, Switzerland, meeting of the International Railway Congress in 1910, in which he had given certain data for the first two years of electrical operation on the Long Island. Figures are now available for the third year. That road now has 152 miles of main track electrified. The cost of operation per car mile for last year was 24.2 cents; the cost of power at the shoes was one cent, and there was an average of 28,000 car miles between detentions. Within the past few years the car miles have doubled, and the number of car miles per detention has tripled.

The figures for the first year's operation of the Pennsylvania terminal at New York are now available. These cover the main line from Harrison to the terminal station, which is about nine miles long. Of this 6½ miles are on the level and the rest of the line through the tunnels and its approaches has some very heavy grades. The service is largely handled by electrical locomotives. The tunnel is much drier than was anticipated and there is therefore a better factor of adhesion. The locomotives have made a total of 909,000 miles during the year, of which 650,000 miles was road service, while the remainder was for switching and transfer. The locomotives averaged 26,000 miles for the year, and the service was entirely satisfactory. The cost of repairs per mile run was 5.91 cents. This is greater than was expected and was largely due to the cost of maintenance of the brake shoes, to tire turning, and to a number of structural changes which it was necessary to make after the locomotives were placed in service. On the New Jersey division the cost of repairs to steam locomotives was 8.83 cents per mile, while for the Pennsylvania as a whole the cost was 11.91 cents per mile. The lubrication of electrical locomotives cost .25 cents per mile, or about the same as for the steam locomotives. The engine house expense for the steam locomotives amounted to .58 cents per mile, while for steam locomotives on the Pennsylvania it amounted to 2.58 cents per mile. The important savings were, therefore, in the repairs and the engine house expenses.

The electrical locomotives are given a daily inspection and after every 2,500 miles run are given a detail inspection which requires about four hours' time. When the electrical operation was first started the locomotives were given a detail inspection after every 800 miles, but this has been gradually increased to 2,500, as the reliability of these locomotives has become more evident. There were only 16 failures of electrical locomotives during the year, and for the multiple unit trains, which made about 300,000 miles, there were only three detentions.

William McClellan said that although the electrical systems had all proved reliable, they had not as yet proved a financial success. Political and other conditions are such that the railway officers would not be warranted in going to the additional expense to electrify at this time. He did not consider that the past year had been a period of stagnation; there has been considerable development in improving the details of construction and operation of the electrical systems. He had been asked how the electrical locomotives would affect the track as compared to the steam locomotive, but he frankly confessed that he could not say it would be easier on the track. This is a question which should be given considerable study. Another problem is that of the desirability of electrical locomotives for use

on heavy grades, and as to how much can be saved by using them rather than eliminating the grades by expensive construction work. The main problem, however, is that of the very great financial investment necessary in making a substitution of electricity for steam. The first cost of the installation cannot be cut down very greatly and the logical solution of the problem is to look for greater efficiency. For instance, if the roads in one district could pool together and build a large power station, it would be possible to get a very much better load factor and thereby increase the efficiency of operation. Moreover, it might be possible to combine the motor repairs and take care of the equipment jointly.

W. S. Murray, electrical engineer of the New Haven, said that for the first few years of electrical operation on the New Haven he always felt that he was on the defensive in talking about the single phase system. So satisfactory have the results been that he does not feel now that that system needs any defending at all. He gave a number of illustrations of the way in which the overhead construction had been improved and the first cost of the apparatus very greatly decreased.

E. B. Katte, of the New York Central, outlined the extensions and improvements which had been made on that road, and said that arrangements were being made to develop a new experimental locomotive and a new type of motor car. B. F. Wood, of the Pennsylvania thought that one reason why the necessity for electrification was not so strongly felt at the present time was that important improvements had been made in locomotive design, including, for instance, the application of superheat, brick arches, etc. The limit of improvement will, however, eventually be reached in the steam locomotive. He suggested that if the different electrical companies could get together on standard apparatus, it might be possible to have the cost of the new equipment financed by equipment trusts. As long as the equipment is not interchangeable, however, this can hardly be done.

TESTS OF BRAKE SHOES.

An elaborate investigation as to the action and service of brake shoes on the surface cars of the Brooklyn Rapid Transit System, which has also been partially extended to the elevated service, has been made during the past year by George L. Fowler. While the work is mainly interesting to those who control the operation of surface electric railways engaged in a congested street traffic, many points were brought out that have a direct bearing on steam railway service. The investigation included a thorough examination of the metals of which the brake shoes were composed, both as to the chemical and physical properties. Analyses of the metal of all of the shoes were made, and tests were also made to determine the hardness and strength, and the microscope was used to examine into the structure.

In the report rendered to the railway company it was specifically recommended that no chemical requirements should be introduced into brake shoe specifications, yet it was suggested that it would be well to urge foundrymen to attempt to make their product as uniform as possible, both as to chemical composition and structure, and that the best results will be obtained if the carbon of the shoe is evenly balanced between the combined and graphitic so that half appears in either form. These are important elements if uniformity of results is to be obtained not only in braking efficiency but in the wear of the shoes, for many variations and vagaries of brake shoe performance are directly traceable to inequalities in shoe structure.

In order, too, that the shoes may give the best results, close attention should be paid to the condition of the foundation brake rigging, for unless this presses the shoe uniformly and evenly against the wheel, there will be an unevenness of wear which will greatly increase the scrap weights of discarded shoes. For example, Mr. Fowler puts the ideal scrap weight of the surface car shoes at 30 per cent. of the weight when new, and at 25 per cent. for the heavier shoes used on the elevated cars. The surface shoes weigh about 21 lbs. when new and the elevated shoes about 45 lbs., flanged shoes being used in both cases. If the foundation rigging is in good condition and the metal of the shoes is of a uniform texture, these conditions of wear can be maintained, but if there is a tilting of the head and the scrap shoe is thicker at one end than the other, the metal so lost in scrap that should be available for wear may amount to from 10 to 20 per cent. of the whole, and therefore, will add a corresponding amount to the cost of brake shoes.

There were four types of brake shoes tested. There was a plain hard cast iron shoe; a cast iron shoe with chilled ends; one with chilled iron inserts in the tread and one with expanded metal in the body. All of the shoes were fitted with steel backs. In testing the transverse strength of the metal, it was found that there were wide variations in the four shoes. Based on transverse test pieces 1 in. square and resting on supports 12 in. apart, the breaking loads varied from about 1,880 lbs. to 3,300 lbs. It was found, however, that so long as the metal did not crumble in service the actual strength was a matter of very small moment, as the steel back will hold the shoe together and in shape even after it has been badly cracked.

Again, in the matter of hardness. Of course the harder the shoe the greater its durability and the lower its coefficient of friction. But, with the speeds obtaining in surface car work, which rarely exceed 20 miles an hour, both the coefficient of friction and the hardness are matters of apparently minor importance, because of the slight influence which they may have on the actual distance required to make a stop. The outside resistances to the movement of a car, such as rolling, journal and wind resistance, vary between such wide limits that their influence more than offsets any variations in the coefficient of friction that exist in practice. As for the hardness of the cast iron, it is very probable that satisfactory results will be obtained if the hardness is in the neighborhood of 275 of the Brinnell scale.

One of the most important points brought out by the investigation was the economic effect of the quality of the shoes. For example, it was found, in accordance with expectation, that the harder the shoe the longer its life and the lower its coefficient of friction. The longer life means a lower cost for shoes. In this the cast iron shoe with chilled ends gave the best results. But when it came to the wear of wheels the plain cast iron shoe was in the lead. If, at current rates, both wheel and shoe wear were compared, then it was a toss-up which shoe would be the best to use. But if the shoes were to be purchased at a fixed price per 1,000 car miles, then it would be possible to pay between 15 and 20 cents more per 1,000 car miles for the plain cast iron shoe than for the one with chilled ends. This is a detail that strikes at every use of shoes on steel and steel tired wheels and demands attention.

This disregard of the coefficient of friction would not be warranted on steam roads where speeds are higher and the rails cleaner than on the streets where this investigation was made. But the recommendation that a basic hardness be used as best adapted to brake shoe work is worth attention, though that hardness be different from the one suggested. So, too, the one regarding the care to be exercised in the foundry practice to secure a uniformity of texture as well as a balanced carbon content, though commercial considerations would prevent the embodiment of it in specifications. Steam roads may also well look to foundation brake rigging, that the adjustment be such as to secure an even brake shoe wear, and thus reduce the weight of scrap and, with it, the cost of shoes. And last, all railway men have long ignored the effect of different grades of shoes on wheels. If a single street railway has found it to be profitable to find out what this means and what it costs to ignore it, it stands to reason that the steam roads might well follow in its wake and find out what it means for them.

HIGH SPEED AND ACCIDENTS.

DOUBTLESS most railway operating officers, when they read the letter of F. C. Rice on "Excessive Speed and Railway Accidents," which was published in the *Railway Age Gazette* of March 8, agreed with Mr. Rice's statement that excessively fast running is the cause of many accidents. It should be noted that Mr. Rice protested, not against fast schedules, but against excessive speeds. A train may run regularly on a fast schedule without ever attaining an excessive speed; and, on the other hand, it may often attain excessive speeds while operating on a slow schedule. It is fast running, and not fast schedules, that causes accidents. A train may be scheduled at an average speed of only 30 miles an hour between terminals. The station and baggage men may be slow in doing their work and may, thereby, cause the train to lie for unduly long periods at stations. To make up the time lost the engineman may run at a very high rate of speed between stations. The result is to put an excessive and unnecessary strain on both track and equipment. If for any reason it is necessary suddenly to slow up or stop, the brakes may be so set as to break a rail or cause a flat wheel which may break numerous rails. These very things do happen in many cases, and they happen on roads having no trains running on fast schedules, as well as on roads having very fast schedules.

In view of Mr. Rice's letter it is interesting to recall that when Daniel Willard was vice-president of the Burlington he put speed indicators on the locomotives of that road to remedy such conditions as have been here referred to, and that the system he adopted is still in use. A prominent railway officer remarked the other day that "if Mr. Willard had never done anything else while he was on the Burlington this provision for safety which he installed would have earned his salary for all the time he was on that road." The speed indicators are employed on practically all of the important passenger runs on both the lines east of the Missouri river and the lines west of it. The tapes showing the performance for each trip are checked regularly by the division officers, and enginemen are strictly required not to exceed maximum rates of speed prescribed. Their attention is promptly called to any excess speed which the record indicates. The records are also checked periodically at headquarters in Chicago to see how thoroughly the superintendents on the different divisions are watching speeds, the check at headquarters relating only to the maximum speeds fixed, as the Chicago office has no record of any temporary slow orders. A general order universally applied limits speed on all lines to a maximum of 50 miles an hour. A lower maximum may be fixed by the management or by the division superintendents as local conditions require.

While the use of the speed recorder has been effective in preventing excessive speeds, officers of the Burlington say that it has not made it necessary to alter the regular schedules. Whatever time is lost by preventing excessive speeds while running has been saved by curtailing the time consumed at stations. The work of agents, station baggage men and those handling express and mail is very carefully supervised, with the result that the loading and discharge of traffic has been very materially quickened.

When Mr. Willard began to install speed indicators he met with a good deal of opposition. The train employees protested against the fixing of a maximum speed and the rigorous requirement, at the same time, that trains should make their schedules. The record shows, however, that the use of speed indicators has not interfered with the regularity of running of the Burlington's trains. In fact, its officers believe that on the whole, the trains make their schedule time better now in proportion than they did before the speed indicators were adopted. They also believe that the use of the indicators has a strong tendency to increase the safety of operation.

Mr. Rice in his letter suggested that Congress might better give attention to the question of excessive speeds in the operation of trains than to some of the other questions pertaining to railway operation to which it devotes a good deal of time and consideration. It would seem that the matter is one to which more attention might well be given by railway operating officers themselves. Fast transportation, other things equal, is desirable, but speed which makes for unsafety is very undesirable. There is no danger in speed of itself. Running at the rate of 60 miles an hour may be as safe on a road having good roadway, double track, heavy rails, good ballast, block signals and the best of equipment as running at the rate of 25 miles an hour on a road having poor track and equipment. Henry S. Haines, formerly president of the American Railway Association, in his book, "Railway Corporations as Public Servants," advocates public regulation fixing the standards of construction and equipment to which railways must be brought before they will be allowed to run trains in excess of certain speeds. The desirability of such regulation is very questionable; but it probably is desirable that stricter rules shall be adopted and stricter supervision exercised to prevent heavy modern trains from being run too fast, particularly on track that is not strong enough to stand the strain or on lines which are not adequately protected with signals.

RURAL TROLLEYS AS STEAM RAILWAY SUBSIDIARIES.

THE yearning of the New England farmers for the rural trolley expressed itself impressively in the Connecticut legislature of 1907. There was just about that time a considerable scandal raised in the state over the extent to which street railway stock watering had been carried—one company alone having stocks and bonds that represented some $20,000,000 at par over and above fair replacement values. But the public outcry did not prevail in a state legislature where the farm interests had a working majority. They wanted the trolleys, no matter how financed, and a dozen or more new trolley charters or amendments to old charters were passed, in spite of the vetoes of the governor, who in each case pointed out how the charters would promote the old evil of "bonding and bonusing" the lines, that is to say, building the lines on bonds marketed by brokers at a high commission, and bonusing the stock among the promoters. The results, however, thus far have shown that the chartering of new trolley lines with "free" financing has not availed. Of cross country independent lines, since 1907, practically only two have been built in the state, and one of those has gone into a receivership. Profitable trolley territory has become so far exhausted that not even speculative privilege has sufficed to build the lines.

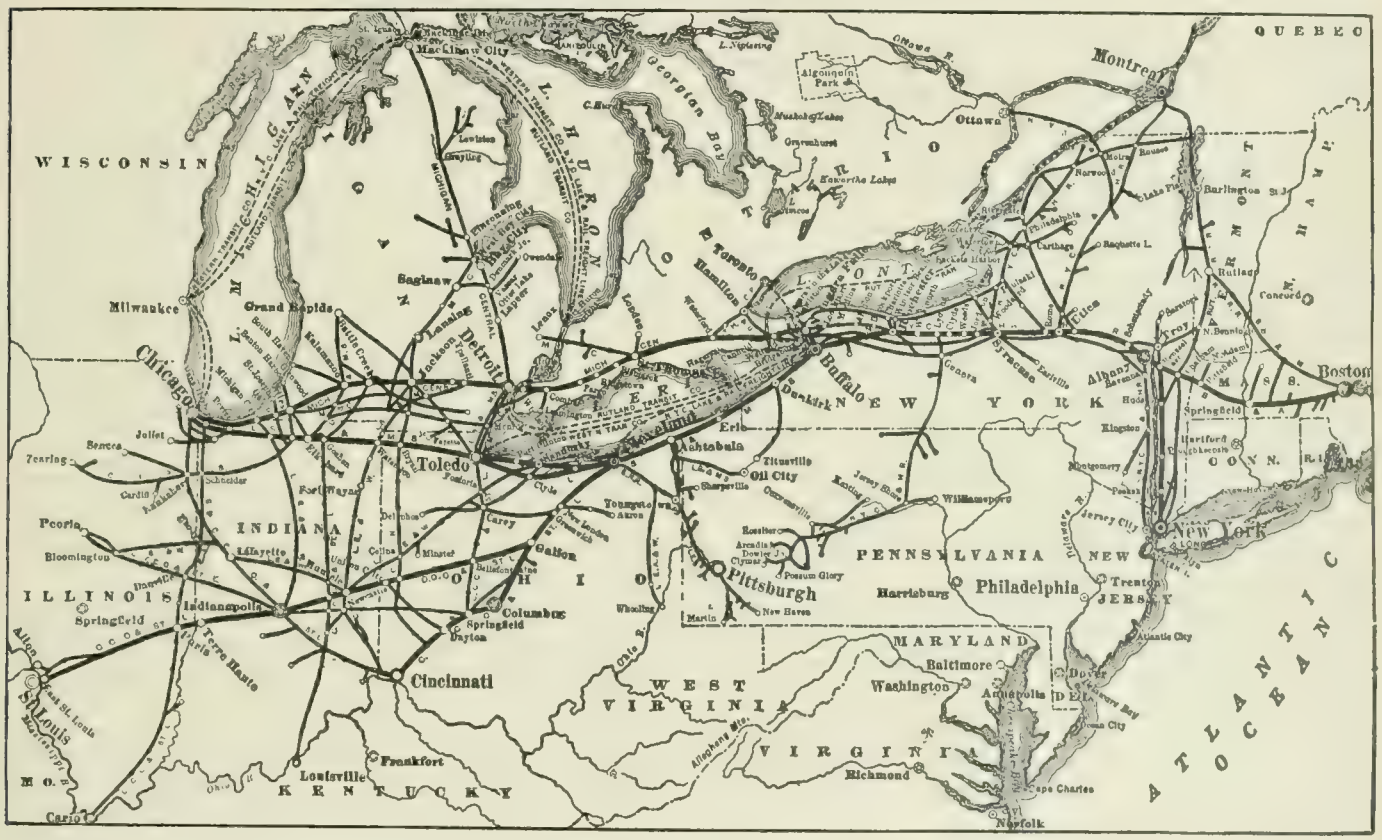
In Massachusetts the extension of the rural trolleys has, however, taken a different shape. In that state it has been illegal for the steam railway companies to take over street railway lines. The New Haven company, nevertheless, acquired some years ago about 500 miles of them, holding them through the New England Investment & Security Corporation of Boston, which the state law and state policy of separating the steam and electric properties has been unable to reach. The acquired street railway properties were in three groups—one in the Berkshire region, one centered at Springfield, and the third at Worcester. In the case of the Berkshire system, by pledging rural extensions the New Haven obtained such support in the legislature from western Massachusetts that the policy of the state has been broken and the Berkshire system, by a new act, passed to direct legal ownership and control of the steam corporation. The same proposition is now pending for central Massachusetts. Bills are before the state legislature legalizing control by the New Haven of the Springfield and Worcester street railway systems, on the promise of the steam company to spend $5,000,000 or more in rural extensions. Naturally the measures have the strong support of members of the legislature from the interested localities, and sooner or later the Berkshire charter will almost surely be written again, the state policy reversed, the back towns get their trolleys and the steam corporation, besides direct control and administration of the trolleys, acquire certain important advantages of a financial nature from its Massachusetts street railway investment.

The legislative and civic branch of the subject is, however, less interesting than one or two of its economic phases, which apply to other regions than New England. It is admitted that private enterprise will not undertake rural trolley extensions in Massachusetts or Connecticut, and in the latter state, the history of the years since 1907 has demonstrated the fact. New England is marked by great expanses of rural territory where transportation of products is limited to the farm wagon and transportation of persons is not much better. There is such a region, for example, in central and western Rhole Island, which, as a state, exceeds any state of the Union in population per square mile. It is typical of the "back country" of New England, where population has decreased 50 per cent. in the last half century, the workers grown listless and the abandoned farm an everyday fact—yet a region once thriving with active farming and orchard culture. In such a region, where private individuals refuse to make trolley investment, with profits at best very remote, the New Haven railway authorities assert, nevertheless, that the investment by the steam corporation—with wise selection of regions of natural farm resources—will pay, given moderate time for development—not because of direct returns from the trolley but from new business fed to the steam line. The old theory, not seldom fulfilled, of leasing a branch steam road not for direct but for secondary profit on a main line thus repeats itself with a new application to the rural electric railway through decadent territory. And the plan, worked out in Massachusetts as part of a scheme of legislative tactics, is, we understand, to be tried out with no such inducement in Connecticut.

The last census has shown higher average values of the New England farm, its product and its equipment. Rural free postal delivery and the telephone have come in to mitigate the solitudes of farm life. Intensive culture of field and orchard have come to the relief of outworn soils; and of the uplifting forces the high prices of farm products are not the least. An incidental factor is the growing tendency of people from the cities to live in the country in the summer. All these give interest to the future of the trolley as a subsidiary of a steam railway. In Massachusetts, at least, the economic proposition is soon to have its test.

THE NEW YORK CENTRAL AND THE LAKE SHORE.

IF the New York Central's plan for consolidating the New York Central & Hudson River and the Lake Shore & Michigan Southern had been carried out previous to the calendar year 1911, and if the consolidation had taken place without adding any fixed charges to either the Central or the Lake Shore, the combined properties would have earned in 1911 over 9 per cent. on the New York Central's outstanding $222,730,000 stock. As it was, the New York Central earned 6.8 per cent. on its stock and paid 5 per cent., and the Lake Shore earned 28.3 per cent. on its stock and paid 18 per cent. Of course, nearly the entire dividend paid by the Lake Shore went last year to help swell the New York Central's earnings, but in the statement of what their combined properties earned such payments by the Lake Shore are deducted from New York Central earnings before they are combined with the Lake Shore's.



The New York Central Lines.

The map shows, in addition to the roads whose reports are reviewed in this issue, the smaller New York Central Lines, like the Lake Erie & Western.

The annual reports of the New York Central & Hudson River and the Lake Shore & Michigan Southern for the calendar year ended December 31, 1911, have two quite distinct features of special interest. Both companies—when compared with other roads in 1911—show unusually high net earnings; and both companies' reports reflect and throw some light on the New York Central's plans to consolidate certain of its properties so as to make a single operating organization.

As it is at present, the New York Central System, so-called, is a very indefinite term. The four principal New York Central lines are the New York Central & Hudson River, the Lake Shore & Michigan Southern, the Michigan Central and the Cleveland, Cincinnati, Chicago & St. Louis. Each one of these companies has subsidiary companies and each one of them has

various contracts or leases with some of its subsidiaries; so that only part of the mileage operated is owned by the parent company, and the intercorporate relations are necessarily very complex. The two companies that we are interested in here are the New York Central & Hudson River and the Lake Shore & Michigan Southern, which operate 3,790 miles and 1,775 miles, respectively. But, of this total mileage of 5,565 miles, there is only 1,676 miles *owned* by the two companies. It is too soon yet to go into any discussion of the plans of the management to consolidate, first, the lines which are leased by the separate companies and, then, the two parent companies, but it is interesting to run over briefly what has been done in the past year. The New York Central & Hudson River has received permission from the New York Public Service Commission to buy the stock of the New York & Harlem at $175 per $50 share; has asked permission—although it has not yet received it—to buy that part of the stock of the New York, Ontario & Western which has heretofore been held by the New York, New Haven & Hartford; and has asked permission to sell the remainder of its Rutland Railroad stock to the New Haven company. The segregation of the Boston & Albany and the arrangements made with the New Haven for joint operation of certain lines were mentioned in our comments on the annual report of the New York Central for 1910. Since the close of the calendar year, the Central has applied to the New York Public Service Commission for authority to buy the outstanding stock of the Rome, Watertown & Ogdensburg at $128 per share and the stock of the Utica & Black River at $180 per share.

The cost of the consolidation of the New York & Harlem can be estimated roughly, but, of course, this throws no light on what it will cost to consolidate the other lines, each consolidation being a problem with its own individual factors. The Central now pays 10 per cent. on the New York & Harlem's $10,000,000 stock and 3½ per cent. on its outstanding bonds. This calls for a total payment of $1,420,000. On the terms of the exchange offered to New York & Harlem stockholders, the Central would pay in interest charges on its own securities to replace the Harlem stock $1,575,000, and would continue, of course, to pay the $420,000 interest on the bonds, but would receive directly $400,000 which the Harlem now gets as rental for its Fourth avenue street car line.

The Lake Shore & Michigan Southern during the past year received $3,525,000 preferred stock and $7,000,000 first mortgage bonds of the Cleveland Short Line and $2,145,000 stock and $2,150,000 first mortgage bonds of the Lake Erie & Pittsburgh. This was in exchange for advances made to these two construction companies, and the Lake Shore now operates over both of these roads. Control of the Lake Erie & Pittsburgh, which runs from Marcy, Ohio, to Brady's Lake Junction, 28 miles, is held equally by the Lake Shore and the Pennsylvania Company.

As to the gain in 1911 in net earnings of the Central and the Lake Shore, we find that, while both roads cut down expenses, the Central also increased its gross. The increase in gross earnings amounted to $4,050,000, and brought the total earnings from rail operations up to $103,950,000. It is not necessary to discount in any way this gain in gross. It is not large when expressed in percentage, but when it is taken into consideration that other roads, including the competitors of the Central, lost in gross earnings during the past year, the gain made here is a highly creditable showing. In 1911 there was 48,250,000 tons of freight carried. The average haul was 200 miles, a gain of 3 miles. The commodities which principally furnished the increase in tonnage were grain, hay, fruit and vegetables, rails, anthracite roal, and cement, brick and lime. A part of the gain in tonnage of agricultural products may be explained by better crops, but the gains in the other commodities lead one to believe that the Central was getting a larger proportion of the traffic offered than was its competitors. The Lake Shore's slight decrease in gross, amounting to $1,060,000, making the total for 1911 $48,360,000, is almost entirely explained by a decrease in the tonnage of bituminous coal, coke and ores. The Lake Shore, like the Central, got a greater tonnage of grain, but not of hay or of fruit and vegetables. The Lake Shore, participating as it does in the traffic originating at Pittsburgh and at Gary, would naturally feel sharply the depression in the iron and steel trades.

As to the gain in net through a saving in expenses, both roads saved on maintenance, and the Lake Shore saved also on cost of transportation. The Central spent $13,720,000 in 1911 for maintenance of way as against $14,060,000 in 1910. The Lake Shore spent $6,180,000 as against $7,550,000 in the previous year. Maintenance of equipment cost the Central $16,910,000 in 1911 and $16,940,000 in 1910; and it cost the Lake Shore $6,700,000 in 1911 and $7,870,000 in 1910. During the year the Central laid 49,317 tons of 100-lb. rail and 27,951 tons of 80-lb. rail. In 1910 this company laid 31,116 tons of 100-lb. rail and 40,827 tons of 80-lb. rail. There were placed in track in 1911 2,073,672 ties, of which considerably more than half were treated; while in 1910 there were placed in track 2,253,401 ties, none of which were treated. Ties at distributing points cost the Central 77.3 cents on an average in 1911 and 68.4 cents in 1910. The Lake Shore's ties cost it 85 cents in 1911 and 79 cents in 1910, twice as many creosoted ties being used last year as in the previous year, although the total number of ties placed in the track was 1,221,236 in 1911, and 2,034,057 in 1910. The Lake Shore laid 9,414 tons of 100-lb. rail and 14,028 tons of 80-lb. rail in 1911, compared with 2,850 tons of 100-lb. rail and 33,103 tons of 80-lb. rail laid in 1910. While both roads, therefore, saved in maintenance expenses, the amount of material used was not much less last year than it was the year before. Some reduction was made in track forces, apparently, on the Lake Shore. The Central savings are due to a decrease in the cost of removing snow, sand and ice, amounting to $232,000, and $321,000 in the maintaining of signals and interlocking plants. President Brown mentions this saving in expenses for signals as due largely to the more economical operation of the modern designs which have been installed in recent years.

The reduction of expenses for conducting transportation made by the Lake Shore are notable, because they were made in the face of increases in trainmen's wages. A reduction of $1,198,000 in transportation costs last year, as compared with the year before, when traffic was only slightly smaller, can be explained in only one way—distinctly better and more efficient operation. The average train load on the Lake Shore has in the past been heavy, and last year it was increased from 594 tons of revenue freight to 635 tons. This was done by running longer trains. Car loading was almost exactly the same in the two years—21 tons per loaded car mile. There were, on an average, 46 cars per freight train in 1911, as against 42 cars in 1910. The increased number of cars was evenly divided as between empty and loaded, making, of course, the proportionate increase in empty mileage greater than that of loaded mileage.

The Central raised its average revenue train load from 417 tons in 1910 to 430 tons in 1911, with very slightly better car loading—19.35 tons in 1911 and 19.22 tons in 1910. The average number of freight cars per train was 38.70 in 1911 and 36.83 in 1910, the longer trains being due largely to an increase in empty car mileage.

The Central got in 1911 an average ton mile rate of 6.33 mills, and got only slightly less in 1910. The Lake Shore got 5.32 mills in 1911 and 5.23 mills in 1910. Both the New York Central & Hudson River, and the Lake Shore & Michigan Southern have heavy freight density. The Central's is 2,560,000 tons of freight carried one mile per mile of road, and the Lake Shore's 3,510,000 tons carried one mile per mile of road. Such a freight density as this handled along with a heavy passenger business makes the problem of getting trains through on time a serious one. On the Lake Shore the easy grades and fine roadbed make this possible. The New York Central has the two West

Shore tracks which it uses for freight as far as possible, and in addition it has in the main four tracks on the east shore of the Hudson, but this four-track system is not complete. There are places where there are only three tracks, or even only two tracks. The company is now at work on a very extensive plan of putting additional tracks in such places, the work being exceedingly difficult and very expensive.

The work of building the new Grand Central terminal can only be mentioned here. It has been frequently referred to and commented on in the *Railway Age Gazette* during the past year. President Brown says that the waiting rooms, ticket offices and concourse will be open to the public by the end of 1912.

During the past year the New York Central Lines, including the N. Y. C. & H. R., the L. S. & M. S., the M. C., and the C. C. C. & St. L., and, subsequently, the C. I. & S., made an equipment trust agreement under which $15,000,000 equipment trust 4½ per cent. certificates were issued to pay for 90 per cent. of the total cost of equipment to be furnished. The equipment to be assigned to the N. Y. C. & H. R. cost $7,950,000, and that to be assigned to the Lake Shore $3,305,000. An agreement has been made by the New York Central lines, including the Pittsburgh & Lake Erie and some others not mentioned above, with the Pullman company, by which that company is to furnish all-steel cars to replace as rapidly as possible the wooden cars now operated on these lines. The delivery of the steel cars is to be at the rate of about 30 cars a month, and by the end of July, 1912, all the sleeping cars on the New York Central lines will be steel cars.

Both the Lake Shore and the New York Central are in a strong cash position. The Central had at the end of 1911 $10,710,000 cash, with only $1,390,000 loans and bills payable; while the Lake Shore had $12,060,000, with $13,010,000 loans and bills payable, of which, however, $11,540,000 are one-year notes which were issued in francs and sold in France, and which were due March 4 of this year and were extended, it is understood, in England and in France for another year.

The following table shows the principal figures for operation of the two roads in 1911 compared with the figures for 1910:

	New York Central & H. R.		Lake Shore & Michigan Southern.	
	1911.	1910.	1911.	1910.
Average mileage operated	3,790	3,785	1,775	1,663
Freight revenue	$61,133,310	$58,411,234	$31,101,335	$32,646,536
Passenger revenue	31,759,238	30,992,856	11,350,096	11,130,125
Total operating revenue	103,954,863	99,908,478	48,360,997	49,420,211
Maint. of way and structures	13,723,709	14,060,178	6,178,623	7,549,661
Maint. of equipment	16,911,146	16,936,253	6,704,096	7,873,217
Traffic	2,180,206	2,487,228	1,026,317	1,153,165
Transportation	38,935,031	37,938,527	16,245,052	17,442,858
Total operating expenses.	74,472,578	74,079,087	31,078,578	34,920,933
Taxes	5,447,759	4,697,826	1,673,940	1,720,182
Operating income	24,356,001	21,012,787	15,577,403	12,729,380
Gross corporate income	40,592,181	36,459,120	25,801,618	23,181,467
Net corporate income	15,304,449	14,288,672	14,173,335	13,787,035
Dividends	11,136,465	13,363,758	8,903,970	8,903,970
Appropriations for additions and betterments	.....	924,914	.....	.....
Appropriations for replacement value of buildings at Grand Central terminal	2,500,000	.....	.....	.....
Surplus	1,667,984	None	5,269,365	*3,517,768

*After the appropriation of $1,365,297 installment on 1907 and 1910 equipment trusts.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.

THE income account of the Cleveland, Cincinnati, Chicago & St. Louis for the calendar year ended December 31, 1911, does not justify the passing of the 2 per cent. dividends on the common stock, but the profit and loss account does. Net corporate income after the payment of all fixed charges was $1,800,000 in 1911 and $1,480,000 in 1910. Preferred dividends call for $500,000 and 2 per cent. on the common stock calls for $941,000 additional, so that in 1910 there was a surplus of $34,000. In 1911 the preferred dividend only was paid, so that there was a surplus of $1,300,000. This was credited to profit and loss, but during the year there was deducted from profit and loss $971,000 discount on debenture bonds of 1910 and 1911, $94,000 discount on general mortgage bonds, $154,000 old Central Indiana advances and $106,000 adjustment of sundry accounts, so that against a credit of $1,301,000 there was a debit of $1,325,000.

The Big Four corresponds geographically to the Northwest system of the Pennsylvania Lines West, but it is the weakest financially of the four New York Central lines whose reports are commented on in this issue of the *Railway Age Gazette*. A glance at the map will show that physically the property is a network of lines rather than one or more trunk lines with feeders, like most large American railways.

In 1911 total operating revenues amounted to $30,430,000, which is a few thousand dollars more than total operating revenue in 1910. In the operation of the property, however, the management was able to save $1,260,000, bringing the total operating expenses down to $22,240,000 for 1911. The volume of business handled in 1911 was about the same as that handled in 1910. There was a somewhat greater ton mileage handled, making the total in 1911 3,625,000,000 tons; and there was a somewhat smaller passenger mileage handled, making the total in 1911 429,000,000 miles. To handle at so much less a cost the same business last year that was handled the year before, the company had to practice the strictest economy, and it is worthy of especial attention that this economy was successful, not only in maintenance departments, but in transportation as well.

In maintenance less material was used than in the previous year, and the payrolls were cut by $279,000. This is for way and structures. For equipment there was a reduction in payrolls of $157,000 from the preceding year. The cost of repairs to locomotives, passenger cars and freight cars were all cut to a very considerable extent. In the transportation department, although the rate of pay was increased, and caused an increase of $296,000, the force was cut down sufficiently to save $403,000, making a net saving of $107,000. Fuel for locomotives cost $268,000 less in 1911 than in 1910. This was due partly to a reduction in the cost of fuel from $1.54 to $1.45, and partly to a decreased consumption.

Handling nearly the same amount of business in 1911 as in 1910, total revenue locomotive mileage was cut down from $23,858,000 to $22,405,000, with a proportionate reduction in train mileage. Car mileage increased, due entirely to an increase of 17,000,000 empty car miles, bringing the total empty car mileage up to 90,043,000 miles, compared with 287,844,000 total car miles. The average revenue train load in 1911 was 445 tons, an increase of 14 tons over the average revenue train load in 1910. This larger train load was attained by the Big Four, as it was by the Lake Shore and the New York Central, by making up longer trains. Car loading was almost the same as in 1910, namely, 19 tons per loaded car. There were, however, on an average a little over 35 cars per train last year, as against 32 cars per train the year before.

The balance sheet at the end of 1911 shows cash on hand of $2,789,000, with loans and bills payable totaling $3,000,000. At the end of 1910 there was $2,866,000 cash and no loans or bills payable. During the year the company sold $5,000,000 4½ per cent. debentures to pay for floating debt which presumably accrued during the first part of 1911, since there was none shown on the balance sheet at the end of 1910, and for construction and improvements. There was spent during the year $3,690,000 for additions and betterments, all of which was charged to capital account. The discount on 1910 and 1911 debentures mentioned in the profit and loss account for 1911 was $972,000. The debentures sold in 1910 were issued in francs and had a face value of 50,000,000 francs. In the 1910 profit and loss account there was $70,000 shown as expenses for floating this issue, and the balance sheet showed unextinguished discount on securities of $825,000. Presumably, then, the discount on the $5,000,000 debentures sold last year amounted to only $147,000.

The two prinicipal pieces of work that the C. C. C. & St. L.

has had under way are the building of the Evansville, Mt. Carmel & Northern, and the building of the Saline Valley Railway. The Evansville road, which runs from Mt. Carmel, Ill., to Evansville, Ind., and gets trackage rights into Evansville over the Louisville & Nashville, was completed in July, 1911, at a cost of $2,193,000. The Saline Valley is to run from Harrisburg, Ill., to the C. C. C. & St. L. coal properties in the eastern part of Williamson county, about 12 miles. At the end of 1911 there were 2 miles in operation.

The following table shows the principal figures for operation in 1911 as compared with 1910:

	1911.	1910.
Average mileage operated	2,012	1,982
Freight revenue	$19,933,296	$19,922,901
Passenger revenue	7,819,255	7,812,012
Total operating revenue	30,431,915	30,423,005
Maint. of way and structures	3,370,476	3,934,281
Maint. of equipment	4,972,330	5,177,765
Traffic	912,751	998,697
Transportation	12,293,691	12,724,100
Total operating expenses	22,239,392	23,495,620
Taxes	1,062,512	949,548
Operating income	7,083,924	5,879,655
Gross corporate income	7,791,655	6,700,469
Net corporate income	1,801,616	1,475,497
Dividends	500,000	1,441,126
Surplus	1,301,616	34,371

MICHIGAN CENTRAL.

IT is often difficult to trace directly the savings made by any extensive improvement to a railway property. This is well illustrated in the case of the Michigan Central's Detroit river tunnel. Early in the calendar year 1911 the tunnel and approaches were completed, and the tubes were in operation for both freight and passengers for almost the entire calendar year. The tunnel was built and is operated by a separate company which issued $3,000,000 stock to the Michigan Central and which has authorized $30,000,000 4½ per cent. bonds guaranteed by the Michigan Central. Of these bonds $16,000,000 have been sold. In 1911 the tunnel company earned its operating expenses and interest on its outstanding bonds, paid 2 per cent. on its stock and had a surplus of $160,000.

The Michigan Central pays the tunnel company for the use of its property on a toll basis. In operating expenses the Michigan Central saved $111,000 in the cost of operating floating equipment; that is, the car ferries at Detroit. It received $60,000 in dividends on its tunnel company stock, and the $160,000 surplus of the tunnel company virtually belongs to the M. C., so that there was here a total saving of $331,000. On the other hand, the Michigan Central paid the tunnel company a little over $1,000,000 in rentals. This is an example of an improvement which makes for better service, and which can be justified conclusively from an operating standpoint; yet which on its face is not justified, at least in the first year of its operation, from a standpoint purely of increased earning or decreased cost. The tunnel itself and its construction and operation have been described in the *Railway Age Gazette* previously.

The balance sheet of the Michigan Central for December 31, 1911, explains the financial operations in connection with the tunnel. At the end of 1910 the assets side of the balance sheet showed $7,890,000 deferred debit which represented advances to the Detroit River Tunnel Company. The liabilities side of the balance sheet showed loans and bills payable of $18,120,000. Presumably after the sale of the $16,000,000 tunnel bonds the tunnel company paid back the advances made to it by the M. C., as at the end of 1911 there is no deferred debit item representing such advances, and the Michigan Central's loans and bills payable were reduced to $4,500,000. Cash on hand at the end of the two years was about the same, $3,310,000 at the end of 1911.

In 1911 the Michigan Central handled 18,730,000 tons of revenue freight, hauling each ton, on an average, 163 miles. This compares with $18,380,000 tons handled in 1910, with an average haul per ton of 167 miles. The ton mileage, therefore, of revenue freight was slightly less in 1911 than in 1910. On the other hand, the number of passengers carried in 1911 amounted to 5,940,000, and the average distance each passenger was carried was 65 miles. The number of passengers carried in 1911 was greater by 140,000 than in 1910, and, since the average distance each passenger was carried remained almost exactly the same, the passengers carried one mile showed a slight increase.

The Michigan Central gets a low ton-mile rate and only a fair passenger mile rate. The revenue per ton per mile in 1911 was 6.42 mills, and in 1910 6.29 mills, while the revenue per passenger per mile was 1.983 cents in both 1911 and 1910. With the slightly higher ton mile rate, the freight revenue amounted to $19,540,000 in 1911, an increase of $260,000 over 1910; and with the larger passenger business passenger revenues amounted to $7,600,000 in 1911, an increase of $200,000 over 1910. There was, therefore, an increase in total operating revenues amounting to about half a million dollars. There was a saving in expenses of $880,000, and, surprising as it may seem, a slight decrease in taxes; so that net operating income totaled $8,100,000 in 1911, an increase of $1,450,000 over 1910. The increase in rentals of leased lines of over a million dollars, which has previously been mentioned, was partly offset by a $420,000 decrease in the cost of hire of equipment. Dividends of 6 per cent. were paid both in 1911 and 1910, and the company finished the year with $990,000 surplus, as against $590,000 surplus in 1910.

If the saving made in operating expenses had been made in the cost of conducting transportation, we might well say that this was in part and indirectly due to the operation of the Detroit tunnel. In 1911 transportation expenses totaled $12,050,000, or about $25,000 more than in 1910. Mr. Brown says that this failure to save more in transportation expenses is due largely to increased train mileage, cost of fuel and increased pay of train and engine crews.

There was a decrease of 1,310,000 miles in the total locomotive mileage and a decrease of 480,000 miles in the total train mileage. The average cost of fuel per ton was $2.08 in 1911, and $2.03 in 1910, but the cost of fuel per locomotive mile run was 13.67 cents in 1911, and 12.51 cents in 1910. Road enginemen received $1,335,000, or $82,000 more than in 1910.

The saving that took place in expenses was in both maintenance of way and maintenance of equipment. The decrease of $490,000 in the cost of maintenance of way and structures was due principally, the president says, to a reduction in outlay for stone ballasting, fencing, replacement of bridges, etc., and to the fact that there was less snow and ice to contend with. There was a considerable reduction made in maintenance of way forces. The decrease of $320,000 in the cost of maintenance of equipment was due to reduced charges for repairs.

The winter of 1910-11 was a comparatively mild one, and it is not surprising that the Michigan Central was able to keep its property up to standard at lowered cost, but the present winter has been an unusually severe one; especially since the first of January. Whether or not the reduction in track forces last year has anything to do with the condition of the property at present it is difficult to say; but the Michigan Central, like other roads in Michigan, has found it quite impossible to keep its track in really good condition during the past few months.

During 1910 the company did not add to its rolling stock. The total capacity of freight cars at the end of 1911 was 858,000 tons as against 869,000 tons at the end of 1910. There were in service 559 locomotives at the end of 1911 as against 565 at the end of 1910. During 1911, however, the company entered into the New York Central Lines equipment trust agreement, mentioned in our comments on the other New York Central lines, and the company will receive during the present calendar year equipment valued at $2,528,000.

In 1911 the Michigan Central spent for additions and betterments to its property $720,000, of which $177,000 was spent on the Michigan Central main line and $544,000 on leased and proprietary lines.

The following table compares the principal figures for operation in 1911 and 1910:

	1911.	1910.
Average mileage operated	1,817	1,803
Freight revenue	$19,538,684	$19,282,288
Passenger revenue	7,607,052	7,404,476
Total operating revenue	30,164,490	29,694,816
Maint. of way and structures	3,549,205	4,035,261
Maint. of equipment	3,800,772	4,124,366
Traffic	783,599	882,151
Transportation	12,049,103	12,023,589
Total operating expenses	20,746,231	21,628,906
Taxes	1,322,621	1,357,020
Operating income	8,104,547	6,652,574
Gross corporate income	9,275,504	7,746,254
Net corporate income	2,116,364	1,717,331
Dividends	1,124,280	1,124,280
Surplus	992,084	593,051

NEW BOOKS.

Efficiency as a Basis for Operation and Wages. By Harrington Emerson. Third edition revised and enlarged. 254 pages. 5 in. x 7½ in. Cloth. Published by the *Engineering Magazine*, 140 Nassau street, New York. Price, $2.00.

A series of articles by Harrington Emerson, which in a general way demonstrated and explained his development of the efficiency system, appeared in the *Engineering Magazine* from July, 1908, to March, 1909. It was soon discovered that it would be necessary to incorporate them into book form in order to supply the demands, and in 1909 the first edition of this work was published. It has very quickly gone through two editions, and it was decided before bringing out this, the third edition, that it would be advisable to make a thorough revision of the text in view of the knowledge and experience gained during the past two years. This has been done, and in addition to more clearly illustrating certain points and adding sections, points of connection between this volume and the one shortly to follow on the twelve principles of efficiency have been established. The book inclines more to the declaration of philosophy than to direct instruction in methods.

Forney's Catechism of the Locomotive. Third Edition, Revised and Enlarged. Part I. By George L. Fowler, associate editor *Railway Age Gazette.* 6 in. x 9 in.; 644 pages; 475 illustrations. Bound in cloth. Published by the Simmons-Boardman Publishing Company. Distributed by the McGraw-Hill Book Company, 239 W. 39th street, New York. Price, $3.00.

The Catechism of the Locomotive, by M. N. Forney, was probably the best known and most widely studied book on the subject that has ever been published. It owed its great popularity to three things; the thoroughness with which the mechanism of the locomotive was described, the simplicity of the language used and the absence of mathematical formulae. These features made it easily understood by men who had not been trained to study and with whom reading was more or less of an effort. It was put in catechism form in the first place, because, as the author stated in the preface to the first edition, a question, "presents first a distinct image of the subject to be considered," and "the explanation which follows is much more apt to be understood than it would be if no such question had been asked."

The first edition was issued in 1873. It was afterwards revised by Mr. Forney, and the second edition was published in 1889. Since that time the methods of locomotive design, construction and operation have been revolutionized and a third revised edition became necessary in order that the book might adequately describe the locomotive of today.

In the second edition Mr. Forney introduced certain elementary theoretical studies of the locomotive and the methods used in developing the design. The preparation of the third edition of the book was intrusted to George L. Fowler, who for many years had been an intimate friend of Mr. Forney and who had been asked by the latter to undertake the work.

The growth of the locomotive in size and the complexity of its details during the past twenty years necessitated the introduction of a great deal of new matter, and the discarding of a little that was old. The years intervening between the appearance of the second and this third edition, have witnessed the rise and partial decadence of the compound locomotive; the birth of the Mallet; the introduction of the superheater; the development of the Atlantic and allied types where the wide firebox is carried by a trailing truck, the use of oil as a fuel; the application of the Walschaert valve gear to American locomotives; the rise of the stoker and the improvements of the air brake, as well as the growth of innumerable details that go for efficiency, to which must be added the great increase in the size and weight of the locomotives of today, as compared with those of two decades ago.

Each of these themes is treated fully, clearly and concisely in the first part of the book under review. But in preparing this matter, it was found "that, with the growth and development of the locomotive during the past two decades, more has been added than taken away, and that the requirements as to space are much greater than they were in 1889. It was, therefore, decided to break the book into two volumes or parts, making each complete in itself. The first part is devoted to the practical construction and operation of the locomotive, with such slight theoretical discussion of the matter as to make it intelligible to men who have not had the advantage of a technical training. The second part will discuss the same points more theoretically."

In the first part, then, we have the presentation of the practical details of locomotive work. There are a few introductory chapters dealing with the elemental laws of force and motion, the steam engine and the expansive action of steam. After this follows descriptions and tables of the various types of locomotives in use; the various details, such as throttle, cylinders, the machinery, and the Stephenson and the Walschaert valve gears. The valve gears are clearly explained, and at some length, so that their action can be fully understood. The various kinds of compound locomotives; the several types of superheaters and the three stokers upon the market are fully described and their operation explained. Other details, such as the spring suspension, the running gear, tenders, tanks, lubricators and miscellaneous parts receive their full need of attention. A chapter preceding that on mechanical stokers is devoted to the general subject of combustion, where, without entering into too minute detail as to theory, the reader is given a clear-cut idea of how combustion takes place and the method to be pursued in order to obtain the best results on a locomotive. A special chapter is devoted to the air brake with instructions as to its construction, care and manipulation.

There are 742 questions with their answers in this Part I, and it closes with chapters on the care and inspection of the locomotive, the handling of the machine on the road, the avoidance of accidents and first aid to the injured; and finally a very complete index by which a direct reference may be obtained to any topic in the book. Throughout the text is a profusion of illustrations, to which are added six folding plates of steam engines, valve gears, locomotives and air brakes.

In the whole treatment the author has adhered closely and faithfully to the ideals of technical presentation as conceived by Mr. Forney. The language is simple, concise and readable. Mathematical demonstrations have been avoided and the book has been kept to its old ideals. As it stands it is undoubtedly, the most complete presentation of the subject that has appeared, and is a presentation in such a form that no locomotive engineer or fireman, regardless of how scanty may have been his early advantages, can fail to grasp the full meaning of what is there offered; so that it will be sure of a hearty reception by these men to whom it is especially addressed and who will be profited by a study of its contents. It is, now, forty years since work on the first edition was undertaken, and, it is certain that, by this revision, its life and usefulness will be indefinitely extended.

Part II is on the press, and its appearance is promised for an early date.

Letters to the Editor.

INCONSISTENCY IN SIGNAL LIGHTS.

Erwin, Ark., March 4, 1912.

To the Editor of the Railway Age Gazette:

Although of a rather late date to write on a point printed in your issue of January 26, the communication from D. A. G., who I note is a superintendent, seems to exaggerate the dangers of the present practice of using green for classification signal lights to denote a following section, and to recommend a change to yellow from a theoretical rather than a practical standpoint.

As stated by you, the New York Central is satisfactorily using yellow for the front and side lights of tail-end markers. The change from green to yellow for classification lights to indicate a following section has not been made by that road. The use of green for classification lights while apparently inconsistent and inadvisable, is, from a practical standpoint, the best light that may be used for the purpose. Red has been given up because that light is reserved for the rear end of trains, confusion having resulted from enginemen being unable to distinguish with reasonable quickness and certainty whether a given red light ahead was a flag, a rear end, or a classification light on an engine running in the opposite direction.

White classification lights are used to designate an extra train and are not available to indicate that there is a following section.

Yellow lights, while theoretically desirable, differ so slightly in shade from the brighter and more powerful headlight, that it is practically impossible to distinguish with a reasonable degree of certainty whether the light is yellow or white. This being the case, and a trial under actual working conditions will readily show that it is so, it is not advisable merely for the sake of consistency in practice to change from the present standard.

Green being the only other color available and being satisfactory from the standpoint of distinctness in shade and brightness of light, still seems to be the best color to use. The use of green classification lights in combination with a headlight is not in practice objectionable and has not resulted in enginemen confusing these lights with green fixed signal lights. W. H. E.

ATTITUDE OF PUBLIC AUTHORITIES TOWARD REGULATION OF OPERATION.

Chicago, March 13, 1912.

To the Editor of the Railway Age Gazette:

Referring to Mr. Rice's letter in your issue of March 8, on "Excessive Speed and Railway Accidents": Without in any way controverting Mr. Rice's view as to the extent to which high speeds contribute to train accidents, it is only proper to point out that Congress has already conferred the fullest power of investigation of accidents and their causes upon the Interstate Commerce Commission, and that that body is in position to undertake the very kind of investigation which Mr. Rice suggests should be made by a congressional committee. It is very doubtful whether the facts developed by an investigation by such a committee would be nearly as valuable as those which the commission is now in position to obtain. It does not seem to be fair criticism to say that Congress has been "making laws to compel the railways to adopt devices of which the most that can be said is that they are still in the experimental stage," etc. Congress has not forced upon the railways one single device of any sort or description which is in an experimental stage. When bills have been proposed looking to the adoption of such devices the railways have had the opportunity to present the facts, and these facts have received adequate consideration, and that no such laws have been passed is doubtless due to this.

In regard to Mr. Rice's suggestion that the bills now in the hands of committees of Congress, requiring various installations, be held up until the necessity for them can be investigated and their practicability established: It is perfectly safe to say that none of these bills will become laws without every opportunity being given the railways to show what the facts are; this has heretofore been the practice of these committees. In addition to this, any railway or railway man, formally or informally, may take up any of the questions involved with any member of any congressional committee, and be thanked for it.

It is known that the Interstate Commerce Commission will welcome every particle of co-operation it can obtain from railway men in every branch of the service; that that commission is willing and anxious to hear from anyone who will take enough interest in any subject to go to see the commission about it. It is perfectly well known that one of the most serious complaints made by those in authority in Washington has been that the railways have failed to give information and to bring their facts to the attention of administrative bodies and congressional committees in the past; that to obviate this complaint a special committee was formed by the railways to perform this duty, among others; that this committee is being called upon constantly to do this very thing, and is doing it with a measure of success. One of the results of this is that no one in Washington at the present time holds that the railways occupy an attitude of obstruction in relation to operating matters.

Certainly, no committee or commission appointed by Congress can have broader power for investigation than the Interstate Commerce Commission now holds, and in dealing with operating matters that commission is receiving "the co-operation and conscientious support of the railways" through proper channels.

NUTLOCK.

SOME INTERESTING SIDE LIGHTS ON RAILWAY ECONOMY.

Chicago, Ill., March 13, 1912.

To the Editor of the Railway Age Gazette:

Your recent articles on railway economy, by different writers of note, surely cannot be taken seriously. No doubt the extravagant manner in which lead pencils are devoured by the pencil sharpener can be greatly curtailed and thus make an unappreciable saving; but would it not be well for one of those who have the power to stop extravagances and are honestly interested in the subject of economy to go incognito into almost any big yard during the busy hours and note the damage done in the rough handling of cars?

I have been told that the *average* cost of repairing a drawhead is $9.00; the cost of the damage to freight done in damaging the drawbar is not stated. It is a common sight to see the end of a new box car bulging out, because the load is shifted, especially if it is loaded with bulk goods—lumber, coal, ice, etc. Refrigerator cars are not exempt and from no other cause than unnecessary rough handling, which could be entirely eliminated if those in charge had the temerity to locate the cause and administer the cure.

A minimum saving of 10 per cent. in full can be accomplished by any railway in the United States, by stopping the overloading of tenders at coaling stations and denying itself the services of any man who shovels off coal between engine and tender.

Piston and cylinder packing, valves and valve stem blowing is a most prolific way to increase the fuel bill, and as an engine properly lubricated, as experience has demonstrated, will develop 200 more horsepower than one saving oil, no doubt in the long run it will be satisfactorily proven that a gill of oil, is cheaper than a ton of coal.

The handling of a dead engine receives not as much attention as that of an empty coal car. It is well known that the reciprocating parts of a disconnected engine are not balanced. Subsequent events in one case where an engine was placed in a train of dead freight proved this train to be the "livest" thing on the system, for where the grade permitted, a constant speed of a mile to a mile and a quarter a minute was maintained for nine consecutive miles. On another occasion, fifty-three miles were

covered in one hour and eleven minutes by a train containing a disconnected engine. Neither of these cases is of an exceptional character. After a dead engine attains a speed of twenty-two to twenty-eight miles per hour, she assumes a vertical movement, akin to that of the "hammer blow" and if it does not on this trip actually break a rail, it lays the foundation so that one soon will be broken and no doubt the section foreman wonders why his track should get out of line over night. An actual occurrence: eighteen broken rails in eleven miles were reported one cold morning, all into lengths of about 17 feet. The blame was placed on a sleeper with flat wheels; but a dead engine with 63 in. drivers also passed over this district and was never suspected of this crime. Thus another guilty man escaped and thus the daily papers start a tirade against the rail manufacturers for dishonest work and poor material. Furthermore, dead freight trains, when not making spectacular runs, burning fuel unnecessarily, are generally found on side tracks packing or setting out "hot boxes."

Without drawing pictures, or going into details, if a few of these abuses were modified, it does not need a savant to see where a little could be added to the credit side of railway economy.

AN ONLOOKER.

USE OF FORM 19 FOR TRAIN ORDERS.

COLUMBUS, Ohio, March 11, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

On the subject of the exclusive use of 19 form of train order (*Railway Age Gazette,* March 8, page 418) it is the unanimous opinion of our despatchers, including the chief, that the exclusive use of form 19 is just as safe as the exclusive use of form 31 would be. During an experience covering four years on a busy single-track road there has been no instance where the use of the 19 form of order was not entirely satisfactory. This form of order has been used almost exclusively during that time.

M. S. CONNORS,
General Manager, Hocking Valley Railway.

FROM AN OFFICER OF THE NEW YORK, NEW HAVEN & HARTFORD.

Mr. Finan's opening paragraph I believe is in accord with the view of all railway officers; but the complete elimination of the 31 order is a question that cannot be settled without considering the conditions under which the operators are working, and the characteristics and density of traffic. For a despatcher to restrict a train's rights without getting any assurance that the crew is aware of these restrictions is a serious matter. On busy lines where passing sidings are close together the use of form 19 alone would seem to demand at least that trains be held up and crews given opportunity to read orders before proceeding; but this is what Mr. Finan wishes to do away with. It is not uncommon on some of our busy divisions for trains to receive from five to ten orders at a station. In passing orders to a train in motion there is the liability of the orders becoming mutilated or soiled; and if the crew were hustling to make a certain station they might get by a meeting point before they were thoroughly familiar with the contents of all the orders. This might perhaps be called a man failure and not the failure of the system; but the result is the same; we are responsible for the system.

On many lines this system of operating under 19 orders only would probably result in as much delay as under the old system. Our operators who also handle ticket work and the towermen in some cases cannot be spared from their offices to watch and wait outside for trains; so if the rule were for operators to go out and deliver orders it would result in the crews waiting for the operator. They would wait for him to come out rather than go to the office themselves. The alternative would be to employ many additional operators, the cost of which would neutralize the saving effected by not stopping and starting trains.

What should be done if an operator failed to deliver an order to a crew but claimed he had delivered it and the crew claimed not? Or, if the operator did deliver an order to a crew and the crew claimed not, it would be two against one.

Can it be shown that there will not be as many failures under the 19 system as under the 31? I believe not, after form 19 has had the trial that the 31 has been subjected to for over 40 years.

In the "hazards" mentioned in Mr. Finan's article there is one in which he says a 31 order was sent to a passenger train and the operator failed to display his stop signal and failed to deliver the order; presumably he forgot. If it had been a 19 order might he not have forgotten to display the stop signal or to go out? A despatcher, knowing that he has a 31 out and that a train is about due to sign it is watching for the signatures; and if he does not get them promptly, he calls on the operator for them. If the operator lets the train go without the order the despatcher knows it and has a chance to stop one or the other train at the next office. If it were a 19 order the despatcher would take it for granted that the order had been delivered; and if the operator forgot he would probably forget to tell the despatcher about it until too late to catch either train.

FROM AN OFFICER OF THE UNION PACIFIC.

Our general and division officers agree that the use of "19" orders to restrict rights should not be extended to lines not having automatic signals.

The "19" order has been extensively and successfully used; it is a wonderful help in expediting trains. With automatic signals it is as safe as the staff system; and it is even better, because it provides short blocks for following movements.

On the Union Pacific a train finding a train order signal at proceed must stop and find out why the operator did not clear it within the view of the engineman. This rule tends to counteract forgetfulness.

To use "19" orders universally without block signals would require 100 per cent. efficiency. One failure to deliver an order, its number at the same time being omitted from the clearance card, would be sufficient to justify the wisdom of always providing an extra precaution.

CAR DEPARTMENT APPRENTICES.

WASONETA, N. J., March 20, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I have read your editorial on "Car Shop Apprentices" in the issue of March 15 with a great deal of interest and would like to reply from the standpoint of an old master car builder, first, however, making an explanation as to why there are not more car shop apprentices and why there are not more men seeking positions in the car department. The facts are, the car department has generally been the "under-dog" in the operating department.

The motive power men and the motive power positions have been sought in the past, chiefly because higher wages and higher salaries have always been paid to machinists and motive power officers. As wages to a workman are his staff of life, he naturally looks for work in the department where he can make the most money. I have had a number of men in my department petition me to get them into the motive power department, as they could see there was a better chance to advance in that department than in the car department.

You state that: "Railway presidents and managers are deploring the fact that there is not a sufficient supply of good material among the younger men in the car shops from which they can make promotions to responsible positions." I am not at all surprised at this, as some railway officers have thought that the car department was of secondary importance and did not require a very responsible man at its head; or, in other words, a

man in charge of the car department need not be as efficient as the motive power man, and generally the car department has been placed under the motive power officers. With all due respect to many of the motive power officers who are competent and have great knowledge of both the motive power and car departments, yet a large per cent. of the men brought up as machinists are neither eligible nor competent to handle the details of both departments.

I am of the opinion that the car department men in the future have as bright, if not brighter prospects, than the motive power men of today. I predict that inside of 20 years most of the railways in this country will be electrically run, and the car men are as competent and eligible to work up into the electrical department as the motive power men are.

I am saying this carefully and guardedly as I have been connected with railways that had only one head over the motive power and car departments, and I am free to say that it was always the locomotives first and the cars second; in shops where joint forces are used, invariably you will find, if there is any lost or dead time to be charged up, it will be "freight car repairs can stand it." I believe the only way to keep the cost records accurate is a separation of the two departments.

I was pleased to note that you mentioned the number of car men that had been promoted in charge of both departments on one of the large trunk lines but you omitted to mention H. F. Ball, former superintendent of motive power of the Lake Shore & Michigan Southern, who was at one time general car inspector of that road; also the late J. Barr, of the Chicago, Milwaukee & St. Paul, who was at one time in the car department. I have possibly said too much relative to the motive power department as compared with the car department, but I have tried to make clear why there are not more young men seeking to get into the car department.

The car department generally represents more value in rolling stock than the motive power department, and repairs to freight cars and passenger cars are such that it requires a very competent man to be in charge of the department and to select foremen who are in position to save or spend thousands of dollars a year in the repairs to cars.

You state that: "The fund should be sufficient to permit of salaries for foremen and superintendents which will be attractive to educated men of high character and good ability." No truer words were ever spoken and within the last few years this has been realized by many managers. On some roads the car department is receiving its just recognition as to shop facilities and the selection of proper men, even to the foremen in charge of the shops.

Referring to the design of steel passenger and freight cars where you say, "very few men are found in the railway car department who are competent to do the designing. The mechanical engineers have been drilled along the lines of locomotive building, not car building, simply because they have been advised when they were seeking positions to take up locomotive and not car work.

You say that the motive power men—those whose training has been almost entirely in the locomotive department—now dominate the two great railway mechanical associations, and the master car builder is no longer regarded as eligible to the principal offices of the Master Car Builders' Association. The change in electing officers in the Master Car Builders' Association was brought about for certain reasons which at the time were well understood by all connected with that association, and had nothing whatever to do with men holding positions as master car builders. It was thought advisable that the officers in the association should be men that were at the head of a department and it is very unfortunate that there are only a few master car builders at the present time who are at the head of their own departments.

A very few of the trunk lines have a master car builder or a superintendent of rolling stock who reports direct to the general manager. The above is the only reason why the change was recommended for officers in the Master Car Builders' Association, and I can point with a great deal of pride to the list of past presidents of the Master Car Builders' Association as containing some of the most brainy and competent mechanical men of this country and who were at the heads of the car departments on their roads.

You speak of the freight car truck—the diversity of designs, etc., and also of the draft gears of freight cars which cause large expenditures for repairs, and are sold in a variety of designs which bear trade names instead of railway standards. You might also mention couplers. The Master Car Builders' Association is the one that got the M. C. B. type of coupler adopted. The Master Car Builders' Association today, through its car department forces and others is bringing out one standard design of coupler. Speaking of the friction buffer, which the article states is not very creditable to the men of the car department. The men of the car department might agree in recommending a friction buffer, but it must be remembered that there are others in authority that may not agree with them, consequently a standard buffer has not been adopted.

Referring to the necessity of training up a body of men who will have the ability to design cars and their details and to select with good judgment those which are purchased. This is very true, but it is a well known fact that the practical car man may have ideas regarding the building of a car, and also of maintaining standards, but others higher up may have different views on account of industries being on the line of the road, and for other reasons, so that the car department men's recommendations may be overlooked.

I thoroughly agree with the writer of the article that the locomotive department on many lines is now so large that it could well occupy the entire time of the motive power officers and there should be officers of equal rank in general charge of the car department. Under such an organization the car shop apprentice would have before him the opportunity of advancement to car foreman, superintendent of car shop and superintendent of the car department. In the past I am free to say that the car department on some railways has offered very poor inducements for a man of ability to ever expect to advance. I have been asked a number of times to recommend men for foremanship on different roads, and when asked what the salary would be, found it would run from $50 to $100 a month less than what they were paying some master mechanic in the motive power department, who did not have one-quarter the responsibility on his shoulders or one-fourth of the expenditure of money that the car department men would have. Is it any wonder then that in the past there have been so few men seeking positions in the car department?

The road with which I am connected believes that the motive power and car departments should be separate, and the very best results have been the result of separating them. We are doing everything we can to educate and bring out young men in the car department, not only by having apprentices, but by testing out the young men. We also endeavor to keep competent men in line of promotion to work up to foremen and master car builders.

Some officers have thought that there was economy in consolidating departments. In some cases this might be true, but in others it is false economy. There is an old saying that a little knowledge is dangerous. It is also true where any one man attempts to manage or control several departments. I am very glad to see this question agitated and am pleased to know that in the last few years some roads have taken a decided stand relative to the management of the car department. Mr. Barnum of the Illinois Central has just completed a good organization of the motive power and car departments of that road and has recognized a head of the car department.

Of course the ideal managed railroad is the one where all departments co-operate together for the interest of the road. This can only be brought about by having reliable, competent and recognized heads of each department. MASTER CAR BUILDER.

ALL-STEEL BOX CARS.

The first large order for all-steel box cars has just been awarded by the Bessemer & Lake Erie to the Summers Steel Car Company, Pittsburgh, Pa. A sample car of this type, built by the Summers Company, has been in service for the past two years, and the 100 fifty-ton cars which have just been ordered will conform to the sample car as far as the construction is concerned, except that they will be 4 ft. longer and the truck side frames will be of the regular arch bar type, but equipped with the Summers balanced side bearing features, the same as on the sample car. This balanced side bearing feature is a new and radical development in car truck construction and bids fair to come into general use because of enabling a car body of rigid construction to traverse twisted and rough track without throwing the twist into the car body or without danger of derailment. The construction of all-steel box cars is so rigid that without a truck of this kind it will be practically impossible to operate them safely. Refrigerator cars, tank cars, and other cars of similar construction are often derailed apparently because of their rigidity in connection with the rigid center bearing truck and rough track. The new truck has a flexibility which permits the car to travel over very irregular track without distorting the car body and at the same time prevents the hammer blows, due to transverse rocking, which are so injurious to the equipment, the lading and the track.

The inside dimensions of the new cars will be 40 ft. long, 9 ft. wide and 8 ft. high. The car has no center sills, the entire vertical load being carried on the side girders. The lower member of the side girder, or what corresponds to the side sill in an ordinary car, is a 5/16 in. pressed steel angle which is deepened near the center of the car. The lower half of the side sheet is a 3/16 in. plate and the upper half is ⅛ in. thick. The lower half of the end sheet is ¼ in. thick and the upper half is ⅛ in. thick. The floor plates are ¼ in. and are supported by 10 in. channels, which extend from side to side of the car. The side sheets are stiffened on the inside by 3 in. x ¾ in. Z bars, weighing 6.7 lbs. per foot. The ends of the car are stiffened by the two horizontal pressed steel braces, the upper one of which covers the joint between the two halves of the end sheet.

The draft gear is attached to draft sills constructed of ⅜ in. plate pressed to a channel shape. Similar pressed members or diaphragms, but constructed of ¼ in. plate, extend between the cross beams above the center of the truck and just back of it. A bottom cover plate ⅜ in. thick extends underneath the rear end of the draft sills and for a distance of about 4 ft. toward the center of the car. The roof sheets are of Carnegie copper steel, ⅛ in. thick. The carlines are on the outside, leaving a smooth roof surface on the inside of the car. The construction is such that no rivets are driven through the roof plates to the inside of the car.

With this form of construction the car will weigh 43,000 lbs., or about 3,000 lbs. less than a steel underframe car of the same capacity and with the same inside dimensions. It is about 9 in. less in height at the eaves and the center of gravity is about 7 in. lower than for the steel underframe car. There are 12,000 lbs. more steel in the car and at the present prices of steel and lumber it can be sold in competition with the steel underframe type of car. It is expected that this order of 100 cars will demonstrate the practicability of the all-steel box cars. As shown on the cross section the car is lined with 13/16 in. yellow pine for a height of about 5 ft. Experience with the sample car thus far has demonstrated that no trouble is encountered due to moisture condensing on the inside of the car and thus damaging the lading. It is quite probable that the cars will be considerably warmer during hot weather than the wooden ones, but if this should be found objectionable it can possibly be overcome by lining or insulating the inside of the car.



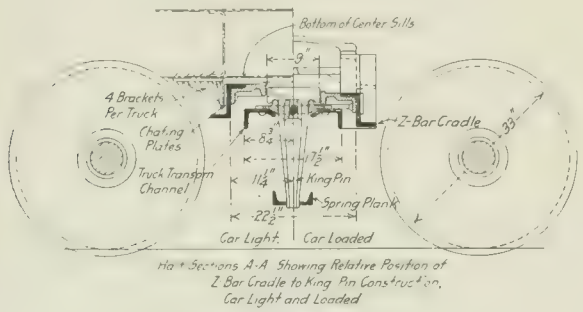
All-Steel Box Car Similar to Those Ordered by the Bessemer & Lake Erie.

The truck arrangement is such that the whole load is carried on the inclined hangers at the side of the car, approximately the same as if it were suspended from a point at the intersection of the center line of the hangers extended until they meet above the center of gravity of the car; this arrangement permits the car body to swing sideways at the bottom but does not allow the sides to sway at the top, with the attendent vertical hammering blows on the side bearings, springs and wheels.

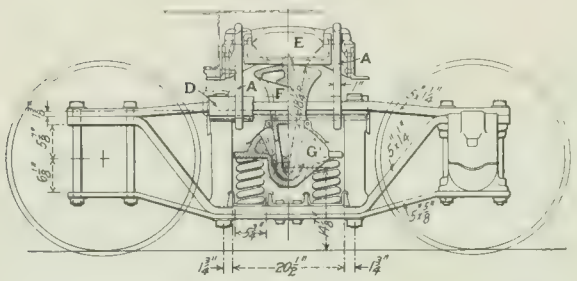
A comparison of this truck and its performance with the standard or center-bearing truck will be interesting and instructive. The center-bearing truck, which at the present time is almost universally used, has one very grave disadvantage. The load

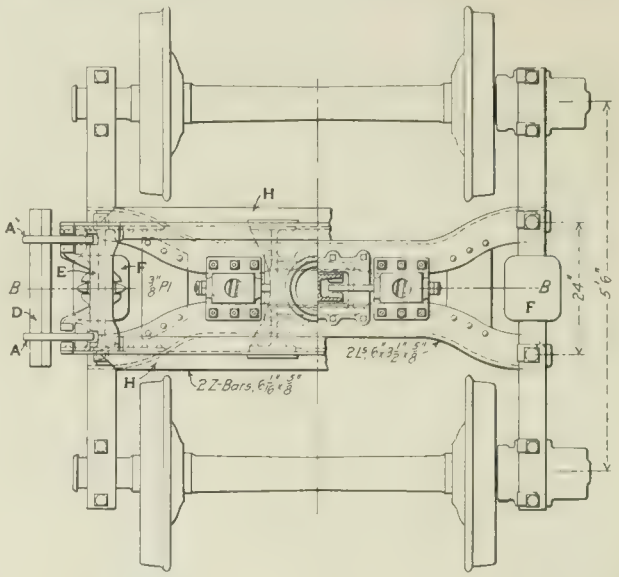
supposedly carried on the center plate and evenly distributed to all the wheels, is, by reason of the transverse rocking of the car and the acceleration of this movement by the truck spring reaction and attendant track conditions, at times all carried on the wheels on one rail; not only is it thus all on half the wheels, but by reason of the every increasing load capacity of the cars and the attendant lifting of the center of gravity above the rails, the impact from the side oscilation may double or quadruple the rail reaction. When the impact occurs coincident with the wheel traversing a rough piece of track at high speed, a part of the stored energy due to train velocity is converted into vertical impact on the rail.

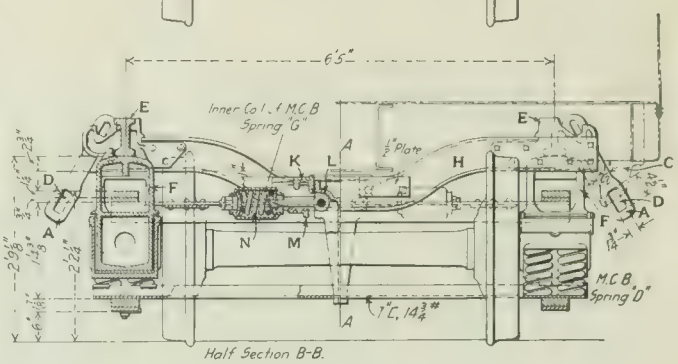
The new truck illustrated herewith carries the load on the inclined hangers *A*. Cast steel brackets *C* are fixed to the underframe of the car body and cross bars *D* pierce the lower ends of hangers *A* and also fit in a notch in the under side of *C*, the



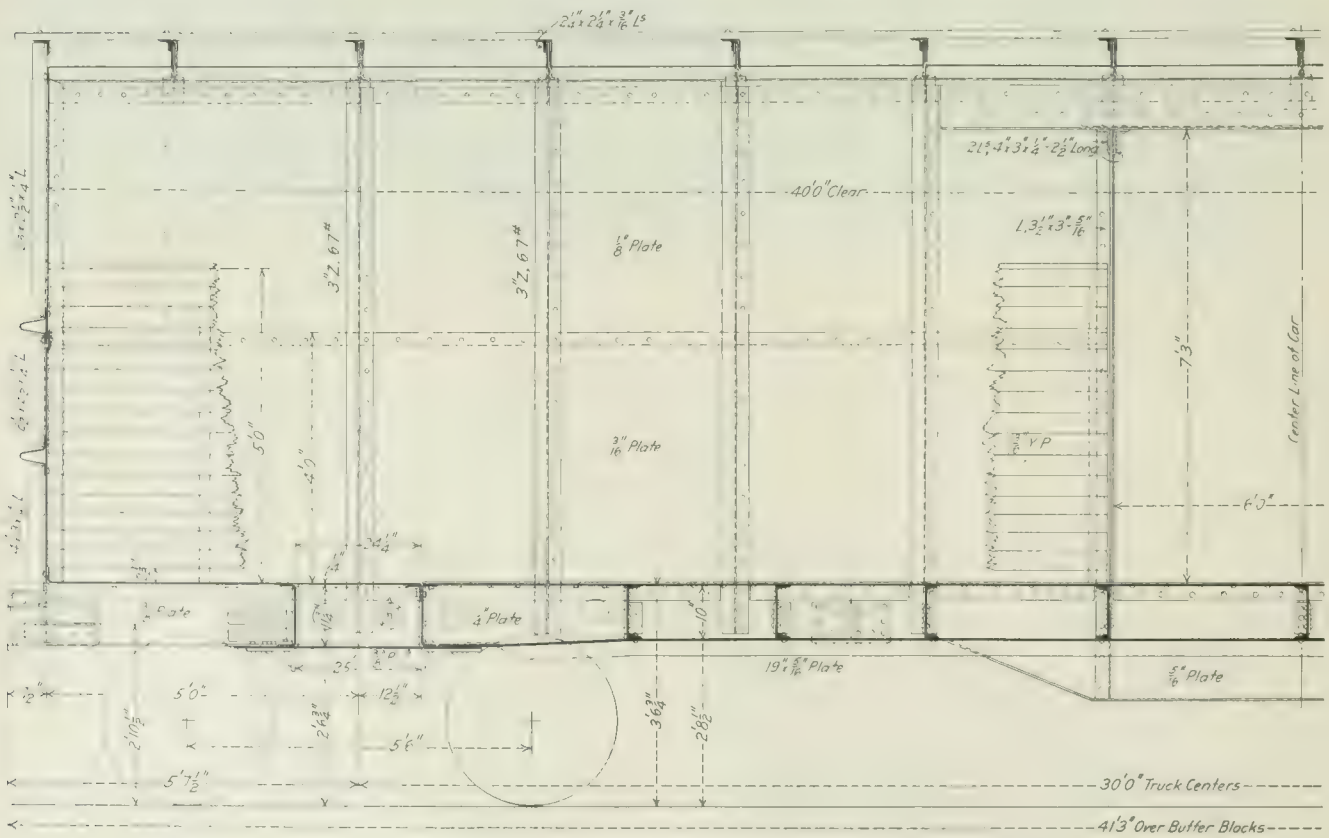
Half Sections A-A Showing Relative Position of Z Bar Cradle to King Pin Construction, Car Light and Loaded



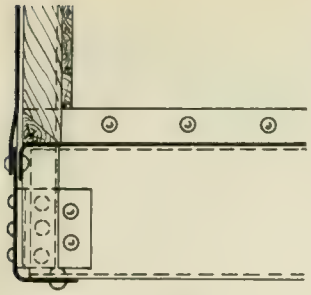




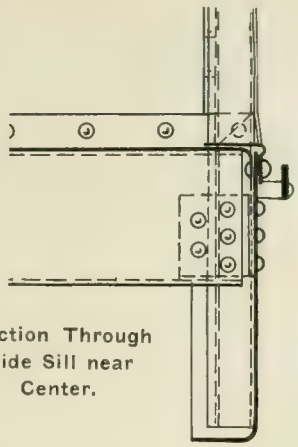
Summers Balanced Side Bearing Truck.



Part Longitudinal Section Through Summers All-Steel Box Car.

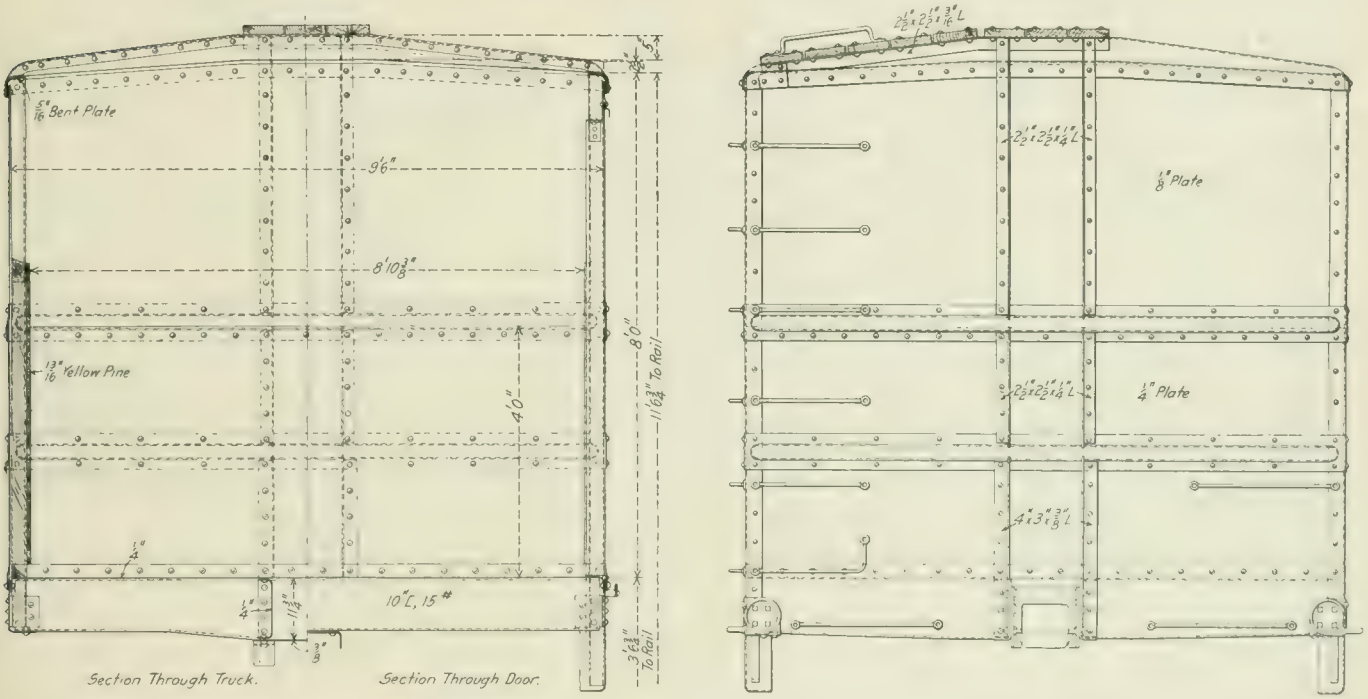


Section Through Side Sill near Truck.

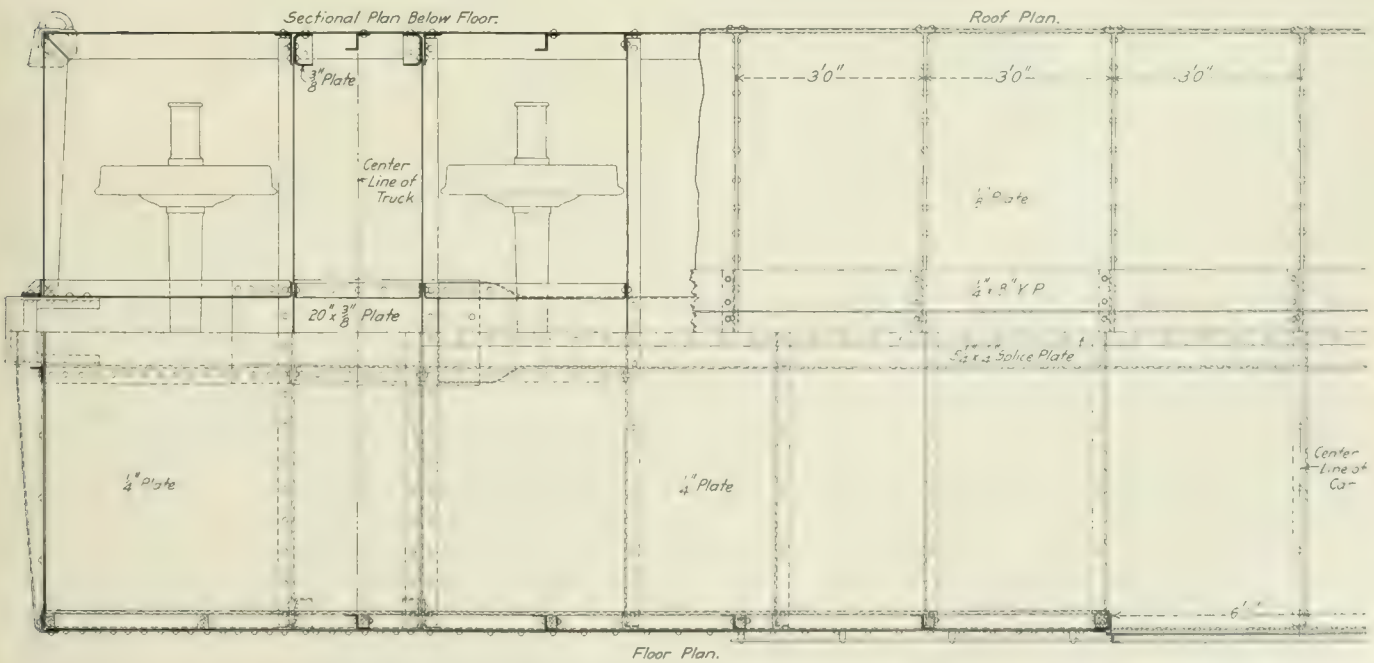


Section Through Side Sill near Center.

load of the car body being carried through these members to the side bearing or rocker cap *E*, thence into the segmental rocker *F*, which is journaled in oil in the spring cap *G*, transmitting the load through the springs and truck side frame to the wheels. The brackets *C* hold the lower ends of hangers *A* at a fixed distance transversely, while the cradle member *H*, to which *E* is secured, holds their upper ends. When the car is moving slowly along the track, any vertical change in track alinement is taken care of by the rotation of the hangers *A* about their upper ends. With high train velocity the cradle *H* will move instead of the car body, the hangers *A* rotating about their lower ends, thus allowing the car body to move in a straight line, the vertical changes in track alinement being converted into horizontal movement by reason of the difference in inertia of the car body and the cradle. The cradle *H* is held in central position by its center plate *K* and the king pin *L*. The latter has a limited lateral



End View and Sections Through Summers All-Steel Box Car.



Partial Floor and Roof Plans for All-Steel Box Car; Bessemer & Lake Erie.

movement at *M* and is returned to the central position by the springs *N*.

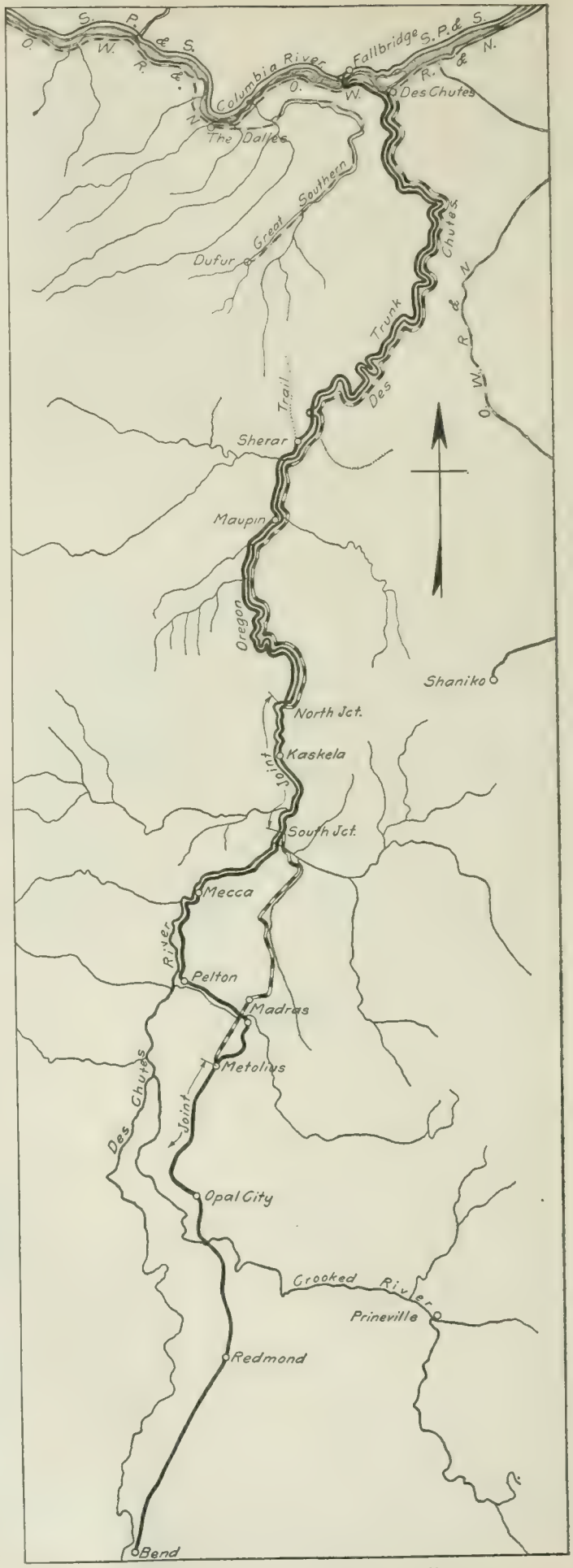
The king pin arrangement is clearly shown in the sections through the truck. The construction is of very generous proportions and indicates also that the parts that come into play in moving the truck along are located to advantage. The helical springs between the center pin and truck transom, act to check and cushion the transverse swerve of the car body on curves or uneven track; these springs also come into action when the car is traveling at high speed, absorbing the lesser vibrations independently of car, the body and the truck proper. This type of side bearing truck makes it possible to carry the load distributed on all side bearings under any track conditions, and thus distributes the load to all wheels. In a word the truck permits of a rigid car body being carried over rough track, the wheels moving up and down or transversely without transmitting the motion to the car body.

THE CONSTRUCTION OF THE OREGON TRUNK AND THE DES CHUTES RAILWAYS IN CENTRAL OREGON.

The driving of the golden spike in the track of the Oregon Trunk Railway at Bend, Ore., and the entrance of trains of the Oregon Trunk and DesChutes railways into this town a few weeks ago marked the closing of one of the most interesting conflicts in competitive railway construction which has been witnessed in recent years. The building of these two lines was equally interesting, because of the very difficult country through which they were built and the manner in which the numerous engineering problems were met. The construction of the Oregon Trunk was one of the first steps in the entrance of the Hill lines into Oregon, a territory which had been previously considered as belonging almost exclusively to the Harriman Lines. This invasion has since been followed by other inroads, especially in the vicinity of Portland, where the control of the Oregon Electric Railway, operating from Portland to Salem, has been secured, which road is now being extended south to Albany and Eugene. The history of the early conflict between the Hill and Harriman interests in the location of lines up the DesChutes river and ending with the decision of the United States district court at Portland has been discussed in the *Railway Age Gazette* of November 12, 1909, while the early features of the construction of both roads were described in the isue of March 18, 1910.

The DesChutes river rises in central Oregon and flows generally north, emptying into the Columbia river at Celilo, about 100 miles east of Portland. Flowing through an arid country it has worn its way through the volcanic rock formation until it now passes through a winding narrow canyon with very abrupt walls. As it is not subject to freshets to any marked degree, the river has a very uniform flow, averaging about 5,200 second ft., and a maximum variation in height of about 10 ft. This flow is practically constant for the lower 90 miles of its course, no tributaries of any consequence entering the stream in that distance. There are only two wagon road crossings of this river in this 90 miles; one a county bridge located at the station of Freebridge on the DesChutes railway, about 5 miles above the mouth of the stream, the other an historic toll road crossing at Sherar 40 miles farther south on the main trail between interior Oregon and The Dalles.

As soon as railway construction was contemplated through this canyon papers were filed with the government for three dam sites for power development. The three projects contemplate dams 140, 100 and 60 ft. high, and are located about 2, 20 and 40 miles respectively from the mouth of the stream. The first and last sites were filed on by private corporations, while the middle site is reserved by the United States government. Although no steps have been taken toward the construction of any of these dams, it was necessary for both roads to locate above these proposed high water lines to avoid possible future trouble. This added about $1,000,000 to the cost of each road.

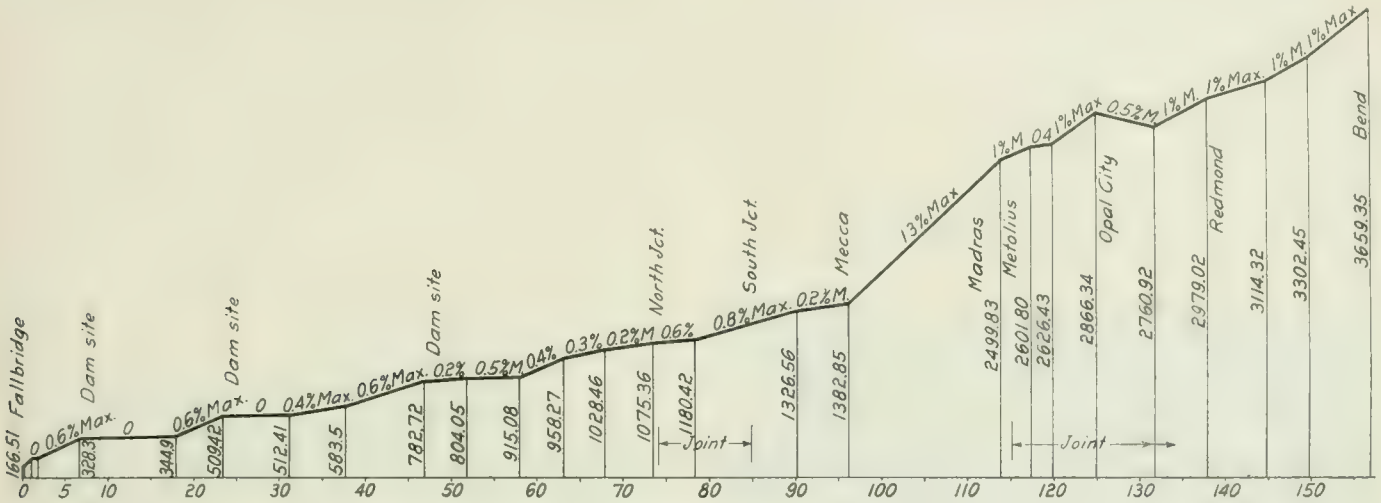


Oregon Trunk and Des Chutes Railways.

THE OREGON TRUNK RAILWAY.

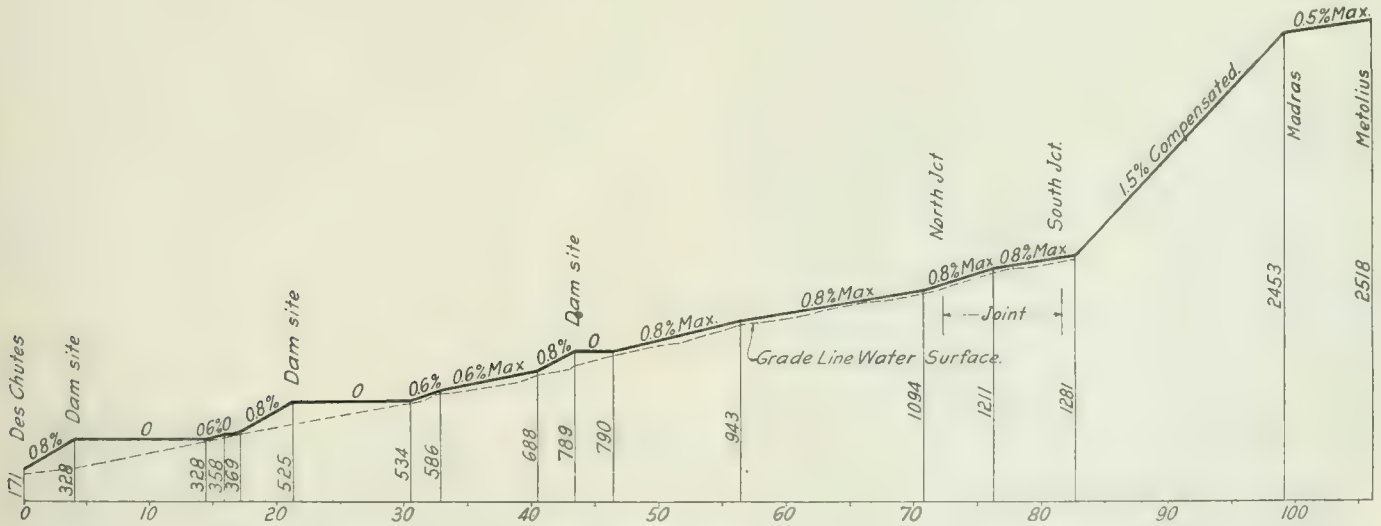
The Oregon Trunk Railway, which was built as a subsidiary of the Spokane, Portland & Seattle, or "North Bank Road," starts from a connection with this line at Fallbridge, Wash., and crosses the Columbia river and the main line of the Oregon-Washington Railroad & Navigation Company on the south bank on a long steel bridge. The line then follows the DesChutes canyon for 75 miles to North Junction, being located on the west bank, except at one point about 4 miles north of Sherar, where it crosses the river to avoid a long detour, and after passing through a tunnel immediately crosses back to the west side of the canyon. At North Junction the line crosses to the east bank of the river and continues on this side to Pelton, 105 miles from Fallbridge. It was on the 11 miles immediately south of North Junction that the early conflict in surveys occurred. These were finally settled by a contract, stipulating that the line should be built by the Oregon Trunk and operated jointly by both roads. At Pelton the line leaves the canyon of the DesChutes and turns into Willow Creek canyon, following this stream until it rises to the level of the table land at Metolius. It then continues south on this table land to Bend, 156 miles south of Fallbridge. In this distance the line rises from an elevation of 140 ft. at Fallbridge to 3,630 ft. at Bend.

The maximum grade is 0.6 per cent. for the first 95 miles to Mecca, from which point a 1.3 per cent. pusher grade extends to Metolius. From Metolius to Bend the maximum grade is 1 per cent. All grades are compensated at the rate of 0.04 per deg. There is no adverse grade against northbound trains, except a 115 ft. rise just north of Crooked river and a small sag south of Redmond. Both of these sags have 0.5 per cent. grade againts northbound trains. The maximum curvature is 6 deg., except at three points, where higher curvature was allowed on temporary lines which it is intended to replace by tunnels when the traffic justifies the additional expense. One of these tunnels will be 2,300 ft. long. The percentage of curvature is very large, especially north of Pelton, where the line is forced to follow the wanderings of the river.



Profile of the Oregon Trunk from Fallbridge, Wash., to Bend, Ore.

Because of the standards of grade and curvature adopted, which are very high, considering the nature of the country through which the line was built, the grading was very heavy, averaging over 55,000 yds. per mile. The total amount of material handled amounted to 8,779,803 cu. yds., of which 152,349 cu. yds. were necessary for excavation for bridges and culverts. The following table gives the classification of the material handled, from which it is noted that 68.8 per cent. of the material handled was solid rock, and 15.4 per cent. loose rock:



Profile of the Des Chutes Railway from Des Chutes, Ore., to Metolius.

	Fallbridge-Madras.		Madras-Bend.		Fallbridge-Bend.	
	Cubic Yards.	Per Ct. of Total.	Cubic Yards.	Per Ct. of Total.	Cubic Yards.	Per Ct. of Total.
Grading and Excavation—						
Earth	523,589	6.8	75,234	7.8	598,823	7.0
Solid rock	5,281,991	69.0	662,155	68.8	5,944,146	68.8
Loose rock	1,192,862	15.5	108,501	11.2	1,301,363	15.1
Hard pan	665,836	8.7	117,286	12.2	783,122	9.1
Totals	7,664,278	100.0	963,176	100.0	8,627,454	100.0

	Fallbridge-Madras.		Madras-Bend.		Fallbridge-Bend.	
	Cubic Yards.	Per Ct. of Total.	Cubic Yards.	Per Ct. of Total.	Cubic Yards.	Per Ct. of Total.
Bridges and Culvert Excavation—						
Earth	4,648	3.2	1,618	20.8	6,266	4.2
Solid rock	77,749	53.9	3,479	44.7	81,228	53.3
Loose rock	45,387	31.4	1,817	23.4	47,204	30.9
Hard pan	16,786	11.5	865	11.1	17,651	11.6
Totals	144,570	100.0	7,779	100.0	152,349	100.0

It was necessary to blast practically all of this rock before it could be handled, and all drilling had to be done by hand. With the exception of about 200,000 yds. of material near the north end of the line, which was moved by steam shovel, all excavation was done by hand. This is one of the largest pieces of railway construction done in this manner in recent years, and it is especially interesting because of this fact. There were at one time on this work 1,140 1½-yd. cars, 600 horses and 62½ miles of 20-lb. track. This method of handling excavation was made necessary by the remoteness of the west side of the canyon from transportation facilities and the impossibility of getting heavy equipment in on to the work. It was even impossible to bring in supplies over the Shaniko branch of the Oregon-Washington Railroad & Navigation, except at a few points, because of the absence of crossings over the river.

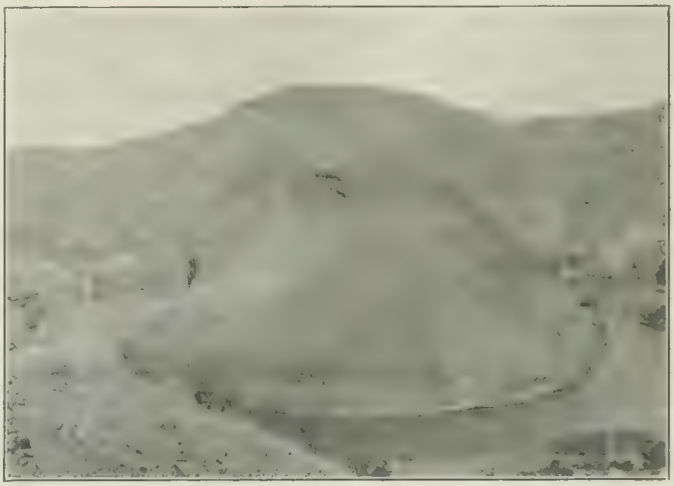


Temporary Bridge and Piers of the Second Crossing of the Des Chutes and Oregon Trunk Railways.

As it was, it was necessary to build over 60 miles of wagon roads in order to get supplies and materials in to the men scattered along the line. In handling the work the practice of the contractors was to do as much of the excavation as possible by station men, three or four men together taking the contract for a short section. In this connection, the curves showing the man-days work and cubic yards moved per month are instructive. As would be expected, these curves are closely parallel until August, 1910, and the divergence here is due to the fact that at this time a large part of the grading was being completed, and that while the forces were being reduced the estimates were being increased by the retained percentages held back until completion of the contracts.

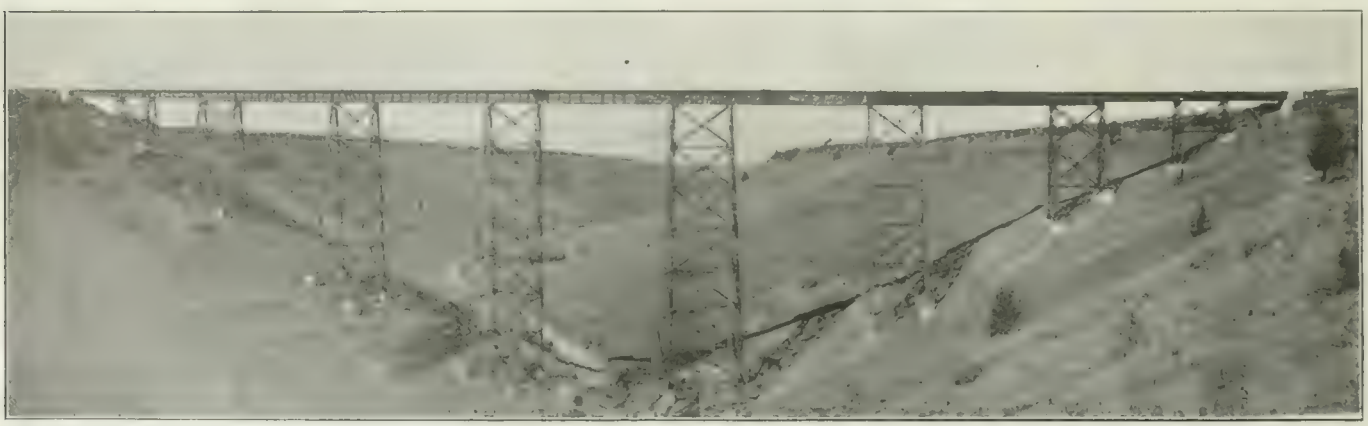
The roadbed is graded 18 ft. wide on earth and 16 ft. wide on rock fills, while cuts are made 24 ft. wide in earth and 20 ft. in rock. The cuts were made with 1 to 1 slope in volcanic ash, and ¼ to 1 in rock. Seven tunnels were built varying in length from 415 to 800 ft., and with a total length of 3,968 ft. These tunnels were lined with timber at the time they were constructed, but contracts have recently been let for relining all but one of them with concrete.

Nine steel bridges were built in addition to the Columbia river crossing. This latter bridge consists of 16 deck girder spans 102 ft. long, six through truss spans 230 ft. long, one through draw span 250 ft. long, one 320 ft. pin connected through span, one deck girder span 76 ft. long, two deck girder spans 75 ft. long and two half through girder spans 75 ft. long. The next most important structure was the bridge over Crooked river, which consists of two deck girders 60 ft. long and an arch span 340 ft. long. A description of these and the other steel structures on this line will be included in another article to follow shortly. In addition to the steel structures, about one mile of wooden trestle was built, most of which will be filled at an early date. All timber structures will be protected from fire by the construction of gravel ballasted decks. Corrugated iron culverts are used for pipe openings.



First and Second Crossings of the Des Chutes River; Oregon Trunk Railway.

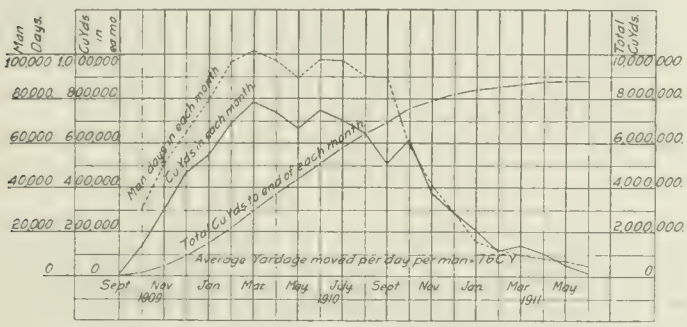
According to the Oregon law railways are required to be fenced on both sides within three months after they start running trains. A new law passed at the last legislature gives the



Willow Creek Viaduct Near Madras on the Des Chutes Railway; Oregon Trunk Railway in the Bottom of the Canyon.

State Railroad commission authority to relieve a company from fencing such part of its right of way as in the judgment of the commission is protected by natural barriers, as steep cliffs or bodies of water. Advantage was taken of this new law and permission was obtained to omit about ten miles of fence in the DesChutes river and Willow Creek canyons. The fence that is being erected has four barb wires, with cedar posts 24 ft. apart and two wire stays in each panel of fence.

The track is laid with Great Northern section 90-lb. O. H. steel rails and angle bars on untreated sawed fir ties, with 10 in. of ballast below the ties. The rails are laid with staggered joints. Tie plates are placed on curves and on all tangents less



Progress of Excavation; Oregon Trunk.

than 500 ft. in length. Tangents longer than this are tie-plated 100 ft. out from the curves. Passing tracks 3,000 ft. long are built at intervals of about seven miles and are laid with 70-lb. rails. No. 11 turnouts are used entirely in the main line and side tracks are built to 14-ft. centers. All track north of Crooked river bridge was laid by contract, while that south of the bridge was laid by company forces.

The ballast used was partly gravel and partly burned clay. The gravel used on the north 50 miles of track was secured from a pit on the Spokane, Portland & Seattle on the north bank of the Columbia river, and was transferred across the river on a car ferry. Another pit was located south of North Junction, from which material was secured to ballast the line as far south as Metolius. In a cut two miles south of Opal City a natural burnt clay was encountered. After track was laid a ballast pit was opened at this cut from which material was secured to ballast the line from Metolius to Bend. This burnt clay is bright red in color and makes excellent ballast material, but is difficult to handle, as it contains ridges of lava which it is necessary to break up and to separate from the clay. In this way about 15 per cent. of the material is wasted in the pit or at the side of the roadbed, but even with this disadvantage the excellence of the material and the advantageous location of this pit made it the cheapest available ballast, there being only two other available supplies—first, from a pit on the S. P. & S. Railway, 130 miles away and at 2,500 ft. lower altitude, and second, to install a rock crusher. All ballasting was done by company forces.

The water stations built were of two types. At the larger number of stations tubs were placed directly on the side hill with standpipes along the track to deliver water to the engines. Where the side hill was not close to the track the tub was erected on posts in the usual manner. The standard tank is 16 ft. by 24 ft. in size, and of 50,000 gal. capacity. From Pelton north the water is secured by pumping from the river at all stations, except at Tuskan, where the supply is secured from a large spring. At this point a 23,000-gal. rectangular concrete tank was erected on the side hill and the flow of the spring was led into the tank and out over a concrete spillway near the top. The flow of this spring is sufficient to completely fill the tank every 17 minutes. At Pelton, where the line leaves the DesChutes river, water is lifted 550 ft., and through 6,000 lin. ft. of pipe by a 50 h. p. gasolene engine direct connected to a 4½ x 10-pot valve pump. South of Pelton the water is secured from deep wells drilled with much difficulty through the broken lava formation. At Metolius, where two wells were sunk, it was necessary to drill through 300 ft. of lava and boulders, and then through 300 ft. of rock to secure a sufficient supply. At this point a deep-well pump delivers water into a 175,000 gal. concrete sump built below the ground, which acts as a storage reservoir from which a small pump then raises the water into a supply tank.

In connection with the construction of the Oregon Trunk Railway it was necessary to establish complete terminal facilities at Fallbridge and a terminal was also built at Metolius. Trains are operated from Fallbridge to Metolius, a distance of 115 miles, while turn-around runs are arranged from Metolius to Bend, 42 miles. A wye was built for the use of the helper engine at Mecca, and another at Bend. The location of the junction with the Spokane, Portland & Seattle at Fallbridge rendered advisable the moving of the yard at Cliffs, 20 miles further east, to this point and building one yard here for the use of Spokane, Portland & Seattle main line traffic as well as interchange with the Oregon Trunk. Accordingly, a classification yard, consisting of four tracks 4,000 ft. long and two tracks 3,600 ft. long, was built, together with the usual tracks about the engine house. A rectangular engine house, 180 ft. long, with six tracks, each holding two engines, and with entrance at each end, was built. An 80-ft. turntable has also been provided. As oil is used exclusively for fuel on both roads, oil storage tanks were necessary. A 30,000-barrel tank, 90 ft. in diameter, was placed on the side hill and supplies the service tanks along the track. As there had been no town here previous to the construction of this yard it was necessary to provide accommodations for the trainmen laying over between runs. In contrast with the general practice, the eating house was built separate from the hotel so that those sleeping would not be disturbed by the others in the lunch and reading rooms.

A similar yard was built at Metolius and will be used by the Oregon Trunk and DesChutes roads, the connection between



Celilo Bridge Nearing Completion; Oregon Trunk.

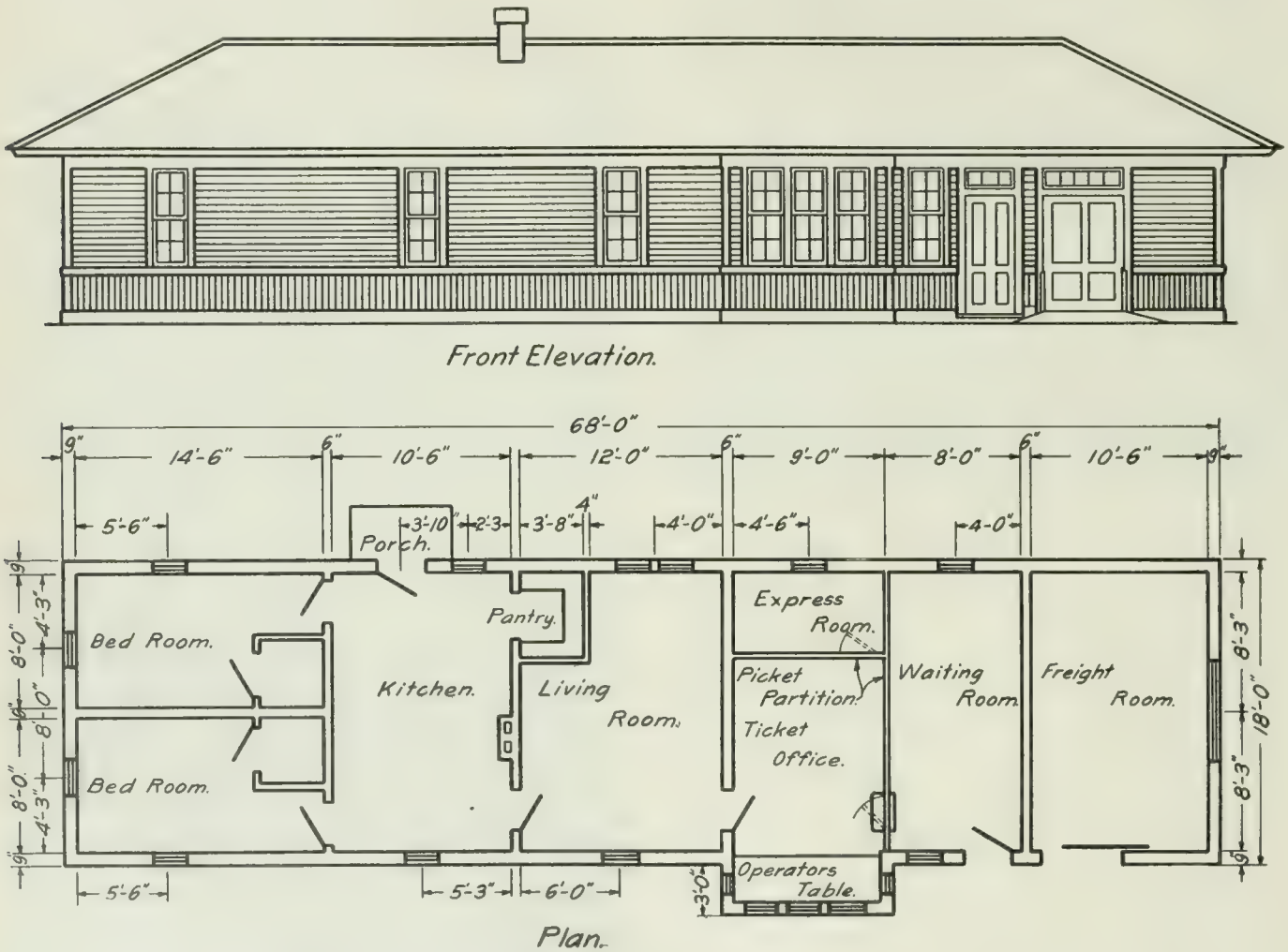
the two roads being made just north of the north end of the yard.

One feature which stands out very prominently in the construction of this line at the smaller stations as well as at the terminals is the building of attractive and serviceable depots and section houses. Houses are furnished for the section foremen on each section, with bunk houses removed some distance from the section house for the use of the laborers. These buildings were all completed and ready for occupancy at the time the line was put into service. They are painted the standard colors, yellow buff with bronze green trimmings. There are three standard sizes of depots, living quarters being pro-

vided for the agent and family in the two smaller sizes. All buildings are one-story. The larger stations are 30 ft. by 115 ft., and are located at Fallbridge, Madras, Metolius and Culver. In the Fallbridge depot, where considerable perishable freight will be transferred, a warm room is provided. The station building at less important points is 36 ft. x 60 ft. in size, while that built at the most unimportant points is 18 ft. x 68 ft.

Awaiting the completion of the bridge across the Columbia river, all freight and passengers were transferred by ferry. As soon as construction work was undertaken a ferry transfer became necessary. Inclines were built on each side of the river and a steamboat and a car float were purchased. The inclines were built on 5 per cent. grades and were designed to provide for a wide variation in stage of the water, which variation reached 30 ft., while the ferry was in service without interferring with its operation. Because of government restrictions regulating the operation of ferries for passenger service, the passenger coaches were not transferred back and forth across the river. The car ferry has a capacity of eight cars. An enormous amount of material has been transferred since the work was started without any accident. Material of all kinds used in the construction of the line, including rail, ties, bridge material and ballast for 50 miles of line, have crossed in this manner.

This line was built under the direction of John F. Stevens, president; Ralph Budd, chief engineer, and J. C. Baxter, division engineer. Porter Brothers of Portland did the grading from Columbia river to Madras, and also laid all the track north of Crooked river bridge and placed the concrete work for the substructure of the bridge across the Columbia river. H. C. Henry of Seattle had the contract for the grading from Madras to Bend, while Bates & Rogers had the contract for all concrete work south of the Columbia river.



Plan and Elevation of Standard Depot for Medium Size Towns; Oregon Trunk Railway.

DES CHUTES RAILWAY.

The DesChutes railway has been constructed as a subsidiary of the Oregon-Washington Railroad & Navigation Company, and starts from a connection with the main line of this road on the south bank of the Columbia river at the station of DesChutes, about three miles east of the mouth of the DesChutes river. It was necessary to change the original plan of establishing this junction at the mouth of the canyon on account of the necessity for raising the location of the road above the high water line of the lower power project. The new line parallels the O.-W. R. & N. main tracks from the mouth of the canyon to DesChutes, the additional distance being necessary to get down to the level of the other tracks on the maximum grade. The DesChutes railway follows the east side of the canyon all the way to South Junction, a distance of 82 miles, the last 10 miles of which is joint track with the Oregon Trunk. At South Junction the line turns into Trout Creek canyon and ascends this stream to the level of the table land at Madras, crossing over the line of the Oregon Trunk at this point at an elevation about 275 ft. above that of the other road. The DesChutes line then continues southerly to Metolius, where it connects with the Oregon Trunk, using its tracks for 41 miles in Bend. The maximum grade of the DesChutes railway is 0.8 per cent. for the first 82 miles to South Junction, from which point there are 16 miles of 1.5 per cent. pusher grade. From Madras to Metolius the maximum grade is 0.5 per

cent. There is no adverse grade against northbound traffic north of Metolius. All grades are compensated for curvature at the rate of 0.035 per deg. up to 6 deg., 0.045 per deg. between 6 and 8 deg., and 0.05 per deg. up to 10 deg. The maximum curvature is 12 deg., with two curves of the maximum. There are about 820 deg. of curvature above 10 deg. All curves are spiralled according to Harriman lines standards.

The grading of the DesChutes road was much lighter than on the Oregon Trunk, due largely to the higher grades and curvature allowed. The line followed more closely the bottom of the canyon and was thus able to avoid much of the heavy side hill work. The general topography of the canyon was also more favorable to railway construction on the east side than on the west. The roadbed was built 14 ft. wide on fills and 16 ft. wide in cuts. There are five tunnels on the line ranging from 500 to 1,200 ft. in length, all of which are timber lined.

While it was necessary to handle most of the excavation by hand, it was possible to get some equipment on to the work by knocking it down and shipping it in on the Shaniko branch of the O.-W. R. & N. In several instances this heavy equipment was lowered to the line in the bottom of the canyon on special skids erected for this purpose.

High steel viaducts were erected at the crossing of Trout and Willow creeks. The Willow creek viaduct is 1,050 ft. long and 275 ft. high above the top of the pedestal. This viaduct passes over the tracks of the Oregon Trunk about 275 ft. below, as shown in the accompanying view. It consists of eight 40-ft. tower spans, with five 100-ft. intermediate spans, one 50-ft. approach span on the north end and two 60-ft. approach spans on the south end. Trout creek viaduct is located a short distance south of South Junction, and has a maximum height of 100 ft. above the top of the pedestals. It consists of four 40-ft. towers, with one 100-ft., one 60-ft. and one 40-ft. intermediate spans. The north approach consists of two 50-ft. spans supported on a single center bent, while the south approach consists of two 40-ft. spans similarly supported. With the exception of these two structures the bridge work is light, consisting largely of timber bridges which will be replaced with permanent structures at a later date. These trestles are covered with galvanized iron, extending between the stringers as a protection against fire. Corrugated pipe was used for all pipe openings. While the original location contemplated the construction of an independent line to Redmond, necessitating a bridge across Crooked river, the joint track arrangements south of Metolius eliminated this structure. Because of the absence of this bridge as well as crossings of the DesChutes and Columbia rivers, the bridge work on this road was light as compared with that on the Oregon Trunk.

The track is laid with new 75-lb. rail with continuous joints. Tie plates are used on all curves and on all bridges. All track was laid by company forces, using the L. C. McCoy common track laying machines, invented by the assistant engineer in charge of track laying and bridge work. The track is ballasted largely with material secured from the adjacent right of way. Steel tanks of 65,000 gal. capacity were erected at Madras gateway, and at the helper station at South Junction. Temporary wooden tanks were erected at other points until such time as permanent tanks can be built. North of South Junction water is secured by pumping directly from the DesChutes river, while at Madras it is obtained from a deep well.

As the freight transfer between the O.-W. R. & N. and the DesChutes railway will be made at the existing terminal of the O.-W. R. & N. at The Dalles, 17 miles east of DesChutes Junction, and as this road will use the yard of the Oregon Trunk at Metolius, it was not necessary to construct any classification yard on this line. Small terminal facilities were established at South Junction for the use of the helper engine, at which point water tank, oil storage facilities, turntable, clinker pit with depressed track, and two or three short tracks were built.

The DesChutes railway was built under the supervision of the engineering department of the O.-W. R. & N., G. W. Boschke, chief engineer; John D. Isaacs, consulting engineer, and L. C. McCoy district engineer. The contractors for the grading and concrete work were Twohy Brothers. We are specially indebted to Mr. Budd and Mr. Boschke for much assistance in preparing this article.

VARIATIONS IN LOCOMOTIVE TRACTIVE EFFORT WITH SPEED.

BY A. S. WILLIAMSON.

Two methods are in general use for estimating the variation in locomotive tractive effort with speed. The more common one is based on cylinder power, and consists of modifying the maximum tractive effort by factors which express the variable relation between mean effective pressure and speed. In the second method, the rate of steam production is divided by the rate of its consumption per horse power and the drawbar pull corresponding to this horse power is found, thus recognizing the limiting effect of the boiler upon tractive power. The validity of the first, or cylinder method, depends upon consideration having been separately given to relative boiler and cylinder capacities, and that of the second depends upon the ability of the cylinders to utilize all of the steam which may be supplied. Thus, in a given case it may happen that at slow speeds, tractive effort is limited by the cylinders, while at higher sustained speeds the boiler will not supply sufficient steam to give the mean effective pressure assumed in the first method.

In calculations based on boiler power, both the rate of evaporation and the cylinder water rate have frequently been assumed as constant throughout the entire range of working. Figures covering rates of evaporation have been based upon tests at high power, while water rates have been based indiscriminately upon tests at various percentages of full power. In the various reports of laboratory tests of locomotives, there is little data on the subject of water rates at slow speeds and long cut-offs. Thus the results of tests, say at 40 r. p. m. and 20 per cent. or 30 per cent. cut-offs, when plotted with full power tests at the higher speeds, give a somewhat flat curve of steam consumption which, while of interest in connection with average performance, may not represent with entire accuracy the variation in water rate with speed at the full (sustained) power on which locomotive rating is based. While an average water rate will furnish a

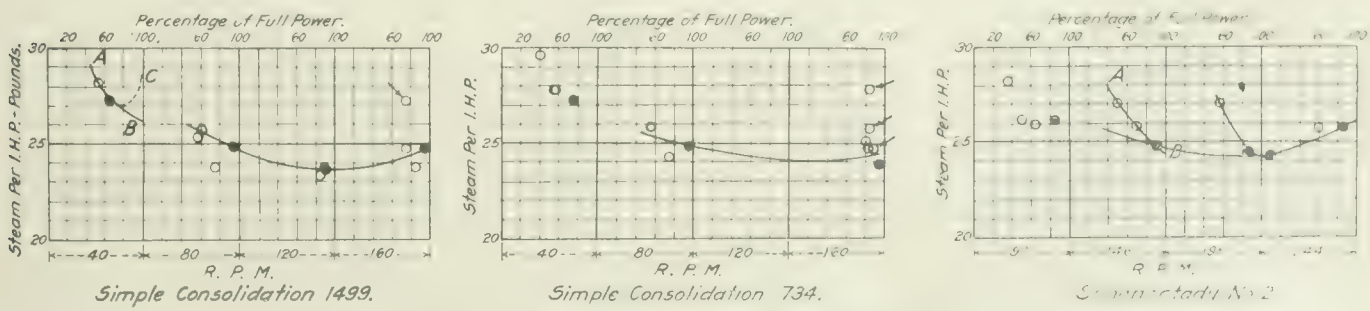


Fig. 1—Steam per I. H. P. for Simple Locomotives.

basis for comparison between different locomotives, the occasional attempts to use the method for more exact purposes suggests an examination of the variables entering into the calculation.

Water Rates.—The water rates found in the tests at St. Louis of each American-built locomotive which was run at high power, and which were recorded in the body of the report of the tests, are plotted in Figs. 1 and 2. The diagram of Schenectady No. 2 represents results obtained at 200 lbs. pressure as recorded by Dr. Goss in University of Illinois Bulletin No. 26 on High Steam Pressures in Locomotive Service. In order to show the combined effect, if any, of percentage of full load and of speed in these diagrams, each speed has assigned to it a vertical zone instead of a single ordinate. Each vertical speed zone is divided by vertical lines representing, as shown by the upper scales of each figure, percentages of full power. Each zone then becomes a diagram showing the water rate on a load base and the combination of several of these into one figure furnishes a speed base for the whole. Thus, in the case of consolidation No. 1499, Fig. 1, the circle *A* represents the result of a test at 51 per cent., and the dot at 64 per cent. of full power. Tests at low power are represented by circles, and tests at high power, or the highest power developed at each speed, by dots.

If, in the low speed zone of this same diagram the tendency *AB* in the variation in water rate be produced to an intersection with the 100 per cent., or full load line, a water rate of 26 or 27 lbs. at full power might appear to be indicated. The circle *A* however represents a test at 20 per cent. cut off and the dot a test at 30 per cent. cut off. Similar remarks apply to consolidation No. 734, Fig. 1. As lengthening the cut-off should increase the water rate, it is clear that the curve should turn upward as shown in the first diagram at *C*. The purpose is not, by means of the data shown, to locate this point, but to indicate that the St. Louis tests furnish little data upon which directly to base a water rate curve for slow speeds and long cut-offs and to illustrate the fact that the low speed range of a curve of water rate at full rating, varies in a manner not indicated by a plot of the results in which no reference is made to the power developed.

Referring now to the zones of moderate and high speed and especially to the line *AB*, of Schenectady No. 2, it will appear, in the case of simple engines, that full power results in a low water rate. It is clear, however, that maximum or extreme cylinder power may involve sufficient back pressure and other undesirable features of steam distribution to affect economy and that, at maximum cylinder power, a rise similar to *C* in the first diagram but of less importance, may be expected. Were the results of a large number of tests at fair speeds and covering a large range of load percentage available, the location of the 100 per cent. line, or the definition of full power, would be important. Extreme cylinder power is disregarded in these diagrams and, assuming that the engines tested were typical as regards boiler and cylinder ratios, the relation of the plotted points to the full power ordinates is based upon full boiler power. It is then clear that at moderate and high speeds we may accept with slight modification the solid dots as representing probable water rates at such maintained power as may be expected with normal ratios of boiler to cylinder power, and it is probable that the variation in water rate due to change in what constitutes full power will be slight. The solid dots representing high power tests of the simple engines are reproduced on Fig. 4 as dots, and the high power tests of compounds are reproduced as circles. Consider-

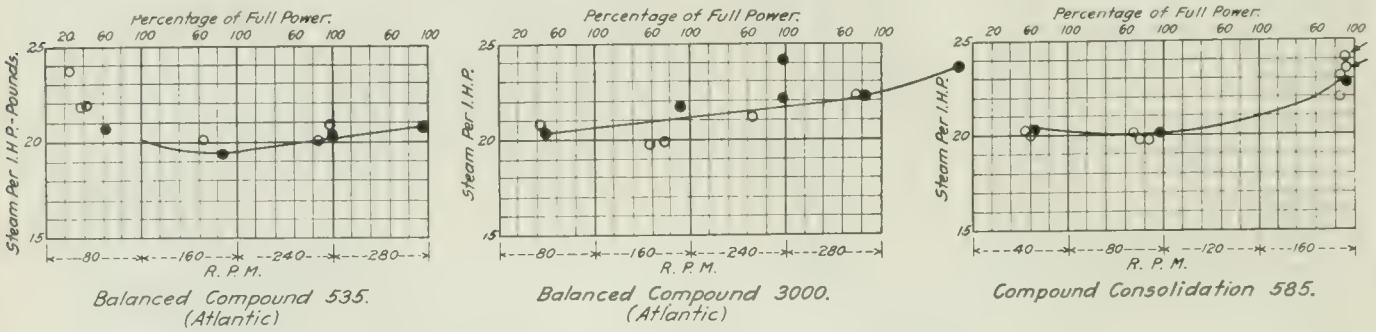


Fig. 2—Steam per I. H. P. for Compound Locomotives.

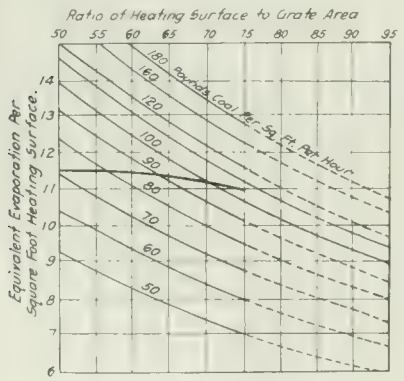


Fig. 3—Evaporation per Pound of Coal Fired.

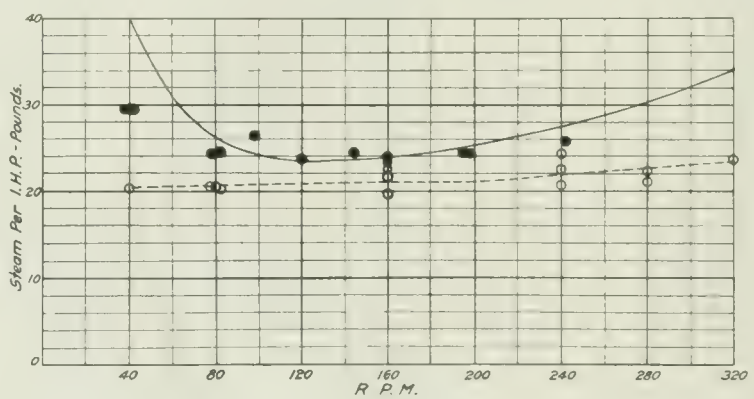


Fig. 4—Comparison of Steam Consumption for Simple and Compound Locomotives.

able uniformity is noticeable, and the water rates at moderate and, to a certain extent, at high speeds are rather well defined. It remains, however, to locate the curve through the low speed ranges, since the dots given for 40 r. p. m. represent but about one half power.

A few tests made at Purdue University, at about 80 per cent. cut-off, 81 r. p. m. and with low boiler pressures, gave water rates which, lowered for steam pressure and raised for speed, correspond with 40 or 41 lbs., at 40 r. p. m. in a modern locomotive. In the report of the St. Louis tests, curves of water rate and cut-off, when extended, indicated a probable water rate of 36.2 at 69 per cent. cut-off and at 40 r. p. m. Again, from a large number of indicator cards taken in road service those were

selected which showed considerable back pressure and wire drawing at cut-off, and a variation between cut-off and speed was derived which represented the road practice of the engineers and the traveling engineer concerned in the tests.

The steam consumption when calculated from the cards, and corrected for moisture by two methods, gave water rates around 38 lbs. at 40 r. p. m., and at other speeds up to 100 r. p. m. gave a curve of water rate closely approximating the solid line, Fig. 4. It may here be remarked that, since the boiler power is seldom the limiting condition at 40 r. p. m., the precise value of the water rate at that speed is of little interest except as indicating the direction of the line and as justifying its curvature through a slightly higher speed range. At high speeds, the curve is elevated as a slight concession to opinions that water rates rise considerably at high speed, all depending of course upon details of design, upon nozzle and back pressure, and other factors which may not be gone into here. Thus the circles of consolidation engines, 1499 and 734, Fig. 1, at 160 r. p. m. represent tests of almost as high power as the dots, and therefore a rising water rate would appear reasonable. Those indicated by arrows, however, were tests in which long cut-offs and throttling resulted in less drawbar pull than shorter cut-offs, and therefore are of less interest than might at first appear. The high speed range of the curve, or, for that matter, both its extremities, may be modified to suit individual beliefs and experience. The empirical equation $S = \frac{1500}{R} + .09\,R$, in which S = lbs. of steam per I.H.P. and R = revolutions per minute, approximates the curve closely. This being the equation of an hyperbola plus a straight line, it may readily and easily be changed so as to raise the curve at one extremity and reduce it at the other and vice versa. No one curve can possibly represent all opinions, the results of various operating conditions or methods of handling; nor for example, the effects either of special valve gears, valve setting or valve leakage. Therefore, while the curve probably represents normal variations corresponding to good conditions, its general form only is here suggested together with one of various methods of arriving at it or similar curves.

In the case of the compounds whose high power tests are represented in Fig. 4 by circles, the probable rise of the curve at the left, is of less importance; the possible ratios of expansion in compound operation indicate that the rise can be but slight. As we are concerned only with sustained power no attempt is made to represent water rates in temporary simple operation. The rise at the left then, at speeds in which full power was not approached, would but little more than equal the rise at the right and suggests that, in the case of compounds a constant water rate of around 21 or 22 lbs. may be used without material error.

Boiler Power.—If we average the rates of evaporation obtained at St. Louis in the three highest power tests of each of these locomotives, and divide by the average thermal value of the fuel used in the same tests, the result indicates an actual rate of evaporation for each thousand B. t. u. in the coal, of 0.68 lbs. water per sq. ft. of heating surface. No allowance is here made for various boiler proportions, such as the ratio of heating surface to grate area. An excellent presentation of that subject appeared in the *Proceedings of the American Railway Engineering and Maintenance of Way Association*, February, 1910, from which the evaporation diagram, Fig. 3 (except for the heavy curve) is taken. Thus, with a ratio of heating surface to grate area of 57, corresponding to locomotive 585 (in Fig. 2) and a rate of firing of 81 lbs. on each of its 49.43 sq. ft. of grate per hour, an equivalent evaporation per square foot of heating surface of 11.4 lbs. is indicated. With a smaller grate area, of say 37.5 sq. ft., giving a ratio of 75, this rate of combustion per square foot of grate should give about 9.5 lbs. evaporation. But the report referred to recommends that the strength and ability of the average fireman be recognized by limiting the amount of coal fired to 4,000 lbs. per hour. Trying this on the above-mentioned ratio of 75, this 4,000 lbs. spread over the corresponding area of 37.5 sq. ft. gives a rate of combustion of 107 lbs. represented by the right end of the heavy line. Similarly, a ratio of 50, or a grate area of 56.4 sq. ft., requiring but 71 lbs. per square foot per hour, gives the left end of the curve, and intermediate points on the heavy line are similarly found. The slope of the line represents loss in economy under high rates of combusion, the same loss that was brought out in tests at Purdue University and reported in Dr. Goss' book on Locomotive Performance. With the somewhat high ratio of 75, an increase in the rate of firing of about 12 per cent. will rectify the line to horizontal, or to a constant rate of evaporation, and with more common ratios, a lesser difference in economy, as 6 per cent. is indicated, a figure insignificant compared with the variables such as endurance of firemen, length of run, weather, and other conditions which enter into the choice of the suggested 4,000 lbs. per hour. The difference in economy is of interest, but that is another matter than hauling capacity.

We have now considered one phase of the subject. If, however, instead of varying the grate, we vary the boiler, so that the 4,000 lbs. gives a constant rate per square foot of grate surface, the diagram readily suggests some striking changes in evaporation per square foot of heating surface. This discussion then will perhaps indicate when the diagram may and may not be used, or the effect of any definite assumption regarding rates of firing. For example: In recently reported tests of a Norfolk & Western locomotive with 44.7 sq. ft. of grate surface, 4,104 sq. ft. of heating surface, giving a ratio of

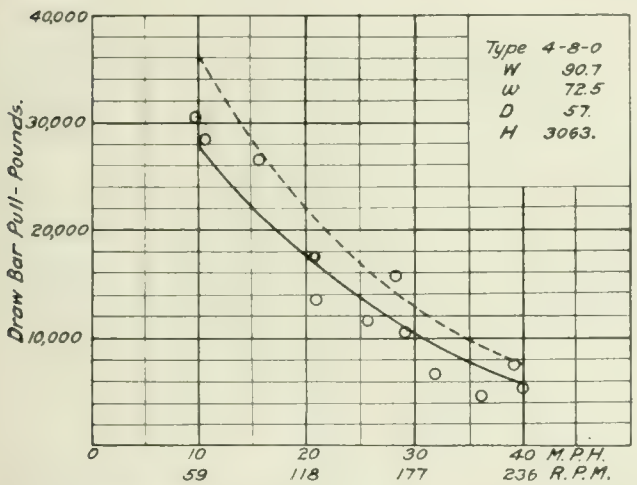


Fig. 5—Actual and Theoretical Drawbar Pull of a 4-8-0 Type Locomotive.

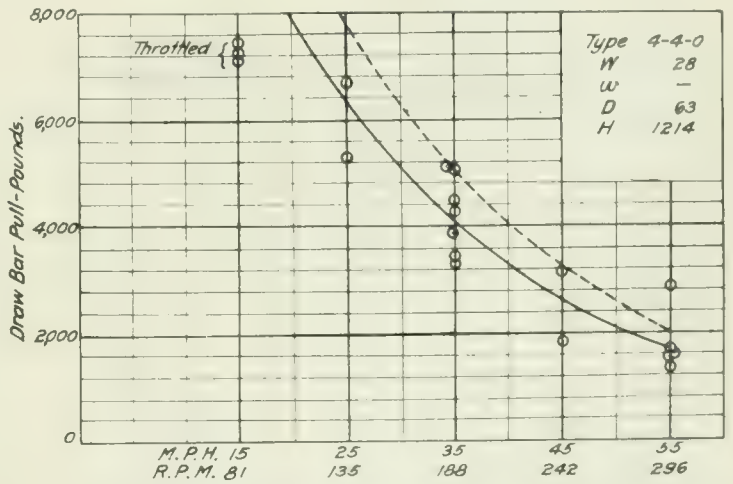


Fig. 6—Actual and Theoretical Drawbar Pull of Purdue Locomotive, Schenectady No. 1.

91.8, 4,000 lbs. per hour or 88 lbs. per sq. ft., would by the diagram give an evaporation very close to the 8.87 lbs. obtained, although the rate of combustion in the test was 128 lbs. per square foot of grate per hour. In using the diagram, it should be remembered that equivalent and not actual evaporation is shown, and that it is based upon coal of 15,000 B. t. u. In the following illustrations, however, actual evaporation will be based upon the above-mentioned 0.68 lbs. per thousand B. t. u. per lb. of coal. Any such generality assumes that the designer understood the proposed conditions, such as quality of fuel and its effect upon details of boiler design and that boiler proportions are as correct as those of the locomotives whose tests furnish the basis of the figure chosen. It also assumes good condition and proper adjustment of the front end. Any allowance for leakage or the common 10 or 12 per cent. per ⅛ in. scale, must be made with a knowledge of conditions, for even were it possible to introduce all factors into an equation its accuracy would still depend upon original judgment.

A General Formula for Estimating Tractive Effort.—If we equate an expression for mechanical horse power at the drawbar to the cylinder horse power (h. p)., and solve for the drawbar pull or tractive effort T which this cylinder power should give were there no frictional losses, we have the common expression

$$T = \frac{375 \text{ h. p.}}{V} \quad (1)$$

in which V represents speed in miles per hour. From the preceding discussion, cylinder horse power cannot at any moment exceed the quotient of the rate of actual evaporation E divided by the steam per I.H.P., S. or $HP = \frac{E}{S}$. A suggested value of E for sustained operation is 0.68 BH in which B represents the thermal value of the coal in thousand B. t. u. and H the heating surface (based upon the fire side of the tubes). Substituting in (1)

$$T = \frac{.68 \times 375.\ BH}{VS} - \frac{255\ BH}{VS}$$

From this the various resistances are to be deducted. The American Locomotive Company suggests 22.2 lbs. per ton on drivers, as representing the resistance of drivers and connected parts of ordinary locomotives. This may be modified, as for increased friction of grease over oil lubrication; some with experience with Mallet compounds in pusher service may prefer 30 lbs. per ton. If preferred, the refinement proposed by the American Railway Engineering and Maintenance of Way Association,

$$R = 18.7\ W + 80\ N$$

(in which R is total resistance of drivers, W is weight on same in tons, and N is number of driving axles), may be used. Generally speaking, the two methods give the same results within but a fraction of a load in ordinary rating. As the variations in driver resistance even on a testing plant, as recorded at St. Louis, were enormous; the figure 22 lbs. may as well be used. If preferred, the deduction of machine resistance may be covered by the use of a water rate based upon dynamometer hours power. Thus, the formula for water rate, if written $S = \frac{1600}{R} + .12\ R$, implies, by comparison with the formula for steam per I. H. P. an efficiency varying from 92 per cent. at slow speeds to 78 per cent. at 280 r. p. m. A water rate per D. H. P. approximating this may be derived from an examination of the tests mentioned in a manner exactly similar to that used for steam per I. H. P. It is as capable of modification as the others:— thus $S = \frac{1600}{R} + .13\ R$ implies an efficiency varying between 91 and 73 per cent.

The resistance of the engine and tender trucks may be deducted by means of some such formula as suggested years ago by Dr. Goss, $W(2 + 1/6V)$ in which W equals total tons on engine and tender trucks and V speed in miles per hour. This will be recognized as one of the older train resistance formulæ with a deduction for air resistance which, in the case of the locomotive is separately taken care of by the expression $\frac{V^2}{4}$.

For the purpose of estimating, then, we may write for level track

$$T = \frac{255\ BH}{SV} - 22.\ W - w(2 + 1/6V) - .25V^2,$$

with further deduction for ascending grades, curvature, etc. This may be changed to r. p. m. of the water rate formula may be expressed in terms of miles per hour and inserted in the above by substitution, by the approximate relation $V = .003\ R\ X\ D$, but it will generally be less confusing to use it in its simpler form for the four or five points necessary to determine the tractive power curve beyond the point at which cylinder power controls.

The circles in Fig. 5 represent the results of dynamometer car tests of the engine whose dimensions* are given. The thermal

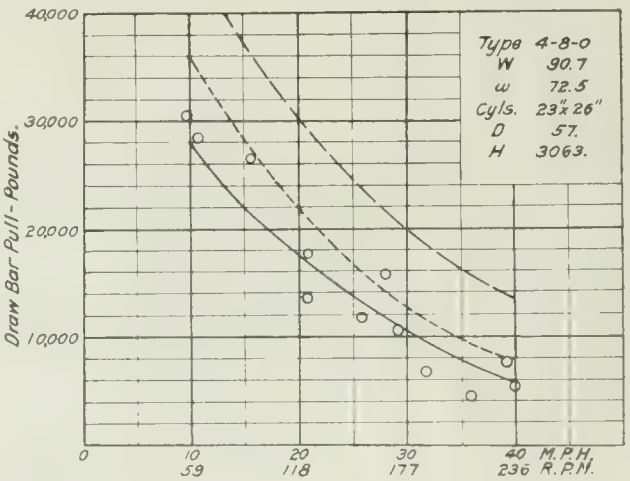


Fig. 7—Drawbar Pull and Tractive Effort Compared.

value of the coal was about 12,000 B. t. u. Every effort was made by all concerned, including the traveling engineer, to obtain good performance. The points represent various high drawbar pulls developed. The figure is taken from both the *Railroad Gazette* of March 7, 1902, and the American Railway Engineering and Maintenance of Way Association report already mentioned. It was selected from among several because it is the largest engine mentioned in those references. With coal of 12,000 B. t. u. the solid line represents continuous performance, and is a plot for this engine of the formula above given. The dotted line represents the possible effect of but one of the operating variables, namely, the use of the injector. It is raised to correspond to the increased temporary boiler power during a drop in water level with the injector shut off. When to this is added other operating variables, including the skill, strength and mood of the fireman, and the consequent variation in the proposed 4,000 lbs. coal per hour, the fact that a single curve cannot agree with all plotted results, nor the latter with themselves, becomes apparent. In order to show the effect of using the same rate of evaporation in the case of a very small boiler, the higher power results obtained at Purdue on Schenectady No. 1 (recorded in *Locomotive Performance*), are plotted in Fig. 6 and also the formula for this engine, omitting air and truck resistance since the results are from laboratory tests.

*W represents the weight in tons on drivers; w, the weight in tons of engine and tender minus the weight on drivers; D, diameter of drivers in inches, and H, the heating surface in square feet.

In case the reader should refer to the proceedings mentioned, he will notice in the case of Fig. 5, a difference in total heating surface, that given in the proceedings being 3,500 sq. ft. and that given in Fig. 5 being 3,063 sq. ft. The heating surface given in the proceedings was based on the water side of the flues but in the report of the St. Louis tests, from which the recommendations given in the proceedings were derived, calculations and results were based on the fire side. Therefore, in using these results the published 3,500 sq. ft. is here changed to the 3,063 sq. ft. corresponding to the fire side of the flues. The difference is important as it changes the total heating surface of the ordinary locomotive about 14 per cent., which represents approximately the error in calculated tractive effort due to the use of the wrong figure.

Fig. 7 is Fig. 5 reproduced with the addition of a tractive effort curve—the upper line—based upon variable mean effective pressure as expressed by speed factors, deduction having been made for the various resistances. A comparison illustrates the point already mentioned, that the validity of either method depends upon consideration having been given the other. To raise the lower line to the upper necessitates the assumption that with Illinois coal a higher rate of evaporation was maintained than the highest rate reached in any of the tests at St. Louis with coal of nearly 25 per cent. higher thermal value. The zone bounded by the curves represents the difference between sustained and temporary tractive effort. Whether all values suggested be accepted or be slightly modified to conform to individual experience or belief the range of variation which may result from different operating conditions is apparent.

TRAIN ACCIDENTS IN FEBRUARY.[1]

Following is a list of the most notable train accidents that occurred on railways of the United States in the month of February, 1912. This record is based on accounts published in local daily newspapers, except in the case of accidents of such magnitude that it seems proper to write to the railway manager for details or for confirmation.

Collisions.

Date.	Road.	Place.	Kind of Accident	Kind of Train.	Kil'd.	Inj'd.
7.	Grand R. & T.	Cooper.	bc.	F. & F.	1	4
11.	Penn.	Primrose.	rc.	F. & F.	1	3
*15.	Grand Trunk	N. Yarmouth.	bc.	F. & F.	3	0
16.	Balt. & Ohio	Rockwood.	bc.	P. & F.	0	24
*17.	Penn.	Larwill.	rc.	P. & F.	4	12
*20.	Boston & Maine	Hoosac Tunnel.	rc.	P. & F.	4	0
20.	Penn.	Middletown.	xc.	P. & F.	0	7
21.	Chi., B. & Q.	Lowder.	bc.	P. & F.	1	9

Derailments.

Date.	Road.	Place.	Cause of Derailm't.	Kind of Train.	Kil'd.	Inj'd.
4.	Lehigh Valley	Flagtown.	unx.	F.	2	1
5.	C. C. C. & St. L.	Myers.	b. rail.	P.	0	9
5.	Penn.	Fort Wayne.	b. rail.	P,	0	3
5.	Southern Pacific	Applegate.	unx.	P.	1	0
11.	N. Y. N. H. & H.	Guilford.	b. rail.	P.	0	0
13.	Great Northern	Doyon.	unx.	P.	..	41
15.	Denver & R. G.	Bingham.	runaway.	F.	5	3
†15.	Penn.	Warrior Ridge.	b. truck.	P.	5	66
16.	Lehigh Valley	Chitt'go Falls.	b. rail.	P.	0	3
26.	Trinity & B. V.	Corsicana.	boiler.	F.	1	4
28.	Southern	Milstead.	unx.	P.	1	6
29.	Illinois Traction	Benld.	unx.	P.	0	14
29.	Chi., R. I. & P.	Anawan.	unx.	P.	0	3

The collision at North Yarmouth, Me., on the 15th, occurred at 4:30 a. m. An eastbound freight with two engines collided with a westbound freight, just east of the point where they should have met, the eastbound train having come into the station at uncontrollable speed. The wreck took fire from the engines and 10 cars of grain and merchandise were burnt up. The engineman, fireman, and a brakeman, on the leading engine of the eastbound train, were killed. One of these men was burned to death and another was smothered under a mass of grain.

In the collision at Larwill, Ind., on the 17th, westbound Pennsylvania Limited No. 5, collided with a preceding wrecking train It was about 5:35 a. m. Four employees were killed and eleven injured, all of whom were on the wrecking train. The wrecking train had been stopped because of a broken rail in the track ahead of it and the workmen were eating breakfast in the commissary car. There was a dense fog at the time and the investigation showed that the passenger train had passed one block signal at caution, two block signals at stop, and the flagman of the standing train. The wooden cars of the wrecking train were burned by fire from the kitchen range. The bodies of two of the killed were slightly burned. The passenger train was largely made up of steel cars and no person on that train was injured. The automatic block signal at the entrance of the block section was about 900 ft. east of the point of collision and the flagman of the standing train was 700 ft. east of his train. He remained on the track swinging his lantern until obliged to step aside to allow the engine to pass. He used neither torpedo nor fusee.

In the rear collision at Hoosac Tunnel, Mass., on the 20th, a passenger train drawn by an electric locomotive ran into the rear of a preceding freight which had been delayed in the Hoosac tunnel near its easterly end. The four men killed were the engineman of the electric locomotive; an apprentice, riding with him to learn the operation of the electric motor; the assistant engineman and a brakeman of the freight train who had gone back to signal the passenger train. The details of the collision were reported in the *Railway Age Gazette*, February 23, page 350, and March 1, page 395. Little additional information has been reported since the publication of our last account. The testimony of the conductor of the freight, who was near the rear end of his train, indicates that all of the men in the cab of the electric locomotive were killed, or at least rendered insensible, by the shock of the collision. The fire did not become serious until somewhere from ten to twenty or thirty minutes after the collision, but the conductor of the freight and the conductor and engineman of the passenger train reached the conclusion that attempts to reach the men in the cab would be useless, and they devoted their chief attention to the safety of the passenger train.

The train derailed at Fort Wayne, Ind., on the 5th, was westbound express No. 15, and the two rear cars in the train were the only ones derailed. One of these was an officer's car, and it fell down a bank. The officer and two porters were slightly injured. The train was running about 35 miles an hour, and the derailment was due to a broken rail.

In the derailment near Doyon, N. D., on the night of the 13th, forty-one persons were injured, many of them only slightly. None were killed. The train was the eastbound Oriental Limited consisting of ten cars, all of which, together with the engine, were derailed, and six fell over on their sides. The cause was not discovered. A loose tire was found on the rear pair of wheels of the engine truck. These wheels had Mansel retaining rings, and all the ring bolts were broken and the tire was about one-third off of the wheel center. The track west of the point of derailment was heaved somewhat by frost, and the train is believed to have been running too fast, causing the engine to roll.

The freight train derailed at Bingham, Utah, on the 15th, was thrown off the track at a sharp curve because of excessive speed while running down a steep grade, and three of the five men killed were sleeping in buildings at the foot of a hill at the side of the track. The locomotive fell down this hill about 75 ft. and crashed through the roof of a bank and a tailor shop. The engineman had lost control of the train some distance back; cause not determined.

[1]Abbreviations and marks used in Accident List:
rc, Rear collision——bc. Butting collision——xc, Other collisions——b, Broken——d, Defective——unf, Unforeseen obstruction——unx, Unexplained——derail, Open derailing switch——ms, Misplaced switch——acc. obst., Accidental obstruction——malice, Malicious obstruction of track, etc. ——boiler, Explosion of locomotive on road——fire, Cars burned while running——P. or Pass., Passenger train——F. or Ft. Freight train (including empty engines, work trains, etc.)——Asterisk, Wreck wholly or partly destroyed by fire——Dagger, One or more passengers killed.

The train derailed at Warrior Ridge, Pa., on the 15th, was the eastbound Pennsylvania Limited No. 2, consisting of two engines, a mail car, a combination baggage and smoking car, two dining cars, three Pullman sleeping cars, and a compartment observation car. The derailment occurred at a switch which had been forced out of position by a piece of the lower arch bar of the truck of the tender of one of the engines which had broken at a point a short distance back of the switch. The engines and the mail car ran a half mile or more beyond the switch, but all of the rest of the cars were derailed and fell down a bank. This derailment was reported in the *Railway Age Gazette* of February 23, page 347. Two passengers and four train employees were killed or fatally injured, and 62 passengers and train employees were injured.

In the accident near Emhouse, Tex., on the 26th, which was caused by the explosion of the boiler of the locomotive, the engineman was killed and the conductor, fireman and one brakeman were injured. The conductor and brakeman were in the caboose, which was being pushed ahead of the engine, having been cut off from the train; and they were injured when the boiler of the engine was blown high in the air, dropping on the caboose and crushing its roof. The accident occurred on a trestle. The caboose was derailed, but the engine frame and the tender remained on the track. The caboose took fire from its stove. The caboose, with eleven bents of the trestle were destroyed by fire. The accident occurred at 1:35 a. m. The explosion was due to low water.

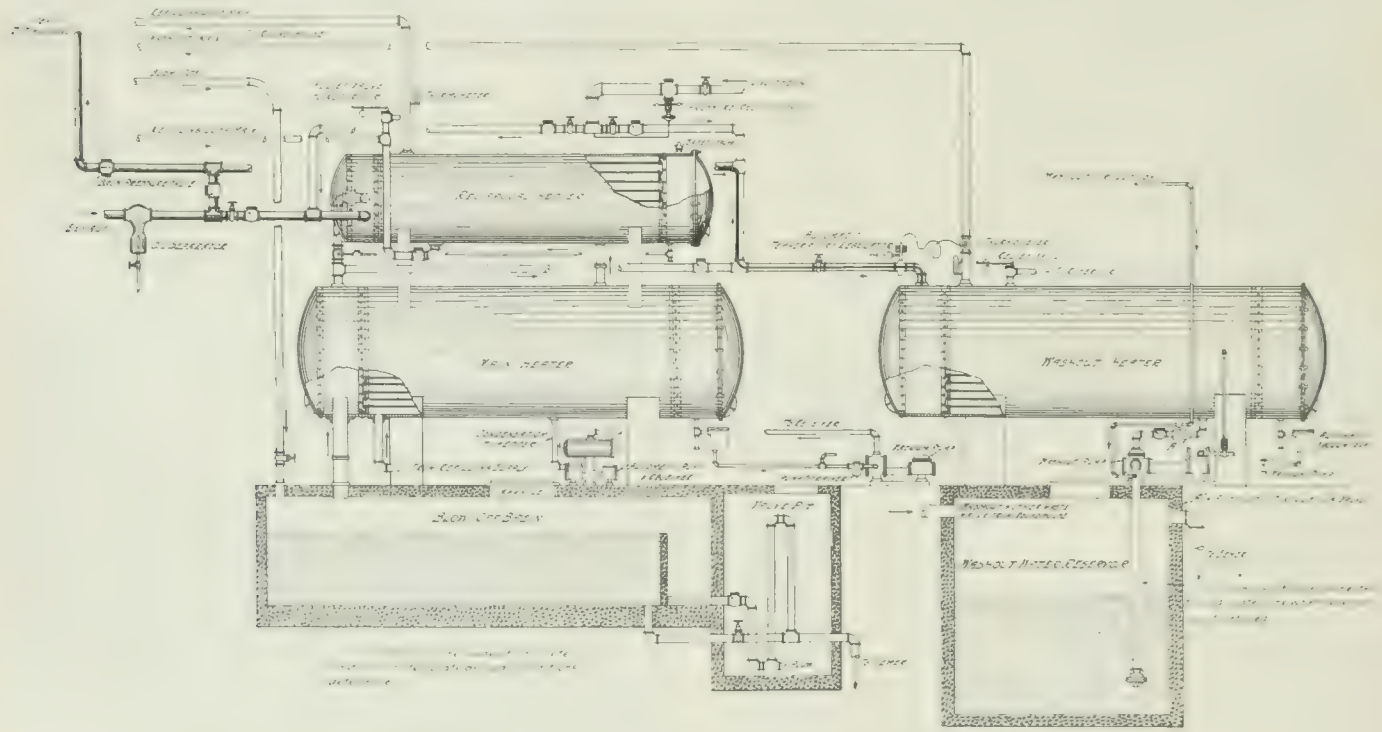
Electric Accidents.—Of the half dozen electric car accidents reported in the newspapers as occurring in the United States in the month of March, only one was reported as having been attended with fatal results. This was a derailment near McKeesport, Pa., on the 6th, where five passengers were killed and 15 were injured. A car which became uncontrollable on a descending grade rolled down a bank about 100 ft. The accident occurred three miles from the nearest town, and one mile from the nearest telephone, and the injured persons suffered severely from the cold while waiting for assistance.

The Bahia Minas Railroad, Brazil, has been granted a concession to build a branch from any convenient point on its line to Conquista City.

HOT WATER BOILER WASHING AND FILLING SYSTEM.

Hot water washing and filling apparatus for locomotive boilers has recently been installed by the Cowles-Mac Dowell Engineering Company, Chicago, on the Chicago & North Western, the Chicago Great Western, the Bessemer & Lake Erie and several other railways. The system operates on the automatic vacuum principle and with a closed circuit. These important improvements result in the maintenance of a more constant water temperature, increase the saving of coal, and reduce the time required to get up steam. The system insures a constant circulation of blow-off and exhaust steam through the heaters, and provides for delivering all condensation into them. The superior efficiency of the heaters is obtained by the use of the vacuum feature and by making them of the closed type. The blow-off basin, main heater and blow-off main are under a vacuum, and as this reduces the back pressure when blowing off it also reduces the time required for the operation.

The drawing shows the general arrangement of the complete apparatus; its operation is as follows: Blow-off water and steam pass first into the blow-off basin. From this basin the steam passes to the first end compartment of the main heater, then through the tubes to the opposite end. Condensation, resulting from the steam imparting its heat to the refilling water surrounding the tubes, is discharged into the main heater, where it adds to the quantity of the refilling water. Clean water for refilling is taken from the railway company's supply and is passed through the main heater, where its temperature is raised by the blow-off steam; thence to the reciprocal heater, where its temperature is raised to 180 deg. and above; from there it goes to the engine house. The heat for raising the temperature of the refilling water in the reciprocal heater is taken from the exhaust steam principally, supplemented by the surplus blow-off steam and by live steam at times when there is a deficiency of waste steam. Steam enters one end compartment of the reciprocal heater, passes through the tubes and imparts its heat to the refilling water surrounding the tubes and is condensed and discharges into the other end compartment of the reciprocal heater; from there it is conveyed to the main heater, adding an additional amount to the quantity and heat of the refilling water. From the end of the refilling line there is a return line to the reciprocal



Cowles-MacDowell Hot Water Boiler Washing and Filling System.

heater which completes the loop for circulation; or, when a separate refilling pump is installed, circulation is maintained through the automatic circulating valve on the pump.

Blow-off products are held in the blow-off basin, where heat is extracted under a vacuum in the form of a vapor which passes into the main heater, as described above, after which the muddy water passes to the sewer through the siphon in the valve pit. The sludge can be washed to the sewer through a sludge pipe in the bottom of the basin, or removed through the manhole. The siphon seals the basin and insures a vacuum therein, and it discharges the dirty water to the sewer.

The washout pump takes its supply from the washout reservoir and passes it through its heater, where the temperature is raised by the heat from exhaust steam, surplus blow-off steam and live steam which circulate through the tubes in the heater. Live steam is used only when there is a deficiency in the other heat supplies. The temperature of the washout water is maintained at about 130 deg. by means of a Sylphon temperature regulator. Circulation is maintained through the automatic circulating valve on the pump. The water used for washing out returns to the washout reservoir. The vacuum pump maintains a vacuum in the tubes and end chambers of the washout heater which insures efficient circulation of steam through them. The condensation from the washout heater is discharged into the main heater.

The vacuum pump maintains a vacuum in the end compartments and tubes of the main heater, the blow-off basin, and the blow-off main to the valves on the lower ends of the post drops. While the vacuum in the blow-off main is destroyed when engines blow-off, the back pressure against the blow-off steam and water is practically destroyed by the counter effect of the vacuum, thus insuring material reduction in the time of blowing off, particularly at the later end when the steam pressure is low. The vacuum causes blow-off steam to pass into the heaters. The vacuum pump discharges all condensation into an automatic pump and receiver, which discharges into the main heater. The pumps are controlled by governors in the usual way. The heaters are built for 135 lb. working pressure. The plant is practically automatic in operation and constitutes a continuous feed water heating system.

THE EVERLASTING BLOW-OFF VALVE.

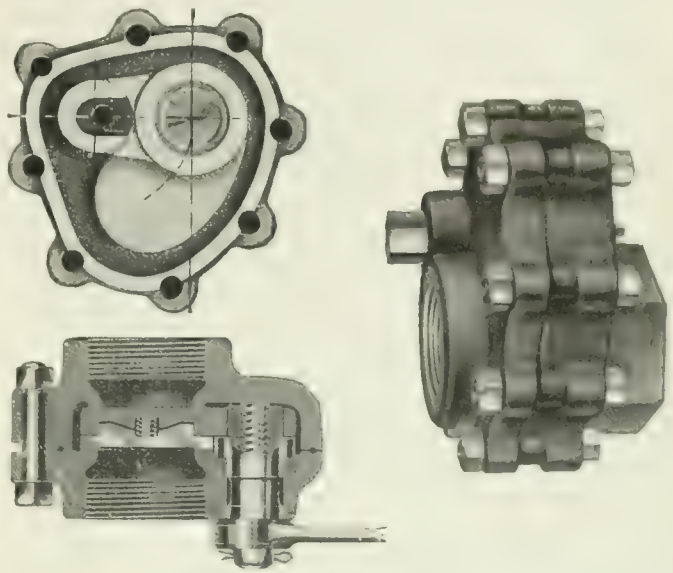
The Everlasting blow-off valve is designed for the severest conditions of blow-off service on locomotives, and differs from others now on the market in several important particulars. The boiler pressure is the only means used to keep it tight, and, as the valve disk never leaves the face of the valve, but is tightly pressed thereto, it is impossible for scale or sediment to get between them and thereby cause leakage, which is the common defect of blow-off valves. Another good point in this valve is the construction of the case, which is made in halves and bolted together. This is more expensive than the solid case used in most other valves, but the accessibility for repairs and inspection attained by this feature is a strong point of merit.

By unbolting the two bonnets the whole working mechanism of the valve can be taken out without the use of hand tools, and the faces may be re-surfaced in ten or fifteen minutes and made as good as new. The valve face is chilled and ground, and the disk is made of the very hardest nickel bronze, giving a remarkable wearing quality to these surfaces.

This valve has no stuffing box, and it will be seen that the mechanism is arranged on very much closer centers than would be possible if the stuffing box were used. A much smoother pull is thus secured, and this materially reduces the effort required to open and close the valve.

The inlet orifice is made tapered and slightly smaller than the opening in the valve face; that is, it is "choke bored." As these openings are eccentric and very close together, the greater part of the solid matter which is carried out with the blow-off enters the discharge pipe without impinging upon the valve face at all. This relieves the face from much of the wear it would otherwise have. By this means also there is obtained a syphoning action which cleans the valve at each operation. The valve is simple, compact, very strong and very rarely requires repairs. A large experience with these valves shows that they are practically self-grinding, as the disk revolves when being operated. The instructions state that the valves should be operated frequently, at least once a day, as this tends to keep them in good condition and is beneficial in helping to clean the boiler.

The 1½ in., 2 in., 2½ in. and 3 in. sizes will stand 150 lbs. hydrostatic pressure, and each valve is tested with 250 lbs. steam



Everlasting Blow-Off Valve.

pressure before leaving the factory. The Central of Georgia has used the Everlasting valve as standard for three or four years. All engines on that line are equipped with four such valves, as the water in that region requires frequent blowing off. The same valve is used through out the engine house at Macon, Ga., in connection with the hot water washing system, and is found very satisfactory for this purpose. It has been used for some time with good results by the Chesapeake & Ohio, and all the new locomotives of the Chicago & North Western are equipped with it. The valve is made by the Scully Steel & Iron Company, Chicago.

Some interesting figures on the progress of the railways in Rhodesia are given in the recent report of the British South Africa Company, which has large interests in the Rhodesia, Mashonaland and Beira Railways. The marked improvement of 1910 in traffic reports of these railways continued during 1911. In 1910 the gross receipts were $6,781,445, and the net receipts $3,504,810, whereas in 1910 the gross receipts increased to $8,677,850, and the net receipts to $4,773,325. Improvement during 1911 was due to the growth in general traffic, apart from the transportation of construction material, although some of that traffic is still passing over the Rhodesian system for the extension in the Congo state of the Katanga company's railway from Elizabethville to Kambove. Today the management of the railways in Rhodesia is concerned less with the absence of traffic than with the means of dealing with traffic already existing and future developments, and also with the adjustment of rates. The principle on which the management is proceeding is not by way of class reductions, which, being wholesale, would be discriminating, but by a careful study of the individual articles. In the last four years reductions have been made on a large number of agricultural products as well as on fencing materials, etc. The rates on timber, scrap iron, etc., have also been reduced.

General News Section.

The St. Louis & San Francisco has announced that it will establish a gasolene electric motor car service between Dallas, Tex., and Sherman.

Press despatches from Corinth, Miss., March 20, report the robbery of train No. 4, on the Mobile & Ohio, near that place, in which it is said that the express car was rifled of valuables aggregating $30,000.

A bill has been introduced in Congress to amend the Erdman act providing for governmental mediation between railways and dissatisfied employees, so that its provisions shall apply to coal mine owners and employees.

The Grand Trunk has increased the pay of telegraphers throughout its lines, making overtime pay for Sunday work the rule everywhere. This will increase the monthly income of a large percentage of the operators.

The proposed meeting of representatives of the mechanical department crafts of the western railways for the purpose of organizing a federation, including employees of all the roads, which was to have been held at Kansas City on March 4, has been postponed, and it is now reported that the meeting will be held on April 15.

The Pennsylvania Railroad reports that in the year 1911 over 500,000 efficiency tests were made and the employees have a record of 99.7 per cent. perfect. As a record of observance of fixed signals this percentage has no value, as the tests cover other subjects, such as conformity to speed regulations, leaving or arriving ahead of time, car doors not properly closed, and other things.

The secretary of the interior, who has just visited the Panama canal, has laid before President Taft a detailed plan for the use of men and equipment from Panama, when certain work on the canal shall have been finished, for the construction of a railway in Alaska. President Taft recently recommended to Congress that the government should undertake the construction of a railway to certain Alaskan coal fields.

The *Santa Fe Employees' Magazine* publishes the record of an Atchison, Topeka & Santa Fe locomotive, No. 1443, that covered 269,899 miles, still carrying its original boiler tubes, between June 13, 1907, when it was received from the Baldwin Locomotive Works, and December 8, 1911, when it was received at the Topeka shops for heavy repairs, with a total outlay for repairs of less than $2,000. The locomotive is an Atlantic type balanced compound passenger engine, and has been in service on the Middle, Southern Kansas and Oklahoma divisions.

Senator Richard Fitzherbert, of Morris County, New Jersey, who was the subject of an investigation on charges of conduct inconsistent with the duty of a senator, still retains his seat, the advocates of expulsion failing to secure the two-thirds' vote, which is necessary to expel a member. The 11 republicans voted for the expulsion of Senator Fitzherbert, and the 7 democrats voted the other way. The connection of Senator Fitzherbert with a bill to forbid the use of acetylene in the lighting of cars in New Jersey, was reported in the *Railway Age Gazette* of February 23, page 326.

A bill has been introduced in the legislature of New York embodying in a modified form the reciprocal demurrage rule which is in force in a number of other states. The bill stipulates that when a car is not furnished to a shipper within the "free time" prescribed in the demurrage rules of the company, the intending shipper shall have a claim equal to the usual demurrage charge for the same number of days. The bill says that no demurrage charges shall be imposed for delay in unloading except by impartial rules and regulations, previously adopted; and these rules must be printed on the bill presented to the consignee.

The announcement that the trains of the Lehigh Valley will cease to use the Pennsylvania terminal at Jersey City on the first of next August, is now followed by the statement that about that time, or as soon as the new station at Summit avenue, Jersey City, shall have been finished, the historic terminal will be abandoned as a passenger station. Summit avenue is two miles from the terminus at the ferry, and this is to be the only passenger station of the Pennsylvania in Jersey City. This station is just west of the point where the tunnel trains of the Hudson & Manhattan emerge from the tunnel and continue westward over the Pennsylvania tracks to Newark. Passengers to and from that part of Jersey City adjacent to the old terminal can avail themselves of the tunnel trains between that point and either Summit avenue or Manhattan transfer.

The broken rail, which was said to have caused the derailment at Hyde Park, N. Y., March 13, was found to have been broken into at least eight pieces. It was a 33-ft. rail. Seven pieces have been recovered. About three feet is missing. This may have been carried into the river. In those parts which were found the breaks were all clean and new showing no fault in the metal. The inspector of the Interstate Commerce Commission proposes to have a piece examined and analyzed at the Bureau of Standards, in Washington, and the New York State Public Service Commission has asked for a piece to be examined and analyzed at the laboratory of the mill where the rail was made (Buffalo). Officers of the road have been unable to decide whether the failure of the rail caused the derailment or was caused by it.

At a recent union meeting of district representatives of the Brotherhood of Locomotive Engineers, Brotherhood of Railway Trainmen, Brotherhood of Locomotive Firemen and Order of Railway Conductors, at Springfield, Ill., it was resolved "that we go on record as opposed to the drastic and unnecessary laws that are being pushed by shippers and manufacturing associations in many states tending to drain the resources of the railways and reduce their operating revenues, believing as we do that the theory of a square deal should apply to so great an industry as the transportation of the world's products. The constantly increasing demands of the public for safer and better facilities in transportation, and the installation of modern safety appliances for the protection of railway employees render it necessary that a more liberal attitude should obtain on the part of public officials, and those having to do with the making of laws."

Disastrous Boiler Explosion at San Antonio.

At the shops of the Southern Pacific in San Antonio, Tex., last Monday one of the company's largest locomotives, nearly new, was wrecked by the explosion of its boiler, and 32 men were killed. The engine stood at a point in the yard where it was nearly surrounded by three buildings, and most of the persons killed were in these buildings. Some of them were crushed by parts of the buildings which fell in consequence of the explosion. Fifty or more persons were injured. Most of these shopmen were from northern and eastern cities, having been employed at San Antonio only since the strike which occurred there a few weeks ago.

The Coal Strikers.

The strike of coal miners in England continues with little change from the condition reported a week ago, although it is said now that the number of employees of factories, railways, etc., who have been made idle by the cessation of work at the coal mines, is increased to 1,500,000. The principal news of the past week has been that relating to the action of Parliament. On Tuesday the government introduced a bill to establish minimum rates of wages in the mines, but there is much difference of opinion as to the merit of the proposal, and the government itself seems to be undecided regarding many features of the problem. The bill divides the country into 21 districts and provides for the establishment in each of a reasonable minimum rate of wages, with safeguards for the owners of the mines, the whole to be arranged by district boards. The bill has little of compulsion, and it is declared to be a temporary measure, intended

to be abolished or modified after the present disagreement shall have been settled.

The strike of coal miners in Germany appears to have failed, and the reports indicate that most of the men went back to work this week. On Monday there was a strike of coal miners in the district of Denain, France, where 7,000 of the 13,000 miners left their work.

The committee of anthracite miners, who met the operators in New York City last week, rejected all of the proposals made by the operators, and it is intimated that the miners will be ordered to strike on the first of April. President Taft has had numerous conferences with representatives of the operators, and has invited John Mitchell to confer with him on the subject.

Value of Harriman Estate.

The final appraisal of the estate of E. H. Harriman is about completed, and it is estimated that the estate will be valued at in the neighborhood of $100,000,000. The transfer tax of the state of New York will amount to about $1,000,000. Of this transfer tax, which is the largest single tax on the transfer of an estate that has ever been made in New York, between $700,000 and $800,000 has already been paid to the state.

Possibly Prejudiced.

Mr. Rockefeller and all the old crowd who were brought up in the oil refining business can never reconcile themselves to the idea of using oil as a locomotive fuel. To them, oil is too valuable a product to be fed into the maw of a hungry locomotive. They think of the big money in the refined oil and its by-products. Of course, they know that 50 per cent. of the oil produced in California is unsuitable for refining, but it hurts them nevertheless to see it burned up like coal or used to improve the condition of country roads.—*Exchange.*

Railway Monopoly.

"What do you think of the suggestion that no corporation be permitted to have more than fifty per cent. of a given business?"

"I think it would be more feasible to provide that not more than fifty per cent. of any legislative body should consist of lawyers. The Anti-Trust Law, as it stands, covers this feature sufficiently, and the experience of the railways illuminates the problem. Transportation is the biggest industry in the United States, but it is not a monopoly, as it is in France, nor are amalgamations encouraged, as they are in England. Here, largely by the operation of the Anti-Trust Law, it is divided into great competitive units. For example, the Chicago & Northwestern is competing all the time with the Chicago, Milwaukee & St. Paul, in service, and in efforts to develop a large section. The Union Pacific, the Burlington, the Rock Island, the Santa Fé, and the Missouri Pacific are competitive. The Southern Railway, the Atlantic Coast Line, and the Seaboard Air Line are competitive in another large territory, and so on through the whole country. Doubtless tens of millions of dollars could be saved if the French method could be applied by parceling out the country into districts and giving one company the business of a district without competition. Much wasteful service could be eliminated, traffic could be sent over the lines of least resistance, and the consequent savings could be divided between producer, consumer, and wage-worker. It would all be a question of administration. Under proficient executives and with political wisdom it might work splendidly, but under other conditions fall into dry rot. The Anti-Trust Law preserves the advantages of competition, which, after all, is not obsolete. The competitive *instinct* has not been repealed in football, or among politicians, or in industry.—*Frank Trumbull; Interview in The Outlook.*

Educational Bureau for the Central of Georgia.

W. G. Winburn, vice-president of the Central of Georgia, has issued a circular announcing the establishment of an educational bureau as recently noticed in the *Railway Age Gazette.* It is to be under the charge of D. C. Buell, who continues chief of the educational bureaus of the Union Pacific and Illinois Central. The first instruction papers for the Central of Georgia will be issued on April 1. The system will be an adoption of that established on the Union Pacific and then extended to the Illinois Central. A local office will be located at Savannah, Ga., to handle lesson papers and correspondence with students, while the text book work will be done at the Union Pacific headquarters at Omaha. Mr. Buell has just finished a trip over the road for the purpose of arranging the necessary changes in the text books and lessons to bring them into accord with the Central of Georgia conditions and standards. He found that little revision was required and that the instructions may be adapted to the needs of each road at a minimum expense.

State Authorities Promise Action to Reduce Trespassing.

The letter written by President Darius Miller of the Chicago, Burlington & Quincy to the governors of the thirteen states traversed by the Burlington lines, asking the co-operation of the state authorities in securing the enactment and enforcement of laws to prevent trespassing on railways, has elicited a ready response, with many promises that the subject shall receive careful consideration. Mr. Miller's letter, in which he showed that over half of the people killed annually by the railways are trespassers, was published in our issue for March 1, page 441.

Governor Shafroth, of Colorado, expressed approval of the endeavor to bring about a reduction in the number of railway casualties by preventing trespassing and requested Mr. Miller to submit a draft of a suitable law.

Governor McGovern, of Wisconsin, wrote that the subject is an important one but not a simple one for the legislators. He said he had called the attention of the State Railway Commission to it, and that he would give the subject his personal attention.

Governor McDonald, of New Mexico, wrote that the subject will be given careful consideration.

Governor Carey, of Wyoming, wrote: "I am heartily in accord with what you propose in the way of legislation to protect railways from trespassers and to protect those who trespass."

Governor Colquitt, of Texas, replied that he had referred Mr. Miller's letter to the chairman of the railway commission; and several others replied similarly.

Secretary Kilpatrick, of the Illinois Railway Commission, replied to Mr. Miller's letter saying that the subject of trespassing has engaged the attention of the Illinois commission and of the North Central Association of Railway Commissioners, and that "something ought to be done to prevent these casualties."

George Rice, chairman of the South Dakota commission, wrote: "The commission has already given the subject some consideration and in its next report to the governor will make some recommendations."

E. H. Hogueland, secretary of the Kansas commission, said in his letter that the subject had never received proper attention at the hands of the legislative bodies and that the Kansas commission will be glad to recommend to the state legislature any appropriate legislation on the subject.

T. M. Bradbury, secretary of the Missouri commission, said he believed that commission is in full accord with Mr. Miller's suggestions and will endeavor to have the matter considered at the next session of the legislature.

Chester M. Dawes, general counsel of the Burlington, is preparing a draft of a proposed bill to prohibit trespassing.

Agreement for Joint Ownership of the Belt Railway of Chicago.

A most important improvement in the methods of interchanging through freight between the various railways in the Chicago terminal district is expected to result from an agreement which has been reached by fourteen of the principal roads entering the city providing for the joint ownership and operation of the Belt Railway of Chicago, which operates under lease what is known as the Belt division of the Chicago & Western Indiana Railway, an inner belt line encircling the city from South Chicago to Cragin, a distance of 22 miles, intersecting all roads entering the city.

All of the roads entering the city have been invited to join in the plan by becoming joint stockholders of the Belt Company, and others in addition to those who have already done so are expected to become parties to the agreement. The list at present includes the Chicago, Rock Island & Pacific, the Illinois Central, including the Chicago, Madison & Northern, the Pennsylvania Lines, the Chicago, Burlington & Quincy, the Chicago & Alton, the Minneapolis, St. Paul & Sault Ste. Marie, the Atchison, Topeka & Santa Fe, the Chesapeake & Ohio, the Grand

Trunk, the Wabash, the Erie, the Chicago, Indianapolis & Louisville and the Chicago & Eastern Illinois. Of these the latter seven now use in part the terminal facilities of the Chicago & Western Indiana.

The agreement provides that the Chicago & Western Indiana shall purchase for $4,400,000 the property of the Chicago Union Transfer Railway, including the Clearing yard, a modern hump classification yard, with a capacity of 5,000 cars a day, situated in the southwestern part of the city, and shall construct when required an auxiliary clearing yard at or near South Chicago, in addition to the eight yards which are now operated by the Belt. The Western Indiana will also construct and elevate two additional main tracks between Seventy-sixth street and Pullman Junction, where it now has four tracks, to be leased to and operated by the Belt. The plan also provides for the construction eventually of additional trackage and yards as required to avoid all grade crossings and enable a thorough reorganization of the present methods of transferring freight. The Western Indiana will lease the Clearing yards and additional main tracks to the Belt company for 50 years in the same manner as its Belt division is now leased to the Belt company and at a rental equal to the interest on the bonds to be issued in payment, and for the cost of all additions and improvements to be made hereafter. The existing leases of the Western Indiana to the Belt company are to be readjusted so that the rentals shall be equal to the interest at 4½ per cent. on $14,000,000, which is assumed to be the value of the Belt division in its present condition. During the year 1911 the net earnings of the Belt were sufficient to pay 4½ per cent. interest on $23,000,000.

The Belt company is to increase its stock from $1,200,000 to at least $4,000,000, and to sell the additional stock to the railway companies at par for cash ($240,000 to each), and each company holding stock in the Belt will be entitled to have one director in the Belt company. The latter will grant to each of the stockholding companies the right to use its main lines between Cragin and South Chicago, and between Argo and Elsdon for interchange of freight traffic with other railways and to and from each of the clearing yards and will itself maintain and operate the property. All working expenses, including rentals to the Western Indiana company and dividends of not less than 6 per cent. on the stock of the Belt company, are to be paid by the stockholding companies on a per car basis of property used in common.

The Belt company will maintain and operate an L. C. L. clearing house at Clearing for the joint use of all of its tenant companies, and will classify and interchange cars at the Clearing yards at an equal price per car for its stockholders which may reach the yards by any line. It will continue to switch cars as at present and to do local and industrial switching on its lines for all companies in Chicago at tariff rates and any profits from such switching will be credited to the rentals and expenses of the Belt company.

The Belt company is to have the option to purchase the property used by it at the end of 50 years on payment of the principal sum on which it shall then be paying interest rentals.

What is probably the most important feature of the plan is that it will remove a large amount of interchange from the congested downtown terminals to the outer clearing yards. Transfers of through freight from east to west and west to east and west to south will be made in the yards at Clearing, which now have a capacity of 5,000 cars a day and occupy but one-fourth of the property to be purchased from the Chicago Union Transfer Company. Therefore, the plan provides for an expansion of the yards to a capacity of 20,000 a day, or twice the volume of the present transfer business of the city. The proposed new yard at South Chicago will be designed to handle transfers between east and south, but will not be required at present, because the Belt now has three yards just north of Ninety-fifth street in that vicinity, the Burnside, Stony Island and South Chicago yards.

Several other roads which have not become parties to the agreement to become stockholders of the Belt are connected with the Clearing yard through the Indiana Harbor Belt, which connects with the yard on the west, while the Belt Line connects with it on the east. The Indiana Harbor provides an outer belt line supplementing the inner belt line. The entire plan also has an important bearing on the plans of the city and of the federal government authorities for the improvement of harbor facilities in and near Chicago which have not yet been definitely determined. From sixty to ninety days will be required to carry out the legal formalities incident to the plan, which represents the culmination of nearly 20 years of effort to effect a plan of joint ownership of the Belt property. Negotiations with the representatives which led to the adoption of the plan have been carried out by W. H. Lyford, general counsel of the Chicago & Eastern Illinois, acting as counsel for the reorganization committee of the Belt company.

Accident Record—Correction.

An officer of the Grand Rapids & Indiana informs us that the item in our January accident record (March 1, page 387), showing a collision on that road on the 24th, is unfounded. No accident occurred on that road on the day named, nor was there any accident in January in which two persons were killed.

Railway Club at University of Illinois.

About 40 students of the University of Illinois, pursuing courses in railway engineering or railway administration, have joined in forming the Railway Club of the University of Illinois. The object of the club is to provide for informal meetings for a discussion of railway problems and to promote good fellowship among its members.

Western Railway Club.

At the regular monthly meeting of the Western Railway Club, which was held in the Karpen building, on Tuesday evening, March 19, Dr. P. H. Conradson, chief chemist of the Galena-Signal Oil Company, Franklin, Pa., presented a paper on Lubrication of Steam Engines. Practical demonstrations of the lubrication of superheater engines were made at the meeting.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.; annual, May 7-10, Richmond, Va.

American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass.; annual, May 10-11, San Francisco, Cal.

American Association of General Passenger and Ticket Agents.—W. C. Hope, New York; next convention, Seattle, Wash.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Detroit, Mich.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and Sept.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York. Convention, October 7-11, Chicago.

American Electrical Railway Manufacturers' Assoc.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

American Railway Association.—W. F. Allen, 75 Church St., New York. Next session, May 15, New York.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago.

American Railway Master Mechanics' Assoc.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

American Railway Tool Foremen's Association.—M. H. Bray, N. Y. N. H. & H., New Raven, Conn. Convention, July 9, Chicago.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Annual, March 28-29, New York.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

American Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago. Semi-annual, June 11, Atlantic City, N. J.; annual, October 21-25, Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Car Accounting Officers.—G. P. Conrad, 75 Church St., New York. Convention, Oct. 7-11, Chicago.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago. Convention, May 22-25, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

Master Car and Locomotive Painters' Assoc. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass. Convention, September, 10-13, Denver, Col.

National Railway Appliances Assoc.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railroad Club.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Business Association.—Frank W. Noxon, 2 Rector St., New York.

Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

Railway Gardening Association.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.

Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio. Convention, May 20-22, Buffalo, N. Y.

Railway Supply Manufacturers' Assoc.—J. D. Conway, 2135 Oliver Bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

Railway Tel. & Tel. Appliance Assoc.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. Y., Sterling; September, 1912, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; August, 1912.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

Prince Rupert, the western terminus of the Grand Trunk Pacific, has become so important as a commercial center that steamships are being loaded in England with cargoes to be carried direct to the Pacific port.

At a meeting of the Central Passenger Association in Chicago on March 13 it was decided not to make special rates below two cents a mile for the democratic and republican national conventions to be held in Baltimore and Chicago. Summer tourist rates will be available for those in attendance at either convention.

The boards of trade of Kansas City and other western cities have petitioned the commerce court to review the order of the Interstate Commerce Commission under which the railways delivering grain at Missouri river points were ordered to cease paying elevator allowances, except on grain passing through for destinations beyond.

Beginning April 3, the Erie Railroad will run, for the Ohio State University, a corn and alfalfa instruction train over the Erie lines in that state. The cost of running this train, covering 25 stops and occupying three days, will be about $1,500; and this sum the railway company contributes for the general good of the communities affected.

The National Industrial Traffic League at a meeting in Chicago on March 14 declined to endorse a bill which has been introduced in Congress providing for the appointment of Deputy Interstate Commerce Commissioners. The matter was referred to the legislative committee for further consideration. The league endorsed the bill providing for a national uniform bill of lading.

The Chicago & North Western, beginning March 25, will run a live stock instruction train in southern Wisconsin, in cooperation with the Wisconsin College of Agriculture and the Wisconsin Live Stock Breeders' Association. The exhibit will include a representative display of stock of types adapted to Wisconsin farming conditions. The live stock exhibit will be installed in a special palace stock car so arranged as to permit of convenient inspection. Another car will be devoted to the dairy exhibit. The speakers will include several agricultural authorities.

The Department of Agriculture (Washington) announces that beginning March 25 the Bureau of Public Roads will run a good roads instruction train over the lines of the St. Louis & San Francisco, starting from Brownsville, Texas, and continuing through a four months' campaign. The trip will cover 15,000 miles of the lines of that and other roads, in eight states. It is planned to give three hundred lectures on good roads topics. The lecturers will have over 100 colored lantern slides. The American Association for Highway Improvement will co-operate with the government and the railway company. The train will consist of four cars, and will carry models of all types of road construction.

Shippers of strawberries in central New York have complained to the State Public Service Commission that the minimum weight charged by the New York Central for a carload of strawberries—10,000 lbs., is unreasonable; this on the ground that because of the quick time that must be made with shipments of strawberries it is impracticable to load two or more consignments in the same car for two destinations; and that, therefore, they are practically compelled to pay for 10,000 lbs. on some small shipments. In 1908 the minimum was 3,000 lbs.; in 1909, it was made 4,000 lbs., and last year 10,000. This increase in prices checked the shipments so that the number of carload lots fell off greatly. The actual increase in the freight bills is claimed to have been from 42 to 79 per cent. Complaint is also made that serious loss was caused by sending strawberries from Utica to Saranac by way of Norwood and Malone, 228 miles, instead of sending by way of Utica, 143 miles.

The Merchants & Manufacturers' Association, composed of 1,500 representative commercial, business and professional men of Milwaukee, has adopted a resolution directed to the Interstate Commerce Commission, the Wisconsin Railway Commis-

sion and the Congress of the United States, asking for more conservative regulation of railways in order to give the railway companies an opportunity to make a reasonable profit and thereby give better service. It is pointed out that the welfare of shippers is seriously threatened by the lack of sufficient equipment and improvement in facilities, a condition for which over-regulation is blamed. The president of the association, General Falk, says: "There is no intention to give the railways more than their just dues. We cannot do without them. They must be prosperous in order to render a good service and to make extensions and improvements. Milwaukee is vitally concerned. Many of the local industries are engaged in the production of railway supplies. A revival of railway business would benefit Milwaukee industries to a very considerable extent."

The New York State College of Agriculture is to run an instruction train over the Delaware & Hudson beginning April 1 and visiting towns in the state of New York along that company's lines for the two weeks following. The train is to be made up of six cars, including four demonstration cars. In variety this traveling school apparently will rival, and perhaps will surpass all others. According to the announcement "three cows from the college herd will illustrate the possibilities in developing good grade cows from common stock. Various plant diseases will be shown by mounted specimens of affected plants, and these will be studied with the help of microscopes. Visitors will have an opportunity to grade and test eggs. Women will find an exhibit of inexpensive and practical labor-saving devices for the home, to be shown in operation. The underlying principles of cooking certain classes of food will be given in lectures and illustrated by the actual cooking of the foods. Insect pests will be shown in various stages of development. An exhibit of spraying nozzles, chemicals and materials will show the best methods of controlling insect pests." The lectures will be given by nine experts from the college.

The case of C. M. Cole, a wealthy cotton factor of Memphis, Tenn., against the St. Louis, Iron Mountain & Southern, which has attracted a good deal of attention in the federal district court of West Tennessee, was dismissed on March 5. Mr. Cole was suing the railway company for $250,000 damage, claiming that he had been maliciously prosecuted. Cole had been prosecuted by the road recently on the charge of stealing cotton from the platforms of the company in Memphis, but he won the suit. In the present case Cole sought to recover damages which he conceived had accrued to himself and his business as a result of the prosecution. The presiding judge, however, in his instructions to the jury, stated that it had not been proved that the former prosecution was brought with malicious intent. Indeed, he held that the railway company had shown reasonable grounds for a suit against Cole, and that Cole had not been able thoroughly to disprove suspicions arising from the charges against him. And since, in his opinion, the guilt or innocence of Cole was not the point at issue, but rather the responsibility of the company for having brought its suit, it was judged that the company could not be held for damages, and the jury was so instructed. A motion for a new trial has been filed by the attorneys for Cole, claiming that the court has erred on four points during the trial.

January Earnings.

The Bureau of Railway Economics, 1329 Pennsylvania avenue, Washington, reports that January railway receipts have fallen off while expenses increased. Returns for the month received by the Interstate Commerce Commission covering about 93 per cent. of the mileage of the country, show total operating revenues of $203,143,118, and operating expenses $158,911,489. In comparison with January, 1911, this is a decrease of $2,886,149 in revenues and an increase of $4,205,871 in expenses. Net operating revenue, $44,231,629, is less than for January, 1911, by $7,092,020; an average decrease of $34 per mile of line for the month, or 15 per cent.

High [Speed] Living.

A party of tourists which recently traveled over the Grand Trunk Railway of Canada continuously for five days, was served during that time, on the dining cars, with 660 meals daily, or 3,300 meals in all. This was done on two standard dining cars, each having a seating capacity of 30 persons and managed by one conductor, four cooks and five waiters. At this rate each waiter served, at each meal, an average of 22 persons; and each chair would be used an average of three and two-thirds times at each meal. Moreover, the press agent avers that the passengers unhesitatingly testified that this dining car service was superior to anything which they had had on their entire trip. As to the unfortunate dining cars, steamboats or hotels which are thus relegated to second place, no names are given.

Traffic Club of Chicago.

Several active campaigns are being conducted in the Traffic Club of Chicago in preparation for the annual election to be held on March 26. Three tickets of officers for the ensuing year have been nominated. The regular ticket of the nominating committee was published in the *Railway Age Gazette* of March 1. A second ticket names the same candidates as the regular ticket, with the exception that it includes John H. Grace, assistant general freight agent of the Great Northern Railway as a candidate for treasurer, which office he has held since the organization of the club. A third ticket nominates the following: President, J. Charles Maddison, traffic manager of Montgomery Ward & Co.; first vice-president, W. H. Cochrane, general manager Chicago & South Haven Steamship Company; second vice-president, J. A. Tapee, assistant traffic manager Morris & Company; third vice-president, J. J. Armstrong, traffic manager, Pickands, Brown & Company; secretary, W. H. Wharton, commercial agent Nashville, Chattanooga & St. Louis; treasurer, Harry Zweig, traffic manager J. Rosenbaum Grain Company.

California Raisin Day.

This anniversary, inaugurated three years ago, will be celebrated again this year on April 30. Raisin Day has now become an annual affair, and we are assured "there is hardly a part of the United States where raisins are not eaten on this occasion." The Southern Pacific and other railways prepare special menus for their dining cars, all of which have some dish containing raisins. A committee is to issue 40,000 posters and window cards, 100,000 post cards and 2,000,000 stickers, to be distributed throughout the country.

Railways and the Panama Canal.

Vice-President Kruttschnitt, of the Union and Southern Pacific Lines, takes an intelligent view of the relation of the transcontinental railways to the Panama canal. He admits that a good deal of business might be lost by the Southern Pacific to the canal, but he sees compensating advantages in the increase in short-distance traffic which would result from opening the water route between the coasts. If the canal is to be successful it will result in building up business inland from the coasts, especially on the Pacific side, where there is ample room for development. "The great shipping and consuming public," Mr. Kruttschnitt said, "does not live at seaports." The railways will continue to move traffic which requires frequency and expedition of service, and they will gather and land at the docks freight which is to be sent by water and distribute that which is brought in by water; and they are likely to gain twice as much as they lose, through the development that will take place. This is a broad and enlightened view which is not often enough taken by railway managers in considering the competition of water routes. There is no more reason why railways should control steamship lines than why steamship companies should control railways. Neither can do the proper work of the other, and, if left free and independent, each will help the other, and it is to the advantage of the public that neither should control.—*Journal of Commerce, New York.*

INTERSTATE COMMERCE COMMISSION.

The commission has suspended until July 13 certain tariffs, naming increased rates for the transportation of hay, filed by the Chicago & Northwestern and other roads west of Chicago. These tariffs as filed were to go into effect March 15.

The commission, on Tuesday of this week, announced its decision in a number of cases involving freight rates on coal from

the Virginia and Pittsburgh districts to Lake Erie. On bituminous coal from Pittsburgh to the Lake the rate of 88 cents a ton is ordered reduced to 78 cents. From the Thacker district in Virginia to the Lake an advance made by the railways from 97 cents a ton to $1.065 a ton, and from the Pocahontas district an advance from $1.12 to $1.2125, are sustained by the commission. The commission refused to approve the following proposed advances: from the Fairmount district, 96¾ cents to $1; from the Kanawha district, from 97 cents to $1.065; from the New River district, from $1.12 to $1.2125. The opinion in the Virginia case, prepared by Commissioner Lane, includes an exhaustive study of the cost of transporting this coal. The opinion in the Pittsburgh case, by Commissioner Meyer, also goes into details of cost.

Sugar Rates Reasonable.

Rates and Practices of the Louisiana Railway and Navigation Company. Opinion by Commissioner Clark:

This road has on file a "local import tariff" applying on sugar imported from foreign countries, etc., to Gramercy, La. The rail haul from New Orleans or Port Chalmette to Gramercy is wholly within the state of Louisiana. When the sugar is being loaded into vessel at foreign port the New Orleans agent of the Gramercy refinery is notified and he notifies agent of the railway; the railway loads the sugar into its cars at the wharves, has it switched to its terminal, and transports it to Gramercy; *Held,* That the rail transportation is subject to the federal act. On complaint that the rail carrier is transporting this sugar at less than the cost of the service, and thereby effecting discrimination against sugar refinery at New Orleans; *Held,* That under the tariff as amended subsequently to the institution of the inquiry the service is not performed at less than cost and that the practice does not effect undue discrimination. (22 I. C. C., 558.)

COURT NEWS.

In the Federal court at Buffalo, N. Y., on Tuesday of this week, the Delaware, Lackawanna & Western was fined $2,000, or $100 each on 20 counts, for carrying hay from Buffalo, N. Y., to Scranton, Pa., without charge. The hay was to be used in feeding the mules in the coal mines controlled by the company.

The Commerce Court, on March 20, issued a peremptory writ of mandamus requiring the Louisville & Nashville and the Southern Railway to receive and transport coal from the Stony Fork Coal Company and the Ralston Coal Company in Kentucky. The two roads had refused shipments because of disagreement as to which company should furnish the cars, and the coal companies lost a great amount of business. Judges Archbald and Mack dissented.

The Nyasaland Protectorate, Africa, already possesses a railway within its borders known as the Shire Highlands Railway, 113 miles long. This line runs from Port Herald, on the Shire river at the southern entrance to the Protectorate, first to Chiromo and then through the Shire Highlands to Blantyre. During the short time it has been in operation it has caused such a development of the country it serves that an outlet to the coast has become urgently necessary. If the present arrangements are completed, the government will buy for $900,000 from the British Central Africa Company, public lands to which the Shire Highlands Railway Company is entitled, and will guarantee interest at 4 per cent. for a term of years on the $2,500,000 required for extension of the Shire Highlands Railway from Port Herald southward to the northern bank of the Zambesi river, subject to the consent of the Portuguese government to the railway passing through its territory. This arrangement is also dependent on the construction of a railway through the Mozambique company's territory from Beira to a point on the southern bank of the Zambesi opposite the river terminus of the Shire Highlands extension. The combined length of the proposed new railway will be about 250 miles. The northern line will run from Port Herald along the bank of the Shire river and touch the Zambesi at Kaia, near the junction of the two rivers, to which place the Zambesi is navigable all the year round. This section is about 70 miles long and will be of 3-ft. 6-in. gage.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

W. S. Kinnear, president of the Kansas City Terminal, with office at Kansas City, Mo., has resigned to become president of the United States Realty & Trust Co., New York, effective May 1. Mr. Kinnear was chief engineer of the Michigan Central from September, 1902, to April, 1905, and was then made assistant general manager of the same road. He was also chief engineer of the Detroit River Tunnel Company. He went to the Kansas City Terminal in August, 1910.

Operating Officers.

E. C. Riddle, superintendent of the Western Ohio, with office at Wapakoneta, Ohio, has resigned.

E. J. Dedman has been appointed general manager of the Gainesville & Northwestern, which is building a new line in Georgia, with headquarters at Gainesville, Ga.

C. L. Hinkle, assistant to the general manager of the Chicago & Alton and the Toledo, St. Louis & Western at Chicago, has been appointed superintendent of the latter road, with office at Frankfort, Ind., succeeding J. F. Clement, resigned.

T. T. Irving, resident engineer of the Grand Trunk at Detroit, Mich., has been appointed trainmaster of the Twenty-fifth district (C. S. & M.), and the Twenty-seventh and Twenty-eighth districts, with office at Durand, Mich., succeeding J. C. Talmage, resigned.

N. A. Williams, superintendent of the Green river division of the Denver & Rio Grande at Helper, Utah, has been appointed superintendent of the Salt Lake division, with office at Salt Lake City, Utah, succeeding W. M. Bacon, resigned. J. T. Slattery, trainmaster at Tucker, Utah, succeeds Mr. Williams.

J. T. Waddell, chief despatcher of the Georgia, Florida & Alabama at Bainbridge, Ga., has been appointed superintendent of transportation, with headquarters at Bainbridge, succeeding S. J. Jones, resigned to go to another company, and T. A. Connor has been appointed car accountant, with headquarters at Bainbridge.

C. A. Manthe has been appointed trainmaster of the Fergus Falls division of the Great Northern, with office at Melrose, Minn., succeeding J. W. Granger, transferred. Walter Clarke, assistant superintendent at Spokane, Wash., having been assigned to other duties, as has been announced in these columns; F. J. Gavin, trainmaster at Whitefish, Mont., has been transferred to Spokane; and W. W. McFadzen succeeds Mr. Gavin.

R. A. Crofton has been appointed assistant superintendent, and not assistant general manager, of the Second division of the Houston & Texas Central, the Houston East & West Texas, and the Houston & Shreveport, with headquarters at Houston, Tex.; this is only a part of the territory formerly supervised by J. T. Connor, assistant general manager at Houston, who has been granted an indefinite leave of absence. This corrects the item in our issue of February 23, p. 357.

Traffic Officers.

H. F. Moeller, general passenger agent of the Pere Marquette, with office at Detroit, Mich., has resigned.

Ernest J. Derry has been appointed a freight solicitor of the Union Line of the Pennsylvania System, with office at Kansas City, Mo., succeeding R. V. Telfer, resigned.

E. L. Wilson, chief clerk in the office of the general passenger agent of the New York, New Haven & Hartford at New Haven, Conn., has been appointed assistant general passenger agent, with office at Boston, Mass.

F. G. Smith has been appointed general freight and passenger agent of the Marietta, Columbus & Cleveland, with headquarters at Marietta, Ohio, succeeding E. D. Perkins, resigned to accept service with another company.

Fred Wright, district passenger agent of the Chicago Great Western at Omaha, Neb., has been appointed division passenger

agent, with headquarters at Red Wing, Minn. S. G. Yerkes, general agent, with office at Fargo, N. D., has resigned.

Glenn W. Hutchinson, advertising manager of the St. Louis & San Francisco, at St. Louis, Mo., has resigned to become southwestern manager of the American Lithographic Company, New York, effective April 1. Mr. Hutchinson's headquarters will be at St. Louis.

Engineering and Rolling Stock Officers.

F. P. Sisson has been appointed resident engineer of the Grand Trunk, with office at Detroit, Mich., succeeding T. T. Irving, promoted.

C. W. P. Ramsey, division engineer of construction of the Canadian Pacific at Montreal, Que., has been appointed engineer of construction for the Eastern Lines, with office at Montreal.

C. W. Abrams, assistant general foreman of the Missouri Pacific at Little Rock, Ark., has been appointed general directing foreman, succeeding George Langton, resigned to accept service with another company, and the office of assistant general foreman has been abolished.

J. G. Shillinger, engineer maintenance of way of the Cleveland-Indianapolis division of the Cleveland, Cincinnati, Chicago & St. Louis at Galion, Ohio, has been appointed chief engineer of the Rutland Railroad, with office at Rutland, Vt., succeeding J. C. Irwin, resigned, effective April 1.

C. B. Brown, division engineer of the Canadian Pacific at Montreal, Que., has been appointed principal assistant engineer, with office at Montreal, and J. W. Orrock, assistant engineer at Montreal, has been appointed division engineer of the Lake Superior division, with office at North Bay, Ont., succeeding Frank Taylor, transferred.

P. P. Mirtz has been appointed mechanical engineer of the Lake Shore & Michigan Southern, the Chicago, Indiana & Southern, the Indiana Harbor Belt, the Lake Erie, Alliance & Wheeling, the Lake Erie & Western, the Dunkirk, Allegheny Valley & Pittsburgh, the Fort Wayne, Cincinnati & Louisville and the Northern Ohio, with office at Cleveland, Ohio, succeeding A. R. Ayers, promoted.

George K. Stewart, who has been appointed master mechanic of the Missouri Pacific-Iron Mountain system, with office at Coffeyville, Kan., as has been announced in these columns, was born August 5, 1869, at Ottawa, Kan. He received a common school education, and in 1889 began railway work as a machinist apprentice on the Atchison, Topeka & Santa Fe at Topeka, Kan. In 1898 he went with the Missouri Pacific as a machinist and has been with that company ever since. He was night roundhouse foreman at Coffeyville for two years and was day roundhouse foreman for one year at the same place. He was transferred to Wichita, Kan., as division foreman in 1909, and held that position until March 4, 1912, when he was promoted to master mechanic of the Missouri Pacific-Iron Mountain system as above noted.



G. K. Stewart.

W. J. Eddy has been appointed inspector of tools and machinery of the Rock Island Lines, with office at Chicago. Mr. Eddy was born in England, and previous to September, 1903, he was a machinist's apprentice and journeyman in the shops of the Choctaw, Oklahoma & Gulf at Shawnee, Okla. He was graduated from Purdue University with the degree of mechanical engineer in 1907, and in September of that year entered the service of the Erie Railroad as tool room inspector. While he was in that position the small tools were standardized and a classification and record of all shop equipment was made, as was mentioned in the *Railway Age Gazette* of November 4, 1910, page 851. Mr. Eddy is also the originator and specialist in installing the shop standard practice system on that road.

M. V. Hynes, division engineer of the Cincinnati, Hamilton & Dayton, at Dayton, Ohio, has been appointed engineer of maintenance of way, with office at Cincinnati, succeeding to engineering duties performed by F. H. Alfred, general superintendent, resigned to go to another company. I. F. White, division engineer at Indianapolis, Ind., has been transferred to Dayton, succeeding Mr. Hynes, and H. A. Cassil succeeds Mr. White.

A. R. Ayers, mechanical engineer of the Lake Shore & Michigan Southern, the Indiana Harbor Belt and the Chicago, Indiana & Southern at Cleveland, Ohio, has been appointed general mechanical engineer of all the New York Central Lines west of Buffalo, with office at Chicago, a new position. Mr. Ayers graduated from Cornell University in 1900 as a mechanical engineer, and began railway work with the Lake Shore & Michigan Southern as a special apprentice in the same year, and he has been connected with the Lake Shore ever since. He was special inspector from 1903 to 1905, and in the latter year was made night engine house foreman at Elkhart, Ind. The next year he was made assistant general foreman of the Collinwood shops, and in 1907 was promoted to superintendent of shops at Elkhart. From January 1, 1908, to November 1 of the same year he was assistant superintendent of shops at Collinwood, and on the latter date was appointed assistant master mechanic, with office at Elkhart. He was appointed mechanical engineer of the Lake Shore, the Chicago, Indiana & Southern and the Indiana Harbor Belt, with office at Cleveland, Ohio, in 1910, from which position he has just been promoted as above.



A. R. Ayers.

OBITUARY.

Robert Patterson, a number of years ago master mechanic of the Florence & Cripple Creek Railroad, died at his home in Denver, Colo., on March 10, at the age of 60 years.

T. L. Waggener, formerly chief engineer of the Colorado Springs & Cripple Creek District Railway, died at his home in Colorado Springs, Colo., on March 10. Mr. Waggener was 67 years of age.

Franklin J. Firth, formerly president of the Erie & Western Transportation Company, a subsidiary of the Pennsylvania Railroad, operating steamers on the Great Lakes, died on March 18 after a long illness, at his home in Philadelphia, Pa., at the age of 70. Mr. Firth retired from the presidency of the Erie & Western Transportation Company in 1906.

Frank Bradley Mesick, general eastern freight agent of the Chicago, Rock Island & Pacific, from 1882 to 1911, died at his home in Flatbush, Brooklyn, N. Y., on March 18. Mr. Mesick was born in Columbia county, N. Y., on January 29, 1854, and in 1871 began railway work in the eastern freight office of the Rock Island, and in 1882 he became general eastern freight agent, his entire railway career has been in the service of the Rock Island System. On account of ill health Mr. Mesick was retired in September, 1911. He was a man of great kindness of heart, and with a remarkable faculty for both making and holding friends.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Pennsylvania Railroad has ordered 52 locomotives from the company's shops at Altoona, Pa.

The Chicago Great Western has ordered 5 mikado locomotives from the Baldwin Locomotive Works.

The Norfolk & Western has ordered 6 Pacific type locomotives from the Baldwin Locomotive Works.

The St. Louis Southwestern is in the market for 20 consolidation locomotives and five mogul locomotives.

The Texas Pacific has ordered 10 consolidation locomotives and 10 passenger locomotives from the Baldwin Locomotive Works.

The Southern Pacific has ordered 15 mogul locomotives, 10 Pacific type locomotives and 8 six-wheel switching locomotives from the Baldwin Locomotive Works.

The Atchison, Topeka & Santa Fe has ordered 25 Pacific type locomotives, 20 switching locomotives, 20 Santa Fe locomotives and 10 consolidation locomotives from the Baldwin Locomotive Works.

CAR BUILDING.

The Grand Trunk Pacific is in the market for 6 sleeping cars.

The Wabash has ordered 200 all-steel hopper cars from the Standard Steel Car Company.

The Chicago, Rock Island & Pacific has ordered 700 gondola cars from the Standard Steel Car Company.

The Pennsylvania Railroad has ordered 26 combination baggage and mail cars and 7 dining cars from the company's shops at Altoona, Pa.

The St. Louis Southwestern is in the market for fifteen 70-ft. baggage cars, twelve 70-ft. combination mail and express cars and eight 70-ft. chair cars.

The Ulster & Delaware is in the market for from 50 to 100 box cars, and is said to have ordered three combination baggage and mail cars from the Pullman Company. The latter item is unconfirmed.

The New York, New Haven & Hartford, mentioned in the *Railway Age Gazette* of March 15 as having ordered a number of motor cars from the Standard Steel Car Company, has ordered 39 motor cars from that company.

The Western Maryland has ordered 500 fifty-ton gondola cars and 500 hopper cars from the Pressed Steel Car Company; 500 forty-ton gondola cars and 500 hopper cars from the Standard Steel Car Company, and 500 box cars from the American Car & Foundry Company.

The Atchison, Topeka & Santa Fe is in the market for 1,250 box cars, 1,000 refrigerator cars, 200 furniture cars, 200 steel tank cars, 1,000 all-steel, flat cars, 75 work cars, 15 smoking cars, 10 combination passenger and mail cars, 10 chair cars, 14 three-compartment Jim Crow cars, and 1 combination passenger and baggage car.

IRON AND STEEL.

The Long Island is in the market for 2,000 tons of bridge material.

The Wabash has ordered 15,000 tons of rails from the Lackawanna Steel Company.

The New York, New Haven & Hartford has ordered 11,000 tons of open hearth rails from the Pennsylvania Steel Company.

The St. Louis Southwestern has recently purchased a large amount of bridge material, including one 355-ft. draw span; two through girder spans 54 ft. 2 in.; one 70-ft. through girder span and three 74-ft. 6 in. through girder spans from the Phoenix Bridge Company.

Supply Trade News.

The Osborn Engineering Company, Cleveland, Ohio, civil engineers, will on April 1 move its main office from the Osborn building to the Engineers building.

R. T. McCormick has resigned as manager of sales of the Petroleum Iron Works Company, Sharon, Pa., and C. J. McDowell has been appointed to succeed him.

John Dickey Culbertson, president of the National Tube Company, Pittsburgh, Pa., a subsidiary of the United States Steel Corporation, died at his home in Sewickley, Pa., on March 13.

C. W. Reinhardt, for the past 20 years chief draftsman of the *Engineering News*, New York, has resigned his position and opened a general drafting office at 120 Liberty street, New York.

Scully-Jones & Company, Chicago, have been made exclusive agents in Illinois, Indiana, Iowa and Wisconsin for Elco high-speed steel, made by Vickers Sons & Maxim, Sheffield, England.

Martin Prehn, assistant eastern manager and associate editor of the *Railway & Enginering Review*, Chicago, has been made sales manager of the Revolute Machine Company, New York, manufacturers of blue printing machinery, effective March 25.

C. C. Owens, in the New York sales office of the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., with special charge of the industrial and power division, has been made district manager of the Westinghouse company, with office in Detroit, Mich.

Cornell S. Hawley, former president of the Consolidated Car Heating Company, Albany, N. Y., has been made president of the Laconia Car Company, Boston, Mass. Craig Colgate, William L. Putnam, Harold J. Coolidge and Robert T. Paine, 2nd, were elected to the board of directors. The Laconia Car Company was recently organized to take over the Laconia Car Company Works. It is capitalized at $2,000,000, consisting of $1,000,000 7 per cent. cumulative preferred stock and $1,000,000 common stock.

The Bucyrus Company, South Milwaukee, Wis., has taken over the manufacture of the Atlantic type shovel, heretofore built by the American Locomotive Company, New York, and under a license from A. W. Robinson, the patentee, it is the expectation of the company to continue to build all of the sizes previously built, and to eventually have a complete line of Atlantic wire-rope shovels, in addition to a complete line of Bucyrus chain-type shovels. The Bucyrus company has transferred the manufacture of Vulcan shovels from Toledo, Ohio, to the new plant at Evansville, Ind. Norman B. Livermore & Co., San Francisco, Cal., will handle the steam shovels, wrecking cranes, pile drivers and ballast plows of the Bucyrus company in California, and the same products, with the addition of drag line excavators, in Nevada, Utah and Arizona. Arrangements have been made with the Yuba Construction Company, San Francisco, Cal., for the handling of the Bucyrus dredges on the Pacific coast and in Alaska. Smith & Wiggin, Mexico City, Mex., are agents for the Bucyrus company in Mexico. George B. Massey, for a number of years in charge of the New York office of the company, is now at South Milwaukee preparing for an extensive trip abroad in the interest of the company's foreign business.

The reorganization committee of Allis-Chalmers Company, Milwaukee, Wis., has given out its plans of reorganization. The preferred stock will be assessed 20 per cent., or $3,210,000; the common stock, 10 per cent., or $1,982,000, providing $5,192,000 working capital. Ten per cent. of the respective assessments are to be paid on deposits of share certificates and the balance on or after October 1 on 30 days' notice. A new corporation is to be organized with $42,500,000 capital stock, consisting of $26,000,000 common and $16,500,000 7 per cent. cumulative preferred. The preferred stock is to be cumulative 5 per cent. from January 1, 1913, 6 per cent. from January 1, 1915, and 7 per cent. from January 1, 1917, but to be entitled to 7 per cent. from beginning if earned. If practicable the new preferred stock is to have power to elect the majority of the board of diretcors and is to be redeemable at 110. A voting trust of new preferred and common stock is to be created for five years with five voting

trustees, to be appointed by the reorganization committee, which consists of James M. Wallace, chairman; C. W. Cox, A. J. Hemfipill, R. W. Leigh, J. H. McClement, W. E. Roosevelt and F. Vogel, Jr. The new preferred stock will be distributed as follows: 5 per cent. to bondholders, $11,148,000; to stockholders or underwriters, on payment of assessments, $5,192,000, leaving a surplus of $160,000. The new common stock will be distributed as follows: 5 per cent. to bondholders, 35 per cent. of holdings in consideration of release of lien and fixed charges, $3,901,800; old preferred stock, 90 per cent. of holdings, $14,445,000; old common stock, 35 per cent. of holdings, $6,937,000, leaving a surplus $716,200. The results to present holders of the securities are as follows: For each $1,000 5 per cent. bond a total value of $1,375, of which $1,000 new preferred, $350 new common and $25 coupon of January 1 in cash; for each $100 par preferred stock upon payment of $20 in cash, a total value of $110, of which $20 will be new preferred stock and $90 new common stock; for each $100 par value of common stock, a total value of $45, of which $10 will be in new preferred stock for the $10 assessment and $35 in new common stock. To carry out the plan, a receiver will have to be obtained, but will probably not be asked for until April 3, at which time the 90 days' grace expires. The reorganization plan was formulated by the bondholders.

TRADE PUBLICATIONS.

Chain Care.—The Jones & Laughlin Steel Company, Pittsburgh, Pa., has published a small illustrated folder giving some valuable suggestions for the care of chains.

Fire Extinguisher.—The Pyrene Manufacturing Company, New York, has published a small illustrated folder describing and pointing out the advantages of Pyrene as a fire extinguisher.

Valves & Fittings.—The Crane Company, Chicago, has published a special railway catalog, No. 42-A, illustrating and briefly describing its line of valves, air-brake fittings, unions, union fittings, etc. The prices are included.

Bangor & Aroostook.—The passenger department of this company has published a very attractive 170-page booklet entitled In the Maine Woods. This booklet describes in a most alluring manner the many types of sport and pastimes that may be found in this region. The carefully selected illustrations and the descriptions of the country combine to give a splendid idea of life in the woods.

Chicago & North Western.—The passenger department has issued an attractive bulletin, entitled The Care of the Immigrant, describing and illustrating the especially complete arrangements in the company's new passenger terminal at Chicago for handling and protecting immigrant travel while awaiting trains. In the construction of the station special provision was made for taking care of the immigrants, including a waiting room in charge of a custodian and matron, rest rooms, lunch room, bath rooms and laundries, writing tables and current newspapers in foreign languages. Every precaution is taken to safeguard such passengers until they are able to communicate with friends or reach their destination.

Steam Tables.—The Wheeler Condenser & Engineering Company, Carteret, N. J., has published a hand book of steam tables with pressures below atmosphere expressed in inches of mercury, referred to a 30-in. barometer. In the first table the independent variable is vacuum; properties of saturated steam from 29.8 in. vacuum to atmospheric pressure are given. In the second, temperature is the independent variable; properties of saturated steam from 32 deg. Fahr. to 212 deg Fahr. are given. In the third table the independent variables are gage pressure and absolute pressure; properties of saturated steam up to 200 lbs. gage pressure are given. The booklet also includes a discussion of the use of the mercury column, the errors in such measurements and constants for their correction. These tables are copyrighted and are neither for sale nor for general distribution. They are published primarily for engineers who are using and purchasing condensing apparatus.

The Dourado Railroad, Brazil, has been granted a concession to build a line from Sao Joao das Tres Barras to San Jose do Novo Horizonte.

Railway Construction.

New Incorporations, Surveys, Etc.

Alberta, Peace River & Eastern.—This company has been granted an extension of five years' time in which to complete a line from a point on the Alberta Railway & Irrigation Company's line in township three, range 16, west of the fourth meridian, west towards Cardston, west and northwest to Pincher creek and northerly to Cochrane, Alta., in all about 200 miles. From Cochrane the line is to be built north to the Peace River line, then east to Fort McHenry and eventually east to Fort Churchill on Hudson Bay, with a branch from a point on the line between parallels 51 and 52. A. J. Millar, Pembroke, Ont.; E. Hutton, Montreal, Que., R. L. Snowball, O. E. Culbert and J. O. Carss, Ottawa, Ont., are the incorporators.

Bartlesville Interurban.—An officer writes that this company plans to build from Dewey, Okla., north via Copan, to Caney, Kan., 16 miles. There will be three 90-ton steel bridges and two culverts, also a station and a sub-station at Copan. J. J. Carl, president.

British Columbia & Dawson.—Authority has been granted to this company to build from Fort George, B. C., northerly via Fort McLeod, thence along the Parsnip river to its junction with the Peace river and along the valley of the Finlay river via Sifton Pass and along the Stikine river to Telegraph creek; also from this line via Pine River Pass, or the Peace River Pass, to Peace River Landing; from Lytton north to Fort George, about 250 miles, and from Telegraph creek to Dawson, Yucatan territory, with a branch from Ashcroft south to Vancouver, about 120 miles. The incorporators include J. Walkenstein, A. T. Sullivan and C. G. Young, New York, and J. O. Clifford, Chicago.

Canadian Northern.—Authority has been granted to the Canadian Northern Montreal Tunnel & Terminal Company to build a tunnel for one or more tracks from a point in the city of Montreal, Que., in a westerly direction under Mount Royal with the necessary approaches, terminals, stations, etc. Tracks are to be laid to connect with the Canadian Northern Ontario, the Canadian Northern Quebec, and the Montreal Harbor Commissioners' line. Electricity will be used as the motive power for all trains run through the tunnel. T. Turnbull, assistant chief engineer, Winnipeg, Man. (January 5, p. 36).

Canadian Northern Montreal Tunnel & Terminal Company.—See Canadian Northern.

Canadian Pacific.—A contract has been given to W. A. Dutton, Winnipeg, Man., for grading 85 miles of the extension from Swift Current, Sask., northwest. A contract has also been given to Mr. Dutton for double tracking about 70 miles on the main line between Regina, Sask., and Chaplin. J. G. Sullivan, chief engineer, Western Lines, Winnipeg, Man.

A contract has been given to Deeks & Hinds, Toronto, Ont., to build from the present Toronto-Montreal line at Agincourt, Ont., northeast to the same line at a point 20 miles west of Smith's Falls, 198 miles. The work is to be completed within two years. J. M. R. Fairbairn, assistant engineer, Eastern Lines, Montreal, Que.

Cary North & South.—An officer writes that a contract has been let to T. W. Ellis, Jr., Macon, Ga., to build from Cochran, Ga., north to Cary, 10 miles. Maximum grades will be 1 per cent., and maximum curvature 6 deg. The company recently amended its charter to build via Toomsboro and Milledgeville, to Sandersville. H. R. Brown, president, and D. B. Dunn, chief engineer, Macon. (December 15, p. 1257.)

Chicago, Milwaukee & St. Paul.—This company is planning to spend $15,500,000 for grade reductions and double tracking work. Of this amount $10,000,000 will be used for the reduction of grades and double track on the Council Bluffs division, and for improvements to lines and double track on the Hastings & Dakota division $5,500,000 will be spent. It is expected that it will take three years to complete the improvements.

Chicago, Milwaukee & Puget Sound.—A contract has been given to H. C. Henry, Seattle, Wash., to build an extension down the Columbia river from Cohasset to Hanford, and the work is now under way. The company will build 43 miles of main line and seven miles of side tracks this year, which will

complete the line through the Priest Rapids district and White Bluffs country into Hanford. E. O. Reeder, chief engineer, Seattle, Wash.

East Texas Traction.—Incorporated in Texas with $2,000,000 capital, and headquarters at Greenville, Tex. The plans call for building a line to connect Dallas, Tex., via Greenville, with Wolfe City, about 70 miles. The incorporators include J. F. Nichol, W. A. Williams and J. W. Crotty, Dallas.

Fort Smith, Arkoma & Wilburton.—Incorporated in Oklahoma with $50,000 capital to build from Arkoma, Okla., which is opposite Fort Smith, Ark., southwest to Wilburton, 60 miles. The incorporators include M. C. Burke, C. T. Kinney and J. Vaughan, all of Fort Smith, and M. W. Murray, Arkoma.

Fredericton & Grand Lake Coal & Railway Company.—The New Brunswick legislature has granted permission to this company to build an extension of the New Brunswick Coal & Railway line from Minto, N. B., to Fredericton, and to lease the entire line to the Canadian Pacific.

Garrett County (Electric).—Application has been made for a charter in Maryland to build from Oakland, Md., northeast to Frostburg, about 40 miles. H. J. Speicher, Accident, Md., may be addressed.

Glengary & Stormont.—Application has been made by this company, with $600,000 capital and headquarters at Alexandria, Ont., for a charter to build from a point on the Canadian Pacific, near the eastern boundary of Ontario, in Lancaster township, south and west to a point near the St. Lawrence river in Charlottenburg township, thence west to Cornwall. C. L. Hervey and A. A. Mellor, Montreal, and T. Burgess, Ottawa, are interested.

Grand Trunk Pacific.—Track-laying on the Rocky Mountain section has been finished from Wolf Creek to Athabaska river, 100 miles; between Yellowhead Pass and Tete Jaune Cache, 79 miles, track has been laid on 58½ miles, and between Aldermere and Copper river, 140 miles, track has been laid on 38 miles. Track has also been laid from Copper river to Prince Rupert, 100 miles. B. B. Kelliher, chief engineer, Winnipeg, Man.

Greenville Light & Water Company.—An officer writes that the plans call for building a line to connect Greenville, Ky., with Central City, about five miles, and the work will probably be started this coming fall. The line will pass through seven mining towns. A power house is to be put up to supply power for all the mines on the line. J. A. Rose, box 43, Greenville, may be addressed.

Intercolonial.—An officer writes that a contract has been given to M. P. & J. T. Davis, Quebec, Que., to build the branch from Dartmouth, N. S., to Dean's Settlement, 73 miles, and the work is to be started at once. The line is being built under the direction of the Department of Railways and Canals, L. K. Jones, secretary, Ottawa, Ont. (October 20, p. 815).

Kinston Terminal.—Application will be made for a charter in North Carolina to build from Kinston, N. C., south to Richlands, about 25 miles. R. C. Strong, Kinston, may be addressed.

Kittitas Railway & Transportation Company.—This company has been incorporated in Washington to build an electric line from South Cle Elum, Wash., to Roslyn. Work is now under way. The line is being built to reach coal and copper fields. Paul L. Richards, representing French capitalists, is back of the project.

Louisville & Nashville.—An officer writes that a contract has been given to S. Walton & Company, Falls Mills, Va., for piercing a tunnel to be about 1,500 ft. long in Giles county, Tennessee. The estimated cost of the work is $225,000. W. H. Courtenay, chief engineer, Louisville, Ky.

Maine Central.—A contract has been given to McGregor Brothers, Rumford Falls, Maine, to build the Rangely Lakes & Megantic from Oquossoc, north along the east shore of the Kennebago river to Kennebago, about 11 miles. T. L. Dunn, chief engineer, Portland. (February 2, p. 221.)

Missouri, Kansas & Texas.—It is understood that this company is planning to build an extension from Austin, Tex., south to Lockhart, about 30 miles, where a connection is to be made with the Smithville branch. Plans are being made for building a bridge over the Colorado river. S. B. Fisher, chief engineer, St. Louis, Mo. (March 1, p. 408.)

Morgantown Interurban.—An officer writes that the company expects to begin work soon on a line between Morgantown, W. Va., and Point Marion, Pa., about 10 miles. It has not yet been decided when bids will be asked for the work. I. H. McDermott, president; S. D. Brady, chief engineer, Morgantown.

Mount McKay & Kakabeka Falls.—An officer writes that this company is building a 20-mile line from Slate River, Ont., to Kakabeka Falls; track has already been laid on 5½ miles. The work is to be carried out under the direction of the government of Ontario. W. F. Hogart, Fort William, Ont., may be addressed.

Ocilla Southern.—An officer of this company, which operates a line from Fitzgerald, Ga., south to Alapaha, 26½ miles, and a branch to Irwinville, nine miles, writes that contracts are to be let soon for building an extension from Fitzgerald north to Macon, about 90 miles. E. Wilson, chief engineer.

Pacific & Peace River.—An officer writes that the plans call for building from Dunvegan, B. C., to Bella Coola, or to a point on Dean channel. It is undecided when the work will be carried out. J. A. Ritchie, Ottawa, Ont., may be addressed. (March 15, p. 526.)

Richmond, Urbana & Peninsula.—An officer writes that this company is now operating an eight-mile line, has track laid on 12 miles, and is at work building a section of five miles between Richmond, Va., and Urbana. H. D. Eichelberger & Company are the contractors. The company expects to develop a traffic in farm products and lumber. John C. Robertson, president, and C. P. E. Burgwyn, chief engineer, Richmond, Va.

St. John & Ophir.—Incorporated in Utah with $150,000 capital, to build from St. John, in Tooele county, Utah, east to Ophir, 10 miles. The headquarters of the company are at Salt Lake City. J. R. Clark, president; C. L. Whittmore, vice-president, and W. H. Comstock, secretary and treasurer.

Stamford & Eastern.—According to press reports this company will begin work at once on a line from Stamford, Tex., east to Fort Worth, about 160 miles. Judge W. T. Andrews, president; P. G. Burns, chief engineer, Stamford.

Texas & Pacific.—An officer writes that there will be some improvement work carried out in the yards at Fort Worth, Tex., but not a general remodeling of the yard. Plans have been made for the completion during 1912 of the double tracking work between Dallas and Fort Worth. This will necessitate laying about 12 miles of new track. C. H. Chamberlin, chief engineer, Dallas.

Union Pacific.—An officer writes that grading and nearly all the bridge work has been finished on the extension of the Kearney branch from Callaway, Neb., to Stapleton, 37 miles, and that track laying is now in progress. R. L. Huntley, chief engineer, Omaha, Nebr.

Winnipegosis & Northern.—Application has been made for a charter in the province of Manitoba, to build from a point in the Porcupine mountains near Steep Rock river east through township 43 in ranges 24, 25, 26 and 27 west of the principal meridian in Manitoba, crossing the Canadian Northern near Mafeking, thence to the west shore of Dawson bay on Lake Winnepegosis. The incorporators are B. A. Craig, McGregor Young, J. A. McEvoy, W. J. Rooney and G. F. Morrison, Toronto.

RAILWAY STRUCTURES.

Austin, Tex.—See Missouri, Kansas & Texas under Railway Construction.

Brinkley, Ark.—The St. Louis Southwestern, in connection with the Chicago, Rock Island & Pacific, is erecting a joint passenger station at an estimated cost of $30,000.

Clarendon, Ark.—The St. Louis Southwestern is erecting a brick and steel passenger station to cost approximately $18,000, similar to one just completed at England, Ark. Confirmed.

Durango, Mexico.—On the line now being built by the National Railways of Mexico from Durango west to Llano Grande.

a bridge is being built over the Rio Chico. The bridge is to be 701 ft. long and 208 ft. above the river. In the center there is to be a cantilever span 390 ft. long.

Galveston, Texas.—The Atchison, Topeka & Santa Fe has appropriated $500,000 for a new office building.

Kansas City, Mo.—An officer of the Kansas City Terminal writes that a contract has been given to Fogel & Son, Kansas City, for putting up the McGee street freight sub-station at Kansas City. The building will be a two-story brick structure 56 ft. x 178 ft on concrete foundation, with steel frame and re-inforced concrete floors. The work will cost about $6,000.

Lewisburg, Pa.—The Lewisburg Bridge Company has given a contract to the Pennsylvania Steel Company, at $65,000, for the steel work for a bridge to be built over the river at St. John street. The new bridge will replace an old wooden structure.

Macon, Ga.—Work is nearing completion on the freight terminal to be used jointly by the Southern Railway and the Georgia Southern & Florida and on April 15 the terminal will open for business. The joint terminal is in the center of the business district and consists of separate inbound and outbound freight warehouses, each 492 ft. long, together with two covered transfer platforms, and served by seven tracks accommodating 70 cars; cotton platform 250 ft. long; and team tracks for the delivery of bulk freight accommodating 100 cars.

Montreal, Que.—An officer of the Grand Trunk writes that a contract has been given to the Dominion Bridge Company, Montreal, for 400 tons of structural steel for a steel bridge to be built on an old substructure over the Lachine canal. The contract amounts to $45,000.

Norfolk, Va.—Permission has been granted to the Norfolk & Western to build a new pier at Lamberts Point, just north of pier No. 1, which is to be removed. Permission has also been granted to the Virginia Railway & Power Company to extend the pier at the foot of Reeves avenue.

Philadelphia, Pa.—An officer of the Pennsylvania Railroad writes that plans have been made for putting up a new grain elevator at Girard Point.

Philadelphia, Pa.—The passenger station of the Baltimore & Ohio at Philadelphia, which fronts on the south side of Chestnut street, is to be connected with Market street, about 500 ft. farther north, by a covered walk, thus affording passengers convenient access to the trains of the Philadelphia subway. The contract for the construction of the walk, which will cost about $15,000, has been let to the Roydhouse-Arey Company.

Portland, Me.—An officer of the Grand Trunk writes that a contract has been given to the Pennsylvania Steel Company, Steelton, Pa., for 250 tons of structural steel for a single track bridge, 225 ft. long to be built over Back Cove at Portland. The improvements will cost $70,000, including two new concrete piers and additions to the present pivot pier. (March 1, p. 409).

Rockport, Tex.—The San Antonio, Rockport & Mexico, organized to build from San Antonio, Tex., to a point on the Rio Grande, with a branch to Rockport and to Harbor Island, has bought land at the latter place, it is said, as a site for terminals and warehouses. It is understood that the work is to be started in May, and that the cost will be about $250,000.

Somerset, Ky.—The Queen & Crescent has under consideration the question of putting up a new passenger station at Somerset.

Watts, Okla.—The Kansas City Southern expects to construct a six-stall roundhouse, a 90-ft. turntable, a machine shop, coaling plant, fuel oil plant, sandhouse and cinder pit, together with a yard having a capacity of about 700 cars.

In consequence of an agitation that has been carried over several parliamentary sessions respecting the uneconomical administration of the Russian railways, the minister of ways and communication has decided to draw up a series of regulations involving an examination of the railway credits on the model of the systems adopted by western European powers; and has sent the engineer, L. L. Elkin, abroad to visit the respective railway departments in order to have the necessary data on which to base the Russian project.

Railway Financial News.

Atchison, Topeka & Santa Fe.—The Santa Fe system has appropriated $22,700,000 for improvements for the coming year, which will be distributed as follows: $5,700,000 will be expended for equipment; $2,000,000 for double tracking the Coast lines; $1,000,000 for terminal yards and improvements on the Colorado division; $500,000 for a new office building at Galveston, and the balance in general improvements.

J. P. Morgan & Co. have sold the whole of the 50-year California-Arizona 4½ per cent. bonds which were put in their hands. These were first and refunding 4½ per cents. and the aggregate amount was $9,394,000.

Chicago, Milwaukee & St. Paul.—The New York Stock Exchange has listed $1,095,000 of the first mortgage bonds of the Chicago, Milwaukee & Puget Sound, due in 1949, making the total amount of these bonds listed $26,095,000. These are 4 per cent. bonds guaranteed by the C. M. & St. P.

Delaware, Lackawanna & Western.—This company jointly with the Syracuse, Binghamton & New York has applied to the New York Public Service Commission, Second district, to authorize the lease of the S. B. & N. Y. to the D. L. & W. until the year 2006, when the corporate existence of the S. B. & N. Y. will expire. This road constitutes the Lackawanna's line from Binghamton to Syracuse and is controlled by the Lackawanna by ownership of more than four-fifths of its stock. The application says that the stock of the S. B. & N. Y. has for some years past paid a dividend of 10 per cent. and that with a lease the economies which can be accomplished by the discontinuance of separate accounts will justify the agreement, which is proposed in the form of lease submitted, to pay 12 per cent. annually. Two-thirds of the stockholders of both corporations have approved the proposition; but objections have been filed; one holder of one hundred shares declares that the earnings of the S. B. & N. Y. warrant an annual dividend of at least 20 per cent. The commission will give a hearing at Albany, March 25.

Denver, Northwestern & Pacific.—According to reports from Denver, the officers of this road have assurances from Kidder, Peabody & Company, of Boston, after an examination of the road by that firm, that the necessary funds will be raised to pay off outstanding notes amounting to $3,500,000 and to make necessary improvements.

Georgia & Florida.—The stockholders of this company at a special meeting have authorized the issue of 6 per cent. general mortgage bonds to the amount of $2,000,000. It is understood that the bonds have already been underwritten. The proceeds will be used to pay off obligations for cars and engines, to retire the floating debt and to provide working capital.

New York, New Haven & Hartford.—The New York, Westchester & Boston, a subsidiary of the New Haven Company which within a few months will be opened for passenger traffic between New York and New Rochelle, has had listed on the New York Stock Exchange $17,200,000 of its first mortgage 4½ per cent. bonds, series I, due in 1946. The company has authority at any time prior to the end of this year to issue $2,900,000 more of these bonds. The bonds are guaranteed by the N. Y. N. H. & H.

Norfolk Southern.—The New York Stock Exchange has listed $5,837,000 of this company's first and refunding 5 per cent. bonds, series A, due in 1961.

Northern Pacific.—The company has sold 4 per cent. prior lien bonds to the amount of $4,613,000; and the total amount of these bonds now outstanding and listed on the New York Stock Exchange is $107,028,500.

Pittsburgh, Summerville & Clarion.—The road, equipment and franchises of this company are advertised to be sold at sheriff's sale in Jefferson County, Pa., March 30. The road is leased to the Pennsylvania Southern, and the sale will be subject to a mortgage of which the Union Trust Co., of Pittsburgh, is trustee. The main line of the road extends from Summerville, Pa., on the Allegheny division of the Pennsylvania Railroad, about 100 miles northeast of Pittsburgh, to Clarion, Pa., 15 miles, with two short branches.

ANNUAL REPORTS

FORTY-THIRD ANNUAL REPORT, NEW YORK CENTRAL AND HUDSON RIVER RAILROAD COMPANY FOR THE YEAR ENDED DECEMBER 31, 1911.

To the Stockholders of

THE NEW YORK CENTRAL AND HUDSON RIVER RAILROAD COMPANY:

The Board of Directors herewith submits its report for the year ended December 31, 1911, with statements showing the results for the year and the financial condition of the company.

The mileage embraced in the operation of the road is as follows:

	Miles.
Main line and branches owned	805.49
Proprietary lines	3.06
Lines leased*	2,626.31
Lines operated under contract	81.70
Trackage rights	273.67
Total road operated	3,790.23

The increase of 5.20 miles in road mileage operated is due to the construction of a branch line on the Rome Watertown & Ogdensburg Railroad, running from Sanfords to a point on the Cape Vincent branch, forming a new route for freight traffic between Watertown and Sanfords.

The capital stock authorized is	$250,000,000.00
of which there is issued and outstanding	222,729,300.00
leaving a balance authorized but not issued of	$27,270,700.00

The mortgage, bonded and secured debt outstanding on December 31, 1910, was		$271,098,232.72
This has been added to by the issue of three year gold notes due March 1, 1914, bearing interest at the rate of four and one-half per cent per annum		30,000,000.00
		$301,098,232.72
and has been decreased by the payment of installments falling due during the year on this company's pro rata liability in connection with the certificates issued under equipment trust agreements, as follows:		
Trust of 1907, installment due November, 1911	$793,660.12	
Trust of 1910, installment due January, 1911	433,964.42	1,227,624.54
Outsanding, as shown in the balance sheet of December 31, 1911		$299,870,608.18

SUMMARY OF FINANCIAL OPERATIONS AFFECTING INCOME.

	1911.	1910.	Increase or decrease.
OPERATING INCOME.			
RAIL OPERATIONS.	3,790.23 *miles operated.*	3,785.03 *miles operated.*	5.20 *miles.*
Revenues	$103,954,862.81	$99,908,478.17	$4,046,384.64
Expenses	74,472,578.24	74,079,086.58	393,491.66
NET REVENUE FROM RAIL OPERATIONS	$29,482,284.57	$25,829,391.59	$3,652,892.98
Percentage of expenses to revenues	(71.63%)	(74.15%)	—(2.52%)
OUTSIDE OPERATIONS.			
Revenues	$5,202,572.62	$4,791,030.30	$411,542.32
Expenses	4,881,096.79	4,909,808.90	—28,712.11
NET REVENUE FROM OUTSIDE OPERATIONS	$321,475.83	.....	$440,254.43
NET LOSS ON OUTSIDE OPERATIONS	.....	$118,778.60	.....
NET REVENUE FROM ALL OPERATIONS	$29,803,760.40	$25,710,612.99	$4,093,147.41
TAXES ACCRUED	5,447,759.13	4,697,826.30	749,932.83
OPERATING INCOME	$24,356,001.27	$21,012,786.69	$3,343,214.58
OTHER INCOME.			
Joint facilities rents	$1,754,125.34	$1,451,212.04	$302,913.30
Miscellaneous rents	309,579.61	319,527.90	—9,948.29
Dividends on stocks owned or controlled	11,649,589.23	11,150,915.74	498,673.49
Interest on funded debt owned	489,986.73	573,754.67	—83,767.94
Interest on other securities, loans and accounts	1,616,736.54	1,595,601.41	21,135.13
Miscellaneous income	416,162.50	355,321.51	60,840.99
TOTAL OTHER INCOME	$16,236,179.95	$15,446,333.27	$789,846.68
GROSS CORPORATE INCOME	$40,592,181.22	$36,459,119.96	$4,133,061.26
DEDUCTIONS FROM GROSS CORPORATE INCOME.			
Rentals of leased lines	$10,036,832.20	$10,058,290.85	—$21,458.65
Hire of equipment	1,151,064.87	972,557.08	178,507.79
Joint facilities rents	556,026.51	538,131.73	17,894.78
Miscellaneous rents	565,593.96	504,395.88	61,198.08
Separately operated properties—loss	210,693.02	.....	210,693.02
Interest on bonds	9,162,019.58	9,162,019.59	—.01
Interest on three year gold notes of 1911	1,085,039.99	.....	1,085,039.99
Interest on equipment trust certificates	742,979.81	630,097.20	112,882.61
Other interest	76,749.96	80,848.89	—4,098.93
Equipment reserve	1,227,624.54	.....	1,227,624.54
St L & A Railway: interest, rental, etc.	138,600.00	74,000.00	64,600.00
N Y & Ottawa Railway: interest on bonds	58,240.00	58,240.00	.....
Other deductions	276,267.74	91,866.67	184,401.07
TOTAL DEDUCTIONS FROM GROSS CORPORATE INCOME	$25,287,732.18	$22,170,447.89	$3,117,284.29
NET CORPORATE INCOME	$15,304,449.04	$14,288,672.07	$1,015,776.97
DIVIDENDS, four each year: 5% in 1911; 6% in 1910	11,136,465.00	13,363,758.00	—2,227,293.00
SURPLUS FOR THE YEAR	$4,167,984.04	$924,914.07	$3,243,069.97
Appropriation for additions and betterments	.....	924,914.07	—924,914.07
Appropriation to cover replacement value of abandoned property including buildings at Grand Central Terminal, etc.	2,500,000.00	.....	2,500,000.00
BALANCE FOR YEAR CARRIED TO PROFIT AND LOSS	$1,667,984.04	.....	$1,667,984.04

NOTE: Decrease designated by minus sign, —.

Balance to credit of profit and loss (free surplus) December 31, 1910		$12,337,616.37
Surplus for the year 1911		1,667,984.04
Additions for the year:		
Interest on investment in Rutland stock to December 31, 1910	$355,845.72	
New York & Putnam Railroad Company first consolidated mortgage bonds	38,000.00	
Refund of deposits account New York & Northern Railway Company	1,907.61	395,753.33
		$14,401,353.74
Deductions for the year:		
Commission and discount, three year gold notes	$349,500.00	
Adjustments Western Union Telegraph Company accounts prior to 1911	147,014.79	
Adjustments Pullman Company accounts prior to 1911	33,404.03	
Clearfield Bituminous Coal Corporation advances, interest, deficit, etc	254,912.75	
Settlement Canadian Pacific Ry for St L & A Ry proportion of property and facilities at Montreal, twenty months prior to March 1, 1910	90,000.00	
Sundry uncollectible accounts and adjustments	77,853.84	952,685.41
BALANCE TO CREDIT OF PROFIT AND LOSS (FREE SURPLUS) DECEMBER 31, 1911		$13,448,668.33

For the year covered by this report the revenue from transportation was $102,550,898.26, an increase of $3,865,153.51; revenue from operations other than transportation was $1,403,964.55, an increase of $181,231.13; revenue from outside operations (connected with, but in addition to transportation by rail) was $5,202,572.62, an increase of $411,542.32.

The total gross revenue from all operations was $109,157,435.43, an increase of $4,457,926.96.

Revenues from transportation from all the principal sources have shown an increase.

Freight revenue was $61,133,309.92, an increase of $2,722,075.78. The revenue freight carried amounted to 48,250,535 tons, an increase of 1,183,696 tons over last year, and 828,381 tons over 1907, which had the highest previous record as to tonnage. Twenty-four commodities named in the classified list show increases, and fifteen show decreases; the tonnage for each group, except products of forests, is greater than it was in 1910. The notable increases are in grain, 457,939 tons, hay, 113,895 tons, fruit and vegetables, 142,202 tons, dressed meats and other packing-house and dairy products, 214,379 tons, anthracite coal, 644,310 tons, and manufactured articles, 115,792 tons. The commodities which have been moved in smaller quantities than in the previous year are bituminous coal, 182,720 tons, coke, 152,972 tons, ores, 216,804 tons, castings and machinery, 142,331 tons, and bar and sheet metal, 78,371 tons. The average revenue per ton of all freight carried is $1.27, an increase of three cents per ton, due to the greater quantities of high class freight and the smaller tonnage of medium and low class commodities.

The revenue from passengers amounted to $31,759,237.98, an increase of $766,382.27. There was an increase in the number of local and commutation passengers carried, and in the average amount received from each passenger and the average revenue per passenger per mile.

The total revenue of all passenger-train transportation was $39,638,528.43, an increase of $1,056,976.12 over the year 1910. Of this amount the revenue from express traffic was $4,202,777.42, an increase of $80,493.91 over the year 1910, due to an enlarged volume of business.

The expenses of rail operations amounted to $74,472,578.24, an increase of $393,491.66 equal to fifty-three one-hundredths of one per cent while

*The Dunkirk Allegheny Valley and Pittsburgh Railroad, 90.51 miles, is also leased by this company, but its mileage and operations are not included in this report. Separate accounts are kept and independent returns prepared in its behalf.

the increase in revenues from rail operations was over four per cent.

The operating expenses, by groups, were:

Maintenance of way and structures	$13,723,709.20,	a decrease of $336,468.63
Maintenance of equipment	16,911,146.39,	a decrease of 25,106.85
Traffic expenses	2,180,206.49,	a decrease of 307,021.25
Transportation expenses	38,935,030.94,	an increase of 996,504.19
General expenses	2,722,485.22,	an increase of 65,584.20
Outside operations	4,881,096.79,	a decrease of 28,712.11

The ratio of rail operating expenses to the total revenues for the year was 71.63% as compared with a ratio of 74.15% in the year 1910, due to the enforcement of the most rigid economy in all departments, unremitting surveillance of all channels of expenditure, and to improved appliances, especially in motive power. Economy in operation has been effected on the Pennsylvania division by the installation of twenty-six Mallet articulated compound locomotives. The improved character of the equipment in service is indicated by the following figures:

Freight locomotive mileage increased	71,764 miles
Freight train mileage increased	250,860 miles
Freight car mileage increased	50,855,079 miles

of which 16,735,072 was the increase in loaded freight car mileage.

Passenger locomotive mileage decreased	743,326 miles
Passenger train mileage decreased	348,800 miles
Passenger car mileage increased	2,123,760 miles

The latter item represents a decrease of 1,132,042 in the mileage of ordinary passenger-train cars, due to the annulment of unremunerative trains: an increase of 560,360 Pullman car miles, due to the increase in through business: and an increase of 2,695,472 miles made by principally express and milk train cars, caused by the greater volume of such business.

In adidtion to the current requirements for maintenance of way, a large amount of renewal and improvement work has been done. Creosoted ties, mostly of yellow pine, expected to give much longer service than the ordinary untreated ties, have been laid for the first time, during the year 1911, to the number of 710,570. The average price ot ties this year was 77.3 cents as against 68.4 cents last year. There were 49,317 tons of 100-lb. new steel rail, at an average price of $30.59 per ton, and 27,951 tons of new 80-lb. rail, at an average price of $29.95 per ton, laid during the year; an excess of 5,000 tons over 1910, the price in each case being higher than that of the previous year. The installation of the most modern type of automatic signal apparatus has resulted in a decreased cost of up-keep.

In the maintenance of equipment group, notwithstanding an increase of $121,775.87 to cover retirements, a total decrease of $25,106.85 is shown. This is partly due to a change in the method of accounting for improvements, and partly to the fact that the equipment has been kept at a high standard of efficiency, resulting in a decrease in charges for repairs.

Traffic expenses, being those charges incurred in soliciting and procuring traffic, outside of its actual movement by rail, amounted to $2,180,206.49, a reduction of $307,021.25, due to a change in the method of treating the deficit of the Merchants Despatch Transportation Company and to the decreased charges for advertising.

The cost of transportation shows large increases in those items representing cost of labor, in consequence of the higher rates of pay which went into effect in the spring of 1910 and the deferred arbitration award effective January 1, 1911. Increases of this class of expense amounted to the sum of $507,000, out of a total increase in transportation expenses of $996,504.19.

General expenses show an increase of $65,584.20, of which $26,531.72 represents the increased amount paid for pensions to retired employees.

In outside operations there was a net revenue of $321,475.83. Ferry lines, harbor terminal transfers, and dining and special car service showed a diminution in the deficits of last year of $198,976.25; and electric light and power plants, grain elevators, stock yards, station restaurants, and freight storage plants produced an increased surplus of $251,600.55.

Taxes have increased $749,932.83, of which $473,044.67 is due to the settlement of disputed special franchise taxes levied on property in the City of New York, mostly in connection with the use of Park Avenue. The federal tax on the income of corporations amounted to $129,183.23, as against $150,564.54 in 1910, but a large amount of the payments in both years was made under protest, and suits have been brought to recover the amounts paid on account of leased lines under the claim that they are not liable to this tax.

In deductions from gross corporate income, rentals of leased lines show a decrease of $21,458.65. There was an increase in the rental of the Boston and Albany Railroad, due to the inclusion in this year's accounts of a full year's interest on the improvement bonds of 1910, as against two months' charges in last year. There was a decrease of $66,458.32 in the rental of the Dunkirk Allegheny Valley and Pittsburgh Railroad, due to the substitution, on February 1, 1911, of a first mortgage bond for $2,900,000, bearing interest at the rate of 4½%, for a like amount of bonds of various kinds on which 7% interest was paid. Interest on obligations of this company increased $1,085,039.99, being the amount of interest on three year gold notes amounting to $30,000,000, issued March 1, 1911. Loss on separately operated properties caused an increase in deductions from income of $210,693.02, being the amount of this company's proportion of the annual guarantee to the Merchants Despatch Transportation Company and the loss on the operation of the Dunkirk Allegheny Valley and Pittsburgh Railroad for the year. An amount of $1,227,624.54 has been charged against income for the year, covering the amount of installments paid on equipment trust certificates of 1907 and 1910. A dividend of 4% was paid on the capital stock of the St Lawrence and Adirondack Railway Company, accounting for an increase in deductions from income of $64,600, which amount, however, is included in this company's income as dividend on stocks owned and does not affect the final result.

The rate of dividend for the year amounted to 5%, as against 6% for the year 1910, the decrease in the amount paid being $2,227,293.

The surplus for the year, after paying dividends, amounted to $4,167,984.04, an increase of $3,243,069.97 over last year. Of this surplus the sum of $2,500,000 was set aside by the Directors as a fund to cover the replacement value of property abandoned prior to 1911, mainly in connection with the improvements at the Grand Central Terminal.

Expenditures for additions and betterments to the property of this company during the year were,

Expenditures on road account		$5,851,806.23
Additional trust equipment		3,714,648.51
		$9,566,454.74
Credit value of equipment retired	$3,333,827.47	
Expenditures on equipment account	1,563,415.99	
Credit balance to equipment replacement fund	$1,770,411.48	
Amount to equal equipment trust installments	1,227,624.54	2,998,036.02
making a net addition to this company's property account of		$6,568,418.72
Expenditures on account of construction work on leased lines amounted to the sum of	$10,068,342.11	
Less valuation of abandoned property	2,264,328.30	
a net charge to leased lines construction of		$7,804,013.81
making a grand total of extraordinary expenditures during the year of		$14,372,432.53

details of which are shown on subsequent pages.

The operation by electricity of multiple unit trains was extended in November to Tarrytown on the Hudson River division.

The Grand Central Terminal improvements, have on the whole, progressed satisfactorily, although delays in receipt of structural steel and a strike in the marble trade have somewhat retarded the completion of the work. The office building immediately to the north of the concourse is practically completed and the majority of the offices are occupied. The Merchants and Manufacturers loft building has been completed and occupied since the early part of the year. The new building for the Adams Express Company is nearly finished and will be ready for occupancy by March 1, 1912. All the buildings on the site of the old Grand Central Station and the temporary building erected for the use of the Post Office Department between 43rd and 44th Streets and Madison and Vanderbilt Avenues, have been demolished. Some of the cross streets have been opened for traffic and all of them are expected to be in use by the end of the year 1912. The Grand Central Terminal is expected to be finished and the waiting rooms, ticket offices and concourse opened to the use of the public by the end of 1912. Arrangements have been completed with the City of New York for the alteration of Vanderbilt Avenue and the closing of Depew Place as a public street. During the year several tracks on the main level of the Terminal have been placed in service and the entire mail business has been transferred to the lower, or suburban, level. Nearly all of the American Express business has been removed from the Terminal territory and is being handled in the new premises on Eleventh Avenue.

There was issued by consent of the Public Service Commission of the Second District of the State of New York, $30,000,000 gold notes due March 1, 1914, bearing interest at the rate of four and one-half per cent per annum, the proceeds to be used for reimbursement of expenditures already made on improvements to property of this company and for advances for construction purposes to lessor companies; for acquisition of lands and for additions and betterments to property of this company and several of its leased lines and for work in connection with the Grand Central Terminal improvements.

One half of this company's holding of the capital stock of the Rutland Railroad Company was sold to the New York New Haven and Hartford Railroad Company, (or associated interests), and an agreement made for the sale to it of the other half, subject to the approval of the Public Service Commission of the State of New York, which has not yet been given.

Application has been made to the Public Service Commission of the State of New York for leave to purchase capital stock of the New York Ontario and Western Railway Company, but that application is still pending.

Under date of December 1, 1911, The New York Central and Hudson River Railroad Company, together with The Lake Shore and Michigan Southern Railway Company, The Michigan Central Railroad Company and The Cleveland Cincinnati Chicago and St Louis Railway Company, became parties to an equipment trust agreement for the purpose of establishing the New York Central Lines Equipment Trust of 1912. Subsequently the Chicago Indiana and Southern Railroad Company also became a party thereto. This agreement provides for an issue of $15,000,000 of equipment trust certificates bearing interest at four and a half per cent per annum, being ninety per cent of the total cost of the equipment to be furnished under the terms of said agreement. The certificates are to be paid in fifteen annual installments of $1,000,000 each, the first installment being payable January 1, 1913. The cost of the equipment to be assigned to this company will be approximately $7,950,000, and the pro rata amount of certificates representing ninety per cent of the cost will be approximately $7,155,000. Full particulars as to the character of the equipment to be acquired will be set forth in the report to the stockholders for 1912.

An agreement was made between this Company and the New York New Haven and Hartford Railroad Company for the establishment of through routes via the Boston and Albany Railroad and whereby the companies agreed to co-operate in building up and increasing the business over that line. The two companies are to share equally in the net results of the operation of the Boston and Albany while the agreement remains in force. This arrangement became effective on July 1, 1911, and is to continue for a period of ten years, and thereafter subject to termination by either party on one year's notice.

Trackage rights have been granted to the New York New Haven and Hartford Railroad Company between Pittsfield and North Adams and between Boston and Ashland, South Framingham and Newton Highlands, with the use of station facilities at Trinity Place and Huntington Avenue.

The Public Service Commission of the State of New York granted this company permission to purchase the whole or any part of the capital stock of the New York and Harlem Railroad Company amounting to $10,000,000 for $175 a share of the par value of $50 and to issue for the purpose of such acquisition $35,000,000 in thirty year four per cent debentures, and to use, for the same purpose, $5,000,000 of the money received from the issue of the gold notes of March 1, 1911. Pending the advantageous sale of these debentures this company received permission to issue four and one-half per cent notes maturing in not more than three years from their respective dates, not to exceed at any one time the sum of $30,000,000, to be redeemed at or before maturity out of the proceeds of the thirty year debentures above mentioned, the intention being that not more than $35,000,000 of the par value of the debentures and notes shall be outstanding at any one time.

By the action of the Board of Directors on December 6, 1911, the holders of this company's Lake Shore Collateral bonds and Michigan Central Collateral bonds have been requested to consent to the consolidation of the Lake Shore and Michigan Southern Railway Company with The New York Central and Hudson River Railroad Company.

This company together with The Lake Shore and Michigan Southern Railway Company, The Michigan Central Railroad Company, The Cleveland Cincinnati Chicago and St Louis Railway Company, The Pittsburgh and Lake Erie Railroad Company, The Lake Erie and Western Railroad Company, Chicago Indiana and Southern Railroad Company, Rutland Railroad Company, The New York Chicago and St Louis Railroad Company, The Toledo and Ohio Central Railway Company, and The Zanesville and West-

ern Railway Company entered into an agreement with The Pullman Company dated April 1, 1911, under which that company is to furnish cars of steel construction to replace the wooden cars operating over the lines of the companies named, the delivery to be at the rate of approximately thirty cars a month. The effect of this agreement will be that by the end of July, 1912, all sleeping cars on the New York Central Lines will be of steel construction.

The Board of Directors on June 5, 1911 appointed James H. Hustis, who had been in charge of the operation of the Boston and Albany Railroad under the title of Assistant General Manager, to be a Vice President of The New York Central and Hudson River Railroad Company, with offices in Boston.

The following appointments also were made during the year:

April 1, Sidney B. Wight, General Purchasing Agent; April 1, William C. Bower, Purchasing Agent; April 1, Frank V. Whiting, General Claims Attorney; May 1, George H. Alexander, Superintendent of Car Service.

Appreciative acknowledgment is made of the faithful, efficient performance of duty of employees in every department of the service during the year.

WILLIAM C. BROWN,
President.

TRAFFIC STATISTICS.

FREIGHT.	1911.	1910.	Increase or Decrease.
Tons of revenue freight carried	48,250,535	47,066,839	1,183,696
Tons of company freight carried	7,751,641	7,964,088	—212,447
Total tons of freight carried..	56,002,176	55,030,927	971,249
Tons of revenue freight carried one mile	9,660,523,688	9,276,710,584	383,813,104
Tons of company freight carried one mile	1,316,028,414	1,299,708,232	16,320,182
Total tons of freight carried one mile	10,976,552,102	10,576,418,816	400,133,286
Miles of road operated in freight service	3,775.27	3,770.07	5.20
Tons of revenue freight carried one mile per mile of road	2,558,896	2,460,620	98,276
Tons of all freight carried one mile per mile of road	2,907,488	2,805,364	102,124
Average distance haul of one ton of revenue freight	200.22	197.10	3.12
Average distance haul of one ton of all freight	196.00	192.19	3.81
Average number of tons of revenue freight per train mile	429.86	417.25	12.61
Average number of tons all freight per train mile	488.42	475.71	12.71
Average number of tons of revenue freight per loaded car mile	17.03	16.85	.18
Average number of tons all freight per loaded car mile	19.35	19.22	.13
Average number of freight cars per train mile	38.70	36.83	1.87
Average number of loaded cars per train mile	25.24	24.76	.48
Average number of empty cars per train mile	12.45	11.06	1.39
Total freight revenue	$61,133,309.92	$58,411,234.14	$2,722,075.78
Average amount received for each ton of freight	$1.27	$1.24	$0.03
Average revenue per ton per mile	mills 6.33	mills 6.30	mills 0.03
Average revenue per mile of road	$16,193.10	$15,493.41	$699.69
Average revenue per train mile	$2.72	$2.63	$0.09

PASSENGER.			
Number of interline passengers carried	3,227,200	3,250,458	—23,258
Number of local passengers carried	30,834,956	30,443,833	391,123
Number of commutation passengers carried	15,250,951	14,670,654	580,297
Total number of revenue passengers carried	49,313,107	48,364,945	948,162
Total number of revenue passengers carried one mile	1,795,954,782	1,770,667,550	25,287,232
Miles of road operated in passenger service	3,497.26	3,497.26	.....
Number of revenue passengers carried one mile per mile of road	513,532	506,301	7,231
Average distance each revenue passenger carried	56.42	56.61	—.19
Average number of passengers per train mile	68	66	2
Average number of passengers per car mile	10	10	.....
Average number of passenger cars per train mile	6	6	.....
Total passenger revenue	$31,759,237.98	$30,992,855.71	$766,382.27
Average amount received from each passenger	cents 64.40	cents 64.08	cents 0.32
Average revenue per passenger per mile	cents 1.768	cents 1.750	cents 0.018
Total passenger service train revenue	$39,638,528.43	$38,581,552.31	$1,056,976.12
Average passenger service train revenue per mile of road	$11,334.17	$11,031.94	$302.23
Average passenger service train revenue per train mile	$1.51	$1.45	$0.06

TOTAL TRAFFIC.			
Operating revenues	$103,954,862.81	$99,908,478.17	$4,046,384.64
Operating expenses	74,472,578.24	74,079,086.58	393,491.66
Net operating revenue	$29,482,284.57	$25,829,391.59	$3,652,892.98
Operating revenues per mile of road	$27,427.06	$26,395.69	$1,031.37
Operating expenses per mile of road	19,648.56	19,571.60	76.96
Net operating revenue per mile of road	$7,778.50	$6,824.09	$954.41
Operating revenues per train mile	$2.13	$2.04	$0.09
Operating expenses per train mile	1.53	1.51	0.02
Net operating revenue per train mile	$0.60	$0.53	$0.07

Note: Decrease designated by minus sign, —.

CONDENSED GENERAL BALANCE SHEET, DECEMBER 31, 1911.

Assets.

Property owned as investment:		
Physical property owned		$261,883,863.21
Securities owned		131,621,727.82
Other permanent investments		52,696,847.99
Total property owned as investment		$446,202,439.02
Working assets:		
Cash	$10,714,189.19	
Marketable securities	28,831,272.67	
Loans and bills receivable	33,684,177.07	
Net traffic, car mileage and per diem balance	4,143,760.53	
Net balance due from agents and conductors	3,660,793.73	
Miscellaneous accounts receivable	6,734,442.45	
Materials and supplies	8,713,817.86	
Unmatured interest, dividends and rents receivable	3,056,441.58	99,538,895.08
Deferred debit items		20,481,025.49
Total assets		$566,222,359.59

Liabilities.

Stock:		
Consolidation certificates	4,900.00	$222,729,300.00
Mortgage, bonded and secured debt		299,870,608.18
Working liabilities		18,443,221.54
Accrued liabilities not due		6,757,596.87
Deferred credit items		2,928.00
Appropriated surplus		4,970,036.67
Free surplus, Profit and loss		13,448,668.33
Total liabilities		$566,222,359.59

FORTY-SECOND ANNUAL REPORT, LAKE SHORE AND MICHIGAN SOUTHERN RAILWAY COMPANY; FOR THE YEAR ENDED DECEMBER 31, 1911.

To the Stockholders of

The Lake Shore and Michigan Southern Railway Company:

The Board of Directors herewith submits its report for the year ended December 31, 1911, with statements showing results for the year and the financial condition of the company.

The mileage embraced in the operation of the road is as follows:

	Miles.
Main line and branches	871.00
Proprietary lines	289.32
Leased lines	424.67
Trackage rights	190.44
Total road operated	1,775.43

The increase of 112.55 miles in mileage operated is caused by the acquisition of rights over the Lake Erie and Pittsburg Railway, Pennsylvania and Baltimore and Ohio Railroad Companies' tracks, and by the use of the Cleveland Short Line Railway. This is a decrease of mileage in main line and branches of .03 miles due to elimination of curves. The net total increase in mileage over 1910 is 112.52 miles.

There was no change in capital stock during the year, the amount authorized and outstanding December 31, 1911, being $50,000,000.00.

The funded debt outstanding on December 31, 1910, was.. $163,817,779.79

It has been increased during the year by the issue and sale of twenty-five year four per cent gold bonds of 1906, being the remainder of the total authorized issue of [illegible]

$169,537,779.79

Funded debt *(brought forward)*	$169,537,779.79
It has been decreased during the year by the payment of the company's pro-rata of installments on equipment trust certificates as follows:	
January 1, First installment 1910 trust...$918,071.04	
November 1, Fourth installment 1907 trust. 447,226.18	1,365,297.22
Total funded debt December 31, 1911	$168,172,482.57

SUMMARY OF FINANCIAL OPERATIONS AFFECTING INCOME.

Operating Income. Rail Operations.	1911. 1,775.43 *miles operated.*	1910. 1,662.91 *miles operated.*	Increase or decrease. 112.52 *miles operated.*
Revenues	$48,360,997.13	$49,420,210.99	—$1,059,213.86
Expenses	31,078,577.87	34,920,932.90	—3,842,355.03
Net Revenue from Rail Operations	$17,282,419.26	$14,499,278.09	$2,783,141.17
Percentage of expenses to revenues	(64.26%)	(70.66%)	—(6.40%)
Outside Operations.			
Revenues	$577,657.87	$559,376.73	$18,281.14
Expenses	608,734.97	609,092.28	—357.31
Net Deficit from Outside Operations	$31,077,10	$49,715.55	—$18,638.45
Net Revenue from All Operations	$17,251,342.16	$14,449,562.54	$2,801.779.62
Taxes Accrued	1,673,939.54	1,720,182.33	—46,242.79
Operating Income	$15,577,402.62	$12,729,380.21	$2,848,022.41
Other Income.			
Hire of equipment	$157,555.78	$383,818.19	—$226,262.41
Joint facilities rents	336,426.83	350,446.54	—14,019.71
Miscellaneous rents	137,904.57	70,209.43	67,695.14
Dividends on stocks owned or controlled	7,878,679.77	7,755,013.50	123,666.27
Interest on funded debt owned	288,623.75	164,946.87	123,676.88
Interest on other securities, loans and accounts	845,556.19	1,005,914.11	—160,357.92
Miscellaneous income	579,468.76	721,738.05	—142,269.29
Total Other Income	$10,224,215.65	$10,452,086.69	—$227,871.04
Gross Corporate Income	$25,801,618.27	$23,181,466.90	$2,620,151.37
Deductions from Gross Corporate Income.			
Rentals of leased lines	$2,531,081.50	$2,268,573.56	$262,507.94
Joint facilities rents	449,678.61	336,967.81	112.710.80
Miscellaneous rents	5,173.90	8,122.88	—2,948.98
Interest on bonded debt	5,724,812.45	5,454,783.05	270,029.40
Interest on equipment trust certificates	842,993.60	542,595.54	300,398.06
Other interest	563,963.49	410,222.83	153,740.66
Dividend on guaranteed stock	96,030.00	96,030.00	.....
Equipment reserve	1,365,297.22	.....	1,365,297.22
Other deductions	49,252.18	277,135.80	—227,883.62
Total Deductions from Gross Corporate Income	$11,628,282.95	$9,394,431.47	$2,233,851.48
Net Corporate Income	$14,173,335.32	$13,787,035.43	$386,299.89
Dividends (18% in each year)	8,903,970.00	8,903,970.00	.....
Surplus for the Year	$5,269,365.32	$4,883,065.43	$386,299.89
1910 installments on 1907 and 1910 trust equipment	.....	1,365,297.22	—1,365,297.22
Balance to Credit of Profit and Loss	$5,269,365.32	$3,517,768.21	$1,751,597.11

Note: Decrease designated by minus sign, —.

Amount to credit of profit and loss (free surplus, December 31, 1910		$29,721,219.05
Balance to credit of profit and loss for the year 1911		5,269,365.32
		$34,990,584.37
Add:		
Amount received from Chicago and North Western and Chicago, Milwaukee and St. Paul Railway Companies account proportion deficit of Indiana Harbor Belt Railroad Company to December 31, 1910	$245,545.73	
Increasing value of Indiana Harbor Belt Railroad Company stock to par	1,224,998.00	
Adjustment with Pittsburgh and Lake Erie Railroad Company account one half operating profit of Pittsburg, McKeesport and Youghiogheny Railroad for years 1909 and 1910	438,092.79	1,908,636.52
		$36,899,220.89
Deduct:		
Discount on $5,720,000.00 gold bonds of 1906.	$457,157.50	
Value of property at Ashtabula and other locations abandoned during the year	209,538.45	
Net loss in adjustment of sundry accounts	77,901.59	744,597.54
Balance to credit of profit and loss (free surplus), December 31, 1911		$36,154,623.35

The operating revenues for the year were $48,360,997.13, a decrease of $1,059,213.86 as compared with the previous year.

Revenue derived from the transportation of freight amounted to $31,-101,334.62, a decrease of $1,545,200.90, almost wholly attributable to unsettled business conditions. Among the commodities carried bituminous coal shows a decrease of 576,594 tons, coke 438,965 tons, ores 1,673,771 tons, and bar and sheet metal 128,671 tons.

Passenger revenue was $11,350,095.67, an increase of $219,970.89. There were 110,061 more local and interline passengers carried, and the revenue per passenger was one cent greater than in the previous year.

Revenue from transportation of mails was $2,178,633.63, an increase of $54,419.52. Contracts regulating the compensation allowed for the transportation of mails for the past four years, expired on June 30 last, at which time the Post Office Department completed a reweighing of the mails, resulting in an increased compensation to the company. Subsequently the Post Office Department inaugurated the transportation of magazines and periodicals by freight and on September 1, withdrew from mail service and transferred to freight service a heavy tonnage of these magazines and periodicals and on that date started another reweighing of the mails, the result of which was a reduction in the compensation to be allowed, to an amount about equal to that which existed prior to June 30, hence the company received the increased compensation for only two months, viz: July and August.

Revenue from express traffic was $1,745,935.84, an increase of $96,593.01.

Revenue from excess baggage and milk was $210,556.49, an increase of $6,398.12.

Other passenger train revenue amounted to $555,262.27, an increase of $69,995.34, due principally to greater patronage of limited trains, resulting in a larger collection of excess fares.

Switching, special service train and miscellaneous transportation revenues amounted to $717,767.64, an increase of $38,119.31.

Revenues other than from transportation were $501,410.97, an increase of $490.85.

The operating expenses for the year amounted to $31,078,577.87, a decrease of $3,842,355.03. By groups they were as follows:

		Decrease.	Per Cent.
Maintenance of way and structures	$6,178,623.31	$1,371,038.09	18.03
Maintenance of equipment	6,704,095.72	1,169,121.34	14.85
Traffic expenses	1,026,317.29	126,847.81	11.00
Transportation expenses	16,245,052.22	1,197,805.58	6.87
General expenses	924,489.33	*22,457.79	2.43

*Increase.

Retrenchments in expenditures for maintenance of way and structures were made during the latter half of the year, but curtailing the work of reballasting main line track with stone and by reduction in outlay for repairs and renewals of bridge structures and buildings and fixtures. There was a heavy charge to maintenance during 1910 in completing change of line from left to right hand running, with no corresponding expense during the year 1911.

There was a decrease in practically all maintenance of equipment items, principally due to the large amount of equipment out of service during the year with a consequent reduction in charges for repairs, and to a lesser number of old locomotives and cars retired from service.

The decrease in traffic expenses is due to a reduction in freight tariff publications and elimination of the charge to "Fast freight lines" of the company's proportion of the deficit of the Merchants' Despatch Transportation Company, which this year is shown under "Deductions from income."

In transportation expenses there are decreases in nearly all items affected by the volume of train service, by reason of a falling off in freight traffic and a greater number of tons hauled per train, resulting in a reduced train mileage.

The increase in general expenses is due to payments made by the company during the year to a larger number of superannuated employes under the pension rules and to increased legal expenses.

Outside operations show a decreased loss for the year of $18,638.45, principally due to increased revenues derived from dining car service and commercial ice supply plants.

Taxes accrued amounted to $1,673,939.54, a decrease of $46,242.79.

Other income for the year was $10,224,215.65, a decrease of $227,871.04 as compared with the previous year, caused by changing the method of settlement between system lines for freight car hire from a per diem to a mileage basis, effective January 1, resulting in less revenue; and also a smaller return in interest on notes, owing to liquidation of promissory notes of The Cleveland Short Line Railway Company and The Lake Erie and Pittsburg Railway Company.

Deductions from gross corporate income were $11,628,282.95, an increase of $2,233,851.48 as compared with the previous year, attributable to the following causes:

Rental of leased lines increased $262,507.94, owing to the terms of the agreement for the use of the Cleveland Short Line Railway.

Joint facilities and miscellaneous rents increased $109,761.82, on account of payments for additional trackage acquired during the year as more fully referred to hereinafter.

Interest on equipment trust certificates increased $300,398.06, a full year's interest having been accrued on the company's pro-rata of the equipment trust certificates of 1910, as against a partial year's accrual in the previous year.

Interest on bonded debt increased $270,029.40, through the issuance during the year of $5,720,000.00 gold bonds of 1906, with attending accrual of interest thereon.

Other interest increased $153,740.66, principally due to additional one year French notes issued by the company during the year.

Equipment reserves increased $1,365,297.22, being the amount equivalent to the year's installments on account of 1907 and 1910 equipment trusts and included as a deduction from income, whereas in 1910 the same amount was deducted from surplus.

Other deductions decreased $227,883.62. There was a reduction of $277,135.80, caused by the discontinuance on December 31, 1910, of contributions by the company toward the deficit of the Indiana Harbor Belt Railroad Company. This reduction was partially offset by an increase of $49,252.18 in "Separately operated properties—loss", due to the transfer to that account of the company's proportion of Merchants' Despatch Transportation Company deficit heretofore included in traffic expenses.

From the net corporate income of the company for the year, amounting to $14,173,335.32, there were paid three dividends aggregating 18 per cent or $8,903,970.00, leaving a surplus for the year of $5,269,365.32.

Additions and betterments to the property during the year were $2,722,-976.80, the full amount of which was charged direct to capital account. The detail of such expenditures will be found on a following page.

The company as owner of the entire outstanding capital stock of The Cleveland Short Line Railway Company, entered into an agreement and lease on April 1, 1911, whereby it acquired the right to use the railroad and properties of The Short Line Company, extending from Rockport to Collinwood, Ohio, forming a belt line around the City of Cleveland. That part of the line from Rockport to Marcy, Ohio, a distance of 10.08 miles, is being operated in connection with the Lake Erie and Pittsburg Railway, while the line from Marcy to Collinwood, Ohio, is still under construction. As rental The Lake Shore and Michigan Southern Railway Company agrees to pay an amount equivalent to five per cent per annum on outstanding capital stock and interest on outstanding obligations of that company. Further, it is to pay all taxes and assessments and to keep and maintain,

at its own expense, the railroad and properties leased and is to receive all revenues derived from the operation thereof.

The Lake Erie and Pittsburg Railway, extending from Marcy to Brady's Lake Junction, Ohio, a distance of 27.84 miles, was opened for operation on October 15, 1911, at which time through freight service was established by The Lake Shore and Michigan Southern Railway Company over that road. The Lake Erie and Pittsburg Railway was constructed under an agreement dated January 10, 1908, between The Lake Shore and Michigan Southern Railway Company, the Pennsylvania Company and The Lake Erie and Pittsburg Railway Company, under the terms of which the two former companies agreed to advance funds for construction in equal proportions. Upon completion of the road, The Lake Erie and Pittsburg Railway Company issued its securities in reimbursement for the advances made, and control of the property is now held equally by The Lake Shore and Michigan Southern and Pennsylvania Companies through ownership of stock. Under the conditions of the agreement hereinbefore referred to, the two owning companies will each pay one-half of an amount equivalent to five per cent per annum on the outstanding stock, and interest on outstanding obligations of The Lake Erie and Pittsburg Railway Company, in consideration of which The Lake Shore and Michigan Southern Railway Company and The Pennsylvania Company have equal rights for the operation of their trains over the tracks of The Lake Erie and Pittsburg Railway.

In connection with the opening of The Lake Erie and Pittsburg Railway, trackage rights were acquired over the tracks of the Pennsylvania Company between Brady's Lake Junction and Minerva, Ohio, which gives the company a direct connection with the Lake Erie, Alliance and Wheeling Railroad and access to the coal fields located along that line.

Running rights were also acquired over the tracks of the Baltimore and Ohio Railroad Company between Ravenna and Haselton, Ohio, at which point connection is made with the Pittsburg and Lake Erie Railroad, thus opening up a new short route for traffic between the company's territory west of Cleveland, Ohio, and points on the Pittsburg and Lake Erie Railroad and also in the Mahoning and Shenango Valley district.

The company issued, on March 4, 1911, its one year notes payable March 4, 1912, to the extent of 60,000,000 francs, equivalent to $11,538,461.53, and from the proceeds retired its one year franc notes falling due March 15, 1911, amounting to 44,000,000 francs. The balance remaining was applied to the general purposes of the company.

In accordance with an agreement dated April 13, 1911, between the Chicago, Milwaukee and St. Paul Railway Company, Chicago and North Western Railway Company, The Michigan Central Railroad Company and The Lake Shore and Michigan Southern Railway Company, the two latter companies sold in equal proportions to the Chicago, Milwaukee and St. Paul Railway Company and the Chicago and North Western Railway Company, forty per cent of their entire holdings in the capital stock and a like interest in certain other obligations of the Indiana Harbor Belt Railroad Company. The Lake Shore and Michigan Southern Railway Company, through this transaction, disposed of 4,900 shares of the capital stock and $447,538.65 of promissory notes of the Indiana Harbor Belt Railroad Company. The Lake Shore and Michigan Southern Railway Company and The Michigan Central Railroad Company have guaranteed the principal and interest of an issue of $6,725,000 of bonds of the Indiana Harbor Belt Railroad Company. To the extent of twenty per cent each the Chicago Milwaukee and St. Paul Railway Company and the Chicago and North Western Railway Company further agree to protect the guarantors of the Belt Company's bonds on their guaranty.

The company received during the year as reimbursement for advances made for construction purposes, 35,250 shares of preferred stock, par value $3,525,000.00, and $7,000,000.00 first mortgage bonds of The Cleveland Short Line Railway Company. For the same purpose it received 21,450 shares of stock, par value $2,145,000.00, and $2,150,000.00 first mortgage bonds of The Lake Erie and Pittsburg Railway Company.

There were acquired by purchase 42,000 shares of stock, par value $2,100,000.00, of The Pittsburgh and Lake Erie Railroad Company, and $25,000.00 of The Toledo and Ohio Central Railway Company, St. Mary's Division, first preference income bonds.

Under date of December 1, 1911, The Lake Shore and Michigan Southern Railway Company, together with The New York Central and Hudson River Railroad Company, The Michigan Central Railroad Company and The Cleveland Cincinnati Chicago and St. Louis Railway Company, became parties to an equipment trust agreement for the purpose of establishing the New York Central Lines Equipment Trust of 1912. Subsequently, the Chicago Indiana and Southern Railroad Company also became a party thereto. This agreement provides for an issue of $15,000,000 of equipment trust certificates bearing interest at four and a half per cent per annum; being ninety per cent of the total cost of the equipment to be furnished under the terms of said agreement. The certificates are to be paid in fifteen annual installments of $1,000,000 each; the first installment being payable January 1, 1913. The cost of the equipment to be assigned to this company will be approximately $3,305,000, and the pro-rata amount of certificates representing ninety per cent of the cost will be approximately $2,974,500. Full particulars as to the character of the equipment to be acquired will be set forth in the report to the stockholders for 1912.

Cost of road and equipment on December 31, 1910, was....		$128,198,961.34
It has been increased during the year as follows:		
Expenditures for additions and betterments to the property as shown in detail elsewhere	$2,722,976.80	
Cost of equipment received during the year under the equipment trust of 1910.....	535,123.89	
Adjustment account transferring from "Physical property owned" the value of the warehouse, which was until February, 1911, leased to The Taylor Street Warehouse Company, now used by the company as an adjunct to its Chicago freight station	100,000.00	3,358,100.69
		$131,557,062.03
Amount to credit of equipment replacement fund, December 31, 1910.....	$986,824.51	
To which there was added value of equipment retired from service during the year.....	828,468.00	
	$1,815,292.51	
Amount charged for new equipment acquired during the year consisting of 10 passenger, 40 freight and 25 switching locomotives, 15 steel mail cars, 1000 box cars, 12 caboose cars and miscellaneous work equipment.....	2,702,441.70	
Leaving expended for additional equipment in excess of the replacement fund		887,149.19
		$132,444,211.22
Amount credited in 1911 for account of 1907 and 1910 equipment trust installments provided for through income.....		1,365,297.22
Cost of road and equipment, December 31, 1911.....		$131,078,914.00

The following appointments were made during the year:

January 1, William A. Newman, General Freight Agent.
April 1, Sydney B. Wight, General Purchasing Agent and Frank V. Whiting, General Claims Attorney.
May 1, John W. Daly, Passenger Traffic Manager.
June 1, Albert S. Ingalls, General Superintendent.

Appreciative acknowledgment is made of the faithful, efficient performance of duty by employes in every department of the service during the year.

WILLIAM C. BROWN,
President.

CONDENSED GENERAL BALANCE SHEET, DECEMBER 31, 1911.

Assets.

Property investment		$143,959,056.60
Working assets:		
Cash	$12,063,012.85	
Securities issued or assumed—held in treasury	3,900.00	
Marketable securities	107,689,832.01	
Loans and bills receivable	8,008,121.13	
Traffic and car service balances due from other companies	1,060,734.89	
Net balance due from agents and conductors	1,009,980.23	
Miscellaneous accounts receivable	6,342,688.32	
Materials and supplies	3,519,173.46	
Other working assets	150,820.83	139,848,263.72
Accrued income not due.....		1,530,246.46
Deferred debit items		2,215,673.53
Total assets		$287,553,240.31

Liabilities.

Stock	$50,000,000.00
Mortgage, bonded and secured debt	168,172,482.57
Working liabilities	19,811,913.01
Accrued liabilities not due	4,407,072.60
Deferred credit items	161,825.73
Appropriated surplus	8,845,323.05
Profit and loss—balance	36,154,623.35
Total liabilities	$287,553,240.31

TWENTY-THIRD ANNUAL REPORT, CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS RAILWAY COMPANY; FOR THE YEAR ENDED DECEMBER 31, 1911.

To the stockholders of

The Cleveland, Cincinnati, Chicago & St. Louis Railway Company:

The Board of Directors herewith submits its report for the year ended December 31, 1911, with statements showing the results for the year and the financial condition of the company.

The mileage embraced in the operation of the road is as follows:

Main line	1,676.33
Branches	201.29
Trackage rights	134.02
Total length of road operated.....	2,011.64

There was a decrease in the main line mileage of 4.62 miles accounted for by changes in alinement, relocations and remeasurements. There was an increase in branch line mileage of 34.65 due to opening the Evansville branch and two miles of the Saline Valley Railway, with slight changes on account of remeasurements. A decrease of .60 miles in trackage rights is accounted for by the operation of the trains of this company into Toledo via Berwick, Ohio, instead of via Carey, Ohio, nearly offset by the additien of trackage rights at Evansville, over the Louisville and Nashville Railroad.

There was no change in the capital stock during the year, the amounts authorized and outstanding on December 31, 1911, being as follows:

Preferred stock authorized		$10,000,000.00
Common stock authorized		50,000,000.00
Total preferred and common stock authorized.....		$60,000,000.00
Preferred stock issued and outstanding.....$10,000,000 00		
Common stock issued and outstanding.....	47,056,300.00	57,056,300.00
Balance common stock authorized but not issued, December 31, 1911		$2,943,700.00
The funded debt oustanding December 31, 1910, was.....		$86,792,000.97
It has been increased during the year as follows:		
C C C & St L Ry general mortgage bonds; issued for additions, improvements, double tracking, equipment, etc.	$1,000,000.00	
C C C & St L Ry 4½% twenty-year debenture bonds, dated January 1, 1911, maturing January 1, 1931, issued for purpose of funding floating indebtedness, and for construction and improvements	5,000,000.00	
C C C & St L Ry general mortgage bonds issued for retirement of prior lien bonds...	28,000.00	6,028,000.00
		$92,820,000.97

Funded debt *brought forward*		$92,820,000.97
Retired during the year:		
Equipment trust certificates due January 1, 1911	$199,625.82	
Equipment trust certificates due November 1, 1911	246,689.81	
C I St L & C Ry Co first mortgage bonds	6,000.00	
C I St L & C Ry Co general first mortgage bonds	22,000.00	
C C C & St L Ry Co 5% Gold notes	4,988,000.00	5,462,315.63
Total funded debt outstanding December 31, 1911		$87,357,685.34

Under date of December 1, 1911, The Cleveland, Cincinnati, Chicago and St. Louis Railway Company, together with The New York Central and Hudson River Railroad Company, The Lake Shore and Michigan Southern Railway Company and The Michigan Central Railroad Company, became parties to an equipment trust agreement for the purpose of establishing the New York Central Lines Equipment Trust of 1912. Subsequently, the Chicago, Indiana and Southern Railroad Company also become a party thereto. This agreement provides for an issue of $15,000,000 of equipment trust certificates bearing interest at four and a half per cent per annum; being ninety per cent of the total cost of the equipment to be furnished under the terms of said agreement. The certificates are to be paid in fifteen annual installments of $1,000,000 each; the first installment being payable January 1, 1913. The cost of the equipment to be assigned to this company will be approximately $2,664,000 and the pro rata amount of certificates representing ninety per cent of the cost will be approximately $2,398,320. Full particulars as to the character of the equipment to be acquired will be set forth in the report to the stockholders for 1912.

There was extended during the year for additions to the property, improvements, double tracking, equipment, etc., and charged to cost of road and equipment, the sum of $3,690,080.24, a detailed statement of which will be found upon another page.

SUMMARY OF FINANCIAL OPERATIONS AFFECTING INCOME.

Operating Income.	1911.	1910	Increase or decrease.
Rail Operations.	2,011.64 *miles operated.*	1,982.21 *miles operated.*	29.43 *miles operated.*
Revenues	$30,431,914.86	$30,423,004.78	$8,910.08
Expenses	22,239,392.18	23,495,620.12	—1,256,227.94
Net Revenue from Rail Operations	$8,192,522.68	$6,927,384.66	$1,265,138.02
Percentage of expenses to revenue	(73.08%)	(77.23%)	—(4.15%)
Outside Operations.			
Revenues	$355,626.95	$335,702.20	$19,924.75
Expenses	401,713.41	433,883.69	—32,170.28
Net Deficit from Outside Operations	$46,086.46	$98,181.49	—$52,095.03
Net Revenue from All Operations	$8,146,436.22	$6,829,203.17	$1,317,233.05
Taxes Accrued	1,062,512.28	949,548.00	112,964.28
Operating Income	$7,083,923.94	$5,879,655.17	$1,204,268.77
Other Income.			
Joint facilities rents	$319,639.86	$329,149.90	—$9,510.04
Miscellaneous rents	207,988.31	203,603.48	4,384.83
Dividends on stocks owned or controlled	72,764.90	141,503.90	—68,739.00
Interest on funded debt owned	46,120.00	45,160.00	960.00
Interest on other securities, loans and accounts	52,769.25	91,689.56	—38,920.31
Miscellaneous income	8,448.94	9,706.68	—1,257.74
Total Other Income	$707,731.26	$820,813.52	—$113,082.26
Gross Corporate Income	$7,791,655.20	$6,700,468.69	$1,091,186.51
Deductions from Gross Corporate Income.			
Rentals of leased lines	$132,500.00	$120,000.00	$12,500.00
Hire of equipment, car mileage and per diem balances	763,307.31	680,209.94	83,097.37
Interest on equipment trust certificates	271,722.40	213,875.94	57,846.46
Equipment reserve	446,315.63		446,315.63
Joint facilities rents	526,794.42	533,661.18	—6,866.76
Miscellaneous rents	141,710.61	142,868.82	—1,158.21
Interest on funded debt	3,475,625.15	3,187,574.66	288,050.49
Other interest	80,324.24	240,874.66	—160,550.42
Proportion loss operation Central Indiana Ry.	56,300.00	62,465.00	—6,165.00
Discount on debenture bonds	53,425.00	43,441.29	9,983.71
Separately operated properties	[illegible]	[illegible]	42,014.85
Total Deductions from Gross Corporate Income	$5,990,039.61	$5,224,971.49	$765,068.12
Net Corporate Income	$1,801,615.59	$1,475,497.20	$326,118.39
Dividends, preferred, four, aggregating 5%	$500,000.00	$500,000.00	
Dividends [illegible]		941,126.00	—941,126.00
	$500,000.00	$1,441,126.00	—$941,126.00
Surplus for the Year	$1,301,615.59	[illegible]	[illegible]

Note: Decrease designated by minus sign.

Amount to credit of profit and loss or surplus December 31, 1910	$2,192,735.68
Surplus for the year 1911	1,301,615.59
	$3,494,351.27
Deduct:	
Discount on C. C. C. & St L. Ry. Co. debenture bonds of 1910 and 1911	$971,650.00
Discount on C. C. C. & St L. Ry. Co. general mortgage bonds	94,040.00
Old Central Indiana Railway advances	153,756.70
Adjustment of sundry accounts	105,781.97
	1,325,198.67
Balance to the Credit of Profit and Loss (Life Surplus) December 31, 1911	$2,169,152.60

The total operating revenues for the year showed a slight increase of $8,910.08 over the preceding year. For the most part, the detailed accounts show only minor variations from last year, the only important exceptions being decreases in express revenue of $18,667.58; in switching revenue of $26,821.84, and in special service train revenue of $13,767.95, the latter on account of military encampment at Fort Benjamin Harrison in 1910; with increases in other passenger train revenue of $30,192.18 and in miscellaneous revenue, other than transportation, of $25,946.35.

Freight revenue for the year was $19,933,295.87, an increase of $10,395.30. The average revenue per ton mile showed but a slight variation from the preceding year, being 5.50 mills in 1911, as compared with 5.46 mills in 1910. The volume of freight moved was 23,339,590 tons, an increase of 409,958 tons over last year. The movement of individual commodities shows the largest increase in bituminous coal which was 818,807 tons in excess of last year; the most marked decreases were in coke, which decreased 234,376 tons, and in lumber, which decreased 181,199 tons. The average number of tons of revenue freight per train mile increased 14 tons and the average number of freight cars per train mile increased 3 cars.

Passenger revenue was $7,819,254.70, an increase of $7,242.59, which slight variation is altogether attributable to increase in the average revenue per passenger per mile from 1.795 cents to 1.825 cents, there being a decrease of 52,347 in the total number of revenue passengers carried and a decrease of 6,652,374 in revenue passengers carried one mile. Local revenue increased $23,480.94 and interline revenue decreased $16,238.35.

The decrease in express revenue of $18,667.58 reflects decreased earnings of the express company on traffic over this road, the compensation fluctuating with the volume of business handled for the express company.

The operating expenses for the year amounted to $22,239,392.18, a decrease of $1,256,227.94. The fluctuations by groups were as follows:

Maintenance of way and structures—decrease	$563,804.77
Maintenance of equipment repairs—decrease	441,121.44
Maintenance of equipment renewals—increase	235,685.93
Traffic expenses—decrease	85,945.59
Transportation expenses—decrease	430,408.99
General expenses—increase	29,366.92
Net decrease	$1,256,227.94

It will be noted that the foregoing shows in a marked degree a retrenchment of expenses wherever possible; as a result, the ratio of operating expenses to operating revenues was reduced from 77.23% to 73.08% (4.15%).

The decrease in maintenance of way and structures is distributed through practically all the accounts, the pay rolls of this department showing a decrease of $278,844.43 from the preceding year. As exceptions to the general decrease, ties show an increase of $42,934.52, due to the fact that track conditions necessitated the laying of 93,908 ties in excess of last year, and telegraph and telephone lines increased $20,401.47, principally on account of installation of despatchers' telephone circuits on the Cleveland and Cincinnati divisions.

The decrease in maintenance of equipment repairs will be found to cover repairs of all classes of equipment, the pay rolls of this department showed a reduction of $156,543.86 from the preceding year.

The increase in renewals of equipment, amounting to $235,685.93, is principally accounted for by the retirement from service this year of 39 locomotives, costing $282,927.91; only 8 being retired last year, costing $38,922.97; there were also 8 passenger cars retired this year, costing $26,353.15 as compared with 3 last year at a cost of $14,327.67, retirements of equipment of other classes not materially varying from the preceding year.

Traffic expenses decreased $85,945.59; the important items being outside agencies, decrease $15,234.16, made possible by abolition or consolidation of agencies at various points; fast freight line expenses, decrease $43,556.91, accounted for by the transfer of Merchants' Despatch Transportation Co. deficit in operations from this account to operation of outside properties, under deductions from income, and stationery and printing decreased $30,944.70 on account of the abnormal necessities for tariffs in the preceding year.

Conducting transportation expenses decreased $430,408.99. The decrease in pay rolls on account of decreased force in this department amounted to $403,155.71, partially offset by increase in rates of pay during early part of the year, amounting to $296,249.82. An important item of decrease in transportation expenses was in fuel for locomotives which showed a decrease of $268,150.04, of which amount, approximately $163,103.49 was due to decrease in average cost per ton from $1.54 to $1.45, and $105,046.55 due to decreased consumption. Incident to the general policy of retrenchment, there was a reduction of 1,452,728 miles in revenue locomotive mileage for the year and a reduction of 978,594 miles in revenue train mileage. There was an increase of $38,754.18 in payments made for personal injuries, on account of increased number of settlements due to casualties.

General expenses increased $29,366.92, principally in the items of pensions, insurance, law expenses, and other expenses; the expenses of general administration being naturally enhanced by the exacting requirements of various state and federal commissions which require elaboration of details in reports and other general work for which no adequate provision could be made in former year.

The net deficit from outside operations decreased $52,095.03. This is due to increased revenue from the dining car service, which was $54,831.04 in excess of last year; the returns from other outside operations showing a net decrease of $2,736.01 from last year.

Taxes have increased $112,964.28; of which $78,362.80 is due to increased taxes on intrastate earnings in Ohio and $39,123.26 to increase of other taxes in Ohio, the balance being fluctuations in taxes in other states and in the federal income tax.

In other income a decrease is shown of $113,082.26, which is on account of decreased dividends on securities owned in subsidiary companies, $68,739.00, and decreased interest on bank balances, notes and loans.

The important items in increase in deductions from income, which amounted to $765,068.12, are: increased interest on bonds, $288,050.49, due to the issue during 1911 of $5,000,000 twenty-year gold debenture bonds, maturing in 1931, and of $1,000,000 additional general mortgage bonds; charges representing the 1911 proportion of installments on 1907 and 1910 equipment trust certificates $446,315.63 against which there was no corre-

sponding charge in this account in 1910; increased interest on equipment trust certificates, $57,846.46; increase in hire of equipment, $83,097.37; and increase account of discount on debentures, $9,983.71.

The surplus for the year, after paying a dividend of $500,000 representing five per cent on the preferred stock, was $1,301,615.59.

The general balance sheets and tabulated statements showing results of operation for the year are given later.

During the year the construction of the Evansville, Mt. Carmel and Northern Railway was completed and was opened for traffic on July 1, 1911, as the "Evansville branch" of this road. The line extends from Mt. Carmel, Illinois, to Evansville, Indiana; entrance into Evansville being secured by trackage rights over the Louisville & Nashville Railroad, with joint use of its terminal facilities at that point. The cost of construction of the road to December 31, 1911, was $2,193,417.95, for whch the Cleveland, Cincinnati, Chicago & St. Louis Railway Company has acquired all the capital stock of the road and $2,082,000.00 of its funded debt. The outlook for business on this branch is very satisfactory.

There has been advanced during the year, for construction on the Saline Valley Railway, $16,857.11, and two miles of this road are being operated, from Harrisburg to coal mines in the vicinity. The Saline Valley Railway Company, organized under the laws of the State of Illinois, April 6, 1907, will ultimately extend from Harrisburg, Saline County, Illinois, to this company's coal properties in the eastern part of Williamson County, Illinois, a distance of about 12 miles. The total expenditures for construction to date have been $50,531.01. The Cleveland, Cincinnati, Chicago & St. Louis Railway Company owns all the capital stock and funded debt of this road.

There has been advanced on account of the St. Louis Short Line division for construction and improvements during the year, $48,584.67.

This company's proportion of the deficit in operation of the Central Indiana Railway for the year 1911, amounting to $56,300.00, has been charged off as a "Deduction from Income."

The sinking fund of the Cleveland, Cincinnati, Chicago & St. Louis Railway Company's St. Louis Division first collateral trust bonds has been increased during the year by the purchase of 24 bonds, par value $24,000.00, making a total of 590 bonds, par value $590,000.00, in the hands of the Central Trust Company, trustee of this fund.

The credit balance in equipment replacement fund on December 31, 1910 was		$504,407.74
There was added during the year 1911 representing the value of equipment retired:		732,032.65
		$1,236,440.39
There was charged against this fund the following:		
Locomotives	$62,258.76	
Passenger cars	147,257.61	
Freight cars	52,678.45	
Work cars	114.74	262,309.56
Balance December 31, 1911		$974,130.83

Separate reports have been issued showing the financial condition and results from operation of the Peoria & Eastern Railway and the Cincinnati Northern Railroad for the year.

The operation of the Kankakee and Seneca Railroad (for which separate accounts are kept) shows earnings for the year $73,661.21, operating expenses and taxes $94,680.23, additions and betterments, $9.86, deficit, $21,028.88.

The Mt Gilead Short Line (for which separate accounts are kept) shows earnings for the year $6,044.25, operating expenses and taxes $9,124.37, deficit $3,080.12.

The following appointments were made during the year:

On March 20, 1911, Sydney B. Wight, General Purchasing Agent.

On April 1, 1911, Frank V. Whiting, General Claims Attorney.

On May 1, 1911, John W. Daly, Passenger Traffic Manager.

On September 1, 1911, Herman M. Griggs and John B. Nessle, General Coal and Ore Agents.

On December 11, 1911, James C. Wallace, Auditor of Disbursements.

Appreciative acknowledgment is made of the faithful, efficient performance of duty by employees in every department of the service during the year.

WILLIAM C. BROWN,
President.

CONDENSED GENERAL BALANCE SHEET, DECEMBER 31, 1911.

Assets.

Property investment:		
Road and equipment	$139,584,862.96	
Securities owned	4,824,024.42	
Other investments	2,543,810.11	
Total		$146,952,697.49
Working assets:		
Cash	$2,789,131.46	
Securities issued or assumed held in treasury Stock	29,100.00	
Marketable securities Stock	122,851.00	
Loans and bills receivable	323,899.15	
Traffic and car service balances due from other companies	414,342.91	
Net balance due from agents and conductors	721,687.95	
Miscellaneous accounts receivable	2,458,973.59	
Materials and supplies	1,724,178.73	
Total		8,584,164.79
Deferred debit items		1,343,002.39
Total assets		$156,879,864.67

Liabilities.

Stock	$57,496,014.46
Mortgage, bonded and secured debt	87,357,685.34
Working liabilities	7,839,540.61
Accrued liabilities not due	644,063.79
Deferred credit items	668,178.34
Appropriated surplus	705,229.53
Free surplus, profit and loss—balance	2,169,152.60
Total liabilities	$156,879,864.67

SIXTY-SIXTH ANNUAL REPORT, MICHIGAN CENTRAL RAILROAD COMPANY; FOR THE YEAR ENDED DECEMBER 31, 1911.

To the Stockholders of

THE MICHIGAN CENTRAL RAILROAD COMPANY:

The Board of Directors herewith submits its report for the year ended December 31, 1911, with statements showing the results for the year and the financial condition of the company.

The report covers the operation of the following mileage:

	Miles.
Main line	270.07
Proprietary lines	343.31
Leased lines	1,110.20
Lines operated under trackage rights	93.18
Total road operated	1,816.76

The total road operated as shown in the report for 1910 was 1,803.29 miles. The increase of 13.47 miles shown for this year is on account of corrections due to re-measurement.

There was no change in capital stock during the year, the amount authorized and outstanding being $18,738,000.00.

The funded debt outstanding December 31, 1910, was		$41,870,578.68
It has been decreased during the year ended December 31, 1911, as follows:		
Installment on New York Central lines equipment trust certificates of 1910, paid January 1, 1911	$339,098.22	
Installment on New York Central lines equipment trust certificates of 1907, paid November 1, 1911	260,425.45	
Michigan Central-Jackson, Lansing & Saginaw three and one-half per cent. gold bonds of 1951 purchased and cancelled by the Trustees of the Land Grant Fund of the Jackson, Lansing & Saginaw Railroad Company	2,000.00	601,523.67
Total funded debt December 31, 1911 (detail on another page)		$41,269,055.01
The total amount charged to road and equipment on December 31, 1911, was $65,527,985.12 as follows:		
Amount charged against main line to December 31, 1910		$48,184,503.07
There was charged for additions and betterments in 1911, as shown in detail on another page:		
Against capital account		
For road	$123,406.53	
For equipment	597,789.00	$721,195.53
Against income account (appropriated surplus)		
For equipment	87,277.02	
	$808,472.55	
Less: Equipment replacement fund	$32,194.36	
Equipment trust installments	599,523.67	631,718.03	176,754.52
Total main line		$48,361,257.59
Amount charged account leased lines to December 31, 1910		$16,622,525.25
There was charged for additions and betterments in 1911 against capital account for road, as shown in detail elsewhere	544,202.28	
Total leased lines		17,166,727.53
Grand total		$65,527,985.12

The double tube tunnel under the Detroit River, including interlocking system, electrical sub-stations and equipment, was fully completed in the early part of the year, and in its operation has met every expectation. The earnings of the Detroit River Tunnel Company for the year were sufficient to defray maintenance and operating expenses, taxes, interest on bonds, and to pay a dividend of two per cent. on its capital stock, with a surplus of $159,152.33. Under date of May 10, 1911, an agreement, supplemental to the lease of December 19, 1906, was made with the Detroit River Tunnel Company, whereby that company is now proceeding with the construction of a passenger station, terminal yards, and accommodations, in the City of Detroit, which facilities, when completed, will be operated by The Michigan Central Railroad Company. This company has agreed to guarantee the principal and interest on thirty million dollars of Detroit River Tunnel Company Terminal and Tunnel Gold Bonds, bearing date May 1, 1911, as issued. There were issued and sold during the year fourteen millions of such bonds, bearing interest at the rate of 4½% per annum.

In accordance with an agreement dated April 13, 1911, between the Chicago Milwaukee and St Paul Railway Company, Chicago and North Western Railway Company, The Michigan Central Railroad Company and The Lake Shore and Michigan Southern Railway Company, the two latter companies sold in equal proportions to the Chicago Milwaukee and St Paul Railway Company and the Chicago and North Western Railway Company, forty per cent. of their entire holdings in the capital stock and a like interest in certain other obligations of the Indiana Harbor Belt Railroad Company. The Michigan Central Railroad Company, through this transaction disposed of 4,900 shares of the capital stock and $447,538.65 of promissory notes of the Indiana Harbor Belt Railroad Company. The Lake Shore and Michigan Southern Railway Company and The Michigan Central Railroad Company have guaranteed the principal and interest of an issue of $6,725,000.00 of bonds of the Indiana Harbor Belt Railroad Company. To the extent of twenty per cent. each the Chicago Milwaukee and St Paul Railway Company and the Chicago and North Western Railway Company further agree to protect the guarantors of the Belt Company's bonds on their guaranty.

Under date of December 1, 1911, The Michigan Central Railroad Company, together with The New York Central and Hudson River Railroad Company, The Lake Shore and Michigan Southern Railway Company and The Cleveland Cincinnati Chicago and St. Louis Railway Company, became parties to an equipment trust agreement for the purpose of establishing the New York Central Lines Equipment Trust of 1912. Subsequently, the Chicago Indiana and Southern Railroad Company also became a party thereto. This agreement provides for an issue of $15,000,000 of equipment trust certificates bearing interest at four and a half per cent. per annum; being ninety per cent. of the total cost of the equipment to be furnished under the terms of said agreement. The certificates are to be paid in fifteen annual installments of $1,000,000 each; the first installment being payable January 1, 1913. The cost of the equipment to be assigned to this company will be approximately $2,528,000 and the pro rata amount of certificates

representing ninety per cent. of the cost will be approximately $2,275,200. Full particulars as to the character of the equipment to be acquired will be set forth in the report to the stockholders for 1912.

SUMMARY OF FINANCIAL OPERATIONS AFFECTING INCOME.

Operating Income, Rail Operations.	1911. 1,816.76 miles operated.	1910. 1,803.29 miles operated.	Increase or decrease. 13.47 miles operated.
Revenues	$30,164,490.16	$29,694,815.71	$469,674.45
Expenses	20,746,231.18	21,628,906.26	—882,675.08
Net Revenue from Rail Operations	$9,418,258.98	$8,065,909.45	$1,352,349.53
Percentage of expenses to revenue	(68.78%)	(72.84%)	—(4.06%)
Outside Operations.			
Revenues	$608,294.24	$543,636.69	$64,657.55
Expenses	599,385.38	599,951.82	—566.44
Net Revenue from Outside Operations	$8,908.86	.....	$65,223.99
Net Deficit from Outside Operations	.....	$56,315.13	.....
Net Revenue from All Operations	$9,427,167.84	$8,009,594.32	$1,417,573.52
Taxes Accrued	1,322,620.82	1,357,019.92	—34,399.10
Operating Income	$8,104,547.02	$6,652,574.40	$1,451,972.62
Other Income.			
Joint facilities rents	$236,403.38	$229,289.51	$7,113.87
Miscellaneous rents	3,259.77	2,676.02	583.75
Dividends on stocks owned or controlled	347,241.50	287,241.50	60,000.00
Interest on funded debt owned	46,880.00	46,880.00	.....
Interest on other securities, loans and accounts	525,154.01	440,969.02	84,184.99
Miscellaneous income	12,018.43	86,623.87	—74,605.44
Total Other Income	$1,170,957.09	$1,093,679.92	$77,277.17
Gross Corporate Income	$9,275,504.11	$7,746,254.32	$1,529,249.79
Deductions from Gross Corporate Income.			
Rentals of leased lines	$1,605,443.67	$585,310.00	$1,020,133.67
Equipment reserve	599,523.67	.....	599,523.67
Hire of equipment	652,736.44	1,073,983.18	—421,246.74
Interest on equipment trust certificates	367,716.93	261,523.83	106,192.94
Joint facilities rents	583,551.98	620,568.83	—37,016.85
Miscellaneous rents	6,816.35	6,069.24	747.11
Interest on funded debt	2,543,998.88	2,535,398.33	8,600.55
Other interest	624,464.64	746,367.95	—121,903.31
Other deductions	174,887.13	199,701.96	—24,814.83
Total Deductions from Gross Corporate Income	$7,159,139.69	$6,028,923.48	$1,130,216.21
Net Corporate Income	$2,116,364.42	$1,717,330.84	$399,033.58
Dividends, Two, Aggregating 6%	1,124,280.00	1,124,280.00	.....
Surplus	$992,084.42	$593,050.84	$399,033.58
Additional equipment On account 1910 proportion of New York Central Lines 1907 and 1910 equipment trusts	.....	$250,000.00	—$250,000.00
Balance to Profit and Loss.	$992,084.42	$343,050.84	$649,033.58

Note: Decrease designated by minus sign, —.

Amount to Credit of Profit and Loss (Free Surplus) December 31, 1910		$9,051,952.11
Balance to Profit and Loss for Year 1911		992,084.42
		$10,044,036.53
Add:		
To increase ledger value Indiana Harbor Belt Railroad Company's stock to par	$1,224,998.00	
From C. & N. W. Ry. and C. M. & St. P. Ry. account proportion I. H. B. deficit to December 31, 1910	122,961.09	
Proceeds sale of Toledo property	21,079.51	
Adjustment sundry items	54,375.57	1,423,414.20
		$11,467,450.73
Deduct:		
For abandoned property	$105,054.42	
Balance 10% payments account trust equipment of 1910	83,356.70	
Exchange on French notes	50,980.12	239,391.24
Balance to Credit of Profit and Loss (Free Surplus) December 31, 1911		$11,228,059.49

The total operating revnues were $30,164,490.16, an increase of $469,674.45 as compared with the previous year.

The freight revenue was $19,538,684.00, an increase of $256,395.55. This was due to the increased movement of flour, dressed meats, coke, stone and miscellaneous commodities.

The passenger revenue was $7,607,051.96, an increase of $202,576.30 due to increased train service and general improvement in excursion travel and local business.

The express revenue was $1,478,449.15, a decrease of $41,500.52 compared with the previous year.

The revenue from the transportation of mails was $411,700.55, a decrease of $19,924.77. This is an apparent decrease only, due to the fact that mail revenues for 1910 were over estimated in advance of actual figures not received until too late to revise the 1910 statements.

The operating revenue from all other sources increased $72,127.89 over the previous year.

The total expenses of operation were $20,746,231.18, a decrease of $882,675.08, as per detail on following pages. By groups and principal fluctuations they were as follows:

Maintenance of way and structures $3,549,204.67, a decrease of $486,056.11, caused principally by reduction in outlay for stone ballasting, fencing, crossing gates, etc., fewer bridges and buildings needing replacement, less snow and ice to contend with, and a considerable reduction in force.

Maintenance of equipment $3,800,772.34, a decrease of $323,593.26, principally caused by reduced charges for repairs.

Traffic expenses $783,599.14, a decrease of $98,551.94, principally due to decreased charges account of fast freight lines through a different method of treating deficit account Merchants' Despatch Transportation Company and large reduction in cost of tariffs included in stationery and printing.

Transportation expenses $12,049,103.34, an increase of $25,514.19 notwithstanding the discontinuance of operation of the Detroit River ferry boats, and is largely due to increased train mileage, cost of fuel and increased pay of train and engine crews.

General expenses $563,551.69, an increase of $12.04.

There was an increase in the revenue from outside operations of $65,223.99 over the previous year derived principally from dining car service and operation of stock yards and restaurants.

The operating income was $8,104,547.02, an increase of $1,451,972.62.

Other income was $1,170,957.09, an increase of $77,277.17, of which $60,000.00 was due to additional amounts received from interest and dividends on securities, $84,184.99 to additional interest on notes, loans, etc. and $7,697.62 to rentals partially offset by a decrease of $73,363.61 in profit on trust equipment material.

Deductions from income amounted to $7,159,139.69, an increase of $1,130,216.21. The principal fluctuations were an increase of $1,001,383.67 due to rental of the Detroit River Tunnel, an increase of $599,523.67 due to a charge against income of an amount equivalent to the installments on account of the 1907 and 1910 equipment trusts, an increase of $106,192.94 in interest on equipment trust certificates, a decrease of $421,246.74 in hire of equipment and a decrease of $121,903.31 in general interest.

The profit from operation for the year, after payment of six per cent in dividends upon the capital stock was $992,034.42, which has been carried to the credit of profit and loss.

The credits to retired equipment account during the year amounted to $407,093.00

The charges against this account for cost of new equipment and betterments were as follows:

10 locomotives	$209,628.40	
8 steel postal cars	93,295.83	
3 cafe coaches	23,455.60	
½ interest in joint equipment consisting of 1 first class coach and 2 smoking and baggage cars	7,870.91	
19 caboose cars	18,107.60	
Miscellaneous charges covering United States duty on six Canada Southern engines and application of sundry betterments to equipment	22,540.30	374,898.64
Credit balance December 31, 1911		$32,194.36

The following appointments of officials were made during the year:

January 1, Louis W. Landman, General Passenger Agent, succeeding Oliver W. Ruggles, transferred.

March 20, Sydney B. Wight, General Purchasing Agent.

April 1, Frank V. Whiting, General Claims Attorney, New York.

May 1, John W. Daly, Passenger Traffic Manager, succeeding Warren J. Lynch resigned.

September 1, Herman M. Griggs, and John B. Nessle were appointed General Coal and Ore Agents.

Appreciative acknowledgment is made of the faithful, efficient performance of duty by employees in every department of the service during the year.

WILLIAM C. BROWN,
President.

CONDENSED GENERAL BALANCE SHEET, DECEMBER 31, 1911.

Assets.

Property investment, road and equipment		$65,527,985.12
Securities		7,039,192.50
Other investments		2,920,876.13
Total property owned as investment		$75,488,053.75
Working assets:		
Cash	$3,311,257.02	
Michigan Central Railroad stock	1,600.00	
Marketable securities	18,130.28	
Net traffic, car mileage and per diem balance	184,110.97	
Net balance due from agents and conductors	1,818,608.98	
Miscellaneous accounts receivable	1,331,555.16	
Materials and supplies	2,531,254.35	9,196,516.76
Accrued income not due		258,618.65
Deferred debit items		1,246,181.39
Total assets		$86,189,370.55

Liabilities.

Stock	$18,738,000.00
Mortgaged, bonded and secured debt	41,269,055.01
Total capitalization	$60,007,055.01
Working liabilities	9,006,395.30
Accrued liabilities not due	1,096,349.36
Deferred credit items	1,095,388.25
Appropriated surplus	3,756,123.14
Free surplus, profit and loss—balance	11,228,059.49
Total liabilities	$86,189,370.55

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AT THE COLISEUM 734

The point regarding the desirability of uniform signs at grade crossings which Mr. Stein raised at yesterday's session of the Engineering Association's convention is worthy of serious consideration. Since the advent of the automobile the amount of traffic crossing railways at high speed has very greatly increased, thereby, of course, adding to the danger of crossing accidents. Crossing signs should, it would seem, in the interest of safety, be uniform as to location, prominence and general appearance, so that persons passing along the streets and roads crossing the lines of different roads will always be able to recognize a sign from a considerable distance wherever it may be. Crossing signs usually are prominently displayed, but they are not uniform, either as to location or general appearance; and, no doubt, a good many grade crossing accidents are due to this. The questions as to what are the best location and the best general appearance to adopt are matters about which there will be differences of opinion, but there can be little difference of opinion as to the desirability of uniformity. Mr. Stein referred to one case where a state railway commission was considering issuing an order in regard to crossing signs, and the increasing activities of the commissions indicate that numerous state bodies are likely to take such action. If the Engineering Association should adopt a uniform specification it seems probable that any orders that might be issued by commissions would require the signs to be made according to the Association's specifications, which would be very much better than that each commission should make a different requirement on this subject.

The Committee on Buildings has carried on a thorough investigation of the subject of roof coverings during the past two years. Last year a very complete report was presented, and considerable supplemental information was added this year. The committee deserves a great deal of credit for the thoroughness with which it has conducted this investigation and the frankness with which the different products are discussed in the report. The committee has labored under unusual difficulties both in the securing of information and in presenting it in its reports. The roofing business is highly competitive, and the rivalry between the different companies is keen. Because of this condition highly exaggerated claims have been made for the various products, and the purchaser has been largely at the mercy of the manufacturers, being unable to secure reliable information concerning the relative merits of the different articles. The committee met with the same difficulty in trying to secure information, but by persistence has partially overcome it. In discussing the various materials in such a frank manner the committee has given the membership the information so badly needed and put it up in such shape as to leave little doubt as to the committee's conclusions. This real constructive work makes the report of definite value to the association.

The tendency noticeable at this year's convention to confine discussions of the various committee reports to their important features is a healthy one. The members in most cases confined their remarks to the larger points brought out, and the time which in previous conventions frequently was spent in lengthy arguments over unimportant details has been conserved for really constructive purposes. Last year, it will be remembered, considerable time was devoted in one instance to a discussion of the relative merits of round or flat hoops for water tanks after the committee had studied the subject carefully and made recommendations in accordance with well-defined practice. The discussion this year on the specifications for frogs and switches, beginning Tuesday afternoon and continuing Wednesday morning, was in marked contrast to this. While this discussion was long, it was constructive, and brought out considerable additional information which should be of value to the committee in its further study. One reason for the improvement in the discussions this year undoubtedly is that, with one exception, the committee reports were in the hands of the members at least several days in advance of the convention, and they have had opportunity to digest them. Last year the members were handicapped by not receiving the reports until just before the convention. The Board of Direction is to be complimented on its success in getting the reports completed so early, as this, undoubtedly, is contributing much to the convention's success. The completion of reports on time is an important part of committee work. In several past instances a committee has prepared a report after thorough and consistent study, and has had it rejected or torn to pieces as a result of discussion based on snap judgment or on a hurried reading of the reports while they were being presented.

The effect of the popularity of the automobile and the tendency, which it typifies, toward luxuriousness in almost everything under the sun, including the railways, has long been a prolific theme of discussion. Ray Morris referred

to a phase of the subject in his address at the annual dinner of the Engineering Association, pointing out that this "development in applied extravagance" has been responsible for the constantly increasing demands upon the railways for luxurious equipment, costly stations and other increased expenditures, while increasing the interest rates at which securities can be marketed. There has also been some speculation as to the effect of the automobile on railway travel. Last summer P. S. Eustis, passenger traffic manager of the Burlington, while canvassing his station agents for an explanation of a temporary diminution in passenger business, was able to locate specifically several ways in which to a certain degree the increasing rise of the automobile was cutting into the passenger receipts. In one case the purchase of a large number of automobiles in a small town greatly reduced the number of tickets sold during a Chautauqua meeting in a town a score of miles distant, although the attendance at the meeting was larger than the year before. Several agents observed that traveling salesmen were using automobiles to make a number of towns a day in districts where infrequent train service had formerly limited the territory that could be covered in a day. In other instances people who in previous years had taken vacation railway journeys were substituting the recreation of a motor tour or of frequent short rides. Mr. Morris was not at all pessimistic regarding the situation he depicted. Neither was Mr. Eustis concerning that which he had observed. Everyone knows that railway passenger traffic is not being diminished either by the automobile or by any other cause, but that it is steadily increasing from year to year. While the high cost of living and the cost of high living have had the same effect on the railways that they have had on the rest of mankind, the tendency that induces people to buy automobiles is the same that persuades others to travel by railway. For each person who buys an automobile there are thousands who cannot command the price of that luxury, but who do buy more and better clothing, household furnishings and groceries, which are transported by and pay freight to the railways.

THE CONSERVATION OF TIMBER BY RAILWAYS.

As the railways of the United States consume annually approximately 15 per cent. of the lumber, 40 per cent. of the coal and 10 per cent. of the crude oil produced, it is proper that they should take a reasonable interest in the conservation of these products, and the American Railway Engineering Association is well justified in publishing from year to year valuable statistics which serve to emphasize the importance of the work, as well as the progress attained. In its report this year on the Conservation of Natural Resources is a good bibliography of articles pertaining to the timber resources of the United States, a number of articles on fuel oil for locomotives, one on methods of preventing waste in the petroleum industry, and one on waste in coal mining. The report proper deals principally with tree planting and general reforestration.

The prodigal use of lumber in the United States is shown by the statement that, not including loss from fire, there is taken from the forests annually 23 billion cu. ft. of wood, or three times the yearly growth. This large consumption amounts to 230 cu. ft. per capita; while Germany uses 37 cu. ft., and France only 25 cu. ft., per capita. The comparison is still more unfavorable when it is found that even with this apparently small consumption, Germany and France have well-established systems of reforestration which keep a more even balance of production and consumption. The American Railway Engineering Association report of 1910 on the future policy of railways with reference to tie supply considered at length the purchase and management by railways of forest lands, and discussed the project of buying forest land in eastern Texas for about $3.25 per acre for the production of loblolly pine, which trees reach their maturity in 40 years. The conclusion reached was that the purchase and management of forest lands by railways was not only possible but eminently desirable at that date, but in the short time since that report all prices have advanced in Texas as elsewhere, and at present the project might not be so favorably considered. This shows the importance of prompt action by railways if they desire to acquire forest land for these purposes.

The present condition of railway finances and the restrictions surrounding their earnings are such as to discourage building or planting for the distant future. The Norfolk & Western, the Pennsylvania, the Delaware & Hudson, the Northern Pacific and the Southern Pacific have established a plan of forest management, and seven or eight lines have been planting trees for tie timber. Beyond this, little has been done by the railways since 1910, when details of this work were reported. The committee concludes that from present indications it will not be safe to depend on tree planting by railways for any important addition to the supply of tie timber. Most railways do not own forest tracts or any extent of land where tree planting can be profitably conducted, and their best work will be in rendering what assistance they can to the systematic forestry undertaken by the states and the federal government. Much can be done by the reduction of waste in various forms. The preservation of ties is now helping largely in this direction and is rapidly growing. A beginning has been made this year in the treatment of car lumber, and this should become more general. The preservation of wooden structures along the right of way will be found profitable in many cases, and the extensive use of concrete for miscellaneous structures which have heretofore been made of wood and having a short life, will also effect a saving in the amount of lumber required for renewals.

A preventable waste now involving large losses is that due to forest fires. The value of standing timber destroyed from this cause amounts in some seasons to $100,000,000 and averages yearly more than $50,000,000. The lines passing through the Cascade mountains have equipped locomotives for burning oil for the purpose of preventing forest fires, and further east the railways are working with the state forestry officials in order to devise means for preventing fires started by sparks from locomotives.

The lumbering methods are often to blame for leaving the railway right of way in bad condition after logging operations, and concerted action for improving this is desirable. The committee has therefore concluded to take up, as the most important subject for next year's work, an investigation of the forest fire laws of the different states as they apply to the railways, and the best methods for reducing risk from forest fires caused by locomotive sparks.

ECONOMICS OF RAILWAY LOCATION.

Railway work can be broadly divided into construction and operation. The work of the American Railway Engineering Association relates largely to both branches. In most cases the fundamental formulae, together with the data necessary for the calculations connected with the different investigations undertaken, are at hand and well established by long experience. The work of the committee on Economics of Railway Location covers both construction and operating problems, and in these fields the necessary information is in most cases not at hand. The

committee finds its chief difficulty in getting operating statistics in such form as to be readily available for its purpose. The report this year, while brief, is not as discouraging as that of last year, when the chairman said: "Nothing of real value can be done by this committee if they are not furnished with sufficient information on which to base conclusions, and if this is not forthcoming the committee should be released from further study of the subject."

This appeal has produced good results, and the committee is now able to report that it is greatly encouraged by the receipt of considerable valuable operating data; so that it hopes to present in the coming year new methods of analysis which may help to clear up some of the uncertainties which make the study of the subject so complex. In the relation of track facilities to cost of operation, it is becoming apparent that no general fixed values can be established for distance, curvature, rise and fall or gradient. The cost may vary with the number of train miles, the ratio of freight and passenger train mileage and the density of traffic both as to train mileage and ton mileage. All these questions require the compilation of detailed statistics, and a very careful study of these statistics, before accurate conclusions can be drawn. This is but one phase of the broad and exceedingly important field which is before this committee. It is doubtful if any committee has any more important work now before it than this one, especially at the present time, when railways are all devoting their attention to effecting economies in operation. On many roads the problem now is not the construction of extensions to gather new traffic, but the handling economically of the traffic already coming to it and the provision of facilities for increasing these economies. The remarkable increase in train loading made on the Baltimore & Ohio last year was undoubtedly due in large measure to the careful study of grades and their effect on train rating which has been carried on by that road within the past three or four years.

This class of investigation and study requires a large amount of analytical work which exceeds the limits of time which the individual members of the committee are able to devote to it without neglecting their regular office duties. For this reason it is very necessary that those members of the committee who are doing the work have the full support of the entire personnel of the committee in order that the amount of work necessary for each individual member to do will be reduced to a minimum. Furthermore, the committee reports inability to secure information from certain sources which it is essential that it have for the successful prosecution of its work. In view of the great importance of this investigation to the railways in general, it is to be regretted that action on the part of a few roads tends to cripple the effectiveness of the committee as a whole. It is to be hoped that they will realize the importance of the work and give it their support. In some cases this lack of support has perhaps been due to the fact that the information asked for was not readily available in the form requested, and the roads were unwilling to go to the expense of having it prepared from their records. It is to be hoped that they will co-operate as far as possible with the committee in order that the best results may be secured.

Comparatively little comprehensive study has been undertaken on the subject of economics of railway location since that conducted by the late A. N. Wellington and included in his book on Economics of Railway Location, which was first published in 1887 and revised two years later. In spite of the fact that a great many changes have taken place in both track and locomotive design and operation in the past 25 years, this book is still standard to-day, although the figures given in it are out of date. There is opportunity and a demand for similar studies of operating conditions at the present time, in order to put out a standard authority for use under present-day operating conditions. The most thorough contribution in this line made in recent years was that by J. B. Berry on Grade Revision on the Union Pacific, published as a bulletin of the American Railway Engineering Association in 1904. A similar paper was prepared by John D. Isaacs several years ago outlining the study made before grade revision was undertaken on the main line of the Southern Pacific, and also published as a bulletin of this association.

The dynamometer car has been improved in several important particulars in recent years, and its results are far more accurate than those secured by the use of older cars. The exact measurements made possible by electrical devices and by tests made with electric locomotives add to the fund of new data which render necessary a revision of that obtained from the older instruments, and all this needs to be digested, tabulated and analyzed as a contribution to the work of this important committee. The very large increase in tractive power made available by the use of Mallet locomotives, their enormous cost and the large expense for their maintenance, must have proper consideration in order to balance the reduction in cost due to slight grade reductions. The motive power department must, therefore, contribute its proper share in furnishing reliable figures to show the cost of operation with different types of motive power.

In shop operations, a large amount of special study has been given to increased efficiency with resulting economies which have prevented locomotive and car repairs from reaching extravagant figures. While the efficiency expert has often been extravagant in his claims, more rational workers have quietly effected vast economies in the maintenance of equipment. A few specialists properly directed could produce a body of valuable data on the economics of railway location, and the large sums involved in the construction work now going on would well justify the expenditure necessary for this analysis.

The traffic of the country is rapidly outgrowing the capacity of single and double track lines, and much of the new construction is on multiple tracks. When multiple tracks are taken up for long distances the question of proper location becomes important. It is fair to say, therefore, that the most extensive construction work which will be done by railways in the next few years involves questions of economic location, and should have applied to it all the accurate data which is available. The St. Paul has just finished its double track between Chicago and St. Paul; and the Santa Fe has completed its second track between Chicago and Newton, Kan. The Illinois Central is completing double track between Chicago and New Orleans; the Erie is now double-tracked within 240 miles of Chicago, and the Baltimore & Ohio is working in the same direction. All these and numerous others are lines with a large traffic well developed, and much more data is available for determining economic location than when the single tracks were built.

The low freight rates of the United States, and their tendency to become lower, make the most careful economy necessary, and the proper location of second track is a complex problem which involves close calculation and the use of new data, which should be placed in shape for the purpose, even if it is necessary to expend a reasonable amount for extra salaries, until some co-operation in this direction is established. The lines which have valuable statistics should be willing to spend a small sum necessary to place them in good shape for the committee's purpose.

Proceedings.

The Thursday morning session of the American Railway Engineering Association was called to order at 9:15 o'clock by President Cushing.

CONSERVATION OF NATURAL RESOURCES.

The following subjects were assigned:

(1) Continue the study of tree-planting and general reforestation.

(2) Continue the study of coal and fuel oil resources.

(3) Continue the study of iron and steel resources.

In presenting the report, which is naturally one of progress, the committee realizes that there is a great difference between the practical application of "Conservation of Natural Resources" to the everyday business conditions met by the members of the association and the purely sentimental ideals which may be indulged in by the world in general.

It is felt also that while the committee was originally formed to co-operate with the National Conservation Commission of this country, as well as with the Commission of Conservation



E. O. FAULKNER.

Chairman Committee on Conservation of Natural Resources.

of Canada, yet its principal object was to keep under special observation those particular features in which the railways were directly and practically interested.

It is hoped that the information which the committee has been able thus far to collect, may, in the method and form in which it is here given, be easy of reference as well as productive of practical benefit to our members, and through them to the railways in general.

The report is signed by E. O. Faulkner (A. T. & S. F.), Chairman; William McNab (G. T.), Vice-Chairman; R. H. Aishton (C. & N. W.), Moses Burpee (B. & A.), F. F. Busteed (C. P.), C. H. Fisk (T. A. & G.), W. A. McGonagle (D. M. & N.), G. A. Mountan (Can. Ry. Com.), W. L. Park (I. C.), G. H. Webb (M. C.).

TREE PLANTING AND GENERAL REFORESTATION IN THE UNITED STATES.

As leading up to the necessity for tree planting and reforestation, it would seem desirable to consider, first, the extent and location of existing forests, their annual increment, and the yearly consumption of forest products.

These questions were very fully reported upon by the National Conservation Commission. The commission was assisted in its labors by experts whose papers form the basis of the report. These papers, representing as they do the original work of experts, form a body of evidence along the various lines pertaining to the timber resources of the country, which will be found valuable for reference.

The original forests of the United States exceeded in the quantity and variety of their timber the forests of any other region of similar size on the globe. Five great forest types were distinguished—the northern, southern, central, Rocky Mountain and Pacific Coast. The kinds of timber and extent of these forests are presented in Table 1.

In addition to these timbered areas there were probably 100,000,000 acres of scrub forest and brush land, chiefly in the West, which has been and still is a source of much post and fuel material.

The Bureau of Corporations estimates that there is a total of about 2,800 billion board ft. of standing timber in the country. Of this about 2,200 billion ft. is privately owned, about 539 billion ft. is in the National forests, and about 90 billion ft. is on the unreserved public lands, national parks, state lands and Indian reservations.

The results of the Bureau's investigation of the amount of standing timber in the United States may be summarized as shown in Table 2.

Table 2.

STANDING TIMBER IN THE UNITED STATES.

		Billion Feet.
Privately owned timber in investigation area:		
Pacific Northwest	1,013	
Southern Pine Region	634	
Lake States	100	
	1,747	
Outside of investigation area	450	
		2,197
Total owned by Federal Government in National forests		539
Total otherwise owned by Federal Government, owned by States and on Indian reservations		90
Grand Total		2,826

The earliest attack was upon the white pine of the Northeast, the original stand of which is almost entirely cut out. From Table 2 it is apparent that at the present time the two great sources of timber supply, so far as privately owned timber is concerned, are the Pacific Northwest, with 1,013 billion ft. and the Southern pine region, with 634 billion ft. Moreover, 82 per cent of the standing timber owned by the United States Government is in the Pacific Northwest, and nearly all of the remainder is in the other states of the Rocky Mountain region.

The yearly growth of wood in our forests does not average more than 12 cu. ft. per acre. This gives a total yearly growth of less than seven billion cubic feet. That our forests grow very slowly, although the individual trees of many kinds grow fast, is our fault. There are about 200 million acres of mature forest mainly in the northern Rockies and on the Pacific Coast in which the yearly growth is balanced by decay.

There are 250 million acres, mostly in the Southern mountains and Southern pine belt, partly cut or burned over, but restocking naturally with young growth and 100 million acres chiefly in the Lake States and Southern pine belt which have been cut or burned over upon which young growth is wholly lacking or too scanty to make merchantable timber.

There is taken from the forest annually, not including loss from fire, 23 billion cu. ft. of wood or over three times its yearly growth. This large consumption amounts to 230 cu. ft. per capita, while Germany uses 37 cu. ft. and France 25 cu. ft.

Each year there is used 90,000,000 cords of fire wood, 40,000,000,000 board feet of lumber, more than 1,000,000,000 posts, poles and fence rails, 118,000,000 hewn ties, 1,500,000,000 staves, over 133,000,000 sets of heading, nearly 500,000,000 barrel hoops, 3,000,000 cords of native pulp wood, 165,000,000 cubic feet of round mine timbers, and 1,250,000 cords of wood for distillation.

The condition of the world supply of timber makes us already dependent upon what we produce. There is exported out of the country one and one-half times as much timber as is brought in, and except for finishing woods, relatively insignificant in quantity, we must rely upon our own resources for the future supply.

The Forest Service estimates the yearly drain on the saw timber of the country at about 50 billion board feet. Without allowing either for new growth or for any increase in the rate of consumption the total for all the timber in the United States would represent about 55 years' supply, and that for privately owned timber alone only 44 years' supply.

These conditions affect the railways of the country not only as they are concerned in the production of timber for their own use, but from the broader viewpoint of developing the territory traversed by their lines. The destruction of the timber is followed by a rapid decline of the industries utilizing the products of the forest with a corresponding loss of revenue for the roads serving the region.

Turning our attention to the conservation of the forest it will be seen that by the introduction of proper forestry methods the annual productivity of the forest can be considerably increased and that the yearly loss from avoidable causes is much greater than it should be. There are 225 million acres of producing forest in the country. On this area the stand is so open that all the trees could be grown on 145 million acres, which would be producing at the rate of 70 cu. ft. per acre annually. By growing only the best species this

growth can be increased to 80 cu. ft., an increase of 1,450 million cu. ft.

There is an unutilized area of 80 million acres within our present producing forest. There are 135 million acres of absolute forest land within our virgin or mature forests now unproductive. There are 90 million acres of waste lands which can be made productive by planting, or by fire protection all of these areas can be made to produce 80 cu. ft. per acre, or a total of 24,400 million cu. ft.

The total increase possible in the productiveness of our forests is, therefore, 25,850 million cu. ft.

Only 25 per cent of the yield of our present producing forest is saw timber. It can be made from 50 to 75 per cent saw timber through the concentration of growth on the best trees by thinning and the holding of the crop until it reaches good size. This would mean an increase, if all our forest land were productive, from 27,000 million board ft. to between 54,000 million and 81,000 million board ft. per annum.

The enormous loss from fire in our forests every year is a matter of common knowledge. The value of standing timber destroyed each season from this cause has varied from $25,000,000 to more than $100,000,000, the direct annual loss in recent years averaging considerably over $50,000,000. The destruction of young growth, though never included in estimates of fire damage, is a principal item of loss. The natural restocking of burned-over lands takes place very slowly or not at all.

All experiences go to prove that damage by forest fires is practically preventable. This stage of development has already been reached in Europe. For exampie, of 7 million acres in Prussia, an average of only 1,400 acres or one-fiftieth

Forest.	Kinds of Timber.	Quantity Billion F. B. M.	Extent Million Acres.
Northern..	Cone-bearing trees predominated, with some hardwoods..	1,000	156
Southern..	Coniferous forest with yellow pine predominating. Interspersed with the pine were a variety of hardwoods.....	1,000	220
Central...	This is the only forest region in the United States in which the hardwoods predominated.	1,400	280
Rocky Mountain..	Almost entirely coniferous.....	400	110
Pacific....	Almost entirely coniferous.....	1,400	90
Total..	.....	5,200	850

Original Forests of the United States, Table 1.

of 1 per cent was burned over each year during the period from 1868 to 1895.

The committee feels that the railways by working with the State Forestry officials can accomplish a great deal of good in the way of prevention of fires started by sparks from locomotives. The committee is assembling information from both the railway companies and the State Forest officials in regard to the laws governing the subject and the means used in different parts of the country to reduce the fire risk from this cause.

It would appear that a concerted action on the part of the railways and state officials is desirable, as the forest adjacent to the railway right-of-way is often left in such a condition after logging operations that it is a difficult matter to prevent fire starting, even when the greatest precaution is observed. Several roads are now working with the state foresters to accomplish this result; notably the Chicago & Northwestern in the state of Wisconsin.

While the chief loss in timber is due to fire, other causes contribute largely to the prodigious waste which has accompanied our use of the forest. One-fourth of the standing timber is left or otherwise lost in logging. The boxing of long leaf pine for turpentine has destroyed one-fifth of the forests worked. The loss in the mill is from one-third to two-thirds of the timber sawed. The loss in the mill product through seasoning and fitting for use is from one-seventh to one-fourth. Great damage is done by insects to forests and forest products. An average of only 320 ft. of lumber is used for each 1,000 ft. which stood in the forest.

Of all the wood in every form now in use in the United States, decay, fire, insects and saltwater borers destroy not less than the equivalent of 8,000 million board ft. each year. Of these, decay is far the most destructive.

The first attempt in this country to prevent decay by treating wood was in 1838 on the Northern Central Railroad. About a mile of track was laid with treated ties, but owing to the low first cost of the ties which were chestnut and oak and were delivered to the railway at 14 or 16 cents apiece, this did not develop into a permanent industry.

In 1880 for the first time the United States census undertook to ascertain what remained of our timber resources; it was found that they had been very rapidly depleted. Realizing the importance of the question the American Society of Civil Engineers appointed a committee to report upon the best methods of preserving wood, in order to lengthen its life. This committee was appointed in 1880 and after five years of work presented its report in 1885. This was followed by the movement which has culminated in the present large wood preservation industry of the country.

In the year 1910, 97,500,000 cu. ft. of timber was treated. Most of this material consisted of cross-ties. Sixty-three million cu. ft., which constituted about 65 per cent of the total, were treated with the creosote treatment and the remainder with zinc chloride and zinc creosote treatment in the order named

In the United States the science of forestry is still in the formation stage. Knowledge of the characteristics and requirements of the many species of trees composing the forests is limited; the total amount and distribution of forest wealth is not accurately known; and methods of administration are not yet settled, but are subject to frequent change. In Europe, on the contrary, forestry as practiced to-day is the result of centuries of gradual evolution, and is consequently thoroughly systematized and its methods firmly established. Foreign silvicultural methods are not usually applicable without change, but the general systems have been adapted with success to conditions in this country, and should be still more widely used.

A striking point concerning forestry abroad is the important part taken by the state in the management of communal and private as well as of the state forests, and the considerably greater returns obtained under state management. All communal forests are subject to some form of state supervision, and many of them are managed precisely as if they were state property.

Private forests necessary for the protection of water sheds or the welfare of the general public are also subject to state control; they cannot be cleared, cutting must be done as prescribed by the state, and all cuttings must be reforested. Other private forests not necessary for protective purposes can usually be managed as the owner desires, but co-operation with the state in the management of such forests is common.

With a few exceptions comparatively little attention has been paid by the railways to forestry. Tree plantations have been started in a number of cases, some of which have been on a large scale, but for the most part experimentally. Forest planting in some cases may be desirable when a railway has waste land for which it has no particular use. It is a good object lesson to the farmers, and if the plantations are successful they will net a fair return on the investment and furnish a limited supply of ties and timber for the future.

It should be observed, however, that it would not be practicable for the individual roads to plant enough trees to supply their timber requirements, and further the critical period of scarcity and high prices would come before any of the trees so planted would reach maturity.

The information assembled by the committee on ties in 1910 shows what has been done by the railways in the way of tree planting; the situation is very little changed at the present time and in the opinion of those best able to judge, relief from this source is very uncertain.

If the railways wish to provide against future scarcity and excessive prices with any degree of certainty it will be necessary for them to actively engage in forestry operations having for their purpose the management of mature timber lands and the cultivation and reforestation of the cut-over lands within the forest area. This is an individual problem with every road, but generally speaking it is the only sound policy which will provide for the future requirements fifteen or twenty years hence.

Some of the railways have now undertaken to preserve the timber lands which they acquired through land grants and otherwise. The Southern Pacific in Northern California and Southern Oregon still have quite large areas of good timber from which they can cut mature trees. The Northern Pacific has been co-operating with the Government for some years with a view to finding how best to handle their western holdings and provide a source of tie supply at the eastern end of their lines. In the East, the Delaware & Hudson have put about one hundred thousand acres in the Adirondacks under management.

RECOMMENDATION FOR NEXT YEAR'S WORK.

(a) Investigation of the forest fire laws of the different States as they apply to railways.

(b) The best methods to be used by railways to reduce risk from fires caused by locomotives.

COAL AND FUEL OIL RESOURCES.

The sub-committee dealing with this subject has read and examined a large mass of papers and various data, and submits papers on the advantages of oil as fuel; inspection, tests and specifications; methods of preventing or lessening waste in the petroleum industry, and the duration of the coal supply.

TREE PLANTING AND REFORESTATION IN CANADA.

The Forestry Branch of the Department of the Interior (Government of Canada) has, since 1900, been carrying out a scheme of free tree distribution to farmers in the prairie provinces of Manitoba, Saskatchewan and Alberta. During that time some eighteen million trees have been sent out from the nurseries of this particular branch. The trees are planted on the homesteads throughout these provinces for windbreaks, shelter belts and wood supply. Nurseries have been established also on some of the forest reserves, and some planting is being done.

In 1894, the Government of the Province of Ontario established a nursery at the Ontario Agricultural College, Guelph, Ont., and they have since been distributing trees to farmers throughout that province. This nursery has since been removed to St. Williams, Ont., where the Provincial Department of Agriculture has acquired some 1,300 acres of sandy land, which it is planting up with forest trees. The Province of Quebec has also established a forest nursery at Berthier, P. Q., but the distribution from there has, as yet, been small. In a few instances, planting or sowing has been undertaken in other provinces of the Dominion by individuals or private concerns.

The Canadian Pacific has taken in hand the planting of trees of different varieties on the prairies. The trees and shrubs used are Russian poplar and willows, box elder, ash, spruce, Scotch pine, caragana and artemosia. A good deal of this work is done along the cuts, in order that the trees and shrubs may serve as permanent snow fences.

There is also a permanentt plantation at Wolseley, Sask., to determine the values of different species of trees for tie purposes, as well as for the correct spacing and mixture. The species selected are native tamarack, Scotch, red and jack pine, and although the plantation has not been established long enough to give any reliable figures as to growth, the results so far have been satisfactory. This plantation is situated on dry upland prairie. The tamaracks, or larch, used were transferred from swamp land to the plantation, and the growth on the high land, so far, has been three times faster than at any time in the swamp. It is hoped that this plantation will ultimately afford reliable information as to the selecting and planting of such trees as will eventually be suitable for tie timber.

Investigations are also being made by the Canadian Pacific as to the value of cut-over and virgin timber lands in selected locations, in order to determine the value of these lands for permanent tie reserves. The information obtained from this source is not, as yet, sufficient to give out anything of a definite nature, but it will be continued, and in a few years it is also hoped that reliable information will be obtained regarding this reforestation.

The consumption of timber in the year 1910 was as follows:

Lumber	4,901,649,000 ft. B. M.
Square timber	37,962 tons
Shingles	1,976,400,000
Lath	851,953,000
Pulpwood	598,487 cords
Poles	782,841
Cross-ties	9,213,962
Mining timber (round)	52,848,000 linear ft.
Mining timber (sawn)	22,305,000 ft. B. M.
Cooperage (slack), including staves, heading and hoops	161,641,000 pieces
Cooperage (tight)	8,370,000 pieces

ANNUAL FIRE LOSS IN CANADA.

The information in regard to the annual fire loss is not definite, as much of the loss occurs in districts so far removed from settlement that it is impossible to make any reliable estimate. The annual loss from forest fires will, however, run between 250,000,000 and 500,000,000 ft., board measure, per annum. In very wet years it might fall below the minimum—in very dry years it will go over it. The value of the timber destroyed might be taken at one dollar per thousand at the stump. In the districts where railways are being constructed they are the most frequent cause of fire—at least 50 per cent of the fires being caused by them. In the districts beyond, where the railways are constructed, fires are mostly due to the clearing of the land by settlers.

COAL AND FUEL OIL RESOURCES IN CANADA.

In the Dominion the aggregate area of coal lands is 29,957 square miles, containing about 172,100,000,000 tons of the several classes.

Little, as yet, has been done towards ascertaining the loss incident upon coal mining operations in Canada. Nova Scotia has recently taken steps to secure this information by issuing coal depletion statement forms to be filled in by the mine operators. It has been stated by some authorities that for every ton of coal mined, one-half a ton is lost or wasted; and in thick beds the recovery probably does not exceed 30 per cent.

The wastes attending coal mining operations may be enumerated as follows:

(1) Coal lost beyond recovery by mining lowest seams first.
(2) Coal left in pillars to support the roof.
(3) The low-grade coal left in the mines.
(4) Slack coal formed during mining operations.

In Western Canada, where there are so many seams of great thickness close together, it is looked upon as important that the upper seams should be mined first, so that any caving as a result of removing the pillars will not render it impossible to get at the other seams.

Great losses have resulted also from improperly burned coal. The loss in smoke alone with bituminous coal has been estimated at about 10 per cent.

PEAT DEPOSITS IN CANADA.

In round numbers there are 37,000 square miles of peat lands scattered throughout the various provinces.

As a result of investigations carried on in Canada it has been demonstrated that:

(1) For the economic production of fuel from peat, machinery driven by power must be substituted as far as possible for manual labor.

(2) That processes so far invented for removing the water content of the peat by pressure or artificial heat have not hitherto led to profitable commercial results.

A number of bogs, however, are being exploited to some extent, and the result of the operation of one of them in particular, viz., the plant at Alfred, Ont., goes to prove that the production of excellent peat fuel is a commercial possibility.

It has been found that one ton of peat burned under boilers is equal to about 5/9 of a ton of coal. It does not clinker, nor give off any objectionable volatile matter in the form of black smoke, and as a domestic fuel it is clean, easily handled and efficient.

CRUDE PETROLEUM IN CANADA.

The waste which occurs in oil production in Canada is not so much in the oil itself as in the natural gas incident to the oil production. The oil, when obtained, may be sold at once, whereas, to sell the gas, long, expensive pipe lines must be laid, franchises obtained from towns or cities, and their market is but limited.

NATURAL GAS IN CANADA.

The production of natural gas in Canada has increased in value nearly ten-fold during the last eighteen years, and of the total amount the Province of Ontario produced about 95 per cent.

Steps were taken by the Ontario government in 1907 to prevent the waste of natural gas, and a law was passed levying a tax of two cents per 1,000 feet, with a rebate of 90 per cent when the gas is used in Canada. This provision has been very effective.

In Alberta little provision has as yet been made for the plugging of the gas wells, and many millions of cubic feet have therefore been wasted annually and extended areas have been more or less drained.

In order to conserve the supply of natural gas the gas must be utilized (1) for the purpose for which it is most valuable; (2) in the manner that will secure the greatest efficiency, and (3) as near as possible to the point of production. The most valuable uses for natural gas are for domestic purposes and the development of power.

In the absence of the chairman, the report was presented by William McMab (G. T.). The report was accepted as a progress report without discussion.

SIGNS, FENCES AND CROSSINGS.

The following subjects were assigned:

(1) Continue the investigation of ways and means for securing a proper quality of fence wire to resist corrosion and secure durability.

(2) Report on the relative advantages and disadvantages of the different kinds of fence posts.

(3) Report on the best form of track construction and flangeways at street crossings in paved streets.

(4) Report on the relative advantages and disadvantages of the different kinds of telegraph poles.

The committee decided to devote its attention to the first three subjects assigned, and also to investigate the general subject of miscellaneous signs for railway purposes. A series of questions were prepared for submission to the various railways with a view to determining the practice in vogue at this time and to secure the benefit of data that had been accumulated from experiments made in recent years with various forms of fencing wires, and by various processes, as well as with various kinds of wooden and concrete fence posts. Replies were received from 44 railways of the United States and Canada, representing 61,000 miles of track, which developed the following information:

(1) 28 roads are using woven wire exclusively;
6 roads are using barb wire exclusively;
2 roads are using ribbon wire exclusively;
5 roads are using both barb and woven wire.

Woven wire 49 in. to 55 in. in height appears to be generally used. Specifications in use refer merely to method, form of erection, and style of fence, and give practically no consideration to quality of wire or process of manufacture. The wire companies seem to control this latter feature exclusively. In a couple of cases compliance with the specifications of the American Railway Engineering Association is recommended but not explicitly demanded. Only two of the roads are



C. H. STEIN,

Chairman Committee on Signs, Fences and Crossings.

making any experiments in the development of the subject. Experiments in one case, started April 1, 1909, are being conducted with wires grouped in four classes, as follows:

(a) Galvanized after weaving;
(b) Ordinary dip process;
(c) Special galvanized;
(d) Sherardized.

When examination was last made, less than a year ago, (a), galvanized after weaving, was found to be in perfect condition; (b), ordinary dip process, began to corrode during the first year. The corrosion was not so rapid during the second year, but was sufficiently progressive to indicate that deterioration would soon become serious, and the wire go to pieces at points where stay wires were woven around the longitudinal ones; (c), special galvanized, was found to be in excellent condition. No corrosion was apparent, and the wires were still bright. This process is still in an experimental stage, and investigations will be continued. (d), Sherardized. This is a process in which the wire is placed in air-tight receptacles and zinc flue dust packed about it. The receptacles are then heated for a given period of time at a temperature somewhat below the melting point of zinc, the zinc forming a coating over the wires. At the time the test was commenced, this process was not yet far advanced, and later developments may give some promise of success. The results in this case, however, were not good.

Similar tests were commenced under the auspices of the American Society for Testing Materials on the grounds of the Carnegie Technical School, Pittsburg, Pa., on September 26, 1908. The results of these tests will be watched with interest and profit. Several rolling mills are now rolling what is claimed to be a pure metal, running about 99.95 per cent pure iron, and exceedingly low in sulphur, carbon and phosphorus. This is being used for a variety of purposes, and we understand that it can be drawn into wire. This may develop into a proper material for wire making purposes with efficient rust resisting properties.

Copper clad wire is also a form of material that is attracting considerable attention. This consists of a steel core surrounded by a copper jacket applied by mechanical means. The American consul at Birmingham recently called the attention of the State Department of this government to the announcement in a British journal of a new rust-proofing process for iron and steel that is said to be cheap and efficient.

The article to be protected is boiled in a solution whose proportions are: Water, one gallon; phosphoric acid, four ounces, and one ounce of iron filings. This produces a black non-corroding coating that is durable. These different products and methods will be further investigated during the coming year.

It might be stated that English roads use a much heavier wire than those in this country, usually No. 4 to No. 6 gage. All of it is unwiped, and it is said they use a better grade of spelter than we do.

At the present time, undoubtedly the wire galvanized after weaving has proved most durable and efficient, but only certain forms of weaving appear at this writing to be adapted to that process. Progress is being made, however, and if tests now being conducted demonstrate that this is the only manner in which desired results may be obtained, the larger wire mills will discover a means of accomplishing it if the railway companies insist upon it.

(2) Report on the relative advantages and disadvantages of the different kinds of fence posts. Nine roads which replied to circular are beginning to use concrete posts, and we know of others using them, which gave us no information. Experiments have been conducted for too short a period, however, to enable them to make a definite statement as to their durability, economy and efficiency.

The tendency toward the use of concrete posts, however, is becoming very pronounced, and we should in the course of the next year or so be able to secure some very valuable and satisfactory information. The prices for concrete posts appear to vary between 18 and 40 cts., but the figure largely prevailing for the most popular form of post now on the market is 18 to 22 cts. Since the cost of the various kinds of wood posts now in use ranges from 12 cts. to 40 cts., the prevailing cost being 12 to 15 cts., the difference is not so great as to act as a prohibition to the use of concrete. The woods used are necessarily those native to the road and consist of Oregon fir; red, white and Michigan cedar; black, yellow and honey locust; catalpa; tamarack; mulberry, juniper; bois d'arc, chestnut; white and pin oak.

Several forms of metal posts are now being manufactured, and it is claimed by a large manufacturer that they will have a life of at least thirty years and can be delivered at reasonable distances at a price of 23 cts. f. o. b. line of road. These will also receive our attention during the current year, in connection with the further investigation of concrete posts.

(3) Report on the best form of track construction and flangeways at street crossings in paved streets.

The customary practice is the very old one of turning an old light rail on its side and backing it up with wood plank, planking solid with wood or planking next to rail and paving with blocks or brick between. The rail or plank forms the flangeway. Five roads of the forty-four referred to use some special form of rail or flangeway through paved streets. In several of the cases a 141-lb. girder rail is employed with suitable compromise bars at each end to connect to the tee-rail sections. In three cases a special form of rolled filler or flangeway, similar to angle bar construction, with extension beyond the railhead similar to street car flangeways, is being considered and gives promise of successful application. Correspondence is now in progress with the steel company to roll a trial order, and it is hoped the experiment may be made during the course of this year, which would perhaps enable us to make a definite recommendation at the next convention.

(4) Report on the relative advantages and disadvantages of the different kinds of telegraph poles.

This subject was not investigated, as very few experiments have thus far been conducted with this form of construction. The industry is growing, however, and attention will be given it this year.

Signs for railway purposes.—There is a growing demand for uniformity of signs for all railway purposes. It is obvious that it would be a desirable end to be obtained if all signs for use in giving information to the public or employes were of a similar design in all parts of the country. The committee has been investigating the subject with the purpose of producing uniformity, and securing substantial and economic signs, but has not progressed to the point where a conclusion

can be reached. It will recommend the subject for definite recommendations at the next convention.

Much information has been received in regard to the foregoing subjects, but it has not been in a sufficiently substantial form, nor in the nature of such new information, that would warrant the committee in making any recommendations in the shape of conclusions. The various subjects, however, are in a progressive stage, and with the mass of information now at hand it appears that the committee will be enabled at the next convention to put the matters in definite shape.

We have been handicapped very much in failing to secure information from our letters of inquiry. Many roads from whom we expected to get beneficial data have failed entirely to reply to our circulars for information. It is possible that this is due to the fact that there are so many committees of the association reporting on so many different subjects that it is practically impossible for the engineering officers to compile the necessary information and satisfy all of the inquiries. The solution to this problem would, therefore, be that fewer subjects should be assigned for investigation and thus relieve the roads of the great amount of labor that is now necessary in securing and compiling data on the multitude of subjects on which information has been sought during past years.

The matter of a proper quality of fencing wire to resist corrosion and secure durability has been under consideration by the American Society for Testing Materials, and we would, therefore, make the following recommendations:

(1) That the Board of Direction instruct the committee to endeavor to co-operate with a similar committee of the American Society for Testing Materials in reaching a conclusion on this latter subject.

(2) That subjects Nos. 2, 3 and 4, assigned last year, be reassigned for study and a report made when the committee considers that it has sufficient data to warrant conclusions.

(3) That the Board of Direction assign the subject of "Uniform Railway Signs for all purposes as applicable to the Public and to Railway Operation."

The report is signed by C. H. Stein (C. R. R. N. J.), Chairman; A. M. Funk (B. & O.), Vice-Chairman; H. E. Billman (M. P.), G. E. Boyd (D. L. & W.), L. C. Lawton (A. T. & S. F.), E. R. Lewis (M. C.), J. B. Myers (B. & O.), F. M. Patterson (C. B. & Q.), C. H. Splitstone (Erie), W. D. Williams (C. N.).

The report of the committee was received without discussion.

BUILDINGS.

The following subjects were assigned:

(1) Report on the advantages and disadvantages of various types of freight house floor construction.

(2) Continue the study of roof coverings.

(3) Present principles covering the design of inbound and outbound freight houses.

(4) Continue the study of concrete coaling stations.

The committee reports progress on subject (1) Report on the advantages and disadvantages of various types of freight house floor construction.

No recommendations are made as to revision of the manual.

ROOF COVERINGS.

The committee presents as information some miscellaneous corrections and additions to last year's report on roofing. As yet the report is incomplete. The committee had hoped this year to present specifications for coal-tar pitch, but we were unable to offer sufficient inducements to extract the necessary information.

Page numbers refer to the annual report in Vol. 12, Part 1.

Page 589, last paragraph: A single asphalt fluxed by a single oil is ordinarily an imperfect and unsatisfactory roofing material. Like a cut back tar pitch, it lacks stability. The oil is liable to separate out, sometimes supposedly by capillary attraction into the felt, leaving a brittle compound. The successful asphaltic roofing compounds are ordinarily composed of several different materials.

Page 590, last paragraph: Elaterite occurs in Utah in territory near where gilsonite is found, and has much the same appearance, but is found only in narrow veins. Its qualities are considerably different from those of gilsonite, said to be in part due to the presence of considerable sulphur. From it is made a high-priced product which is supposed to be especially valuable as a constituent of the protective coating of ready roofs. We are of the opinion that some products advertising elaterite contain it in only small quantities, if at all.

Page 591, paragraph 2: Rock Asphalt or Mastic Rock.—There is also bitumen saturated limestone of which that found in Uvalde county, Texas, is an example.

Page 591, last paragraph: The first two sentences should be changed to read as follows: "Eastern oils are largely made up of compounds of the paraffine series, which vary in consistency from comparatively thin oil to hard scale paraffine."

There are other members of the paraffine series which are light gases.

Page 592, paragraph 1: The method of distillation of California oils profoundly modifies the character of the residual.

Page 592, paragraph 2: The blown oils are coming to be more appreciated. They can be made into a very uniform product of great value for many purposes, and now that certain patents covering them are expired, their use will probably broaden considerably.

Page 592, paragraph 4: The bitumen in the coal-tar includes, besides the hydrocarbons, other organic compounds, which are, however, present in roofing pitch only in small quantities.

Page 593, last paragraph: Water Gas Tars.—In making carburetted water gas, the procedure is as follows: Steam is blown through a bed of incandescent coal or coke, where it is broken up, forming blue water gas, which consists of about equal quantities of hydrogen and carbon monoxide. This gas, which has no illuminating value, is passed into a second chamber, which is filled with checker brick and which has been previously raised to a high temperature. Into this chamber is sprayed petroleum oil, which, by the intense heat, is broken down into permanent gas and a tar consisting, in the main, of aromatic hydrocarbons similar to those ocurring in coal-tar. This permanent gas is of high illuminating value and imparts its luminosity to the blue water gas, while the tars drop out further on in the process of manufacture. It is from this tar that water gas tar pitch and other products are obtained



MAURICE COBURN.

Chairman Committee on Buildings.

Water gas tar contains some free carbon, but usually not over two per cent. Its pitch is not acted upon by water. There is a very general opinion among practical roofing men that the water gas tar products are less stable than the coal-tar pitches, but we cannot find that there has been any accurate proof of this. Its small percentage of free carbon materially interferes with its value as a roofing pitch. It is said that carbon can be added, but we doubt the commercial practicability of such a scheme.

Page 596, paragraph 6: Burlap decays much more readily than the average cotton felt.

Page 597, last paragraph: To combat severe conditions encountered like those at locomotive engine houses, instead of the dry sheet, an asphalt or oil-saturated felt is sometimes used. This does not so readily deteriorate. One roofer uses for this purpose asphalt asbestos sheets, which are perhaps better yet.

Page 600, last paragraph: General specifications for an asphalt built-up roof cannot well be prepared because of the differences in materials, and ordinarily must come from the manufacturers of the materials.

The successful laying of an asphalt built-up roof in cold weather is a difficult matter. If the asphalt is hot enough to be properly handled, there is chance of charring the felts. On steep slopes thorough mopping is difficult and there is chance of danger to the men. One of the chief reasons for deterioration of the asphalt is supposed to be gradual absorption, due to capillary action of the flux into the felt.

Page 601, second paragraph: Asbestos Asphalt Built-Up Roofings.—It is claimed that asbestos felt, acting as it does more as a protection to the layers of waterproofing material and not merely as a medium for carrying them, does not have any capillary action on the oil fluxes, and that the bitumen is so protected that it retains its elasticity and waterproofing qualities much longer than with the other types of felt. If this point is sustained, asbestos felts have a superiority for asphalt roofing over the ordinary felts which may more than overbalance the increased costs. While the experience obtained from this material is not nearly as extended as that which has been had from rag felts, these roofings have been in use for about eleven years, and we have so far found nothing to disprove this claim.

The asbestos felt has advantage due to its freedom from action by fire and decay, and it is claimed that the asbestos roofings have a considerable value in their blanketing influence on fires inside the building covered, which the ordinary felts do not have, points the value of which we consider have been overemphasized. The asbestos felt is not in any danger of being charred by hot asphalt which sometimes happens with rag felts.

The asbestos built-up roofings also avoid the gravel or slag necessary with the ordinary "wool" felt built-up roofing. This freedom from the use of gravel or slag with its tendency to roll or be washed off the roof into the gutters would seem to be of some advantage. This also makes it easier to locate a leak and leaves the asbestos roofings much lighter in weight than the other types, an advantage which is probably to some extent offset by the insulating power of the much greater amounts of material used with the "wool" felt. As with all built-up asphalt roofings, difficulties encountered in the mopping make a slope of not more than three inches to the foot desirable.

Tar has not been successfully used with asbestos felts.

As compared with a five-ply tar and gravel roof a four-ply asbestos roof will ordinarily cost at least from one to two dollars more a square. A three-ply roof is supposed to give good results over concrete, but for wood sheathing it would seem to be approaching too closely to the conditions met with in ready roofing, for first class work.

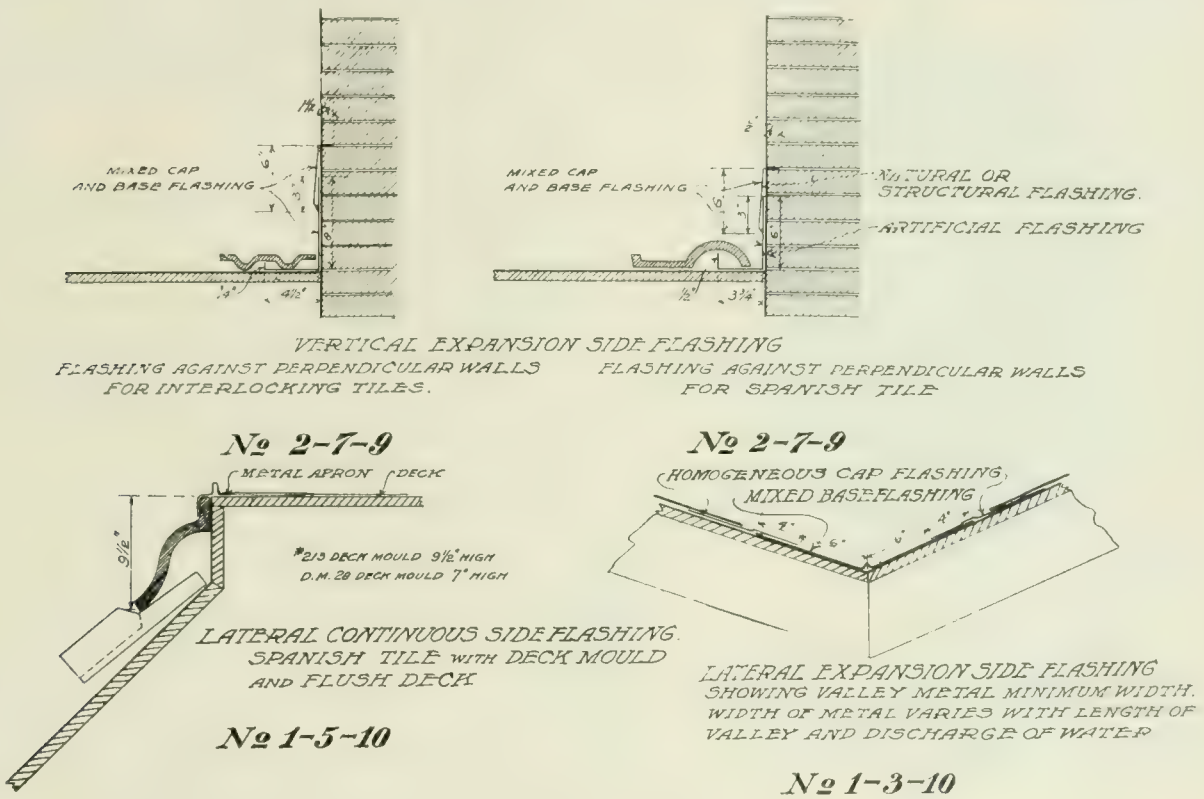
Page 609, paragraph 2: Concrete Roofings.—The Asbestos-Portland cement shingles seem to be gaining ground. The different manufacturers use different methods and the results obtained must be used with caution, as it is claimed that the methods of manufacture have an important bearing on the results which may be expected. Shingles of this type are said to have been successfully used abroad for many years. Recent changes are said to have much improved the quality of the material.

For small buildings, or where the design is such as to make tile undesirable, they have especial advantages. The growing difficulty of obtaining good slate should tend to increase their sale. Their cost is somewhat greater than good slate, but their uniformity is such that they can more successfully be laid French or diagonal method than can slate. A considerable saving can be made by laying them French method, but we do not consider this good practice, especially with large sheets. The material is somewhat brittle and with this method considerably greater amounts of breakage are to be expected, especially on the points. When new, some water may be absorbed, but as they grow older this defect tends to disappear.

The corrugated sheets should have value as a substitute for corrugated iron sheets. They must be laid with good fastenings and sufficient lap to insure against leakage. They must not be nailed. Some of these materials are strengthened by wire mesh and some with perforated steel sheets grading toward the metal protected by asphalt and asbestos.

GUTTERS.

Gutters for many classes of railway buildings may and should be omitted. This is more particularly true of buildings with steep roofs near tracks where cinders from passing locomotives roll down the roof into the gutters and in time, unless more care is taken to keep them clean than is usual in railway buildings, the downspouts become choked and fail to carry off the water.



Details of Flashing and Counter Flashing for Roofs and Walls.

Gutters may be of metal, wood, or be formed in roof of the materials used in the construction of the roof, the latter being ordinarily preferable where the design of the building permits.

Wood gutters are usually of Ogee form on the outside and owing to the thickness of shell the capacity is small for the size of the gutters. They are made in three sizes, 3x4, 4x5 and 4x6. The capacity of these sizes is, however, scarcely more than one-fourth the same size of metal gutters of equal outside dimensions. They are the most durable kind of gutters for buildings exposed to smoke and cinders. They are usually made of fir, white pine or cypress and should be painted inside and out every few years.

Metal gutters are made of copper, galvanized steel, iron, tin or zinc. For permanent buildings, copper is preferable. All joints should be soldered and riveted with not less than four rivets for smaller sizes and should be well braced at least every four feet and proportionately increased in number for larger sizes. The common grades of galvanized steel often

used cannot be depended on for more than two or three years. Some of the refined irons now on the market should be of value for this purpose. Cast-iron gutters are used to a limited extent.

Gutters may be built in the roof, or hanging, as the design of the building requires. Hanging gutters, which are easier to repair, and which do not damage the building if defective, are generally preferable. They should be given as much slope as practicable to the various downspouts and the outer edge of hanging gutters should be low enough to avoid chance of damage by possible backing up of water due to stopped-up gutters and conductor pipes.

Copper gutters should be given a coat of linseed oil and tin gutters a coat of iron oxide paint soon after hanging, and galvanized iron should not be painted until about a year of exposure to the weather unless a special acid treatment is applied to provide a surface which will hold the paint. If a galvanized iron roof is used where copper gutters are applied, care should be taken to insulate or separate the two metals so that galvanic action will be prevented.

FLASHINGS.

The following definitions, together with the diagrams, are presented as information concerning flashings. The numbers accompanying the different diagrams refer to the numbers of the definitions.

(1) Flashings are the mechanical unions between roof surfaces and other parts of the structure intersecting and bounding the plane of the roof, and between roofs in different planes.

(2) Vertical flashings are flashings between roofs and other parts of the structure which intersect the plane of the roof and extend through or above the roof (Examples: Walls, parapets, combings, soil pipes.)

(3) Lateral flashings are flashings between roofs and other parts of the structure which bound the roof or which intersect the plane of the roof without extending above it, or, flashings between roofs in different planes. (Examples: Cornices, eaves, gutters, leader heads, ridges, hips, valleys.)

(4) Head flashings are flashings which are approximately at right angles to the general slope of the roof, at the top of the incline.

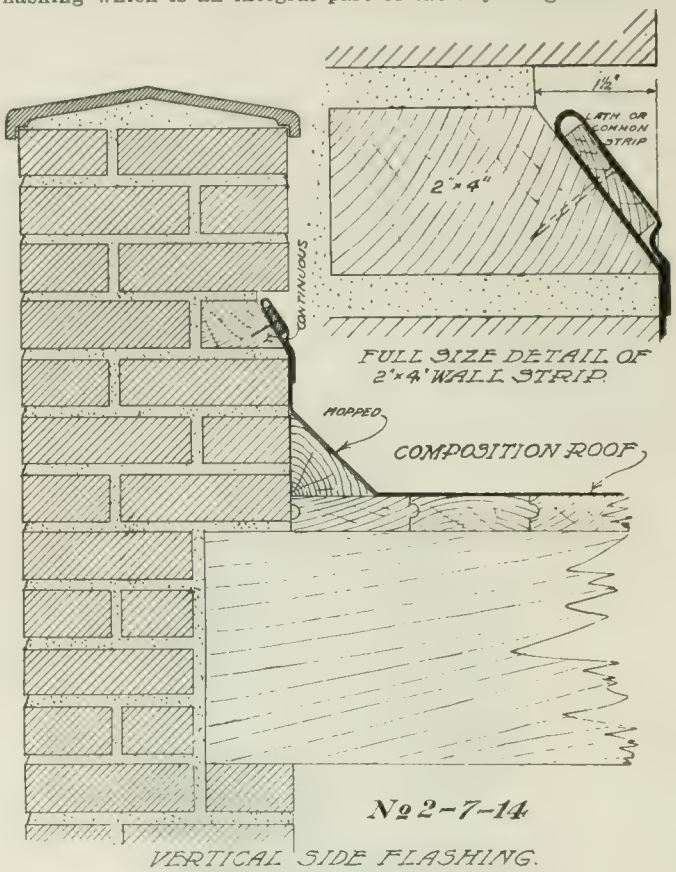
(5) Side flashings are flashings which are approximately parallel to the general slope of the roof.

(6) Foot flashings are flashings which are approximately at right angles to the general slope of the roof, at the foot of the incline.

(7) Expansion flashings are flashings built of two independent parts, each of which is respectively an integral part of the roof, and of the adjoining structure.

(8) Base flashing is that part of an expansion flashing which is an integral part of the roof.

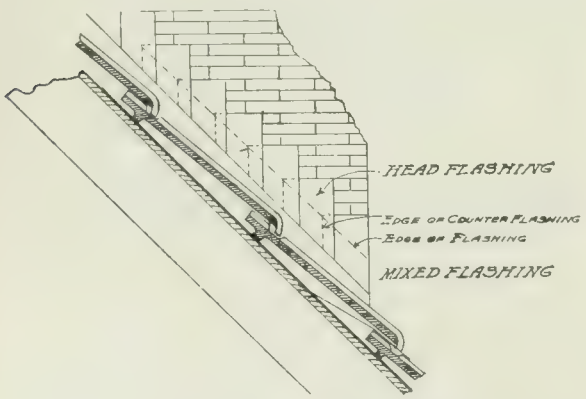
(9) Cap or Counter flashing is that part of an expansion flashing which is an integral part of the adjoining structure.



№ 2–7–14

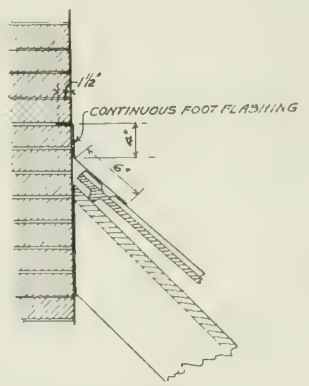
VERTICAL SIDE FLASHING.
SECTION THROUGH WALL FLASHING ON BRICK WALLS

Special Details of Flashing.



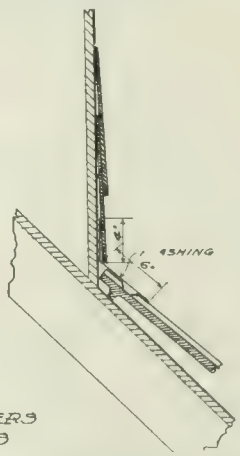
FLASHING AGAINST PERPENDICULAR WALLS FOR INTERLOCKING AND SPANISH TILES

№ 4



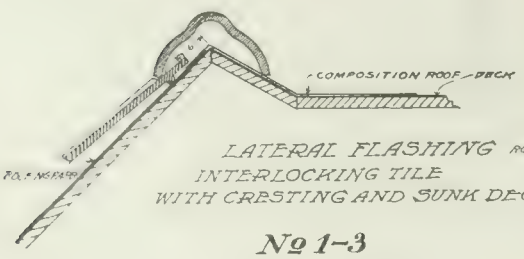
FLASHING AT BASE OF DORMERS AND AGAINST BRICK WALLS

№ 2–10



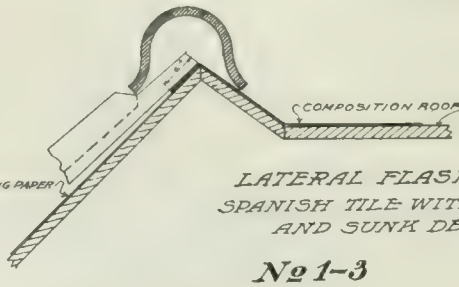
CONTINUOUS FLASHING.
FLASHING AT BASE OF DORMERS IN CONNECTION WITH SIDING TILE

№ 2–10



LATERAL FLASHING
INTERLOCKING TILE
WITH CRESTING AND SUNK DECK

№ 1–3



LATERAL FLASHING.
SPANISH TILE WITH CRESTING AND SUNK DECK

№ 1–3

Details of Flashing and Counter Flashing for Roofs and Walls.

(10) Continuous flashings are flashings which are integral parts of both roof and adjoining structure, without slip or expansion joint.

(11) Protective flashing is that part of a continuous flashing which is an integral part of the adjoining structure, but which does not form an expansion joint with a base flashing.

(12) Homogeneous flashings are flashings built of the same materials as the roof.

(13) Mixed flashings are flashings formed of materials other than materials of the roof. (Examples: A metal base flashing for a felt roof.)

(14) Natural or Structural flashings are flashings which are formed structurally integral with the roof or adjoining structure. (Example: A cap flashing built into a raglet in a parapet wall.)

(15) Artificial flashings are flashings which are not structurally integral with either the roof or the adjoining structure. (Example: A "base" or "continuous" flashing supported upon the adjoining structure by adhesion of materials, or outside cleats.)

The accompanying diagrams are designed to be only illustrative of the distinctions defined above. No effort has been made to formulate recommendations for details of applications of different materials under different conditions.

The report has been signed by Maurice Coburn (Vandalia), Chairman; M. A. Long (B. & O.), Vice-Chairman; G. W. Andrews (B. & O.), W. G. Arn (I. C.), J. P. Canty (B. & M.), O. P. Chamberlain (C. & I. W.), D. R. Collin, C. G. Delo (C. G. W.), W. T. Dorrance (N. Y. C. & H. R.), C. H. Fake (M. R. & B. T.), E. N. Layfield, C. F. W. Felt (A. T. & S. F.).

The report of the committee was received without discussion.

UNIFORM GENERAL CONTRACT FORMS.

The committee was instructed to report on "General Contract Forms."

The text of the report of the 1911 committee was thoroughly discussed and revised, and the reports of the committee on Buildings, published in Bulletin 68, and of the Special Contract committee, made at the tenth annual convention in 1909 and published in Bulletin 108, have been studied. As the report of March, 1911, was not acted upon, the following portion of that report may be repeated:

"The plan of having an agreement form of two pages separate from the general contract conditions and as referred to on page 1176 of the proceedings of the tenth annual convention, is approved by this committee, and the agreement form presented in that report has been reconsidered and revised and is presented here with recommendations for adoption.

"In small or unimportant contracts this agreement form, which is designated as Form A, may be used alone, but in larger contracts the general conditions statement designated as Form B may be inserted, using the agreement form as a folder with the introductory page at the beginning of the contract and the signature at the end.

"Specifications relating to the particular work can either be included in the folder or attached to the back.

"The committee has, in the agreement, made the 'contractor' the party of the first part, and the 'company' the party of the second part, and has, therefore, in preparing the 'general conditions,' placed the provisions relating especially to the duties and rights of the 'contractor' first and those relating to the duties and rights of the 'company' last."

The committee has considered and presents herewith, for discussion, the form suggested for Agreement A, and also the following sections for the General Conditions B:

1. Bond.
2. Contractor's Understanding.
3. Intent of Plans and Specifications.
4. Permits.
5. Protection.
6. Rights of Various Interests.
7. Consent to Transfer.
8. Superintendence.
9. Timely Demand for Points and Instructions.
10. Report Errors and Discrepancies.
11. Preservation of Stakes.
12. Inspection.
13. Defective Work or Material.
14. Insurance.
15. Indemnity.
16. Settlement for Wages.
17. Liens.
18. Work Adjacent to Railroad.
19. Risk.
20. Order and Discipline.
21. Contractor Not to Hire Company's Employes.
22. Intoxicating Liquors Prohibited.
23. Cleaning Up.
24. Engineer and Chief Engineer Defined.
25. Power of Engineer.
26. Adjustment of Dispute.
27. Order of Completion. Use of Completed Portions.
28. Changes.
29. Extra Work.
30. Property and Right of Entry.
31. Unavoidable Delays. Extension of Time on Parts of Work.
32. Suspension of Work.
37. Monthly Estimate.

The committee has discussed, but not formally acted upon, sections 33, 34, 35, 36 and 38.

The committee especially presents for approval:

(1) The general scheme of having the two-page general agreement, Form A, as a folder, within which the other portions of the contract can be bound, thus permitting a concise contract form or a large contract form, according to the requirements of the case.

(2) The Agreement—Form A—as presented herewith.

(3) Sections 1 to 32 and Section 37 of B General Conditions.

For next year's work recommendations are made as follows:

(1) Reconsider standard contract form so far as presented in the light of discussions presented at the convention or by letter.



J. C. IRWIN.

Chairman Committee on Uniform General Contract Forms.

(2) Complete the construction of final sections of contract.

(3) Consider advisability of having any supplementary standard forms in conjunction with Uniform Contract Form, and prepare such contract forms as may be considered advisable.

The report is signed by J. C. Irwin (Rutland), chairman; W. G. Atwood (L. E. & W.), vice-chairman; E. F. Ackerman (L. V.), W. L. Breckinridge (C. B. & Q.), R. G. Kenly (M. & St. L.), E. H. Lee (C. & N. W. I.), C. A. Paquette (C. C. C. & St. L.), H. C. Phillips (A. T. & S. F.), J. H. Roach (L. S. & M. S.), H. A. Woods, (G. T. P.), C. A. Wilson.

CONSTRUCTION CONTRACT.

A.—Agreement.

This Agreement, made this ..... day of ..... in the year .....by and between..... party of the first part, hereinafter called the contractor, and ..... party of the second part, hereinafter called the company.

Witnesseth, That, in consideration of the covenants and agreements hereinafter mentioned, to be performed by the parties hereto and of the payments hereinafter agreed to be made, it is mutually agreed as follows:

The contractor shall furnish all the necessary transportation, materials, superintendence, labor and equipment, and shall execute, construct and finish, in an expeditious, substantial and workmanlike manner, to the satisfaction and acceptance of the chief engineer of the company, in accordance with the plans hereto attached or as herein described, and the following general conditions, requirements and specifications, forming part of this contract.

The work covered by this contract shall be commenced ..... and be completed on or before the ..... day of ....., 191.., ...
.....

And in consideration of the completion of the work described herein, and the fulfillment of all stipulations of this agreement to the satisfaction and acceptance of the chief engineer of the company, the said company shall pay, or cause to be paid, to said contractor, the amount due the contractor, based on the following prices:

.....
.....

This agreement shall inure to the benefit of and be binding upon the legal representatives and successors of the parties respectively.

In Witness Whereof, The parties hereto have executed this agreement in.....the day and year first above written.

Witness:

....
....

CONSTRUCTION CONTRACT.

B—General Conditions.

Bond.

1. The contractor agrees, at the time of the execution and delivery of this contract and before the taking effect of the same, to furnish and deliver to the company a good and sufficient bond of indemnity to the amount of ..... dollars, as security for the faithful performance, by the contractor, of all the covenants and agreements on the part of the contractor contained in this contract. The security in such bond of indemnity must be satisfactory and acceptable to the company.

This bond shall remain in force and effect in such amount, not greater than that specified, as shall be determined by the chief engineer, until the final completion and acceptance of the work.

Contractor's Understanding.

2. It is understood and agreed that the contractor has, by careful examination, satisfied himself as to the nature and location of the work, the conformation of the ground, the character, quality and quantity of the materials to be encountered, the character of equipment and facilities needed preliminary to and during the prosecution of the work, the general and local conditions, and all other matters which can in any way affect the work under this contract. No verbal agreement or conversation with any officer, agent or employe of the company, either before or after the execution of this contract, shall affect or modify any of the terms or obligations herein contained.

Intent of Plans and Specifications.

3. All work that may be called for in the specifications and not shown on the plans, or shown on the plans and not called for in the specifications, shall be executed and furnished by the contractor as if described in both these ways; and should any work or material be required which is not denoted in the specifications or plans, either directly or indirectly, but which is nevertheless necessary for the proper carrying out of the obvious intentions thereof, the contractor is to understand the same to be implied and required, and shall perform all such work and furnish any such material as fully as if they were particularly delineated or described.

Permits.

4. Permits of a temporary nature necessary for the prosecution of the work shall be secured by the contractor. Permits for permanent structures or permanent changes in existing facilities shall be secured by the company.

Protection.

5. Whenever the local conditions, laws or ordinances require, the contractor shall furnish and maintain, at his own cost and expense, necessary passageways, guard fences and lights and such other facilities and means of protection as may be required.

Rights of Various Interests.

6. Wherever work being done by company forces or by other contractors is contiguous to work covered by this contract the respective rights of the various interests involved shall be determined by the engineer, to secure the completion of the various portions of the work in general harmony.

Consent to Transfer.

7. The contractor shall not let or transfer this contract or any part thereof (except for the delivery of material) without consent of the chief engineer, given in writing. Such consent does not release or relieve the contractor from any or all of his obligations and liabilities under the contract.

Superintendence.

8. The contractor shall constantly superintend all the work embraced in this contract, in person or by a duly authorized manager acceptable to the company.

Timely Demand for Points and Instructions.

9. The contractor shall not proceed until he has made timely demand upon the engineer for, and has received from him, such points and instructions as may be necessary as the work progresses. The work shall be done in strict conformity with such points and instructions.

Report Errors and Discrepancies.

10. If the contractor, in the course of the work, finds any discrepancy between the plans and the physical conditions of the locality, or any errors in plans or in the layout as given by said points and instructions, it shall be his duty to immediately inform the engineer. Any work done after such discovery, until verified, will be done at the contractor's risk.

Preservation of Stakes.

11. The contractor must carefully preserve bench marks, reference points and stakes, and in case of wilful or careless destruction, he will be charged with the resulting expense and shall be responsible for any mistakes that may be caused by their unnecessary loss or disturbance.

Inspection.

12. All work and materials shall be at all times open to the inspection, acceptance or rejection of the engineer or his duly authorized representative. The contractor shall at all times provide reasonable and necessary facilities for such inspection.

Defective Work or Material.

13. Any omission or failure on the part of the engineer to disapprove or reject any work or material shall not be construed to be an acceptance of any defective work or material. The contractor shall remove, at his own expense, any work or material condemned by the engineer, and shall rebuild and replace the same without extra charge, and in default thereof the same shall be done by the company at the contractor's expense —or, in case the chief engineer should not consider the defect of sufficient importance to require the contractor to rebuild or replace any important work or material, he shall have power, and is hereby authorized, to make any deduction from the stipulated price that he may deem proper.

Insurance.

14. The contractor shall secure in the name of the company and for its benefit, policies of fire insurance on such structures and in such amounts as shall be specified by the chief engineer not exceeding .....

Indemnity.

15. The contractor shall indemnify and save harmless the company for and from all claims, demands, payments, suits, actions, recoveries and judgments of every nature and description brought or recovered against it, by reason of any act or omission of the said contractor, his agents or employes, in the execution of the work by or in consequence of any negligence or carelessness in guarding the same.

Settlement for Wages.

16. Whenever, in the opinion of the chief engineer, it may be necessary for the progress of the work to secure to any of the employes of the contractor any wages which may then be due them, the company is hereby authorized to pay said employes the amount due them or any lesser amount, and the amount so paid them, as shown by their receipts, shall be deducted from any moneys that may be or become payable to said contractor.

Liens.

17. If an established lien be filed against the contractor for labor or material furnished in the performance of the work, the company is hereby authorized to pay and discharge the same, if it shall deem best so to do, and to deduct the amount so paid from any moneys which may be or become due and payable to the contractor.

Work Adjacent to Railroad.

18. Whenever the work embraced in this contract is near the tracks, structures or buildings of this company or of other roadroads, the contractor shall use proper care and vigilance to avoid injury to persons or property. The work must be so conducted as not to interfere with the movement of trains or other operations of the railroad; or, if in any case such interference be necessary, the contractor shall not proceed until he has first obtained specific authority and directions therefor from the proper officer of the company and has the approval of the engineer.

Risk.

19. The work in every respect shall be at the risk of the contractor until finished and accepted, except damage or injury caused directly by company's agents or employes.

Order and Discipline.

20. The contractor shall at all times enforce strict discipline and good order among his employes, and any employe of the contractor who shall appear to be incompetent, disorderly or intemperate, or in any other way disqualified for or unfaithful to the work entrusted to him, shall be discharged immediately on the request of the engineer, and he shall not again be employed on the work without the engineer's written consent.

Contractor Not to Hire Company's Employes.

21. The contractor shall not employ or hire any of the company's employes without the permission of the engineer.

Intoxicating Liquors Prohibited.

22. The contractor, in so far as his authority extends, shall not permit the sale, distribution or use of any intoxicating liquors upon or adjacent to the work, or allow any such to be brought upon, to or near the line of the railway of the company.

Cleaning Up.

23. The contractor shall, as directed by the engineer, remove from the company's property and from all public and private property, at his own expense, all temporary structures, rubbish and waste materials resulting from his operations.

Engineer and Chief Engineer Defined.

24. Wherever in this contract the word engineer is used, it shall be understood as referring to the chief engineer of the company, acting personally or through an assistant duly authorized in writing for such act by the chief engineer, and wherever the words chief engineer are used it shall be understood as referring to the chief engineer in person, and not to any assistant engineer.

Power of Engineer.

25. The engineer shall have full power to reject or condemn all work or material, which, in his opinion, does not conform to this contract; to direct the application of forcec to any portion of the work which, in his judgment, requires it; to order the force increased or diminished, and to decide every question that may arise between the parties relative to the execution of th work.

Adjustment of Dispute.

26. All questions or controversies which may arise between the contractor and the company, under or in reference to this contract, shall be subject to the decision of the chief engineer, and his decision shall be final and conclusive to both parties.

Order of Completion; Use of Completed Portions.

27. The contractor shall complete any portion or portions of the work in such order of time as the engineer may require. The company shall have the right to take possession of and use any completed or partially completed portions of the work, notwithstanding the time for completing the entire work or such portions may not have expired; but such taking possession and use shall not be deemed an acceptance of the work so taken or used or any part thereof. If such prior use increases the cost of or delays the work, the contractor will be entitled to such extra compensation, or extension of time, as the chief engineer may determine.

Changes.

28. The company shall have the right to make any changes that may be hereafter determined upon, in the nature or dimensions of the work, either before or after its commencement, and such changes shall in no way affect or void this contract. If such changes diminish the quantity or extent of the work to be done, they shall not, under any circumstances, be construed as constituting, and shall not constitute a claim for damages or for anticipated profits on such work.

In case quantities in the completed work vary from the quantities shown on the original plans, and provided for in the specifications, then the final payment shall be adjusted on the basis of unit rates specified in this contract.

Note.—First paragraph of Section 28 to be used in unit price and force account contracts, i. e., in all contracts not on lump-sum prices. Should be omitted in lump-sum contracts.

Extra Work.

29. No bill or claim for extra work or material shall be allowed or paid unless the doing of such extra work or the furnishing of such extra material shall have been authorized in writing by the engineer before any part of such work was done or material furnished.

The price for such work shall be determined by the chief engineer, who may either fix a unit price or a lump-sum price, or may, if he so elects, provide that the price shall be determined by the actual cost, to which shall be added .. per cent. to cover general expense and superintendence, profits, contingencies, use of tools, contractor's risk and liability. If the contractor shall perform any work or furnish any material which is not provided for in this contract, or which was not authorized in writing by the engineer previous to the doing of the work or the furnishing of material, said contractor shall receive no compensation for such work or material so furnished, and does hereby release and discharge the company from any payment therefor.

If the contractor shall proceed with such extra work or the furnishing of such extra material after receiving the written authority therefor, as hereinbefore provided, then such work or material, stated in the written authority of the engineer, shall be covered, governed and controlled by all the terms and provisions of this contract, subject to such prices as may be agreed upon or fixed by the chief engineer.

If the contractor shall decline or fail to perform such work or furnish such extra material as authorized by the engineer in writing, as aforesaid, the company may then arrange for the performance of the work in any manner it may see fit, the same as if this contract had not been executed, and the contractor shall not interfere with such performance of the work.

Property and Right of Entry.

30. The company shall provide the lands upon which the work under this contract is to be done, except that the contractor shall provide land required for the erection of temporary construction facilities and storage of his material, together with right of access to the same.

The contractor shall not enter upon said lands, nor ship any material or equipment, until he has received written notice from the engineer that he may proceed with said work or any part thereof.

Unavoidable Delays; Extension of Time on Parts of Work.

31. If the contractor shall be delayed in the performance of the work from any cause, for which the company is responsible, he shall, upon written application to the chief engineer at the time of such delay, be granted such extension of time as the chief engineer shall deem equitable and just.

Suspension of Work.

32. The company may at any time stop the work, or any part thereof, by giving 10 days' notice to the contractor, in writing. The work shall be resumed by the contractor in 10 days after the date fixed in the written notice from the company to the contractor so to do. The company shall not be held liable for any damages or anticipated profits on account of the work being stopped, or for any work done during the interval of suspension. It will, however, pay the contractor for expense of men and teams necessarily retained during the interval of suspension, provided the contractor can show that it was not reasonably practicable to move these men and teams to other points at which they can be engaged. The company will further pay the contractor for time necessarily lost during such suspension at the rate of .. per cent. per annum on the estimated value of all equipment and fixtures owned by the contractor and employed on the work which are necessarily idle during such suspension, said rate of .. per cent. per annum being understood to include depreciation, interest and insurance. But if the work, or any part thereof, shall be stopped by the notice in writing aforesaid, and if the company does not give notice in writing to the contractor to resume work at a date within ..... of the date fixed in the written notice to suspend, then the contractor may abandon that portion of the work to suspend and he will be entitled to the estimates and payments for such work so abandoned, as provided in Sections ..... of this contract.

Annulment, Contractor's Fault.

33. Discussed, but not acted upon by the committee.

Annulment, Without Fault of Contractor.

34. Discussed, but not acted upon by the committee.

Removal of Equipment in Case of Annulment.

35. Discussed, but not acted upon by the committee.

Measurement and Approval of Work.

36. Discussed, but not acted upon by the committee.

Monthly Estimate.

37. So long as the work herein contracted for is prosecuted in accordance with the provisions of this contract, and with such progress as may be satisfactory to the chief engineer, the said chief engineer will, on or about the first day of each month, make an approximate estimate of the proportionate value of the work done and of material furnished or delivered upon the company's property at the site of the work, up to and including the last day of the previous month. The amount of said estimate, after deducting .. per cent. and all previous

payments, shall be due and payable to the contractor at the office of the treasurer of the company on or about the 20th day of the current month.

Final Estimate.

38. Discussed, but not acted upon by the committee.

Discussion on Uniform General Contract Forms.

In the absence of the chairman, the report was presented by W. G. Atwood (L. E. & W.).

Mr. Atwood: The committee asks the approval of the convention of the general idea of having a short agreement which can be used, when desired, in place of letter agreements, which are very common. If we desire a formal contract instead of the acceptance of the proposition by letter, we would use the agreement which we have shown under Form A. In cases of larger work, where more detail is desired, we propose the general condition shown under Form B, the idea being to print the Form A so that the Form B can be bound in it, together with such other clauses as may be desired by the person using the contract.

J. P. Snow (Con. Eng.): I would like to ask the committee if they feel it is worth while to say that either the contractor or the company is the party of the first part or the party of the second part? It seems to me that the first line or first sentence of an agreement should state what the job is, so that in running over your files you can see what it is that you are trying to find. My preference is to name the work which is to be done—give it a distinctive title—any say that it will hereafter be called "the work."

Mr. Atwood: We have found the practice of naming the parties to the contract as the first and second party is very largely a matter of preference. I have found one or two attorneys who insist that it should be that way. The committee thought this was the better way.

In regard to naming the work in the first portion of an agreement, that could readily be cared for by a heading. A blank is provided below the next clause for a description of the work. That is on the first page of the contract.

C. Frank Allen (Mass. Inst. Tech.): In all contracts there must be definitely two parties. Sometimes the description of one of the parties is somewhat elaborate, and if there is a clear distinction made between those two parties, the contract, on the whole. is somewhat clearer, and I believe that a distinction by the use of "party of the first part" and "party of the second part" does more fully establish who the two parties are. It does not impress me as unnecessarily encumbering the contract, and it does add somewhat to its clearness.

Mr. Atwood: This clause reads, "party of the first part, hereinafter called 'the contractor,' and blank, party of the second part, hereinafter called 'the company.'" In the clauses in Form B the two parties to the contract are spoken of in that way.

Mr. Baldwin: What do you gain by naming them as parties of the first part and second part if you don't refer to them that way in the contract? They are referred to as "contractor" and "the railway company."

Mr. Atwood: That is a legal form and some of the lawyers consider it necessary. I don't know whether there is any legal objection to withdrawing "party of the first part" and "party of the second part" from this one clause or not, but it doesn't seem to me there is any objection to leaving it there.

Mr. Baldwin: I move that in the third line "party of the first part" be eliminated, and in the fourth line "party of the second part" be eliminated."

Mr. Stein: I think there should be some specific designation similar to the one outlined by the committee. I believe that almost from time immemorial there has been a substantial form in which the contracts have been gotten up, and it frequently happens that the names of contracting parties are so much alike that even we who are familiar with the general character of the contract, but not entirely familiar with the specifications of it, are obliged to be very careful in reading the contract in order to fully understand what obligations rest upon the respective parties. In my own experience when it has been referred to as "party of the first part" and "party of the second part," I would be obliged to refer to the indication in the preamble to the contract to distinctly understand what particular person was obligated by that particular specification. If names so nearly alike had simply been mentioned it would have been almost impossible and would have made us prone to error in a proper interpretation of the contract. For that reason, I believe, if this paper, as prepared by the committee, was submitted to the legal departments of the railways, they would direct that the contract be prepared just in the form that has been arranged for by the committee. I think the committee's report should stand. If the association thinks there is any question as to the propriety of this contract, it had better be submitted to the legal department of some of the railways and get their advice in the matter before the association arbitrarily says, "cut this thing out."

The motion was lost by a rising vote.

J. B. Berry (C., R. I. & P.): I suggest the committee leave a blank line or two after the description of the parties—there are frequently three or more parties to any contract, and I think the necessary space should be left for the insertion of three, four or five names if necessary.

E. A. Frink (S. A. L.): The last clause of the argument reads, "In witness whereof the parties hereto have executed this agreement in ..... the day and year first above written." It seems to me that date is incorrect, for the reason that a contract is made and completed on the day when the proposition has been accepted, but need not necessarily be signed until some time thereafter. Instead of that clause referring to the date first above written, which appears at the head of the contract, it seems to me it should show the date when the contract was actually signed.

Mr. Raymer: The contract has the usual form in saying "in accordance with the plans hereto attached." We know that is an idle form, because in most of the railway contracts it is impossible to attach the plans to the contract, and I think a different form should be arranged, for instance: "In accordance with the plans identified by the signatures of the parties hereto."

Mr. Atwood: In regard to the criticism of the last clause, there is a misprint. The word "in" should be "on." It is my opinion that the contract does not become in force and effective until it is signed. In fact, a contract supersedes any prior agreement, verbal or written. The contract is supposed to embody all such agreements, and it does not seem to me the last clause should be changed as suggested.

In regard to Mr. Raymer's criticism, it is, of course, a fact that sometimes the complete plans are not attached to the contract, but that is covered by the words, "or as herein described." If the plans are not attached the description of the work would necessarily embody the plans that would be required to cover the entire work.

Mr. Raymer: In work of any magnitude the plans are completed at the time of the letting of the contract. It is frequently necessary, however, to make changes in the plans during the progress of the work by agreement with the contractor, and the original plans referred to in the contract should be specifically marked in some way so as to form part of the contract, and for that reason it is desirable to have the plans referred to in the contract, and identified by the signatures of the parties to the contract.

I move that the phraseology now contained in the report, "in accordance with the plans hereto attached," or "as herein described," be changed to read as follows: "In accordance with plans identified by the signatures of the parties hereto."

The motion was lost.

Mr. Atwood: I move that the first recommendation of the committee that the form of construction contract A, as presented, be approved.

Motion carried.

The President: We will now take up the Construction Contract B, General Conditions.

Mr. Morse: What is intended to be meant by the words, "to furnish and deliver to the company a good and sufficient bond?" Would not it be well to say the treasurer of the company in referring to the railway company?

Mr. Atwood: That practice varies with different companies. In the case of some companies the chief engineer controls it, in some cases the treasurer, in some cases the legal department, and in some cases all three.

Mr. Lindsay: What is the object of making the distinction between "permits of a temporary nature" and "permits for permanent structures"? It seems to me the line is hazy and might lead to confusion unless the committee has some special object in making the distinction.

Mr. Atwood: The committee has already boiled down some clauses bearing on this matter which were much longer. It is intended that the contractor shall obtain permits for such work, for instance, as the opening of a street, or the erection of scaffolding or similar temporary work, while it is intended that it shall be the duty of the company to secure permits in such cases as the permanent change of grade or the position of a sewer or water pipe. Anything that is of a permanent character will be cared for by the company, and if it is a temporary obstruction it will be the duty of the contractor to secure the permit.

Mr. Steffens: The last sentence of Section 13 is pretty radical. It gives the chief engineer authority to make any deduction from the stipulated price that he may deem proper for defective work. Unless there is an arbitration clause later which I have not seen, that is pretty dangerous from

the contractor's standpoint. I think "as agreed upon by the parties" would be acceptable reading.

Mr. Atwood: It is unusual, I think, in contracts to permit the chief engineer to accept work that is not up to specifications. I think all of us have had experiences where we have condemned work and ordered it torn out when we felt it was not up to specifications, but would perhaps have performed its service. This paragraph leaves an opportunity to use the work and allow a deduction. I do not believe it is practicable to make that a matter of agreement.

Mr. McDonald: I ask the committee if they intend the word "Employes" in the second line of clause 16 to mean also "sub-contractors?"

Mr. Atwood: I think that was the intention of the committee.

Mr. Raymer: Referring to Section 17, it is customary in Pennsylvania to have a "no lien" clause. The law requires a copy of the contract and some additional information to be filed at the County Court House, after which the company is not responsible for liens. I ask the committee if there is any objection against having a "no lien" clause included in this contract?

Mr. Atwood: It seems to the committee that such cases as might occur under various state laws would be special cases that the road using the contract would have to cover in a special clause.

Mr. Steffens: It seems to me an arbitration clause should be inserted between Sections 26 and 27. This clause makes the chief engineer the sole judge of all disputes, and an arbitration clause very often saves us from annoying lawsuits.

W. I. Trench (B. & O.): I have prepared an addition to paragraph 27 to meet a condition I have lately encountered, a case in which a contractor failed to properly locate his plant in the beginning, failed to remove it in time to avoid delay in the work, and failed to remove portions of his plant after completion of parts of the work, which seriously delayed another portion of the work to be done by the company. I move that an addition be made to paragraph 27, as follows:

"The contractor shall locate his plant only after careful study of the plans, and consultation with the engineer in charge, so as not to interfere with any work to be performed by the company during his occupation of the premises. If, to facilitate the work, temporary location has been permitted, the contractor shall immediately upon demand of the engineer remove such plant or portion of plant at his own expense. If the contractor fails to make said removal, the company may do it at his expense. The contractor shall remove the plant from finished portions of the work immediately on demand of the engineer in charge. If he shall fail to make such removal, it may be done by the company at his expense."

The above addition was put to vote, but was not adopted.

Mr. Greiner: It seems to me that the last part of the second paragraph of Section 29 is rather hard on the contractor. Conditions may arise where the contractor is compelled to do some work not covered in the contract, in order to protect his work. It may be necessary to do that at a time in advance of notice from the engineer, and as this paragraph reads, he would get no pay for it at all.

Mr. Atwood: The committee has felt that it is necessary to draw this contract as rigidly as it is drawn. The engineer is an arbitrator and he is supposed to be fair to both parties. The final determination in any case would go to the courts if there was a disagreement, and we feel we have covered this matter of extra work as fairly to both parties as it is possible to do it and protect both parties. An unfair engineer can, of course, by the arbitrary enforcement of certain clauses of a contract work great hardships.

Mr. Greiner: The engineer will have no authority at all on this point. If the contractor was performing any work, or furnishing any material, which was not provided for in the contract, or authorized in writing by the engineer, previous to the doing of the work, or the furnishing of the material, the contractor would receive no compensation for such work or material. If the contractor does work not called for in the contract, he should be paid for it, provided the engineer shall see fit to authorize it in writing, even after it is started. According to the language used in this section, the engineer has no right to authorize it, after the work is started, even if it is absolutely necessary.

Mr. Jenkins: I think the clause as it stands deters the contractor in some cases from doing necessary extra work in the absence of the engineer, because he might be afraid he would not get the proper authorization, even after the work is done, and might be afraid that authorization, if issued, would not enable him to collect any money.

L. C. Fritch: I think Mr. Greiner's point can be covered if we leave out the words "previous to the doing of the work or the furnishing of material."

Mr. Lindsay: In the third paragraph of the same section, it would be necessary to eliminate the words "after receiving the written authority therefor."

Mr. Atwood: The committee will accept the amendment.

Mr. Lindsay: I would like to ask if it is necessary to put in the words "in sections," near the bottom of paragraph 32? Would it not be better to read, "as provided in this contract"?

Mr. Baldwin: This clause, as drawn, leaves latitude for a great deal of dispute between the contractor and the engineer as to the value or amount of the time that is lost. We have made it a practice to name the price per day that should be charged for teams under those circumstances, and require the contractor to make it part of his contract, and likewise specify that payment would be made for men on monthly time only. To a certain extent this precludes the contractor from bringing in an excessive claim.

G. D. Swingly (B. & O.): It is my idea that the contractor should be paid for teams which are necessarily idle on account of temporary stoppage of the work, but it seems to me that we might name a time limit, because it might be necessary to hold up the work for a considerable period of time and give the contractor a very good chance to keep his men and teams there at our expense, and if he did not have any other contracts it might be more profitable for him to keep his men and teams there and not try to get them away.

Mr. Baldwin: We cover that by naming a price that barely more than lets the contractor out, with both men and teams. The result is he is after the engineer to get started.

Mr. Frink (S. A. L.): Referring to Section 37, we have found it saves a good deal of trouble if we require the contractor before the first monthly payment, to file with us a schedule of prices for material on specified price contracts and material on lump sum contracts. Then, in making up the estimates, the inspector on the ground makes up an estimate of the work done, makes up a regular form showing his estimate. That is examined by the contractor, or the contractor's foreman, and if it is satisfactory, it is signed by both parties and sent to the home office for payment. In that way we avoid all discussion with the contractor about whether he has or has not been allowed as much as he ought to be allowed.

Mr. Berry: I would like to ask the committee whether the members have consulted with their law departments in regard to the bond and the contracts.

Mr. Atwood: The New York Central Lines' members of the committee have, and we have, found that in various states that various roads' law departments disagree about the same thing. There are, undoubtedly, things in this contract which some law departments will not approve and will change, but I do not believe it possible to draw a general contract of this kind that will satisfy all law departments.

Mr. Fritch: I believe that before we vote on the adoption of this, it ought to be referred for a legal opinion. There are five clauses which were discussed, but not acted upon by the committee. It seems to me it would be proper to receive this as information and have the committee report next year. In the meantime, many of us can use this form, but we should get a final opinion on it for next year.

Mr. Fritch: I move that the report of the committee be received as information and referred back to the committee for final report next year.

Motion carried.

ECONOMICS OF RAILWAY LOCATION.

The committe realizes that some of the members of the association may be disappointed in its failure to produce a report having some logical conclusions. The failure to report at the 1911 convention was explained at the time, but during the past year the committee has been greatly encouraged in its work by the receipt of considerable valuable operating information.

Under date of October 26, 1911, the chairman was able to send to such members of the committee as had shown any interest in the work a tabulated statement by accounts of the operating costs of nine large railways, comprising 13 per cent of the main track mileage of the United States, over 18 per cent of the freight train mileage, and over 16 per cent of the passenger train mileage. In some cases the more important accounts covering "Conducting Transportation" were separated between passenger and freight service, which will be of particular value to the committee in the final analysis of the questions to be considered.

In addition to the cost data, information has been tabulated covering the density of traffic per mile of main track in train miles, car miles and ton miles.

The working members of the committee have been devoting such time as they could spare to the study of the statistics

tabulated, and to a portion of them it becomes apparent that no fixed values can be established for distance, curvature, rise and fall, or gradient. A careful study of the data covering costs by primary accounts apparently indicates that costs in some of the accounts vary with the number of train miles and the ratio of freight train mileage to passenger train mileage.

In other cases the logical unit of variation is the ton mile, or car mile depending entirely on the account in question. Further, the density of traffic both as to train mileage and ton mileage enters into the costs.

The result is that the committee has refrained from presenting any conclusions for your consideration until it has had time to thoroughly digest the information now at hand.

A portion of the committee believes that each case must be considered by itself, with a probability that the values used for the unit costs will vary widely, depending on local conditions of traffic with reference to car loading, character and density of traffic, etc., and in some cases on climatic conditions.

The committee hopes to present a report during the coming year which will show one or more methods of practical analysis of the question covering conditions that exist with each case.

The report is signed by A. K. Shurtleff (C. R. I. & P.), Chairman; R. N. Begien (B. & O.), Vice-Chairman; C. Frank Allen (M. I. T.), Willard Beahan (L. S. & M. S.), C. K. Conard (Erie), A. C. Dennis, C. P. Howard (I. C.), W. A. James (C. P. R.), Fred Lavis (Consulting Eng.), C. J. Parker (N. Y. C. & H. R.), F. W. Smith (C. C. C. & St. L.), Francis Lee Stuart (B. & O.), Walter Loring Webb (Consulting Eng.), M. A. Zook (C. G. W.).

The committee report was received without discussion.



A. K. SHURTLEFF,

Chairman Committee on Economics of Railway Location.

GRADING OF LUMBER.

The committee wishes to re-submit the definitions of defects and lumber grading rules submitted in its report last year, with certain slight changes, indicated below. It believes that they fairly represent specifications for maintenance of way lumber as it can be purchased in the market to-day. The rules submitted may not suit all conditions. It is pointed out, however, that the acceptance of these rules by the association, with a provision that individual grades can be departed from where the requirements of any particular road seem to make it necessary, will represent a great step forward in bringing about uniform rules for the grading of lumber. It appears to the committee that slight differences of opinion, concerning one or more grades, should not interfere with the acceptance of these rules in a general way.

The rules as submitted last year have been changed so as to bring them into harmony with those already published in the manual. The descriptions and definitions of defects are in accord with those already adopted by the association as standard. There have been added this year "Grading Rules for Cypress Lumber."

RECOMMENDATIONS.

The committee recommends that the lumber grading rules as presented last year, subject to the corrections and including the additions made below, be adopted as standard.

The following is a list and reference to the proceedings where the data included in these recommendations can be found:

(1) Classification and Grading Rules for Douglas Fir (pp. 548-555, Vol. 12, Part 3, 1911 Proceedings).

(2) Specifications for Douglas Fir Structural Timbers. (Substitute for paragraphs 38-51, inclusive, pp. 556, 557, Vol. 12, Part 3 of the Proceedings, the specifications for Douglas Fir Bridge and Trestle Timbers, as given on pp. 143 and 144 of the manual for 1911. For paragraphs 54 and 55, page 557, Vol. 12, Part 3 of the Proceedings, substitute paragraphs 1, 2, 3, 6 and 7, as given on page 145 of the manual for 1911).

(3) Classification, Grading and Dressing Rules for Northern Pine, including White and Norway Pine and Hemlock (pp. 565, 577, Vol. 12, Part 3, 1911 Proceedings).

(4) Classification, Grading and Dressing Rules for Southern Yellow Pine (pp. 578-600, Vol. 12, Part 3, Proceedings, 1911). (For paragraphs 43-59, inclusive, substitute paragraphs 1-14, inclusive, as given on pp. 141 and 142 of the manual for 1911.)

(5) Standard Specifications for Construction Oak Timbers (pp. 601-606, Vol. 12, Part 3 of the 1911 Proceedings).

(6) Classification and Grading Rules for Cypress Lumber and Shingles, presented in this report.

The report is signed by Dr. Hermann von Schrenk (Rock Island Lines), Chairman; B. A. Wood (M. & O.), Vice-Chairman; D. Fairchild (N. P.), R. Koehler (S. F.), A. J. Neafie (D. L. & W.), W. H. Norris (M. C.), F. B. Walker (N. P.), C. W. Richey (P. R. R.).



HERMAN VON SCHRENCK.

Chairman Committee on Grading of Lumber.

APPENDIX E.

Classification and Grading Rules for Cypress Lumber and Shingles.

General Instructions.

Cypress lumber shall be graded according to the following rules and specifications, bearing in mind that as no arbitrary set of rules and specifications can be maintained in every case, much must be left to the common-sense and best judgment of the inspector:

1. Lumber shall be manufactured and shipped in standard lengths and thicknesses.

2. Tank, 1st and 2d and worked partition shall be graded from the poorer side.

3. Select lumber, flooring, ceiling, bevel siding and finishing shall be graded from better or finished side, but the reverse side should in no case be more than one grade lower.

4. All lumber shall be tallied surface or face measure, the tally counted up, and the one-quarter or one-half added to the total where the lumber is one and one-quarter or one and one-half inches thick, and 2 in. and thicker to be multiplied by the thickness.

5. In the measurement of all lumber, fractions exactly on the one-half foot are to be given alternately to the buyer and the seller; the fractions below the one-half foot are to be dropped, and all fractions above the one-half foot are to be counted to the next higher figure on the board rule.

6. In "line boards," pieces 14 ft. and longer shall be given the advantage in grade; pieces 12 ft. and shorter shall be reduced in grade.

7. Recognized defects in cypress are knots, knot holes, shake, splits, wane, worm holes, stained sap and peck.

Standard Defects.

8. A standard knot is sound and not to exceed 1¼ in. in diameter.

9. A small sound knot is one not exxceeding ¾ in. in diameter.

10. Two small knots not to exceed in extent or damage one 1¼ in. knot.

11. One straight split not to exceed in length the width of the piece.

12. Worm, grub, knot and rafting pin holes not exceeding in damage one 1¼ in. knot.

13. Ordinary seasoned checks shall not be considered a defect in any grade.

14. Ordinary season checks are such as occur in lumber properly covered on yard, or season checks of equal size in kiln dried lumber.

15. Bright sap is not a defect in select or below.

16. Pin worm holes, sound knots and stained sap shall not be considered a defect in No. 1 barn or below.

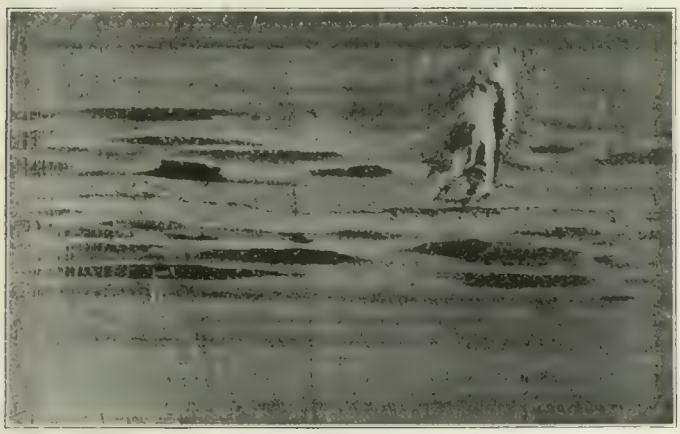
Standard Lengths.

17. All random standard length stock may be furnished in odd as well as even foot lengths, but there shall not be to exceed 20 per cent of odd lengths in any one item.

18. Tank stock and No. 1 barn shall be 8 ft. and longer.

19. 1st and 2d and select shall be 10 to 20 ft.

20. Finish, flooring, ceiling, partition, bevel and drop siding shall be 10 to 20 ft.



Pecky Cypress.

21. Moldings and battens of all sizes 6 to 20 ft., in both odd and even foot lengths, but not exceeding 10 per cent of 6, 7, 8 and 9 ft. lengths.

22. No. 2 barn, 6 ft. and longer.

23. Cull or peck, 4 ft. and longer.

Standard Finished Sizes of Cypress.

24. All lumber shipped in the rough (except 8/4 in. No. 1 and No. 2 "Dimension," which grades may be ¼-in. under or ¼ in. over the size specified, both in thickness and width) shall be of sufficient thickness to S2S to standard thickness, as follows:

25. 4/4 lumber S1S or S2S shall be $\frac{13}{16}$ in. thick.

26. 5/4 select, 1st and 2d clear, selected common tank and tank lumber S1S or S2S, shall be 1⅛ in. thick.

27. 5/4 peck, No. 1 and No. 2 barn and finishing lumber S1S or S2S, shall be $1\frac{1}{16}$ in. thick.

28. 6/4 select, 1st and 2d clear, selected common tank and tank lumber S1S or S2S, shall be 1⅜ in. thick.

29. 6/4 peck, No. 1 and No. 2 barn and finishing lumber S1S or S2S shall be $1\frac{5}{16}$ in. thick.

30. 8/4 lumber, except No. 1 and No. 2 barn or dimension S1S or S2S, shall be 1¾ in. thick.

31. 8/4 No. 1 and No. 2 barn or dimension S1S or S2S shall be 1⅝ in. thick.

32. 10/4 lumber S1S or S2S shall be 2¼ in. thick.

33. 12/4 lumber S1S or S2S shall be 2¾ in. thick.

34. All lumber S1E takes off ⅜ in. S2E, ½ in.

35. All flooring shall be S2S and C. M.

36. 4/4 flooring shall be $\frac{13}{16}$ in. by 2¼ in., 3¼ in., 4¼ in., 5¼ in. face.

37. 5/4 flooring shall be $1\frac{1}{16}$, 6/4 shall be $1\frac{5}{16}$, by same widths as 4/4.

38. ⅜ ceiling shall be worked $\frac{5}{16}$ in., S1S only.

39. ½ ceiling shall be worked $\frac{7}{16}$ in., S1S only.

40. ⅝ ceiling shall be worked $\frac{9}{16}$ in., S1S only.

41. ¾ ceiling shall be worked $\frac{11}{16}$ in., S1S only.

42. All widths of ceiling to be the same as flooring, unless otherwise specified. Ceiling up to 3¼ in. face to have one bead on one edge and ceiling wider than 3¼ in. face to be beaded center and edge.

43. Partition to be finished the same as ceiling, but on both faces.

44. Drop siding shall be worked ¾ in. by 3¼ in., 4¼ in., 5¼ in., 7¼ in., 9¼ in. face, S2S and C. M. or shiplapped.

45. Bevel siding or bevel cribbing shall be worked ½ in. less in width than the rough strip measure.

Tank Stock.

46. This grade shall be random widths, and will not be furnished in specified widths, and shall be graded from the poorer side.

47. This grade shall be 5 in. and wider, 1½ in. to 4 in. thick and 8 ft. and over in length. Pieces up to 7 in. shall be free from sap. Pieces 7 in. to 13 in. may have 1 in. of sound sap on one edge, not to exceed half the length and half the thickness of the piece. Pieces 14 in. and wider may have 1 in. of sound sap on both edges, not to exceed half the length and half the thickness of the piece. In all widths sound knots that do not impair usefulness for tank purposes may be admitted.

First and Second Clear.

48. This grade shall be random widths, and will not be furnished in specified widths, and shall be graded from the poorer side.

49. This grade shall be 8 in. and wider, 1 in. to 4 in. thick and 10 ft. and over in length. Pieces 8 in. to 10 in. may have 1 in. of bright sap on each edge, or its equivalent on one or both edges, otherwise they must be clear. Pieces 10 in. and under 12 in. may have 1½ in. of bright sap on each edge or 3 in. on one edge, and may have one standard knot or its equivalent. Pieces 12 in. wide may have 2 in. of bright sap on each edge, or 4 in. on one edge and may have one standard knot; or, in lieu of sap, may have two standard knots or their equivalent. Pieces wider than 12 in. may admit of defects as specified above in proportion as width increases. Pieces 10 in. and wider may admit of one end split, which shall not exceed in length the width of the piece. Pieces 12 in. and less in width, free from other defects, may have bright sap across one face at one end, but this sap shall not exceed in length one-tenth of the length of the piece. In pieces 13 in. and wider bright sap is not a defect.

Selects.

50. This grade shall be random widths, and will not be furnished in specified widths, and shall be graded from the better side, but the reverse side shall not be of a lower grade than No. 1 shop or No. 1 barn.

51. This grade shall be 7 in. and wider, but will not be furnished wider than 12 in.; shall be 1 in. to 4 in. thick, 10 ft. and longer. Pieces 10 in. and under in width shall admit two standard knots or their equivalent and an additional standard knot or its equivalent for every 2 in. in width over 10 in. Pieces free from other defects, 10 in. and over in width, to admit pin worm holes on one edge one-tenth the width of the piece. Bright sap is not a defect in this grade. Slight wane on pieces 10 in. and over in width is allowed on one edge not over 3 ft. in length. When no other defect appears, slight amount of stained sap may be allowed. Pieces 10 in. and wider may admit of one end split, which shall not exceed in length the width of the piece.

Selected Common Tank Stock.

52. This grade shall be 4 in. wide, or wider, 1½ in. and 2 in. thick, 8 ft. and over in length. Sound sap no defect in this grade, but must be free from unsound knots or other defects that extend through the thickness of the piece, and must be square edged to work the full length of the piece.

No. 1 Barn or Dimension.

53. This grade shall be specified widths only, shall be 3 in. and wider, 1 in. and thicker, 8 ft. and over in length, admitting sap, bright or stained, shake, season checks, knots, pin worm holes, a small amount of peck on one side and one edge, or very slight peck on both sides and both edges of pieces comparatively free from coarse defects; which defects, however, shall not be sufficient to seriously impair the strength, or prevent the use of each piece for "common" purposes in its full length and full width.

No. 2 Barn or Dimension.

54. This grade shall be specified widths, 3 in. and wider, 1 in. and thicker, 6 ft. and over in length, admitting all the defects allowed in No. 1 barn, but same may be larger and coarser, and in addition will admit pick on both sides; however, the defect shall not be sufficient to prevent the use of each piece in full length and full width for low-grade fencing and other very common purposes.

Cull or Peck.

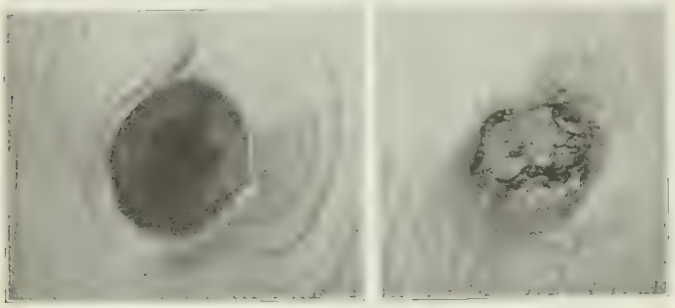
55. This grade may be random or specified widths 3 in. and wider, 1 in. to 4 in. thick, 4 ft. and over in length. Shall admit all pieces below the grade of No. 2 boxing, and shall also admit the product of that part of the log known as "pecky;" however, each piece shall have sufficient strength and nailing surface to permit its use as a low grade boxing, crating, sheathing and foundation material.

Finishing.

56. Shall be specified widths 4 in. and wider, 1 in. to 2 in. thick, 10 ft. and over long, and shall be graded from the better side, A, B and C, but the reverse side should not be more than one grade lower. All grades of finish, rough or S1S or S2S may vary ¼ in. from the width specified.

57. "A" Finish.—Pieces 4 in. and 5 in. wide shall be clear of sap, knots and other defects. Pieces 6 in. wide may have 1 in. of bright sap, or in lieu of sap one small sound knot. Pieces 7 in. and 8 in. wide may have 2 in. of bright sap, or in lieu of sap one small sound knot. Pieces 9 in. and 10 in. wide may have 3 in. of bright sap, or in lieu of sap two small sound knots, or 1½ in. of bright sap and one small sound knot. Pieces 12 in. wide may have 4 in. of bright sap, or in lieu of sap one standard knot, or two small sound knots, or 2 in. of bright sap and one small sound knot. Pieces 14 in. or wider may have more defects in proportion as the width increases.

58. "B" Finish.—Pieces 4 in., 5 in. and 6 in. wide may have 2 in. of bright sap and one or two small sound knots, or in lieu of knots may have all bright sap. Pieces 7 in. and 8 in. wide may have 3 in. of bright sap and two small sound knots, or in lieu of knots may have all bright sap. Pieces 9 in. and 10 in. wide may have 4 in. of bright sap and one standard knot or three small sound knots, or in lieu of knots may have all bright sap. Pieces 12 in. wide may have 6 in. of bright sap and one standard or four small sound knots, or in lieu of knots may have all bright sap. This grade will not be furnished wider than 12 in.



Standard Sound Knot. Rotten Knot.

59. "C" Finish.—All widths in this grade shall admit small sound knots, stained sap, pin worms and other defects except shake; but none that will prevent the use of same in its full width and length as a paint grade, and will admit pieces containing one coarse defect which can be removed by making two cuts with a waste of not to exceed 5 per cent in the one piece removed, but which pieces are otherwise "B" grade or better. This grade will not be furnished wider than 12 in.

60. "D" Finish.—All widths will admit sound knots, stained sap, pin worms, slight shakes, and other defects; but none that will prevent the use of same in its full width and length as a common paint grade. This grade will not be furnished wider than 12 in.

Siding.

61. Siding shall be 4 in. and 6 in. in width, 10 ft. to 20 ft. in length, and graded from the finished side, A, B, C and D.

62. "A" Siding.—May have 1 in. of bright sap on thin edge, and may contain one small sound knot.

63. "B" Siding.—May have any amount of bright sap, or if not all bright sap, may have three small sound knots, shake, split or pin worm holes not exceeding in damage the three small knots as above, and may have slight wane on the thin edge. In the absence of other defects a small amount of stained sap will be permitted.

64. "C" Siding.—May have one to five knots, the whole not aggregating over 3 in. in diameter, or knots, splits or other defects that can be removed in two cuts with waste not exceeding 10 per cent of the length, or may have small amount of stained sap and pin worm holes not exceeding in damage the five small knots above described.

65. "D" Siding.—May have stained sap and pin worm holes, or may have other defects that will not cause a waste to exceed one-third the piece.

Flooring and Ceiling.

66. Shall be specified widths, 10 ft. to 20 ft. in length and graded from the finished side, or if both sides are finished, it shall be graded from the better side, A, B, C and D.

67. "A"—May have bright sap on one edge one-fourth its width, otherwise must be clear.

68. "B"—May have one-half of its face bright sap if otherwise clear, or in lieu of sap, may contain two small sound knots, or may have a split not to exceed 9 in. at one end.

69. "C" (10 to 20 ft.)—May have all bright sap, or may have one to five knots, the whole not aggregating over 3 in., or knots or other defects that can be removed in two cuts with waste not exceeding 10 per cent of the length, or may have three pin worm holes, or may have check or split at one end, not to exceed 10 per cent of the length.

70. "C" (4 to 9 ft.)—May have all bright sap, small sound knots, stained sap, pin worm holes and other defects except shake, but none that will prevent the use of each piece the full length.

71. "D"—May have stained sap and pin worm holes, or may have unsound knots or other defects that will not cause a waste to exceed one-third the piece.

Partition.

72. Shall be same widths and lengths as flooring and ceiling, but shall be graded from the poorer side, A, B, C and D, same grading to apply as in flooring and ceiling.

Pickets.

73. Shall be graded No. 1 and No. 2.

74. 1 in. by 1 in. shall be headed and S4S to 13/16 in. by 13/16 in.

75. 1¼ in. by 1¼ in. shall be headed and S4S to 1 1/16 in. by 1 1/16 in.

76. 1½ in. by 1½ in. shall be headed and S4S to 1 5/16 in. by 1 5/16 in.

77. 1 in. by 3 in. shall be headed and S4S to ¾ in. by 2½ in.

78. No. 1.—Shall be well manufactured, bright sap, no defect and may contain one small sound knot.

79. No. 2.—Shall admit stained sap, sound knots, pin worm holes, slight shake, and pickets thrown out of the No. 1 grade because of poor manufacture.

Battens.

80. Battens, both flat and O. G., are not moldings. Same are invariably used with "common" lumber and shall, therefore, be graded No. 1 barn and better, admitting all defects allowed in No. 1 barn, but none that will prevent the use of each piece in full length for batten purposes. ⅜ in. battens shall be 1 in. strips S2S to $\frac{13}{16}$ in. by 2½ in. and resawed, or 1 in. by 2¾ in. to 3 in. S2S and resawed. Unless otherwise specified, ⅜ in. or flat battens shall be S2S only and resawed.

81. O. G. battens shall be manufactured in the sizes and pattern shown in the Universal Molding Book.

Car Roofing and Siding.

82. "C and Better" Grade.—This grade will admit sound knots, stained sap, pin worm holes, very slight shake and other defects, but none that will prevent the use of each piece in its full width and length for car roofing and car siding; may be random or specified lengths and may be worked to pattern specified and graded from pattern side or S2S and C. M. and graded from the better side.

Car Lining.

83. Shall be specified widths and 8 to 20 ft. in length. Will admit tight knots, stained sap, pin worm holes, slight shake and other defects, but none that will prevent the use of each piece in its full width and length for car-lining purposes.

Shingles.

84. Bests.—A dimension shingle, 4, 5, and 6 in. in width, 16 in. long, each width packed separately, 5 butts to measure 2 in., to be all heart and free of shake, knots and other defects.

85. Primes.—A dimension shingle, 4, 5 and 6 in. in width, 16 in. long, each width packed separately, 5 butts to measure 2 in., admitting tight knots and sap, but free of shake and other defects, but with no knots within 8 in. of the butts.

86. This grade may contain shingles clipped two-thirds of the width and one-eighth of the length on the point.

87. Star a Star.—A random width shingle 3 in. and wider, 14 in. to 16 in. long, otherwise the same as primes.

88. Economy.—Dimensions 4, 5 and 6 in., each width separately bunched, admitting sap and sound knots, may have slight peck 5 in. from butts, imperfections on points no objection and admitting 14 in. shingles.

89. Clippers.—All shingles below the above grades which are sound for 5 in. from the butts, worm holes and slight peck excepted, random widths 2½ in. and wider.

90. The count of our manufacture of shingles, of all grades,

is based on 4,000 linear inches in width, making 1,000 standard shingles, consequently there would be only 667 6-in. shingles packed and counted as 1,000 standard shingles; 5 in. dimension being counted in like proportion.

91. In making re-inspections of shingles, one bundle out of 20 bundles taken at random shall be cut open, the results of this investigation to form the basis of arriving at the grade of the entire shipment.

Discussion on Grading of Lumber.

Dr. von Schrenk: At the time this report was submitted, it was thought it would probably be printed sufficiently far in advance of the convention to give the members a chance to criticize the rules submitted. As the report has only been out a short time, I suggest that, in adopting these lumber grading rules, the sixth reference be omitted.

Appendices A, B, C and D, published last year, and amended by this year's report, were voted on separately, and all were adopted. Appendix E was received as information.

WOOD PRESERVATION.

The subjects assigned were as follows:

(1) Continue investigation of the proper grouping of the different timbers for antiseptic treatment.

(2) Compile available information from service tests.

(3) Investigate the merits of various preservatives, giving special attention to oil from water gas tar and to the use of refined coal-tar in creosote oil.



EARL STIMSON.

Chairman Committee on Wood Preservation.

(4) Report on the advisability of revising the adopted specifications for creosote oil.

(5) Recommend forms for the inspection of preservative processes.

(6) Present specifications for impregnation with creosote oil.

(7) Report on the value of impregnation with crude oil.

(8) Report on the value of brush coating and dipping.

(1) GROUPING OF TIMBERS FOR ANTISEPTIC TREATMENT.

The Sub-Committee on Grouping was instructed to continue the investigations of the proper grouping of timbers for antiseptic treatment. Last year arrangements were made for a series of co-operative experiments at several plants to determine the best method of grouping various species in different regions. These tests have not been completed, but some progress has been made, the results of which are submitted as appendix "A" to this report. During the coming year additional experimental work will be done at several plants. This will be systematized, so that uniform results will be obtained and as definite a basis as possible established for grouping under representative conditions.

Considerable time must elapse before the experimental work will be brought to a point where final conclusions can be drawn. Past experience, however, has demonstrated certain fundamental facts in relation to grouping, and it is recommended that such principles as have received recognition in standard practice be embodied in the manual. These fundamentals can be elaborated upon in the future as additional information becomes available.

The principles recommended at the present time for insertion in the manual are as follows:

(a) Ties of approximately the same period of seasoning should be grouped together for treatment; green ties should never be mixed with seasoned ones.

(b) Pine ties should be separated on the basis of heartwood and sapwood; it would also be advisable in some cases to group hardwoods on the same basis, but it is not generally practical to do so.

(c) Grouping on the basis of species and families, as, for example, red oaks, pines, beeches, etc., if a further division into hardwood classes is made with pine, is usually a satisfactory practice. From this it follows that red oak, beech, long-leaf pine, loblolly pine and gum should be treated separately. Birch and hard maples and certain other combinations, depending on the locality, can be grouped together to advantage.

(d) The separation in the yard, on the basis the ties are to be grouped for treatment, is an essential and economical practice.

(2) The recommendations of the report of the committee for 1911 included the recommendation that certain sections of track be selected on each railway for the purpose of making accurate tests covering the life of treated and untreated ties. To ascertain the extent to which this had been done in the past, and the results which have been obtained, the committee sent out a circular letter, the replies to which are abstracted in appendix "B" to this report.

(3) The committee was directed to give special attention to the merits of oil from water gas tar and to the use of refined coal-tar in creosote oil. Sufficient information has not been obtained to enable report to be made on these subjects at this time. The investigations will be continued the coming year.

(4) REVISION OF THE ADOPTED SPECIFICATIONS FOR CREOSOTE OIL.

After careful consideration it seems desirable to change the first clause in the adopted specifications for creosote oil to provide that it shall be a pure product from coal gas tar or coke oven tar and free from any foreign admixture, including coal gas tar or coke oven tar. With this change, the specification for standard creosote oil will read as follows:

The oil used shall be the best obtainable grade of coal-tar creosote; that is, it shall be a pure product obtained from coal gas tar or coke oven tar and shall be free from any tar, oil or residue obtained from petroleum or any other source, including coal gas tar or coke oven tar; it shall be completely liquid at 38 deg. centigrade and shall be free from suspended matter; the specific gravity of the oil at 38 deg. centigrade shall be at least 1.03. When distilled by the common method—that is, using an eight-ounce retort, asbestos covered, with standard thermometer, bulb one-half inch above the surface of the oil—the creosote, calculated on the basis of the dry oil, shall give no distillate below 200 deg. centigrade, not more than five per cent. below 210 deg. centigrade, not more than 25 per cent. below 235 deg. centigrade, and the residue above 355 deg. centigrade, if it exceeds five per cent. in quantity, shall be soft. The oil shall not contain more than three per cent. water.

In addition to the standard grade, two inferior grades can be used in cases where the higher grade oil cannot be procured. It should be understood that where it is necessary to purchase grades No. 2 and No. 3 consideration should be given to the use of a greater quantity of creosote oil per cubic foot. The following specification is for the No. 2 grade:

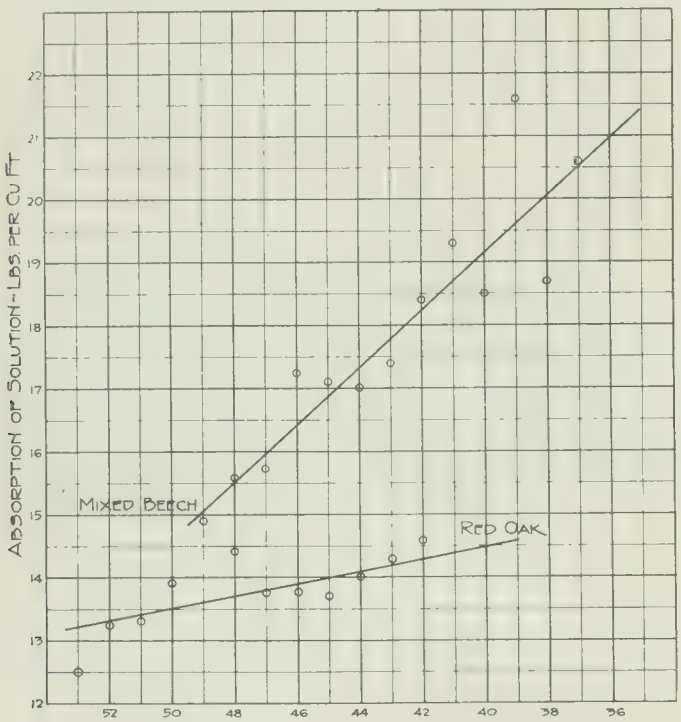
The oil used shall be the best obtainable grade of coal-tar creosote; that is, it shall be a pure product obtained from coal gas tar or coke oven tar, and shall be free from any tar, oil or residue obtained from petroleum or any other source, including coal gas tar or coke oven tar; it shall be completely liquid at 38 deg. centigrade and shall be free from suspended matter; the specific gravity of the oil at 38 deg. centigrade shall be at least 1.03. When distilled by the common method—that is, using an eight-ounce retort, asbestos covered, with standard thermometer, bulb one-half inch above the surface of the oil—the creosote, calculated on the basis of the dry oil, shall give not more than eight per cent. distillate below 210 deg. centigrade, not more than 35 per cent. below 235 deg. centigrade, and the residue above 355 deg. centigrade, if it exceeds five per cent. in quantity, shall be soft. The oil shall not contain more than three per cent. water.

The following is the specification for the No. 3 grade:

The oil shall be the best obtainable grade of coal-tar creosote; that is, it shall be a pure product obtained from coal gas tar or coke oven tar and shall be free from any tar, oil or residue obtained from petroleum or any other source, in-

cluding coal gas tar or coke oven tar; it shall be completely liquid at 38 deg. centigrade and shall be free from suspended matter; the specific gravity of the oil at 38 deg. centigrade shall be at least 1.025. When distilled by the common method—that is, using an eight-ounce retort, asbestos covered, with standard thermometer, bulb one-half inch above the surface of the oil—the creosote, calculated on the basis of the dry oil, shall give not more than 10 per cent. distillate below 210 deg. centigrade, not more than 40 per cent. below 235 deg. centigrade, and the residue above 355 deg. centigrade, if it exceeds five per cent. in quantity, shall be soft. The oil shall not contain more than three per cent. water.

No change is recommended at this time in the "Specifications for Analysis of Creosote Oil," except that this heading should be changed to read "Specifications for the Fractionation of Creosote Oil." This specification merely covers the fractionation and does not cover the chemical analysis which would be necessary in order to determine the presence of adulteration. The determination in regard to adulterants can be made chemically in several manners with the same results, and there does not, therefore, seem to be the necessity for preparing a complete specification covering chemical analysis that there is for preparing the specification covering the fractionation, the latter giving different results when made by different methods.



Absorption of Red Oak and Mixed Beech Ties at Various Treating Weights, Per Cubic Foot, by the Card Process.

For the purpose of obtaining more information in regard to the relative merits of the flask and retort for the fractionation of creosote oil, and also for the purpose of obtaining other information on which to base further consideration of the specification for fractionation, it has been arranged that various samples of creosote oil be submitted to the various railways for analysis by various methods, the reports obtained being submitted in writing to the committee as soon as possible for action by the committee next year.

(5) It is found that the various railway and timber-treating companies have their own forms for the inspection and recording of the various preservative processes, each meeting their own peculiar conditions, although similar in the essential details. The committee is not now prepared to submit a report on this subject, but will continue its consideration the coming year.

(6) A specification for impregnation with creosote oil has already been adopted by the association and is contained in the manual. It is the sense of the committee that this specification is in accordance with good practice, and no change is recommended.

(7) The committee is not in position to report at this time and recommends the continuance of the subject for the coming year.

(8) A circular letter was sent out making inquiry as to these methods of treatment. Out of 38 replies, 31 report that neither process has been used, and seven report that no definite conclusions can be drawn from their experience. It is recommended that further consideration be given this subject.

CONCLUSIONS.

It is recommended:

(1) That the four principles of grouping of timbers, as given under subhead (1), grouping of timbers for antiseptic treatment, be accepted for insertion in the manual.

(2) That the revised standard specifications for creosote oil, and the specifications for No. 2 grade and No. 3 grade creosote oil, as given under subhead (4), revision of adopted specifications for creosote oil, be adopted.

(3) That the heading "Specifications for Analysis of Creosote Oil," as it now stands in the manual, be changed to read as follows: "Specifications for the Fractionation of Creosote Oil."

OUTLINE OF WORK FOR 1912.

The committee recommends:

(1) Continue investigations of the merits as a preservative of oil from water gas and the use of refined coal-tar in creosote oil.

(2) Continue the compilation of available information from service tests.

(3) Continue the investigation of the proper grouping of the different timbers for antiseptic treatment.

(4) Continue consideration of the revision of the specifications for fractionation of creosote oil.

(5) Report on the value of impregnation with crude oil.

(6) Report on the value of brush coating and dipping.

(7) Report on methods of accurately determining the absorption of creosote oil, including check of gage readings and the keeping of corrected records.

(8) That the Board of Direction assign the work of drawing up a standard specification for timber for treatment to a joint committee of the committee on Wood Preservation and the committee on Grading of Lumber.

The report is signed by Earl Stimson (B. & O.), Chairman; E. H. Bowser (I. C.), Vice-Chairman; G. M. Davidson (C. & & N.-W.), H. B. Dick (B. & O. S. W.), W. W. Drinker (Erie), Dr. W. K. Hatt (Purdue Univ.), V. K. Hendricks (S. L. & S. F.), George E. Rex (A. T. & S. F.), E. A. Sterling (Consulting Eng.), C. M. Taylor (C. R. R. of N. J.), Dr. H. von Schrenk (Rock Island Lines), Charles Yoder (L. S. & M. S.), C. E. Knickerbocker.

APPENDIX A.

Grouping of Timbers for Antiseptic Treatment.

Chicago Tie and Timber Preserving Company.—The information furnished by this company covers the treatment of red oak and mixed beech ties by the Card process. The weights as given in the table are not taken from selected lots, but cover the daily practice. The cubical contents in each charge was estimated by displacement. The computations from the daily log sheets were made by the Forest Products laboratory:

Oak—Card Process.			Beech (mixed)—Card Process (includes gum, elm, basswood, etc.)		
Weight per cu. ft. Pounds	Absorption per cu. ft. Pounds	No. Ties used	Weight per cu. ft. Pounds	Absorption per cu. ft. Pounds	No. Ties used
42	14.6	2,670	37	20.6	567
43	14.3	7,516	38	18.7	1,723
44	14.6	19,472	39	21.6	571
45	13.7	32,727	40	18.5	2,818
46	13.8	32,498	41	19.3	1,707
47	13.8	10,323	42	18.4	3,972
48	14.4	1,569	43	17.4	1,702
49			44	17.0	5,114
50	13.9	1,113	45	17.1	3,414
51	13.3	2,228	46	17.2	3,982
52	13.2	1,668	47	15.7	4,027
53	12.5	2,308	48	15.6	4,553
			49	14.9	2,313
Total		114,092	Total		36,463

The table and accompanying diagram show clearly that the absorption per cu. ft. with both mixed beech and red oak ties falls off as the treating weights of the ties increase. Thus the absorption of red oak at 42 lbs. per cu. ft. is about 14½ lbs. of solution, and at 53 lbs. per cu. ft. about 12½ lbs. For mixed beech the difference is even more marked, varying from about 21 lbs. of solution at 37 lbs. per cu. ft. to 15 lbs. absorption at a treating weight of 49 lbs. per cu. ft.

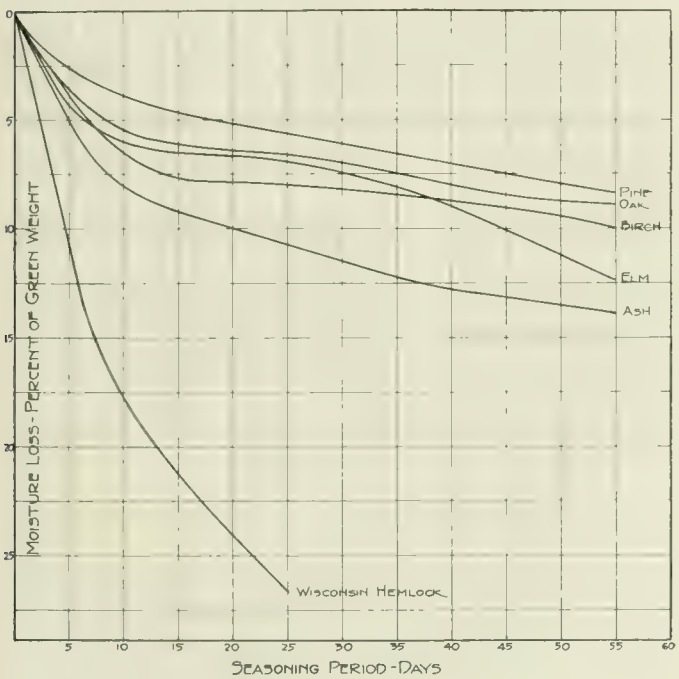
Northern Pacific.—The report submitted concerns the sea-

soning and treatment of pine, oak, beech, elm, ash and hemlock crossties at the Paradise, Mont., plant of the Northern Pacific. The data were compiled by the Forest Products laboratory.

Two ties of each of the above species, with the exception of the birch and hemlock, of which four ties were used, were piled to air-season in a shed where the air was artificially heated. All were hewn ties 7 in. by 9 in. by 8 ft. and contained an average of sapwood for Minnesota timber. The ties were weighed from time to time to ascertain the rate at which they were seasoning; Fig. 1, in the accompanying diagram, showing graphically the results obtained. After the ties had seasoned to the minimum weight shown in the figure they were placed in the treating cylinder and given a Lowry treatment, all being treated in exactly the same manner. Fig. 2 shows the amount of creosote absorbed by the ties under these conditions. Just before treatment the ties had the following weights:

Pine	110.50 lbs.
Oak	164.25 "
Birch	153.50 "
Elm	135.75 "
Ash	126.00 "
Wisconsin hemlock	168.00 "

Of special note is the rate at which hemlock seasoned, as compared with the other woods, and the large amount of oil



Rates of Air Seasoning of Untreated Ties.

absorbed by the ash ties as compared with those cut from oak and hemlock, it being approximately four times as great.

Pennsylvania Railroad.—At the Mt. Union and Greenwich plants of the Pennsylvania Railroad definite experiments are under way to determine the length of time to season the different species handled, the results from various methods of piling and the period of seasoning which will give the best results from the standpoint of treatment. As the experiments have not been in progress long enough to arrive at a definite solution of the several points, it will only be possible at this time to outline the nature of the work.

The experiments at the two plants are to be identical in character, the tests at Mt. Union to be made with beech, maple and red oak and at Greenwich with beech, red oak, black gum and sap pine.

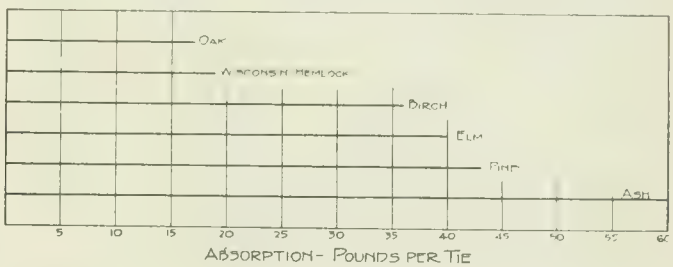
Two definite lines of experiments are under way. In the first 24 ties of each species are to be weighed and piled 7x1, and at the end of each month two ties of each kind will be weighed and treated. This work was started in April, 1911, but another series will be conducted later to determine the influence of climatic conditions in different seasons of the year. The data eventually produced should indicate the rapidity with which each species seasons and show after what period of seasoning the treatment is most effective.

The second line of experiments will be a comparison of the 7x7 with the 7x1 piling systems, and of open blocks as compared with solid ones. In this test a whole block (six piles square) of oak ties at Mt. Union were piled solid 7x7; adjoining this was a block of ties 7x7, but with 2-foot alleys between each two rows of piles; while another adjoining block was piled according to the company's present system, with the 7x1 arrangement in the piles, 2-ft. alleys between each two tiers of piles and 4-ft. alleys between the blocks. In each of these experimental blocks a large number of ties has been weighed, marked and placed in various places in the different piles; yet in each block the marked ties will be in approximately the same position. These ties are to be left for 8 or 9 months, and just before treatment the marked ties will be weighed and the comparative rates of seasoning noted.

Texas Tie and Lumber Preserving Company.—This company reports that the grouping and seasoning of pine ties, as described, is in connection with the Rueping empty-cell process.

"We have carried the segregation of pine timber a little further than is customary when we can do so and have tried to separate, when possible, ties that had more than 50 per cent. sapwood from those that had less and treated them in different charges. Our ties at Somerville are also divided approximately 50 per cent. hewn and 50 per cent. sawn, and of our sawn ties we get approximately 65 per cent. heartwood ties with very little sap, and of our hewn ties we get only about 10 per cent. of long-leaf ties, which have very little sapwood on.

"In treating ties with the Rueping process we find, for instance, that we have to put in from 10 to 15 pounds more air in the sawn tie that are 65 per cent. heartwood than we do in the hewn ties that are only 10 per cent. long leaf, with small sapwood to leave in the same amount of oil at the finish of the treatment. We also find when we separate the hewn ties in saps and hearts that we have to make about



Absorption of Creosote (Lowry Process) of Air-Seasoned Ties.

15 lbs. difference in the air to leave in the amount of oil when the tie is treated. This is about the extent of our findings on this subject, and it may not be of interest to those not using the Rueping process."

Discussion on Wood Preservation.

Mr. Stimson: We will consider the four recommended principles for the grouping of timbers, which are presented for adoption by the association, for insertion in the manual.

Mr. McDonald: There seems to be a tendency on the part of the committee to confine its activity entirely to ties. Should not the first clause in the first principle refer to something else besides ties? I think it is just as important to group dimension timber as ties.

Mr. Stimson: This particular grouping applies more particularly to ties than to longer timbers. The bulk of the timber treating is confined to ties, from a railway standpoint. We can widen the scope of our recommendations and substitute the word "timbers" for "ties," if that is what the association wants.

The four principles included under subhead (1), "Grouping of Timbers," were voted on separately and all were adopted.

The change in the standard specifications for creosote oil recommended in Conclusion 2 was adopted without discussion.

Mr. Stimson: There seems to be a demand for a specification for creosote oil somewhat less stringent than our standard specification. In fact, it seems necessary to have such a specification to meet the grade of oil that we are oftentimes obliged to purchase. I move the adoption of the specification for a No. 2 grade creosote oil.

Mr. Fritch: What will be the difference in the cost between specifications No. 2 and No. 3?

Mr. Stimson: That is a matter, more or less, of market price. We are very seldom able to get a creosote oil that conforms strictly to the standard specification. Still, the

inference is that you pay for a high-grade oil. We would place a modified specification in the hands of the purchasing agent, and if he cannot get it according to the standard specification, it will meet one or the other of the modified specifications, with some hope that there might be some modification in price.

Mr. Fritch: I think three grades are too many. Two, in most cases, are enough. It seems to me we should insist upon the very best grade of creosote oil. I realize at times it is difficult to secure the first grade, but it seems to me the third grade is too low for us to accept. A slight difference in the grade of the oil will seriously affect the treatment, while the difference in the cost will be very slight.

Victor K. Hendricks (St. L. & S. F.): Some of the roads are getting a grade of creosote that will not come under No. 2 and will come under No. 3, and they have to have the creosote, and that was the reason the third grade was recommended by the committee.

W. L. Seddon (S. A. L.): The question of the price is not so much one of the difference in cost of the oil, as of the action of the low-grade oils in preserving the timber. Before we recommend No. 2 and No. 3 oil specifications, we ought to have some information as to the effect of such oils on the timber.

Mr. Stimson: Most of us are now using No. 2 or No. 3 oil and get very good results.

Dr. von Schrenk: I have always advocated the use of strictly No. 1 high-grade specification oil on account of the desirability of getting the very best that we can possibly find. The committee finds, however, that for several years, owing to the tremendous increase in the creosoting industry in this country, and owing to the absence of a sufficient high-grade supply, a great many railways are buying oil under our standard specifications, which, as a matter of fact, does not meet the requirements.

The committee pointed out that in using specifications 2 and 3, consideration should be given to the use of greater quantities of creosote oil per cubic foot of wood than would be used if specification No. 1 was used.

Mr. Frink: I understand the known sources of supply of first-class oil are not utilized. Enormous amounts go to waste every year in this country. If there were a demand for that No. 1 grade, I think the supply would soon fill it.

Mr. Lindsay: Is it practicable to refine the No. 2 and No. 3 grades up to the standard of No. 1?

Dr. von Schrenk: No, sir; if that were the case, we would insist absolutely on No. 1.

S. B. Fisher (M. K. & T.): I think we should have the lower grades of creosote. The indications are that soft ties will wear out before they decay, and we may have to get cheaper grades of creosote to preserve those ties before they wear out.

Mr. Coombs: It may be perfectly proper to use a cheaper grade of oil for a cheaper class of work, and I would suggest that the committee might properly advise the relative ultimate cost in the work of the different grades, taking into account the larger quantity of the cheaper grades.

A vote on the motion for the adoption of the specification for No. 2 oil showed 83 votes in the affirmative and 7 in the negative.

Mr. Stimson: I move the adoption of the specification for the third grade creosote oil.

C. H. Spencer (Wash. Ter. Co.): I wish to amend that motion to the effect that the specification for No. 3 oil be referred back to the committee for further consideration and report as to quality and values of the creosote specified.

Mr. Fritch: In seconding the amendment I would like to say that many of us are treating our timber with all the oil we can get into it. How are you going to get more oil of the lower grades into the timber? I question whether it is not possible to refine the lower grade oil into higher grades. There is a commercial condition which we must meet, and I do not think we are prepared to meet it now. We have not enough light on the subject and we are simply asking for a little more time so that the subject may be thoroughly investigated.

Mr. Webb: The question involved here is like the question of buying different grades of lumber. We would all like to use the highest grade A1 lumber, but we cannot. We do not recommend that any railway shall use this third grade of creosote oil, but we simply define what the third grade of creosote oil shall be.

Mr. Seddon: We do know comparatively something about the comparative life and usefulness of various grades of lumber, and we would be willing to consider various grades of creosote oil if we knew something about them.

Mr. Stimson: We are not prepared to state how many cents less per gallon the different grades of oil No. 2 and No. 3 will cost as compared with No. 1, or how many years, more or less, the ties which are treated with No. 2 and No. 3 oil will last. It must be determined by practical experience, and no doubt many of the best results obtained on railways in creosoting are obtained with the use not only of the standard grade, but of the No. 2 and No. 3 grade of creosote oil.

L. G. Curtis (B. & O.): The only way we can tell as to what the No. 1 grade is worth, what the No. 2 grade is worth, and what the No. 3 grade is worth is to adopt the specifications and then try them out.

C. E. Lindsay: As I understand it, the difference between specification No. 2 and specification No. 3 is only a small percentage in specific gravity; one is 1.03 and the other 1.25. What percentage of the total output of creosote oil would be rejected if we did not have No. 3 specification?

Dr. von Schrenk: That is almost impossible to answer, because the volume of oils differ from week to week and month to month, depending on peculiar accidents which occur in the distilling operation. The only reason why a very small difference is made in the specifications is simply to give an actual specification for the actual oil we find the railways are buying in millions of gallons every week. Oils of the character of grades No. 2 and 3 have been used for from 75 to 100 years. All we are doing is to endeavor to get an opportunity for some of the oils to be used with positive recommendations concerning their use.

S. R. Church: (Barrett Mfg. Co.): There is really no essential difference between the three grades of oil which the committee has recommended. They are all pure coal tar creosotes. The reputation of coal tar creosote as a preservative both abroad and in this country was established before any oil that was of high specific gravity, or with as high distillation range as your standard specification requires, was produced or was in use in large quantities.

The question has been raised as to whether it is possible to refine any of the oils of lower distillation range to make them comply with specification No. 1. That could be done, but only at the loss of some creosote oil increasing, the cost of the preservative.

It is not true that there is any surplus of oil material in this country from which creosote oil can be obtained. The amount of tar going to waste is very negligible. The manufacturers are doing everything in their power to get the highest possible percentage of creosote and the best possible quality of creosote from the tar. We are continually endeavoring to obtain enlarged outlets for the by-product which results in the manufacture of high grade creosote, and I feel safe in saying that the average quality of the creosote will improve with time. I also feel safe in saying that the average quality of the creosote produced to-day is of proven value and the timbers treated with enough of the preservative of any of these three oils may cause no anxiety as to their life.

The amendment to the motion for adoption instructing for recommittal was voted on and lost.

The motion to adopt the recommendation of the committee covering No. 3 grade creosote oil was carried.

Mr. Stimson: I move the adoption of the third conclusion of the committee "That the heading 'Specifications for Analysis of Creosote Oil,' as it now stands in the manual, be changed to read as follows: 'Specifications for the Fractionation of Creosote Oil.'" Motion carried.

J. B. Berry: I would suggest action by the members of this Association on the following resolution:

"Resolved, By the members of the A. R. E. A. in convention assembled, that we desire to place on record our hearty appreciation of the efforts made and the admirable results obtained by the Railway Age Gazette in its daily issue during this convention.

CONCLUDING BUSINESS OF THE CONVENTION.

Resolutions were unanimously adopted expressing appreciation of the efforts made and the results obtained by the Railway Age Gazette and the Railway and Engineering Review in publishing daily editions during the convention.

A resolution was unanimously adopted in appreciation of the efforts made by the National Railway Appliance Association in making possible the instructive exhibit of devices and materials used in the construction, operation and maintenance of railways.

Resolutions were unanimously adopted expressing appreciation of the work of the Committee on Arrangements and of the retiring president. The convention adjourned.

The most important railway in German East Africa is the Dar-Es-Salam Morogoro-Tobora, of which 285 miles have been opened to traffic and 465 miles are under construction. This railway is of the 3 ft. 1 in. gage as well as the shorter Usambara Railway, of which 155 miles have been opened to traffic.

BALTIMORE & OHIO IMPROVEMENTS.

The Baltimore & Ohio is planning to begin work early in April on extensive improvements at Garrett, Ind., including a general enlargement of the terminal facilities, the erection of a new roundhouse, turntable and pits, and the enlargement of the shops to handle classified repairs.

COMPARATIVE REGISTRATION FIGURES.

Last year the total registration of members of the Engineering Association during the three days of the convention was 351. On the first day, 287 registered; on the second day, 51; and on the last day, 13. This year 386 members registered; 296 on the first day, 76 on the second day and 14 on the last day.

TRIP TO BUFFINGTON AND GARY.

The party which is being made up to go to Buffington, Ind., and Gary will meet at the La Salle Street Station this morning and take the Lake Shore & Michigan Southern train leaving at 10:30. Special Pullman cars will be attached to this train. It arrives at Buffington at 11:15, giving about an hour for inspecting the works of the Universal Portland Cement Company, before luncheon, which will be served in the company's clubrooms. Immediately after luncheon the party will take special cars on the interurban to Gary, returning at the end of the afternoon and arriving at Chicago at 6:15.

Members of the A. R. E. A., their guests and members of the Appliances Association are invited to join the party. The trip is being arranged by L. J. MacMahon of the cement company.

REGISTRATION—AMERICAN RAILWAY ENGINEERING ASSOCIATION.

ACTIVE MEMBERS.

Brown, H. W., Asst. Eng., Pennsylvania Lines, Logansport, Ind.
Davis, Garrett, Supt., C., R. I. & P. Ry., El Dorado, Mo.
Delo, C. G., Eng. M. W., C., G. W. R. R., Chicago, Ill.
Duncan, K. B., Office Eng., A., T. & S. F. Ry., Topeka, Kan.
Frame, J. T., Eng. M. W., C. G. W. R. R., Clarion, Iowa.
Gray, Edward, E. M. W., Sou. Ry., St. Louis, Mo.
Henoch, M. J., Con. Eng., Sioux City, Iowa.
LaFountain, N. H., Asst. Supt. B. and B., C., M. & St. P. Ry., Chicago, Ill.
MacPherson, Duncan, Asst. to Chairman, Nat. Trans. Ry., Ottawa, Ont.
Petersen, W. H., Eng. M. W., C., R. I. & P. Ry., Davenport, Iowa.
Spencer, C. B., Office Eng., St. L. & San Francisco Ry., Springfield, Mo.
Williams, W. D., Chief Engineer, C. N. R. R., Van Wert, Ohio.
Wilson, C. A., Consulting Engineer, Cincinnati, Ohio.

ASSOCIATE MEMBERS.

Maher, John, Asst. Div. Eng., B. & O. R. R., Flora, Ill.

GUESTS.

DeWitt, Elmer, Penna. Steel Co., New York.
Currier, A. M., Office Eng., Cleveland Short Line Ry., Cleveland, Ohio.
McConnell, E., Roadmaster, A., T. & S. F. Ry., Marceline, Mo.
Baird, W. W., Roadmaster, A., T. & S. F. Ry., Marceline, Mo.
Grant, E. W., Asst. Eng. A., T. & S. F. Ry., Topeka, Kan.
Workman, Franz, Eng., B. M. Process, New York, N. Y.
Clough, A. M., Supr. Mach., N. Y. C. & H. R. R. R., Batavia, N. Y.
Cherrington, Frank, Cincinnati Wood Preserving Co., Cincinnati, Ohio.
Galloway, C. W., Gen. Supt., B. & O. S. W. R. R., Cincinnati, Ohio.
Kloss, H. E., Asst. Div. Eng., Grafton, W. Va.
Curry, G. M., Vandalia R. R., St. Louis, Mo.
Currier, A. M., Off. Eng., C., S. L. Ry., Cleveland, Ohio.

THE STORAGE BATTERY IN RAILWAY SERVICE.*

BY L. C. FRITCH,
Chief Engineer Chicago-Great Western.

THE LEAD CELL.

Until quite recently the only type of cell that has been extensively adopted in commercial service of all kinds is the lead cell. This cell consists of two lead plates or two groups of such plates which constitute, respectively, the positive and negative electrodes, immersed in a solution of dilute sulphuric acid. Each plate consists of a metallic support, or grid, which acts as a support for the active material, and at the same time serves to conduct the electric current to the point where connection is made to the external circuit. The active material of the positive plate, when fully charged, consists of lead peroxide represented by the symbol PbO_2. This lead peroxide in a healthy cell has a dark chocolate brown color. The active material of the negative plate in a fully charged cell is spongy metallic lead, and is slate gray in color. During discharge the peroxide is reduced to a lower state of oxidization and combines with a portion of the sulphuric acid in the electolyte forming lead sulphate ($PbSO_4$), which, being insoluble, remains on the plate. At the same time the spongy metallic lead of the negative plate becomes oxidized, and also combines with a portion of the sulphuric acid of the electrolyte, forming sulphate of lead on the negative plate. During discharge, therefore, it will be seen that the electrolyte loses some of its sulphuric acid, and becomes weaker. When the cell is recharged the lead sulphate on the two plates is decomposed, the sulphuric acid is restored to the electrolyte, while the active material on the positive plate again becomes lead peroxide, and on the negative plate spongy metallic lead.

The chemical action above described may be expressed in the form of the following equations:

$$PbO_2 + H_2SO_4 = PbSO_4 + H_2O + O \quad (1)$$

$$Pb + H_2SO_4 = PbSO + H_2 \quad (2)$$

$$(1) + (2) = PbO_2 + Pb + 2H_2SO_4 = 2PbSO_4 + 2H_2O \quad (3)$$

Equation (1) represents the reactions which take place at the positive plate, and equation (2) at the negative plate during charge, and equation (3) the combined effect or fundamental equation of the storage battery and is the reaction which takes place on discharge.

THEORY OF CHEMICAL REACTION OF EDISON CELL.

Starting with oxide of iron in the negative electrode, green nickel hydrate in the positive electrode and potassium hydrate in the electrolyte, the first charging of a cell reduces the iron oxide to metallic iron while converting the nickel hydrate to a very high nickel oxide, black in color.

On discharge, the metallic iron is converted back to iron oxide and the high nickel oxide to a lower oxide, but not to its original form of green hydrate.

In every cycle thereafter the negative active material charges to metallic iron and discharges to iron oxide, while the positive active material charges to a high nickel oxide and discharges to a lower oxide.

Current passing in the direction of charge or discharge decomposes the potassium hydrate of the electrolyte, and the oxidation and reductions at the electrodes are brought about by the action of its elements. An amount of potassium hydrate equal to that decomposed is always reformed at one of the electrodes by a secondary chemical reaction, and as a result none of it is lost and its density remains constant.

The result of charging, therefore, is the transference of oxygen from the negative to the positive electrode and a discharging of a transference back again of oxygen from the positive to the negative electrode.

A description of the component parts of the Edison Batteries follows:

*From a paper published in Bulletin 145 of the American Railway Engineering Association, March, 1912.

The positive plate consists of one or more perforated steel tubes, nickel plated, filled with alternate layers of nickel hydroxide, and pure metallic in thin flakes which form the active material.

The tube is drawn from a perforated steel ribbon, and has a spiral lapped seam. After being filled with the active material, the tube is reinforced with eight steel bands equally spaced to prevent expansion and breaking of contact of tube with its contents.

The negative plate consists of a grid of cold-rolled steel, nickel plated, holding a number of rectangular pockets of perforated steel, also nickel plated, which contains powdered iron oxide, the active material. After the pockets are filled they are inserted in the grid and compressed between dies, corrugating the surface of the pockets, and forcing them into integral contact with the grid.

The electrolyte consists of a 21 per cent solution of potash in distilled water, added to which is a small per cent lithia.

SIGNALING.

In signal service the storage battery has, in many situations, supplanted the primary battery. It is generally found less expensive to maintain, and it also offers other advantages over the primary cell, such as low internal resistance, uniform voltage and large output for intermittent service, such as the operation of motor-driven signals. In some cases portable batteries are employed for this purpose, which are collected at regular intervals for charging at some convenient charging point, a certain number of spare batteries being provided for service while the discharged cells are being charged. In other systems the batteries are charged without removal by a charging circuit which extends along the right-of-way, into which the cells may be connected in series. Duplicate batteries are installed, one of which is connected to the charging circuit, while the other is supplying the current to the signals. In some cases the storage cells are connected in parallel with a sufficient number of primary cells of the "gravity" type. These primary cells supply a small amount of current continuously, sufficient to keep the storage cells fully charged, while the storage cells, on account of their low internal resistance, furnish the high momentary current demands for operating the signals.

DRAWBRIDGE OPERATION.

The introduction of storage batteries for supplying current for operating motor-driven drawbridges has been quite general of recent years. The battery in this service has two important functions. The first is to provide an absolutely reliable source of current which is not subject to interruption. Accidents which have occurred, due to failure of power while a large vessel, under considerable headway, is approaching a partially opened drawbridge, have shown the necessity for such an auxiliary supply of current. The second function is to provide, by means of a small continuous current supply, for the heavy intermittent service required. The 24-hour average demand of the drawbridge is usually very small as compared with the momentary maximum demand. By the installation of a storage battery, the primary source of current, which may be a dynamo driven by a gasoline engine, or a motor generator set operated by alternating current supplied from a distance, may be only sufficient for the average requirements, and for charging the battery at its normal rate. On discharge, the battery may be called upon for an output up to eight times its normal rate, or under certain conditions for even greater discharge rates.

J. G. Shillinger, engineer of maintenance of way of the Cleveland-Indianapolis division of the Cleveland, Cincinnati, Chicago & St. Louis at Galion, O., has been appointed chief engineer of the Rutland Railroad, with office at Rutland, Vt., succeeding J. C. Irwin, resigned, effective April 1.

At the Coliseum

ATTENDANCE AT THE EXHIBIT.

The Engineering Association finished its third day's work in one session yesterday, and adjourned about noon,—the earliest hour in several years. An unusually large number of the members took advantage of this chance to visit the exhibits during the afternoon.

A noticeable characteristic of the interest of railway men in the exhibits this year is that it is much more definite than in previous years. Men come this year to see some one thing in particular first, and then take in the other exhibits. The exhibition is really more than annual. It is perennial. This fact has led visitors to make plans in advance as to what they may want to see, and to look for these things. The custom a good many supply men have of getting the same location each year helps to make exhibits easy to find; and the many lines of railway work represented by the visitors makes it practically certain that each one of the spaces is visited first by somebody.

The general opinion among exhibitors seems to be that the exhibition is the best yet, and that they have profited greatly by the publicity connected with it. The attendance, including as it does such a large number of representative railway officers in engineering and executive positions, has made up in quality, perhaps, what it lacks in quantity, though it was better yesterday than the day before when the blizzard kept so many away. The interest was well divided between the Armory and the Coliseum. The many signs and guides to the Armory helped greatly to direct the crowds toward it.

Last night was "popular night" at the Coliseum. There were more people in attendance who are not directly connected with railway work than at any previous time. That they were interested was shown, however, by the pleasure they found in looking over the exhibits.

FIRE-RESISTING PAINT.

The increased number of fires on bridges and trestles, resulting from the operation of the self-dumping ash-pan law, has convinced most roads that some form of protection is necessary. Tests of the paint made by the Clapp Fire-Resisting Paint Company, Bridgeport, Conn., have been noted heretofore in the Railway Age Gazette. While this paint has been in use on certain eastern roads for several years, it is only during the last year that it has been tried experimentally by some western roads, including the Illinois Central, the Chicago, Burlington & Quincy and the Chicago Great Western. The Canadian Pacific, which had been experimenting for some time, is now applying this paint to many of its bridges. An instance of its use on buildings is a switchman's shanty in one of the freight yards in Chicago. Before being painted with this paint, the roof of this shanty caught fire from locomotive cinders about every six weeks, but there has been no fire since the application of the Clapp paint several months ago.

THE USE OF SHEET METAL FOR RAILWAY PURPOSES.

One of the factors, if not the main factor, that have prevented the extensive use of steel and iron sheets for railway work, is the tendency developed by users other than railways, and catered to by the mills themselves, to cut down first cost by the use of gages lighter than the requirements really demanded. This tendency has in the past few years been so general and so excessive that the sheet metal industry has lost a great deal of ground and substitutes have been sought. Some of the manufacturers of open hearth steel sheets came to the conclusion that all metal

products should be rolled full weight to United States standard gages. Among these is the Stark Rolling Mill Company of Canton, O., makers of Toncan metal sheets, who do not vary from this rule. This has had much to do with the success of their corrugated culverts made of Toncan metal, now used by many leading railway systems. The gage is full standard; the heavier gages are recommended; the galvanized coating is pure and heavy, standing the four-dip copper sulphate test in all cases. These basic conditions, coupled with care in making up the culverts, whether nestable or round riveted, make them satisfactory for use in compliance with rigid requirements. The material is used not only for culverts, but for roofing, siding, eaves troughs, conductor pipes, ventilators, skylights, etc.

STEEL WATER TANKS.

The accompanying photograph shows a steel tank and tower of 100,000 gals. capacity above the 30-ft. line, built by the Des Moines Bridge & Iron Company, Pittsburgh, Pa., for the Northern Pacific at Zero, Mont., where extremely low temperatures continue for many consecutive days.

Among other features of this design are the proportions of the tank, the diameter being relatively large, usually exceeding the depth about 30 per cent. The segmental bottom has a very short radius of curvature, and, consequently, low bursting stress. The tank bottom has a decided slope, very pronounced even at the riser-pipe opening,



Tank at Zero, Mont.; Northern Pacific.

and the tank, therefore, is self-cleaning for ordinary conditions. For water carrying large quantities of silt, the lower portion of the bottom is built in the shape of a cone having a slope of one to one, making the tank surely self-cleaning. A simple and effective blow-off valve is provided so that all sediment may be removed while the tank continues in service.

For structures of this type the riser-pipe is usually a riveted steel cylinder of large diameter, making wood frost casing unnecessary. It also serves as a sedimentation basin, and, when used, the blow-off valve is located in its bottom. The riser-pipe has an expansion-joint connection to the tank bottom so that no undesirable stresses will be induced in the structure as a result of unequal expansion or contraction due to temperature changes or uneven settlement of the foundations. Another feature is that all surfaces are accessible for inspection and painting. With ordinary care these tanks should last indefinitely.

FAIRBANKS-MORSE ELECTRIC TURNTABLE TRACTOR.

Fairbanks, Morse & Co. have on exhibition at the Coliseum an electric turntable tractor.

This tractor is claimed by the manufacturers to be as simple and "fool proof" a piece of mechanism as it is possible to install for this purpose, with no more parts than



Fairbanks-Morse Electric Turntable Tractor Installation; Michigan Central, Windsor, Ont.

is necessary, yet everything accessible for easy adjustment or replacement, and built for the particularly heavy duty to which it must of necessity be subjected. The outfit is of the three point bearing type, being fastened to the turntable at two points by heavy forged strap hinges, the third point being the tractor wheel resting on the pit rail.

The tractor frame is of the "A" type, of heavy construction and well gussetted. A compartment for ballast to increase the adhesion of the outfit to the rail forms a part of the tractor frame. The tractor is made so that the floor of the cab is on a level with the base of the engine rail. This feature is departed from only when the pit is extremely shallow and insufficient head room will not be left below the floor for the reception of the mechanism.

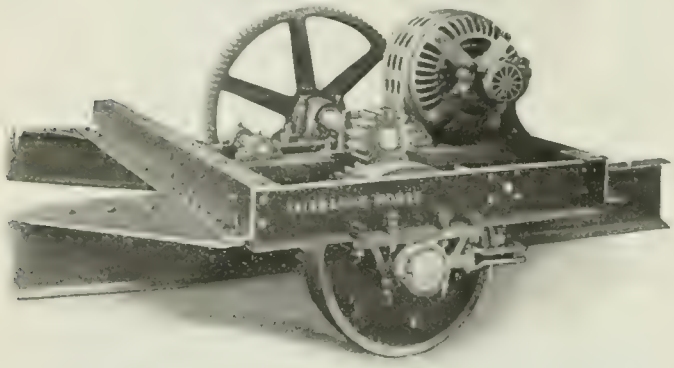
A noticeable feature is the fact that the main driving gear transmits the power to the tractor wheel by being bolted direct to the tractor wheel by six turned studs in reamed holes, and not by being keyed to the tractor wheel shaft and driving through these keys. The tractor wheel has a chilled tread and the braking effect is obtained by means of two brake shoes placed on opposite sides of this tractor wheel, bearing on the tread and putting the braking effect where it is most needed and not braking through gears and keys.

A sanding device is arranged so as to apply sand to the pit rail on either side of the tractor wheel, dependent, of course, on the direction of the turntable.

A cabin, which is shipped in five pieces ready for immediate erection, is furnished with each outfit. This is fitted with four windows, three of which are sliding, and a swing door.

The cabin is bolted together with long tie rods and held to the operating floor by means of vertical tie rods extending from the roof timbers through the steel floor support.

The mechanism under the operating floor is enclosed with galvanized steel panels with covered hand holes for easy access to oil bearings. These panels are fitted with



Fairbanks-Morse Electric Turntable Tractor.

an improved method for easy removal so that the mechanism can be exposed on all four sides without the use of tools.

BOSTON & MAINE WATER TOWER.

One of the tallest water towers ever built is that recently constructed for the Boston & Maine on the Cunard docks at Boston, Mass. This tank, which has a capacity of 100,000 gals., is 239 ft. high to the maximum water line and 200 ft. high to the lowest point of the tank bottom. The object of



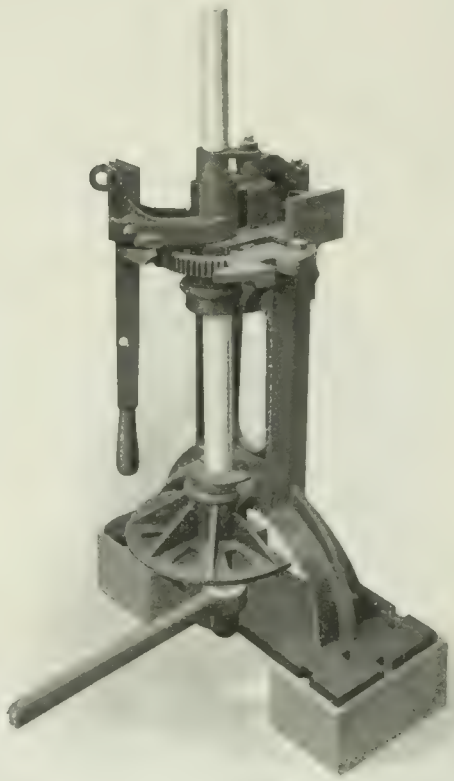
Boston & Maine Water Tower.

building a structure of such height was to protect the large nearby elevators from fire. The tower was designed for a wind pressure of 30 lbs. per sq. ft. over one-half of the diametral plate of the tank, with a load of 200 lbs. per vertical ft. of tower. The structure was designed and built by the Chicago Bridge & Iron Works, Chicago, in accordance with their standard practice.

A NEW ADJUSTABLE SWITCH STAND.

A large number of devices of various kinds have been used in the last ten years for adjusting the points of split switches. These devices have been of many forms, although most of them applied to the head rod of the switch. The screw, the eccentric, the wedge, the sawtooth, staggered holes, etc., have all had their turn, and they have all been open to more or less criticism. Recently there has developed a tendency to make switches with the rods rigid and with a fixed throw and do the necessary adjusting in the switch stand itself. Several stands possessing this adjustable feature have been designed.

The accompanying cut shows a stand of this type in which the table is made in two segments so arranged that they may be moved and fixed in any position to vary the throw of the switch. The principle, and in fact the device itself, is simple, and can be used with any stand, either high or low, of the ordinary revolving or circular throw type. In the ordinary stand of this type, the throw is fixed by the length of the



Adjustable Switch Stand.

crank, and the handle operating the mast and crank is in nearly all cases moved through an arc of 90 deg.

In the new adjustable stand, the throw is varied by changing the position of the adjustable segments, as each segment carries a locking notch for the handle. By varying the position of the notches, the throw of the crank is varied from 90 deg., or its greatest throw, to about 60 deg., its minimum. In actual practice, a variation in throw of two inches is obtained. Not only is the throw of the stand variable, but by moving either one or both of the two notched segments either switch point can be adjusted independently of the other.

The targets and lamp top are carried on a mast in the center of the stand, but independently of the crank, and are operated automatically with the movement of the handle by an enclosed spring between two fixed abutments, so that no matter what arc the handle and crank move through, the targets and lamp always revolve exactly the required 90 deg.

Another interesting feature in connection with this stand

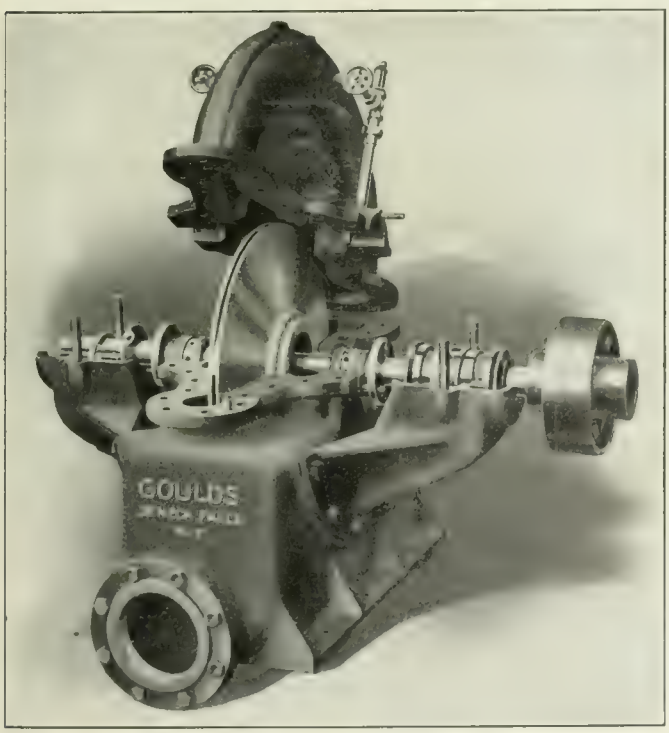
is the arrangement of the crank and the connecting rod. The crank is of the ordinary upturned type, and a special semi-circular wing-shaped casting which forms part of the lower journal of the mast fits closely over the top of the crank, preventing the connecting rod from encountering any chance misplacement, as at no period of the throw can the rod become disengaged. To install and connect up to the switch, the "U" bolt holding the protecting casting is removed and then replaced after the connecting rod has been slipped on to the upturned crank.

This stand has just been placed on the market by the Morden Frog and Crossing Works, Chicago, and is being shown and demonstrated at their booth in the First Regiment Armory.

CENTRIFUGAL PUMPS.

The Goulds Manufacturing Company, Senaca Falls, N. Y., has recently placed on the market an entirely new line of centrifugal pumps. These pumps are furnished in both the single-stage, single-suction and the single-stage, double-suction types. Either type may be arranged for belt drive or direct connection to electric motor, gas, gasolene or steam engines, steam or hydraulic turbines. These pumps are especially suitable for railway tank pumping, and general water supply where the elevations do not exceed 150 ft. They are also used in circulating hot water in heating systems, pumping water for condenser service and other similar services in the power plant or shops.

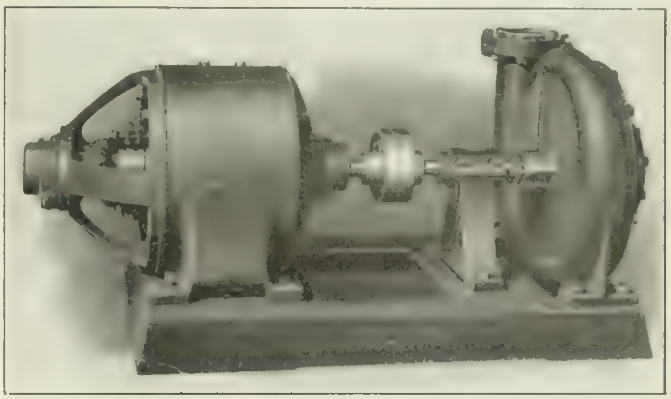
The impeller in the single-suction pump is of the open type and the clearances between the impeller and the side



Goulds Double Suction Pump.

covers are reduced as much as possible. This latter feature has considerable influence upon the efficiency which is obtained with this type of pump. Although of the single-suction type, which in most cases means considerable end thrust, the impeller is so designed as to minimize this annoying feature. The stuffing box, through which the shaft passes, has a brass water sealing ring which prevents air being drawn into the pump at this point. Air will destroy the vacuum in a pump and impair suction.

The casting proper of the single-stage, double-suction centrifugal pumps consists of two castings bolted together on a horizontal joint. The purpose of dividing the castings is to permit quick and ready access to the interior parts of the pump for inspection, without disturbing the pipe connec-



Goulds Single Suction Pump.

tions. The impeller is of the enclosed type, developing high efficiency under conditions for which the pump is sold. The bearings are of the ring-oiling type, independent of the stuffing boxes and are provided with removable shells lined with anti-friction metal.

CHEMICAL WEED DESTROYER AND TRACK PRESERVATIVE.

Weeding ballast in Porto Rico involves considerable expenditure. The season of heavy sugar traffic extends from December until August and during that time three months of the dry season and three months of the rainy season are experienced. The ballast generally used consists mainly of coral rock and sand. Vegetation is always present during all seasons, but is especially heavy in the rainy weather. To eliminate this vegetation, from five to eight constant hand-weeding operations are required annually. Labor for this class of work can be obtained for 50 cents a day and the estimated expenditure per mile per year is $70.

The Atlas A chemical weed destroyer and track preservative, made by the Atlas Preservative Company of America, New York, was used for a season on one of the Porto Rican railways. A representative of the Atlas company was sent out to study the conditions and see if the economies of the chemical treatment warranted further activity in that field. It was found that three chemical treatments in the first year and one treatment each succeeding year would be sufficient to eradicate the entire growth. This would mean an expenditure in the first year of about 10 per cent more than the previous annual cost and a saving in each future year of from 50 to 60 per cent. These figures are based on labor at 50 cents a day, as against over $1.00 a day in the United States.

In the United States, wherever the growing season does not exceed seven months, one treatment a year with progressively weaker strengths is sufficient. Comparing the conditions of vegetation in the tropics with those in the United States, the benefit in economies effected is much in favor of the United States if the chemical treatment is made, and much in favor of the tropics if hand weeding is resorted to. This statement is strengthened by the fact that vegetation is much more vigorous and reappears more quickly in a climate where the growing is confined to the summer months. In the spring growing in the United States, hand weeding could be accomplished each three weeks, but in the tropics, each six weeks would be sufficient to keep a track clear.

INTERIOR HARBORS AS MEANS OF PROVIDING ECONOMICAL TERMINALS AND PREVENTING CONGESTION.

There has been a marked tendency during the last ten years toward the development and extension of interior harbors, not only in the United States but throughout the world. Experience, it is contended by their advocates, has shown that interior harbors prevent congestion and supply economical sites for industries and railway terminals, and that it is becoming apparent that the greatest commercial, industrial and manufacturing cities have internal harbors and that cities



Scherzer Rolling Lift Bridge for C., L. S. & E. at Indiana Harbor, Ind.

with outer harbors only become congested and remain comparatively small.

On the Great Lakes important inner harbor improvements have been made at Buffalo, where the Buffalo river has been widened, deepened, straightened and extended farther inland. At Cleveland the Cuyahoga river has been straightened and most of the obstructive center pier swing bridges have been removed and replaced by modern bascule bridges. At Chicago progress has been made in this same direction by the building of the Sanitary ship canal, forming an extension of the inner harbor of Chicago. At Milwaukee and Duluth similar deepening, straightening and improving of the rivers has been going on.

In all of these cities the improvement of the inner harbors has resulted in a great increase in industrial development and population and consequent increase of railway traffic. The building of the East Chicago canal has been the most recent progressive enterprise in the development of the inner harbor system. The success of the East Chicago canal in creating and developing a great industrial center within a few years demonstrates the soundness of the inner harbor in principle and its great usefulness for economical, industrial and transportation development.

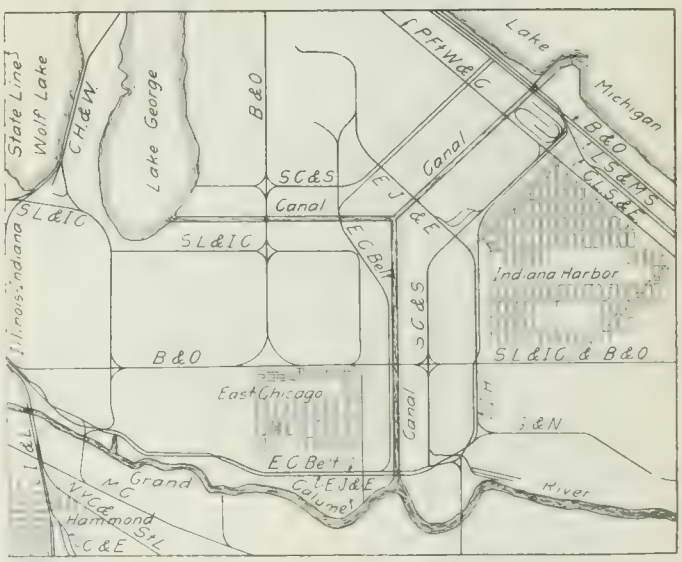
A glance at the accompanying map of the East Chicago canal shows that, in form, it is an artificial duplicate of the main Chicago river, with its north and south branches, thereby providing the railways and industries in the vicinity of East Chicago with the advantages of lake terminal facilities without the expense and congestion connected with outer harbors. The canal has opened up large areas of land for industrial development which without it would have remained of comparatively slight value.

The building of this interior harbor is regarded by those favoring interior harbors as an especially progressive step in view of the fact that nearly all the leading railways entering Chicago from the East cross this canal, and by private negotiations agreed to the construction of movable bridges. The slight inconvenience of a modern movable bridge became insignificant when considered in relation to the great industrial and traffic expansion resulting from the construction of the canal.

The East Chicago canal will connect up with the Grand Calumet river and also the sag Calumet channel of the Sanitary District of Chicago, thus affording a further extension of the interior harbor system and opening up new territory to industrial and transportation development, all of which will be needed because this territory is rapidly becoming the most economical steel making and distributing center in the world, making capital investments within this territory very safe and productive.

This vast interior harbor and traffic development is secured at a comparatively small cost in so far as bridges to cross the navigable channels are concerned. In fact one hundred modern movable bridges can be constructed and maintained for the capital cost involved in the building of a single Brooklyn bridge at New York, because the Brooklyn bridges are elevated 150 ft. above the surface of the water, whereas the draw bridges at Chicago are constructed virtually at grade. In other words, by means of modern movable bridges the industrial and commercial districts around Chicago obtain all the economic advantages of a great interior harbor system at a comparatively small capital investment.

The Scherzer rolling lift bridge has been of valuable assistance in this industrial and transportation development. One double-track Scherzer rolling lift bridge has been already constructed for the Lake Shore & Michigan Southern,



Relation of East Chicago Canal to Railway and Industrial Development.

and another double-track bridge for the Chicago, Lake Shore & Eastern near the entrance to the East Chicago canal. Another Scherzer rolling lift bridge is under construction for the Elgin, Joliet & Eastern. One has recently been completed and carries the electric railway and highway traffic across the channel at Hammond, and two additional bridges of the Scherzer type are now being constructed to carry highways and the Chicago, Lake Shore & South Bend lines across the canal at East Chicago. The photograph herewith showing the Chicago, Lake Shore & Eastern's bridge is, in general, typical of these modern movable bridges.

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BECAUSE of the severity of the past winter more than ordinary interest attaches to the performance of the American Locomotive Company's experimental Pacific type locomotive, No. 50,000, which is now in passenger service on the Erie, and which was described in the *Railway Age Gazette* of December 29, 1911. From November 17 to February 25 schedule speed was maintained for 96 per cent. of the time, or for 163 out of 170 runs. During November and December the locomotive made daily round trips between Jersey City and Port Jervis, 89 miles each way, and early in January the run was extended through to Susquehanna from Jersey City, 193 miles, allowing a lay-over of only 1½ hours at the western terminal. These two divisions have a number of heavy grades and sharp curves; for instance, the profile over the Susquehanna hill on the Delaware division shows a rise of 373 ft. in 6 miles, an average of 1.18 per cent., the grade varying from 0.96 per cent. for 1,000 ft. to 1.47 per cent. for 300 ft. For four months the train frequently pulled as many as 11 or 12 cars and averaged 9. In 170 runs 1,379 minutes were made up, or an average of 8 minutes per trip. On only seven runs was any time lost by the locomotive which was not more than made up before the terminal was reached. In each of these cases the delays were such that the locomotive could not be held entirely responsible. During the coldest days in January, from the 5th to the 8th, 120 minutes were made up in eight runs, or an average of 15 minutes per trip between Jersey City and Susquehanna. In the coldest weather in February, from the 5th to the 10th, the schedule time was bettered by an average of 10 minutes for each of 12 runs. The schedule from Jersey City to Susquehanna is 35 miles an hour, including frequent stops, and the rule of the road, which is rigidly enforced, limits the speed to 60 miles an hour. The experimental locomotive has thus indicated its ability to meet the requirements of heavy fast passenger service, with a good margin for exceptional requirements. This performance is all the more remarkable when the low weight of the locomotive, compared with the ordinary Pacific type, is considered. Tests have shown that the experimental locomotive can develop in actual service 1 h. p. for each 121.4 lbs. of total weight, which indicates that it is approximately 25 per cent. more efficient than the average locomotive of this type. This surprising result has been obtained by taking advantage of the most approved developments in locomotive design, by carefully proportioning the details and by using the best grade of materials. The weight thus saved was used in providing a boiler of large capacity, thus giving the locomotive more "lungs," or greater ability to operate under sustained heavy service. It is hoped that the results of dynamometer tests which were made during February will soon be available for publication.

THE old railway commission of Connecticut which went out of existence a few months ago was one of feeble personal abilities, political in character and untrained in its work. It has been succeeded by a public utilities commission which, while technically untrained, is a body of better personnel and, under the new state law, is prohibited from political work. The commission has just rendered a decision of much significance to steam railway companies owning large street railway systems. The question involved was the lowering, as asked for by a public petition, of the fare between Hartford and Manchester—about 10 miles—from 15 to 10 cents. The commission ruled that in fixing such a fare, while local conditions must be considered, original cost, as well as later capitalization, is not to be the test, but *present* cost of reproduction; and, although to some extent it segregates the property in making its decision not to reduce the fare, it emphasizes an opposite view, saying: "That the income of any particular line or branch of a street railway, which may be operated at a large profit to the company and helps to maintain the unprofitable lines, should be reduced to a bare reasonable income would, in our opinion, work a general hardship to the state, would minimize the investment of capital in street railway operation, and would retard the development of rural districts which depend so largely on street railway facilities." The commission cites a Canadian telephone decision to uphold its opinion. It means, from the commission's viewpoint, that, in adjusting local fares upon one of the component parts of a large street railway system, that system must be taken into account as a whole; that, for example, the part must bear its share of the costs of general management, and, presumably, the financial condition of the owning corporation be considered. That such an adjustment of a general situation to a local one may be difficult does not affect the principle. The bearing of such a finding in a New England state, where street railways have been excessively capitalized, on steam railway investments in street railways—like those of the New Haven, the New York Central, the Delaware & Hudson and the Southern Pacific—is obvious.

THE EASTERN ENGINEMEN'S DEMANDS.

NEGOTIATIONS between the enginemen and the managers of the eastern railways came to an end, for the present, when the managers announced, last Monday, their decision not to grant the request of the enginemen for increased pay and offered no alternative proposal. It would seem that the burden now rests on the enginemen to show that it would be to the best interest of the country that wages and conditions of service be standardized and on such a scale as will result in increased wages. To do this they must disprove what seems to be a strong case on the part of the managers. The latter say that the enginemen's demands would make the railways pay enginemen in eastern territory some $7,500,000, or 18.6 per cent., more than at present, and for the same service now being rendered. Less than two years ago the pay of the enginemen was increased 10.7 per cent., and the managers contend that since that time there has been no substantial change in the conditions of service. The inconsistencies in a standard scale in a territory where the conditions of operation vary so widely as in the East are so easily understood that the public should require a pretty full explanation as to why the enginemen feel justified in asking it.

The most vital of the managers' reasons for refusal is that they cannot afford it. The advances in 1910 were made in expectation of the much needed advance in freight rates which the Interstate Commerce Commission declined to allow, and enforced reductions of rates have been more or less continuous since that time. Can the public consistently feel that it is right for the railways to pay more for the same service, but that it is not right for the shippers to pay the railways more for the same service? It should remember that in the settlement of the railway strike in England last fall the government assured the railways that legislation would be introduced to the effect that, in future, an increase in the cost of labor is to be considered a valid justification for a reasonable general increase in freight rates. It must consider also that recent legislation has made railways spend money for which their stockholders receive no return, and for which the public at large receives no return; but certain of the employees do get some of this additional money, and without giving additional service. And it should be remembered also that the federal employees' compensation bill, now pending, provides that the cost of complying with the law be charged to operating expenses.

The case for the enginemen, as so far brought out, does not rest on such substantial grounds. They say they are entitled to more money, because they are not paid as much as western enginemen; because advances in enginemen's wages have not kept pace with advances of wages in other classes of railway labor (so that in some cases the conductor is paid more than the engineman); and because their wages have not been advanced commensurately with the increased work and responsibility required in handling heavy locomotives. It may properly be asked why a man should not be paid what he is worth without regard to what someone else is paid for doing an entirely different kind of work, particularly when it is, to say the least, a question whether the other man deserves the pay he is getting. It is, indeed, in accordance with precedent to recognize "the custom of the trade" and admit that an engineman should be paid more than the conductor of his train, but the representatives of the enginemen have not given the specific instances in which they say the reverse is true; and it is believed that these exceptions are so few that they should be dealt with by themselves and not considered in connection with the main question. As to the increased labor and responsibility of enginemen, evidence is needed to show the extent of this. Finally, the public should know whether or not there is any general dissatisfaction among the rank and file with their wages and conditions of service, or whether this movement is primarily one starting from the top and not from the bottom, and is really a matter of inter and intra-union policy rather than anything which affects favorably or adversely the well-being of the general public.

THE INTERESTS REPRESENTED ON THE ORIENT PROTECTIVE COMMITTEE.

A STUDY of the personnel of the bondholders' committee of the Kansas City, Mexico & Orient may well lead to certain speculations as to the road's future which are at least tenable as theories. Lord Monson and a good many of the other members of the committee are quite evidently representatives of English bondholders. There are, however, five men on the committee who are capable, at least, of representing American railways that are strongly interested in the future of the K. C., M. & O. There are three roads—the Wabash, the Chicago & Alton and the Chicago Great Western—which serve the territory north and northeast of Kansas City and which are in a sense bottled up at Kansas City in respect to traffic originating southwest of there. The Chicago, Burlington & Quincy reaches Kansas City, and its Colorado & Southern line crosses the Kansas City, Mexico & Orient not far from the Red river in Texas. The Southern Pacific will have three connections with the K. C., M. & O.—two in Texas and one on its lines in the west coast country of Mexico.

Any one of these five railways would probably find the Orient, when it is completed, a very useful subsidiary. The Southern Pacific could use it as an alternative line for traffic which it now turns over to the Rock Island at El Paso; to the Burlington it would give a line which could be used as supplemental to the Colorado & Southern; and to any one of the other three roads it would give a very valuable connection with Mexico.

It has been pointed out before that when the K. C. M. & O. is completed it will form the shortest line from Kansas City to the Pacific coast. Its traffic possibilities, however, are far more important than would be suggested simply by this fact. With a connection with the National Railways of Mexico at Eagle Pass, west of Laredo, the K. C., M. & O. will form the shortest line between Chicago and the city of Mexico. The entire country of Mexico will naturally be tributary to its lines on traffic moving to or from Chicago and the lakes; the west coast lines of the Southern Pacific will probably naturally interchange traffic from or to its territory destined to or bound from Chicago and the lakes. Traffic which the National Railways of Mexico now takes to El Paso, and which the Southern Pacific, the Santa Fe and the Rock Island all compete for, could be sent by the shorter route to Eagle Pass and there be divided simply between the Southern Pacific and the Orient.

It is claimed that there are extensive coal fields not far northwest of Topolobampo on the proposed line of the Orient; and since steamers from Liverpool bound for Honk Kong via the Panama canal will pass as close in to Topolobampo as possible to get the short sailing route, vessels may be expected quite naturally to make that town a port of call. Since Topolobampo is more nearly half way betwen Liverpool and Hong Kong than is the isthmus of Panama, if coal can be taken on at Topolobampo it will be a considerable advantage for vessels to coal here rather than at the isthmus. Considerably the shortest route between the Hawaiian islands and Chicago will be by way of the Orient to Topolobampo; and, since this is a Mexican city, foreign vessels may be loaded here for a point on the Pacific coast or for the Hawaiian islands, while from San Francisco and Portland only American vessels can be used.

From this cursory mention of the traffic possibilities of the completed K. C. M. & O. it is very easy to understand why banking interests and railway interests were opposed to Mr. Stilwell's control of an independent line such as the K. C. M. & O., and it is also easy to understand why the various railway interests mentioned should be greatly interested in the plan of reorganization of the company and probably represented on the bondholders' protective committee.

There have been rumors that Mr. Stilwell has resigned from the presidency of the company. The road, since it is in the hands of receivers, is being managed under the direction of the court. The presidency of a company in the hands of a receiver means very little unless the man who holds it also represents

the interests of large holders of securities of the company. Mr. Stilwell has not resigned as president of the company, but since the protective committee represents the interests of the bondholders, and a committee of which Mr. Stilwell is not a member represents the interests of the construction company, as a matter of fact the management of the road and the plans for reorganization of the company are not in Mr. Stilwell's hands.

STATE INTERFERENCE WITH INTERSTATE COMMISSION.

THE report of the Interstate Commerce Commission in the proceeding brought by the Railroad Commission of Louisiana to secure reductions in the freight rates from Shreveport, La., to points in eastern Texas raises very interesting questions both of law and public policy. The complaint alleged that the interstate rates westward into eastern Texas were too high as compared with the state rates eastward from Dallas to the same territory, and, therefore, were unfairly discriminatory against interstate commerce. The railways showed that the rates from Dallas had been prescribed by the Texas commission in pursuance of a policy of trying to secure a monopoly of Texas markets for Texas shippers, and that if the roads had so adjusted the rates from Shreveport as to put its business men on a parity with those of Dallas the Texas commission probably would have further reduced the rates from Dallas. The testimony also showed that the railway men did not concede that the rates fixed by the Texas commission were reasonable, but accepted them because they feared if they carried them into the courts the Texas commission would find means of punishing them for doing so.

The majority opinion of the Interstate Commerce Commission rendered by Commissioner Lane, and concurred in by Chairman Prouty and Commissioners Clark and Meyer, holds that the adjustment of rates works an unfair discrimination in favor of state and against interstate commerce; condemns the policy of the Texas commission, but holds that the railways knew when they accepted the rates prescribed by the Texas commission that they owed the same duty to interstate as to state commerce; and that, as they accepted the state rates, the interstate commission has the power and duty of compelling them to make proportionate rates on interstate traffic. The roads were, therefore, ordered to reduce the rates from Shreveport. Commissioners Clements, Harlan and McChord vigorously dissented on the ground that by making this order the commission exceeded its lawful powers.

In considering the legality of the commission's order, it should be remembered that the power of Congress and that of the commission over commerce are two entirely different things. Congress derives its power from the commerce clause of the federal constitution, and its authority is so far paramount and exclusive that it may adopt any measure necessary to prevent interference with or burdening of interstate commerce by the states; indeed, the states cannot constitutionally burden or interfere with such commerce, even though they would not by doing so interfere with any regulation adopted by Congress. On the other hand, the Interstate Commerce Commission derives all of its powers from legislation passed by Congress, and any authority this legislation has not expressly or by direct implication conferred has not been conferred at all.

There is no question that the commission is given full power to regulate and prevent unfair discrimination in *interstate* commerce. But where in the law is to be found the provision which expressly or by direct implication authorizes it to regulate and prevent unfair discrimination between interstate and state commerce? There is no such provision. The railways are subject to regulation by both state commissions and the interstate commission. Where is to be found the provision which expressly or by direct implication authorizes the interstate commission to punish railways by reducing their interstate rates for obeying the mandates of state commissions in regard to state rates? There is no such provision. There is, however, a provision which shows clearly that Congress never intended to confer any such power, This is found in the first section, and reads as follows: "Provided, however, that the provisions of this act shall not apply to the transportation of passengers or property, or to the receiving, delivering, storage or handling of property wholly with one state." Commissioner Lane elaborately proves that the federal government has paramount authority over commerce, and then concludes that the Interstate Commerce Commission also has. But there is a hiatus in this reasoning; because Congress has full and paramount authority does not prove at all that it has delegated all of its power to the Interstate Commerce Commission. The very means that the commission adopted to correct the alleged discrimination is a confession, as Commissioner McChord clearly pointed out, that it has not paramount authority. If it had such authority it might correct the discrimination, as Congress might do, by authority, the action of the Texas commission. But the majority do not pretend they may control rates made by state authorities. Why? Because the act gives the commission no power to do so. Mr. Lane says "that when conditions arise which in the fulfillment of its obligation and the due exercise of its granted power to regulate commerce among the states makes such course necessary the national government must assume its constitutional right to lead." And how does it "lead" in this case? Mr. McChord, in his dissenting opinion, very effectively answers this question. He says:

> "The national government therefore leads by following the judgment of the state government, to whom it says: 'We will adopt not only your present scale of rates, but any lower scale you may see fit to establish. Your judgment has been the standard by which we have measured and fixed the maximum rates from Shreveport. If you desire to make lower rates from Shreveport into Texas you may do so by lowering the Texas scale.' Of course, if in this instance we fix interstate rates by the Texas yardstick, we must fix other interstate rates by other state yardsticks, and may find ourselves incumbered with some forty-eight different rate meters, which will doubtless create a condition 'more absurd and unbearable' than that which the majority opines would arise if the states remain unmolested in the exercise of their legitimate powers."

The situation recalls the story of the man who was telling his neighbor about the dog that ran a coyote to death. "What did the dog do with the coyote after the coyote fell dead?" asked the neighbor. "Oh, he didn't do anything. The dog was ahead."

Not only is there nothing in the law, but there is nothing in the discussions in Congress which preceded the enactment of the provisions giving the commission its present power, to indicate that it was intended to give it the authority that it sought to exercise in the Shreveport case. Five out of the seven present members of the commission are lawyers, and it is perhaps not without significance that three of these five dissented from the majority opinion, while the majority opinion was rendered by two lawyers and two laymen.

As already indicated, however, there is involved in this case an important question of public policy as well as an important question of law. Not only does it seem very improbable that the commission has the particular authority which it seeks to exercise, but it ought not to have it. The theory of the majority is that state commissions may, without legal interference by the Interstate Commerce Commission, prescribe state rates, which may actually be unremunerative, and that the Interstate Commerce Commission may then require the railways either to refuse to obey the state commissions and take the state rates into the courts, or to proportionately reduce their interstate rates. On this theory, if a road refuses to obey the mandate of the state commission it may be subjected to reprisals by the state commission; and if it does obey the state commission it will have its interstate rates reduced, even though the result be to make both its state and interstate rates unduly low; the railway is to be "damned if it does and damned if it doesn't." Under such conditions the railways would have to seek refuge in the courts from both the state and interstate commissions. And we suppose that if they did so and the courts decided in their favor, both the state and interstate commissions would denounce the courts for being pro-railway, just as the Interstate Commerce Commission denounced the Commerce Court in its last annual report.

But, while the law probably is not, and certainly ought not to be, what the majority of the commission contend that it is, there

can be no serious question of the need for such construction of existing laws by the courts, or for the enactment of such new legislation, as will give the interstate commission authority to so supervise state regulation as to prevent interference by state authorities with interstate commerce. The facts brought out in the Shreveport case demonstrate conclusively that the Texas commission has for years consistently pursued the policy of so regulating state rates as to compel the carriers to adjust both their state and interstate rates so as to give the shippers of Texas an undue advantage over shippers outside the state in competing for business in Texas. It has consistently tried to erect what amounts to a protective tariff at the Texas border. The same policy has been followed in other states; notably in Iowa. In many cases, also, reductions in state rates have been ordered when the state traffic involved was trifling and the real purpose was to force reductions in interstate rates. The movement of interstate commerce and its regulation by the interstate commission are seriously interfered with by some of the activities of state legislatures and commissions. Commissioner Harlan, in his dissenting opinion, said:

"The power of the federal government to fix maximum rates on state traffic, even when conducted by an interstate carrier, is therefore a matter of no small doubt. Its power to fix minimum rates on state traffic conducted by an interstate carrier, on the general theory that such traffic ought to contribute ratably to the cost of operating a vehicle of interstate commerce in order not to become a burden upon such commerce, seems to me to be more clear. On the same general theory, I think that Congress in aid, or rather in protection, of interstate commerce may forbid discriminations by a railway or other instrument of interstate traffic in favor of state traffic."

Whatever power in the premises Congress has it ought to exercise or delegate to the Interstate Commerce Commission. Under existing law, even on the interpretation put on it by the majority of the Interstate Commerce Commission, the commission cannot both do justice to the railways and protect interstate commerce against improper interference or unfair discrimination; and it ought to be given the necessary power.

NEW BOOKS.

Railroad Operating Costs. By Suffern & Son, New York. Cloth. 8 in. x 12 in. 82 pages. Price, $2.00.

This book consists of a series of original studies of the operating costs of the leading American railways, which should be of great value to railway men and others whose interest or duty impels the making of comparisons on this important phase of railroading. Prior to 1908 it was almost impossible to make any satisfactory comparison of the operating costs of American railways, principally because of the great variety of accounting methods employed. Now that railway accounts have been standardized and are required to be regularly filed with the Interstate Commerce Commission, the author believes that they may be made to serve an exceedingly useful purpose in leading to an increase in efficiency of operation. The studies in the book are based mainly on the railway's annual reports to the commission, amplified by information obtained from the Census bureau and from various railway officers, in respect to earnings, operating expenses, physical characteristics and operating conditions of the representative roads.

Various chapters of the book discuss in detail facts brought out by the examination of the primary accounts and their relations to each other, and some interesting portions of the book contain criticisms of some recent examples of unusually heavy railway expenditures, such as the Pennsylvania's New York terminal improvements, the Virginian Railway and the New York Central-New Haven electrification, on the ground that they have been constructed without sufficient regard to the possibility of adding enough to earnings to pay for their cost.

The author also criticizes some of the generally used units of railway statistics and urges that the statistical publications of the Interstate Commerce Commission be made to include more extensive abstracts of the information received.

Letters to the Editor.

USEFULNESS OF DEMURRAGE ADJUSTERS.

Hartford, Conn., March 18, 1912.

To the Editor of the Railway Age Gazette:

The proposed establishment of government demurrage bureaus, as noticed on the first page of your last issue, is good news, and it is to be hoped that the law will be passed. Commissioner Lane has taken a very lively interest in this subject—rescuing it from obscurity and neglect—and it is no more than right for Congress to give him the formal approval and encouragement implied in this bill.

I say that this is good news, because demurrage is one of those subjects on which we (merchants) need to record our sentiments in order to know that we have any sentiments; or at least in order to know definitely what our interest is. Being usually a matter of secondary importance we either neglect it entirely—and often to our loss—or else make a kick which is ineffectual because we do not go at it in a business-like way. I was glad therefore, to learn also that trade organizations in 37 eastern cities, from Virginia to Maine, have endorsed the Peters bill. At a meeting of shippers and shippers' representatives, in Washington, D. C., recently the bill was also unanimously approved. There were men at that meeting representing the largest shipping interests in the country; from Chicago, St. Louis, Pittsburgh, Youngstown, Detroit, Philadelphia and New England.

Throughout the eastern states, and wherever the demurrage bureaus have been abandoned, there is a growing discontent in the public mind over the fact that all appeals for adjustment of small but vexatious demurrage penalties must now be made to the railway company which is interested in collecting the charges.

In the south, where all the railways have hung together in demurrage bureaus, and have, to all intents and purposes, turned the bureaus over to their managers with a free hand to supervise the uniform application of the rules under uniform interpretations, approved by the Interstate Commerce Commission, I am informed that there is peace in demurrage matters. In one city, Louisville, I am sure this is true. The bureau there, under the direction of Mr. Loomis, has held an even hand consistently for 20 years. In the north, where the railways have put this penalty-inflicting business, requiring the most delicate diplomacy, into the hands of men who treat it as an adjunct to their principal business of looking after car interchange between railways, there is, as I have said, a growing discontent. One representative of a large iron manufacturer, at the meeting in Washington just referred to, rather bitterly argued that, no matter what changes in the rules may be agreed upon, business men must insist as a *sine qua non* that the railways shall not interpret for themselves the meaning of the rules or the manner of their application. It is in the manner of the application of the rules that discriminatory results appear. That is, the railway car department men may meet ever so often and solemnly agree upon uniform interpretations of the rules, and yet they will go home and apply the rules, or withhold their application, in a way to result in flagrant discrimination.

Some railways were notoriously dishonest in the application of the rules while under the supervision of the demurrage bureaus, and even continued this after the law was amended, in 1906, as proved by prosecutions of record. Is it at all probable that these roads will be honest under the more remote supervision of the Interstate Commerce Commission, and under the same law? As a matter of fact, the roads cannot all agree upon questions of interpretation, to say nothing about questions of application. In short, where there is competition it is very difficult to prove such differences purposeful violations of

the law. Where there is no competition there is an arbitrary, brusque, sometimes discourteous refusal to satisfactorily adjust demurrage claims.

In competitive territory the differences in application of rules slowly, but surely, make for discontent. In non-competitive territory the undiplomatic handling of demurrage claims by railway men interested in the revenue involved causes immediate and fiery protest.

If the railways had been wisely directed they would have, promptly upon the passage of the Hepburn Act, publicly turned over the demurrage bureau organizations to the supervision and direction of the Interstate Commerce Commission. To an outsider it looks as though they ought to be glad of an opportunity thus to relieve themselves of the odium arising from the enforcement of a police measure. C. H. M.

THE CAR INSPECTOR'S IMPORTANT DUTIES.

Wilmington, Del., Feb. 5, 1912.

To the Editor of the Railway Age Gazette:

In your editorial of February 2 you say that the right handling of cars depends on the right spirit in the minds of not only the superintendents and despatchers, but also the conductors and yard masters, and even the brakemen, firemen and "car knockers."

To the latter class I belong, having spent the last twenty-five years of my life in the inspection department in a large classification yard; and I have been trained to be just, not only to the company by which we are employed, but to apply the same rule to all foreign equipment. But I seriously object to the term "car knocker," which you have used on more than one occasion. To my mind it implies contempt for the calling of a car inspector. While we admit that we are not such an important unit as some other railway employees and that we are considered by many simply a necessary evil, yet we are one of the necessary links in the chain of railway progress. By our discovery of defective parts and remedying the same, we are the means of preventing accidents to the equipment, to railway employees and to the traveling public, and we feel that our calling is just as honorable as any other in the railway service.

Our duties compel us to be familiar with the rules for interchange of cars at junction points, and the loading rules, each of which is revised yearly. Some of these would puzzle a lawyer to interpretate, yet a "car knocker" is expected to know their proper meaning. The Federal Safety Appliances Laws have got to be memorized and a car inspector has to know at a glance whether a car is properly equipped, and whether the old law applies or the new one (in effect July 1, 1911). In addition we have to know whether the dimensions of cars or of open loads exceed the clearance dimensions of the tunnels, bridges, stations and platforms, as well as keep a close scrutiny of all parts of cars for defective parts. We must either repair them on the spot or send them to the shops for heavier repairs. We must also familiarize ourselves with the operation of the air brakes, and their diseases, and put them in order whenever possible.

The higher officers of the maintenance of car equipment largely depend on the car inspector and the freight repair yard for knowledge of the causes of failures of the rolling stock, and base many of their improvements on that knowledge.

We are worked long hours, generally twelve per day or night, almost every day in the year; and we have little leisure to improve our intellect or get recreation for our bodies.

The danger of loss of life is as great in our work as among trainmen, and the compensation is about 30 per cent. less; while the amount of knowledge in the way of rules and instructions that we have to familiarize ourselves with is about 200 per cent. more. It takes about five years to educate a dependable car inspector and for a brakeman about one month. Whatever a brakeman thinks he should not do, he manages to have unloaded upon the car inspector. If a car or train gets derailed or wrecked, our duties are to investigate and discover the cause, if possible.

With this information before you, Mr. Editor, I trust that you will not use the term "car knocker" in the future.

A REGULAR READER.

[The editor regrets to have offended "A Regular Reader," and assures him that there was no intention of "knocking" any reader, either regular or occasional; or any railway man, high or low. In making a journey between New York and Wilmington, a passenger generally passes or meets about one or two thousand freight cars, most of them moving at from 15 to 40 miles an hour; and if he has any notion of the construction of freight cars, and of the ease with which a derailed freight car could block his path, he signalizes the safe conclusion of his journey by a mental resolve that in his prayers that night the car inspector shall have prominent mention. The car inspector need have no fear that thoughtful and well informed passengers will forget him.]

LABOR'S CO-OPERATION WITH RAILWAY MANAGEMENT.

Fresno, Cal., February 24, 1912.

To the Editor of the Railway Age Gazette:

In an editorial published in the *Railway Age Gazette* of February 2, 1912, dealing with co-operation between the managements and employees of the railways of the United States, your paper has touched the dominant chord. In fact, it is a matter of vital importance to both sides.

The day has passed when employer and employee are lined up in battle array against one and another. While there are a few more piers to be placed in the chasm that separated the two, it is fast being bridged, and let us hope that the day is not far distant when employee and employer will work hand in hand for the betterment of railway conditions.

The railway employees of today are not the men of yesterday. In fact the major part of them are of families, men whose ambitions are to have homes of their own, be good citizens, and to know that they are not going to be dismissed from the service of the company for some small infraction of the company's rules, but who still realize the vital importance of discipline.

We are all working for one great cause, that is, betterment of conditions, and that can never be accomplished by working on different lines.

It is a fact that petty politicians have ridden into office on the slogan, "Down with the railways," and looked to the employee to assist in boosting them into office. What is the result? Both employees and railways received a beautiful "swat" in the jaw, and the political parasite reaps a rich harvest.

Speaking from the ranks, the employee, by a little personal application, could work wonders in reducing some of the hysterical legislation that is sweeping over the country, and be loyal to his brotherhood, also.

It is no disgrace to support a man at the polls that you know will be fair to a railway company and our organizations also. If the railways are allowed to make a fair return on the money invested, there is no doubt but what we could get our share of the returns.

In my dealing with legislative matters, I always found that I could deal squarely with the organization which I represented and not club the company, either. There were many measures that were introduced in the California legislature, which would be of no benefit to employer or employee, but an actual detriment to both; notably, a measure that was introduced by the representative of some lumber jacks in the northern part of the state. It appears that some small lumber corporation deducted fees from the pay of the men for medical attention which they never received. A bill went to the house to prohibit the deducting of hospital fees from the wages of any working man in the state, which, if he had not been successful in defeating it, the railway employees would have been the ones to suffer from.

We co-operated successfully regarding that and a few other insane measures that would have been a burden to the railways and the men also.

Co-operation is a matter to which I have given careful thought, and I find that a word and a deed at the right time and place will have more effect than some silver tongued orator would have by shouting his head off for a week.

I am speaking of a co-operation from the employee's standpoint, and am trying to show where it is the duty of the employee to work to the interest of the company. I have found in the past that the company will work towards the same ends in behalf of the employee.

It is a fact that at times too severe discipline is meted out to an employee by some local official. The seed of discontent is sown. If the sentence is just it will probably end there. If it is unjust, we all know that the news spreads like wild fire. While it may appear insignificant at the time, it may later result in strained relations between the men and company.

However, when in my case discipline was dealt out to me, it was always just, and I merited the sentence. In fact, in the fourteen years of my service with the great Santa Fe system, I have always found the management willing to adjust any just case, and generally willing to give the men the benefit of the doubt.

I am not going to put all the responsibility of co-operation on one side, for there are always two sides to every question, and both sides should be met on lines that are fair and square. The officials should offer encouragement to truthfulness and honesty, letting an employee know that his truthfulness is appreciated. When a man has made a mistake, and he knows that the truth will bear weight, and he will not be as severely punished as if he tried to cover it up, it will encourage him to make honest reports.

If he is punished just as severely for the offense, whether he is honest or not, he is offered no encouragement to be honest in future cases, and he will try to worm out by covering up the facts.

It is not my intention to drift off the subject, and go into regarding measures of discipline, but we all know that this is one of the factors of co-operation.

The public today is exacting more from the railways in the way of transportation facilities than was ever demanded before. The companies, on the other hand, have to demand first-class service from the men. In no other class of service is a man held up before the public eye more than is a railway employee, and it is nothing more than right that he furnish the first-class service that is essential to first-class railroading. We find the screws being drawn tighter, and some relief must be afforded. The only logical solution offered is that suggested by the *Railway Age Gazette*—co-operation in fact; to use that much heralded motto of the *Santa Fe Employees' Magazine*, "team work."

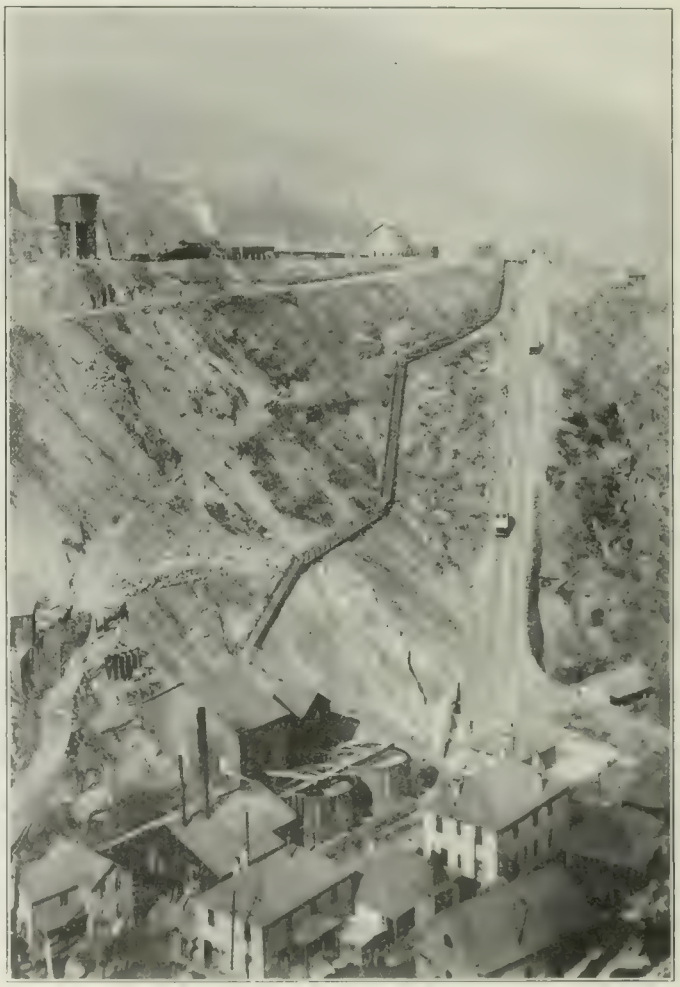
L. H. COLLETT,
Locomotive Engineer, A. T. & S. F.

The Yemen railway, which is to be built by a French company from the Turkish port of Hodeida to Sanaa, the capital of Yemen and which later on will be extended to Mecca, where it will make connection with the Hedjas railway, is of especial importance as it will be the first line which will connect the Red sea with central Arabia. This line is also very important for Turkey, as it offers the possibility of vigorous action against the continual uprising of the Arabs. Sanaa is the middle point of a strip of very fertile country about 60 miles wide along the edge of the Arabian plateau bordering on the Great Salt desert. This plateau, which rises gently from the northwest, reaches its greatest altitude, about 9,200 ft. in Yemen, and then falls gradually towards the South and East. The construction of the line will take five or six years, as the section lying in the mountainous district offers difficulties of construction. To prevent attacks by the natives, it will be guarded by soldiers even after completion.

CONSTRUCTION OF THE BINGHAM & GARFIELD.

The Bingham & Garfield extends from a connection with the San Pedro, Los Angeles & Salt Lake at Garfield, Utah, up through Bingham Canyon to the town of Bingham, a distance of 20 miles. The road was built primarily to transport ore from the Utah Copper Company's mine at Bingham to the company's concentrating plants at Garfield, but, in addition to this ore traffic it handles a general passenger and freight business between the numerous mines at Bingham and the mills and smelters around Garfield and Salt Lake City.

The distance from Garfield to Salt Lake City via the San Pedro, Los Angeles & Salt Lake is 15 miles, traffic on the Bingham & Garfield being turned over to the latter road at Garfield. The building of the line involved unusual engineering features, as the country is extremely mountainous. The line is approximately 10 miles shorter than any previous connection between Garfield and the mines at Bingham, materially reducing the cost of transportation on the ore.



Inclined Railway in Town of Bingham.

Bingham Canyon at the upper terminal of the road is 13 miles in a direct line from Garfield, and is 1,875 ft. higher than the lower terminal of the line. Location work on the road was started at both ends, the controlling point being Harker's Ridge, a long, flat ridge approximately half way between the terminal points. It was found that a 2½ per cent. grade from Garfield would enter a saddle in this ridge very nicely, and surveys from the other end showed that a maximum 2½ per cent. grade would meet this line very satisfactorily. On account of the mountainous character of the country at the upper end it was very difficult to develop terminal facilities. Surveys showed that storage tracks with a capacity of 40 cars could be ob-

tained, which was finally considered satisfactory, on the assurance of locomotive builders that Mallet locomotives could be furnished that would handle 40 cars up a 2½ per cent. grade at 12 miles an hour. The maximum grade was, therefore, fixed at 2½ per cent. There is approximately 14 miles of the maximum grade on the line, the average for the entire line being 2 per cent. All grades are compensated .04 per deg. for curvature and are materially reduced at sidings and through tunnels. The line is continuously rising from Garfield to Bingham, there being no adverse grade against northbound traffic. There are two 10-deg. curves at Dry Fork, but with this exception the maximum curvature is 8 deg., the majority being 6 deg. The first 10-mile section below Bingham is through a very precipitous country, construction on the first three miles great difficulty by steam shovels and which were not economical to handle with teams, the method commonly known as "Swede trapping" was employed. This method consists of driving a small drift slightly below subgrade and large enough to accommodate a track and a small dump car, the drift being provided with trap doors on the top through which materials blasted down from above can be dropped into cars. This obviates the necessity for shoveling most of the material. The total excavation amounted to 1,780,000 cu. yds.

The tunneling on the line totaled 4,795 ft., divided into four tunnels, respectively 1,280 ft., 2,079 ft., 754 ft. and 682 ft. long. These tunnels are 18 ft. wide and 22 ft. high above the top of rail. In order to economize labor and make more rapid progress in driving a frame structure known as a "Jumbo" was



Town of Bingham, Utah, Showing Mining Operations and Carr Fork Viaduct, under Construction, on the Bingham & Garfield.

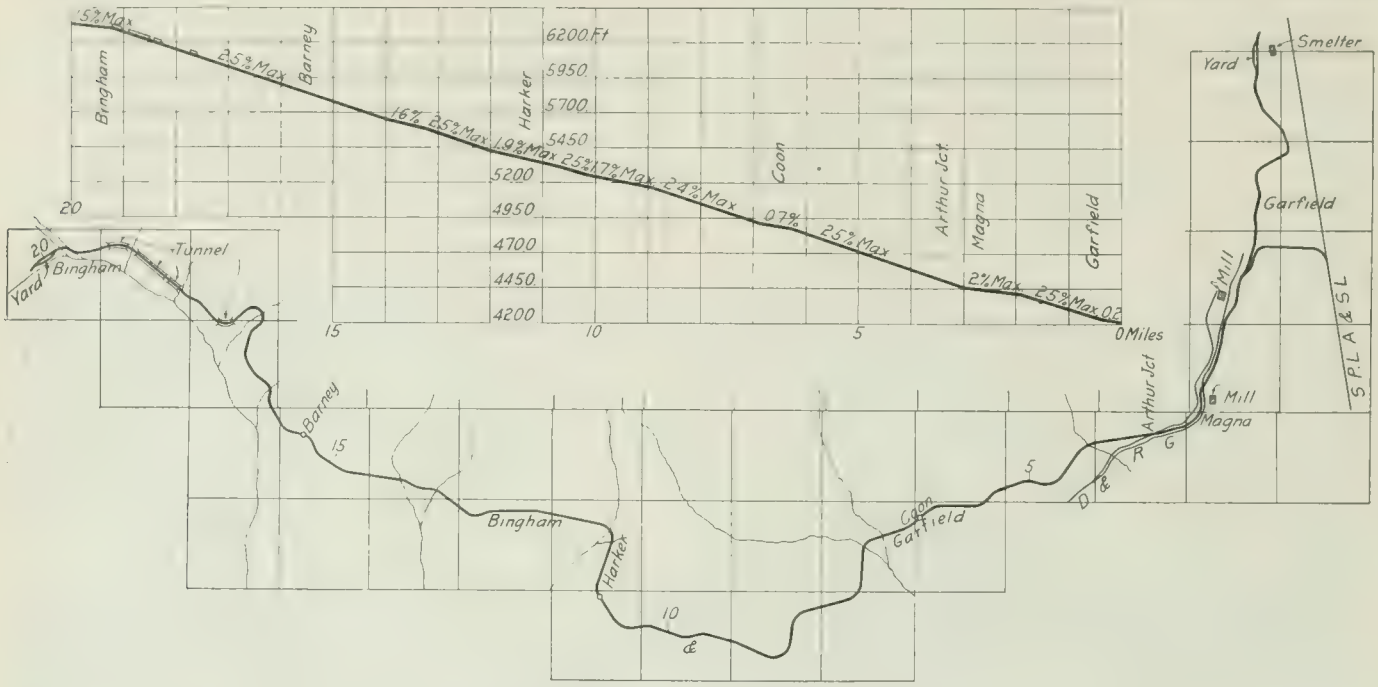
of which was particularly difficult on account of the deep canyons that had to be bridged and the steep ridges that had to be tunneled. The cost of these three miles was about $1,170,000, and that of the first mile $592,250. This was the most expensive section of the line, including Carr Fork and Markham Gulch bridges, the Bingham yards and a 1,280-ft. tunnel. Tunneling at the upper end of the line above the town of Bingham was made necessary by the fact that if the line had been benched in the face of the almost vertical wall, construction work would have endangered the lives of the inhabitants in the town below, and the amount of curvature would have been materially increased.

Six steam shovels and over 1,000 men were employed in grading the road. As a large part of the excavation was in very deep and short cuts which could be reached only with used. This structure was supported on running rails and was moved forward as the work progressed, allowing the excavation to be handled in three benches. From the top story outriggers were run to the top bench, on which material was wheeled out to be deposited in a bin or directly into cars. The second bench was handled in the same way from the second story of the Jumbo, the lower bench being shoveled directly into the cars. Drilling was all done with air drills, compressors being located about one mile from the work. The average progress in driving the tunnels was 5 ft. per heading per 24 hours. The rock encountered was principally quartzite, which shattered easily, making it necessary to support more than half of the tunnel length. The timbering was of Oregon fir, consisting of 12-in. x 12-in. posts and three-segment arch rings. The lagging was of 4 in. x 6 in. timber. After the completion of the

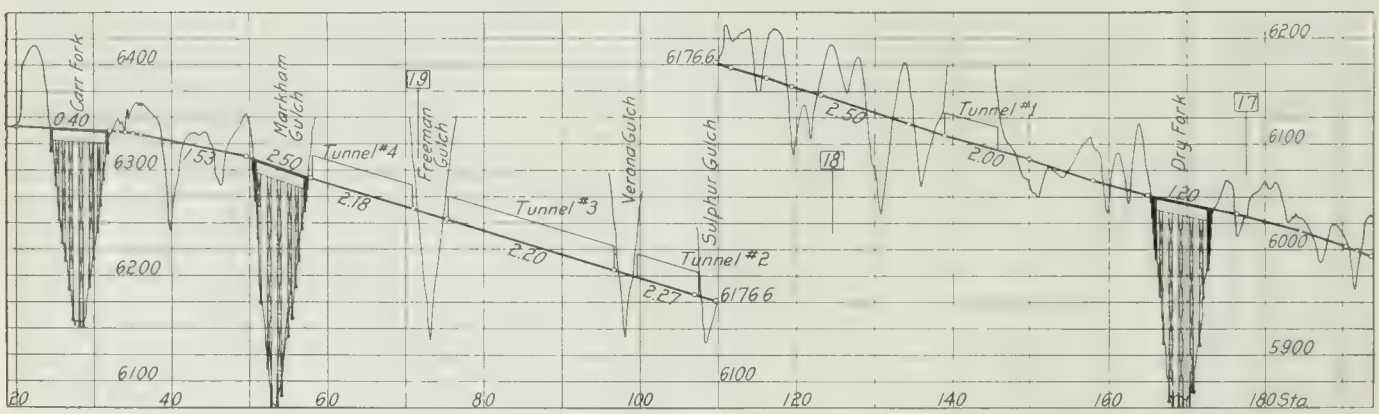
tunnels a tunnel sectioner, shown in one of the accompanying cuts, was used to determine the exact volume of rock moved and to provide a permanent record of the sectional outline.

There are three steel viaducts in Bingham Canyon, one 690 ft. long and 190 ft. high, one 640 ft. long and 225 ft. high, and one 670 ft. long and 188 ft. high. The concrete foundations under all these viaducts were carried down to solid rock, and the depth below the surface which was required to reach rock was 57 ft., 38 ft. and 95 ft., respectively, for the three structures.

The drainage along the mountainous part of the road was a serious problem. Concrete arches, varying in span from 3 ft. to 10 ft., were standard for drainage openings, but it was difficult at some points to locate these arches in such a way that their foundations could be economically excavated when the length of the arch was made as short as possible. It was found that at some points the building of such drainage culverts



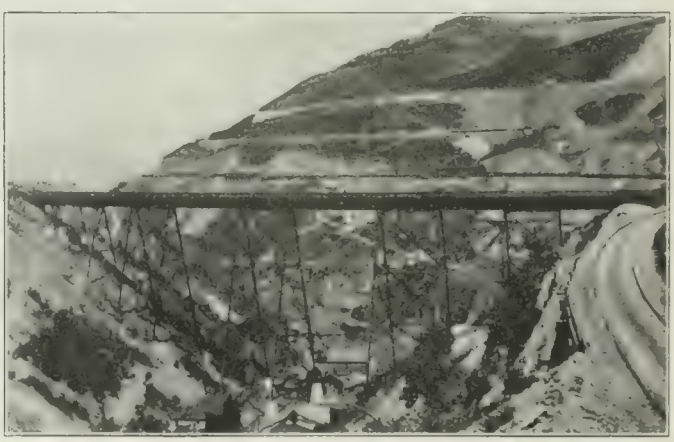
General Plan and Profile of Bingham & Garfield.



Profile of Upper Section of the Line.



Trestle over Markham Gulch.



Trestle over Carr Fork.

would prevent the immediate starting of grading, so it was decided to drive tunnels through the original ground to provide proper drainage and allow the filling of the gulches to proceed without delay. To provide these openings 1,400 lineal feet of drain tunnel was built. The concrete work on the line totaled 12,000 cu. yds.

The track is built to Harriman Lines main line standard. The main line is laid with 90-lb. A. R. A. rails and sidings and branches with 65-lb. rails. Flat bottom tieplates, boltless rail anchors and 4-hole continuous joints, are used on the main line.

The operation of the company's copper mines is an interesting problem in railway construction and operation. The ore lies in a deposit which is covered to a depth of 40 ft. to 200 ft. The operations extend over a difference in elevation of 1,500 ft. This working surface is divided into benches not exceeding 75 ft. in height, which are operated by steam shovels. The



Mallet and Switching Locomotive Used on Bingham & Garfield.

ore body lies in folds near the surface so that in removing the capping or overburden there are times when thousands of tons of ore are uncovered, and facilities must be provided for loading it as fast as the steam shovel can handle it. The railway tracks in the mines are laid on 4 per cent. compensated grades with 16 deg. maximum curvature. Small saddle tank locomotives, handling 240 tons of ore at a rate of 10 miles an hour, are used on these lines. This railway system connects all levels in the mine so that coal and other supplies can be delivered to each steam shovel and ore removed from any level as fast as it is encountered. The equipment used in this service consists of 25 steam shovels, 53 locomotives, 408 cars, with which approximately three-fourths of a million yards of material a month is moved.

The ore service on the Bingham & Garfield is operated



One of the Tunnels, Showing Rock Formation.

with Mallet articulated compound locomotives and all-steel ore cars. The locomotives have a weight of 625,000 lbs., including the tender, 457,000 lbs. being on the 16 driving wheels. The maximum tractive power is 105,500 lbs. The over-all length of the engine and tender is 90 ft. 6 in., with a driving wheel base of 14 ft. 9 in., allowing the locomotives to take the curves more easily and damage the track less than the heavy types of consolidated locomotives. The cars are especially designed to handle this ore, and have a capacity of 60 tons with 10 per cent. excess allowance for overload. They are of the hopper-bottom type, dumping the load quickly and cleanly at the mills.

The building of this line was under the direction of H. C. Goodrich, chief engineer. The concrete work was handled by the Utah Construction Company. Steel for the bridges was furnished by the Minneapolis Steel & Machinery Company, and erected by Gerrick & Gerrick.

THE I. C. C. CLAIMS JURISDICTION OVER STATE RATES.*

J. J. Meredith, Shelby Taylor and Henry B. Schreiber, constituting the Railroad Commission of Louisiana v. St. Louis Southwestern et al. Opinion by Commissioner Lane:

This proceeding places in issue the right of interstate carriers to discriminate in favor of state traffic and aginst interstate traffic. A rate of 60 cents carries first class traffic eastward from Dallas, Tex., 160 miles, while the same rate carries the same class of traffic but 55 miles from Shreveport, La., into Texas. The railway commission of Louisiana, under direction of the legislature, brought this case to secure an adjustment of rates that would be reasonable from Shreveport into Texas and to end the unjust discrimination in favor of Texas state traffic against traffic from Louisiana into Texas. The defense is mainly that the railways are compelled by the Texas commission to effect the discrimination here involved.

In a letter signed by the chairman of the Texas commission and addressed to the secretary of the Progressive League, Marshall, Tex., the Texas commission expresses the opinion that it would be very much against the interests of the Texas jobber, "whom it has been the endeavor of this commission to protect," to have the rates from Shreveport to Texas points reduced. The letter points out that carload rates to Texas jobbing points are higher than to Shreveport, and the high local rate from Shreveport about equalizes Shreveport and Texas jobbing points on through business. The I. C. C. finds that it was not the prime desire of the Texas commission that rates within the state should be low, but rather that the interstate roads should not make rates so low on commodities which Texas could supply to herself as could hinder the growth of her cities as manufacturing and distributing cities. If interstate carriers were determined on a long haul policy which tended to make the people of Texas depend on merchants in other states, the Texas commission frankly declared that it would meet this policy in such a way as to save the interests of Texas. The general freight agent of one of the roads interested in the question of granting concentration rates on cotton at Shreveport wrote as follows:

The Honorable Railroad Commission of Texas,
Austin, Tex.

Gentlemen: We have received requests from cotton men along our line south of Shreveport, also on the Texas & Gulf, and Timpson & Henderson, also merchants at Shreveport, for the establishment of a concentrating privilege at Shreveport on cotton from the points indicated.

We have hesitated so far to establish any such privilege, feeling that it might not meet with the entire approval of the railway commission of Texas. However, we are advised that such privilege would give a better market for cotton to the producers along

*The opinion herewith is an abstract, but, insofar as possible, the commission's language has been preserved.

the lines indicated, and as such would be an advantage to the Texas farmer.

Under the circumstances, if you will advise us that you do not disapprove of the plans, we will take steps to see if we cannot meet the views of our cotton friends in regard to this feature.

Yours truly,

J. R. CHRISTIAN, G. F. A.

To this letter the chairman of the Texas commission replied that "the establishment of such an arrangement would not meet with the approval of this commission."

The petition of the complainants is that the I. C. C. established the same basis of rates between Shreveport and east Texas points as are given to Texas competitors of Shreveport interests for the same distances.

The rates fixed by a state commission are not prescribed as a standard, by the act of Congress, governing interstate rates. The Texas rates as such; therefore, the commission may not prescribe. If, however, they stand a test of reasonableness they may be adopted. The I. C. C. can comply with the petition only if power has been granted it under the first, third and fifteenth sections of the act to regulate commerce. Under the third section discrimination is prohibited.

In this case the rates adopted by interstate carriers on state traffic are not adopted on interstate traffic. Thus arises a discrimination in favor of communities within the state, and interstate commerce suffers a corresponding disadvantage. May this commisison end such discrimination by saying to the interstate carrier: "You may not distinguish between state and interstate traffic transported under similar conditions. If the rates prescribed for you by state authority are not compensatory on this specific traffic as to which discrimination is found the burden rests on you, irrespective of your obligation to the state, to so adjust your rates that justice will be done between communities, regardless of the invisible state line which divides them." To which we are compelled to answer that the effective exercise of its power regarding interstate commerce makes necessary the assertion of the supreme authority of the national government and that Congress has appropriately exercised this power in the provisions of the act to regulate commerce touching discrimination. The power of Congress is unquestioned to control all such carriers as do not exclude themselves from participating in interstate traffic. The defendants themselves may not give unreasonable preference to any locality whatsoever or to subject any locality to unreasonable disadvantage in any respect whatsoever. The only reasonable reading in the law is one which credits Congress with the intention of stopping all undue discrimination by interstate carriers. The orders of a state commission enforcing a discrimination against interstate commerce are not acceptable under the law. [The commission quotes Justice White in the Pullman case, Justice McKenna in the Oklahoma v. Kansas Natural Gas case, and Justice Van Devanter in the Safety Appliance case.]

It is said that the carriers within the state of Texas are protected from the provisions of the act to regulate commerce by the clause in the first section reading:

Provided, however, that the provisions of this act shall not apply to the transportation of passengers or property, or to the receiving, delivering, storage or handling of property wholly within one state and not shipped to or from a foreign country from or to any state or territory as aforesaid.

This language was intended as a recognition of the fact that Congress by this act was not assuming to regulate transportation entirely within the borders of a state. It does not by the broadest construction justify the inference that an interstate carrier may pursue a policy of rate making within a state that would affect unlawfully commerce among the states. It is not merely commerce which is confined to a single state which is state commerce, but that which "does not affect other states." To say that this prohibition permits carriers to exclude a city within the state of Louisiana from doing business on equal terms with the cities in Texas is to distort the plain meaning of the act and to make the regulation of interstate commerce farcically ineffective. To say that the interstate carrier may so discriminate because of the orders of a state commission is to admit that a state may limit and prescribe the flow of commerce between the states.

How utterly incongruous the result if the interstate carriers of Ohio should be allowed to make rates within that state which would so confine the commerce of its communities as to exclude on equal terms that of Buffalo or of Pittsburgh. An interstate carrier must respect the federal law, and if it is also subject to state law it must respect that insofar as it can without doing violence to its obligation under the national authority. The defendants undeniably discriminate directly against interstate traffic and plead that they were obeying the orders of a state commission against which they were helpless. They appealed to no court for relief, nor to this commission. The class rates of the Texas commission within the distances here involved are not too low. This the carriers themselves do not urge. To the suggestion that the exercise of the commission's power to do away with discrimination effected by the adjustment of state and interstate rates must lead to conflict in which the jurisdiction of one sovereignty or the other must give way, the answer is that when conditions arise in the fulfillment of the commission's obligation and the exercise of granted power, the national government must assume its constitutional right to lead.

The railways are therefore ordered to put in a prescribed schedule of rates from Shreveport to Texas points, and are ordered to maintain no higher rates than those prescribed and to equalize the terms and conditions on which they will extend transportation of a similar character moving into Texas from Shreveport with that moving wholly within Texas. But in effecting such equalization the class scale of rates prescribed herewith shall not be exceeded. Whatever is the practice respecting the concentration of cotton within Texas, the road shall be ordered to apply at Shreveport.

Chairman Prouty concurring:

I entirely agree with the conclusion reached in the majority opinion. While this commission cannot establish and should not attempt to establish, directly or indirectly, a state rate, it must in the exercise of the duty put on it by the act to regulate commerce, determine whether discrimination exists, and in doing that it may and should examine the state rate in comparison with the interstate rate. I think that the Andy's Ridge Coal Company v. Southern Pacific, 18 I. C. C., 405, was wrongly decided and should be overruled. The third section declares that no carrier subject to the act shall be guilty of undue preference, and lays on this commission the duty of removing such preference when found. Such an authority must manifestly be exercised by some one, nor is its exercise antagonistic to the interest of state shippers.

Commissioner Clark concurring:

Under the constitution a state may not levy any tax or impost on commerce from another state. A transportation rate that is subject to regulation by a body created by law for that purpose is in essence a tax on traffic. A state may not obstruct a navigable waterway without the consent of the federal government, and it is no answer to say that it has opened another stream or channel in lieu of the one so obstructed. Whether or not Congress has exercised its jurisdiction in these premises, and whether or not it has delegated to us power to remove such discriminations and preferences, are questions which apparently can never be settled until they have been passed on by the court that is empowered to speak the last word.

Commissioner Clements dissenting:

The act to regulate commerce at once confers and specifically limits the powers of the commission intended by Congress to be exercised by it for the correction of wrongs against which the

act was aimed. It is not a question of what additional powers Congress could or ought to invest in the commission, but has it conferred the power here sought to be exercised? The clause in section one quoted in the majority opinion limits the effect of the commission's orders. When a condition arises which presents wrongs which cannot be corrected without additional authority, the commission should ask for additional legislation and should not read section three of the act independently of the restrictive proviso of section one. The commission is not justified, in my judgment, in undertaking by interpretation to read out of the act an important provision in order to meet the situation which can be reached only by additional legislation. The quotations in the majority case relate largely not to the authority given the commission, but to the authority of Congress itself under the constitution.

Commissioner Harlan dissenting:

The result of the ruling of the majority when analyzed seems to be that in fixing a rate on interstate traffic of a carrier we thereby impose on it and on the lawfully constituted state authorities a standard to which both must adjust their views as to what is a reasonable rate on purely state traffic. The exercise by this commission of a power that so modifies the control of state commissions over state rates that it requires a carrier either to put itself in an attitude of disobedience to an order of a state commission respecting a state tariff, or to accept less than a reasonable compensation on its interstate traffic manifestly ought to rest on some clear and definite declaration of that policy by Congress. It rests on an insecure and wholly unsatisfactory foundation for administrative purposes when it flows from a process of reasoning that is admittedly mere construction. This is particularly true when it is announced by a quasi-judicial tribunal that has no general jurisdiction, only such special and limited powers as are defined in the act creating it. In my judgment the language of the proviso of section one admits of no other reasonable construction than that Congress intended expressly to withhold from this commission the right, directly or indirectly, to exercise its powers with respect to state commerce or to enforce on such traffic any of the provisions of the act.

Commissioner McChord dissenting:

In dissenting from the opinion of the majority, it is not my purpose to discuss the relative powers of the state and national governments, for that would presuppose a conflict between federal and state authority, which conflict I do not concede here exists. Neither is it my purpose to argue the extent of the powers of the Congress under the constitution, but rather to confine myself to the powers which the Congress has delegated to this commission.

The report finds that the rates out of Shreveport, La., into eastern Texas discriminate against Shreveport in favor of Texas jobbers. Conceding, for the purpose of argument, that the rates from Dallas to eastern Texas discriminate in favor of Dallas as compared with the rates from Shreveport into eastern Texas, the first question that arises is: Is the discrimination voluntary? In all the reports of this commission dealing with the question of discrimination we have invariably inquired into the reason for the discrimination, to determine whether or not the same was undue, and where we have found the situation to be one over which the carrier defendant has no control we have held that the carrier was not responsible for the discrimination.

In my opinion, the charging of lower rates to a common territory for intrastate than for interstate traffic, at least where the intrastate rates are compelled, does not constitute undue discriminations. But suppose it did. Has this commission power to correct it?

I do not hesitate to subscribe to the theory that where intrastate commerce or anything else places a direct burden and obstruction upon interstate commerce the obstruction can be removed. In deputizing this commission to correct unreasonable and discriminatory transportation charges and practices for the interstate transportation of passengers and property as defined by the act, Congress specifically excluded from our jurisdiction that transportation which lay wholly within one state. The phrase "wholly within one state" is qualified only by "and not shipped to or from a foreign country from or to any state or territory as aforesaid." As we look to the act of Congress rather than to the constitution for our powers and duties, it is useless to discuss the constitutional power of Congress under the commerce clause. In my opinion, the majority report is in effect legislation which the Congress has expressly refused to enact.

The Congress is able completely to regulate interstate transportation without the exercise of any control over transportation which lies wholly within a state; so, also, is this commission, by the proper exercise of the powers which have been conferred. If the alleged preferential intrastate rates are reasonable, and if the transportation conditions from the interstate point to the common territory are similar, it follows that the interstate rates must be too high and should be reduced. But this is not because of discrimination; rather because of inherent unreasonableness.

Much of the opinion is devoted to a discussion of the supremacy of federal over state control. To my mind, a conclusion both erroneous and unnecessary is reached, and as it is unnecessary I would not further refer to it except for the great length with which the matter has been dealt and my unwillingness to subscribe to the views therein announced. The quotation from the *Pullman case,* 216 U. S., 65, is unassailable, but it should be remembered that in that case the state of Kansas attempted to impose a tax upon all of the property, both interstate and intrastate, of the Pullman Company. The excerpt from *Oklahoma* v. *Kansas Natural Gas Co.,* 221 U. S., 261, is quoted from *Haskell* v. *Cowham,* 187 Fed., 409, and was directed at the action of the state of Oklahoma in refusing to allow natural gas mined therein to be transported by pipe lines out of the state, a situation in no wise analogous to that here presented. The decision in the *Safety Appliance case,* 220 U. S., 27, has absolutely no application to the present case. There it was in effect held that cars and locomotives are instrumentalities and vehicles of commerce moving over an interstate highway and that their proper and safe equipment was necessary to insure the transportation of interstate commerce.

To the suggestion that the exercise of the power to end discrimination between rates within a state and rates to interstate points must lead to conflict in which the jurisdiction of one sovereignty or the other must give way, the majority answers "That when conditions arise which, in the fulfillment of its obligations and the due exercise of its granted power to regulate commerce among the states, make such course necessary, the national government must assume its constitutional right to lead." Let us see whether by the finding of the majority the national government really leads. The rates prescribed as maxima to apply from Shreveport are virtually the Texas commission rates that are in effect in Texas. Subject to these maxima, Shreveport is ordered kept on a parity with Houston and Dallas, leaving it then within the power of the Texas commission to further reduce the Shreveport rates by a reduction in the present Texas scale. The national government therefore *leads* by *following* the judgment of the state government, to whom it says: "We will adopt not only your present scale of rates, but any lower scale you may see fit to establish. Your judgment has been the standard by which we have measured and fixed the maximum rates from Shreveport. If you desire to make lower rates from Shreveport into Texas you may do so by lowering the Texas scale." Of course, if in this instance we fix interstate rates by the Texas yardstick, we must fix other interstate rates by other state yardsticks, and may find ourselves incumbered with some forty-eight different rate meters, which will doubtless create a condition "more absurd and unbearable" than that which the majority opines would arise if the states remain unmolested in the exercise of their legitimate powers. But, aside from this

chaos, the Supreme Court has said that the function which the majority would delegate to the state of Texas can not by a state be constitutionally exercised, because:

The fact which vitiates the provision is that it compels the carrier to regulate, adjust, or fix his interstate rates with some reference at least to his rates within the state. [*L. & N. R. R. Co.* v. *Eubank,* 184 U. S., 41.]

To prevent the conflict between sovereignties which the majority has unnecessarily and by no means conclusively discovered and attempted to remove, the Congress has wisely declared:

That the provisions of this act shall not apply to the transportation of passengers or property, or to the receiving, delivering, storage, or handling of property wholly within one state and not shipped to or from a foreign country from or to any state or territory as aforesaid.

The majority endeavors to interpret this provision by explaining what it does not mean, but I submit that if it were not intended to cover instances of the kind with which we are here dealing its incorporation in the act to regulate commerce was wanton and unnecessary.

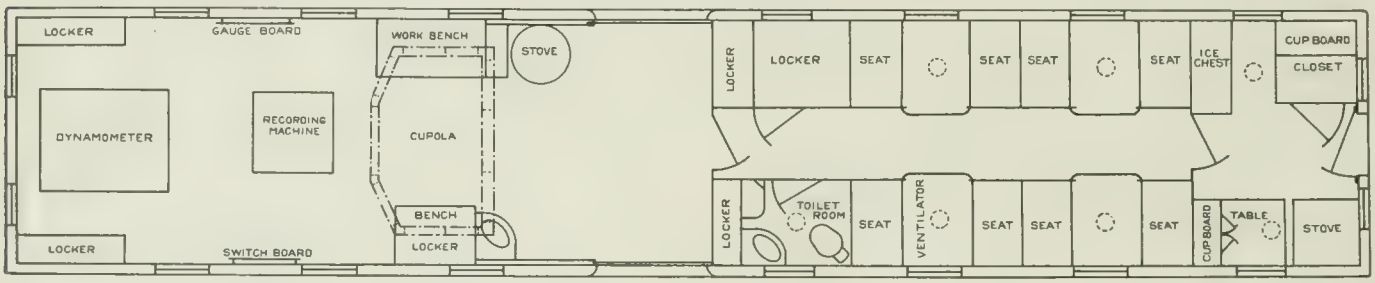
My position is that this commission should confine itself within the four corners of the law of its creation, usurping neither the legislative function of the Congress nor the judicial power of the courts.

The governor of Para has signed a bill passed by the Brazilian Congress for the construction of railway lines in the valleys of the Gurupy, Tocantins, Aragura, Xingu and Tapajos rivers.

SANTA FE DYNAMOMETER CAR.

BY H. B. MACFARLAND,
Engineer of Tests, Topeka, Kan.

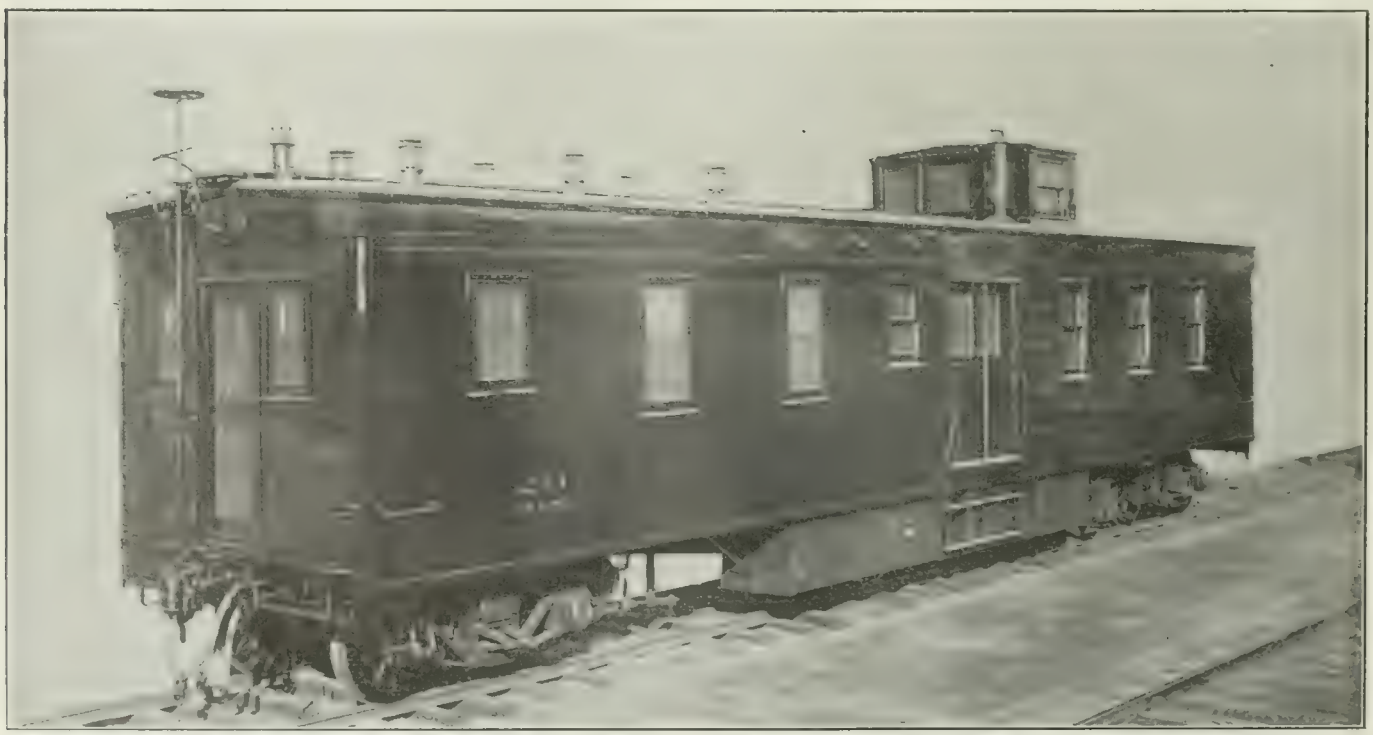
An exceptionally high capacity dynamometer car, 1,000,000 lbs., having a steel frame for the superstructure, has just been placed in service on the Atchison, Topeka & Santa Fe. The dynamometer was built by the Locomotive Finished Material Company, Atchison, Kan., and the recording apparatus by the Burr Machine Company, Champaign, Ill., from drawings furnished by the railway. The steel frame for the car was built by the Crawford Locomotive Works at Streator, Ill. The car was finished and the apparatus installed at the Topeka shops. The under-



Floor Plan of the Santa Fe Dynamometer Car.

frame, side and roof frame are entirely of steel, the underframe being composed of a built-up box girder for the center sill, channels for the intermediate sills, and Z-bars for the side sills. The side frame is of angles and the roof frame of I-beams.

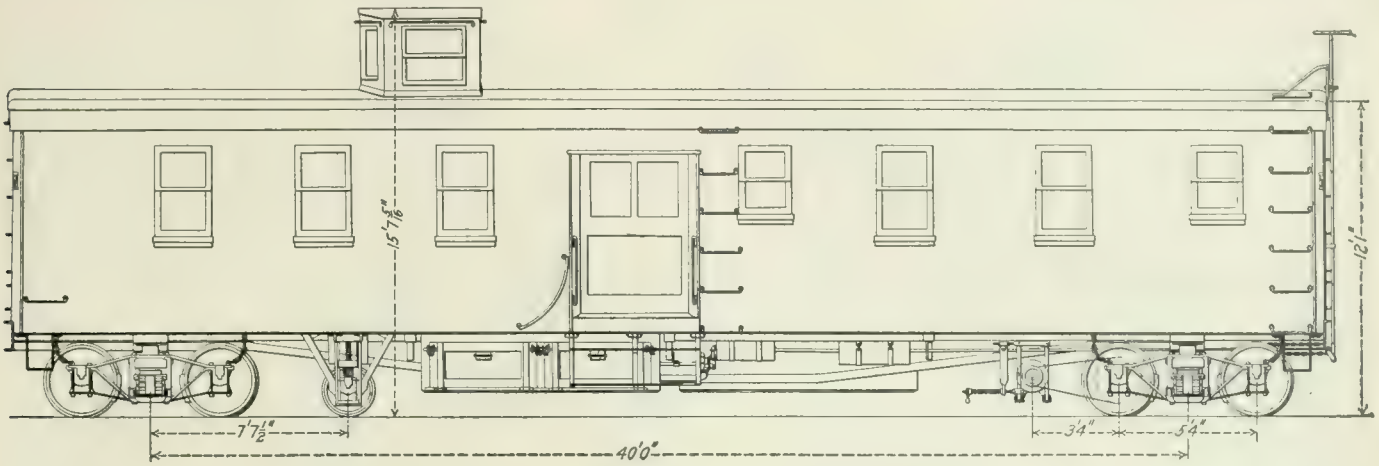
The center sills are of the fish-belly type, 28 in. deep at the center and 13 in. deep at the bolster. The web of the girder is ⅜ in. thick, with a 3½ in. by 3½ in. by ⅜ in. angle at the top, and two 3½ in. by 3½ in. by ½ in. angles at the bottom; there is also a ⅜ in. top cover plate the full length of the car. A ¼ in. steel plate covers the entire floor from the end sill to the inner edge of the body bolster at the dynamometer end. The body bolster is entirely of rolled and flanged steel parts with ⅝ in. by 16 in. top and bottom plates, and two ⅜ in. webs spaced 8 in. apart. The end sill is a 13 in., 32 lb., channel. The crossties have 5 in. by ¼ in. top and bottom plates with single flanged webs ⅜ in. thick. The posts,



Dynamometer Car of 1,000,000 Lbs. Capacity; Atchison, Topeka & Santa Fe.

braces and plates in the side and end framing are steel angles with the dimensions shown on the general plan. The carlines are 4 in. I-beams split near the end, so as to form diagonal bracing at the plate.

A ⅜-in. steel plate covers the front end of the car for a height of 2 ft. from the floor. The length over end sills is 50 ft., and the extreme width is 10 ft. The working end of the car is 25 ft. in length, and contains the dynamometer, recording apparatus, switchboard, gage board, work benches, stove and desk. The rear half of the car contains four upper and lower berths, toilet room, closet and kitchen. The trucks are of the four-wheel arch bar type, with heavy elliptical springs and extra heavy arch bars. The wheels are 34 in. in diameter and have steel tires. The car is lighted by electricity from an axle lighting system, as will be explained later.



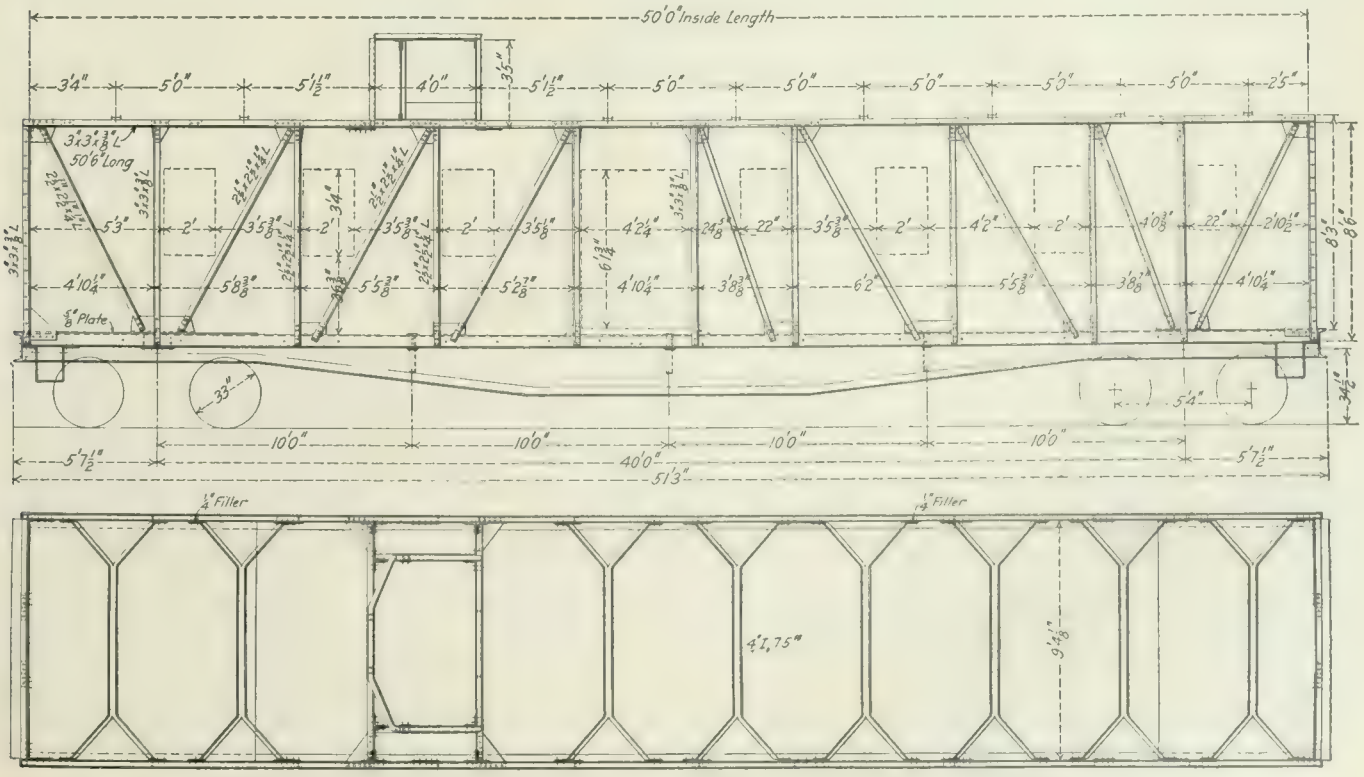
Side Elevation of Santa Fe 1,000,000 Lbs. Capacity Dynamometer Car.

DYNAMOMETER.

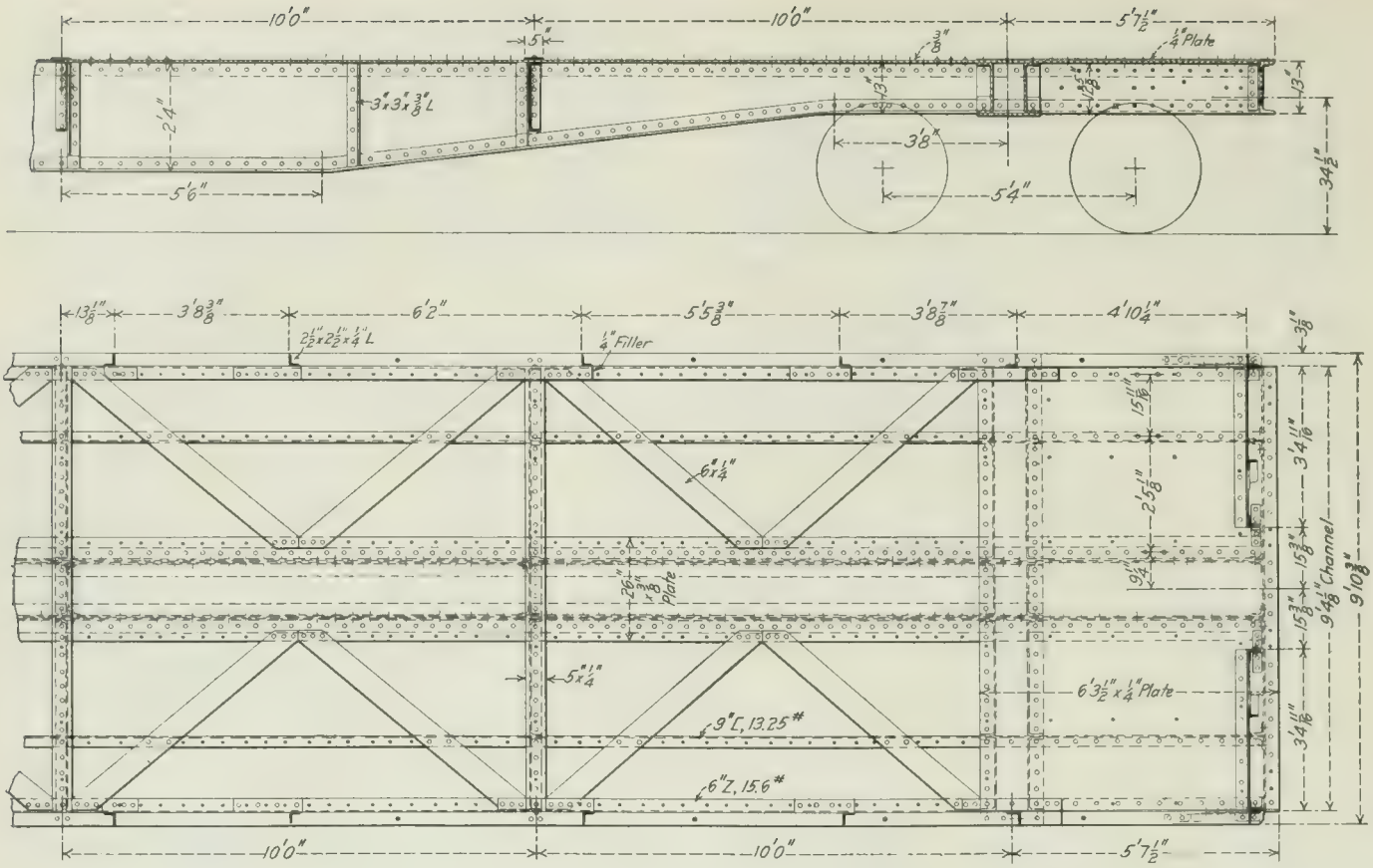
The dynamometer is of the double diaphragm type, recording both drawbar pull and drawbar push. The lever arms, with a ratio of five to one, are connected at one end to a filler block in the drawbar yoke and at the other end to a double piston, 20 in. in diameter, whose heads press against blind rubber gaskets, covering the liquid chambers. The piston is suspended by means of knife edges, in order to eliminate all friction. The bearings for the lever arms are small hardened tool steel pins surrounding the main pins. A mixture of glycerine and alcohol is used in the liquid chambers. These latter are connected to the recording apparatus and gage board by ¾-in. copper pipes. When the dynamometer is not in use the arms are brought to the center and held by four small jacks between the top of the arms and the cylinder casting. The dynamometer is so designed as to take and record safely a shock of 1,000,000 lbs. at the drawbar.

RECORDING APPARATUS.

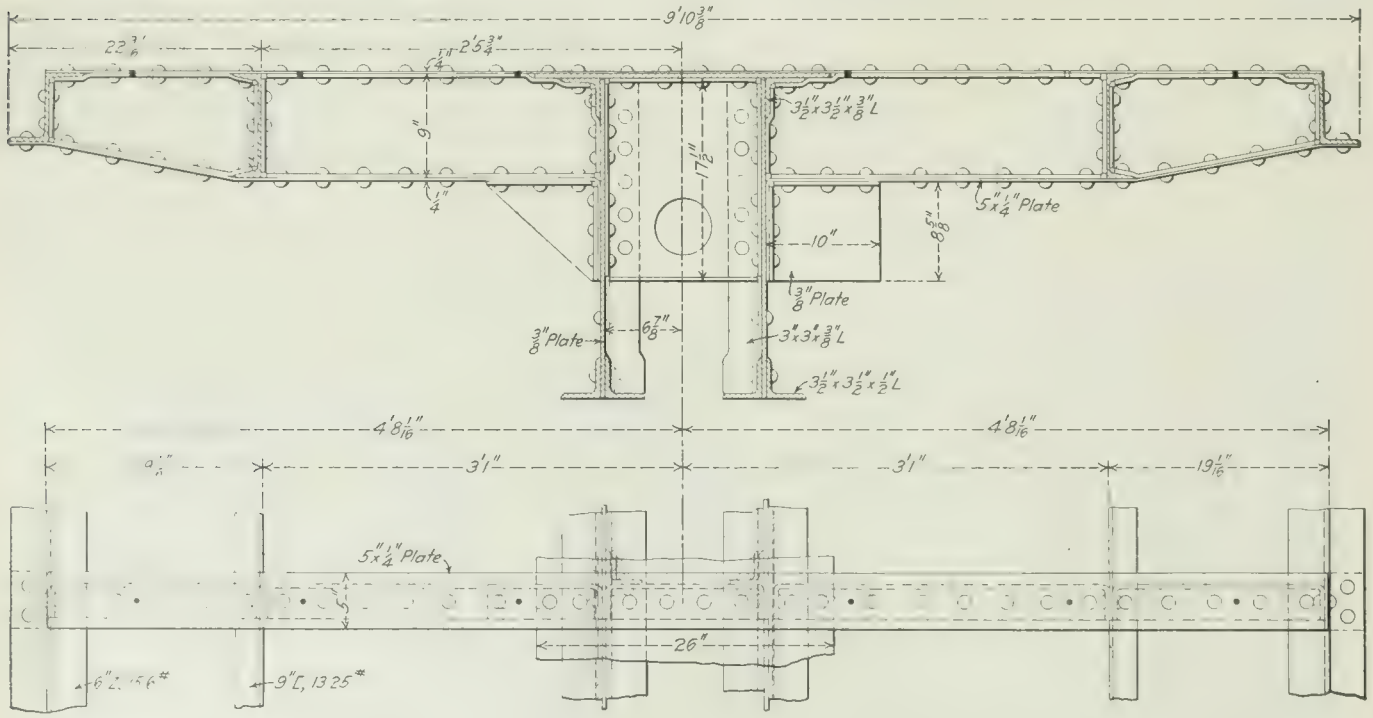
The recording apparatus is placed just back of the dynamometer and the following records may be made on the chart: Drawbar pull; drawbar push; speed; time either by five seconds or half-seconds; position of mile posts and stations; throttle opening; reverse lever; boiler pressures; indicator cards; train line pressure; brake cylinder pressure, and coal or oil fired. The



Steel Side and Roof Frame of Santa Fe 1,000,000 Lbs. Capacity Dynamometer Car.



Steel Underframe of Santa Fe Dynamometer Car at End Opposite Dynamometer.

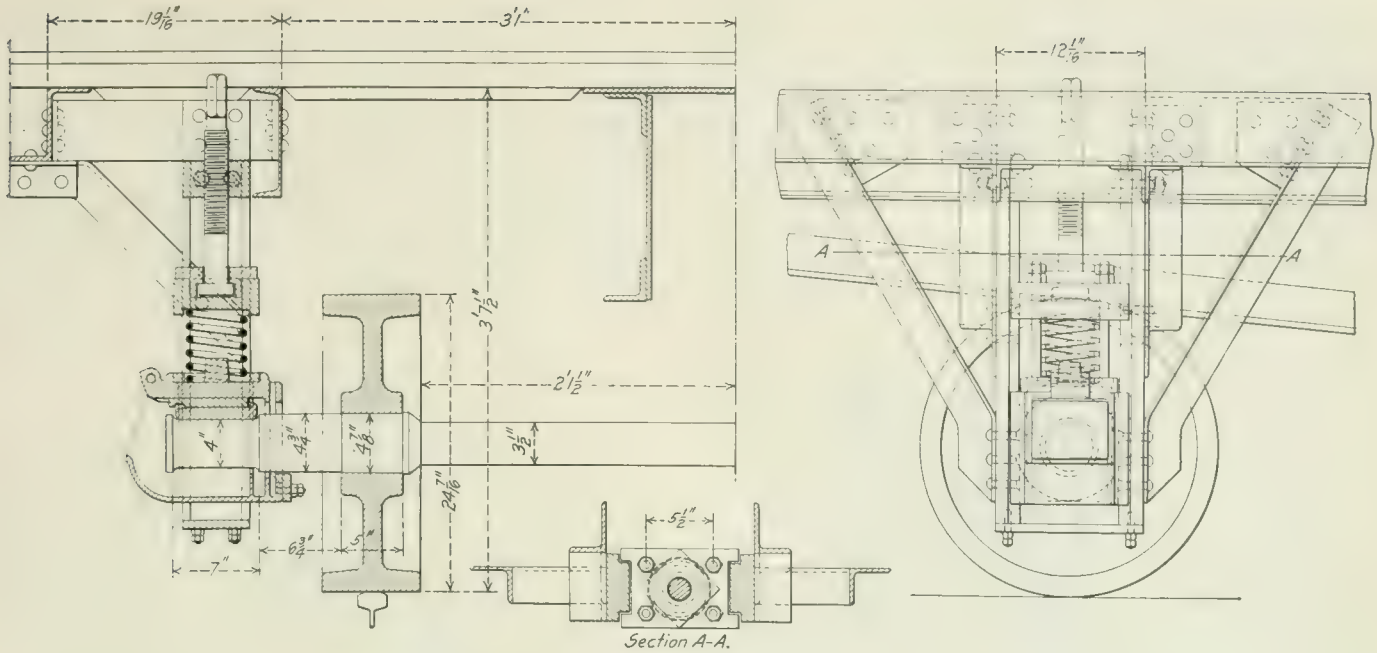




Crosstie At Dynamometer End Looking Towards Center of Car.

Crosstie Opposite Dynamometer End Looking Towards Center of Car.

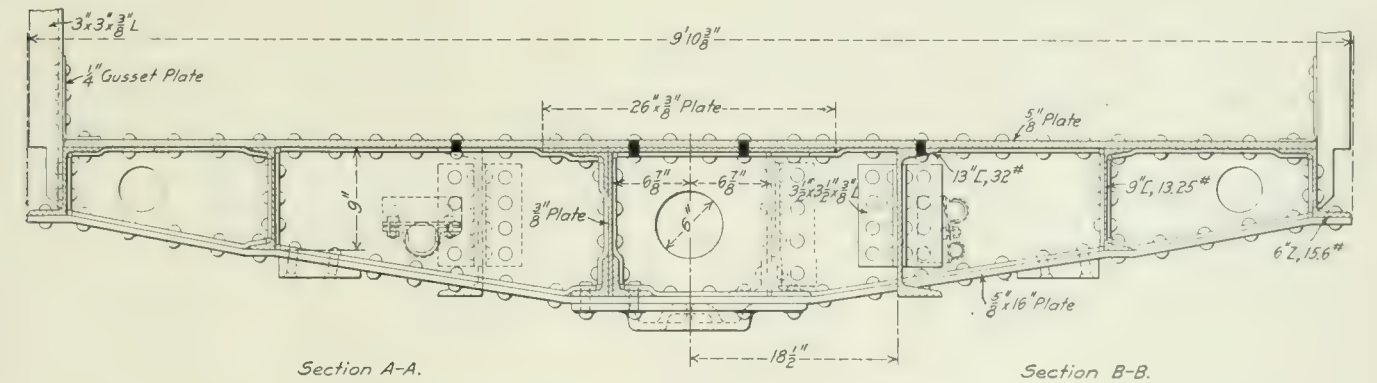
Sections Through Underframe of Dynamometer Car Showing Arrangement of Crossties.

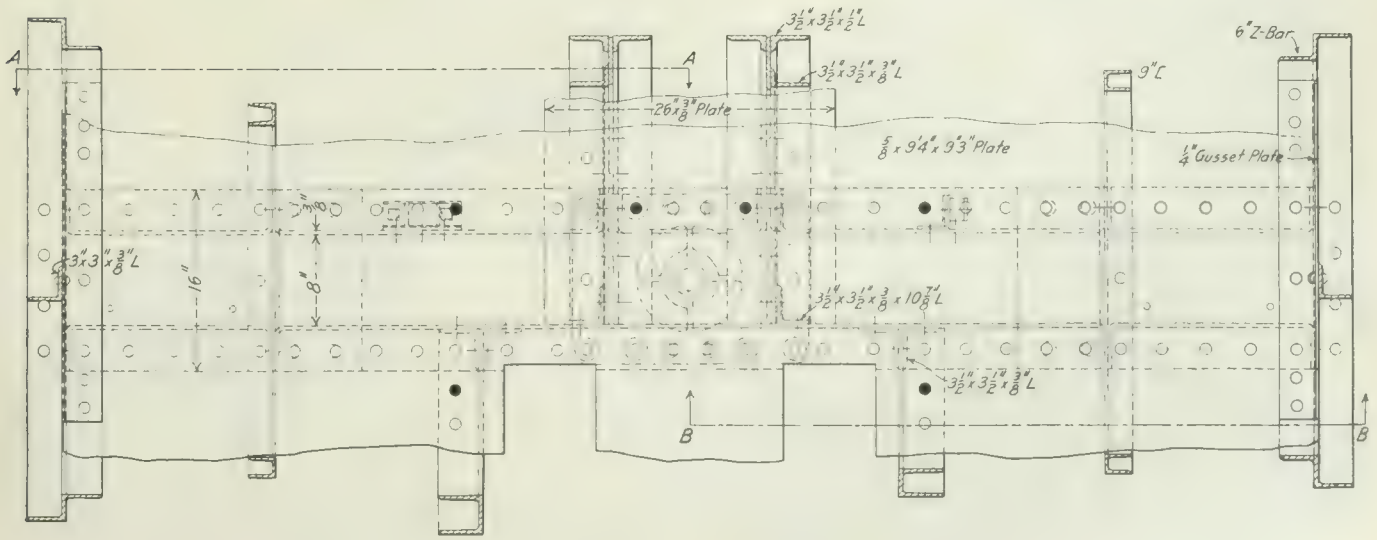


Auxiliary Truck; Santa Fe Dynamometer Car.

recording apparatus is mounted on a very heavy iron base plate through which a driving shaft passes from the auxiliary truck below. The auxiliary truck has two 22-in. wheels with 9-in. plain tires. It is connected to the main driving shaft through a train of bevel gears, which run in oil, by a universal joint. This auxiliary truck may be raised or lowered from within the car.

An electric motor is also provided for driving the recording apparatus. Three speeds are provided for the motor drive and three for the auxiliary truck drive, it being the intention to use the auxiliary truck drive in rating work and general engine tests, and the motor drive in special air brake and draft rigging tests. By means of two conveniently located levers and clutches it is





Body Bolster at Dynamometer End of Santa Fe Dynamometer Car.

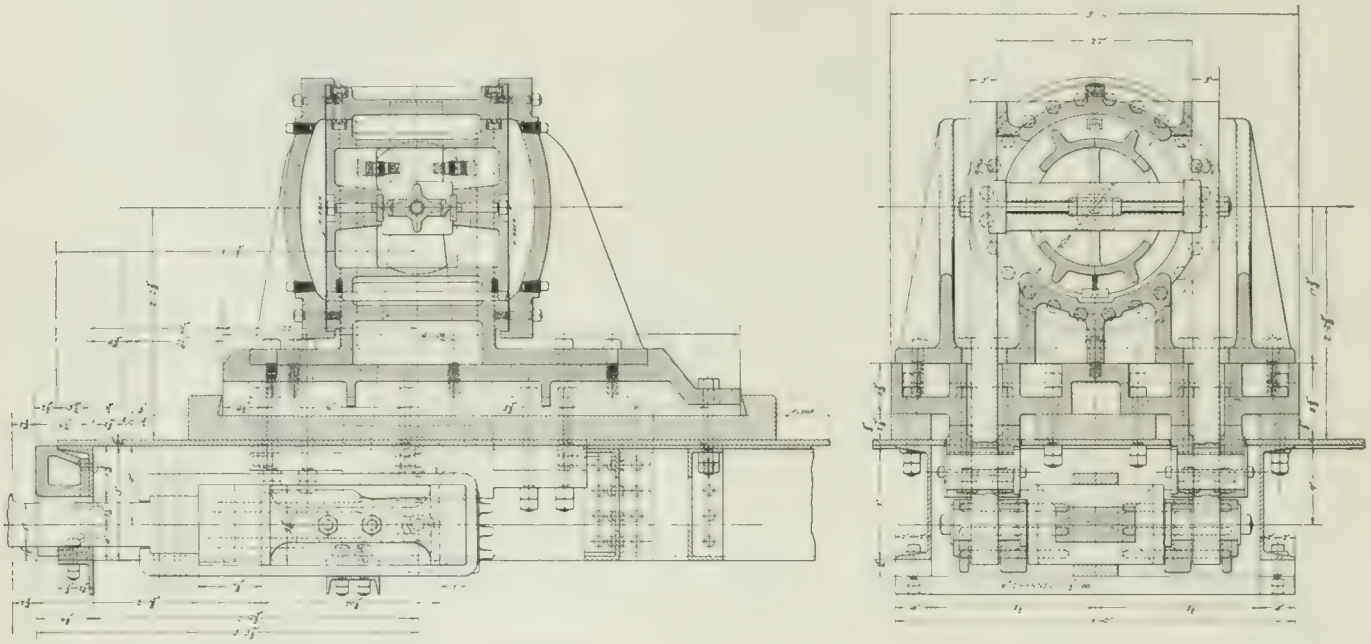
possible to quickly change from one drive or one speed to another. The drive is so connected that reversal of direction of the car movement does not reverse the direction of chart travel. The records are made on a chart 15 in. wide, which is drawn over the table between two gear-connected rollers by means of friction. Both originating roll and receiving roll are located at the back of the machine, where they can be readily removed or put in place.

All curves are drawn by pens attached to hollow aluminum rods running at right angles to the paper. All datum line pens are connected to a single cross bar at the front, their records being made an inch in front of those made by the recording pens. The pens are made of small brass cups with phosphor bronze troughs which carry a thread wick from the barrel to the point; they will draw a line moving sidewise as well as forward.

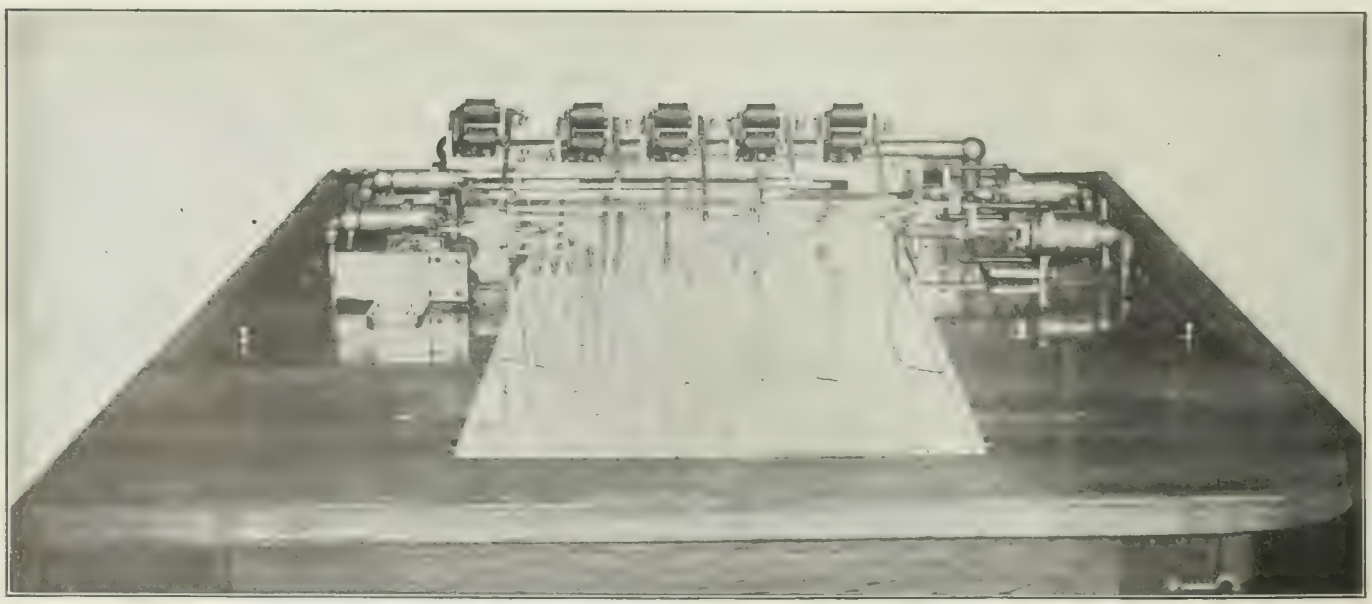
The pressures from the dynamometer are transmitted to standard outside spring Crosby indicators on one side of the recording table, it being the intention to put in different weights of indicator springs for the various classes of work. The curve of speed is obtained from a Boyer speed recorder located in the base of the recording apparatus and chain driven from the main shaft, it being so arranged that it may be driven at double its normal speed in freight service and at normal speed in passenger service, thus giving a large offset at low speeds when desired. The time record is drawn on one edge of the chart by means of a pen connected to a small electric magnet, which in turn is operated from an electric clock. Records of one minute, five seconds, or one-half second may be obtained. The record of locations is made by a small electric magnet in connection with a push button running to the observation cupola. The cupola is provided with an electric searchlight for night work.

The records from the locomotive are also made by means of electric magnets similar to that used in the location record. Two pens connected to standard Crosby indicators on the side of the table give a continuous curve of air pressure in the train line and in the brake cylinder, or if desired, in the auxiliary or supplementary reservoirs.

The gage board contains the following apparatus: One standard clock; one Haushalter speed recorder, driven from the main truck; four air recording gages; four standard air gages; one gage



Dynamometer of 1,000,000 Lbs. Capacity; Santa Fe Dynamometer Car.



Recording Apparatus In Dynamometer Car Showing the Pens and Chart.

for the dynamometer showing drawbar pull, two electric counters.

ELECTRICAL EQUIPMENT.

Electricity for the lighting of the car and the operation of all magnets and motors is obtained from a set of 16 storage battery cells, located beneath the car. These in turn are charged by means of a Bliss generator, driven from the rear truck of the car. The voltage used throughout is 32. The switchboard is so arranged with a series of multiple jacks that it is possible to put any voltage on any magnet, thus making the whole arrangement flexible and convenient. The total weight of the car is 91,000 lbs. The outside is finished in standard Pullman color, and the interior in French gray.

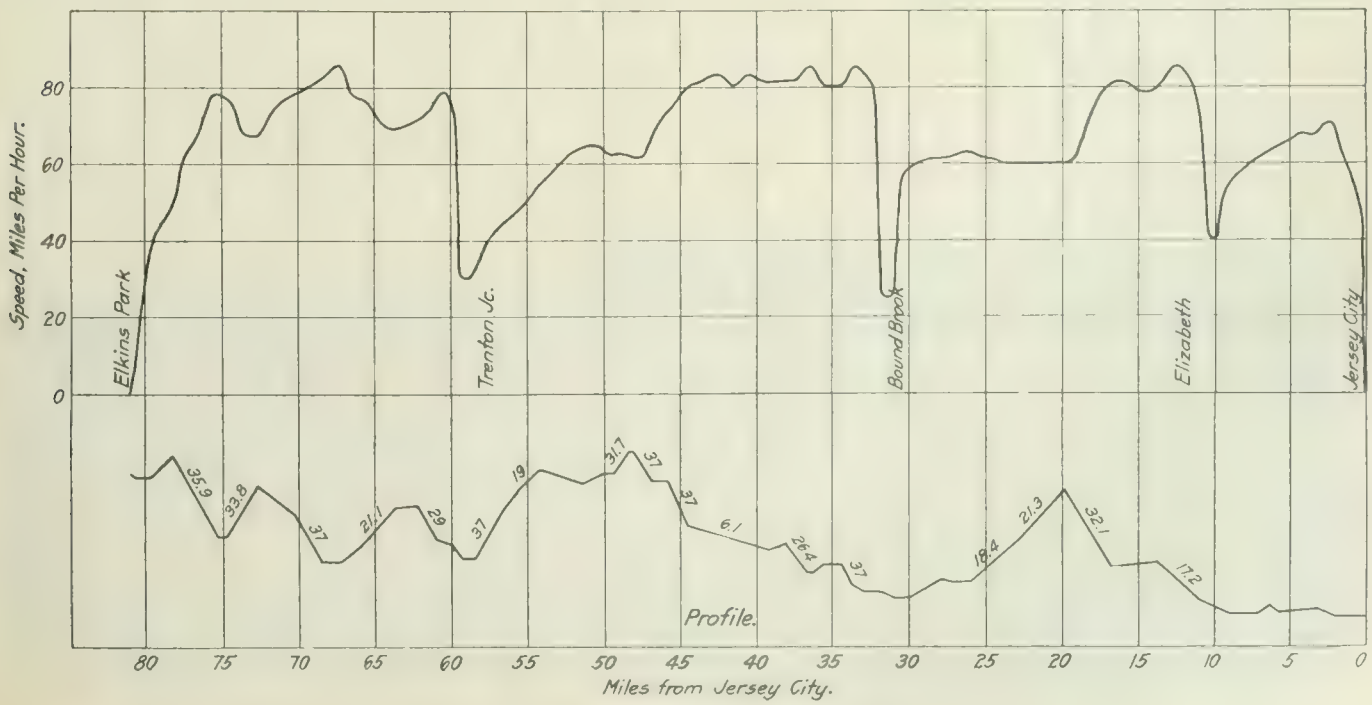
FAST RUN ON THE READING.

BY PAUL T. WARNER.

There are few trains in this country which have a faster or more difficult schedule than train 602 on the New York branch of the Philadelphia & Reading. This train leaves Philadelphia at 8:00 a. m., and is allowed 98 minutes for the 90.2 miles to Jersey City. Stops are made at Columbia avenue, Wayne Junction, Pa., and Elkins Park, 81 miles between the last named point and Jersey City, N. J., being allowed 80 minutes on the time card. As this is an important train, largely patronized by business men, every effort is made to bring it through on time. The accompanying diagram shows a graphic log of a run made by this train a short time ago. The train was made up of 8 cars, estimated to weigh about 450 tons, and was handled by a Class P-6-B locomotive No. 302. This is a two cylinder single expansion Atlantic type locomotive using saturated steam, and was built in the company's shops at Reading. The boiler is of the Wootten type, and the steam distribution is controlled by piston valves controlled by the Walschaert gear.

As far as track and equipment are concerned, the New York branch of the Reading System is well suited to high speed service; and the same is true of the Central Railroad of New Jersey, over whose tracks the Philadelphia-New York trains operate between Bound Brook, N. J., and Jersey City. The profile between Elkins Park and Bound Brook is undulating, with maximum grades of approximately 37 ft. per mile. Between Bound Brook and Jersey City there is a summit near Westfield, which is approached from the west by a grade of 21.3 ft. per mile. The curvature is generally light. Data for the log was secured with the help of an ordinary watch by noting the time in minutes and seconds of passing each mile post. While slight errors may exist for individual miles, it is believed that in no case do they exceed one second; while the elapsed time between termini is correct, as a cumulative error is impossible. The train left Elkins Park at 8:20:37, over two minutes late, and reached Jersey City at 9:36:40, over a minute in advance of schedule; the 81 miles thus being covered in 76 min. 3 sec., or at an average speed of 63.9 m. p. h.

For the first 20 miles after leaving Elkins Park, the speed was influenced solely by the grades, and the speed changes accord, in a conspicuous degree, with the variations in the profile. After passing mile post 60, speed was reduced to scoop water and to cross the Delaware river bridge, which was in process of reconstruction. Then followed some heavy work until mile post 48 was reached, after which the speed rose rapidly. The 12 miles between mile posts 45 and 33 were covered in 8 min. 46 sec., equivalent to an average of 82.2 m. p. h., while the maximum speed was a mile in 42 sec., or 85.7 m. p. h. The manner in which the speed curve follows the profile undulations between posts 38 and 33 is most interesting. After passing post 32, the speed was reduced to run through the junction with the Central Railroad of New Jersey, a short distance west of Bound Brook. Once on the Jersey Central tracks the locomotive quickly accelerated and maintained a steady speed of 60 m. p. h. on the 21.3 ft. grade east of Plainfield. Assuming a frictional resistance of 10 lb. per ton, the drawbar horse power at this point must have been about 1,300, and the total indicated horse power between 1,800 and 1,900. After passing the summit there was a rapid acceleration and the maximum speed again reached a mile in 42 seconds. A sharp reduction, presumably for a signal, occurred near mile post 10, after which the run into Jersey City continued without incident. Altogether there are eleven trains each way per day on this division, which are scheduled to run from terminus to terminus in 98 minutes. The majority of these run over the Neshaminy cut-off, which omits one stop and is a trifle shorter than the route taken by train 602, while the grades are somewhat easier. Between mile post 69 and Jersey City, however, all trains use the same line; and the service over this division is remarkable for its speed, frequency and the regularity with which it is performed.



Speed Curve of Reading Locomotive No. 302 and Profile of Division Over Which It Ran.

BRIDGE CONSTRUCTION ON THE OREGON TRUNK RAILWAY.

The construction of the Oregon Trunk railway, which was described in the *Railway Age Gazette* of March 22, involved the building of ten steel bridges, four of which are comparatively large structures. The Columbia river bridge at Celilo, Ohio, is the largest, possessing a number of unusual features, while the Crooked river bridge, near the southern end of the line, is quite unusual both in design and method of erection.

Two locations for the crossing of the Columbia river to connect with the Spokane, Portland & Seattle were considered when the Oregon Trunk line was being located. In addition to the location adopted at Celilo, another crossing about five miles farther down stream, nearer The Dalles, was investigated. The difficult and expensive approach to this site, and the greater total mileage necessary to construct, if it were used, caused it to be abandoned. The bridge was built directly over Celilo falls. Here the river narrows down to a width of approximately 2,700 ft. from shore to shore, and is bordered by high basaltic bluffs on either side. At low water the bed of the river consists of a number of basaltic islands separated by channels of swift water. The main channel near the Oregon shore is about 300 ft. wide, and the others are narrower. During high water all of these islands are submerged. The bridge consists of 2,000 ft. of plate girder spans, six riveted through spans 230 ft. long, one 250-ft. draw span, and one 320-ft. pin-connected span over the main channel. The north approach is in the form of a wye connecting at both ends with the Spokane, Portland & Seattle.

The location of these islands and intermediate channels presented an opportunity for an interesting study of the proper location of the piers. It was not possible to secure a location for the bridge crossing the main bed of the river at right angles, so it was necessary to adopt a slight skew. The piers were located so that all of them came on islands above ordinary low water. The south leg of the draw span extends over the government canal now being built around the rapids. In order to locate both the center pier and the north pier of the draw span on one of the islands that appear in the river at low water, and to provide the necessary opening over Celilo canal, the draw was designed with unequal legs. The bridge is unusual in respect to the foundations, as they were built in the dry, and it is possible to examine them each year. The piers are built of concrete with granite nosings, beltings and copings, while the approach piers on the south side are built entirely of concrete. The design of the superstructure contained no unusual features.

The erection of the structure presented some exceptional difficulties. The prevailing high winds, carrying fine Columbia river sand, make it almost impossible to work outside at times, and erection work, if possible at all, then becomes dangerous. For this reason the structure was designed to reduce as much as possible the time necessary for assembling in the field. The placing of falsework in the narrow channels was out of the question, and the spans were so designed that they could be erected by cantilevering out over the channels until it was possible to reach falsework on the other side. Special erection devices, consisting of temporary riveted tension members, were inserted between the hip joints of adjacent spans. The spans already erected then acted as anchorage for the one being erected.



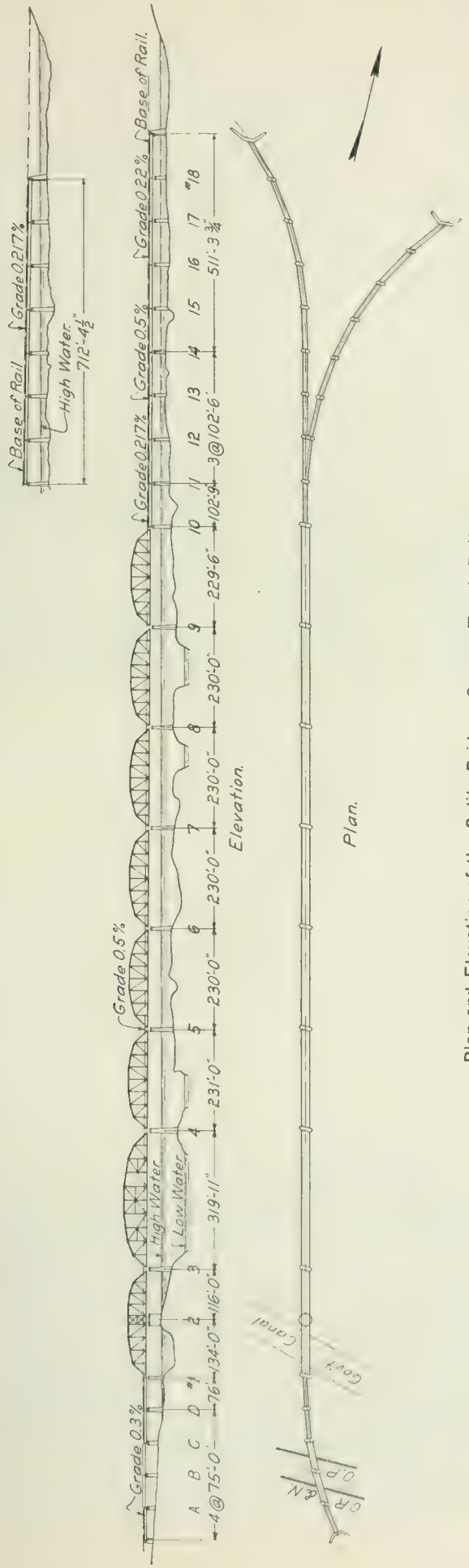
Celilo Bridge Nearing Completion.

Both a traveler and derrick cars were used in the erection of the structure, although the derrick car was found to be best suited for handling the spans of moderate length. Ground was broken for the foundations of this structure on July 9, 1910; the substructure was completed June 5, 1911, and the first train crossed the bridge January 4, 1912, the total time of construction being 17½ months.

South of Celilo the Oregon Trunk crosses the Des Chutes river three times in the distance of about 100 miles that it follows the stream. In order not to delay the track-laying by waiting to build temporary timber bridges at these points, and also across several tributaries entering the river, until material could be brought in by rail, the timber was sawed at the nearest



Construction of Celilo Bridge During High Water.



Plan and Elevation of the Celilo Bridge; Oregon Trunk Railway.

available mills in the timber belt and hauled by teams into the canyon over the very difficult and precipitous construction roads. The timber bridges were then completed, except for decks, stringers and ties, which were placed after the track was laid to the crossing. The standard timber trestle of the Oregon Trunk was used for these structures, being modified only to allow placing the permanent bridges without interference. All stringers, ties and guard rails were of Oregon or Washington fir, and all other material of Central Oregon pine or fir. The bents were composed of six 12-in. x 12-in. posts, the two outside posts being battered 2½ in 12, the two inner ones 1¼ in 12, and the two center ones being vertical. The bents are sway-braced and sash-braced with 3-in. x 10-in. plank and 12-in. x 12-in. timbers are used as sills. Six 8-in. x 18-in. track stringers with two outer jack stringers of the same size are used with a spacing of bents varying from the standard of 13 ft. 8 in. to 15 ft., the latter



Erecting Entire Span on Falsework.

spacing being used in several cases to conform better with the erection of the permanent spans.

At the first crossing of the Des Chutes the condition presented unusual difficulties which were solved in an interesting manner. To avoid following around a long "horse shoe" curve in the river at this point, the road saves distance and curvature by crossing the Des Chutes, passing through an 800 ft. tunnel and immediately recrossing the stream. The first bridge is placed at a point where the river is confined to a channel about 120 ft. in width at normal stage, through which it rushes with high velocity. Efforts to take soundings here with a 125-lb. anvil lowered from a platform suspended from a cable across the stream were entirely unsuccessful on account of the force of the current. As it was impossible to place foundations for timber bents in such a stream, a Howe truss of 120 ft. span was decided on, this truss to be erected on a suspension span which was first swung across the stream. To provide a foundation for a crib which supported the Howe truss on the south side of this stream, 2,000 cu. yds.



Celilo Bridge Construction During Low Water.

of riprap was placed on that side of the channel, using no stone smaller than 1 cu. yd. in volume. This riprap was transported across the river by a traveler running on a 1½-in. cable way. The riprap was thus brought up above the water level and the crib placed in the dry. On the north side the crib was set directly on the rock bottom in about 10 ft. of very swift water. In constructing this a raft was floated over the site on which was laid out the plan of the crib. Soundings were then taken around this outline and the crib framed to fit the bottom, which was very irregular. The lower part of the crib was assembled, floated to position and sunk by weighting it with riprap until it came to bearing on the bottom. It was then built to its full height and filled with rock. The towers of the suspension span were built on these cribs.

The bottom chords of the three trusses of the timber span were packed on needle beams and hung from the suspension cable. The middle truss was completed first, after which the needle beams were hung from it so as to largely throw the load of the other two trusses on the center truss as they were being built. As the base of the rail at this crossing is about 70 ft. above mean water level, timber bents were required on top of the Howe truss to carry the track. These were built with vertical posts so spaced as to allow the ready placing of the steel later without interfering with traffic. The truss span is approached on both sides by timber trestles about 70 ft. in height, the bents for which were set on mud sills. As an additional complication of the work here, the bridge is on a 5 deg. curve, and it was necessary to set the bents parallel to the center line of the future concrete piers, which brought them skew to the structure itself.

At the second crossing the timber bridge was about 600 ft. long and was carried on piles across the channel. Provision was also made here for placing the steel truss spans without interference and for setting the approach girders by removing the pony bents placed on top of the standard bents.

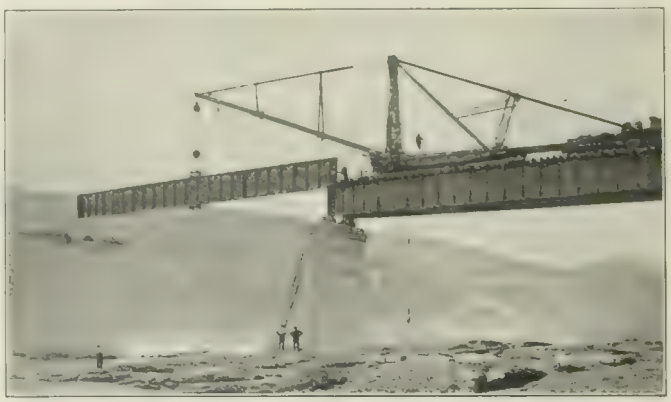
There are four concrete piers and two concrete abutments for each of these bridges. All abutments, except the north one at the first crossing, are of the U-type with the track carried on a fill, and with a small amount of reinforcement. The north abutment is also a U abutment, with an arched front wall, but the track is carried on a 3-ft. floor slab. It is 60 ft. high on the river side. The abutments were made of 1:2½:5 gravel concrete; the piers of 1:2:5 concrete in the shaft, and the copings of 1:2:4. The noses were formed by two intersecting arcs and protected by 10 in. 25-lb. I-beams, embedded in the nose with one flange exposed.

The piers, with the exception of pier II at both the first and second crossings, were based on rock, excavation being made in the open in cofferdams. At two of the piers difficulty was experienced in getting tight dams on account of the necessity of constructing them on the nearly, or quite, bare rock bottom of the river. In these cases, after satisfactorily cleaning off and preparing the bedrock, the concrete of the footing was placed under water by bucket and tremie. At pier II of the second crossing, where rock was about 40 ft. below the surface, a cofferdam of Wakefield sheet piling was driven into the sand, penetrating as nearly as possible to rock. The excavation was made inside this dam with a clam-shell. Piling was then driven and cut off under water and a concrete blanket placed under water with a bottom dump bucket. After the concrete set the cofferdam was pumped out and the pier completed in the dry, the sheeting being cut off at the top of the footing and left in to protect the pier against scour. Pier II at the first crossing was founded on a bed of big boulders and gravel.

The permanent bridges are designed for the standard loading



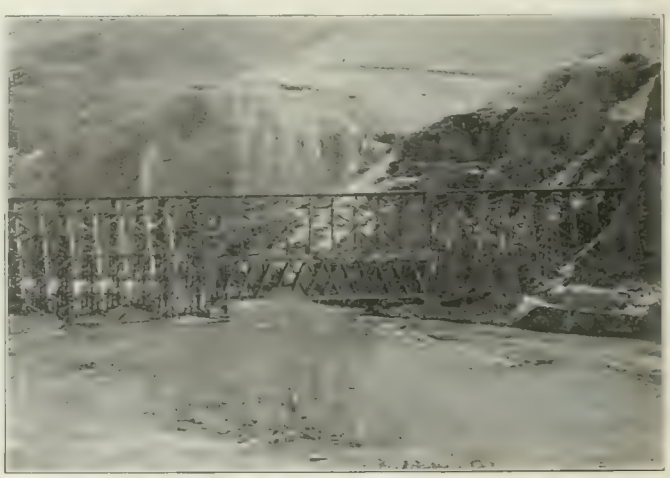
Erection of Truss Span by Cantilevering Across Deep Channel.



Placing Girder with Derrick Car.



Crooked River Arch; Oregon Trunk Railway.



Des Chutes River Crossing Showing Howe Truss with Trestle.

of the Oregon Trunk—two 188.5-ton engines followed by 5,000 lbs. per lineal foot for the trusses and one 214.5-ton engine followed and preceded by 5,000 lbs. per foot for stringers, floor beams and all girder spans.

At the first crossing there are three 75-ft. girder spans, supported by single bents on the north side, a 165-ft. Warren riveted deck truss across the channel and another 75-ft. girder on the south side. The location of this bridge on a curve, the piers being parallel to the channel, required the skewing of all spans, complicating their details somewhat. The second crossing is simpler, being on tangent and requiring three 120-ft. Warren riveted deck trusses and two 75-ft. girder approach spans. At the third crossing the grade is nearer the river and two 175-ft. Pratt riveted trusses are used. The other bridges are smaller crossings over tributary streams and through, and deck girders of from 32 ft. to 100 ft. in length are used. Girders 60 ft. and under in length were shipped after they had been assembled and riveted.

The bridge across Crooked river, three miles south of Opal City, consists of one 340-ft. arch span, with a 60-ft. deck girder approach on each end. This structure crosses Crooked river canyon 320 ft. above the water level, the walls at this point being practically vertical. The arch was erected by cantilevering out, a traveler handling the material. The method adopted for anchoring was unique, in that the adjusting device was connected to heavy bars anchored vertically into 20 ft. of concrete, and that the adjustments were made by the use of bronze bearings which were tightened or loosened as occasion demanded. This structure will be described more in detail in a later issue.

The timber bridges, and all the falsework, including the Howe truss at the first crossing of the Des Chutes, were designed and erected by the engineering department of the railway company. R. Budd, chief engineer. The permanent structures were designed by and erected under the supervision of Ralph Modjeski, chief engineer of bridges. H. M. Harps was resident engineer; M. B. Case, assistant engineer, and M. H. Combs, inspector at Celilo; W. R. Weidman was resident engineer, and Clement E. Chase, assistant engineer, in charge of work south of the Columbia river. We are indebted to Messrs. Budd, Modjeski, Combs and Chase for assistance in securing this information.

In reply to members of the Prussian parliament who urged that committees of workmen be consulted concerning the wages to be paid them, an official of the Prussian state railways declared that it was a rule to give the men opportunity to discuss questions of wages and to make suggestions. In 1910 the workmen's committees discussed 5,482 questions, and more than a third of these concerned wages. More than half of their requests were granted. So far from being without effect, the workmen value the committees so highly that they are continually asking for the establishment of new ones. In arranging prices for piece work, not the committees but a large number of men engaged in each kind of work are consulted. During the last year the higher wages had added $2,500,000 to the working expenses, and they will cost still more this year. A committee member may propose whatever he pleases. It would never occur to an official to dismiss him on that account.

WORKINGS OF THE ERDMAN ACT.*

BY CHARLES P. NEILL,
Commissioner of Labor.

The federal law, commonly known as the Erdman act, which provides a means for the mediation and arbitration of controversies affecting railways and their employees engaged in railway train service, has now been on the statute books of the United States for more than 13 years, but it may be said to have been in practical operation only about five years. During the first eight and a half years following the enactment of the law, in June, 1898, one attempt only was made to utilize its provisions. This attempt, which was made within a year after the passage of the law, proved entirely fruitless. During the past five years the provisions of the law have been invoked in nearly 60 different controversies. During that period its provisions have been invoked with increasing frequency, and from the middle of 1908 to the present time there has been only one period as long as three months during which the mediators have not been called upon to act in some pending controversy.

The list of formal applications for mediation and arbitration is given herewith. This list, however, gives an inadequate idea of the extent to which the mechanism for mediation provided in the law has been utilized, as it contains no mention of a considerable number of cases in which controversies arising over the application or the interpretation of agreements made under the provisions of the law have been brought back to the mediators and understandings have thus been reached over the matters in dispute.

In the following table the number of cases brought before the mediators under the act, the railway mileage involved, and the number of employees directly involved are shown year by year, the cases being classified according as the application came from the railway company, the employees, or from both jointly:

Year.	Applications by company.			Applications by employees.			Joint applications.			Total.		
	Number of cases.	Railway mileage involved.	Employees directly involved.	Number of cases.	Railway mileage involved.	Employees directly involved.	Number of cases.	Railway mileage involved.	Employees directly involved.	Number of cases.	Railway mileage involved.	Employees directly involved.
1899	..	.....	.....	1	.....	.....	..	.....	.....	1	.....	.....
1906	1	2,350	600	..	.....	.....	..	.....	.....	1	2,350	600
1907	5	117,850	46,350	..	.....	.....	1	5,800	1,250	6	123,650	47,600
1908	1	7,000	5,350	4	16,800	6,300	2	11,050	4,600	7	34,850	16,250
1909	2	2,200	380	5	15,370	10,705	2	19,150	3,400	9	36,720	14,485
1910	6	257,350	71,330	2	330	87	8	33,270	7,145	16	290,950	78,562
1911	4	10,440	2,830	1	70	38	3	6,850	2,685	8	17,360	5,553
Total	19	397,190	126,840	13	[2]32,570	[2]17,130	16	76,120	19,080	48	[2]505,880	[2]163,050

[2] Not including 1 case for which mileage and employees directly involved were not reported.

In spite of the large number of serious controversies successfully handled, the law may be said to be in an experimental stage, and it is too early yet to predict that it will meet the exigencies of the future as it has those of the past five years. Some of its defects have already become apparent, and in a number of aspects it can be strengthened and improved through amendment, but its success has been marked during the five years in which it has been in practical operation. In no case has there been a repudiation by either side of the award of an arbitration board. In some instances, as is inevitable, there have been different interpretations placed on certain sections of the award and there has been consequent friction in some of these instances, but the awards as a whole, it can be said, have been acceptable and lived up to by both sides.

At the time the Erdman act was passed practically all the discussion was focused on its arbitration features and little attention was given to its provisions for mediation. Experience has shown, however, that the latter are the more important and efficacious features of the law. Of the 44 cases in which mediation under the act was invoked, only 8 have been carried on to arbitration. These figures do not show the whole disproportion, however, for in each of these 8 cases the greater part of

*Abstract of part of Bulletin No. 98 of the Bureau of Labor.

the matters in controversy were settled by mediation and only a few of the points were carried to arbitration. In addition to these, four other cases have been arbitrated under the provisions of the Erdman act, these cases having been submitted to arbitration directly by agreement between the parties in controversy without first invoking the mediation proceedings of the act.

In all cases, either of mediation or of arbitration, the employees who were parties to the proceedings have been organized and have always been represented by the officials of their respective organizations. In mediation proceedings they have always been represented by officers of the national associations. Although the law applies equally to organized and unorganized workers, it is difficult to see how its provisions could be carried out with any degree of satisfaction except in cases where organized employees are dealt with. Much of the success which has marked the operation of the law thus far is probably due to the fact that the classes of employees with whom it deals are strongly organized and well-disciplined groups.

PROCEDURE IN A CASE OF MEDIATION.

In the 48 cases of mediation and arbitration in which the act has been invoked, applications have in 19 instances been made by the railway companies involved, in 13 cases by officers of organizations representing the employees involved, and in 16 cases by representatives of both parties to the controversy. The applications made by the employees approach in number those made by the companies, but cover proportionately a much smaller mileage and involve a smaller number of employees. When a really serious strike is threatened it is naturally the company rather than the employees which involkes the friendly offices of the mediators.

In a few cases applications, either made jointly or by the employees alone, have been made before a strike vote has been taken. In such instances the mediators, in deciding upon their action, have been governed by the gravity of the existing situation. The law itself provides that its machinery shall be utilized only when traffic either has been actually interrupted or is seriously threatened with interruption. But the law does not require the taking of a strike vote as a preliminary to invoking its provisions, and in each case the mediators are left free to exercise their own judgment as to whether or not the conditions assumed by the law exist. It is sometimes undesirable and unwise to compel the employees to go to the expense of polling the road on the question of a strike, and at the same time to stir up the unrest and friction attendant upon that process. The mediators, therefore, have only required that they be satisfied that the parties to a controversy can not themselves reach an agreement, and that the dispute is of such a character that it might, if not settled, bring about a strike with consequent serious results to the public dependent upon the road involved. Applications of this kind, however, are exceptional. In the great majority of cases in which intervention is sought strike votes have actually been taken and strikes seriously threatened before the cases were taken up under the provisions of the Erdman act.

It is essential, if the Erdman act is to be effectively administered, that action be taken quickly and that as little formality as possible be required in the matter of making and acting upon applications for mediation.

Almost invariably, no matter by which side the application has been made, the offer of the mediators' services is at once accepted. When both sides have agreed to mediation proceedings they are as a rule begun very promptly, usually the only delay being that which is involved in getting the parties concerned together at the place decided upon.

The proceedings are purposely kept as informal as possible, in order that they may be the more readily adapted to the exigencies of any given case. Conferences are always held with the two parties to the controversy separately, and a joint meeting is never arranged until either a complete settlement of the questions in dispute or an agreement to arbitrate has been brought about by the mediators and agreed to in writing by the two parties.

Ordinarily the mediators begin by meeting the representatives of the side by which the mediation was invoked. After learning the matters at issue and discussing these in a general way, a conference is held by the mediators with the other party to the dispute. Successive conferences are then held by the mediators with one or the other party alternately, or it may happen that several successive conferences are held with one side before again conferring with the other side. Some cases have been brought to a successful termination within a few days, but these are exceptions; from one to two weeks is more nearly the rule. In some of the large cases where conditions were peculiarly acute, and a tension existed which made it important to secure a settlement at the earliest possible moment, conferences have for days at a time been carried on throughout the entire day and far into the night; and even what were practically all-night sessions have not been unusual.

While the procedure usually follows the above lines, any variation which seems desirable may be introduced, and the only fixed and unvarying rule is that neither side shall know what concessions the other side is willing to make unless and until an amicable agreement is reached. This rule has been adopted because both sides are more likely to make concessions if there is no danger that these concessions may later on be used to their disadvantage if the case should go to arbitration. It is always possible that the mediation proceedings may prove ineffective and that the case may go to arbitration. In that event, if any concessions offered by either side were known to the other side and could be adduced before the arbitrators as offers once made, it is obvious that the side which had offered the concessions in the mediation proceedings would be to that extent at a disadvantage in arbitration proceedings. The rule above referred to prevents this difficulty and leaves both parties free to suggest concessions without fear of future prejudice. In the event of a failure to secure a settlement through mediation in any given case, neither party at the end of the proceedings would have any definite knowledge of what concessions the other had been willing to make, and both are therefore in the same relative position as they were when the proceedings began. Neither has gained any tactical advantage, nor has either had its side of the case prejudiced by what has passed during the mediation proceedings.

No minutes are taken nor are any formal records kept of what occurs in the meetings between the mediators and the respective parties to the controversy. Ordinarily the only thing which becomes a matter of formal record is the final articles of settlement agreed to and signed by the parties in dispute. Unless requested or authorized to do so by the parties to the controversy, the mediators do not make public the terms of settlement agreed upon through mediation.

ARBITRATION UNDER THE ERDMAN ACT.

The law provides that in the event the efforts to secure an agreement through mediation should prove unsuccessful the mediators shall endeavor to induce the parties to the controversy to submit their differences to an arbitration in accordance with the provisions of the law.

Under the provisions of the law one arbitrator is selected by each party to the controversy, and the two thus chosen select a third, provided they are able to agree upon such third arbitrator within five days after their first meeting. In the event of their failure to agree upon the third arbitrator within these five days, he is named by the presiding judge of the Commerce Court and the Commissioner of Labor acting together.

From January, 1907, up to the present time there have been 12 arbitrations under this law. In only three cases out of the 12 have the two arbitrators appointed, respectively, by the parties to the controversy been able to agree upon a third arbitrator. The selection of the third arbitrator by the mediators has been a difficult and embarrassing duty and one that involves a considerable degree of responsibility. It is practically inevitable that the third arbitrator is unfamiliar with the questions at issue. The contracts between the railway companies and the em-

ployees engaged in train operation are complex agreements involving many matters of detail which it is important for an arbitrator to understand, but of which few persons have any correct appreciation unless they have been familiar with railway operations at first hand. Obviously anyone having this familiarity would be either a former manager or operating official of a road or a former employee who had been engaged in train operation. While the mediators could unquestionably find and agree upon some one of either of these classes who in their judgment would be absolutely fair-minded, it is obvious that the appointment of such person might be looked upon with distrust by one or the other side to the arbitration. If the other two arbitrators should differ, each one leaning to the side by which he had been appointed, and the third arbitrator, joining with the one appointed by the interest with which he had formerly been affiliated, should render an award favorable to that side, there would more than likely be an added feeling of dissatisfaction with the award on the part of the interest which had lost by the decision, and criticism on its part of the mediators for making such appointment. In any event, dissatisfaction with an award and consequent criticism of the appointment of the third arbitrator is to be expected; and this would not be a factor to be taken into consideration by the mediators in choosing an arbitrator were it not that the character of their work in mediation is delicate, and anything tending to create distrust of their fairness or their judgment on the part of either employer or employee would lessen their usefulness and hamper their work under the law. In a word, it is necessary that the person appointed by the mediators shall not only in their judgment be fair-minded in fact, but shall be free from any present or past affiliations which might justify either side in doubting his actual fair-mindedness.

It would, of course, be particularly unfortunate if by any chance the mediators should unknowingly appoint as third arbitrator some one who during the five days spent by the two arbitrators first appointed in considering a third arbitrator had been considered and rejected by them. To avoid this possibility, the meditators, when notified by the two arbitrators of their inability to agree upon a third arbitrator, request that they be given a list of the names, if any, that have been discussed or proposed and rejected. In some instances, in the hope of simplifying their own task and of finding a third arbitrator who would unquestionably be acceptable to each of the other two arbitrators, the mediators have asked each of the arbitrators already appointed to submit a list of names of persons who would not only be satisfactory to the side that had chosen the arbitrator making up the list, but whom that arbitrator had a right to feel would be entirely acceptable to the other side. The mediators had hoped that perhaps one name might appear on both lists, and by the selection of that name they could assure themselves that the appointee was entirely satisfactory to the other two arbitrators. This hope, however, has never been realized.

The railway companies have usually frankly named as their arbitrator one of the operating officials of the road or roads involved, or an operating official of a neighboring road, and the organizations representing the employees have on their part frankly selected as their arbitrator one of their own officials. While on the face of it this might seem a matter for criticism, it is not at all certain that it is not after all the wiser course to pursue. Ordinarily each side is convinced of the fairness of the position that it has taken in the controversy which brought about the dispute and led up to the arbitration; and each side probably feels that the inability of the other side to see the fairness of the opposing contention is due to a natural bias brought about by its own interests. Each side, therefore, in choosing an arbitrator naturally selects one who will look at the question from its own standpoint. Unavoidably, therefore, the third arbitrator really becomes the umpire and the other two arbitrators, through what might be termed an honest bias, become more or less advocates of the contention of the side by which they have been respectively appointed.

The questions involved in most of these controversies are complex and technical far beyond the ordinary wage controversy. The agreements regulate every phase of wage rates and working conditions. Questions under any or several of these provisions may arise in any arbitration, and arbitrators unfamiliar with the complexities might easily, if in their deliberations after the hearings are closed they are unaided by the presence of representatives of both parties, be very much confused over some of the questions, and might unwittingly render a decision the results of which would be far different from what they anticipated or desired. It may be argued, therefore, that there is considerable advantage in having present during the period of deliberation and the framing of an award two arbitrators who are themselves entirely familiar with every detail of the questions involved and who can foresee and point out the exact effect of any given decision proposed by the third arbitrator.

Section 4 of the act provides for an appeal to the courts from the decision of the arbitrators. After the award has been filed in court, the parties to the controversy are given only 10 days within which to file exceptions thereto preparatory to an appeal from the decision of the arbitrators; and the only basis of an appeal is for "error of law apparent on the record."

The right of appeal from the award of the arbitrators is, first, to the circuit court of the United States; and after the decision of the circuit court either party has a further right of appeal to the circuit court of appeals. The only instance in which an appeal has been taken from an award of the arbitrators to the court was in one of the earliest cases of arbitration under this law. In this case, after long litigation, the parties to the controversy reopened direct negotiations with one another and finally reached an agreement, whereupon the litigation in court was abandoned and the dispute was thus finally disposed of fourteen months after the decision had been rendered by the arbitrators.

As was clearly demonstrated in this case, a provision for court appeals in an arbitration act must inevitably either remain a dead letter or defeat the very purpose of the law itself. Arbitration is a quasi-judicial method adopted for the speedy settlement of industrial controversies. Industrial controversies of the kind contemplated in this act as well as industrial controversies in general relate to questions which if they are to be settled effectively must be settled promptly. They cannot be settled to the satisfaction of either side by any such lengthy process as is involved in litigation in one or more courts. This fact was so clearly demonstrated in the case just described that not only has no other case been carried from the arbitrators to the courts, but, on the contrary, practically all of the agreements to arbitrate made since that time have been accompanied by further agreements between the parties to the controversy to waive the right of appeal to the courts and to accept the decision of the arbitrators as final and binding.

Cases of Mediation and Arbitration Under the Erdman Act, June 1, 1898, to December 31, 1911.

Application.			Railways involved.		Employees involved.					
Case No.	Date received	Made by—	Name.	Approximate mileage.	Class.	Approximate number.	Represented by—	Date mediation conferences began.	Settled by—	Date mediation agreement was reached.
1	June 23, 1899	Employees.....	8 companies in Pittsburgh district.	.....	Switchmen...	.....	B. R. T.	.....	.....	...
2	Dec. 22, 1906	Company.....	Southern Pacific (Atlantic System).	2,350	Firemen and enginemen.	600	B. L. F. & E.	Dec. 27, 1906 Jan. 5, 1907	Mediation and arbitration.	Jan. 7, 1907

Cases of Mediation and Arbitration Under the Erdman Act, June 1, 1898, to December 31, 1911 (Continued).

Case No.	Application. Date received.	Made by—	Railways involved. Name.	Approximate mileage.	Employees involved. Class.	Approximate number.	Represented by	Date mediation conferences began.	Settled by—	Date mediation agreement was reached.
3	Feb. 19, 1907	Company and employees jointly.	Southern Pacific (Pacific System).	5,800	Telegraphers.	1,250	O. R. T.	.....	Arbitration	.....
4	Mar. 28, 1907	Company.....	38 Western lines.....	101,500	Conductors... Trainmen.	42,500	O. R. C..... B. R. T.	Mar. 30, 1907	Mediation.	Apr. 4, 1907
5	Apr. 24, 1907	Company.....	Denver & Rio Grande..	2,550	Conductors... Trainmen. Switchmen.	1,200	O. R. C..... B. R. T. B. R. T.	May 5, 1907	Mediation.	May 17, 1907
6	Aug. 3, 1907	Company.....	Colorado & Southern...	1,100	Trainmen....	200	B. R. T.....	.....	.....	.....
7	Sept. 17, 1907	Company.....	Missouri Pacific	6,350	Engineers....	1,150	B. L. E.....	Sept. 20, 1907	Mediation.	Oct. 1, 1907
8	Nov. 20, 1907	Company.....	Missouri Pacific	6,350	Firemen and enginemen.	1,300	B. L. F. & E.	Nov. 26, 1907	Mediation.	Nov. 27, 1907
9	Feb. 25, 1908	Company.....	Southern	7,000	Engineers.... Firemen and enginemen. Conductors. Trainmen. Switchmen. Telegraphers. Machinists. Blacksmiths. Boiler makers. Carmen. Sheet metal workers. Maintenance of way employees.	5,350	B. L. E..... B. L. F. & E. O. R. C. B. R. T. B. R. T. O. R. T.	Mar. 10, 1908	Mediation.	Apr. 1, 1908
10	Feb. 27, 1908	Employees.....	7 Southern roads.....	11,500	Engineers....	2,350	B. L. E.....	.....	.....	.....
11	Mar. 2, 1908	Employees.....	3 Southern roads.....	1,050	Engineers....	300	B. L. E.....	.....	.....	.....
12	Mar. 14, 1908	Employees.....	Chicago Great Western.	1,350	Engineers.... Firemen and enginemen. Conductors. Trainmen. Switchmen.	1,500	B. L. E..... B. L. F. & E. O. R. C. B. R. T. S. U. N. A.	.....	.....	.....
13	July 9, 1908	Company and employees jointly.	Chicago, Rock Island & Pacific.	8,000	Telegraphers.	1,300	O. R. T.....	July 29, 1908 Aug. 12, 1908	Mediation.	Aug. 15, 1908
14	Nov. 19, 1908	Company and employees jointly.	Missouri, Kansas & Texas	3,050	Engineers.... Firemen and enginemen. Conductors. Trainmen. Switchmen.	3,300	B. L. E..... B. L. F. & E. O. R. C. B. R. T. B. R. T.	Dec. 17, 1908	Mediation.	Jan. 1, 1909
15	Nov. 23, 1908	Employees.....	Pennsylvania Lines West of Pittsburgh.	2,900	Engineers....	2,150	B. L. E.....	Nov. 30, 1908	Mediation.	Dec. 4, 1908
16	Feb. 19, 1909	Employees.....	Pennsylvania (Lines East of Pittsburgh).	5,300	Telegraphers.	3,000	O. R. T.....	.....	.....	.....
17	Feb. 26, 1909	Employees.....	El Paso & Southwestern	900	Telegraphers.	150	O. R. T.....	.....	.....	.....
18	Mar. 1, 1909	Employees.....	Pennsylvania Lines (East and West).	8,200	Firemen and enginemen.	7,300	B. L. F. & E.	.....	.....	.....
19	Mar. 12, 1909	Company.....	Texas & Pacific.....	1,900	Engineers....	300	B. L. E.....	.....	.....	.....
20	May 22, 1909	Company.....	Georgia	300	Firemen and enginemen.	80	B. L. F. & E.	May 25, 1909	Mediation and arbitration.	May 29, 1909
21	July 15, 1909	Employees.....	Huntingdon & Broad Top Mountain.	70	Engineers.... Firemen and enginemen. Conductors. Trainmen.	95	B. L. E..... B. L. F. & E. O. R. T. B. R. T.	.....	.....	.....
22	Sept. 15, 1909	Employees.....	El Paso & Southwestern.	900	Trainmen.....	160	B. R. T.....	Sept. 22, 1909	Mediation.	Sept. 25, 1909
23	Nov. 24, 1909	Company and employees jointly.	13 Northwestern roads..	13,000	Switchmen...	2,000	S. U. N. A..	Nov. 29, 1909	.....	.....
24	Dec. 8, 1909	Company and employees jointly.	Illinois Central, Indianapolis Southern and Yazoo & Mississippi Valley.	6,150	Telegraphers.	1,400	O. R. T.....	Dec. 13, 1909	Mediation and arbitration.	Dec. 17, 1909
25	Jan. 6, 1910	Company and employees jointly.	8 Chicago roads.....	14,450	Switchmen...	3,100	S. U. N. A..	Jan. 12, 1910	Mediation and arbitration.	Jan. 19, 1910
26	Jan. 8, 1910	Company and employees jointly.	Cleveland, Cincinnati, Chicago & St. Louis.	2,300	Telegraphers.	1,050	O. R. T.....	Jan. 24, 1910	Mediation and arbitration.	Jan. 29, 1910
27	Jan. 22, 1910	Company and employees jointly.	Baltimore & Ohio Southwestern.	900	Telegraphers.	400	O. R. T.....	Jan. 27, 1910	Mediation and arbitration.	Feb. 17, 1910
28	Mar. 3, 1910	Company.....	Baltimore & Ohio.....	4,400	Conductors... Trainmen. Switchmen.	6,400	O. R. C..... B. R. T. B. R. T.	Mar. 4, 1910	Mediation.	Mar. 11, 1910
29	Mar. 15, 1910	Company.....	52 Western roads.....	110,000	Firemen and enginemen.	26,000	B. L. F. & E.	Mar. 17, 1910	Mediation and arbitration.	Mar. 23, 1910
30	Apr. 6, 1910	Company.....	Southern Ry.	7,000	Telegraphers.	1,650	O. R. T.....	Apr. 7, 1910	Mediation and arbitration.	Apr. 15, 1910
31	Apr. 23, 1910	Company and employees jointly.	Southern Pacific (Atlantic System).	2,350	Telegraphers.	300	O. R. T.....	May 27, 1910	Mediation.	July 15, 1910
32	Apr. 25, 1910	Company and employees jointly.	Seaboard Air Line.....	3,000	Telegraphers.	600	O. R. T.....	May 5, 1910	.....	.....
33	May 31, 1910	Company and employees jointly.	Missouri Pacific	7,200	Telegraphers.	1,050	O. R. T.....	.....	Arbitration	.....
34	June 16, 1910	Employees.....	Gulf & Ship Island.....	300	Telegraphers.	50	O. R. T.....	.....	.....	.....
35	June 16, 1910	Company.....	13 Southern roads.....	19,950	Conductors... Trainmen. Switchmen.	12,500	O. R. C..... B. R. T. B. R. T.	June 16, 1910	Mediation.	July 2, 1910
36	July 16, 1910	Company and employees jointly.	Virginian	470	Engineers....	75	B. L. E.....	July 19, 1910	Mediation.	July 23, 1910
37	July 18, 1910	Company.....	Central Vermont	400	Conductors... Trainmen.	180	O. R. C..... B. R. T.	.....	.....	.....

Cases of Mediation and Arbitration Under the Erdman Act, June 1, 1898, to December 31, 1911—(Continued).

Application.			Railways involved.		Employees involved.					
Case No.	Date received.	Made by—	Name.	Approximate mileage.	Class.	Approximate number.	Represented by—	Date mediation conferences began.	Settled by—	Date mediation agreement was reached.
38	Sept. 20, 1910	Employees.....	Birmingham Southern..	30	Engineers....	37	B. L. E.....	.....	.....	.....
39	Sept. 24, 1910	Company and employees jointly.	Denver & Rio Grande..	2,600	Firemen and enginemen.	570	B. L. F. & E.	.....	Arbitration	.....
40	Dec. 15, 1910	Company.....	63 Western roads.....	115,600	Engineers....	24,600	B. L. E.....	Dec. 17, 1910	Mediation.	Dec. 24, 1910
41	Mar. 4, 1911	Company.....	Denver & Rio Grande..	2,600	Engineers....	570	B. L. E.....	Mar. 10, 1911	Mediation.	Mar. 22, 1911
42	Mar. 9, 1911	Company.....	Cincinnati, New Orleans & Texas Pacific.....	340	Firemen and enginemen.	300	B. L. F. & E.	.....	Mediation.	Mar. 25, 1911
43	Apr. 1, 1911	Company and employees jointly.	Coal & Coke	200	Engineers.... Firemen and enginemen. Conductors. Trainmen.	105	B. L. E..... B. L. F. & E. O. R. C. B. R. T.	.....	Arbitration	.....
44	May 27, 1911	Company.....	Southern	7,000	Firemen and enginemen.	1,800	B. L. F. & E.	May 29, 1911	Mediation.	June 10, 1911
45	Oct. 22, 1911	Company and employees jointly.	Baltimore & Ohio.....	4,400	Telegraphers.	1,950	O. R. T.....	Oct. 24, 1911 Oct. 26, 1911	Mediation.	Nov. 7, 1911
46	Nov. 11, 1911	Employees.....	Montpelier & Wells River and Barre R. R.	70	Firemen and enginemen. Conductors. Trainmen.	38	B. L. F. & E. O. R. C. B. R. T.	.....	.....	.....
47	Nov. 22, 1911	Company.....	New Orleans & Northeastern, Alabama & Vicksburg, Vicksburg, Shreveport & Pacific	500	Engineers....	160	B. L. E.....	Nov. 27, 1911	Mediation.	Dec. 7, 1911
48	Dec. 29, 1911	Company and employees jointly.	Chesapeake & Ohio.....	2,250	Telegraphers.	630	O. R. T.....	Jan. 4, 1912	Mediation.	Jan. 13, 1912

CONTROL OF SUPPLIES BY THE SUPPLY DEPARTMENT.

BY E. T. MCVEIGH,
Storekeeper, Grand Trunk Railway.

In saying that the supply man should have more full and complete control of the supplies, we say a thing that will be scoffed at by all the men who have the idea that *they* are the people who are doing the real things on the railway; and when you come to think of it that means pretty near all of them. To try to make my meaning clear, and at the same time show that there is method in my madness, I will first use the stationery part of the supply department as an illustration.

The executive appoints some individual to the position of stationery agent and keeper of the stationery stock. He receives requisitions for the supplies from the different offices, made up by a junior clerk and approved by a chief clerk or other minor official, who signs them, as a general thing because the office boy has made them ready for him to sign. The name signed or stamped on requisitions is sufficient warrent for the stationery agent to issue material. Outside offices, such as line agents, etc., send their requisitions to trainmasters or assistant superintendents whose clerks sign them, and forward them to the stationery agent for him to fill. In the case of the higher officers the supplies are issued on the judgment of the office boy, and in the case of the line officer or that of the agent himself at very small stations, where he would naturally be a very small man, or on the judgment of the younger member of the staff at larger stations. Oh, yes, I know I have said the line requisitions go to trainmasters, or assistant superintendent, but as not one in ten of the men holding these positions know anything about what quantity of such supplies are required at a station of any given class, and as they leave the approval of the requisition to their clerks, anyway, who know much less about the matter, this leaves the issue of many thousands of dollars' worth of supplies each month to the judgment or caprice of the office boy or junior clerks. Some of you may have noticed that these younger "Jim" Hills are, at times, capricious.

Now, suppose when we appoint our stationery agent we have him inform himself as to who he is supplying with material, have him become acquainted with his road, classify the offices and stations, and let the requisitions go direct to him, let him analyze them, and use his judgment in filling them. Of course all officers and agents would have the right to appeal to higher authority when they felt they were not being treated right; and it would then be up to the stationery man to make good his position, or back down. But we would be getting full returns for the money paid our stationery agent and his staff.

Why should this plan work out more satisfactorily than the one followed at present on most of our larger roads? The present method is something very like what I have outlined above. Even supposing the trainmaster, assistant superintendent or division superintendent has knowledge of the requirements in this line of his line offices, and does give some personal attention to the requisitions going through his offices, he does not keep a record of the requisitions he signs, and can make no comparison between those he signs this month and the ones he signed last month, so he is not in a position to criticize intelligently. Then, any single requisition for stationery aggregates a comparatively small amount in cash value, and a busy trainmaster, or superintendent, with large and important affairs on his mind, must naturally view such things as small and cheap. Even if he has the knowledge he has neither the time nor inclination to go carefully into some thousands of items with a view to saving a very small amount of money. And without records of what has been supplied in previous months he cannot do it intelligently, anyway.

Now, against this plan let us glance at how it could be done by a stationery agent with a proper knowledge of his business. In the first place, this is a matter of first interest to him. It is his business, he knows where his stuff comes from, he has knowledge of its cost, and he is, or should be, deeply interested in where it goes. He has, or will quickly acquire, a general knowledge of the quantities required to run any class of office. He has his records of quantities previously supplied, and can intelligently criticize the quantities asked for, and, knowing that the responsibility is his, he will be careful not only to supply no more than he can help, but to supply enough. Then, the stationery man, having control of the stationery, could make an annual inspection of offices and stations, and collect surplus supplies. And let me ask just here if he came into *your* office on such a quest today would he find anything to take away?

Is there any good reason why this plan would not work out to the satisfaction of all concerned? We have the stationery man; he is paid to look after the stationery; why not let him do it? And is there any good reason why trainmasters and superintendents should relieve the office boy, the agent and the stationery man of responsibility in a matter of this kind? Let the cobbler stick to his last.

As an abject lesson, let me tell shortly of a case that came under my notice a few years ago. A large railway system took

over a smaller road. It was in order for the small road to get in line and use the large system forms. The stationery agent was instructed to send out the necessary supplies, and he took a working time card of the small road, made a list of train stops, and sent to each a full station equipment. Now, this small road ran through a new and unsettled country, and 50 per cent. of the train stops were flag stations, many of them with not even a caretaker in charge. Is it necessary to enlarge on this? And don't blame the stationery man, he was only following along the lines laid down for him. He had never been held responsible for goods *sent out,* that part was up to some one else. Not very clear just who, but not him, anyway. As a matter of fact, he had really never had control of his business, and his company had never made proper use of him.

So much for the stationery part of our railway supplies. But it is after all a simple matter, and easily disposed of compared with general supplies. Just where to begin in dealing with them from the view point of more complete control by the supply men is not clear when you want to say what is necessary, and yet not confuse the issue by a multiplicity of words.

I have in mind a matter that came under my notice in the office of a railway storekeeper a few weeks ago, and it might be considered to have a bearing on the case. There came to the storekeepers' desk a requisition form filled out in lead pencil. On looking it over to see what it called for the storekeeper found this.

"To Mr. J. Doe.
"Dear Sir:—
"All culverts and bridges on my district O. K. at present time.
(Sgd.) J. Smith, Foreman.

"Approved,
"R. Roe,
"Superintendent."

The real names are not given for reasons easily understood. It was evident that Foreman Smith was a little shy on note paper, and had sent his report in on the paper he had. But it happened to be a requisition form, so the superintendent's clerk promptly "approved" it with the name of his chief, and sent it on to the storekeeper.

My reason for relating this little incident is that it seems to me to throw a side light on the value of the approval of requisitions by officials other than the maker of them. Any railway storekeeper could show scores of requisitions where the "approval" means just as much, and as little, as in the case cited. But the storekeeper, like the stationery agent, has no option but to send out the material called for. Now, what are we going to do? The railways have, and pay for, a supply department, but that department has no authoritative control over the supplies other than to procure and hand them out on requisitions approved much like that we have glanced at. Yet we must have them approved by some one, or so we honestly believe.

These things are problems of vast importance, for they deal with money value that runs into many millions, and knowledge that will help solve them is of value and heartily welcome. Mere criticism without suggestions as to improved methods is cheap, and of small value. The larger the railway system the greater the problem, and a method that might greatly reduce the problem on a small road might be of little real value on a larger one. There came under my notice a few years ago an attempt to secure better control of supplies, and it may be worth setting down. The railway in question was a small one, under a thousand miles long. The general manager was naturally in closer touch with details than would be the manager of a larger road, and he became very much dissatisfied with his supply methods. So with a view to improving them he appointed a general storekeeper, giving him full charge of all material and supplies, including stationery. The man he appointed was one thoroughly familiar with the road, he knew personally every agent on the line, and had a general knowledge of the volume of business done at each station. And he also knew the shops, and had good knowledge of the work done in them. His first move after his appointment was to go to his manager with this proposition: No material or supplies of any kind were to be ordered than from his (the storekeeper's) requisitions. All requests for materials and supplies were to come to him, no matter by whom originated, or by whom approved. The storekeeper's requisitions would be divided into two classes, A and B. On the "A" requisition would appear all of the material and supplies that the storekeeper had positive knowledge were required for the economical operation of the road. This requisition was to be passed on to the buyer at once, and the items ordered, the storekeeper to be held strictly responsible for each and every item, his half yearly inventory, and bills payable, to be the criterion of business done.

On the requisition "B" would appear all items that the storekeeper had not positive knowledge of, such as new machinery, equipment, rails, ties, new bridge material, material for new buildings, furniture, etc., and this requisition would remain on the general manager's desk for his careful consideration, and none of the items would be ordered until authorized by him. The storekeeper would, of course, handle such material when ordered, but would not be held responsible for its purchase.

The idea was to relieve the general manager from the necessity of attempting to pass judgment each month on the thousands of items of miscellaneous supplies that must be purchased, but leave such items as he could hold up, if so disposed, in a form that would enable him, in the least possible time, to judge intelligently of them.

The general manager finally adopted this plan, and I have before me some figures dealing with the business done under this arrangement. These figures were obtained from the auditor of road in question, and show, among other things:

1. That the stock of stationery on hand was reduced 5 per cent. and held down to the new basis for six years.

2. That the general supply stock on hand was reduced to $200 worth per mile of road operated, and held at that.

3. That the store's cost of ordering, receiving, caring for, distributing in detail, and accounting for supplies was 1⅞ per cent. on value of issues.

There are many other items of information all tending to a good showing, and I have heard railway men and others, credit this road with a high degree of efficiency. This was only a small road, and, of course, we on the larger systems claim that it is impossible to conduct our business on any such plan as that hinted at here. But is this true? We are leaning more and more each year to the divisional plan of organization in everything except the supply departments, and there are many reasons given why it cannot be applied to it. But is there any good reason why the divisional storekeeper should not have complete control of all the material and supplies, other than stationery and fuel on, coming on, and going off his division?

It has been laid down as a rule that all buying and selling for the company, or of its material, shall be done by the purchasing agent, who has been appointed for that purpose. It was realized early in the game that it led to confusion, and left the door open to loss in many ways, to allow persons other than those to whom it is their first care and business to either buy or sell. To that extent, and at that end, the supply department has control of its business. Now, the buying and selling is but one step, and not the most important step, in this matter. The deciding on the best thing required for a given piece of work, the listing of the thing intelligently, the receiving, inspecting, taking care of, disbursing, and accounting for it, are many steps, each of them of great importance. Each of these, with the exception of the first, and even that half the time, are functions of the supply department man, and are performed by him, but there has grown up on our larger roads a system, or plan, whereby a large percentage of the supplies and material are removed beyond the control of the supply men before it is actually put to use, and this we claim is not good business. At one end we have complete control, at the other, and perhaps the most im-

portant end, we have not. It is true that this plan relieves us of much responsibility, but we are not here to shirk our responsibility, we do not ask to be relieved of it, and the object in creating the supply department is, to an extent, defeated when we are so relieved. We fully appreciate the importance of having small stocks of supplies at points other than headquarters and the economy of having them looked after by the clerk of the foreman in charge, rather than appointing a special man under the supply department to do so, as the clerk will be there anyway. But we do claim that the supply man on that division should not lose general jurisdiction over these supplies, no matter under whose nominal control they may be, even if, as a matter of bookkeeping they are written off into a sub-stock. That there are men outside the supply department who desire that they should be removed from, and remain outside of, the supply man's jurisdiction, is a good and sufficient reason why they should *not* be so removed. The man who does not like to be watched at his work is just the man the foreman must keep his eye on.

Let me cite a case in point. On a certain road the supply man found that a department had, without good and sufficient reason, increased the quantity and value of the material and supplies on hand for the use of that department something over 100 per cent. These supplies had been written off to the department sub-stock and were no longer under the supply man's control, but in the general interest he called attention to the condition, and the matter was referred to the head of the deparment. The action of the storekeeper was resented, he was accused of attempting to exceed his authority, the material was scattered out of sight, and the storekeeper only succeeded in making a few enemies for himself. The evil gains a footing through allowing it to be understood that unused material may be removed from the supply man's jurisdictions. We have the car man to look after cars; enginemen to look after engines; trackmen to look after track, and so on through the whole organization. They each do their own work, and help each other when such help is necessary, but they are each held responsible for their own part, from beginning to end. Could they be held responsible if they did not have complete control? And could any management hope to get satisfactory results with anyone of them doing independently a portion of the work for which the other is paid and held responsible? I think not.

The question is, are our railways today making the best use possible of their supply department organization. For, after all, a department is created and maintained to help either to save, or make money. Are they taking full advantage of the supply man's local knowledge of requirements, and his natural conservative interest in supplies, or are they disregarding him, and destroying his interest in the economical supplying of material by making him simply a bookkeeper, and a medium through which the departments will secure what they think they want on requisition "approved" in the manner hinted at here. I claim that they are doing this, and losing money by so doing.

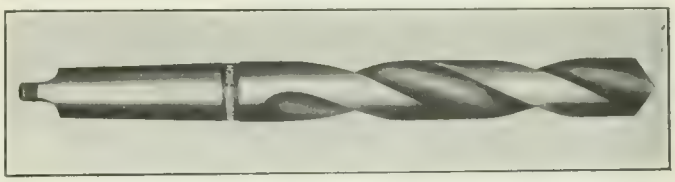
The storekeeper should be given the right to criticize all requisitions and refer them back, he should be encouraged to do this. I am writing of regular supplies now, not cases of emergency. Most storekeepers know what an emergency is about as well as other officials. And his reports of excessive quantities used receive proper attention, not merely referred to the head of the department in fault and pigeon-holed by him. If the storekeeper goes too far along these lines he will soon be tripped up; but when he has the right to do these things, such action on his part will not be resented as merely "butting in," and it will have a tendency to make every one more careful. When the maker of the requisitions knows that while it is easy enough to get his requisition "approved," as it is now, it must also pass the criticism of the man who supplied him with the last lot, he will be careful not to make his requisitions excessive.

Water will find its level, and in reaching it, it flows along the line of least resistance, and man, being 75 per cent. water, is prone to do much the same thing. And today on many of our railways there is an unwritten understanding that the storekeeper will refer back, but he is not given the *right* to do it. To what extent he will do it, and what success he meets with in doing it, depends on the friendly feeling there may happen to be between him and the superintendent, trainmaster, master mechanic, and many others. But this is not right. Friendliness of this kind will either wear thin in spots, or degenerate into that good fellowship that will sacrifice the company's interest, rather than question the action of a "good fellow." The storekeeper cannot afford to be called a "good fellow" in that sense, and it is a poor foundation on which to build, in conducting either your own or the company's business.

I am fully aware of the fact that in advocating increased work and responsibility for the men of the supply department, I may not please some of the "weak sisters." It is much easier to jog along letting anyone who will do a portion of our work, no matter who pays; but this question is bigger than either individuals or departments. It concerns the railway as a whole, and we must try to grow big enough to consider the whole.

FORGED HIGH SPEED TWIST DRILL.

In recent years there has been a decided change in drilling methods and large economies have resulted from these improvements. Slow drilling has been superseded by high speed drilling, which has increased the output; but it is desired to increase the feed of the high speed drills in order to produce an economical combination giving a still greater output. The new high speed forged drill which has been placed on the market by Joseph T. Ryerson & Son, Chicago, and called the Ryerson-Rich drill has been designed to give such service. It is made of hammered or forged steel and a ⅞ in. or 1 in. drill will run at 250 r. p. m. with twice the allowable feed of the common type of high speed drill running at 400 r. p. m. The history of the development of this new drill is interesting. The first high speed drill was made of plain flat steel and was used principally for drilling rails. This was a decided step in advance, but it was necessary to use a bushing to center the drill in the chuck, and a separate bushing was used for each size of drill. This objection was overcome by making



Ryerson-Rich Forged Twist Drill.

a flat bitted drill which fits in grooves and in the jaws of the chuck and does away with all of the bushings. This was successful and is still in use. The flat twisted drill was next made and it met with similar success on account of its low cost and strength as compared with the other types. This was found suitable for rough work, but did not permit drilling to exact size. After many experiments and developments the new forged drill was designed and seems to answer all the requirements. In making this drill the forging is the new and important feature. Most bar steel contains poor material at the center and this is usually the cause of the drill breaking and splitting. To eliminate such flaws the new drill is hammered or forged to shape and provides a more homogeneous structure.

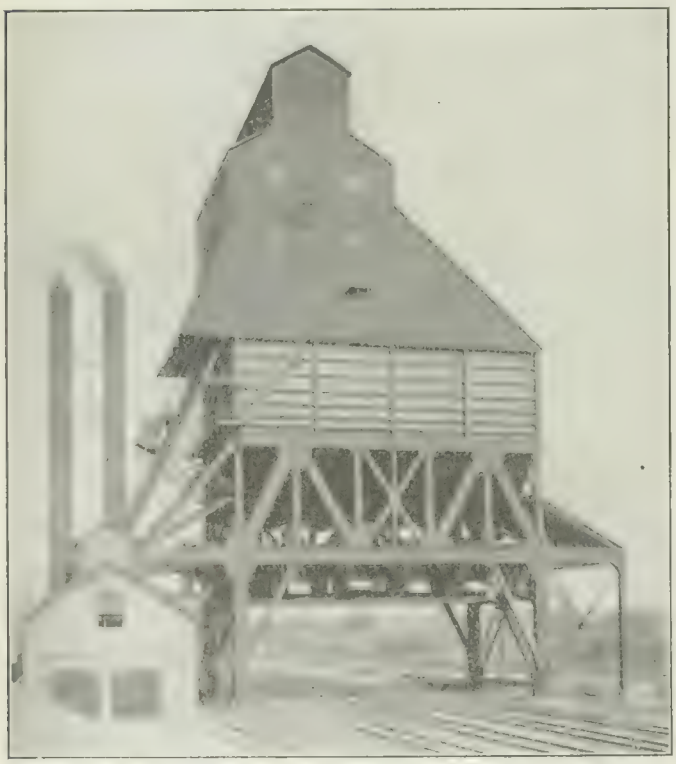
The objections to ordinary drills are as follows: First, many drills, if run above a certain cutting speed, will heat and lose their temper, no matter how carefully the lubricant is applied; second, it is impossible to drill hard material without continually regrinding the drills, causing a loss in the capacity of the drill press and increased expense for labor; third, the loss due to splitting up the center; fourth, loss and inconvenience

are caused by twisting off the tang on the taper shank. The new drill tends to overcome these faults. It has the same general shape and cross section as the milled twist drill now so generally used and which has the best cutting qualities and has the strength of the forged drill. The advantage and economy of these drills have been shown in numerous tests, and the following gives the general results of such tests:

Six 13/16-in. drills bored 40,000 holes through structural built-up girders measuring from 1 in. to 2⅝ in. thickness and were still in good condition. One 2½-in. drill bored three holes through a .40 per cent. carbon steel block 8¾ in. thick in seven minutes. One hundred and sixty 9/16 in. holes were drilled in a 3-in. angle iron in one hour without using oil or water and without the drill being sharpened, and when done the drill did not show unusual wear. A ¼-in. drill made 500 holes through a ¾-in. steel bar without being sharpened, while it was necessary to sharpen the ordinary twist drill after 55 holes had been drilled. A 15/32-in. drill made 100 holes through a hard casting without being sharpened, while other drills only bored 25 holes. The new drill was forced in the effort to break it, but its cutting power exceeded the capacity of the drill press, and it bored 31.4 ft. of rather hard steel without being reground. These drills can be furnished with regular taper shank or one size larger if desired.

COALING STATION FOR THE LAKE SHORE.

The Lake Shore & Michigan Southern has recently built a locomotive coaling station of large capacity at Wesleyville, Pa., three miles east of Erie. It spans six tracks, four of which are main tracks; the other two, located on each side, are sidings. Each of these sidings has a cinder pit 100 ft long, with depressed



1,800-Ton Coaling Station; Lake Shore & Michigan Southern.

tracks for loading the ashes. Two water columns are located on either side of the coaling station, making a convenient arrangement for cleaning, watering and coaling the locomotives. The coal is delivered from the cars on two elevated tracks into a hopper 44 ft. long and 28 ft. wide at one side of the station. From this hopper it is conveyed by means of automatic measuring feeders, to two independent counterbalanced skip hoists, which have buckets of 3 tons capacity. These buckets are hauled up a steep incline, as shown in the illustration, by two steam driven hoists operated separately. The hoists automatically slow down and stop when the buckets reach the loading points As they are operated separately there is less danger of a shut down, for if one should be out of commission the other would deliver sufficient coal for the locomotives.

The buckets deliver the coal at the top of the tower and there it passes over a screen which allows the small coal to pass through and guides the large lumps to a two-roll coal crusher, which reduces them to standard size. The coal is distributed to the main storage bins by means of chutes and a by-pass is pro-



Weighing Hoppers for Coaling Station.

vided so that when handling small coal it is not necessary to pass it over the screen. The main storage pocket of the station holds 1,800 tons and the coal is drawn from it through under-cut gates leading to 15-ton weighing hoppers over each track, from which it is delivered to the locomotives by means of chutes. The hoisting plant is capable of handling 350 tons of coal per hour. This station was constructed under the supervision of the engineering department of the road, the Link Belt Company of Chicago being in charge of the design and installation of the machinery.

The great advance in the price of oil in Russia has led to a change in the fuel of Russian locomotives. It will be remembered that when the disturbances took place in Baku in 1905, and the price of oil rose to an extraordinary height, the railway companies that had been using oil fuel or ostatki found themselves compelled to turn to the coal of the Donetz basin. Then, however, as a more normal situation began to obtain on the oil fields, the railways, along with other consumers of fuel, began to return to oil again, the price of which had declined to a more normal level. But the fact that is being borne in on Russian economists is unmistakable—that the oil wells of Baku are giving out, and the seriously reduced output last year caused prices of oil fuel to rise again. The prices are now something like 75 per cent. more than the prices of last year. Most of the railways have once more gone back to coal. It is a significant fact that the Caucasian Railway which carried immense quantities of liquid fuel along its own line should find it better and cheaper to use coal than to use the liquid fuel of the district through which it runs.

General News Section.

The Intercolonial is to put collectors on its through passenger trains.

The New York state highway commission at sessions at Albany April 15, 17 and 19 expects to open bids for the construction of 358 miles of roads at the estimated cost of $5,000,000.

A bill has been introduced in the legislature of Rhode Island, and passed by the lower House, providing for the establishment of a public service commission, with plenary powers, such as are now possessed by the commissions of Connecticut, New York and other states.

Judgments amounting to $1,575 have been entered in the federal court against the Denver & Rio Grande for violations of the hours of service law, and judgments for violations of the safety appliance law against the Pere Marquette for $1,500, and the Minneapolis & St. Louis for $200.

The lower house of the New York legislature has adopted a resolution looking to the amendment of the constitution of the state so as to empower the legislature to enact laws for the payment by employers, or by employers and employees jointly, of compensation for injuries to employees.

The Long Island Railroad, during the month of February, ran 18,671 passenger trains, of which 95 per cent. reached destination on time, or not more than five minutes late; and the officers of the road think that, in view of the severe winter which prevailed throughout the month of February, this is a unique record.

The Interborough Bulletin, a monthly periodical published by the Interborough Rapid Transit Company, New York City, for the benefit of its employees, fills two pages of its March issue with copies of letters received from passengers commending trainmen and stationmen for courtesy, honesty and careful attention to their duties—20 letters in all.

The Chicago, Rock Island & Pacific in making its spring readjustment of passenger train schedules, has taken off several trains, thus effecting a small economy in mileage. Among the trains discontinued is one leaving Chicago daily at 3:10 p. m. for Davenport, La., two trains between Estherville, Ia., and Sioux Falls, S. D., and two between Vinton, Ia., and Iowa Falls.

It is not on large railways alone that "Safety Committees" may be useful. The Jonesboro, Lake City & Eastern, we are informed, has inaugurated a general safety system over its lines "whereby better care is to be taken of the life and comfort of the company's patrons." The J. L. C. & E. runs from Jonesboro, Ark., to Barfield, 66 miles, with two branches aggregating 45 miles.

J. S. Dennis, president of the Canadian Pacific's land company, estimates that 200,000 Americans will go from the United States into Canada to settle there in 1912. He says that land in the irrigation block, which is selling at present at $30 an acre, will be selling at from $35 to $55 an acre. He says that about 250,000 acres of irrigable lands in the eastern block will be placed on the market this season.

The Marconi Wireless Telegraph Company, of England, announces that a contract has been made with the British post office department for the construction by the Marconi Company of the long distance wireless stations which are contemplated under the "Imperial wireless" scheme, under which the British government contemplates a wireless telegraph system extending around the world. Work will be begun at once on the erection of stations at London, Aden, Bangalore, Pretoria and Singapore.

The passenger station of the Missouri, Kansas & Texas at Parsons, Kan., was completely destroyed on the evening of March 18 by a fire which was believed to have originated in defective electric wires. The building was 60 ft. x 260 ft., three stories in height, the upper floors being occupied by the offices of the company. A large number of records and papers were lost, but the permanent records were kept in an adjoining building and were saved. The loss is estimated at $200,000.

The Chicago General Managers' Association has recommended to all of the roads entering Chicago a plan for posting notices in all passenger stations, baggage rooms and other railway properties, warning passengers against the danger of carrying explosives in satchels, trunks or other baggage. The notices are to be printed in several languages, and cite a provision in the federal law imposing a penalty of a fine of not over $2,000 or imprisonment for not over 18 months, or both, for carrying explosives in passenger trains.

The proposition before Congress to amend the Erdman law, so as to provide for governmental conciliation in disputes between employers and employees in the coal mining industry, has now taken the shape of a bill empowering the President of the United States to inquire into the facts whenever there shall be a dispute over wages, hours of labor, or conditions of employment [in any industry] affecting the free and regular movement of commerce among the states. The purpose of the bill is to provide for the creation of a commission in such cases when that shall be found desirable.

In Canada a legislator or government officer whose love for the labor unions governs his public acts makes no bones of saying so, or, at least, letting the fact be known. A press despatch from Ottawa this week says: "Ministers of Labor and Railways are holding up the financial legislation required by the Grand Trunk, in order to force the company to reinstate the strikers who quit work in July, 1910, and who have not been taken back. The bill under consideration amends the Grand Trunk Pacific act and authorizes the issue of $25,000,000 in debentures for the completion of the Grand Trunk Pacific.

The New York State Public Service Commission, First District, has sent to the Interborough Rapid Transit Company an order requiring emergency lighting apparatus to be maintained in the subway cars; also to provide independent illumination in the stations. The purpose of this order is to guard against the complete darkness which has resulted in cases where the power current has failed. The requirement is that there shall be a storage battery, or other suitable provision for maintaining at least two lamps in each car. The lamps must be instantly and automatically lighted whenever the regular lamps fail.

On Thursday afternoon, March 21, a street car arrived in New York City (129th street, Manhattan) direct from Boston in 33 hours—about 12 hours of which was spent in New Haven, where the passengers slept at a hotel. The trip was made by a party of street railway officers. The route was by way of Worcester, Springfield and New Haven. Between Darien and Stamford a short piece of temporary track had to be laid to enable the car to come through. Passengers have made this trip by trolley car occasionally for a number of years past, but never without bridging short gaps by steam cars or by private conveyance.

A bill has been introduced in Congress by Senator Clapp, of Minnesota, chairman of the Interstate Commerce Committee, to impose a penalty of $200 on railways not settling freight claims promptly. It is said that the bill was drafted by the Interstate Commerce Commission and that it was presented at the request of President Taft. The bill applies not only to loss or damage of freight, but would punish for delays in transportation and for unlawful discrimination in furnishing cars. The penalty applies in case a claim is not settled within six months after the carrier is held legally liable—which apparently may be interpreted to mean six months after the termination of a law suit. In ordinary cases a road is allowed 90 days in which to settle a claim; if the shipment went over the lines of two or more carriers, 30 days may be added for each carrier; claims on shipments to or from points outside the United States, six months.

A new plan for the proposed contract with the Illinois Central for exchange of property in Chicago with the board of South Park Commissioners in order to provide for the carrying out of the city's plan for lake front improvement and the erection of a new passenger station, has been submitted to the Chicago

city council committee on harbors, wharves and bridges by a committee of citizens, including representatives of the City Club, whose opposition led to the rejection of the original plan. The citizens' committee asks that negotiations be resumed with the Illinois Central on a basis providing for the depression of its tracks on the lake front, the electrification of the passenger terminals within a period of five to eight years, a reduction of the amount of land to be granted to the Illinois Central, and a change of location of the proposed passenger station from Michigan avenue and Twelfth street to Indiana avenue and Twelfth street, to permit the extension of Indiana avenue north to Twelfth street.

Disaster in the Berlin Subway.

On the morning of March 27, an extension of the underground railway of Berlin, Germany, which is being pierced beneath the river Spree, to reach the northeastern part of Berlin, was flooded with water from the river, by an accidental break, and 80 workmen in the tunnel barely escaped with their lives. A large section of the existing subway was flooded so that traffic will be suspended probably for a month. The damage will amount to several millions of marks, and the completion of the extension will be indefinitely postponed.

The Coal Strikers.

The British government continued up to Wednesday of this week its efforts to bring about an agreement between the coal owners and the miners, but the result was utter failure. The government then at once proceeded in Parliament to secure the passage of its law providing for a minimum rate of wages, and it is expected that by the time these lines reach the reader that law will have received the royal assent. The proposed law is admittedly unsatisfactory to both sides, but is going through without serious objection, because of the desperate situation. On Wednesday there was serious violence at Cannock in Staffordshire, where 80 men were at work in a mine. It is said that the coal owners have resolved to accept the proposed law and that the mines will be opened, probably next week. Considerable numbers of miners, though but a small proportion of the whole, have expressed a willingness to go back to work, and it is expected that the pressure will soon be relieved. A few mines have already resumed. Poverty and destitution have become widespread, not only among the miners, but in other industries, and distress will continue for a long time. On Monday last it was announced that the railways were preparing to suspend all trains on the less important branch lines. In London there were large reserve stocks of coal on hand, but elsewhere the scarcity was universally felt. At Newcastle the price has risen to more than $20 a ton. One colliery in Yorkshire sold to the Cunard company 50,000 tons at $8.50 at the pit, more than three times the usual price. Ocean steamships usually coaling at English ports have bought hundreds of thousands of tons elsewhere. Well-informed statisticians have estimated that the strike is costing the United Kingdom ten million pounds ($50,000,000) a week. The funds of the miners' unions are becoming rapidly exhausted.

The deadlock between the anthracite miners of Pennsylvania and their employers continues, and the latest despatches from the mining regions say that the men are bringing their tools out of the mines with a view to stopping work on the first of April.

At Cleveland, Ohio, negotiations are going on between the bituminous coal operators and their employees, but no definite results are reported.

The Beneficent Sherman Law.

"Has the Interstate Commerce Act so eliminated competition between carriers as to justify exempting them from the Anti-Trust Law?"

"No. Undoubtedly the greatest restraint ever placed upon *competition* in this country is the compulsory uniformity of railway rates, for your competitor knows thirty days ahead what your rates are to be. After years of experience with secret rates, midnight tariffs, and rate wars, the common cry of the traders was for stability of rates, and that stability has not restrained trade. All any fair man wants is to be on an even keel with his competitor under similar circumstances and conditions, and he will go on trading to the best of his ability. But, quite independent of the Interstate Commerce Law, the Anti-Trust Law works in a beneficent way because, if it is observed, there is no restraint upon quantity or quality of service. Every wisely managed railway is trying to build up its own territory, and, however much might be saved by adopting the very consistent French monopolistic method, the advantages of retaining competition in quantity—increasing capacity—and quality are most valuable assets for a growing country."—*Frank Trumbull; Interview in The Outlook.*

The Vermonters.

Governor Grout has said that there is no place on earth so unheard of or so remote that you won't find there at least one Irishman and one Vermonter. Next to being a Vermonter and living in Vermont, the best thing in the world is to hail from Vermont. Ever since our little state ceased, in 1792, to be, as she then was, a world power, Vermonters have always been in demand for odd jobs of all sizes. Hundreds, yes, thousands of Vermont men serve the public by managing the industrials and the railways—Daniel Willard of the B. & O.; J. H. Hiland of the C. M. & St. P.; Maxwell Evarts of the Union and Southern Pacific, to name but a few of them. But for twenty-five years these men and their fellows and predecessors have not really managed their railways. They have been answerable to the Interstate Commerce Commissioners, one of the ablest of whom is before you as I speak [Chairman Prouty]. But mark well this further fact: the Interstate Commerce Commission has uninterruptedly had a Vermonter on it since its work began. Thus the making of rates has never lacked a Vermonter to supervise and control it.—*Robert Walker, at Dinner of Vermont Society, New York City, March 23.*

Canadian Railway Subsidies.

The Canadian Government has laid before Parliament its budget of transportation aid in the form of railway and bridge subsidies for the current year. It amounts to $22,927,200. Subsidies are proposed for 3,433 miles of railway, the construction of which, at the maximum aid of $6,400 a mile, will call for government aid amounting to $21,971,200. Bridge subsidies amount to $956,000. Of the total railway mileage subsidized, 1,882 miles represent renewals of former votes, the subsidy amounting to $12,044,808. New lines total 1,551 miles, subsidies $9,056,400.

Safety Committees on the Pennsylvania.

There are now thirty-three safety committees at work on the several divisions of the Pennsylvania, consisting of from three to eight members each, making a total of 148 men in all. There are separate road, shop and yard committees on the larger divisions; road and shop committees on the intermediate sized divisions, and separate shop committees at the larger shops; all other divisions have a single committee. These committees report monthly to their superintendents. The general superintendents submit quarterly reports to the general manager.

In the early stages of safety committee work, monthly inspections were made by the committees, but the officers are now considering the advisability of having some of the committees make quarterly inspections, and are also considering the advisability of a longer period of service on the committees (longer than two months). The membership of each committee includes representatives from the motive power and the maintenance of way departments and of the department for conducting transportation. The committees have received suggestions from many employees, in addition to making their own observations. They make a monthly inspection in a body, covering all points on which recommendations are offered, and compile the report from their findings. A representative from the general manager's office and a representative of the Insurance department, are engaged in visiting the divisions and personally inspecting those points at which recommendations have been approved, but not yet carried out, and in securing the views of the general superintendents as to the most practical form of report. The committees appear to be working satisfactorily, and the results show a marked decrease in the number of accidents, especially in the shops, where the number of serious injuries to employees decreased more than 63 per cent. from January 1 to November 1, 1911.

U. S. Steel Corporation Sells Bonds.

The United States Steel Corporation has sold to J. P. Morgan & Co., New York, $30,500,000 5 per cent. bonds. In connection with the new bond issue E. H. Gary, chairman of the board, says:

"As authorized by the unanimous vote of the members of the board of directors, and not including any member of the firm hereinafter mentioned, the United States Steel Corporation has sold to J. P. Morgan & Co. $30,500,000 bonds on a basis of 5.1 per cent. rate of interest.

"The amount will include $15,000,000 secured on the Indiana Steel Company plant at Gary, Ind., $10,000,000 on the Lorain Steel plant at Lorain, Ohio, and $5,500,000 debentures on the Illinois Steel Company, being part of an issue heretofore authorized.

"As there must be expended during the year about $20,000,000 for extensions of properties generally, heretofore authorized, and as about $17,000,000 additional working capital is needed in consequence of the increased business of the companies, particularly in the ore department, it has been thought advisable to secure the sum named by the sale of bonds in order to keep the amount of cash on hand up to the sum shown at the beginning of calendar year.

"In view of the fact that very large sums have heretofore been appropriated from net earnings for capital expenditures, it has been decided to finance some of the capital expenditures as above stated."

Harvard to the Hub, Eight Minutes.

The title of this paragraph has been evolved for the purpose of celebrating the completion of the subway from Tremont and Park streets, Boston, to Harvard Square, Cambridge, about three miles. The line was put in operation last Saturday. From the Boston terminus it runs about half a mile beneath Beacon Hill, then across the Charles River on the new Cambridge bridge, and thence about 2¼ miles underground in Cambridge. The cars are 70 ft. long. The work on this road was begun in 1909. It is called the most adequately equipped and most artistically planned institution of its kind, the engineers and builders having availed themselves of the experiences of New York, London and Paris, as well as of the lessons of Boston's experience with her other tunnels during the past 20 years.

Rail Conference in New York.

On March 21, representatives of the rail makers met in conference with members of the executive committee of the American Railway Association to discuss means of improving the quality of rails. The meeting resulted in no definite action, aside from the decision to appoint a joint committee to make further studies. President Willard, of the A. R. A., who presided, made the following statement after the meeting:

"A full and frank discussion of the question relating to the character and wearing qualities of rails was had, and the opinions of experts received and considered. The questions of mill practice in manufacturing rails and usage of the rails in tracks were discussed, and it was conceded that improvements can and ought to be made by both sides. Every reasonable effort will promptly be made in this direction.

"Important facts were gathered together, and much benefit will be derived as the result of the meeting. Before adjournment a sub-committee of six was appointed, consisting of three representatives of the railway companies and three representatives of the manufacturers, to consider the whole subject matter and report their conclusions and recommendations at a future meeting to be called by the chairman."

Who Said Car Surplus?

Canadian railway companies are refusing to supply cars for the export of hay, pulp, paper and other commodities into the United States on the ground that once their cars get south of the border it is next to impossible to get them back. G. S. Cantlie, head of the car distributing department of the Canadian Pacific, tells the Dominion Railway Commission that since November last the Canadian Pacific has lost 6,000 cars to United States roads. If the present tendency of American lines to pool their cars becomes more pronounced it will not be long before all Canadian equipment will be across the border. Other railways make similar complaints. It is estimated that one-third of the entire equipment of the Intercolonial Railway is now being used by American roads. The railways in the United States have to pay 30 cents a day for each car delivered to them, but evidently they think them cheap at the price.—*Press Despatch from Montreal.*

Improvements on the Denver & Rio Grande.

E. T. Jeffery, chairman of the board, in speaking of authorizing an issue of $25,000,000 7 per cent. adjustment income bonds, said: "Subject to the stockholders' approval, $10,000,000 of these bonds will be offered for subscription to stockholders between May 11 and June 1 at par and accrued interest, in proportion to their holdings. Payments may be made in four instalments, the first on subscription and the remaining three of 25 per cent. each upon August 1, September 3 and October 1, 1912, with accrued interest.

"Proceeds of these $10,000,000 bonds will be used to construct a detour line, 14 miles, from Soldier Summit to a point near Tucker, with a maximum grade of 2 per cent. against the existing grade of 4 per cent. and to continue this detour line as a second track westerly 16½ miles to Thistle at not exceeding the maximum grade. This detour will save about $490,000 in operating costs per annum. A second main line track will also be constructed from Thistle to Midvale, 54 miles, and from Castle Gate to Kyune, 7½ miles.

"When these improvements are completed the company will have a double track line from Helper, in the Utah coal fields to Salt Lake City, 115 miles, which will greatly facilitate transportation on the part of the railway where traffic is now seriously congested. These improvements will cost $3,700,000 and will effect a saving of about $600,000 per annum in operating costs.

"About $2,500,000 will be expended for new equipment and locomotives, which will result in an increase of revenue of not less than $500,000 per annum. It is proposed also to set aside $2,500,000 of the proceeds of the bonds to acquire obligations of the Western Pacific Railway. A portion will be used by Western Pacific to apply on payment of first mortgage bond interest. The remainder is to be used for important improvements on Western Pacific, including completion of low grade line, 145 miles west of Salt Lake City, and the company's shops at Sacramento."

Negotiations with Eastern Enginemen.

On March 25, the Conference Committee of Managers, representing 50 roads in eastern territory, made its formal reply to the proposals of the enginemen for an increase in wages and standardization of wages and working conditions. It is said that it was impossible to grant the requests, the present rates of wages being, as a rule, full and liberal, and the railways being unable to bear the increased expense involved. On the same day, Grand Chief Stone replied, saying that this decision could not be accepted, and that the representatives of the enginemen reaffirmed their request of January 23; he further said that if the Conference Committee had nothing further to offer the question would be submitted to the enginemen employed on the various roads for their final action. To this the Conference Committee replied that it could add nothing to the facts set forth in its previous letter, that it had hoped the enginemen would recognize the gravity of the situation confronting the railways and their inability to meet the enginemen's requests, and further said that it trusted the matter would be given full consideration when the entire question was submitted to the enginemen at large for their final action.

Arrangements are being made for taking a strike vote. On April 10 the representatives of the Brotherhood of Locomotive Engineers will again meet in New York to consider the situation, and, in the event of a repetition of the refusal of the managers to grant the demands, to decide whether to strike (if the results of the vote so authorize them) or to invoke mediation under the Erdman law.

The reply of the Conference Committee, referred to above is, in part, as follows:

"The railways represented in this district are fifty in number and carry about one-half of the passenger and freight traffic of the United States. The proposed increase in wages and changes in working conditions would increase the pay of engineers of the

railways of the eastern district for the service now being rendered, by the following amounts per year:

Passenger service	$1,253,537
Freight service	3,578,392
Switching service, including belt	1,052,303
Terminal delay	804,155
Other working conditions	865,406
Total increase	$7,553,793
Percentage increase	18.63

"This increase would be equivalent to placing on these properties a lien of $188,844,818 of 4 per cent. securities, which would have preference over first mortgage bonds, and to just that extent would lessen the ability of the roads to make the improvements necessary to increase the efficiency of their service, and to insure greater safety to the public and the employees.

"Already the traffic of a growing country has over-taxed the existing facilities; and the heavy burdens incurred through legislation, the large expenditures for improvements which produce no revenue, and the previous wage increases, have made it impossible for many of the roads to raise money to provide the added facilities which a prudent foresight demands.

"Past history indicates that if these increases are given to the engineers they will be followed by similar requests from other employees, which, if granted, would result in actual bankruptcy to some of the roads, and would leave them as a whole unprepared to meet any sudden increase in the demands for transportation.

"The wage advance to engineers and other employees in 1910 was made in expectation of a much needed advance in freight rates which the Interstate Commerce Commission declined to allow. Enforced reductions of rates have been more or less continuous since that period, and many important rate reductions are now pending, the latest decision being in the Pittsburgh Lake Coal case, requiring an average reduction of 10.0476 cents per ton in the freight rate, which will directly affect over 21,000,000 tons of coal per year, and the general effect upon freight rates on fuel and commercial coal will be far reaching.

"It is less than two years since the last adjustment of engineers' wages was made in the eastern district, which resulted in an annual increase of engineers' pay amounting to $3,923,681, or 10.73 per cent. per year. In this adjustment, all conditions of the service then prevailing were considered and provided for, and, since that time, there has been no substantial change in these conditions.

"The conductors and trainmen have standard wages as a result of the crisis developed in connection with their demands, which were finally disposed of by mediation and arbitration; not that the railways were satisfied with the standard scale, but because of the conclusions reached by the arbitrators. The fact that another class of employees has through stress of circumstances secured a standard wage in a certain territory does not make it right. There are many inconsistencies in a standard wage that should be carefully considered. It must be apparent that all railways are not equally able to pay a standard rate, and it would be manifestly unfair not to recognize the dissimilar working conditions existing on the different roads and the different parts of a system, and the marked variation in earning capacity which governs their ability to pay wages.

"The ability of the railways to meet the recurring demands for increased wages is measured by the net results of their operation and the sum of the obligations which they must meet to maintain their solvency. The reduction of the net revenues by the constantly increasing expenses of operation have so narrowed the margin which is essential to the solvent existence of many of the roads that further increases in operating costs are viewed with grave concern. To illustrate the tendency in this direction during the past two years, the following figures from the reports of the Interstate Commerce Commission are submitted for the railways of the eastern district:

	1911.	1910.		
Miles operated	52,836	52,340	Inc.	496
Total operating revenue	$1,114,027,248	$1,095,467,589	Inc.	$18,559,659
Net operating revenue	$330,159,909	$357,810,109	Dec.	$27,650,200
Total number of employees	679,179	687,376	Dec.	8,197
Total compensation (employees)	$518,781,736	$479,364,934	Inc.	$39,416,802

"From these figures it will be seen that while gross earnings increased $18,559,659 in 1911 there was a decrease of $27,650,200 in net earnings; and while 8,197 less men were employed, the total wages increased $39,416,802.

"This headlong movement towards financial disaster cannot proceed unchecked."

German Vacations and the Railways.

It is proposed in Germany to change the end of the school year in different districts or states so that the vacation may begin at different seasons, and the summer travel on the railways be more evenly distributed. As a rule, at present the schools close almost all over Germany in the second week of July, and then every student wishes to start for his summer vacation. In the great majority of cases these people are not away from home much more than three weeks, and as things are at present hotels as well as railways are at their wit's end to provide for the crowd from the middle of July till the middle of August, and lack patronage before and after. The proposition is to close the schools in Berlin and most of Prussia July 1; in Saxony and the Hanseatic cities three weeks later; in another portion of the country six weeks later.

International Railway General Foremen's Association.

At the annual convention of the International Railway General Foremen's Association, to be held at the Hotel Sherman, Chicago, July 23-26, the following papers will be presented for discussion: How Can Shop Foremen Best Promote Efficiency? (A continuation of a paper presented at the 1910 convention) by William G. Reyer (N. C. & St. L.); Shop Supervision and Local Conditions, by W. W. Scott (P. M.); Shop Specialization Work and Tools, by W. T. Gale (C. & N. W.); Roundhouse Efficiency, by W. Hall (C. & N. W.). Special papers will be presented on Reclaiming of Scrap, by C. H. Voges (C. C. C. & St. L.); and by C. Odger (A. T. & S. F.). On the Relation of Tests to Shop Efficiency, by J. S. Sheafe (I. C.), and L. A. North (I. C.).

Cleveland Engineering Society.

At the regular meeting of the Cleveland Engineering Society, to be held April 9, there will be a symposium on the Elimination of Grade Crossings.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.; annual, May 7-10, Richmond, Va.

American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass.; annual, May 10-11, San Francisco, Cal.

American Association of General Passenger and Ticket Agents.—W. C. Hope, New York; next convention, Seattle, Wash.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Detroit, Mich.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and Sept.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York. Convention, October 7-11, Chicago.

American Electrical Railway Manufacturers' Assoc.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

American Railway Association.—W. F. Allen, 75 Church St., New York. Next session, May 15, New York.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago.

American Railway Master Mechanics' Assoc.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

American Railway Tool Foremen's Association.—M. H. Bray, N. Y. N. H. & H., New Raven, Conn. Convention, July 9, Chicago.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

American Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago. Semi-annual, June 11, Atlantic City, N. J.; annual, October 21-25, Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Cac Accounting Officers.—G. P. Conrad, 75 Church St., New York. Convention, Oct. 7-11, Chicago.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago. Convention, May 22-25, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

Master Car and Locomotive Painters' Assoc. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass. Convention, September, 10-13, Denver, Col.

National Railway Appliances Assoc.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railroad Club.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Business Association.—Frank W. Noxon, 2 Rector St., New York.

Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

Railway Gardening Association.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.

Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio. Convention, May 20-22, Buffalo, N. Y.

Railway Supply Manufacturers' Assoc.—J. D. Conway, 2135 Oliver Bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

Railway Tel. & Tel. Appliance Assoc.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. Y., Sterling; September, 1912, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; August, 1912.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The Chicago, Rock Island & Pacific is running an agricultural demonstration train of six cars over its lines in Arkansas.

L. D. Rosenheimer, until recently secretary of the Rockford Manufacturers' and Shippers' Association at Rockford, Ill., has entered upon his duties as general traffic manager of the Booth Fisheries Co. and its subsidiaries.

According to the returns of the cotton ginners for the season up to the first of March, it is estimated that the cotton crop of the last year will aggregate 16,050,000 bales, which is nearly 31 per cent. more than the average yearly crop during the preceding ten years (11,500,000 bales). In consequence of the low figure to which the price of cotton has been reduced by the enormous yield, a considerable quantity remained unpicked; but in spite of this the average production was 235 lbs. an acre.

A special "good roads" train is being operated by the St. Louis & San Francisco on an itinerary which will cover the entire system. The train consists of four cars carrying exhibits of models of road construction, and the lecturers who will demonstrate them. The progress of the train is being widely advertised throughout the territory served by the Frisco and every effort is being made to attract large audiences and impress upon them the importance of good roads. Over 300 stops have been scheduled.

The statement of exports and imports made up by the Department of Commerce and Labor for the month of February shows increases over February, 1911, on both sides. The value of imports increased from $121,694,000 to $134,207,000; exports from $173,304,000 to $196,821,000. The value of cotton exported increased from 410 millions to 643 millions, and for the eight months ending with February, from 3,456 millions to 4,321 millions. Copper for the month increased from 49 millions to 72 millions, and iron and steel articles in a still larger proportion.

The Canadian Railway Commission has rendered a decision in the case of the Dawson Board of Trade versus the White Pass & Yukon Railway Company, rescinding an order of January 18, 1911, which reduced the freight and passenger rates on the rail division of this company between Skagway, Alaska, and White Horse, Yukon Territory, by 33⅓ per cent.. On a rehearing of the case, which had been before the commission for five years, the company showed that the reduction of its rates by one-third would leave a deficit of $127,000 a year, after paying fixed charges. President O. L. Dickeson voluntarily agreed to make a number of reductions in the interest of the development of the country.

The Louisiana State University is running a "farmers' demonstration train" over the railways of the state which consists of ten cars, the longest train of the kind which we remember to have heard of. Co-operating with the university are the State Agricultural College, the State Board of Health, the State Board of Education and the United States Department of Agriculture. Besides the animals and farm exhibits, there is a school exhibit and a general health exhibit. This train makes comparatively long stops, the schedule over the Vicksburg, Shreveport & Pacific providing in most cases for only three towns a day. For example, April 2, Mound, 8 to 10; Delhi, 11 to 2:30; Rayville, 3 to 5.

The classification committee of the National Industrial Traffic League, of which D. O. Ives, of Boston, is chairman, has submitted a report to the league that it is unprepared to make recommendations as to actual uniformity of classification ratings, but that steps ought to be taken at once to provide for a uniform scale of numbering the classes. The committee has prepared a draft of a tentative plan by which it believes a gradual change from "the present chaotic medley of classes to a uniform scale can be made without any material changes in the ratings and without disruption of traffic conditions or extraordinary expense." The plans submitted readjust the present classifications into ten classes, each corresponding as closely as possible to the present relationships. The report states that the committee believes that no decisions as to the feasibility of uniform rating can ever be intelligently made until this essential preliminary work is accomplished.

Chicago Traffic Club.

The Traffic Club of Chicago at its meeting last Tuesday evening elected the following officers (the regular ticket): President, Frank B. Montgomery, traffic manager, International Harvester Company; first vice-president, Edward S. Keeley, vice-president, Chicago, Milwaukee & St. Paul; second vice-president, J. W. Hicks, traffic manager, Sears, Roebuck & Co.; third vice-president, Fred H. Tristram, assistant general passenger agent, Wabash; secretary, Guy S. McCabe, general Western freight agent, Pennsylvania Company; treasurer, Charles B. Hopper, general freight agent, Goodrich Transportation Company; directors for two years, Frank P. Eyman, Fred Zimmerman, Robert C. Ross and F. T. Randall.

Still Another Variety.

The latest traveling instruction enterprise for the benefit of the farmers is called the "Drainage and Good Roads Special." It is being run over the Missouri, Kansas & Texas in the state of Kansas. One of the lecturers is the state highway engineer, who discusses not only roads but concrete bridges.

New Grain Elevator at New York.

The Lehigh Valley has decided to build a large grain elevator at its freight terminus in New York harbor near the Greenville docks of the Pennsylvania. The building will be of reinforced concrete, to hold five hundred thousand bushels. The contract has been let to the Witherspoon-Englar Company, of Chicago, the work to be done by next October.

New Grand Trunk Steamships.

The directors of the Central Vermont, which is controlled by the Grand Trunk of Canada, at a meeting held last week, voted to order the construction of two steamships of 5,000 tons each; and it is said that the vessels are intended to be run between New York City and Providence, Rhode Island.

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association in presenting statistical bulletin No. 115, giving a summary of car shortages and surpluses by groups from November 9, 1910, to March 13, 1912, says:

"Compared with the preceding period the total surplus shows but little change, there being an increase of 1,044 cars. There is, however, an increase of 3,886 in surplus box cars with decreases in the other classes of equipment. The increase in the surplus is practically altogether in groups 6 (Iowa, Illinois, Wisconsin, Minnesota and the Dakotas), 8 (Kansas, Colorado, Missouri, Arkansas and Oklahoma) and 10 (Oregon, Idaho, Arizona, California and Washington). The total shortage increased 5,843 cars, of which 2,075 are box and 3,576 coal cars. This increase in shortage is general throughout the country, but is particularly noticeable in group 3 (Ohio, Indiana, Michigan and western Pennsylvania). Compared with the same date of 1911 there is a decrease in surplus of 162,499 cars, of which 30,204 is in box and 105,067 is in coal cars; and an increase in shortage of 41,719 cars, of which 25,299 is in box and 11,622 is in coal cars. The bulk of this decrease is in groups 2 (New York, New Jersey, Delaware, Maryland and eastern Pennsylvania), 3, 6, 8 and 10 (see above); and the principal increases in shortage occurred in groups 2, 3 (as above), 4 (the Virginias and Carolinas), 5 (Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida), 6 (as above), and 11 (Canadian Lines).

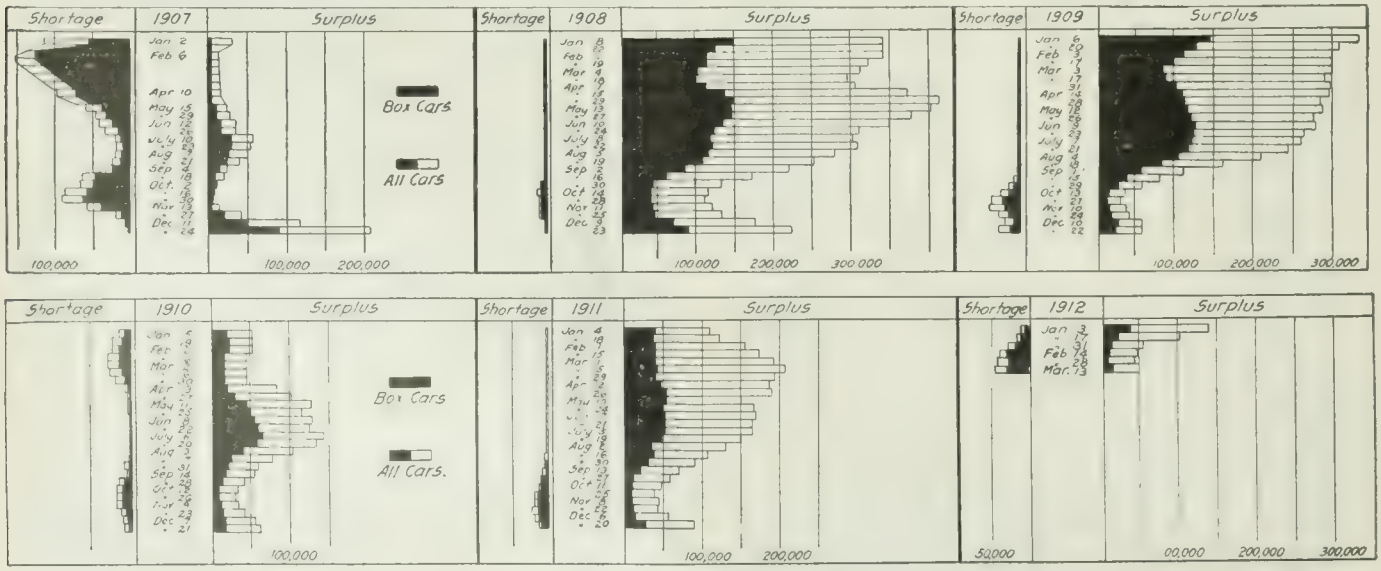
"This increase in surplus and increase in shortage as compared with 1911, while doubtless partially due to the greater severity of the weather this year, may in part be explained by the prospective suspension in coal traffic."

The accompanying table gives car surplus and shortage figures by groups for the last period covered in the report, and the diagrams show total bi-weekly surpluses and shortages in 1907 to 1911.

CAR SURPLUSES AND SHORTAGES.

Date.	No. of roads.	Surpluses: Box.	Flat.	Coal gondola and hopper.	Other kinds.	Total.	Shortages: Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group 1. March 13, 1912	7	80	1,492	486	90	2,148	334	97	0	159	590
" 2. " 13, 1912	25	327	92	1,368	527	2,314	1,233	21	2,750	155	4,159
" 3. " 13, 1912	25	0	714	951	1,469	3,134	6,307	125	4,262	1,923	12,617
" 4. " 13, 1912	10	17	146	272	682	1,117	2,720	263	3,650	500	7,133
" 5. " 13, 1912	18	7	6	4	312	329	3,539	139	483	206	4,367
" 6. " 13, 1912	23	2,781	284	2,416	3,017	8,498	3,734	76	516	277	4,603
" 7. " 13, 1912	8	55	86	15	156	312	534	0	24	5	563
" 8. " 13, 1912	15	2,744	191	1,228	2,118	6,281	90	30	19	201	340
" 9. " 13, 1912	9	1,762	138	201	658	2,759	75	0	0	0	75
" 10. " 13, 1912	23	5,120	2,523	2,903	8,093	18,639	10	15	5	7	37
" 11. " 13, 1912	5	17	329	0	151	497	7,013	135	0	1,353	8,501
Total	163	12,910	6,001	9,844	17,273	46,028	25,589	901	11,709	4,786	42,985

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortage in 1907 to 1912.

Revenues and Expenses in January.

The Bureau of Railway Economics includes in bulletin No. 30 returns from 227,813 miles of line, or about 93 per cent. of all the steam railway mileage in the United States. The total operating revenues for the month of January, 1912 amounted to $203,143,118. Compared with January, 1911, the total operating revenues of these railways show a decrease of $2,886,149. These operating revenues per mile of line amounted to $892 in January, 1912, and $917 in January, 1911, a decrease for 1912 of $25, or 2.8 per cent. This decrease in operating revenues resulted from decreases in freight and passenger revenues and in other transportation revenues.

Operating expenses amounted to $158,911,489. This was $4,205,871 more than for January, 1911. These operating expenses per mile of line amounted to $698 in January, 1912, and $689 in January, 1911, an increase for 1912 of $9 per mile, or 1.3 per cent. In the cost per mile of maintaining way and structures, there was a decrease compared with January, 1911, of 1.6 per cent., and in traffic expenses per mile a decrease of 0.4 per cent.; in the cost per mile of maintaining equipment there was an increase of 2.8 per cent.; in the cost per mile of conducting transportation, an increase of 1.6 per cent., and in general expenses per mile an increase of 0.5 per cent.

Net operating revenue amounted to $44,231,629. This was $7,092,020 less than for January, 1911. Net operating revenue per mile of line amounted to $194 in January, 1912, and $228 in January, 1911, a decrease for 1912 of $34 per mile, or 15.0 per cent. The net operating revenue for each mile of line for each day in January averaged $6.26, as compared with $7.37 for January, 1911.

Taxes for the month of January amounted to $9,579,337, or $42 per mile, an increase of 11.7 per cent. over January, 1911.

The operating ratio for January was 78.2 per cent., as compared with 68.7 per cent. in December, 1911, and 75.0 per cent. in January, 1911.

The eastern group of railways show a decrease in total operating revenues per mile, as compared with January, 1911, of 0.8 per cent., the southern group a decrease of 2.4 per cent., and the western group a decrease of 5.4 per cent. Operating expenses per mile increased 2.1 per cent. on the eastern railways, as compared with January, 1911, and on the southern railways 5.1 per cent., but decreased on the western railways 1.1 per cent. On the eastern group of railways there was an increase in the cost of maintaining way and structures, the cost of maintaining equipment, and in transportation expenses. Traffic expenses and general expenses show decreases. On the southern railways there were increases in each of these primary expense accounts. On the western railways there were decreases in the cost of maintaining way and structures, in the cost of maintaining equipment, and in the cost of conducting transportation, but there were increases in traffic expenses and general expenses. All the groups show considerable decreases in net operating revenue per mile. In the eastern group this net revenue per mile decreased 10.7 per cent., as compared with January, 1911; in the southern group it decreased 19.4 per cent.; in the western group it decreased 17.7 per cent. Taxes increased in all the groups, as compared with January, 1911, the increase per mile amounting to 14.6 per cent. in the eastern group, 2.5 per cent. in the southern group, and 11.1 per cent. in the western group.

INTERSTATE COMMERCE COMMISSION.

The Indianapolis freight bureau has complained against the Big Four and other roads that millers in Indianapolis are discriminated against in the rates on grain originating in Illinois and west of there.

Hearings are being held at New York by Commissioner Harlan in the investigation of the relations between the short line railways owned by steel companies and the larger railways. The investigation has been heretofore in Pittsburgh.

The Chicago Board of Trade has sent to the commission a complaint alleging excessive freight rates on wheat from Minneapolis to Chicago, referring especially to wheat shipments originating beyond Minneapolis as compared with the rates on flour from the Minneapolis mills.

The Michigan Copper & Brass Company of Detroit has complained to the commission against the Duluth, South Shore & Atlantic and other roads claiming that the rates on copper charged by the railways discriminate in favor of copper mills in New York and New Jersey as against those at Detroit. A differential of three cents per hundred pounds is allowed to eastern mills, but is not allowed at Detroit.

The commission has issued an order which provides that, pending the action of the commission on applications for relief under the long and short haul clause in cases where through rates are published which exceed the lowest combination of rates, railways may collect through rates by reducing them so as to equal the lowest combination of locals, even when such reduction may have the effect of increasing the discrimination against intermediate points. Such rates, of course, may be subject of complaint or investigation.

Hearing at Chicago on Weighing Practices.

Chairman C. A. Prouty, of the Inerstate Commerce Commission, began a hearing at Chicago on March 25 for the purpose of investigating alleged irregularities and discrepancies in the weighing of carload freight. The investigation was undertaken on complaint of a large number of associations of lumber, coal and hay dealers. It was complained that the scales used by railways are very often inaccurate and not properly maintained, that the weights are often taken by an irresponsible class of employees, and that the stenciled weights of cars are so inaccurate that the shipper is often obliged to pay freight rates on a large amount of tare.

The principal witness at the hearing was C. F. Staples, chairman of the Minnesota railway commission, which has made a very thorough study of the weighing question. Mr. Staples submitted several statements compiled from reports made by state weighmasters of cars weighed at terminals with careful provision, he said, to omit from consideration cars whose weight was affected by snow and dirt. One of Mr. Staples' statements showed that between January 28 and February 28, 1911, 12 cars of the Chicago Great Western weighed 8,500 lb. over the stenciled weight, 15 cars weighed 9,300 lb. under the stenciled weight and one car was correctly stenciled. On the Chicago & North Western 84 cars weighed 39,600 lb. over the stenciled weight, 41 weighed 21,500 lb. less than the stenciled weight and five cars were correctly stenciled. On the Chicago, St. Paul, Minneapolis & Omaha 72 cars weighed 39,900 lb. over, eight cars 1,700 lb. under and five were correctly stenciled. On the Great Northern 371 cars weighed 233,530 lb. over, 19 cars 4,800 lb. under and nine were correctly stenciled. On the Soo line 188 cars weighed 27,400 lb. over, 41 cars weighed 21,800 lb. under and six were correctly stenciled. Another table contained an aggregate of 1,388 cars which weighed 1,067,020 lb. over the stenciled weight and 393 cars weighing 224,300 lb. under the stenciled weight, while 66 cars were found to be correctly stenciled. Mr. Staples said that a scale on which the Northern Pacific weighed cars for the purpose of obtaining the stenciled weights was found to show a variation of 8,000 lb. He said that incorrect weighing in his opinion was largely the result of a lack of care because the variations were such as to impose an injustice on the railways as well as on the shippers.

The examination of Mr. Staples was not completed and Commissioner Prouty announced that he would in all probability be recalled.

Advanced Rate on Cattle Refused.

In re suspension of advances in rates on stock cattle and sheep. Opinion by Commissioner Clements:

Heretofore a 75 per cent. rate has been charged on so-called "stockers" and "feeders" as compared with a 100 per cent. rate on cattle for market. The proposed advances were to increase the rates on stockers and feeders to the 100 per cent. rate on the ground that there was no essential difference in the cost of handling these cattle and cattle for market, and that this lower rate on stockers and feeders was granted only as a favor by the railways and could be withdrawn at will. The commission, however, finds that the present adjustment of rates has been in effect for more than 25 years, and that the railways fail to justify the proposed advances. The railways have until April 15, 1912, to cancel the proposed rates, and if that is not done, the commission will issue its order. (23 I. C. C., 7.)

REVENUES AND EXPENSES OF EXPRESS COMPANIES.

Month of July, 1911.

	Miles of line covered.			Gross receipts from operation.	Less expense privileges, Dr.	Total operating revenues.	Operating expenses.					Net operating revenue (or deficit).	Taxes.	Operating income (or loss).	Increase or decr. (—) comp. with last year
	Steam roads.	Other lines.	Express revenue.				Maintenance.	Traffic.	Transportation	General.	Total.				
Adams Express Co.	[1] 32,918	3,754	$2,420,931	$2,447,905	$1,288,698	$1,159,207	$62,184	$10,044	$1,038,178	$79,027	$1,189,433	$30,225	$19,779	$50,004	—$98,172
American Express Co.	[2] 54,304	2,561	3,139,491	3,286,447	1,538,351	1,748,096	50,689	29,559	1,444,330	110,470	1,635,039	113,057	30,000	83,057	—58,909
Canadian Express Co.	[3] 6,400	830	246,470	251,508	116,786	134,722	6,094	1,637	90,694	6,820	104,945	29,777	2,250	27,527	15,526
Canadian Northern Express Co.	[4] 3,369	22	45,517	46,811	18,907	28,604	100	578	13,164	2,078	15,920	12,684	128	12,556	2,747
Globe Express Co.	[5] 2,904	.....	74,674	75,252	37,873	37,379	684	1,748	24,608	3,568	30,608	6,771	800	5,971	—4,638
Great Northern Express Co.	[6] 8,466	337	243,122	244,292	146,732	97,560	1,782	1,586	65,920	3,728	73,016	24,544	3,404	21,140	—12,351
National Express Co.	[7] 1,422	218	112,259	112,678	42,939	69,739	1,287	.....	50,498	2,973	54,758	14,981	2,933	12,048	—1,925
Northern Express Co.	[8] 7,310	315	281,354	284,336	143,896	140,530	1,237	3,179	79,888	7,559	91,863	48,667	4,500	44,167	—12,903
Pacific Express Co.	[9] 15,615	1,043	431,360	439,050	213,407	225,643	4,623	5,222	179,393	12,041	201,279	24,364	1,843	22,521	—23,072
Southern Express Co.	[10] 31,735	846	995,054	1,013,705	486,178	527,527	16,383	12,160	390,896	54,464	473,903	53,624	14,769	38,855	— 20,001
United States Express Co.	[11] 38,965	3,943	1,579,025	1,604,944	788,687	816,257	34,112	16,361	790,344	49,138	889,955	73,698	9,899	83,597	128,194
Wells, Fargo & Co.	[12] 47,354	17,334	1,973,546	2,010,569	939,242	1,071,327	38,986	23,103	826,599	64,859	953,547	117,780	24,713	93,067	23,028
Western Express Co.	[13] 4,843	8	92,520	94,100	49,882	44,218	1,525	4,596	36,407	3,579	46,107	1,889	725	— 2,614	— 4,184

Month of August, 1911.

Adams Express Co.	[14] 33,945	4,707	$2,554,524	$2,586,048	$1,288,731	$1,297,317	$68,950	$6,572	$1,048,016	$80,995	$1,204,533	$92,784	$19,645	$73,139	$37,393
American Express Co.	[15] 54,325	2,561	3,247,754	3,393,232	1,591,154	1,802,078	42,154	28,868	1,442,207	118,078	1,631,007	171,071	30,000	141,071	50,257
Canadian Express Co.	[16] 6,400	830	256,216	261,349	125,616	135,733	6,207	845	93,321	6,157	106,530	29,203	2,250	26,953	—8,205
Canadian Northern Express Co.	[17] 3,370	22	40,731	42,178	16,292	25,986	93	437	13,813	1,187	15,530	10,456	129	10,327	329
Globe Express Co.	[18] 2,904	.....	77,626	78,209	38,853	39,356	767	1,605	25,763	3,649	31,784	7,572	800	6,772	— 5,402
Great Northern Express Co.	[19] 8,466	399	254,087	255,358	153,367	101,991	2,269	1,267	67,572	3,885	74,993	26,998	3,640	23,358	—1,727
National Express Co.	[20] 1,422	218	115,932	116,319	44,344	71,975	797	3	49,962	2,947	53,709	18,266	[1] 1,964	20,230	284
Northern Express Co.	[21] 7,310	315	272,900	275,933	139,657	136,276	928	3,362	80,474	4,759	89,523	46,753	4,500	42,253	— 34,971
Pacific Express Co.†	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Southern Express Co.	[22] 31,816	846	976,741	995,099	470,174	524,925	15,242	10,025	393,355	54,092	472,714	52,211	14,814	37,397	1,685
United States Express Co.	[23] 38,965	3,965	1,676,167	1,703,120	782,677	920,443	35,571	18,552	807,465	44,980	906,568	13,875	10,248	3,627	—41,746
Wells, Fargo & Co.	[24] 63,441	17,314	2,525,947	2,570,765	1,190,213	1,380,552	49,448	29,187	964,551	74,032	1,117,218	263,334	24,750	238,584	38,951
Western Express Co.	[25] 4,843	8	91,176	92,763	48,807	43,956	939	2,611	35,527	3,836	42,913	1,043	727	316	13,688

Month of September, 1911.

Adams Express Co.	[26] 33,043	4,707	$2,862,954	$2,896,813	$1,436,253	$1,460,560	$70,993	$5,991	$1,053,230	$82,324	$1,212,538	$248,022	$20,056	$227,966	$12,462
American Express Co.	[27] 54,419	2,466	3,758,258	3,917,090	1,833,379	2,083,711	56,804	27,442	1,436,079	119,044	1,639,369	444,342	30,422	413,920	22,413
Canadian Express Co.	[28] 6,400	830	265,109	269,485	126,390	143,095	7,855	871	95,592	6,207	110,525	32,570	2,250	30,320	—12,033
Canadian Northern Express Co.	[29] 3,551	22	41,305	42,748	17,093	25,655	606	217	13,249	996	15,068	10,587	128	10,459	—456
Globe Express Co.	[30] 2,904	.....	85,353	85,981	42,731	43,250	608	1,608	26,144	3,776	32,136	11,114	800	10,314	—127
Great Northern Express Co.	[31] 8,467	399	257,975	259,091	156,190	102,901	1,506	1,527	70,365	3,802	77,200	25,701	3,530	22,171	639
National Express Co.	[32] 1,422	218	113,360	113,732	43,487	70,245	798	4	48,784	3,014	52,600	17,645	485	17,160	—4,358
Northern Express Co.	[33] 7,310	315	273,561	277,010	141,073	135,937	2,471	3,166	79,844	5,929	91,410	44,527	4,500	40,027	—37,338
Pacific Express Co.†	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Southern Express Co.	[34] 31,841	846	1,116,580	1,138,656	547,025	591,631	16,847	9,006	393,471	55,484	474,808	116,823	14,833	101,990	—7,095
United States Express Co.	[35] 28,965	3,939	1,810,450	1,839,297	832,276	1,007,021	31,440	14,713	[2] 809,542	42,227	897,922	109,099	9,600	99,499	—58,709
Wells, Fargo & Co.	[36] 63,604	17,314	2,854,798	2,904,133	1,354,424	1,549,709	69,768	25,559	1,100,491	80,187	1,276,005	273,704	24,750	248,954	10,421
Western Express Co.	[37] 4,892	4	99,327	100,935	50,884	50,051	854	2,410	33,807	3,255	40,326	9,725	769	8,956	9,425

Three Months of Fiscal Year, 1912.

Adams Express Co.	[38] 33,043	4,707	$7,838,409	$7,930,766	$4,013,681	$3,917,085	$202,126	$22,608	$3,139,425	$242,346	$3,606,505	$310,580	$59,480	$251,100	- $123,103
American Express Co.	[39] 54,419	2,466	10,145,004	10,596,769	4,962,884	5,633,885	149,637	85,569	4,322,617	347,593	4,905,416	728,469	90,422	638,047	—86,753
Canadian Express Co.	[40] 6,400	830	767,795	782,342	368,792	413,550	20,157	3,352	279,607	18,884	322,000	91,550	6,750	84,800	89,514
Canadian Northern Express Co.	[41] 3,551	22	127,553	131,837	51,592	80,245	799	1,231	40,226	4,262	46,518	33,727	385	33,342	2,621
Globe Express Co.	[42] 2,904	.....	237,654	239,442	119,457	119,985	2,059	4,961	76,515	10,993	94,528	25,457	2,400	23,057	—10,167
Great Northern Express Co.	[43] 8,467	399	755,185	758,741	456,290	302,451	5,558	4,379	203,857	11,415	225,209	77,242	10,574	66,668	13,440
National Express Co.	[44] 1,422	218	341,551	342,730	130,771	211,959	2,882	7	149,244	8,934	161,067	50,892	1,454	49,438	6,000
Northern Express Co.	[45] 7,310	315	827,816	837,279	424,536	412,743	4,637	9,706	240,205	18,248	272,796	139,947	13,500	126,447	- -85,212
Pacific Express Co.†	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Southern Express Co.	[46] 31,841	846	3,088,375	3,147,460	1,503,377	1,644,083	48,472	31,191	1,177,721	164,040	1,421,424	222,659	44,417	178,242	- 25,411
United States Express Co.	[47] 38,965	3,939	5,065,643	5,147,360	2,403,640	2,743,720	101,123	49,626	2,407,350	136,345	2,694,444	49,276	29,746	19,530	—328,649
Wells, Fargo & Co.	[48] 63,604	17,314	7,354,291	7,485,468	3,483,880	4,001,588	158,202	77,849	2,891,642	219,078	3,346,771	654,817	74,213	580,604	26,344
Western Express Co.	[49] 4,892	4	283,023	287,798	149,699	138,099	3,319	9,618	105,614	10,669	129,220	8,879	2,221	6,658	18,930

† Operations ceased July 31, 1911. Business disbanded.

Steam Roads (corresponding period last year)—[1] 32,700; [2] 53,038; [3] 6,298; [4] 3,280; [5] 1,916; [6] 7,835; [7] 6,601; [8] 15,944; [9] 31,397; [10] 28,815; [11] 47,024; [12] 3,506; [13] 32,700; [14] 53,250; [15] 6,298; [16] 3,292; [17] 1,916; [18] 7,835; [19] 6,601; [20] 31,430; [21] 28,815; [22] 47,050; [23] 3,506; [24] 32,527; [25] 54,560; [26] 6,964; [27] 3,292; [28] 2,837; [29] 7,835; [30] 6,601; [31] 31,430; [32] 28,792; [33] 46,049; [34] 3,506; [35] 32,527; [36] 54,560; [37] 6,964; [38] 3,293; [39] 2,837; [40] 7,835; [41] 6,601; [42] 31,430; [43] 28,792; [44] 46,049; [45] 3,506.

Other Lines (corresponding period last year)—[1] 3,763; [2] 2,696; [3] 381; [4] 261; [5] 1,019; [6] 816; [7] 4,092; [8] 4,728; [9] 4; [10] 3,763; [11] 2,696; [12] 381; [13] 261; [14] 816; [15] 4,169; [16] 4,728; [17] 4; [18] 3,727; [19] 2,645; [20] 381; [21] 261; [22] 816; [23] 4,057; [24] 5,104; [25] 3,727; [26] 2,645; [27] 830; [28] 381; [29] 261; [30] 816; [31] 4,057; [32] 5,104.

Refusal to Operate a Spur Track.

Chicago, Wilmington & Vermillion Coal Co. v. Chicago, Burlington & Quincy et al. Opinion by Commissioner Clements:

The defendant has refused to build a spur track to the complainant's coal mine at Thayer, Ill., while it has built and operates spur tracks to other mines in its Illinois field. At other mines the complainant makes an allowance for the operation of privately built spur tracks, but refuses to do so at the complainant's mines, and this constitutes a discrimination which the defendants are expected to remove. (23 I. C. C., 13.)

Advance in Lemon Rates Refused.

In re suspension of advances in rates on lemons, C. L., from California to Colorado, Utah, Montana, etc. Opinion by Chairman Prouty:

An advance from $1 to $1.15 per 100 lbs. on lemons is not found to be reasonable and is not justified by the railways making the advance. The commission finds that the average haul on lemons is from four to five hundred miles less than on oranges, and that lemons may properly be loaded much more heavily per car than oranges. A rate, therefore, of $1 on lemons is not unduly low as compared with a rate of $1.15 on oranges. Carriers are permitted, however, to fix a minimum loading for collapsible bunker cars that will require them to be loaded to their full capacity. (23 I. C. C., 27.)

Exclusive Baggage Privileges on Trains Upheld.

W. G. Cosby v. Richmond Transfer Co. et al. Opinion by Commissioner Lane:

The granting of exclusive privileges to baggage transfer agents of a company which is controlled by railway officers does not form any undue discrimination, since the transfer of baggage is not a duty which the railways undertake to perform themselves for their patrons. Allowing, for sake of argument, that the rates made by the defendant are unreasonable, the commission is of the opinion that the act to regulate commerce does not give it jurisdiction over local baggage transfer companies when the service of such companies does not begin until the baggage has left the hands of the railway company. The granting of an exclusive privilege is not *per se* undue or unreasonable. (23 I. C. C., 66.)

Grain Elevation at Chicago.

Van Natta Brothers et al. v. Cleveland, Cincinnati, Chicago & St. Louis, et al. Opinion by Commissioner Lane:

Complainants are owners and operators of grain elevators located at points in Indiana and Illinois, on the line of the principal defendant. Under the tariffs of other roads which serve complainants' competitors in the same producing territory grain can be unloaded into elevators at Chicago, and there treated and shipped on at the balance of a through rate from point of origin to destination. The defendant is a party to such tariffs and participates in the through rates, but it refuses to grant like rates, or to allow any transit privilege at Chicago, on grain from complainants' elevators; its purpose being to hold such grain to its own line in order to get the larger revenue incident to the longer haul to eastern markets. This is an undue discrimination against complainants from which the carrier should be required to desist.

A Through Route Ordered.

Stonega Coke & Coal Co. et al. v. Louisville & Nashville. Opinion by Commissioner McChord:

The petition asks that the Louisville & Nashville be compelled to establish a through route and joint rate from the mines of the complainant through Appalachia to the coal markets, and this the L. & N. has refused to do, claiming that the Interstate Railroad is not a common carrier but merely a plant facility, and that moreover the rates from Appalachia are so low that if it divided them with the Interstate Railroad it would not receive a fair compensation for service performed. The Interstate Railroad operates about 30 miles of line; has 17 stations, of which seven are shipping stations of the Stonega Coke & Coal Company; operates 10 passenger trains daily, and has a large passenger station at Appalachia. It files tariffs and reports with the Interstate Commerce Commission, and maintains through routes and joint rates with the Carolina, Clinchfield & Ohio, and with the Norfolk & Western. The fact that the larger part of the freight it carries is for the Stonega company does not prove that it is a plant facility. Tested by a comparison with other cases, the commission decides that the Interstate Railroad is a common carrier. The L. & N. performs the service asked for by the complainants in this case at the mines at St. Charles. The conditions of transportation are substantially the same as between the two fields; yet the L. & N. gives to St. Charles' operations a service which it refuses to give to complainants' operations, and the commission finds that there is undue discrimination against the complainants. The case will be held open for such discrimination to be removed. (23 I. C. C., 17.)

STATE COMMISSIONS.

The Pennsylvania commission has refused to require the Pennsylvania Railroad to notify the consignee of the arrival of a package sent through its package department service. Neither can the road be compelled to notify the consignor that such a package has not been delivered. A firm in Philadelphia shipped to a suburban town a package which lay in the station three months and on which storage charges accrued to the amount of $2.05. The commission holds that to require notifications will entail much clerical labor. The suburban package service is maintained as an accommodation to the passengers, not as a source of revenue.

COURT NEWS.

The Texas railway commission is to appeal to the United States Commerce Court from the ruling of the Interstate Commerce Commission in the case reported at some length elsewhere in this issue.

The Duluth, South Shore & Atlantic has filed a petition in the federal court at Detroit, Mich., for an injunction restraining the enforcement of the state 2 cent fare law on the ground that it is confiscatory.

The Supreme Court of the United States has decided that an employee in the car repair department of a railway is a fellow servant of employees in the operating department. This decision was in a suit against the Grand Trunk Junction Railway. The opinion is by Justice Holmes, who observes that if the fellow servant doctrine is unjust, Congress is the body to change it.

The Humboldt Steamship Company has filed suit in the superior court at Seattle, Wash., against the Alaska Steamship Company, the Pacific Coast Steamship Company, the Northern Pacific Wharves & Trading Company, and the Pacific & Arctic Railway & Navigation Company, together with several of their officers, on a charge of conspiracy in restraint of trade. The petition charges that the Pacific & Arctic Railway & Navigation Company, operating the White Pass & Yukon Railway, has refused to make through traffic arrangements with the Humboldt company and charges its patrons rates from 5 to 30 per cent. higher than the railway's share of the joint rate granted the steamship companies alleged to be parties to the conspiracy.

The United States District court at Cleveland, Ohio, on March 23 imposed fines aggregating $123,000 on four railway and four dock companies on charges of rebating through the payment of a portion of the earnings of the dock companies back to the shippers of ore at the end of a year's business. The four railways that were fined are the Pennsylvania Company, Lake Shore & Michigan Southern, Bessemer & Lake Erie and New York, Chicago & St. Louis; and the dock companies are the Ohio & Western Pennsylvania Dock Company, the Union Dock Company, the Ashtabula Dock Company, and the Pittsburgh & Conneaut Dock Company. Individual indictments against D. R. Hanna and R. L. Ireland, respectively president and general manager of the M. A. Hanna Coal Company, and D. T. McCabe, fourth vice-president of the Pennsylvania, were quashed on recommendation of the Interstate Commerce Commission. In a statement issued at the time of the indictments last year, President McCrea of the Pennsylvania explained that the refunds to

the shippers were in the nature of adjustments in the rates to be paid for the handling of ore over the docks on account of the introduction of improved ore-handling machinery, which was calculated to reduce the cost of handling by an amount not easily determined in advance, and that there was no discrimination between shippers. The defendant corporations pleaded guilty of technical violations of the law for the reason that the contracts for refunds were not mentioned in the published tariffs.

The Mandamus in the Kentucky Coal Case.

The decision of the Commerce Court ordering the Louisville & Nashville and the Southern to perform their duty toward certain coal shippers, which was briefly reported in our last issue, was prepared by Judge Carland. This case came directly to the Commerce Court, having never been before the Interstate Commerce Commission. Besides the Stony Fork and Ralston coal companies there were two others interested. The mines referred to are situated on a short branch of the Louisville & Nashville extending westward from Middlesborough, Ky., the mines being from seven to nine miles out. At Middlesborough the coal would naturally be delivered to the Southern to be transported to points in Georgia, Alabama and other southeastern states. A joint tariff naming rates from these mines had been issued by the Southern, in which the Louisville & Nashville concurred; but the Southern refused to furnish cars, on the claim that the L. & N. was the originating carrier, while the L. & N. refused on the ground that it only performed a switching service. This deadlock between the companies destroyed the complainants' business. At the same time the railways were carrying to the southeastern states coal from other mines in the region without complaint. The complainants had repeatedly requested these two roads to transport their coal. The roads denied the charge that coal from other places was being accepted, but the court finds that the evidence nullifies this denial. The court holds that it has no jurisdiction to consider the question of car distribution, until action has been taken by the Interstate Commerce Commission. Therefore, the peremptory writ of mandamus is granted on the simple ground that, so long as the two companies establish and maintain a through route and a joint rate, they are required to accept coal tendered in reasonable quantities. If there were any question as to the reasonableness of the quantities offered, the Interstate Commerce Commission would be the authority to decide it. The decision is made under Section 23 of the act to regulate commerce, some of the requirements of which are transferred to the act establishing the Commerce Court. This section refers to violations of the law which are sufficient to amount to discrimination; and it is found that discrimination existed in this case. Reference is made also to Section 1 of the act, which makes it the duty of carriers to establish through routes and to provide reasonable facilities for operating such through routes; also to section 7, declaring it unlawful by any means or device to prevent the carriage of freight from being continuous from point of shipment to the place of destination. The railways argued that to discriminate they must be carrying coal for one shipper on conditions less favorable than for another, whereas, in fact, they were taking no coal whatever from the complainants. This is declared to be too narrow a construction, leading to an absurd result. The railways also claim that the Interstate Commerce Commission was the only place to which petitioners could go for relief. In the case of the B. & O. against Pitcairn, the Supreme Court held that the distribution of coal cars was an administrative matter, properly referred to the Interstate Commerce Commission; but in the present case the issue is one of simple compliance with a plain law, not requiring any previous administrative action. Why did these railways agree to establish a through route and publish a joint tariff? This tariff clearly held out that the carriers were ready to transport the coals of the petitioners. The Southern claimed to have filed its joint tariff as agent of the L. & N., but this excuse is not accepted by the court. The order of the court commands the roads to carry this coal, so long as they maintain the joint tariff referred to, or any like tariff.

The section of the Goyaz Railroad, Brazil, from Araguary to Catalao has been opened to traffic.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

The general offices of the Oklahoma Central having been moved from Purcell, Okla., to Chickasha, Dorset Carter, chief executive officer; G. H. Parker, auditor; and R. C. Boles, cashier, have had their offices transferred to the latter place.

Charles E. Schaff, vice-president in charge of operation of the New York Central Lines west of Buffalo, N. Y., with office at Chicago, has resigned to become president of the Missouri, Kansas & Texas, succeeding A. A. Allen, effective April 15.

Richard Fitzgerald, vice-president and general superintendent of the Chicago Junction Railway, has been elected president, with office at Chicago, succeeding J. A. Spoor, retired. H. F. Poronto, secretary and purchasing agent, has been elected vice-president and secretary, and R. B. Thomson, treasurer, has been elected assistant secretary and treasurer.

George Chester Conn, whose election as vice-president of the Pere Marquette, with office at Detroit, Mich., has been announced in these columns, was born July 1, 1867, at Woburn, Mass., and was educated in the public schools of his native town. He began railway work on October 1, 1884, in the general freight department of the Boston & Lowell, now a part of the Boston & Maine, and he was with the B. & M. until 1888. In November of that year he went to the Pennsylvania Railroad as a traveling freight agent. Two years later he was appointed traveling freight agent of the Canadian Pacific Despatch, and remained with that company until December, 1897, when he was appointed commercial agent of the Flint & Peré Marquette at Minneapolis, Minn. He was then appointed general agent of its successor, the Pere Marquette, and was later made assistant general freight agent at Milwaukee, Wis., of the same road. He left the service of that company in February, 1904, and was then appointed general freight agent of the Minneapolis, St. Paul & Sault Ste. Marie, remaining with that company until March, 1909. He then returned to the service of the Pere Marquette as freight traffic manager, which position he held at the time of his recent election as vice-president of that road.



G. C. Conn.

Operating Officers.

Thomas P. Edgar has been appointed inspector of transportation of the Cincinnati, Hamilton & Dayton.

P. O. Penn has been appointed trainmaster of the Missouri, Kansas & Texas of Texas, with office at Hillsboro, Tex.

W. J. O'Brien, superintendent of the Chicago Junction Railway, has been appointed general superintendent with office at Chicago, succeeding R. Fitzgerald. (See item under Executive, Financial and Legal Officers.)

T. A. Dempsey, superintendent of dining service of the Missouri, Kansas & Texas at St. Louis, Mo., has been appointed superintendent of dining cars of the Rock Island Lines, office at Rock Island, Ill., succeeding F. Stewart.

F. H. Christian, trainmaster of the Gulf, Colorado & Santa Fe at Galveston, Tex., has been appointed trainmaster, with office at Beaumont, Tex., and J. P. Crowley, transportation inspector at Temple, Tex., succeeds Mr. Christian.

J. C. Roth, assistant superintendent of transportation of the Northern Pacific at Tacoma, Wash., has been appointed general superintendent of the North Yakima & Valley, a subsidiary of the Northern Pacific, with office at North Yakima, Wash., succeeding M. S. Meeks. Effective April 1.

Early in April W. M. Whitenton, general manager of the First district of the Rock Island Lines at Chicago, and F. J. Easley, general superintendent of the same district at Davenport, Iowa, will have their offices removed to Des Moines, Iowa. (See item under Engineering and Rolling Stock Officers.)

C. L. Vaughn, superintendent of transportation of the Louisiana Railway & Navigation Company at Shreveport, La., has been appointed superintendent of car service of the Kansas City Southern, with office at Kansas City, Mo., succeeding W. G. Curren, resigned to accept service with the Baltimore & Ohio.

V. W. Lankey, trainmaster of the Michigan Central at Grayling, Mich., has been appointed trainmaster at Bay City, succeeding W. F. Phillips, resigned. F. W. Bennett, trainmaster of the Detroit & Charlevoix at East Jordan, succeeds Mr. Lankey, and W. L. Peck has been appointed trainmaster of the Detroit & Charlevoix, with office at East Jordan, succeeding Mr. Bennett.

H. H. Shepard, assistant general superintendent of the South Buffalo Railway, at Buffalo, N. Y., has been appointed general superintendent of the Charlotte Harbor & Northern, and will have charge over the construction, transportation, mechanical, roadway and bridges and building departments, with office at Boca Grande, Fla. John Bradley has been appointed superintendent of terminals in charge of the terminals at South Boca Grande.

Donald McDonald, whose appointment as district superintendent of the Intercolonial Railway, with office at Levis, Que., has been announced in these columns, was born on February 28, 1862, at St. Hyacinthe, Que., and was educated at the college of Ste. Anne La Pocatiere. In 1880 he began railway work as night agent and telegrapher on the Intercolonial. Three years later he was appointed agent at Ste. Flavie, and in 1885 was transferred to Chaudiere Junction as joint agent and telegraph operator for the Intercolonial and the Grand Trunk. He was then joint ticket agent of both these companies and the Quebec Central at Levis, Que., which position he held at the time of his recent appointment as superintendent of the Intercolonial Railway for the Montreal and Ste. Flavie district. The late A. R. McDonald, who was superintendent of the Intercolonial from 1879 to 1897, was a brother of Mr. McDonald.



D. McDonald.

Horace C. Grout, who has been appointed superintendent of the Canadian Pacific, with office at Toronto, Ont., was born on March 14, 1881, at Wausau, Wis. He attended the University of Wisconsin from 1900 to 1903. Prior to 1903 he was in railway work as a rodman and instrument man on the Canadian Pacific. In April, 1903, he was appointed resident engineer of the Canadian Pacific, remaining in that position until April, 1909, when he was promoted to assistant superintendent, which position he held at the time of his recent appointment as superintendent, effective April 15.

The Eastern and Northern districts of the Wisconsin division of the Chicago, St. Paul, Minneapolis & Omaha, will be operated as separate divisions, effective April 1. The Eastern division will include the lines between Minneapolis, Minn., and Elroy, Wis., including branches, and the northern division will include the lines north of Northline, Wis., and Eau Claire. Thomas W. Kennedy, superintendent at Eau Claire, will continue at Eau Claire as superintendent of the Eastern division, and J. J. O'Neill, superintendent at Omaha, Neb., has been appointed superintendent of the Northern division, with office at Spooner, Wis. James R. Welch, assistant superintendent at Eau Claire, has been appointed superintendent of the Nebraska division, with office at Omaha, Neb., succeeding Mr. O'Neill. C. D. Stockwell, assistant superintendent of the M. & I. division at St. James, Minn., has been appointed assistant superintendent of the Eastern division, with office at Eau Claire, succeeding Mr. Welch. Peter Copeland, assistant superintendent at Spooner, succeeds Mr. Stockwell, and his former position has been abolished.

Traffic Officers.

R. A. Turner has been appointed advertising manager of the Colorado & Southern, succeeding E. A. Cooper.

J. L. Morgan has been appointed traveling freight agent of the Illinois Central, with office at Brookhaven, Miss.

J. M. Macrae has been appointed district freight agent of the Canadian Northern, with office at Saskatoon, Sask., succeeding C. R. Hill, resigned.

Ira F. Kurtz has been appointed soliciting freight agent of the Lehigh Valley, with office at Geneva, N. Y., succeeding W. J. Sheridan, resigned.

Mark E. Simmons has been appointed district passenger agent of the Chicago Great Western, with office at Omaha, Neb., succeeding Fred Wight, promoted.

Stanley H. Watson has been appointed industrial agent of the New Orleans, Texas & Mexico, and the St. Louis, Brownsville & Mexico, with office at Kingsville, Tex.

J. E. Thayer has been appointed soliciting agent of the Central of Georgia, with office at Albany, Ga., succeeding L. K. Newlin, resigned to go into other business.

John Bickel, commercial agent of the Duluth, South Shore & Atlantic at Chicago, in charge of freight matters, has had his jurisdiction extended over passenger business.

F. T. Magan, dairy agent of the Erie Railroad, with office at Chicago, has resigned, effective April 1, to become manager of the Buffalo Cold Storage Company, Buffalo, N. Y.

I. O. Payne, freight soliciting agent of the Southern Railway at Chattanooga, Tenn., has been appointed commercial agent, with office at Chattanooga; and T. H. Gilbert succeeds Mr. Payne.

F. L. Wemple, assistant general freight agent of the National Lines of Mexico, at Mexico City, has been appointed assistant general freight and passenger agent of the Mexico North Western, effective April 1.

C. A. Boyden, traveling freight agent of the Detroit, Toledo & Ironton at Detroit, Mich., has been appointed division freight agent, with office at Detroit, succeeding D. W. Dirr, resigned to accept service elsewhere.

Herman L. Traber, commercial agent of the Missouri, Oklahoma & Gulf at Kansas City, Mo., has been appointed general freight agent, with office at Muskogee, Okla., and A. O. Von Dorn succeeds Mr. Traber.

William A. Sprott, division freight agent of the Wabash at Toledo, Ohio, has been appointed division freight and passenger agent, with office at Danville, Ill., succeeding C. C. Landers, resigned to accept service elsewhere. W. A. Hopkins, division freight and passenger agent at Moberly, Mo., succeeds Mr. Sprott, and Earle Lind, commercial agent at Hannibal, Mo., succeeds Mr. Hopkins at Moberly. W. N. Price, district freight agent at Buffalo, N. Y., has been appointed general agent with headquarters at San Francisco, Cal., succeeding Z. T. George, resigned to accept service elsewhere.

W. E. Wolfenden, general western passenger agent of the Pere Marquette at Chicago, has been appointed general passenger agent, with office at Detroit, Mich., succeeding H. F. Moeller, resigned. H. J. Gray, district passenger agent at Grand Rapids, Mich., succeeds Mr. Wolfenden. John A. Hewitt has been appointed commercial agent, with headquarters at Kan-

sas City, Mo., a new position; and G. G. Little has been appointed commercial agent, with office at Davenport, Iowa. E. O. Niles has been appointed traveling passenger agent with office at Chicago, succeeding R. H. McCurdy, who has been appointed city ticket agent in place of O. L. Kinney, promoted to city passenger agent. The office of the Pere Marquette-Lehigh Valley line at Omaha, Neb., has been discontinued, and correspondence pertaining to it should be addressed to Mr. Hewitt.

Ellis Farnsworth, district passenger agent of the Missouri Pacific, the St. Louis, Iron Mountain & Southern, and the Texas & Pacific at Chicago, has been appointed general agent in the passenger department of the Missouri Pacific and the St. Louis, Iron Mountain & Southern, with office at Chicago; and George W. Thomas, Southwestern passenger agent of the Chicago & Alton at Dallas, Tex., has been appointed Northern passenger agent of the Texas & Pacific, with headquarters at Chicago. W. R. Trelford, traveling passenger agent of the Missouri Pacific-Iron Mountain system at Dallas, Tex., and C. H. Morgan, traveling passenger agent of the Texas & Pacific at Birmingham, have both been appointed traveling passenger agents of the Texas & Pacific, with office at Chicago. P. A. Baer succeeds Mr. Morgan, and C. S. Blackman succeeds Mr. Trelford. J. K. Walker, city passenger and ticket agent of the Texas & Pacific at Shreveport, La., has been appointed district passenger agent at that place, and B. F. Kitchen has been appointed assistant district passenger agent at Shreveport. J. M. Griffin, passenger and ticket agent of the Missouri Pacific at St. Louis, Mo., has been appointed general agent in the passenger department at that place. N. C. Wooldridge, city passenger and ticket agent of the St. Louis Southwestern at Memphis, Tenn., has been appointed Southeastern passenger agent of the Texas & Pacific, with office at Atlanta, Ga.

Engineering and Rolling Stock Officers.

R. B. Kendig has been appointed chief mechanical engineer of the New York Central & Hudson River, with headquarters at New York.

E. D. C. Chisholm has been appointed resident engineer of the Canadian Pacific, with office at Winnipeg, Man., succeeding W. A. Mather, promoted.

Otis Thayer, assistant superintendent of the Union Pacific, with office at Cheyenne, Wyo., has resigned to accept service with the Southern Pacific at Oakland, Cal.

Early in April J. B. Kilpatrick, superintendent of motive power of the First district of the Rock Island Lines, and W. H. Petersen, engineer of maintenance of way of the same district, both at Davenport, Iowa, will have their offices removed to Des Moines, Iowa.

The Louisville & Nashville has formed a new department of construction and the following appointments have been made: J. H. Peyton, assistant to president, has been appointed chief engineer of construction, H. C. Williams, assistant engineer of construction, has been appointed assistant chief engineer of construction, and W. E. Smith, assistant superintendent at Birmingham, Ala., has been appointed general superintendent of construction, all with headquarters at Louisville, Ky.

W. R. Ladd, assistant superintendent of the Oregon division of the Oregon-Washington Railroad & Navigation Company in charge of mechanical matters at Portland, Ore., has been appointed master mechanic of the Albina shops, with office at Portland; and W. H. Dressel, district foreman of the Northern division, succeeds Mr. Ladd. J. H. Watson, district foreman at La Grande, Ore., has been transferred to the Northern division, succeeding Mr. Dressel; and, as has been announced in these columns, Edward Thomas, shop foreman at La Grande, succeeds Mr. Watson. Frank Leavette succeeds Mr. Thomas.

Phillip P. Mirtz, who has been appointed mechanical engineer of the Lake Shore & Michigan Southern, with office at Cleveland, Ohio, as has been announced in these columns, was born November 20, 1883, at Scranton, Pa. He was educated in the public schools at Scranton, and in 1901 began railway work with the Central Railroad of New Jersey as a mechanical draftsman, having been for two years previous a draftsman apprentice with the American Locomotive Company. He became a mechanical draftsman for the New York, Chicago & St. Louis at Cleveland in 1903, and two years later went to the Erie at Meadville, Pa., where he had the same title. In 1906 he was appointed mechanical draftsman of the Lake Shore & Michigan Southern, was promoted to assistant chief draftsman at the Collingwood locomotive shops in 1907, and two years later was made chief draftsman at the Elkhart locomotive shops of the same company. In 1910 he was made assistant engineer of motive power at Cleveland, and he has recently been made mechanical engineer of the same road, as above noted.

Special Officers.

F. W. Bergman, manager of the Chateau Laurier, Ottawa, Ont., has been appointed general manager of all hotels on the Grand Trunk and Grand Trunk Pacific systems, with headquarters at Ottawa.

OBITUARY.

John J. Burns, formerly for many years superintendent of the First division of the Denver & Rio Grande, died at his home in Denver, Colo., on March 18.

Thomas Green, chief engineer of the Minneapolis, St. Paul & Sault Ste. Marie, died at Minneapolis, Minn., on March 27, after several months' illness, at the age of 45.

George Fail Geagan, formerly livestock agent of the Erie Railroad, at New York, died on March 24, at his home in Passaic, N. J. Mr. Geagan was born on March 6, 1846, at New York, and began railway work in 1870, as superintendent of the stock yards of the Erie Railway at Deposit, N. Y., and was transferred in 1875 to Buffalo. In 1884 he was made livestock agent of the Chicago & Atlantic, at Chicago, and four years later he was appointed livestock agent of the New York, Lake Erie & Western, now the Erie, at New York. He held this position, and that of superintendent of the Weehawken stock yards, until his retirement on account of ill health on December 1, 1910.

R. F. McKenna, former president of the Master Car Builders' Association, and master car builder of the Delaware, Lackawanna & Western from March, 1904, to September, 1909, died on March 16 at Philadelphia, Pa., from the effects of a surgical operation. Mr. McKenna was born on November 14, 1868, at Scranton, Pa., and began railway work as an apprentice on the Delaware, Lackawanna & Western in 1884. In 1891 he was made chief draftsman in the car department. From 1892 to 1893 he was manager of the Buffalo Car Wheel Company. After that he returned to railway work as chief air brake instructor and foreman of the car shops of the Lackawanna at Scranton. In 1899 he was appointed general foreman of the Eastern division at Dover, N. J., where he remained until 1902, when he was appointed general foreman of the Scranton division. The following year he was made superintendent of car shops, and in March, 1904, he was appointed master car builder, from which position he resigned on September 1, 1909, because of the gradual failure of his health. Mr. McKenna's entire railway career had been with the Delaware, Lackawanna & Western. The first act of importance after his appointment as master car builder was to develop the organization and operation of the large car shops at Keyser Valley. He was president of the Central Railway Club at Buffalo in 1908. For a number of years, and until his death, he was chairman of the educational committee of the Railroad Department of the Y. M. C. A. Mr. McKenna's delightful personality, together with his high ideals and strong character made for him a host of friends of whom he was held in the highest regard.



R. F. McKenna.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Rutland is figuring on 4 ten-wheel locomotives.

The Coal & Coke Railway is figuring on 4 consolidation locomotives.

The Bingham & Garfield has ordered 4 six-wheel switching locomotives from the Baldwin Locomotive Works.

The International & Great Northern has ordered 10 consolidation locomotives from the Baldwin Locomotive Works.

The Atlantic Coast Line has ordered 15 six-wheel switching locomotives, 8 ten-wheel locomotives and 12 Pacific type locomotives from the Baldwin Locomotive Works.

The Virginian Railway has ordered 1 mikado locomotive from the Baldwin Locomotive Works. This locomotive will be a duplicate of the 9 mikado locomotives recently ordered from the Baldwin Locomotive Works, and mentioned in the *Railway Age Gazette* of January 12.

CAR BUILDING.

The Denver & Rio Grande is reported to be in the market for 2,000 freight and passenger cars.

The Atlantic Coast Line is in the market for 1,900 box cars, 100 flat cars, and a number of caboose cars and passenger cars.

The Bethlehem Steel Company, South Bethlehem, Pa., has ordered 50 coke cars from the American Car & Foundry Company.

The Ulster & Delaware is negotiating with the Pullman Company for 50 box cars and 50 flat cars. The contract is expected to be closed within a few days.

The Chicago, Rock Island & Pacific has ordered 6 dining cars from the Pullman Company, and two gas-electric motor cars from the General Electric Company.

The Bingham & Garfield has ordered 60 gondola cars from the Standard Steel Car Company, and has practically concluded negotiations with that company for 20 general service cars.

The Wabash has ordered 1,000 stock cars and 700 steel underframe box cars from the American Car & Foundry Company and 500 steel underframe box cars from the Haskell & Barker Car Company.

The Pennsylvania has ordered 27 passenger cars from the Pressed Steel Car Company, 20 passenger cars from the American Car & Foundry Company, and 20 passenger cars from the Standard Steel Car Company.

The Atchison, Topeka & Santa Fe reported last week as being in the market for 15 smoking cars, 10 combination passenger and mail cars, 10 chair cars, 14 three-compartment Jim Crow cars, and one combination passenger and baggage car, has ordered this equipment from the Pullman Company.

IRON AND STEEL.

The Chicago, Rock Island & Pacific has ordered 16,600 tons of 90-lb. rails, 15,750 tons of 100-lb. rails and 200 tons of 85-lb. rails. Of this order, the Lackawanna Steel Company will roll 1,000 tons; the Pennsylvania Steel Company, 500 tons; the Cambria Steel Company, 500 tons; and the Illinois Steel Company, the balance.

SIGNALING.

New Installations of Block Signals, Interlocking, Telephones for Train Despatching, Etc.

The Pennsylvania, in addition to the 111 miles of new block signaling recently reported in the *Railway Age Gazette,* is planning also to install automatic signals on the Philadelphia division between Dillersville, Pa., and Branch Intersection, 24 miles, double track.

Supply Trade News.

Willis L. Riley, formerly in charge of the drafting department of the Union Pacific freight car department, at Omaha, Neb., has been appointed mechanical engineer and assistant superintendent of the Moore Patent Car Company, St. Paul, Minn.

Jesse Lantz, vice-president of the Goodwin Car Company, New York, died on March 20. Mr. Lantz was actively engaged in business up to the time of his death. He had been continuously connected with the Goodwin Car Company for the past 10 or 12 years.

William Jay Cooke, vice-president of the McGuire-Cummings Manufacturing Company, Chicago, died on March 20 at his residence, 467 North Oak Park avenue, Oak Park, Ill. He was born in Cleveland, Ohio, in 1845, moved to Chicago in 1883, and was one of the founders of the McGuire-Cummings Manufacturing Company in 1885. He had been prominently identified with the railway supply business for the past 25 years.

The re-organization committee of the Allis-Chalmers Company, Milwaukee, Wis., will apply for a receiver on April 1, under the laws of New Jersey, the state in which the company was organized in 1901. Since the company will not technically have defaulted on its $275,000 interest, payable January 1, until the expiration of 90 days' grace after that date, the reorganization committee is unable to obtain the receiver until after April 1.

Dr. P. H. Conradson, chief chemist of the Galena-Signal Oil Company, Franklin, Pa., will on April 10, 11, 12 and 13, deliver a series of lectures in the assembly room of the Permanent Manufacturers' Exhibit of Railway Supplies and Equipment, Karpen building, Chicago, on the Lubrication of Steam Engines, dealing particularly with the use of a high degree of superheat in locomotive practice. The lectures will be accompanied by practical demonstration with laboratory apparatus arranged by Dr. Conradson.

D. W. Smith and Elmer J. Smith, of the Peter Smith Heater Company Detroit, Mich., have purchased the Baker Heater Company of New York, and have moved its offices and shop to 88 Isabella avenue, Detroit, where the business will be operated in connection with the Peter Smith Heater Company. The product of the Baker company will be sold only to steam railways, and the Smith company will make heaters for electric railway cars, as in the past. It is the intention of the new management to improve the line of heaters formerly made by the Baker company. Elmer J. Smith, vice-president and general manager of the Smith company, will be president of the Baker company. Daniel W. Smith, who is president of the Smith company, will be vice-president and general manager of the Baker company, and M. J. Phelan will be secretary of both companies.

The following changes in the sales organization of the Union Switch & Signal Company, Swissvale, Pa., will go into effect on June 1: The eastern division will be in charge of G. A. Blackmore as eastern sales manager, with headquarters in New York, and will be sub-divided into the eastern and southern districts. The western division will be in charge of J. S. Hobson as western sales manager, with headquarters in Chicago, and will be subdivided into the central district, in charge of Aaron Dean as resident manager, with headquarters in Chicago, and the Pacific district, in charge of J. B. Struble as resident manager, with headquarters in San Francisco, Cal. W. M. Vandersluis, now assistant western manager, will become sales engineer for the central district. H. W. Griffin, H. A. Wallace and T. H. Paternal will become sales engineers for the eastern district, and J. L. Brastow will become sales engineer for the southern district, with headquarters at Atlanta, Ga.

The Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has declared a dividend of 1 per cent. on the common stock. The last common dividend was paid in 1907. Dividend is payable April 30. The Westinghouse Electric & Manufacturing Company has declared regular quarterly dividend of 1¾ per cent. on preferred stock. According to a statement issued by the company the question of the next dividend will not be considered for six months. The rate then will be decided upon, a full consideration of the earnings of the company during that period and the then prospects for the future.

Railway Construction.

New Incorporations, Surveys, Etc.

Brownwood North & South.—See St. Louis & San Francisco.

Canadian Pacific.—A contract has been given to F. R. Wilford, to build a section between Trenton, Ont., and Belleville. It is expected that the work will be started in the near future. J. M. R. Fairbairn, assistant chief engineer, Eastern Lines, Montreal, Que.

Chicago & North Western.—This company has given a contract to Winston Brothers, Minneapolis, Minn., for grading the new line of the St. Louis, Peoria & Northwestern, from Peoria, Ill., south to Girard, 90 miles. E. C. Carter, chief engineer, Chicago. (March 8, p. 453.)

Chicago, Milwaukee & Puget Sound.—It is understood that this company is planning to build a branch from Butte, Mont., via Flathead valley to a point in Canada, and that surveys have been made for this line. The company has under consideration the question of building an extension from the Puget Sound line in the state of Washington north to Vancouver, B. C.

Clarsburg & Weston.—See Monongahela Valley Traction.

Denver & Rio Grande.—See item in General News regarding improvements on this road.

Elgin Terminal.—An officer writes that the entire route of this projected belt line has not yet been definitely decided upon. A section is to be built from Elgin, Ill., southwest via St. Charles to Batavia, thence southeast via Aurora to Joliet, thence east to Crown Point, Ind. D. C. Dunlop, president and chief engineer, 140 South Dearborn street, Chicago.

Elkin & Allegheny.—An officer writes denying the report that a 75-mile extension is to be built to Mountain City, Tenn. The company's plans call for building from Elkin, N. C., northwest to Sparta, about 25 miles, through a mountainous country. Track has been laid on 12 miles. J. A. Mills, president and general manager, Raleigh, N. C. (January 26, p. 176.)

Fairmont & Clarksburg.—See Monongahela Valley Traction.

Fairmont & Northern.—See Monongahela Valley Traction.

Grand Trunk.—Announcement has been made that this company will build a five-mile cut-off at Brantford, Ont., to the Tillsonburg branch. The new line will eliminate 20 grade crossings around the city. The work calls for a four-span bridge to be over 300 ft. long over the Grand river. The cost of the improvements will be about $250,000. H. R. Safford, chief engineer, Montreal, Que.

Harriman, Knoxville & Eastern.—According to press reports, this company has completed work on the line from Harriman, Tenn., east to Dossetts, from which point connection is made over the tracks of the Louisville & Nashville to Knoxville. W. J. Clark, chief engineer, Harriman.

Hutchinson & Northern.—Organized in Kansas to build from Hutchinson, Kan., east to a connection with the St. Louis & San Francisco at Burrton, about 15 miles, thence northeast to a connection with the Union Pacific in the northern part of the state. Under the name of the Hutchinson & Western a line is to be built from Hutchinson, west via Huntsville to Hudson, thence west to Larned, or north to Great Bend, about 70 miles. The Hutchinson Commercial Club, and residents of Hutchinson, are back of both projects.

Hutchinson & Western.—See Hutchinson & Northern.

Jacksonville, McRae & Northern.—Application has been made for a charter in Georgia, to build from Jacksonville, Ga., on the Altamaha river, north via McRae to Dublin, about 55 miles. A bridge is to be built over the river at Jacksonville to Barrows Bluff, and a connection is to be made with the Georgia & Florida from that place south to Douglas, 21 miles. The names of the promoters are not given.

Kettle Valley.—According to press reports, contracts are to be let in April, and work will be started a month later on the extension from Coldwater Junction, B. C., to Hope, 50 miles, thence to the Coquahala river. A. McCulloch, chief engineer, Penticton, B. C. (March 8, p. 453.)

Maine Roads (Electric).—Plans are being made to build an electric line from a connection with the Wiscasset, Waterville & Farmington at Albion, Me., northwest to Benton, seven miles. Residents of Albion, Benton and Fairfield are back of the project.

Missouri, Oklahoma & Gulf.—A contract has been given to McCabe & Steen, Fairland, Okla., for building 300 miles, including bridge work, in Oklahoma and Texas. Work is now under way from Fairland, north to Pittsburg, Kan., also from Wagoner, Okla., north to Joplin, Mo. J. J. Harrison, chief engineer, Muskogee, Okla. (March 15, p. 525.)

Monongahela Valley Traction.—This company is to be formed in May, as a consolidation of the Fairmont & Clarksburg, the Fairmont & Northern, and the Clarksburg & Weston, with a capital of $7,000,000 and headquarters at Fairmont, W. Va. Under the name of the Clarksburg & Weston plans have been made to build from Weston, W. Va., north to Clarksburg, 16 miles, and to put up three sub-stations on the line. Track has been laid on eight miles. S. L. Watson, president, and D. Britt, chief engineer, Clarksburg.

National Railways of Mexico.—A contract has been entered into recently with the Mexican government to carry out the project which has been under consideration for several years of building a new line from Vera Cruz, Mex., north via Tampico to Matamoros, 550 miles. One line is to be built from a point on the Interoceanic, about 25 miles from Vera Cruz to Tamos on the Tampico-San Luis Potosi division, 10 miles from Tampico. A second line is to be built from the Tampico-Monterey division, 32 miles from Tampico, to Rosita on the Matamoros-Monterey division, six miles from Matamoros. The company has also been granted a concession to build a branch from a point at or near Tamos to Honey or to Beristain, on the Hidalgo & Northeastern division. This branch will provide a short line from Mexico City to Tampico. The railway company agrees to complete the first 65 miles within two years, and an additional 65 miles each subsequent year until all the work is finished. The government agrees not to grant any subsidy for the construction of a railway within a distance of 10 miles on either side of the new line for a period of 10 years. James M. Reid, chief engineer, Mexico City, Mex.

New Iberia, Lafayette & Northeastern.—An officer writes that the plans call for building from Eunice, La., southeast via Church Point, Lafayette and St. Martinsville, to New Iberia, about 60 miles. The prospects of building are good, but it has not yet been decided when bids will be asked for the work. The company expects to develop a traffic in sugar cane and products, timber, cotton and corn. F. N. Welch, president; H. A. Genung, chief engineer, New Iberia. (December 22, p. 1300.)

New Orleans, Clinton & Birmingham.—An officer writes that a charter has been granted for building a line from Edenborn, La., on the Louisiana Railway & Navigation Company, north to Clinton, 40 miles, and an extension is eventually to be built northwest to Natchez, Miss. At an election to be held in April, if the residents along the proposed line vote a five mills tax in aid of the project, the line will probably be built. A. J. Kerfoot, Jonesboro, La., may be addressed.

Niobrara & Sioux City.—Incorporated in South Dakota with $1,000,000 capital and offices at Pierre, S. D., and at Omaha, Neb. The plans call for building about 150 miles of railway from Niobrara, Neb., east to a point in Woodbury county, Iowa. A branch line is also to be built southwest to O'Neill, Neb. The estimated cost of building the line is $5,000,000. W. E. King, S. G. Peticolas, C. W. Baker and R. R. Kinkaid, all of Omaha, and G. W. Martens, Pierre, S. D., are the directors.

Pennsylvania Railroad.—See Pennsylvania System.

Pennsylvania System.—The record of the mileage of the road on December 31, 1911, shows that the total length of the main line on the lines east of Pittsburgh, Pa., and Erie, is 5,329 miles of first-track, with 1,871 miles of second-track, 551 miles of third-track, 481 miles of fourth-track, and 4,544 miles of company's sidings, a total of 12,776 miles. There was an increase of six miles of first-track, 13 miles of second-track,

three miles of third-track, six miles of fourth-track, and 148 miles of company's sidings, a total increase of 176 miles. On the Pennsylvania lines west of Pittsburgh and Erie, the mileage is 3,098 miles of first-track, 1,352 miles of second-track, 211 miles of third-track, 121 miles of fourth track, and 2,526 miles of company's sidings, a total of 7,308 miles. During the year there was an increase of 187 miles of first-track, 56 miles of second-track, 19 miles of third-track, 20 miles of fourth-track, and 118 miles of company's sidings, a total increase of 400 miles. The mileage of the Vandalia Railroad is first-track 927 miles, second-track 106 miles, third-track eight miles, and company's sidings 682 miles, a total of 1,723 miles. During the year, there was an increase of four miles of first-track and three miles of company's sidings, a total increase of seven miles. The grand total of all lines, including those operated by and associated in interest with the Pennsylvania Railroad is 11,504 miles of first-track, 3,593 miles of second-track, 798 miles of third-track, 619 miles of fourth-track, and 8,722 miles of company's sidings, a total of 25,236 miles. Of this, 6,330 miles of first-track is east of Pittsburgh and Erie, and 5,174 miles is west of Pittsburgh and Erie.

Quanah, Seymour, Dublin & Rockport.—Work is now under way on a section north of Belton, Tex. The plans call for a line from Quanah, near the Oklahoma line, southeast to the port of Rockport, on the Gulf coast, about 500 miles. The promoters are negotiating with several existing roads for trackage rights to secure a temporary through line between the two proposed terminal points as early as possible. The company plans to build from Quanah, southeast to Georgetown, about 300 miles, where connection is to be made with the Missouri, Kansas & Texas, and over that road to Austin. A connecting link between Austin and Lockhart, 30 miles, is to be built, and the tracks of the San Antonio & Aransas Pass will be used from Lockhart to Luling. Bonuses are being raised for the construction of the link between Luling and Rockport. Surveys for the entire line will be finished soon. L. E. Walker, president, Austin; R. Y. Walker, chief engineer, Belton.

San Pedro, Los Angeles & Salt Lake.—An officer writes that the branch from Moapa, Nev., to St. Thomas, 22 miles, will be finished in April, and that the company does not contemplate building any other branches in the near future. E. G. Tilton, chief engineer, Los Angeles, Cal.

Sioux City, Mitchell & Pierre.—Incorporated in South Dakota with $3,000,000 capital, to build from Mitchell, S. Dak., northwest to Pierre, about 150 miles. The directors include T. Quale, Blunt; J. B. Rose, Miller; T. S. Hall, Gannvalley; D. B. Miller, Mitchell; A. V. Ewart and C. E. Crow, Pierre.

St. John & Ophir.—A contract has been given to the Utah Construction Company, of Ogden, Utah, to build from St. John, Utah, northeast to Ophir, 8½ miles, for the purpose of transporting ore from the Ophir and Cliff mines. The work will be light, and includes 10,000 cu. yds. of cut and fill a mile. Maximum grades will be 7 per cent., maximum curvature 12 deg. It is expected that the work will be finished by June of this year. J. R. Clark, president, Los Angeles, Cal., and F. R. Nicholas, engineer, Ophir, Utah. (March 22, p. 701.)

St. Louis, Peoria & Northwestern.—See Chicago & North Western.

St. Louis & San Francisco.—The Brownwood North & South has increased its capital from $30,000 to $200,000, it is said, to provide funds for building an extension from May, Tex., north to Wichita Falls, about 150 miles. F. G. Jonah, chief engineer, St. Louis, Mo. (November 17, p. 1036.)

Temiskaming & Northern Ontario.—A grading contract has been given to McCaffery & McQuigge, Toronto, Ont., to build from Earlton, Ont., to Elk Lake, about 30 miles. The contract calls for the completion of the work by September 1. S. B. Clement, chief engineer and superintendent maintenance, North Bay, Ont. (March 1, p. 409.)

Texas Roads.—The Huntsville Business League has under consideration the question of building a line from Beaumont, Tex., to Waco, about 200 miles. Bonuses have already been secured for $100,000, and others have been promised, making the total $500,000. S. S. Felder is president of the business league, Huntsville.

RAILWAY STRUCTURES.

Brantford, Ont.—See Grand Trunk under Railway Construction.

Broken Bow, Neb.—The Chicago, Burlington & Quincy is planning the construction of a new roundhouse and turntable.

Centralia, Wash.—Contracts have been let for building a new roundhouse and machine and car shops for the Northern Pacific, to cost approximately $300,000.

Dallas, Tex.—The Union Terminal Company has been incorporated with a capital stock of $48,000, representing all of the railways entering Dallas, for the purpose of building a new union passenger station, and a terminal railway.

Douglas, Ariz.—The El Paso & Southwestern is planning the construction of a new passenger station to cost $25,000.

Garrett, Ind.—The Baltimore & Ohio will begin work early in April on a general enlargement of its terminal facilities, including the erection of a new roundhouse, turntable and pits, and the enlargement of shops to handle classified repairs.

Jacksonville, Ga.—See Jacksonville, McRae & Northern under Railway Construction.

Macon, Ga.—The Southern Railway will make temporary improvements at a cost of $10,000 for handling passengers during the annual re-union of the United Confederate Veterans, to be held in Macon on May 7-9. The work includes new baggage rooms, extensions to platforms, enlargement of ticket offices, etc.

New Carlisle, Que.—The Quebec Oriental and the Atlantic, Quebec & Western have under consideration the question of building joint shops at New Carlisle.

New York, N. Y.—The Lehigh Valley is planning to build a reinforced concrete grain elevator at its terminus in New York harbor.

Norfolk, Va.—An officer of the Norfolk & Western writes that the plans are not yet completed for the new coal pier at Lamberts Point. (March 27, p. 702.)

Outlook, Sask.—See Swift Current, Sask.

Owosso, Mich.—The Ann Arbor is perfecting plans for new car shops, a 40-stall roundhouse, machine, paint and repair shops, and a smelter plant, which will cost approximately $400,000, with the new trackage proposed. The new car shops will replace a building half the size of the proposed new one.

Regina, Sask.—See Swift Current, Sask.

St. John, N. B.—The harbor improvements to be carried out at Courtenay Bay, St. John, for which a contract was given to Norton, Griffiths & Co., including the construction of a breakwater, dredging work in the harbor, reclaiming a site for railway terminals, and constructing about 4,890 ft. of wharves, are being carried out by the Department of Public Works, Ottawa, Ont. This is wholly a government undertaking. This work has no present relation to the work of the National Transcontinental (Grand Trunk Pacific). (February 23, p. 361.)

St. Thomas, Ont.—The London & Lake Erie Transportation Company will put up new car barns at St. Thomas, to cost $20,000.

Swift Current, Sask.—The Canadian Pacific has given contracts for building roundhouse at Swift Current at Outlook, at Regina, and at Wilkie.

Wilkie, Sask.—See Swift Current, Sask.

Trains now operate from Lagos to the junction of the Baro-Kano line at Minna, a distance of 467 miles, and on to Baro-Kano. The work of improving the first section between Lagos and Ibadan in order to remove sharp curves and dangerous grades at a cost of $1,000,000 is approaching completion, and when it is finished it is estimated that the cost of haulage will be reduced by nearly 50 per cent. The development effected by the railways is shown by the increasing revenue which they obtain, for, whereas in 1903 the revenue amounted to only $250,000, in 1907 it exceeded $500,000, while in 1910 it was $1,300,000. The receipts for last year are expected to exceed $1,500,000, and for 1912 they are estimated at $1,750,000.

Railway Financial News.

Artesian Belt Railroad.—This property has been sold for $200,000. The names of the interests represented by the purchaser have not been made public. The road runs from Macdona, Tex., to Christine, 43 miles.

Chicago, Memphis & Gulf.—See Illinois Central.

Chicago, Rock Island & Pacific.—President Mudge predicts much larger net earnings for the balance of the fiscal year, basing his prediction on the steady increase in freight traffic, large amounts of freight which were offered during snow blockades, large amount of grain in farmers' hands in Rock Island territory and excellent crop conditions in that territory.

Denver & Rio Grande.—See an item in regard to the use of the proceeds of the income bonds in General News.

Georgia & Florida.—Stockholders have voted to authorize $2,000,000 general mortgage 6 per cent. bonds. The bonds have been underwritten, it is said, on a basis of 52. The proceeds will be used to retire floating debt and to pay off equipment obligations.

Grand Trunk.—The Canadian senate has passed a bill authorizing the company to acquire bonds and debentures of the Grand Trunk Western to the extent of $30,000,000; and, for the purpose of aiding any existing company, or company to be incorporated, to issue perpetual consolidated debenture stock bearing interest not exceeding 4 per cent., provided that the annual interest payable shall not exceed £250,000, the new issues to rank with the existing consolidated debenture stock of the company.

See an item in regard to steamships to New York in Traffic News.

Illinois Central.—Suit, it is understood, will probably be brought against the Chicago, Memphis & Gulf to compel it to carry out the terms of an agreement of sale to the Illinois Central. New interests acquired the C. M. & G. in 1909, and they will defend the suit on the ground that an agreement to sell the railway property before the railway was built is illegal.

Kansas City, Mexico & Orient.—See comments on the reorganization of this road in our editorial columns.

The protective committee, Lord Monson, chairman, has sent out deposit agreements under which it asks the deposit of first mortgage bonds. This agreement provides that bonds deposited may be withdrawn only after the committee has adopted a plan of reorganization. The agreement does not bind the committee to adopt a plan in the immediate future.

Minneapolis, St. Paul & Sault Ste. Marie.—A press despatch from Marinette, Wis., says that the Soo is to take over the Wisconsin & Michigan, which runs from Marinette, Wis., to Iron Mountain, Mich., and crosses the Soo at Faithron Junction, Mich.

Missouri Pacific.—This company has sold to Speyer & Co., New York, $5,000,000 5 per cent. notes of 1911-1914. This is the balance of $25,000,000 notes authorized in 1911 and secured by collateral which includes $9,800,000 D. & R. G. preferred, $15,000,000 D. & R. G. common, $7,000,000 Wabash preferred and $5,000,000 Texas & Pacific common. President Bush is quoted as saying that this will probably be the last short-term financing that the Missouri Pacific will have to do. The details of a mortgage to be placed on the St. Louis, Iron Mountain & Southern are now being considered.

New York, New Haven & Hartford.—A. S. May, treasurer of the company, has been elected a director temporarily, succeeding Professor G. J. Brush, deceased. Mr. May's election is for the purpose of maintaining a majority of the board residents of Connecticut.

Pennsylvania Railroad.—On December 31, 1911, this company operated 25,237.5 miles of track. The number of stockholders on March 1 was 73,567, showing an increase of 7,744 over last year. This number does not include the stockholders of the various subsidiaries. The lines East and West together now operate 11,504 miles of first track, 3,593 miles of second track, 798 miles of third track, and 619 miles of fourth track. There are 8,722.27 miles of sidings. The increase in the trackage during 1911 was 620 miles.

St. Louis & San Francisco.—James N. Wallace, president of the Central Trust Company, New York, has been elected a director of the St. Louis & San Francisco.

St. Louis Southwestern.—Stockholders are to meet April 17 to vote on the question of authorizing $75,000,000 additional common stock and $100,000,000 first terminal and unifying refunding 5 per cent. bonds.

Southern Pacific.—Representative Smith of California, has introduced in the House of Representatives at Washington a bill appropriating $1,830,673, to reimburse the Southern Pacific for work performed and money spent in controlling the break in the Colorado river, and preventing the flooding of the Imperial valley, California.

Temiskaming & Northern Ontario.—The Ontario parliament has before it a bill providing that the location of the line and all branches; all plans of works, by-laws, fixing of fares and tolls for all traffic, etc., shall be subject to the approval of the Lieutenant-Governor in council. The bill also provides for validating the agreements between the Temiskaming & Northern Ontario and the Grand Trunk regarding running rights by the Grand Trunk over the Temiskaming & Northern Ontario between Cochrane and North Bay.

Virginian Railway.—This company has sold $25,000,000 first mortgage 5 per cent. bonds to a syndicate headed by the National City Bank and Kissel, Kinnicutt & Co., both of New York, and Lee, Higginson & Co., of Boston.

The capitalization of the Virginian Railway is now $25,000,000 first mortgage bonds, $2,400,000 equipment trust certificates, $29,000,000 preferred stock, and $34,245,000 common stock. The Rogers estate takes the preferred stock in settlement of its claims and ceases to be a creditor of the road. The Rogers interests, directly or through the Tidewater Company, own nearly all of the preferred and common stock.

The sale of $25,000,000 bonds is to retire $17,000,000 first lien 5-year 6 per cent. notes of the Tidewater Company. These notes have been called for redemption at 101 on June 1, 1912, and are secured by $33,500,000 first mortgage 5 per cent. bonds of the Virginian Railway and by the personal guarantee of the late H. H. Rogers. The notes are convertible into the Virginian Railway bonds any time within the next month.

Wisconsin & Michigan.—See Minneapolis, St. Paul & Sault Ste. Marie.

With regard to the construction of a railway from Beira, Portuguese East Africa, to the Zambesi river and thence to Nyasaland it is learned that the government proposes to purchase from the British Central Africa Company the subsidy lands to which the latter is entitled in connection with the construction of the Shire Highlands Railway for $876,000. The government will also guarantee 4 per cent. interest for a period of 10 years on $2,433,000 capital necessary for constructing the line from the Zambesi northward to Port Herald in Nyasaland. The northern line, which will begin at Port Herald, the present terminus of the Shire Highlands Railway, will run along the bank of the Shire river and touch the Zambesi at Kaia, to which place the Zambesi is navigable all the year round. This section is about 70 miles in length, and, like the rest of the system, will be of 3 ft. 6 in. gage. The construction of the 173 miles of railway from Beira through the Mozambique Company's territories to the Zambesi—which is a part of the general scheme—will, it is expected, commence simultaneously with that of the northern section. There are no serious engineering difficulties on either section of the line, which, when completed, will insure direct railway communication between the sea at Beira and the heart of Nyasaland, a distance of about 350 miles. It is understood that the necessary financial arrangements for building both railways are nearing completion, and that the contract between the government and the British Central Africa Company is being drafted. Northwards of Blantyre, the limit of the rails, the question is being considered of extending the line to the shores of Lake Nyasa, by way of Zomba, a distance of over 100 miles. This, however, is a matter for the future.

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THE new English law prescribing the form of accounts to be rendered to the Board of Trade by British railway companies is described in another column. While the form of these accounts is in some ways comparable to and in other ways in contrast with the form prescribed by the Interstate Commerce Commission, the spirit which pervades the law is unmistakably different from the spirit that pervades the accounting orders of the Interstate Commerce Commission. The first section of the English law provides that "every railway company shall annually prepare accounts . . . with the form set out . . . and shall submit their accounts to *their auditors* in that form." The italics are our own. Professor Adams, backed by the Interstate Commerce Commission, undertook to act as the accountant with powers of auditor for the railways. The English Parliament wants stockholders of railways and the English Board of Trade to have at their disposal certain information; and it calls for this information in a non-technical, common-sense sort of way, leaving it to the railway accountants and the stockholders' auditors to see that the bookkeeping is done according to the best bookkeeping theory. The difference between our own commission's methods and purposes and the English government's methods and purposes is obvious. The reasons for the differences are not hard to explain. Our commission attempts to teach the railway companies the proper bookkeeping method and to compel them to adopt this method. It goes further than simply calling for information, and prescribes minutely what the theory should be which shall govern in preparing this information. It does this because of the fear, grounded on past experience, that the railway companies will succeed in giving false or misleading information through the use of various systems of bookkeeping which may be founded on quite different theories of bookkeeping practice, as between different companies. There is none of this spirit of attempting to catch the railways in a misdeed in the newly enacted English law, since, presumably, in England past experience has not justified any such attitude.

WE give elsewhere in this issue almost in full the notable address that Chairman Prouty of the Interstate Commerce Commission delivered at the dinner of the Traffic Club of Pittsburgh on March 28. There are some things in the address with which many railway men will disagree. There are more things in it with which they will agree. There is nothing in it which they will not read with interest. Mr. Prouty has now been on the Interstate Commerce Commission for 16 years. During all this time many railway men have regarded him as too radical in his views. Some have even thought that he has had a certain amount of bias against the railways. But they have never questioned his intention to be impartial; nor have they ever, in public or in private, questioned his sturdy integrity and his intellectual eminence. He has the weaknesses of his virtues, but the *Railway Age Gazette* believes that he ranks today in point of character and in point of ability among the very greatest public men of America. There are some people who think that Mr. Roosevelt has influenced railway regulation in this country more than any other person. The man who has put his imprint most deeply on railway regulation in the United States is not Mr. Roosevelt, but Charles Azro Prouty. His are mainly the ideas that have been embodied in the Act to Regulate Commerce; his mainly the tone that up to the present time has been given to the administration of that law by the Interstate Commerce Commission. These are some of the things—and another is his scholarly and effective use of the English language—that make Mr. Prouty's utterances as interesting to those who differ from him as to those who concur with him. It is worth noting in passing that the differences of opinion between Mr. Prouty and the railway managers are not as wide as they used to be. This is because both Mr. Prouty and the railway men have somewhat altered their points of view; although it must be confessed that the point of view of the railway men has changed more than has that of Mr. Prouty.

THE one point in Mr. Prouty's speech with which railway men will most radically disagree is that regarding the limitation of railway profits. It is not practicable, as his comments might be taken to imply, and as many people believe, to limit all railways to an average dividend of 5 per cent. It would be practicable if the government would guarantee this return, but if the nation guaranteed this or any other return, there would be a speedy decline in the efficiency of railway management which probably would make it necessary for the government to go down in the taxpayer's pocket to get the wherewithal to make its guarantee good. As the Railroads Securities Commission said in its report to President Taft: "We hear much about a reasonable return on capital. A reasonable return is one

which, under honest accounting and responsible management, will attract the amount of investors' money needed for the development of our railway facilities. More than this is an unnecessary public burden; less than this means a check to railway construction and to the development of traffic. . . . If rates are going to be reduced whenever dividends exceed the current rates of interest investors will seek other fields where the hazard is less or the opportunity greater. In no event can we expect railways to be developed merely to pay their owners such a return as they could have obtained by the purchase of investment securities which do not involve the hazards of construction or the risks of operation."

THE Sherman anti-trust law as interpreted by the Supreme Court of the United States in the Standard Oil and American Tobacco Company cases permits reasonable agreements between competing concerns. In an editorial in our issue of March 8, page 412, we called attention to the war which has been raging in the steel wheel market and which has reduced the price of steel wheels to a point where it cannot be kept without throwing some of the competitors into bankruptcy or causing deterioration of the product. Such competition, if long persisted in, means survival of only the strongest concern, and that means monopoly. It would seem that the law ought to be made such that public reasonable agreements to abate cut-throat competition would be clearly legal. While it seems clear that under the decisions mentioned a reasonable agreement by competing concerns to raise and maintain prices would be legal, nobody knows just what kind of an agreement the courts would hold reasonable. The result, therefore, is the same as if all agreements whatever were prohibited. It has been suggested that an interstate trade commission should be created to regulate industrial concerns much as the Interstate Commerce Commission now regulates railways. The railways have never been specifically authorized by law to make agreements to maintain rates, either reasonable or unreasonable, whether under the supervision of the Interstate Commerce Commission or not. But that the roads ought to be permitted to make reasonable agreements, or even contracts, to prevent the cut-throat competition that decimates earnings and at the same time so demoralizes business as to confer no public benefits, is the opinion of practically all competent students of railway economic questions. The same kind of reasoning that leads to this conclusion would lead to the conclusion that industrial concerns ought to be legally authorized to make reasonable, public, properly supervised price agreements, and if an interstate trade commission were organized that body undoubtedly would be the proper one to supervise such agreements. The fact is, that even under existing laws price agreements are made between industrial concerns, just as rate agreements are made between railways. The trouble is that they are not public or properly supervised, and that in consequence they are often unreasonable. If the law specifically permitted reasonable agreements and provided for their supervision by some public body and at the same time prohibited all unreasonable agreements and all secret agreements, whether unreasonable or not, the resulting conditions would be better than they are now, or than they can be made by archaic statutes the meaning of which is not clear and the enforcement of which produces as bad results as their violation.

THE DEMAND FOR ACCURATE CAR WEIGHTS.

THE Interstate Commerce Commission's hearing at Chicago last week on irregularities and discrepancies in the weighing of freight cars and carload freight marks the beginning of a thorough investigation of an important subject. That such an investigation is needed was indicated by the testimony of shippers, railway men and others showing that there are many and wide variations between the stenciled and the actual tare weights of cars and between weights obtained at different weighings of the same cars and loads.

The problem presents more practical difficulties than appear on the surface, and it is far easier to describe conditions that work hardships than to formulate a plan for their correction. These things were made manifest at the hearing. Although one or two witnesses were inclined to try to make it appear that the railways have so contrived their weighing rules and practices as to give the shippers the worst of it, a majority of those who testified refrained from muddying the waters by individual complaints, and seemed actuated only by a desire to assist in a co-operative effort to improve conditions by the application of the most scientific principles practicable in view of the physical conditions which must be met.

In fact, the most comprehensive figures presented demonstrated that the effect of the use of inaccurate weights is not at all one-sided, but is as likely to be a reduction of the railways' earnings as an increase in the shippers' transportation charges. Of the cars weighed by the Western Railway Weighing Association and Inspection Bureau during five months of 1911, 59 per cent. weighed less than the stenciled tare weights, or to the advantage of the shipper, and 41 per cent. weighed more, or to the advantage of the railways. As the figures given were for the winter months, when cars are likely to weigh heavier than at other times, it is quite probable that when the figures for the summer months are completed and filed with the commission the advantage that the shippers have derived from incorrect weights will be further emphasized. That there has been a marked improvement in the accuracy of scale weights in recent years is proved by the statements presented to the commission by Superintendent Dodge of the Western Railway Weighing Association, showing that the number of claims involving weights on lumber was reduced from 61,408 in 1906 to 16,125 in 1911, and that out of 5,709,763 cars weighed in 1911 a check-weighing of 213,464 showed only 8.3 per cent. whose weights varied over 1,000 lb.

The individual shipper, however, is not concerned with averages. No matter how evenly the general effect may be distributed, in the long run the shipper very properly desires the adoption of methods that will not subject him to occasional instances of serious injustice; and it will be the endeavor of the commission to bring such methods into use. It is to the discredit of the railways that they have not done so of their own accord. They have long known of the bad conditions that exist and might have obviated the necessity for an investigation and order by the commission by taking proper action in concert with the shippers. The failure of the roads to do what they know ought to be done is the cause of much of the regulation of which they often complain. Justice requires it to be said, however, that some of the railways have been spending large sums for inspection and supervision to make their scale and weighing methods as accurate as practicable. To adopt the suggestion that has been advanced that the government establish a system of detailed supervision over the weights of the railways would be to impose on the government a difficult and costly task that should be performed by the railways and shippers themselves.

Natural variations in the weights of commodities, and in those of cars due to weather and transportation conditions and to the accumulation of dirt and foreign substances, as well as the impracticability of maintaining scales at all points of loading, are physical factors that must be accepted to a reasonable extent. A more frequent and rigid inspection of scales and a more frequent correction of the stenciled weights of cars would go far to remove the causes of complaints. Furthermore, the rule allowing a variation of 1,000 lb. in the weight of cars without requiring a correction to correspond with a check-weight should be amended to better protect the smaller shippers.

It was testified on several occasions during the hearing that accurate weights cannot be obtained without bringing the car to a stand on the scales and cutting it free from other cars in the train. If this is true it would appear that there is need for an improvement in scale construction, for the uncoupling of cars every time they were weighed would cause very serious delays to traffic. A few days ago the Chicago & North Western brought 750 carloads of live stock into Chicago in one morning. To

weigh these cars while in motion over the scales at the rate of three a minute would require over four hours; and to bring all the cars to a stand and uncouple them would, of course, greatly prolong the delay. Slight inaccuracies in the weights of commodities that are usually weighed while cars are in motion will even themselves up in the long run and will probably do little harm until the scale makers can devise a weighing apparatus conforming more fully to the demands of traffic.

It is probable that many railways have not enough scales properly to handle the volume of traffic. This represents another of the expenditures that most railway men agree should be made—if they had more money to spend. In view, however, of the fact that reasonable accuracy of the weights on which rates are computed is an element of the most vital importance to both railways and shippers, it is probable that in some cases the provision of proper and adequate weighing facilities has been neglected in favor of the provision of other facilities of less real importance.

RAIL BREAKAGE AND WHEEL LOADS.

IN the recent discussion on rail failures the principal reasons given by the manufacturers for the large number of breakages are that the weight of locomotives and cars, and the speeds of express trains, have been increased in a more rapid ratio than the size of the rail section, and they suggest, therefore, that a larger section should be used. No figures or calculations have been presented to sustain these statements, and it is difficult to do so, as they are affected by the conditions assumed, and the maximum stresses in rails are almost indeterminate.

As the great majority of rails do not break, and many of those which do break are defective in some respect, it would seem to be the duty of the manufacturer to turn out a uniform product equal to those rails which do not break under present loads and speeds rather than advocate a larger section. If we have stated the conditions correctly, the only reason for using a larger section would be to provide such a factor of safety as would permit of the continued use of rail steel which is not entirely homogeneous. It may be said, further, that experience with sections larger than 100 lbs., made under present methods of manufacture, does not encourage their use in large quantities.

In considering the changed conditions in railway equipment, which are charged with the responsibility for broken rails, we may take some definite time and compare the present wheel loads and rail sections with those used five years ago. Fifty-ton steel freight cars were used then as now. Heavier steel passenger cars have been introduced, but they are carried on 12 wheels and the average load per wheel is not excessive. The Pacific type locomotive is now generally used on fast trains, and while the total weight of this type is greater than the Atlantic, the load on drivers is carried on six wheels instead of four, and the weight per driver averages less. So far as static wheel loads are concerned, whether for cars or locomotives, it would be difficult to show that there has been any important increase in recent years.

As some prominence has been given to the statement that greater impact is due to the counterbalance in heavy locomotives, the fact should not be overlooked that in the Pacific type a definite unbalanced weight, which is a fraction of the total weight of the engine, is divided by six; while in the Atlantic type it is divided by four, and there is less weight in the counterbalance tending to produce impact than in the engines formerly used for fast express service. All things considered, the claim that present locomotives produce more severe stresses in the rail than those used five years ago does not seem to be sustained, and more substantial reason for the use of a larger rail section should be required before any change is made.

Railway representatives can easily disprove the statement that increased rail breakages are due to increased rail pressures; and the rail maker should be asked to explain why such a large proportion of broken rails, no matter for what cause, show defect in the fracture. Until rail manufacture is so improved that the fracture of broken rails shows solid sound steel, the railways are justified in not admitting that it is almost impossible to make a rail that will endure the present loads and speeds.

When referring to heavy wheel loads and high speeds, we naturally consider the conditions on those lines which operate limited express trains, and on most of these roads the 100-lb. rail section is in general use. It can be shown that the unit stress in this rail is less than in the smaller sections which were used with lighter equipment and which did not break after several years.

The gradual increase in the average weight of rolling equipment has been accompanied by an increase in the rail section. It is difficult to determine how closely these conditions have been adjusted, and the results of any calculation depend largely on the assumption taken to represent locomotive and rail practice in any given period. Any increase in wheel load is in direct proportion, while that of the rail section in its resistance to breakage is in proportion to the modulus of the section. A comparison of the increase of rail sections in this period may be made between the 80-lb. and 90-lb. sections, or between the 85-lb. and 100-lb. sections. Taking the latter, we find the 100-lb. A. R. A. "A" section has a section modulus of the head of 15.04, and of the base 17.78. As this type of rail was not in use five years ago we may take for the 85-lb. section, that of the Pennsylvania Railroad, with section modulus of head of 10.7 and of base, 11.25; or the P. H. Dudley 85-lb. section with section modulus of head of 11.46 and of base, 11.76. We have, then, an increase of 40 per cent. in section modulus in the head and 55 per cent. in the base. If the strength of the steel is the same in each section there is an increase of about 50 per cent. in the resistance to transverse breakage in the 100-lb. rail. Is it reasonable, therefore, to require the railways at a large expense to make a still further increase in the size of the rail section? The available evidence does not seem to prove that it is.

While there may be improvements in the track structure apart from the rail, which will help to reduce the number of rail failures, the conditions of equipment which are held responsible for this increase seem unlikely to be changed, and some factor of safety must be allowed for the increased stresses due to defective rolling stock. There is no excuse for the running of defective equipment on the track and it must be prevented wherever possible, but even with the best supervision, flat wheels or unbalanced locomotives will get on the track occasionally. It has been pointed out that wheels out of round, and slid flat or shelled-out wheels, increase the normal loads, as the application is then in the form of a blow and there is an increased stress in the rail due to impact. The magnitude of such stresses cannot be accurately measured and a factor of safety must be provided.

While there has been no material increase in the schedules of fast trains in recent years, there is an important matter connected with rail breakage and high speed, where the railways can effect a decided reform, and that is in a better control of speed. Until rail manufacture has been considerably improved, it would be better to make slower schedules in very cold weather than numerous roads do and require a more uniform speed for all fast trains, and very high speeds making up time on level or down grades should not be permitted.

THE RAILWAY LABOR SITUATION. V.*

THERE are some phases of the accident record of the railways of the United States that are open to controversy. There are some other vitally important points about it, however, which are not open to discussion. Some of these are:

First, while the record is improving, there is no question that it is bad, and that it is not improving fast enough.

Second, while a majority of all the persons killed are trespassers, the next largest number killed, and a very large majority of all injured, are railway employees, and, therefore, employees have the strongest reason for desiring to see the accident record reduced, and for doing all they can to reduce it.

Third, the railway managements and employees are responsible

*Previous editorials in this series have dealt with the following subjects: Co-operation between railways and employees, February 2, page 189; labor unionism and the railways, February 16, page 268; railway labor and efficiency methods, March 1, page 367; arbitration of railway labor disputes, March 15, page 464. The present editorial deals with the need for co-operation between railways and employees for the reduction of accidents.

for a great majority of accidents, excluding those to trespassers, because the indisputable records show that most of them are preventable, and some person or persons must be responsible for every accident that could have been prevented.

Fourth, the main thing that is needed to make the accident record of the railways of the United States defensible is to reduce it; and if managements and employees do not voluntarily better perform their respective duties of trying to reduce it, there will be increased legislation by the state and federal governments to promote safety; and this legislation will, as the public authorities become better acquainted with the facts, be extended to employees as well as to employers.

In view of the above stated patent facts, the past and present attitude of many railway managements, but more especially of railway employees, toward the subject of accidents is hard to understand and impossible to defend. The problem of accidents imperatively demands intelligent, frank, vigorous co-operation between managements and employees; and such co-operation has in the past been conspicuously wanting.

The railway employees who are concerned with the operation of trains are organized into labor brotherhoods which are coextensive with, and even extend beyond, the boundaries of the United States, and which are composed of local units that are to be found on every railway system. As these classes of employees are the worst sufferers from accidents, and as they have the best opportunity of any class of employees to reduce them, one would think that not only the natural dictates of humanity but also the natural dictates of self-preservation would cause them individually, and also through their local and national organizations, to exert themselves in every possible way to reduce the hazards to patrons of the railways, to their fellow employees and to themselves. When an employee joins one of the brotherhoods he is solemnly enjoined as to his duty to exercise care in his work, and also to instruct and caution his fellow employees in the interests of safety. The brotherhoods maintain insurance funds, and have therefore a direct pecuniary reason for promoting safety. Nevertheless many employees concerned in the operation of trains are careless and reckless, as the incontrovertible facts about innumerable accidents demonstrate, and their organizations have done almost nothing to promote safety except to agitate for legislation to regulate the railways. They have interfered, and often successfully, with the administration of discipline when their members have violated the rules of the railways, thereby encouraging a spirit that nullifies the best rules and the provision of the best equipment, and they have then gone to state legislatures and Congress and sought legislation to compel the railways to spend money to prevent the consequences of the spirit thus developed. This course has been persevered in in spite of the fact—a fact which the leaders of the brotherhoods must know if they study the reports and statistics regarding accidents—that if every automatic safety device which human ingenuity could invent and money could buy were adopted by the railways, a great majority of the fatalities to passengers and employees which now occur would continue to take place. No number of automatic devices, and no amount of legislation requiring them, will make good the deficiencies of the human element, which is mainly responsible for accidents in American railways.

We hear a great deal of denunciation in these days from a certain class of politicians directed against those who "put the dollar above the man." If ever there was a flagrant example of putting the dollar above the man it has been presented by the railway labor organizations who for years have struggled incessantly to get ever higher wages for their members—already among the highest paid labor in the world—and who at the same time have absolutely failed to do anything to educate or influence their members in ways that would tend to reduce the fatal accidents to them and to railway passengers. If the accident record of the railways of the United States is a severe indictment of railway management in this country, it is an even worse indictment of the railway labor brotherhoods and their leaders.

And it is a severe indictment of railway management. The operating executives of the railways for years have recognized the need for a more rapid installation of block signal systems, but, largely for financial reasons, which were convincing at least to those who hold railway purse strings, the increase in mileage operated under the space interval system has been inadequate. A large majority of railway, mechanical and operating officers recognized the need for strict compliance with the M. C. B. specifications for safety appliances, but enough roads disregarded those specifications to convince the Interstate Commerce Commission and Congress of the need for legislation to empower the commission to specify the appliances that should be used; and it was passed. Many railway managers long have recognized the need for the adoption of limitations on the speed of trains on track that is not strong enough for heavy modern equipment when hauled at high speeds, but owing to the competitive rivalries which often cause more consideration to be given to the amount of business a road gains than to the safety with which it handles it, agreements to keep speeds within proper limits have been too infrequently made, and when made have usually been shortlived. There long has been complaint from operating officers that they are unable to enforce the discipline necessary to stop accidents, because when they attempt to do so they meet with opposition from the labor unions—opposition before which, when it threatens to lead to strikes, the managements often yield. Unable to enforce proper discipline, the managements of many roads have failed to seek, or at least to find, any substitute for it.

And thus the accidents that the railways are responsible for, those that the employees are responsible for, and those that they are jointly responsible for, continue.

The welfare of the employees, of the railways and of the public forbid that the present condition shall be allowed longer to exist. The accident situation is in some ways similar to that in respect to rebating which existed some years ago. The railway managements had struggled to reduce rebating and made substantial progress, but, nevertheless, it went on. The public grew more and more exasperated; and when the legislation that struck down rebating did come it was not confined to rebating, but, because of the public exasperation rebating had produced, embraced a large number of other subjects. Similarly, unless really comprehensive and effective measures are adopted to reduce accidents, it is but a matter of time until drastic legislation will be adopted to reduce them; and when it comes, if come it does, it will include many provisions that railway managers and employees do not now anticipate—one which probably will be a clause making it a criminal offense punishable by imprisonment for employees to violate rules and regulations of the companies, whether an accident results or not.

In the circumstances it seems clear that, as they both have a weighty duty and responsibility in the premises, it behooves railway managers and employees to adopt some means for the reduction of accidents. Real co-operation for this purpose has begun with the safety committees that have been organized on a number of roads. Why should not the principle on which they are based be carried further, and a nation-wide co-operative campaign by the road and their employees be carried on to reduce accidents? A few years ago, when railway earnings were seriously menaced by agitations for the reduction of rates, the roads and their employees united in the organization of the Railroad Employees' and Investors' Association, whose purpose is to serve as a medium for co-operation between the managements and employees in repelling attacks on railway earnings. Why should not the railways and the railway brotherhoods form a similar joint organization to make investigations, to do educational work and to promote wise legislation regarding accidents? That it is to the mutual interest of the managements and the employees to reduce accidents is too obvious for argu-

ment. That accidents could best be reduced by co-operative action between them seems equally as sure. Why, then, should they continue to work at cross purposes as they are doing now?

The American Railway Association has been criticized because, in the days when rebating was general, and public sentiment was becoming more and more incensed against that practice, this organization did nothing to stop it. Defenders of the association have replied that it was and is purely an operating organization, and therefore had nothing to do with the traffic problem of rebating. The accident problem is purely an operating problem. Therefore, dealing with it clearly falls within the province of the American Railway Association. As a requisite for creating a more favorable public opinion toward railways, the reduction of accidents now occupies the position of foremost importance held a few years ago by the abolition of secret rebating. Are the railways going to take it up with the intelligence and energy that they ought to, and exhaust every resource in efforts to solve it, or are they going to palter with it, as they paltered with the problem of rebating, until the government shall extend regulations over railway operation as it has over railway traffic? More particularly, has the American Railway Association the intelligence and the courage to tackle this purely operating problem squarely and effectively?

The time has come for the railways, as a body, to act in regard to accidents as they never have in the past. The proper agency for them to act through is the American Railway Association. The time has come for employees to act in regard to accidents. The proper agencies for them to act through are their powerful brotherhoods. Will they take up this vitally important problem and solve it?

NEW BOOKS.

Engineering as a Vocation. By Ernest McCullough, C.E. Published by David Williams Company, New York. 5½ in. x 8 in. 201 pages. Cloth. Price, $1.00.

This book, which is prepared primarily for those considering the engineering profession as a vocation, brings out a side of the profession not commonly dwelt upon. Because of the more or less romantic features pictured in the popular magazines as typical of the life of the modern engineer, a quite erroneous idea of their work is sometimes given. The author tries to disillusion the prospective engineer so that he may see more clearly what is before him before he devotes his time and money to getting an engineering education. While much of the discussion of the profession and of methods of teaching will not be new to the experienced engineer or engineering college graduate, it should be helpful to those unfamiliar with the work and desiring information regarding it before entering college. In some portions of the book the writer's tone is quite pessimistic, as he discusses the less favorable features of the engineer's career, while in others he shows his deep interest in the profession. While adding but little to the knowledge of the profession as a whole, the book should be of assistance to prospective and embryo engineers; and this is its purpose.

Proceedings of the Forty-Fifth Annual Convention of the Master Car Builders' Association, held at Atlantic City, N. J., June, 1911. 800 pages. Cloth. Published by the association, J. W. Taylor, secretary, 390 Old Colony building, Chicago. Price, $7.50.

Beyond doubt there is no association in the mechanical department of railways whose work has as far-reaching and important an effect as the Master Car Builders' Association. Each convention makes distinct progress in some important particular, as well as many improvements in minor affairs. Probably the most important work done at the last convention was in connection with the new design of coupler and of the action on safety appliances. This volume contains the full account of the reports and discussions, as well as the standards of the association, list of members, committees to report in 1912, constitution, by-laws, etc.

Letters to the Editor.

AN INTERLINE HOME ROUTE CARD.

Bainbridge, Ga., March 19, 1912.

To the Editor of the Railway Age Gazette:

In order to avoid a great deal of the unnecessary empty car mileage that is being made on every railway in the country, why would not an interline home route card be of assistance?

By this I mean a card so made up as to show all junction movements, giving the initials of the road from which cars are received, junction point and date. A card of the same size as the ordinary home route card as used by most lines would provide space for about forty interchange movements. If after using both sides of the card the car had not returned to the home road an additional card could be securely fastened to the first card and numbered No. 2, etc.

It would, of course, be necessary for the card to accompany the car at all times, loaded or empty, from the time it left its owning line until its return.

Take, for example, a car belonging to the Southern delivered by the Pennsylvania Railroad to the Lehigh Valley at Jersey City and in turn delivered by the Lehigh Valley to the Delaware, Lackawanna & Western at Buffalo and by the Delaware, Lackawanna & Western to the Lehigh Valley at Wilkesbarre. Under the present arrangement, each time this car was delivered at a junction, that junction would make up a local home route card, showing the car home-routed through that junction to the connecting line from which it had been received and in order to get the car home it would have to be returned to the Delaware, Lackawanna & Western at Wilkesbarre and by it carried to Buffalo and then again delivered to the Lehigh Valley which would carry the car to Jersey City, carrying it through Wilkesbarre, and delivering to the Pennsylvania Railroad at Jersey City.

The interline home route card, if used, would show the following:

From	To	Junction	Date
P. R. R.	L. V.	Jersey City	.....
L. V.	D. L. & W.	Buffalo	.....
D. L. & W.	L. V.	Wilkesbarre	.....

When the car was started home from the Lehigh Valley after its receipt from the Delaware, Lackawanna & Western at Wilkesbarre, it would readily be seen from the interline home route card that it originally came from the Pennsylvania Railroad at Jersey City to the Lehigh Valley and the Lehigh Valley would take it to Jersey City instead of delivering it to the Delaware, Lackawanna & Western at Wilkesbarre, thereby saving the haul for the Delaware, Lackawanna & Western from Wilkesbarre to Buffalo and for itself from Buffalo through Wilkesbarre to Jersey City. This would not only save considerable unnecessary mileage but would also save delay to the car.

There are numberless cases where cars are shunted back and forth between lines for weeks and months at a time where it is necessary to call on the car record office for a home route that would be avoided by the use of an interline home route card, as the card would show on the face the full home route.

In order to derive any benefits from such a card it would be necessary for the American Railway Association to adopt a rule requiring all cars offered in interchange to be accompanied by an interline home route card and authorizing a road to refuse to accept cars unless accompanied by such a card, except when car is delivered by the owning road.

This is not intended to be a perfect system, and there are of course some objections to it, such as the possibility of cards being lost and inability to keep up with cards for cars placed at blind sidings.

I find that the percentage of home route cards that are removed from the sides of cars left at blind sidings is too small to mention, and while it is true that some cards would be lost. I

think a rule requiring the road losing the card to be responsible for the per diem on it until it can get the necessary data from the owning line to make up a duplicate card would largely overcome the losing of cards.

Such a card as this would also help to prevent the diversion of equipment, as there would be no excuse for the party loading it to say that he did not know how it was routed beyond his line. The interline home route card would show this.

I do not offer this as a solution of the unnecessary and expensive empty car haul, but I do believe that it will very largely better the situation.

S. J. JONES,
Superintendent Transportation, Georgia, Florida & Alabama.

COLLISIONS WHERE "19" ORDERS ARE USED.

Houston, Tex., March 30, 1912.

To the Editor of the Railway Age Gazette:

Referring to the article in your issue of March 8, page 418, advocating the exclusive use of form 19 for train orders, the superintendents of the "Sunset Central Lines" are unanimously of the opinion that there are serious objections to the 19 form on single track, except in block signal territory; for there is considerable risk of collision at stations where 19 orders are delivered.

To make it effective, the train order signal, when displayed for a 19 order should authorize the train to which it is given to proceed on main line and take the order running. This is likely to result, and has resulted, in collisions at stations. To illustrate: A heavy freight is running from W. to A. B. C., etc. The despatcher expects this train to make B for an opposing superior train. He wishes to give it a 19 order at A concerning some other trains. After the order is put out the despatcher is busy on some other work; the inferior train loses some time and should take siding at A for the opposing superior train. As the inferior train approaches A, the operator, who is not calculating on the opposing superior train, or may not know about it, gives the 19 train order signal indication which means "Proceed on main line and take order running." The engineman does so and by the time he finds out that the order gives him nothing on the opposing superior train, it is too late to avert a collision.

There are various situations that may arise in single track operation making it risky to deliver a 19 order running. It is true that the 19 order is valuable to move trains that are standing; this in cases where, to require the conductor to come to the telegraph office and sign a 31 order would consume so much time as to prevent the movement against the opposing superior train; and of course there is an advantage in not stopping heavy freight trains for orders.

A rule whereby the despatcher controls the giving of a 19 order signal, before or after a certain time, renders the delivery less risky. To illustrate: The despatcher has a heavy freight that he expects to make B for an opposing train due at B at 11:30 a. m. He wants to deliver the freight a 19 order at B. If the freight makes B he does not want the 19 order signal given, but in event the freight does not make B and lays back at A for opposing train, then he wants the 19 order signal given so as not to stop the train at B. To control this, he completes the 19 order on operator's signature and adds after the word "complete"—"Block until 11:30 a. m.," which the rules provide would be written on the order. This would mean to hold the train order signal at block for the delivery of that order until 11:30 a. m.; but after that time to display the 19 order signal.

Another illustration: Despatcher expects a freight to make B by 11:50 a. m. for an opposing superior train, but at the time he puts order out at 11:15 a. m., it is not certain that it will make B. He figures that the freight must pass A by 11:30 a. m. to be able to make B by 11:50 a. m.; so, after the word "complete" he adds, "Block after 11:30 a. m." This would permit the 19 order signal until 11:30 a. m. After that the operator would hold the signal at Block and deliver the order after the train had stopped.

Another illustration: Two freights, No. 243 and 244 have orders to meet at A. Despatcher wants to get 243 to B for No. 10. He does not want to stop 243 at A, provided 244 is in to clear, before 243 arrives, so he gives operator at A a 19 order for 243, helping it on No. 10, and after "complete" adds, "Block until 244 is in to clear."

T. FAY.

SIMPLICITY AND SUCCESS OF THE DEMURRAGE RULES.

Philadelphia, Pa., March 29, 1912.

To the Editor of the Railway Age Gazette:

I note a letter in your issue of today, page 742, from "C. H. M.," of Hartford, Conn., in reference to the "Usefulness of Demurrage Adjusters." He speaks of car demurrage as "this penalty-inflicting business, requiring most delicate diplomacy." The point of view undertaken by this language is not uncommon, but it indicates an entire misconception in regard to the nature of demurrage charges. A demurrage charge is not a penalty or an exaction. It is a charge for the use, not only of the car which is held by the consignee for storage, but of the track occupied by the car, and for the additional shifting and consequent delays due to the fact that the car is held for the convenience of the consignee. The rules governing car demurrage were formulated by the Interstate Commerce Commission after most exhaustive investigation and full discussion, in which not only the railway companies, but shippers participated.

These rules are simple, explicit and readily understood; and the payments on account of them are due precisely as freight charges, or any other charge collected in the ordinary transaction of railway business. Since the date when these rules were issued by the I. C. C. they have had the effect of law, and the collection of charges under them is as much a part of the duty of a railway company as any other freight charges for which tariffs are filed.

No delicate diplomacy is necessary, the facts in any case being readily discoverable and the results being fixed absolutely by the rule themselves. To interpose between the railway companies and their customers a demurrage adjuster or other agent would be as unnecessary as it would be to have all freight charges collected through a collection agency, or a bank; or as to submit questions of the proper wages of employees to the determination of the I. C. C., as has recently been suggested.

There are but two cases in the rules that can give rise to any question as between the railway company and the consignee, omitting of course railway errors, which will occur, but which invariably are promptly adjusted. I refer to "weather interference" and "bunching." If C. H. M. will familiarize himself with the rules, he will note that all shippers or receivers accepting the average agreement, provided for therein, in that agreement, stipulate that they shall not be entitled to any refund on account either of weather interference or bunching. All shippers of any considerable amount do accept the average agreement, thereby eliminating all questions of disagreement that can arise. Experience also shows that those working under the average agreement practically eliminate the demurrage charges, as the rules are favorable to the large shipper, excepting only in the case of one who undertakes to handle a volume of traffic greatly in excess of his capacity for storage when, necessarily, demurrage charges accrue.

Our experience is that since the I. C. C. rules have been in effect the rules have been enforcd with absolute impartiality, in territory much of it highly competitive. Shippers and consignees have adjusted their business to the rules, and the expense of collection, since the abolition of the car demurrage bureaus, has been greatly reduced, and complaints in regard to charges from consignees are very infrequent. Today the railway agents and their customers are in close touch, resulting in a better understanding and much less friction than under previously existing conditions.

THEODORE VOORHEES.

UNION STATION AND GRADE SEPARATION IN JOLIET.

The Extensive Work Involved in Elevating Tracks and Providing Facilities for Increased Passenger Business.

The four roads handling passenger traffic at Joliet, Ill., are now completing the elevation of their tracks through this city and are building a union passenger station which in many ways is unusual for such a structure. The city has a population of about 35,000, but on account of its location near Chicago and the number of important industries located in it, the passenger traffic is heavier than for most cities of equal size. The building was designed to provide ample accommodations for the traffic that is expected to develop during its life, and considerable care was given to the securing of pleasing architectural effects in its general construction and of unusual features in the interior finish and equipment. The cost of the station completely furnished is estimated at about $260,000.

The Chicago, Rock Island & Pacific and the Michigan Central use jointly a four-track line running approximately east and west and crossing a joint four-track line of the Chicago & Alton and the Atchison, Topeka & Santa Fe at an angle of about 80 deg. The alinement of the Rock Island and Michigan Central had to be changed for some distance and some radical changes on the Alton and Santa Fe were also made to secure this arrangement in connection with the general work of separating grades throughout the business district which has been under way for some time. The Alton and Santa Fe tracks are on a tangent at the station and the Rock Island-Michigan Central tracks are on a 1 deg. 6 min. curve. The track spacing between the two passenger tracks adjoining the station is 28 ft. for the north and south line and 26 ft. for the east and west line, with island platforms between the tracks in both cases. The station is located in the obtuse intersection angle towards the principal business district.



Joliet Union Station, from Tracks, as It Appeared March 1.

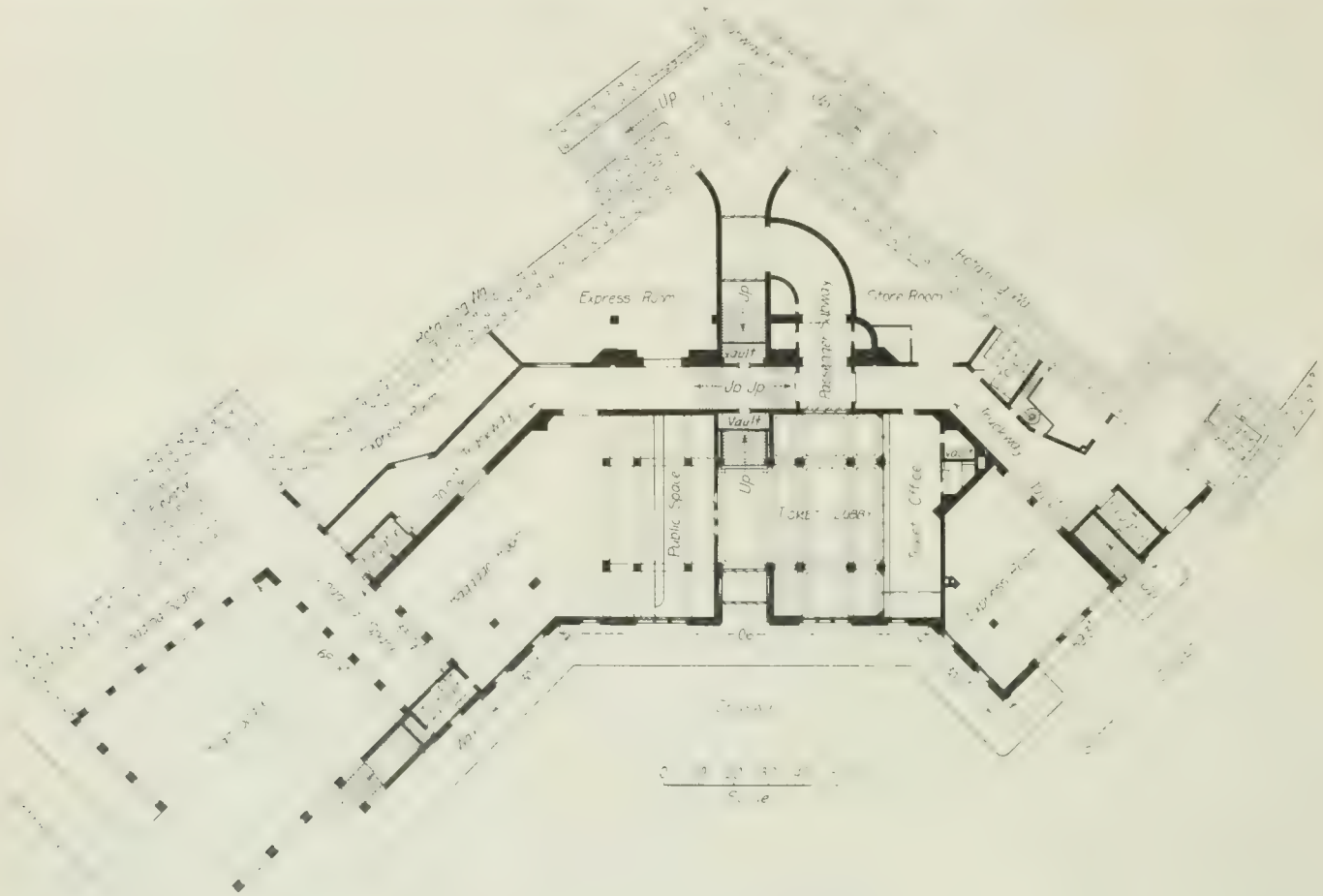
THE STATION BUILDING.

The elevation of the tracks allowed the design of a two-story station with facilities for the transaction of all business incident to travel on the street level and waiting rooms on the track level. The building is faced with blue Bedford stone laid in ashlar masonry and backed with brick. The foundations are of concrete, and some of the columns up to the first floor are steel. The roof is slate carried on steel trusses spanning the main waiting room and supported on brick piers. The area included between the station and Scott and Jefferson streets will be laid out in a small park, with driveways leading to the teaming space, and concrete sidewalks leading to the station entrances. The main entrance is directly in the center of the building opposite the tracks, and auxiliary entrances are provided by stairways at each corner of the building leading to the track level platforms.

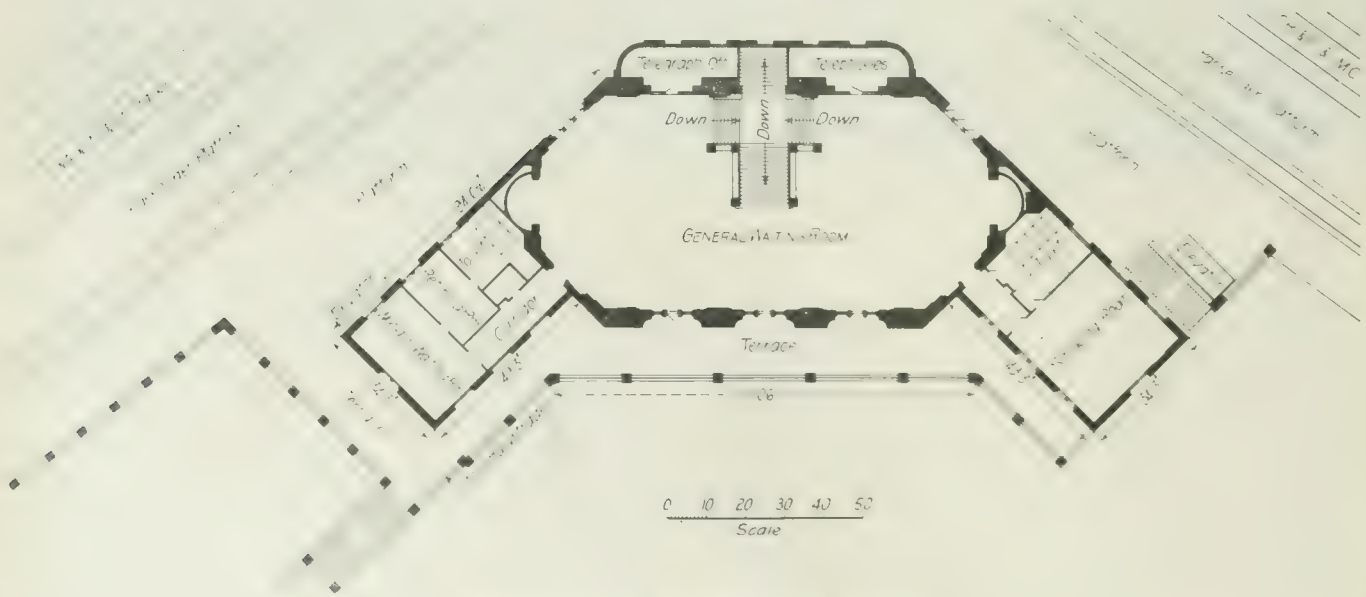
To the right of the main entrance on the lower floor is a ticket lobby about 32 ft. x 57 ft., with a ticket counter along one side. This lobby is finished with terra cotta walls and columns, ornamental plaster ceiling and tile floor. Directly in front of the entrance is a marble stairway leading to the main waiting room above, and to the left is a public space adjoining the baggage counter. A passenger subway leads from the end of the ticket lobby at the right of the main stairway under the tracks to the stairways connecting with the island platforms. This feature will be especially useful for patrons of the Rock Island suburban service to Chicago, allowing quick access to trains without passing through the waiting rooms. The walls of this subway are faced with light brick set in red mortar, the ceiling being of plaster and the floor of tile. Prismatic lights are set in the platform above to provide daylight lighting. The remaining space on the lower floor is occupied principally by express and baggage rooms and truck-ways. A large teaming space paved with creosoted blocks is provided at one end of the building, serving the baggage room and two express rooms, and another driveway provides access directly to the third express room at the other end of the building. All three express companies occupying quarters in the station except to make these offices important points for interchange business, and at least one of them will discontinue its present downtown office. The facilities for handling express business have been carefully worked out. Special racks for iced shipments over large drains in the floor are a feature of these rooms. Scale pits are provided at convenient points for weighing pack-

ages, and two elevators at each corner serve the track platforms above. Three vaults are provided, two for the use of the express companies and one in the ticket office. The floors in the baggage and express rooms are wood and in truck ways concrete; the walls are face brick and the ceilings plaster. All columns and exposed corners which might be damaged by trucks are protected by sheet steel 7 ft. high. The boiler room for supplying heat to the building and operating the ventilating system is located below the ground level, the coal being fed down to a storage bin through a hopper in Scott street and the ashes hoisted to the truck-way on the street level.

The main waiting room on the second floor is octagonal in shape and about 55 ft. x 110 ft. in size with a vaulted ceiling. The floor and wainscoting are Tennessee gray marble and the walls are finished in Keene's cement. Telegraph and telephone offices adjoin this waiting room on the track side and the wings of the building are occupied respectively by the women's rooms and the smoking room. The women's waiting room is about 20 ft.



Street Level Plan of Joliet Union Station.



Track Level Plan of Joliet Union Station.

x 32 ft., with a retiring room about 13 ft. x 20 ft., finished with tile floors and marble bases. The smoking room is about 32 ft. square, with tile floor and wainscoting. The woodwork in the waiting rooms is weathered oak, and the furniture is finished in silver gray, particular attention having been paid to securing pleasing effects in the design of the fittings for each room.

The building is fireproof throughout. All wires are encased in sherardized pipe conduit. All steel supporting columns are encased in concrete. The concrete floors are waterproofed with Sarco. All water pipes, wires, ventilating ducts and heating pipes are concealed in the walls or ceilings, suspended ceilings of metal lath being used in some cases to affect this end. Tungsten incandescent lights are used throughout for artificial lighting, bracket lights being used in the waiting rooms and five-light clusters on the platforms. Numerous drinking fountains are located at convenient points, and bulletin boards and other minor details designed to add to the comfort and convenience of patrons are supplied.

The track platforms are of concrete, the one between the building and the nearest track being a concrete slab in design, and the island platforms being laid on cinder fill to allow for settlement in the new sand embankment under the tracks. The island platforms are protected by butterfly canopies. Numerous stairways are provided leading to these platforms from the streets crossed by the tracks, making the station very easy of access from any direction. A terrace of concrete with an ornamental stone balustrade runs around the sides of the station away from the tracks, connecting with the main waiting room, the track platforms and by stairway with the street. To prevent closing Washington street west of the crossing, the retaining wall along the tracks had to be built close to the outside track, and in order to carry the station platform alongside this track it was necessary to build an overhanging reinforced concrete slab platform for the entire length of the block between Scott and Chicago streets.

The work of building the station was in charge of the Joliet Union Station Company, which was organized for that purpose by the four roads interested. J. B. Berry, chief engineer of the Chicago, Rock Island & Pacific, was the representative of the four roads in the construction work, J. B. French being assistant engineer on the ground. Jarvis Hunt was the architect for the building proper and Adam Groth & Company, Joliet, had the general contract. Work on the building was begun about August 15, 1911, and it is expected that it will be completed by May 19, 1912.



Construction View of Joliet Union Station, from Scott Street.

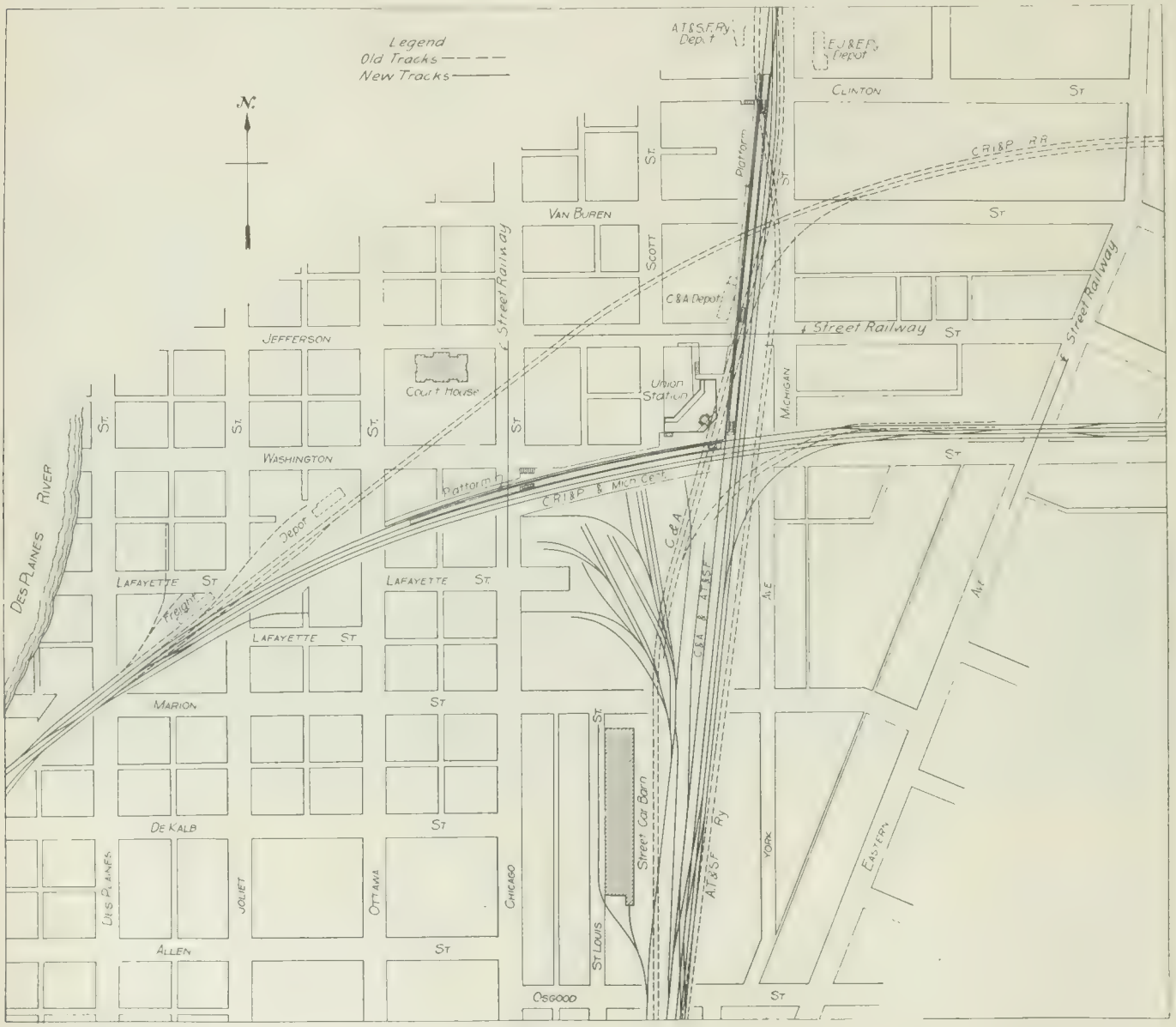
BRIDGE WORK ON ROCK ISLAND-MICHIGAN CENTRAL RELOCATION.

The special features of the relocation of the Rock Island and Michigan Central which enabled those roads to use a joint line were described in the *Railway Age Gazette* of March 16, 1910. At that time, however, little work had been done on the subways and the types of several of them had not yet been decided uopn. Steel construction had been adopted for most of these street crossings, using built-up columns and plate girders with I-beam floors concreted and ballasted. In one type of subway the transverse I-beams in the floors are attached to the webs of the girders, and the entire surface of the bridge above these beams is covered with concrete varying in depth from 5 in. to 8 in. under the tracks and 3 in. over the girders. This slab is reinforced in both directions by bars laid 1½ in. above the tops of the I-beams and by longitudinal bars near the upper surface of the concrete. No. 7 triangular mesh, 58 in. wide, is laid over the tops of the girders to bond together the masses of concrete on each side. The height of the floor beams on the girders is so arranged that the depth of the trough which is formed under each track to retain ballast is just great enough to bring the upper surface of the tie level with the surface of the concrete over the girder, allowing a minimum of 6 in. of ballast under the tie.

In another type of structure the transverse I-beams in the floor are supported by plate and angle connections so that their lower flanges are on the same level as the lower flange of the longitudinal girders. The ends of the floor beams are sheared off diagonally and are connected by two angles to an inclined plate, the upper end of which is riveted to the web of the girder and the lower end of which rests on a plate carried in the lower flange of the girder and to which the lower flange of the I-beams are riveted. This construction is clearly shown in the accompanying cut. Steel plates ½-in. thick and 10 ft. wide are laid on these beams under each track with riveted splices forming a continuous surface to support the ballast. The space between the edges of these plates and the girders is filled with concrete sloped up to the lower edge of the top flange angle. This concrete is bonded

to the steel work by longitudinal angles laid along the edges of the floor plates and by bent bars extending through holes drilled in the webs of the girders about 2 ft. apart, and into the masses of concrete on each side of the girder. Longitudinal and transverse rods are provided for surface reinforcement of this concrete. A waterproofing layer of three-ply burlap mopped with an asphalt mixture was laid, and over this a protecting layer of 2 in. of concrete reinforced with No. 6 wire mesh was laid. On the floor plate a coat of asphalt primer was first brushed on; then a coating of hot asphalt waterproofing was placed with mops; then a heavy coat of asphalt was poured on, and the surface of this was sprinkled with a layer of torpedo sand.

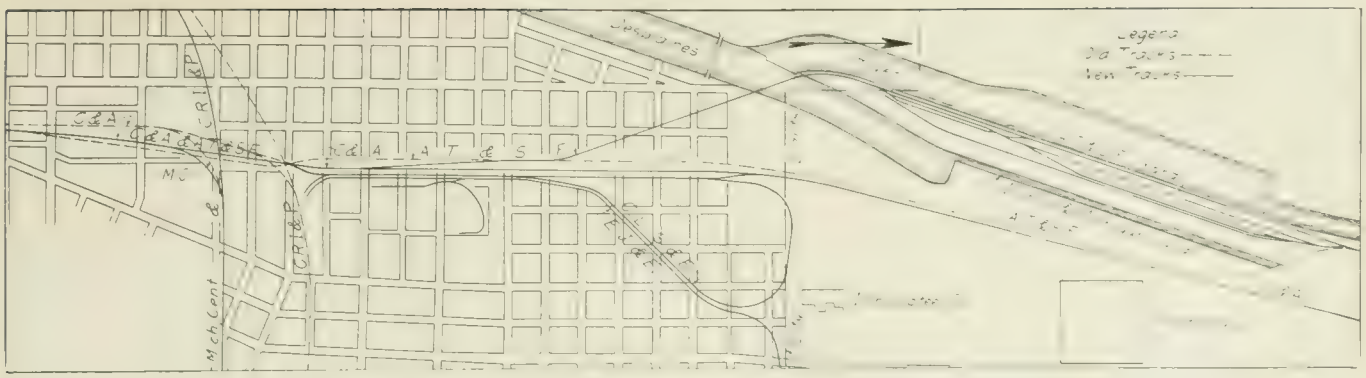
The interchange traffic between the four roads is handled over



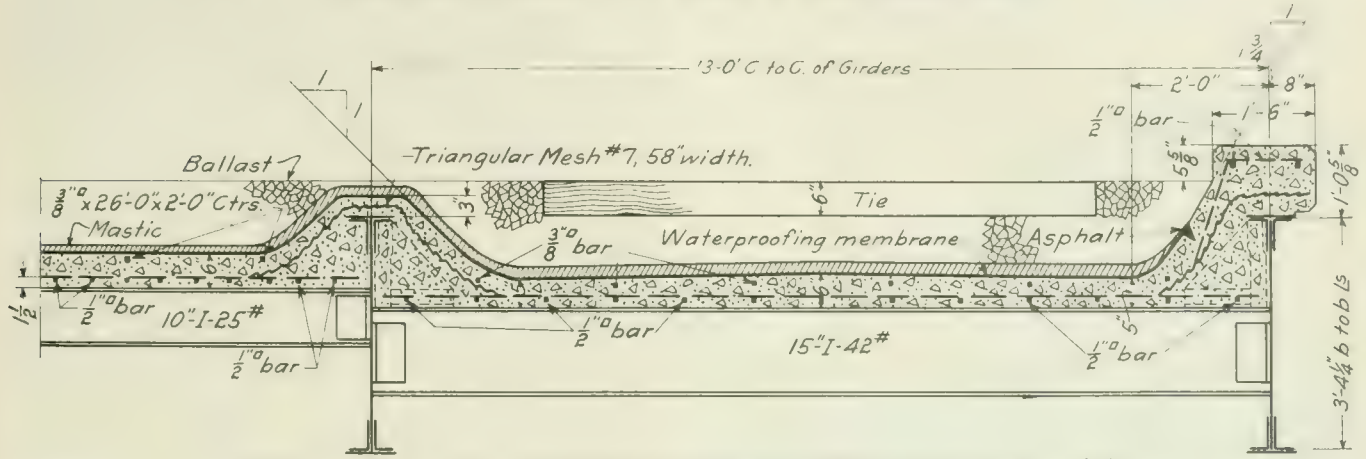
Plan of the Four Railways Using the Joliet Union Station, Showing Track Arrangement on Both Joint Lines.

a single track Y connection opposite the station. This track crosses Washington street and York avenue near the intersection of those streets, making it advisable to carry the track on a reinforced concrete trestle. There are eight spans of concrete trestle and three of plate girders, with a concrete ballasted deck, the latter being used over Washington street where the excessive skew made the spans too great to allow the use of concrete. There are four skew and four square piers, the former having four and the latter three columns each. These columns are 1 ft. 8 in. x 2 ft. 6 in. in section, resting on continuous footings under each pier spread to 6 ft. wide and bearing on rock. The cross girder connecting the columns in each pier is 2 ft. thick and has a minimum depth of 1 ft. 9 in. over the arches between the columns. The column reinforcement consists of eight 1-in. square rods set vertically and extending from the top of the footing course to the top of the girder, banded by ¼-in. square hoops spaced 1 ft. center to center. The girder is reinforced by eight ¾-in. square bars extending for its full length and banded by ½-in. square bars on 1-ft. centers. Stirrups of ½-in. bars are also provided and ¾-in. bars are set diagonally over the arches to take diagonal shear and bond the girder firmly to the columns.

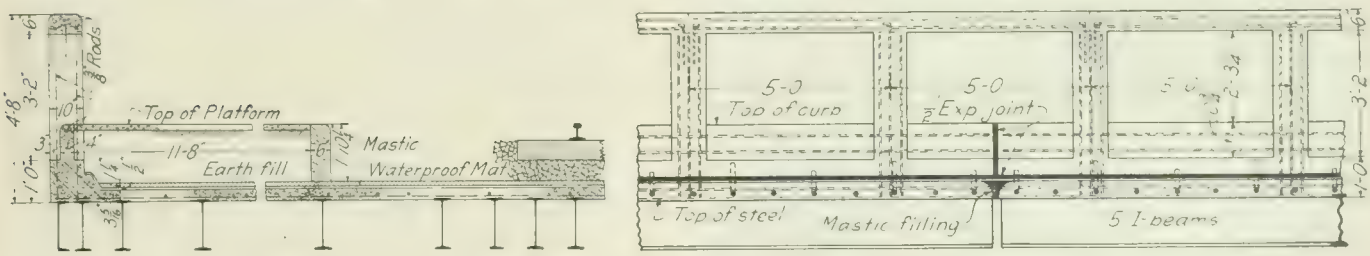
The slabs which were cast in place have a minimum depth of 3 ft. 3 in. with a crown of 1 in. under the center line of track and with sufficient slope from one end to the other to provide for good drainage, the water being carried away in 2-in. drain pipes which are set in the concrete near the corners of the slab and carried down the ends of the piers to the gutters. The reinforcement in the slabs consists of two sets of longitudinal bars, one in the lower reinforcing plane of 1 in. square bars spaced 3½ in. center to center, three of every four being bent up at the ends to provide diagonal reinforcement, the other in the upper plane of ⅜-in. square bars; two sets of ½-in. square transverse bars in the two plans; and ½-in. stirrups connecting the two sets of longitudinal bars. A 4-ft. walk is carried along one side of the trestle on a cantilever construction built as a part of the



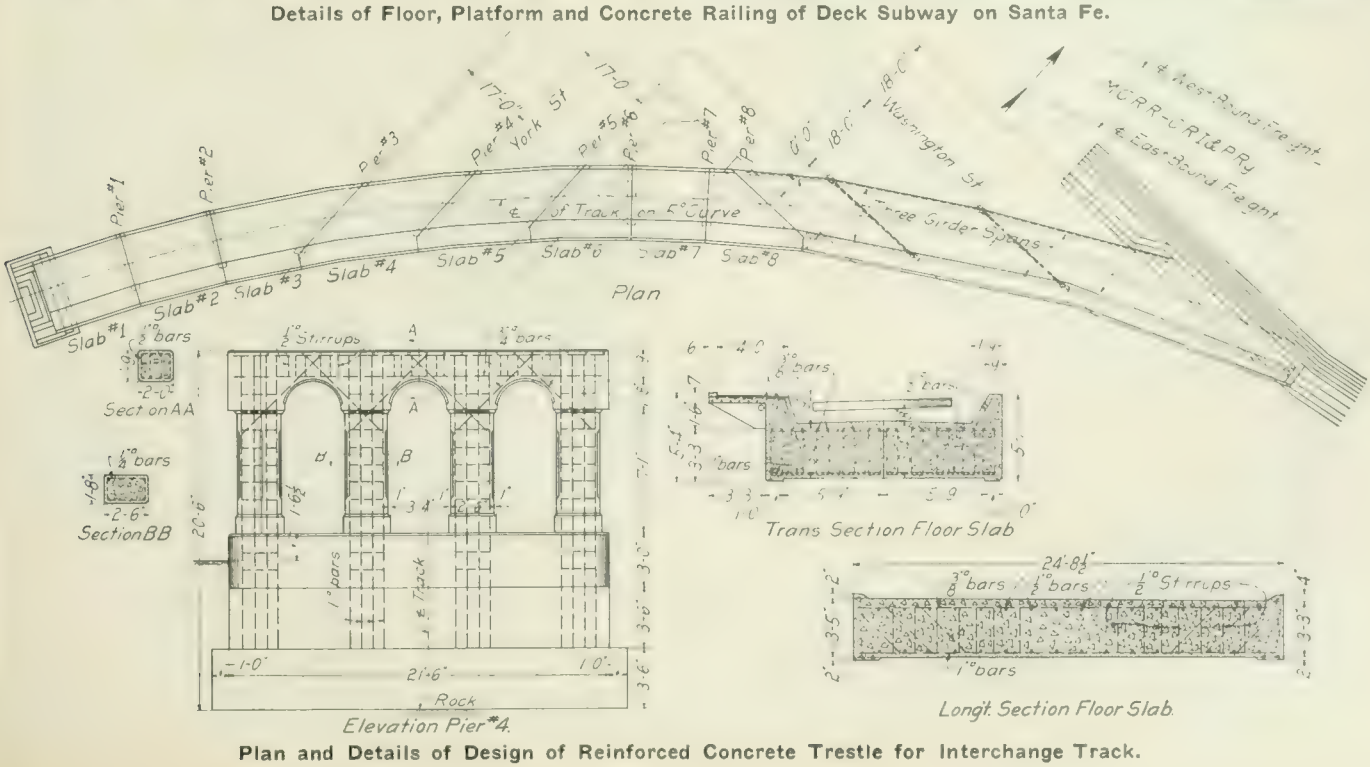
Realinement of Santa Fe and Chicago & Alton Through Joliet.



Half-Through Type of Subway with Continuous Concrete Deck, for C., R. I. & P.



Details of Floor, Platform and Concrete Railing of Deck Subway on Santa Fe.

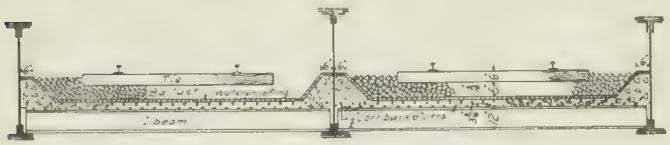


Plan and Details of Design of Reinforced Concrete Trestle for Interchange Track.

slabs. This overhanging sidewalk slab is 5 in. thick reinforced by ⅜-in. square longitudinal bars in two planes and ½-in. square transverse bars which are bent down into the track slab to provide a firm bond. Buttresses 9 in. wide and 1 ft. 6 in. high spaced 6 ft. 6 in. center to center, support this walk. The faces of the slabs are paneled and the corners of columns are chamfered, giving the trestle a neat and finished appearance.

INTERLOCKING.

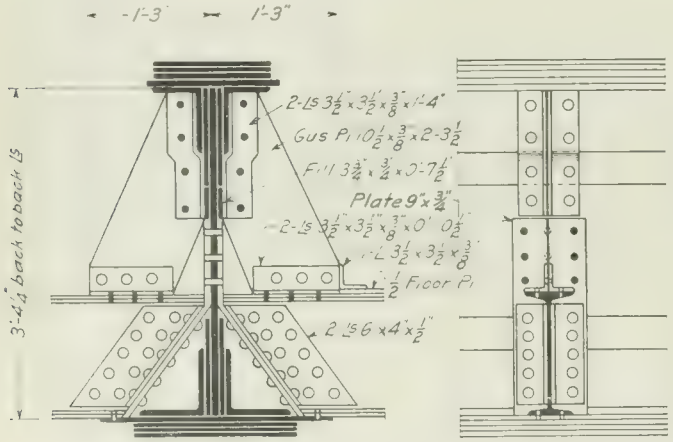
The work on the Alton and Santa Fe involved an extensive



Floor Construction of Through Type Subway, for Chicago & Alton.

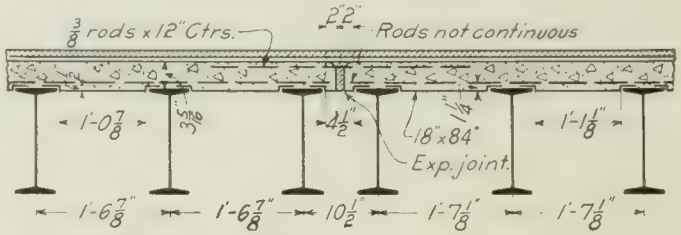
relocation of tracks and buildings by both companies. The two roads previously operated independent double-track lines with a grade crossing near the center of the business district and a separated grade crossing south of the city. The new layout provides for the use of a joint four-track line from Clinton street near the old point of crossing to Osgood street, cross-overs being provided at both ends to allow passenger trains on both roads to use the two tracks adjoining the station and freight trains the two outside tracks.

As it is necessary for all trains to cross over the four tracks at one end or the other in order to cross the other road and leave the joint section on their respective tracks, it will be necessary to interlock all the cross-overs, and it is expected to locate



Detail of Plate and Angle Connection of Floor Beams to Girder in Rock Island Through Type Subway.

one central plant across the Alton-Santa Fe line from the station which will govern movements in all directions on the four main lines and the interchange track. The details of this plant have not yet been worked out, but an electric interlocking machine will probably be installed. Provision is being made in the heating system of the station to run pipes under the tracks to heat the interlocking tower and some connection may be installed between the lighting power supply for the station and the operating power supply of the interlocking plant. Electric power for lighting will be purchased from the local public service company, and plans are being made to connect this supply with an

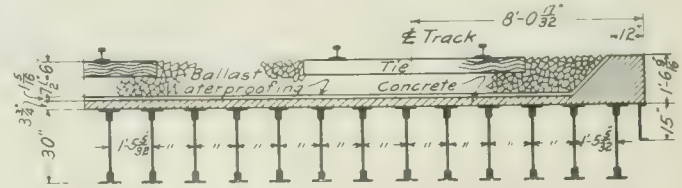


Section of Floor of Santa Fe Deck Subway, Showing Steel Plate Forms for Concrete and Details of Expansion Joint.

auxiliary battery installation in the interlocking plant to supply light for the station in case of a failure of the lighting company. Vitrified clay conduit has been laid for the wires leading to the various functions included within the plant, and reinforced concrete manholes have been built at junction points. The signal departments have co-operated with the construction departments in the designing of most of the structures so that provision is being made in the subway designs and in the interchange traffic trestle for the location of conduits and in some cases derails, signal bridges and other accessories of the interlocking system. In addition to the changes in track it was necessary for the Chicago & Alton to move its freight depot and supply house, tear down an old roundhouse, enlarge its yard at South Joliet about 1.3 miles from Joliet, and build a new 7-stall brick and frame roundhouse at this yard.

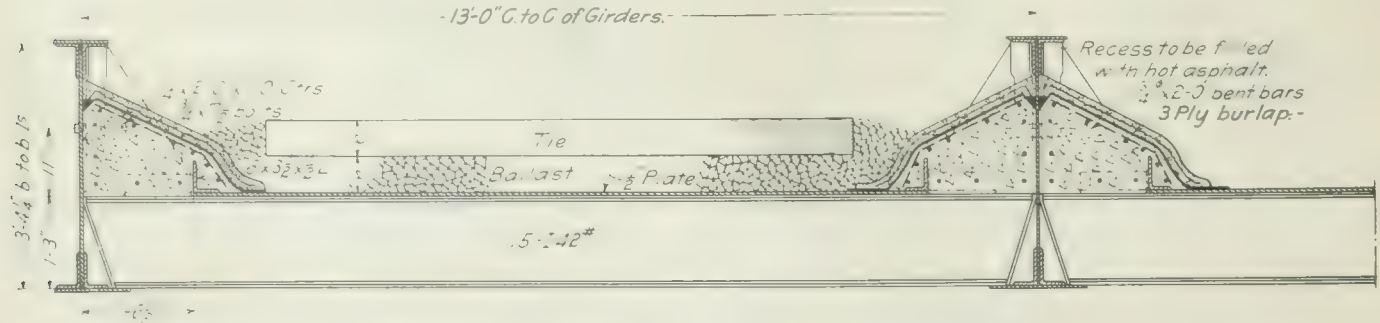
THE ALTON-SANTA FE RECONSTRUCTION.

The principal change made by the Santa Fe was north of the city, where the old line passed through the property of the



Details of Floor on Deck Type Subway with Longitudinal Floor Beams, for Chicago & Alton.

Illinois Steel Company. It was desirable and necessary in connection with the track elevation work to add a second track line through this property and cross the Illinois and Michigan canal. As the additional right of way could not be secured along the existing location the line was revised to cross the canal about a mile further south. The Desplaines river, which is parallel to the canal at this point, was straightened by the Sanitary commission at the same time that a turning basin was dredged in the canal. This improvement made it possible for the Santa Fe to build a



Through Type of Subway with Pan Floor, for the Rock Island.

new yard in the territory between the canal and the river channel, giving it a much needed addition to its yardage at Joliet. This revised line, known locally as the "canal line," was built before the work was started adjacent to the new station, but it was done with the general plan in view of elevating tracks through the business and resident districts and was accordingly built to a grade that allowed over-head crossings with the four most important streets.

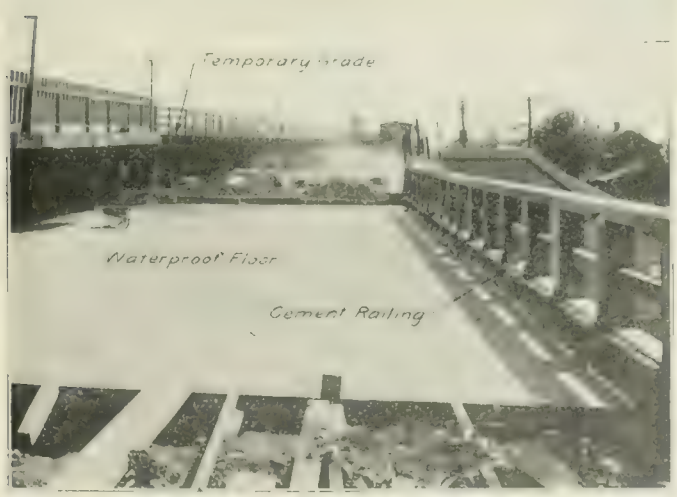
The Chicago & Alton and Santa Fe joint work was divided



Rock Island-Michigan Central Bridge Over Hickory Creek on the Revised Location.

about opposite the new station and the work of elevating tracks and building the joint subways north of that point was carried on by the Santa Fe and south of that point by the Alton. On the Santa Fe work a double-track trestle was driven as it was necessary to maintain traffic over the tracks being raised. On the south end, however, the Alton was able to divert traffic from its tracks to the Santa Fe during elevation of its tracks and reverse the traffic during the elevation of the Santa Fe tracks. The Santa Fe used gravel for filling which was secured from local pits and the Alton used sand secured at a pit about 20 miles distant. The elevation of the tracks placed the Alton grade about on a level through the city with a short 0.8 approach on the north. As this company's heavy traffic is northbound and the grade is very short this is not a serious operating condition. The Santa Fe has a 0.5 per cent. approach grade on the south to secure which it was necessary to raise the Hickory Creek bridge slightly. Track centers on the Chicago & Alton and joint track are 13 ft. and on the Santa Fe 14 ft. The joint track is laid with 90-lb. A. R. A. A-section rail.

The subways built by the Chicago & Alton are steel structures

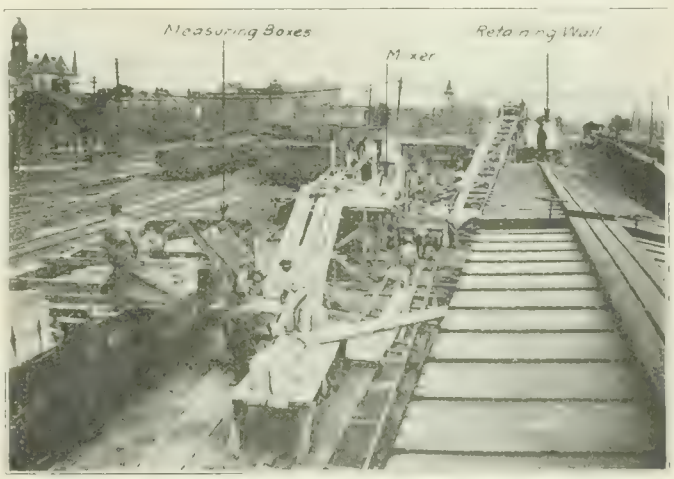


Waterproofing on Santa Fe Deck Subway.

with concrete ballasted floors, some being of the deck and some of the through type. The typical deck structure has transverse girders over the columns on the curb lines, supporting 18-in. I-beams over the sidewalk and 30-in. girders over the street, the spacing in both cases being 1 ft. 5 5/32 in. A 3¼-in. layer of concrete covers this floor, which is waterproofed by a layer of 1 5/16 in. thick Byerlite compound. The through structures have longitudinal girders 54 in. to 60 in. deep between tracks carried directly on the piers and supporting a floor of transverse 12-in. I-beams spaced 16 in. center to center. The concrete layer over these I-beams has a minimum thickness of 3¾ in. and is carried up on the girders to a depth which brings the top of the waterproofing layer level with the top of the tie. The layer of concrete is reinforced by ½-in. corrugated bars spaced 6 in. center to center.

The subways built by the Santa Fe were of two types, through and deck, all having steel piers and steel girder beam decks with continuous ballasted floors. The Jefferson street subway, which is of the deck type, has piers on the curb lines and in the center of the streets. The transverse girders over the columns support 15-in., 42-lb., I-beams on which the concrete floor is laid. Steel sheets are used for forms for this concrete floor, being bent in the field to fit over the upper flanges of the beams and drop ½ in. below the top of these beams between the edges of the flanges. The concrete slab has a thickness of 3 5/16 in. with a 1¼-in. layer of Sarco mastic and three-ply burlap waterproofing. The concrete fence railing is provided along the face of the subway with posts 5 ft. center to center and a 6-in. x 10-in. railing.

In the through girder subways 15-in. 60-lb., I-beams are used for transverse floor beams, the concrete slab on these beams being the same as that described above. The concrete is carried



Concreting Plant for Chicago & Alton Retaining Wall.

up on the girders to form a trough 10 in. deep, which contains the ballast, the concrete being waterproofed in the same manner as the deck type subways.

The original ordinance passed by the city council called for the location of curb piers half on the sidewalk and half in the street or with the center line of pier on the curb line. The representatives of all the roads protested against this feature and various substitute designs were offered, in some cases reinforced concrete subways being proposed. The local aldermen refused to allow any change to be made, however, and most of the subways are built in this way. Several serious accidents have already occurred caused by the hubs of loaded vehicles striking the half of the column which projects into the street.

The joint work of the Michigan Central and Rock Island was handled in the field by G. H. Harris, and later by A. T. Hopkins, assistant engineer, Michigan Central, under the supervision of J. B. Berry, chief engineer of the Chicago Rock Island & Pacific, and G. H. Webb, chief engineer of the Michigan Central. C. A. Morse, chief engineer of the Santa Fe system has general supervision of that company's work, Major G. W. Vaughn being in direct charge. The Chicago & Alton work was carried out under the direction of W. D. Taylor, chief engineer, up to the time of his death, since which E. L. Crugar, assistant chief engineer, has been in charge. R. A. Cook is the assistant engineer on the work.

SPECIFICATIONS FOR STEEL.

At the meeting of the American Society for Testing Materials, held in New York on March 29 and 30, a number of specifications were presented which were voted to be referred to letter ballot for adoption as standards.

Heat Treated Carbon Steel.—The specification for heat-treated carbon steel axles and similar objects requires that the ingot shall be properly cropped and that the axle shall be allowed to cool after forging and before reheating. The chemical composition shall be as follows:

Carbon	Not over 0.60 per cent.
Manganese	0.40 to 0.80 per cent.
Phosphorus	Not over 0.05 per cent.
Sulphur	Not over 0.05 per cent.

Provision should be made for a check analysis. The physical requirements are:

Tensile strength, lbs. per sq. in.	85,000
Elastic limit, lbs. per sq. in.	50,000
Elongation in 2 in., per cent.	22
Reduction of area, per cent.	45

A bending test through 180 deg. is also required. The requirements for specimens are that one tension and one bend test shall be made from each test lot; if more than one melt is represented in a test lot, one tension and one bend test shall be made from each melt. A test lot is defined as consisting of those pieces that are quenched at one time and annealed in the same furnace. The requirements as to marking, inspection and rejection are of the usual character.

Steel Castings.—Steel castings are divided into two classes, one subject to physical tests and one in which none are specified. The chemical requirements for the first class are limited to the phosphorus and sulphur content, neither of which are to be above 0.05 per cent. For the second class the carbon is limited to 0.30 per cent. and the phosphorus to 0.08 per cent., with no restrictions on the sulphur. Check analyses, of course, are provided for.

The steel subject to physical tests may be hard, medium or soft, and the requirements for the three are as follows:

	Hard.	Medium.	Soft.
Tensile strength, lbs. per sq. in.	80,000	70,000	60,000
Yield point, lbs. per sq. in.	36,000	31,500	27,000
Elongation in 2 in., per cent.	15	18	22
Reduction of area, per cent.	20	25	30

Medium castings must bend cold through 90 deg. and soft castings through 120 deg., each over a 1-in. pin. These bending tests may be made by pressure or by blows.

Boiler and Firebox Steel.—For boiler and firebox steel the chemical requirements for the two grades, flange and firebox steel, are:

	Flange.	Firebox.
Phosphorus (acid)	Not over 0.05	Not over 0.04 per cent.
Phosphorus (basic)	Not over 0.04	Not over 0.035 per cent.
Sulphur	Not over 0.05	Not over 0.04 per cent.
Copper		Not over 0.05 per cent.
Manganese	0.30 to 0.60	0.30 to 0.50 per cent.
Carbon		0.12 to 0.35 per cent.

The physical properties are to be as follows:

	Flange.	Firebox.
Tensile strength, lbs. per sq. in.	55,000 to 65,000	52,000 to 62,000
Yield point, lbs. per sq. in.	0.5 tensile str.	0.5 tensile str.
Elongation in 8 in., per cent.	$\frac{1,500,000}{\text{Tensile str.}}$	$\frac{1,500,000}{\text{Tensile str.}}$

The preparation of a specimen for a quench bend test shall consist of heating it to a light cherry red as seen in the dark (not less than 1,200 deg. Fahr.) and quenching in water, the temperature of which is between 80 deg. and 90 deg. Fahr. The specimens for cold and quench bend tests shall bend through 180 deg. without fracture on the outside. The other requirements are of the usual character as to allowable variation in weight and gage.

Rivet Steel.—There was a difference of opinion as to the sulphur requirements of rivet steel. The specifications call for not over 0.04 per cent. As this is the rejection limit it was urged that it be raised to 0.045 per cent. But it appeared that there had been no difficulty in obtaining low sulphur material, it having been furnished as low as 0.02, in cases where there was either no specification or a high upper limit, and that there was little danger of red shortness. So the chemical requirements were allowed to stand at:

Manganese	0.30 to 0.50 per cent.
Phosphorus	Not over 0.04 per cent.
Sulphur	Not over 0.04 per cent.

The required physical properties are:

Yield point, lbs. per sq. in.	0.5 tensile strength
Tensile strength, lbs. per sq. in.	45,000 to 55,000
Elongation in 8 in. (per cent.) should equal	$\frac{1,500,000}{\text{Tensile strength.}}$ but need not exceed 10 per cent.

The cold bend and quench bend tests are about the same as for boiler steel.

Annealed Steel Forgings.—The specifications for annealed steel forgings are about the same as for the other materials insofar as the general requirements are concerned. The sulphur and phosphorus is held at 0.05 per cent. and the manganese at 0.70 per cent. The tensile strength is put at 80,000 lbs. per sq. in., the yield point at one-half that stress, the elongation in 2 in. at 22 per cent. and the reduction of area 35 per cent.

Lap-Welded and Seamless Steel Boiler Tubes.—These must conform to the following chemical composition:

Carbon	Not over 0.15 per cent.
Phosphorus	Not over 0.04 per cent.
Sulphur	Not over 0.045 per cent.
Manganese	0.30 to 0.50 per cent.

Tubes 1¾ in. or over in diameter must be capable of having a flange ⅜ in. wide turned over cold at right angles to the body of the tube without showing cracks or flaws. For tubes less than 1¾ in. in diameter the width of the flange shall be 1/6 the diameter of the tube. A section 4 in. long must stand hammering flat, and coupons 2½ in. long must stand hammering longitudinally into the shape of a ring without showing cracks when crushed flat. Tubes must not be shorter than the required length but may be longer by ⅛ in. It is also required that the thickness of tubes must not vary more than 10 per cent. from that specified.

Wheel Specifications.—Owing to objections offered by the secretary of the Electric Railway Association, all reference to motor car wheels was cut out of the wheel specifications. It also appeared that the specifications, as presented are not altogether satisfactory to the representatives of the M. C. B. Association, principally on account of the tolerances in specified dimensions, and these made up the major portion of the report. There are the usual requirements as to the cropping of the ingots and inspection. A little discussion arose because of the requirement that the metal should be made by the open hearth process, because the alloy and crucible steels were thereby debarred. This was answered by the statement that no one is making crucible steel wheels, and no specification could ever be construed as debarring a superior material.

The chemical requirements for all steel wheels are:

	Acid.	Basic.
Carbon	0.60 to 0.80	0.65 to 0.85 per cent.
Manganese	0.55 to 0.80	0.55 to 0.80 per cent.
Silicon	0.15 to 0.35	0.10 to 0.30 per cent.
Phosphorus	Not over 0.05	Not over 0.05 per cent.
Sulphur	Not over 0.05	Not over 0.05 per cent.

The wheel specifications will be submitted to letter ballot but it is expected that they will have to be modified later to meet the requirements of the M. C. B. Association.

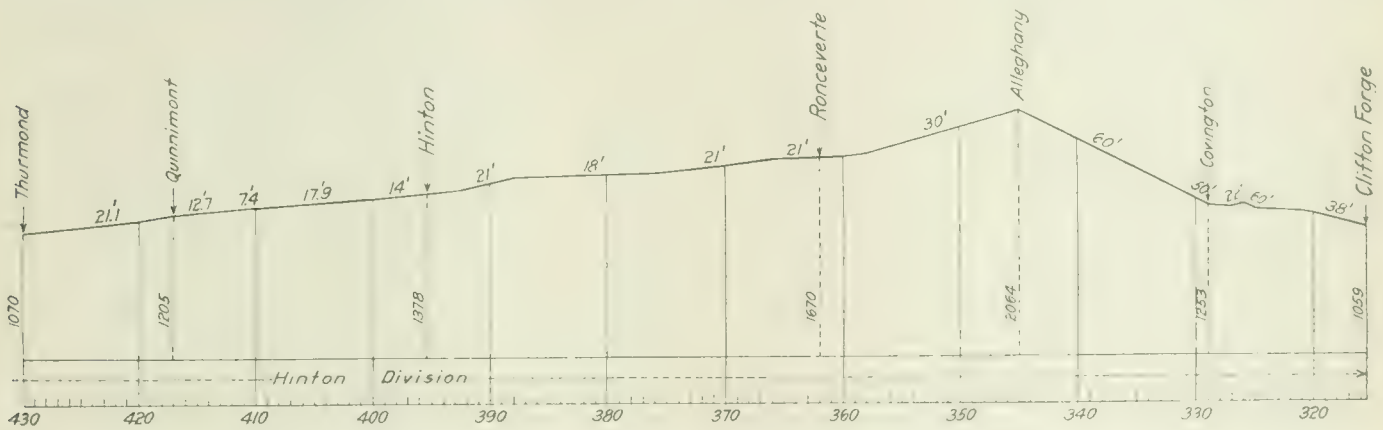
During the last 12 years the Buenos Aires-Pacific railway, Argentina, has increased its lines from 425 miles to 3,180 miles, not including sections of railway now under construction but not yet opened to traffic. Today the railway extends not only to Mendoza and the surrounding country tributary thereto, but crosses the great pampa of central Argentina and links the federal capital with the port of Bahia Blanca. The roadbed and rolling stock of the railway have been greatly improved, and the most modern passenger and freight cars are now employed in handling the immense and ever-growing traffic of this line.

MALLET RESULTS IN ROAD SERVICE.

The 37½ Per Cent. Saving Effected by the Use of High Capacity Freight Locomotives on the Chesapeake & Ohio.

A saving of 5.7 cents per 1,000 ton-miles or 37.55 per cent. in the cost of handling the freight traffic on the Hinton division of the Chesapeake & Ohio, is the result of the installation of 25 Mallets in place of consolidation locomotives in road service on that division, as shown by the comparative records of the operation of the division before and after the Mallets were introduced, furnished by J. F. Walsh, superintendent of motive power.

A single Mallet can haul 3,200 tons up the ruling grade without assistance. The consolidation required a helper of the same class to take 2,250 tons over the division. The Mallets average a 70 per cent. greater train load than the consolidations under present traffic conditions. They handle this greater tonnage at the same average speed—17 miles per hour. As a result, 25 Mallets have replaced 44 consolidations handling the same volume of traffic, and the number of trains daily over the division have been reduced by 17. This has effected a reduction of 27.6 and 42.6 per cent. respectively in the cost of wages for the engine and train crews per 1,000 ton-miles, as well as greatly simplifying the train despatcher's difficulties.



Profile of Hinton Division of the Chesapeake & Ohio from Thurmond to Clifton Forge.

Because of the fuel economy obtained with the superheater and brick arch in combination with compound cylinders, the Mallets save 43 per cent. in coal per ton-mile as compared with the consolidations. This means that a Mallet will burn no more coal than a consolidation in doing 75 per cent. more work; in other words, the fireman's work on the Mallet is no harder and on the average, is probably lighter than formerly on the consolidation. In addition to these important results, 70 per cent. more traffic could be handled with the existing track facilities in case of necessity if Mallets are used without exceeding the number of consolidation locomotives formerly required.

The opportunity of increasing the capacity of a division or relieving existing congestion of traffic without the construction of a single mile of new track, because of the increased power available in the Mallet locomotive, is an advantage which probably bears the greatest weight with the officers of many roads. In this case, for instance, 41 freight trains were run daily over the division with the consolidation locomotives without exceeding the maximum track capacity. If the same number of trains of the average tonnage rating of the Mallets were operated fairly 70 per cent. more tonnage could be transported than at present.

The reduction of over 5 cents per 1,000 ton-miles in the cost of operation becomes impressive when it is considered that on the basis of the present yearly traffic of the Hinton division alone this means a net saving, all factors considered, equal to the interest on $1,500,000 of 5 per cent. bonds.

Assuming for discussion that the total cost of 25 Mallets is $125,000 more than the cost of the 44 consolidations which they replaced (which is certainly not a low estimate), at 13 per cent. yearly for interest and depreciation, which is more than the usual allowance, this would mean an additional fixed charge of $16,250 per year. At present, the average yearly traffic over the division is approximately 1,591,750,400 ton-miles; a saving of 5.7 cents in the operating cost per 1,000 ton-miles, therefore, means an annual saving of $91,360. Deducting the above additional investment charge, the resulting increase in yearly net revenue would be in round numbers, $75,000.

The accompanying itemized comparison of the cost of operation of the two classes of locomotives deserves careful analysis. It is prepared from accurate records, permitting of fair and just comparison, and covers a period of 8 months beginning with the installation of the second order of 24 Mallets, and includes all items of the cost of operation except classified repairs. The item "maintenance" in each case includes only running repairs as none of the Mallets have as yet received general repairs. Records from other roads, however, which have had the American Locomotive Company's Mallets in service for a sufficient length of time to determine the cost of classified repairs, as compared with the locomotives which they replaced, show that while the cost per locomotive is higher the cost per ton-mile is less.

Cost per 1,000 Ton Miles of Mallets and Consolidations in Road Service.

	Cost per 1,000 ton-miles.	
	Mallet.	Consolidation.
Fuel	[illegible]	$.05
Wages, engine crew	.034	.047
Wages, train crew	.031	.054
Maintenance (running repairs only)	.0001	.0009
Engine-house expense	.0002	.00015
Supplies	[illegible]	.00006
Total	$.095	$.152
Decrease due to use of Mallets	$.057	....

From his experience, Mr. Walsh says: "From every point of view we consider the Mallet engines a success."

The introduction of the Mallet on the Hinton division followed directly from the successful performance of a single locomotive of the 2-6-6-2 type of wheel arrangement purchased in July, 1910, from the American Locomotive Company. This original Mallet was ordered for trial purposes with a view of determining the adaptability of the Mallet as a road engine under the existing service conditions. At that time, the freight traffic which is of a general character, consisting of coal, lumber, merchandise and ore, was being handled by consolidation locomotives. A comparison of the principal dimensions of the consolidation locomotives and the Mallets is given in the table on the following page.

Principal Dimensions of the Mallets and the Consolidations Which They Have Replaced.

	2-6-6-2 Type Mallet.	2-8-0 Type Consolidation.
Weight on drivers	337,500 lbs.	176,400 lbs.
Weight on leading truck	25,500 lbs.	21,100 lbs.
Weight on trailing truck	37,000 lbs.	.....
Total weight of locomotive	400,000 lbs.	197,300 lbs.
Weight of tender	163,000 lbs.	131,700 lbs.
Wheel base, rigid	10 ft.	17 ft.
Wheel base, total of engine	48 ft. 10 in.	25 ft. 3 in.
Wheel base, total of engine and tender	80 ft. 9¼ in.	56 ft. 6 in.
Cylinders, diameter and stroke	22 & 35 x 32 in.	22 x 28 in.
Driving wheels, diameter	56 in.	56 in.
Boiler, outside diameter at front end	83⅜ in.	70 in.
Boiler, working pressure	225 lbs.	200 lbs.
Firebox, length	108⅛ in.	90 in.
Firebox, width	96⅛ in.	75 in.
Tubes, number and diameter	244—2¼ in. 36—5½ in.	329—2 in.
Tubes, length	24 ft.	14 ft. 9 in.
Heating surface, tubes	4,674 sq. ft.	2,527 sq. ft.
Heating surface, firebox	344 sq. ft.	157 sq. ft.
Heating surface, water tubes	23 sq. ft.	26 sq. ft.
Heating surface, total	5,041 sq. ft.	2,710 sq. ft.
Superheating surface	911 sq. ft.	.....
Grate area	72.2 sq. ft.	46.9 sq. ft.
Tender, water capacity	9,000 gals.	7,000 gals.
Tender, coal capacity	15 tons	10 tons
Maximum normal tractive effort	82,000 lbs.	41,140 lbs.
Maximum tractive effort (working simple)	98,400 lbs.	.....

The profile here illustrated shows the grade conditions. Most of the freight movement is eastbound from Thurmond, W. Va., to Clifton Forge, Va., in which direction the ruling grade is 30 ft. to the mile and about 13 miles long between Ronceverte and Alleghany. Passing Alleghany, it is practically all down grade into Clifton Forge, 15 miles, of this being a descent of 60 ft. to the mile. With the assistance of a pusher of the same class on the 30 ft grade one of the consolidations could take a maximum train load of 2,250 tons over the division.

In order to reduce the cost of operation by running heavier and fewer trains the Chesapeake & Ohio management decided to introduce a heavier class of power. An order was accordingly placed for the single Mallet above mentioned to determine its advantages. After a few months' service of this engine, 24 more were ordered from the same builders.

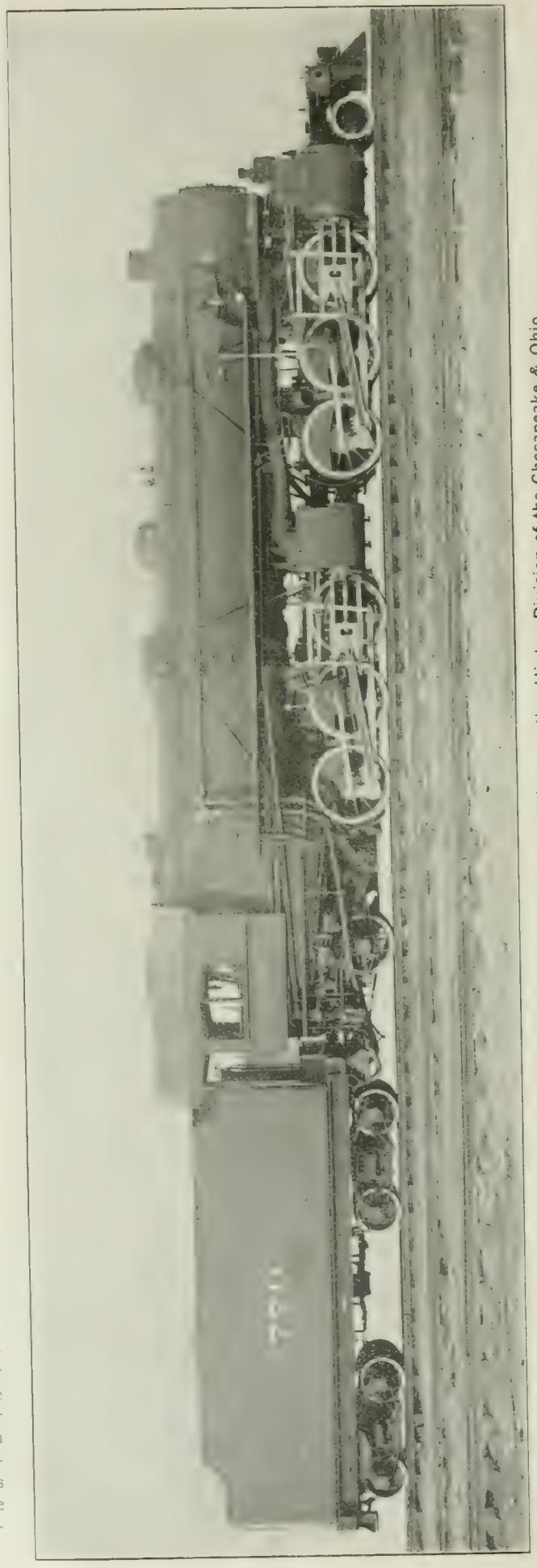
The later engines are of practically the same design as the first except that they are equipped with fire tube superheaters, as prior to their construction comparative tests made of the Mallet on the New York Central* had proved conclusively that highly superheated steam used in conjunction with compound cylinders gave greater economy in operation and increased capacity. This was especially true at the higher speeds as a result of the improved cylinder performance thereby secured, thus better adapting the Mallet to the varying speed conditions which obtain in road service.

The maximum normal starting tractive power of the superheater locomotives is the same as that of the locomotive using saturated steam. At the speeds at which the engines are operated the superheater locomotive probably develops more power than the other. The application of the superheater and such other minor modifications as were made in the design also increased the total weight of the locomotive to 400,000 lbs., 8,000 lbs. more than that of the original design.

These later Mallets thus represent a design specially worked out to meet the specific conditions of the service for which they were intended on the basis of accurate data secured from the performance of an engine of the same type tried out in the identical service. By the use of correct proportions and careful construction of details in combination with fuel-saving devices of proved value and serviceability they provide the maximum economy in operation in increased capacity per pound of fuel burned.

The feature of the design of greatest interest is the construction of the boiler. This is equipped with a combustion chamber 6½ ft. long. By means of this construction the length of the boiler was extended so as to bring the firebox back of the rear driving wheels and over the trailing truck and thus secure an unusually deep throat without necessitating the use of excessively long boiler tubes. As a result the depth of the sheet is 18 3/16 in., thus insuring a better circulation of water. Ample water space of about 9 in. on both the bottom and sides is pro-

Railway Age Gazette, November 24, 1911, page 1054.



Mallet Locomotive Which Has Replaced Consolidations on the Hinton Division of the Chesapeake & Ohio.

vided between the combustion chamber and the shell of the boiler.

The boiler has a large capacity, since with the greater evaporative value of the combustion chamber, as compared with the amount of tube heating surface it displaces, and the improved cylinder economy secured by the superheater, the 5,071 sq. ft. of actual heating surface gives an ample margin of capacity to develop the maximum power of the locomotive.

Another feature worthy of special notice is the trailing truck. This is of the American Locomotive Company's improved type of outside bearing radial truck, and is the first instance of its application to a Mallet locomotive. This truck has, however, been applied with marked success to a large number of mikado and Pacific type locomotives, and is the American Locomotive Company's standard design of trailing truck for those types. It gives a wider supporting base at the rear of the locomotive which tends to increase its steadiness in running and makes it easier riding. The springs are guided by floating spring seat yokes hinged to the main frames. The spring seats are carried on trunnion blocks pivoted in the yoke. This construction provides the greatest flexibility in the spring supports which is necessary to permit the springs to perfectly adjust themselves to the alinement of the journal boxes in any required position without the liability of "cocking" of the spring seats. In the present standard design of this type of truck the double trunnion spring seat support has been replaced by a drop forged sphere, made in halves and riveted together, on which the spring seat rests. This provides the universal adjustment necessary for the rise and fall of the engine and at the same time minimizes the tendency for lost motion to accumulate. Moreover, all the spring seats being in compression any lost motion which may accumulate from wear is automatically taken up.

The Chesapeake & Ohio Railway occupies a prominent position among the many roads of the country who have been making special efforts towards reducing operating costs by taking advantage of the latest improvements in locomotive design. The attitude of J. F. Walsh, general superintendent of motive power toward the present problems of transportation has been very progressive, and a number of new classes of locomotives have been introduced within the past two years, on this road. These include the Mallets under discussion, the mountain type and a powerful mikado just completed by the same builders.

EFFECT OF WAGE ADVANCES ON EMPLOYEES' COMPENSATION.

The Bureau of Railway Economics, Washington, D. C., in its Bulletin No. 28, has issued a report on the effect of recent wage advances on Railway Employees' Compensation during the year ending June 30, 1911. The study was undertaken to ascertain what proportion of the amount of compensation paid by railways to their employees in 1911 was due solely to increases in rates of pay. Changes due to increase or decreases in labor force are not shown. Part of the advances in pay took effect during 1910, so the year 1911 is compared also with 1909.

The railways report to the Interstate Commerce Commission the total compensation received by each class of employees, and the total number of days worked by each class. In classes of labor remunerated on a mileage basis it is frequently the case that individuals receive compensation for more constructive days than there are actual days in the period. In such cases the average daily compensation, as reported, appears to be less than it really is. Comparisons can be made only in a general way between different railways, but comparisons from year to year on individual roads will be valid. Data have been utilized for all railways over 500 miles long; 83 roads, operating a total of 188,760 miles of line, or 77.4 per cent. of the total. The figures cover about 83 per cent. of the total compensation to their employees paid by the railways of the country in 1909, 1910 and 1911, respectively. The wages paid in 1911 by the 83 roads amounted to $1,005,277,249. The increase in compensation over 1909 due to advances in rates of wages over the rates of 1909 amounts to $69,297,678, or 7.4 per cent. The increase in compensation over 1910 due to advances in rates of wages over the rates of 1910 amounts to $41,868,822, or 4.3 per cent.

Increased Compensation of Railway Employees in 1911, Due to Advances in Rates of Pay.

Class	Total compensation 1911.	Difference between compensation in 1911 and what that compensation would have been at rate of wages effective during 1910		1909	
		Amount.	Per Cent.	Amount.	Per Cent.
General officers	$15,966,757	$158,646	1.0	$591,318	4.0
Other officers	[illegible]	46,777	1.4	[illegible]	[illegible]
General office clerks	53,873,729	1,252,563	2.4	2,769,872	5.4
Station agents	22,842,503	755,750	3.4	1,138,021	5.3
Other station men	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Enginemen	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Firemen	49,151,135	3,533,079	7.7	4,657,490	10.5
Conductors	54,077,929	2,828,366	5.5	4,746,785	9.6
Other trainmen	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Machinists	43,714,414	1,330,545	3.1	2,648,127	6.4
Carpenters	41,151,335	1,080,337	2.7	2,172,422	5.6
Other shopmen	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Section foremen	25,607,524	1,100,026	4.5	1,531,441	6.4
Other trackmen	115,662,828	2,877,371	2.6	9,279,486	8.7
Switch tenders, crossing tenders and watchmen	19,359,983	715,827	3.8	569,676	3.0
Telegraph operators and despatchers	30,236,595	1,348,022	4.7	1,709,745	6.0
Employees—account floating equipment	5,070,787	262,252	5.5	222,849	4.6
All other employees and laborers	123,994,116	6,713,143	5.7	8,811,538	7.7
Total	$1,005,277,249	$41,868,822	4.3	$69,297,678	7.4

Minus sign (—) denotes decrease.

Increases due to advances since 1909 have applied to all classes with the exception of "other officers"; increases due to advances since 1910 have applied to all classes except general officers and other officers. The heaviest increases over 1909 are in "other trainmen," "other trackmen," enginemen, conductors and firemen. The larger increases in 1910 are in "other trainmen," "other shopmen," enginemen, firemen and conductors.

A comparison by combined classes for the whole United States shows that increases in compensation have applied to all the large general groups. The largest increase as compared with 1909 is in the wages of trainmen, amounting to 10.4 per cent.; the wages of trainmen also show the largest increase over 1910, the percentage being 6.7 per cent. Trackmen show an increase over 1909 of 8.3 per cent., and an increase over 1910 of 2.9 per cent.

Similar comparisons for the railways of the three geographical divisions are shown herewith. The eastern group comprises roads east of the Mississippi and north of the Ohio and Potomac rivers, the southern group those east of the Mississippi and south of the Ohio and Potomac, and the western group those west of the Mississippi. Roads lying in more than one group are assigned to that group containing the largest portion of their mileage.

Increased Compensation of Railway Employees in 1911, Due to Advances in Rates of Pay—Eastern Group.

Class	Total compensation 1911.	Difference between compensation in 1911 and what that compensation would have been at rate of wages effective during 1910		1909	
		Amount.	Per Cent.	Amount.	Per Cent.
Officers and clerks	$42,931,572	$512,883	1.2	$1,686,628	4.1
Station men	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Enginemen	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Firemen	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Trackmen	59,043,261	2,630,969	4.7	4,872,973	9.0
Switch tenders, crossing tenders and watchmen	13,720,356	721,618	5.6	956,006	7.5
Telegraph operators and despatchers	14,749,346	807,709	5.8	1,099,791	8.1
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	$518,781,732	$27,784,470	5.7	$40,999,467	8.6

Here the largest increase over 1910 was in the compensation to trainmen, amounting to $11,155,376, or 7.9 per cent. Telegraph operators and despatchers in 1911 received 5.8 per cent. over 1910 to switchmen and watchmen 5.6 per cent., and trackmen 4.7 per cent. For 1911, as compared with 1909, the com-

pensation of trainmen again shows the largest increase, $15,107,280, or 11 per cent. The increase to trackmen amounted to 9 per cent., to telegraph operators, 8.1 per cent., to switchmen and watchmen, 7.5 per cent., and to shopmen 7 per cent. This comment does not include the considerable increases in the wages of the miscellaneous group of employees included under "all other employees and laborers."

Increased Compensation in 1911, Etc.—Southern Group.

Combined Class.	Total compensation 1911.	Difference between compensation in 1911 and what that compensation would have been at rate of wages effective during 1910 Amount.	1910 Per Cent.	1909 Amount.	1909 Per Cent.
Officers and clerks	$9,796,057	$294,040	3.1	$581,152	6.3
Station men	12,253,442	531,799	4.5	632,195	5.4
Trainmen	33,916,860	2,586,534	8.3	4,189,480	14.1
Shopmen	25,955,962	934,554	3.7	1,467,683	6.0
Trackmen	14,826,414	306,034	2.1	779,096	5.6
Switch tenders, crossing tenders and watchmen	1,763,817	129,570	7.9	135,242	8.3
Telegraph operators and despatchers	3,755,564	149,885	4.2	202,790	5.7
All other employees and laborers	14,228,905	437,464	3.2	552,306	4.0
Total	$116,497,021	$5,369,880	4.8	$8,539,944	7.9

In the southern group the greatest increase over 1910 was in the compensation to trainmen, $2,586,534, or 8.3 per cent. The increase to switchmen and watchmen was 7.9 per cent., to station men 4.5 per cent., and to telegraph operators and despatchers 4.2 per cent. The total compensation paid to trainmen in 1911 also includes the largest percentage due to advances in the rates of wages over those applying in 1909, the amount being $4,189,480, or 14.1 per cent. The corresponding increase in the pay of switchmen and watchmen amounted to 8.3 per cent., in that of officers and clerks to 6.3 per cent., and in that of shopmen to 6 per cent.

Increased Compensation in 1911, Etc.—Western Group.

Combined Class.	Total compensation 1911.	Difference between compensation in 1911 and what that compensation would have been at rate of wages effective during 1910 Amount.	1910 Per Cent.	1909 Amount.	1909 Per Cent.
Officers and clerks	$32,668,239	$63,217	.2	$1,051,322	3.3
Station men	32,891,613	1,000,973	3.1	1,159,485	3.7
Trainmen	96,181,077	4,022,298	4.4	7,147,272	8.0
Shopmen	76,581,574	1,744,220	2.3	3,765,320	5.2
Trackmen	67,400,677	1,040,394	1.6	5,158,858	8.3
Switch tenders, crossing tenders and watchmen	3,875,810	—135,361	—3.4	—521,572	—11.9
Telegraph operators and despatchers	11,731,685	390,428	3.4	407,164	3.6
All other employees and laborers	48,667,821	588,303	1.2	1,590,418	3.4
Total	$369,998,496	$8,714,472	2.4	$19,758,267	5.6

Minus sign (—) denotes decrease.

All but one of the large general classes show increases over 1910. The only decrease was in the rate of wages of switchmen and watchmen.

In general, the largest per cent. of increase in 1911 over those effective in 1910 or 1909 are found in the eastern group, and the smallest in the western group. (The smallness of these percentages in the case of the western group of railways may be partly due to incomplete returns for certain roads of that group.)

Increased Compensation to Railway Employees in 1911 Due to Advances in Rates of Pay.

(Roads over 500 miles long.*a*)

United States.

Class.	Mileage for 1911 included in comparison, etc.	Total compensation paid in 1911.	What compensation for 1911 would have been, if paid at rate of wages effective during 1910.	1909.	Difference between compensation in 1911 and what that compensation would have been at rate of wages effective during 1910 Amount.	1910 Per Cent.	1909 Amount.	1909 Per Cent.
General officers	188,760.04	$13,669,727	$13,805,373	$13,118,409	—$135,646	—1.0	$551,318	4.2
Other officers	188,760.04	17,852,412	18,099,189	17,854,500	—246,777	—1.4	—2,088	*
General office clerks	188,760.04	53,873,729	52,621,166	51,103,857	1,252,563	2.4	2,769,872	5.4
Station agents	182,561.76	22,842,503	22,086,753	21,704,482	755,750	3.4	1,138,021	5.3
Other station men	182,561.76	81,038,692	78,125,744	77,250,499	2,912,948	3.7	3,788,193	4.9
Enginemen	175,315.56	79,636,834	75,691,514	73,844,966	3,945,320	5.2	5,791,868	7.8
Firemen	175,315.56	49,151,135	45,618,056	44,493,645	3,533,079	7.7	4,657,490	10.5
Conductors	175,315.56	54,077,929	51,249,563	49,331,144	2,828,366	5.5	4,746,785	9.6
Other trainmen	175,315.56	99,154,674	91,697,231	87,906,785	7,457,443	8.1	11,247,889	12.8
Machinists	179,088.99	43,714,414	42,383,869	41,066,287	1,330,545	3.1	2,648,127	6.4
Carpenters	177,442.80	41,151,335	40,070,998	38,978,913	1,080,337	2.7	2,172,422	5.6
Other shopmen	179,088.99	129,182,032	125,043,779	121,518,986	4,138,253	3.3	7,663,046	6.3
Section foremen	188,760.04	25,607,524	24,507,498	24,076,083	1,100,026	4.5	1,531,441	6.4
Other trackmen	188,760.04	115,662,828	112,785,457	106,383,342	2,877,371	2.6	9,279,486	8.7
Switch tenders, crossing tenders and watchmen	182,561.76	19,359,983	18,644,156	18,790,307	715,827	3.8	569,676	3.0
Telegraph operators and despatchers	188,760.04	30,236,595	28,888,573	28,526,850	1,348,022	4.7	1,709,745	6.0
Employees—account floating equipment	182,561.76	5,070,787	4,808,535	4,847,938	262,252	5.5	222,849	4.6
All other employees and laborers	182,561.76	123,994,116	117,280,973	115,182,578	6,713,143	5.7	8,811,538	7.7
Total	188,760.04	$1,005,277,249	$963,408,427	$935,979,571	$41,868,822	4.3	$69,297,678	7.4

Eastern Group.

General officers	52,836.08	$5,695,791	$5,663,802	$5,309,120	$31,989	.6	$386,671	7.3
Other officers	52,836.08	8,593,545	8,663,729	8,572,172	—70,184	—.8	21,373	.2
General office clerks	52,836.08	28,642,236	28,091,158	27,363,652	551,078	2.0	1,278,584	4.7
Station agents	52,836.08	10,138,877	9,671,777	9,403,273	467,100	4.8	735,604	7.8
Other station men	52,836.08	48,597,263	46,938,437	46,198,333	1,668,826	3.6	2,398,930	5.2
Enginemen	52,836.08	42,227,196	39,531,073	38,779,190	2,696,123	6.8	3,448,006	8.9
Firemen	52,836.08	25,964,668	23,813,920	23,427,867	2,150,748	9.0	2,536,801	10.8
Conductors	52,836.08	29,108,995	26,989,311	26,123,487	2,119,684	7.9	2,985,508	11.4
Other trainmen	52,836.08	54,621,776	50,432,955	48,484,811	4,188,821	8.3	6,136,965	12.7
Machinists	52,836.08	26,029,913	24,926,357	24,052,790	1,103,556	4.4	1,977,123	8.2
Carpenters	52,836.08	20,916,953	20,110,253	19,504,328	806,700	4.0	1,412,625	7.2
Other shopmen	52,836.08	64,563,379	62,603,274	60,702,535	1,960,105	3.1	3,860,844	6.4
Section foremen	52,836.08	9,878,119	9,415,129	9,240,144	462,990	4.9	637,975	6.9
Other trackmen	52,836.08	49,165,142	46,997,163	44,930,144	2,167,979	4.6	4,234,998	9.4
Switch tenders, crossing tenders and watchmen	52,836.08	13,720,356	12,998,738	12,764,350	721,618	5.6	956,006	7.5
Telegraph operators and despatchers	52,836.08	14,749,346	13,941,637	13,649,555	807,709	5.8	1,099,791	8.1
Employees—account floating equipment	52,836.08	4,782,012	4,528,579	4,569,040	253,433	5.6	212,972	4.7
All other employees and laborers	52,836.08	61,386,165	55,689,970	54,707,474	5,696,195	10.2	6,678,691	12.2
Total	52,836.08	$518,781,732	$490,997,262	$477,782,265	$27,784,470	5.7	$40,999,467	8.6

Southern Group.

General officers	30,676.62	$1,328,449	$1,414,485	$1,332,537	—$86,036	—6.1	—$4,088	—.3
Other officers	30,676.62	3,026,869	2,983,372	2,876,280	43,497	1.5	150,589	5.2
General office clerks	30,676.62	5,440,739	5,104,160	5,006,088	336,579	6.6	434,651	8.7
Station agents	30,676.62	3,607,838	3,457,502	3,408,035	150,336	4.3	199,803	5.9
Other station men	30,676.62	8,645,604	8,264,141	8,213,212	381,463	4.6	432,392	5.3
Enginemen	30,676.62	10,558,230	9,958,457	9,509,009	599,773	6.0	1,049,221	11.0

INCREASED COMPENSATION TO RAILWAY EMPLOYEES IN 1911 DUE TO ADVANCES IN RATES OF PAY.
(Roads over 500 miles long.*a*)

SOUTHERN GROUP (*Continued.*)

Class.	Mileage for 1911 included in comparison. (*b*)	Total compensation paid in 1911.	What compensation for 1911 would have been, if paid at rate of wages effective during		Difference between compensation in 1911 and what that compensation would have been at rate of wages effective during			
					1910		1909	
			1910.	1909.	Amount.	Per Cent.	Amount.	Per Cent.
Firemen	30,676.62	5,414,180	5,003,375	4,829,146	410,805	8.2	585,034	12.1
Conductors	30,676.62	7,304,782	7,237,174	6,510,472	67,608	.9	794,360	12.2
Other trainmen	30,676.62	10,639,668	9,131,320	8,878,803	1,508,348	16.5	1,760,865	19.8
Machinists	30,676.62	4,078,587	3,930,334	3,854,367	148,253	3.8	224,220	5.8
Carpenters	30,676.62	5,804,506	5,508,342	5,438,331	296,164	5.4	366,175	6.7
Other shopmen	30,676.62	16,072,869	15,582,732	15,195,581	490,137	3.1	877,288	5.8
Section foremen	30,676.62	3,186,811	2,977,668	2,930,935	209,143	7.0	255,876	8.7
Other trackmen	30,676.62	11,639,603	11,542,712	11,116,383	96,891	.8	523,220	4.7
Switch tenders, crossing tenders and watchmen	30,676.62	1,763,817	1,634,247	1,628,575	129,570	7.9	135,242	8.3
Telegraph operators and despatchers	30,676.62	3,755,564	3,605,679	3,552,774	149,885	4.2	202,790	5.7
Employees—account floating equipment	30,676.62	135,189	131,608	131,420	3,581	2.7	3,769	2.9
All other employees and laborers	30,676.62	14,093,716	13,659,833	13,545,179	433,883	3.2	548,537	4.0
Total	30,676.62	$116,497,021	$111,127,141	$107,957,077	$5,369,880	4.8	$8,539,944	7.9
WESTERN GROUP.								
General officers	105,247.34	$6,645,487	$6,727,086	$6,476,752	—$81,599	—1.2	$168,735	2.6
Other officers	105,247.34	6,231,998	6,452,088	6,406,048	—220,090	—3.4	—174,050	—2.7
General office clerks	105,247.34	19,790,754	19,425,848	18,734,117	364,906	1.9	1,056,637	5.6
Station agents	99,049.06	9,095,788	8,957,474	8,893,174	138,314	1.5	202,614	2.3
Other station men	99,049.06	23,795,825	22,933,166	22,838,954	862,659	3.8	956,871	4.2
Enginemen	91,802.86	26,851,408	26,201,984	25,556,767	649,424	2.5	1,294,641	5.1
Firemen	91,802.86	17,772,287	16,800,761	16,236,632	971,526	5.8	1,535,655	9.5
Conductors	91,802.86	17,664,152	17,023,078	16,697,235	641,074	3.8	966,917	5.8
Other trainmen	91,802.86	33,893,230	32,132,956	30,543,171	1,760,274	5.5	3,350,059	11.0
Machinists	95,576.29	13,605,914	13,527,178	13,159,130	78,736	.6	446,784	3.4
Carpenters	93,930.10	14,429,876	14,452,403	14,036,254	—22,527	—.2	393,622	2.8
Other shopmen	95,576.29	48,545,784	46,857,773	45,620,870	1,688,011	3.6	2,924,914	6.4
Section foremen	105,247.34	12,542,594	12,114,701	11,905,004	427,893	3.5	637,590	5.4
Other trackmen	105,247.34	54,858,083	54,245,582	50,336,815	612,501	1.1	4,521,268	9.0
Switch tenders, crossing tenders and watchmen	99,049.06	3,875,810	4,011,171	4,397,382	—135,361	—3.4	—521,572	—11.9
Telegraph operators and despatchers	105,247.34	11,731,685	11,341,257	11,324,521	390,428	3.4	407,164	3.6
Employees—account floating equipment	99,049.06	153,586	148,348	147,478	5,238	3.5	6,108	4.1
All other employees and laborers	99,049.06	48,514,235	47,931,170	46,929,925	583,065	1.2	1,584,310	3.4
Total	105,247.34	$369,998,496	$361,284,024	$350,240,229	$8,714,472	2.4	$19,758,267	5.6

Minus sign (—) denotes decrease.
* Decrease of less than one-tenth of one per cent.
a Except the Chicago, Milwaukee & Puget Sound and Oregon-Washington.
b Variations of mileage represented in different classes are due to incompleteness of returns from certain Western roads.

A FORM FOR ANNUAL REPORTS PRESCRIBED BY LAW IN ENGLAND.

In December last the English Parliament enacted a law prescribing the form of accounts to be submitted by railway companies annually to the English Board of Trade. This law goes further than any orders of our own Interstate Commerce Commission have yet gone, in that it not only requires copies of the accounts to be filed with the supervising body (the Board of Trade in England; the I. C. C. in America), but requires that not later than 60 days after the close of the calendar year a copy of the accounts shall be forwarded to any stockholder or debenture holder of the company making the returns who shall ask for it, and a penalty of $25 a day is prescribed for failing to file reports on time. A further penalty of imprisonment for one year is provided for any officer who signs any of the returns which, to his knowledge, are false. The magazine writer, the investigator, the student and the great British public, who may not be stockholders, are provided for in a rule which gives each or any one of them the right to inspect the accounts on paying a fee of a shilling for each inspection of each railway's account.

The act takes effect on January 1, 1913. The Board of Trade is given the power to change provisions in the act, but must publish a notice of such changes and must consider any objection or suggestion made by those who are affected by the change; and if railway companies having a capitalization totaling a third of the total railway capitalization in Great Britain are not satisfied with the way any objection has been dealt with by the board, the order of the board shall not take effect unless it is confirmed by the English Parliament.

FINANCIAL ACCOUNTS.

The annual report which is required is divided into two parts, called financial accounts and statistical returns. The financial accounts are divided into 18 primary exhibits; the statistical returns into 16. The first three of the financial accounts call for information in regard to the issue of new shares or debentures. Details of the character of the security issued, the amount authorized and the amount actually sold or provided for, and the powers under which the new securities are issued, must be given in full. Account No. 4 shows receipts and expenditures on capital account. Expenditures are divided as between lines in operation, lines under construction, leased lines, etc., and separately for such activities as under the Interstate Commerce Commission form of accounts would be called outside operations, such as hotels, etc. On the receipt side, the amount received from the sale of securities must be shown, together with the premium or discount on the sales. Investment in any other companies must also be shown in detail.

Account 5 calls for the details of capital expenditures for the year, dividing these expenditures as between land and compensation, building of line and accessories, and law charges and parliamentary expenses. This division applies to what we would call additions and betterments to railway lines. Expenditures for new rolling stock must also be shown and expenditures for capital account of outside operations.*

Account 6 has no parallel in the requirements of the Interstate Commerce Commission. It calls for an estimate of future expenditures on capital account. The figures which are required must show what has been already spent on any work which it is estimated will require further expenditures, what the company expects to spend during the current year, and what the probable subsequent expenditures will be to complete the work. This budget must include new railway construction, purchases of railways, new rolling stock and outside operations.

Account 7 carries this one step further and calls for figures showing how these future expenditures are to be financed.

Accounts 8 to 18 deal with revenue and expenses. No. 8 is

*When technical terms, such as this, are taken from the Interstate Commerce Commission's classification, they are used for the convenience of American readers and are not, of course, the terms used in the English act.

called revenue, receipts and expenditures, and might be described as a condensed income account statement down as far as net corporate income after the payment of what the English call general interest. The figures for the year for which the report is made are called for carried out to pounds, shillings and pence, while the previous year's figures are required to be given for comparison in round numbers only. Account No. 9 carries the income account on down, showing interest, rental and fixed charges, appropriations and dividends. Account No. 10 corresponds to and contrasts with the elaborate provision of the Interstate Commerce Commission for the classification of operating revenues and expenses of steam roads.

What we should call operating expenses are divided under the general heads of maintenance and renewal of way and works; maintenance and renewal of rolling stock; locomotive running expenses; traffic expenses; general charges; running powers; and joint lines. The first of these divisions corresponds fairly closely to the I. C. C. maintenance of way and structures. Instead, however, of being divided into 27 accounts, the English system is divided into six main accounts, some of which are further subdivided. The English make a distinction between renewals of right of way and track and repairs of right of way and track, which suggests the possibility of either an arbitrary division of labor costs or a considerable waste of time in trying to determine what should strictly be charged to repairs and what to renewals. It is noticeable that the English charge the cost of repairs of work equipment to maintenance of way and not to maintenance of equipment. Their maintenance of equipment account is divided as between locomotives, carriages (passenger train cars) and wagons (freight train cars). They divide their costs as between complete renewals, and repairs and partial renewals, but they mean by renewals not replacement in whole but apparently renewal of parts, for they have a separate account for purchase of new rolling stock. In each account expenditures are divided as between wages and materials.

The accounts of locomotive running expenses and traffic expenses taken together correspond roughly to the old conducting transportation account which the I. C. C. split up into transportation and traffic; but the English traffic expenses, while it includes such items as printing, advertising, etc., also includes wages of trainmen, exclusive of locomotive enginemen; station men, etc., and fuel, exclusive of locomotive fuel. Locomotive running expenses is self explanatory. It includes wages of enginemen, fuel, water and lubricants. General expenses are much the same as ours. Running powers correspond to our trackage rights, and joint lines explains itself.

Revenues are divided as between passenger and freight traffic, and it is interesting to note that the expense of the collection and delivery of baggage and freight is subtracted separately for each class of revenue in the revenue account and not shown in the expense account.

The general balance sheet required is, compared to that of the I. C. C., quite simple. At first glance it appears strange because, following English custom, the left hand or debit side of the balance sheet is taken up by liabilities, and on the right hand or credit side are the assets. It will be recalled that account 4 showed receipts and expenditures on capital account, so that the balance sheet simply calls for the total credit on account 4 for the liability side, and the total debit for the asset side.

STATISTICAL RETURNS.

Following previous English practice and the opinion of the majority of English railway men, the traffic statistics, especially those of freight, are not called for on by any means as comprehensive a scale as is required by the Interstate Commerce Commission. However, the new bill provides for much more elaborate figures than have been generally reported by English railways heretofore. For the first time all English railways will be required to show tonnage of freight carried, with the exception, however, of live stock, which is shown by number of head and not by weight. A tabulation of track mileage is called for, but nothing need be shown as to the grades, curvature, weight of rail, etc. A description of rolling stock is provided for, as is also a description of the equipment used in delivering and collecting freight. Where financial account 10 called for costs of maintenance of way, statistical tables 10 and 11 call for a description of materials used in maintenance of way and in repairs and renewals of rolling stock. The amount of ballast, tons of rails and number of ties used in maintenance each year are to be shown, and the number of locomotives repaired, divided as between heavy and light repairs, number awaiting repairs, etc. Repairs and renewals done in the company shops is shown separately from the work done by contract. Engine mileage is to be shown in considerable detail, and each company is required to give a list of the tonnage of commodities carried divided as between different classes; the railway company and the Board of Trade in each case agree on the classification for each road separately.

Finally, a summary of financial results secured in comparison with those for past years is required. This requirement is not made retroactive, but is to be extended year by year until ten years are reached, and thereafter to be shown only for the current year and nine previous years. It does not differ very much in substance, although it does in form, from the condensed table that the *Railway Age Gazette* uses when commenting on railway annual reports, with the important exception, however, of showing expenditures on capital account, which would seem to confuse income account and capital account, at least in theory.

FOREIGN RAILWAY NOTES.

The Brazilian Railroad Construction Company has been granted a concession to build a line from Antonio do Juquia, Brazil, to a point on the left bank of the Rio Riberia de Iguape, about 240 miles below the mouth of the Juquia river. This concession will extend over a period of 25 years.

The Hungarian state railways, becoming anxious because the high price of tin was making journal-bearings too costly, started experimenting with a view to finding an alloy which would answer the purpose and require less tin. The engineer, John Farkas, who conducted the experiments, reports that an alloy of 78 parts lead, 17 of antimony and 5 of tin answers the purpose. It melts at 432 degs., and its elasticity is nearly the same as that of the metal heretofore used. To test its wear and friction 5,000 cars were fitted with bearings of the new metal. After three years' trial it was found that they wore almost as well as the old bearings, with as few hot boxes. The metal costs about 20 cents a pound less. The method of casting is different, but is readily learned. The general adoption of this alloy is ordered on the Hungarian state railways.

The preparatory work for the electrification of the division of the Prussian state railway, between Magdeburg and Leipzig via Halle-on-the-Saale is so far along that the entire division is expected to be in operation by the end of 1913. The management has operated experimentally the section between Dessau and Bitterfeld, and is well satisfied with the results. The power station and appliances connected with the experiments have, however, the appearance of temporary works. The Prussian parliament has granted the means for putting into service two divisions with full electric traction. One can serve as a type of a line in a flat country; namely, the one above mentioned, Magdeburg-Halle-Leipzig. The other, representing the conditions of mountain service, starts at Lauban, and will be finished after the first-named. Most of the contracts for the work on the western division have been awarded, so that the carrying out of the plans need not be long delayed. Consideration for the rest of the Prussian State railway service has made it necessary to introduce locomotives temporarily. Not only the freight, but also the passenger trains, are to be run electrically, and those trains which on the other divisions are driven by steam, will be hauled electrically between Magdeburg and Leipzig.

THE FUTURE OF RAILWAY REGULATION.

Abstract of an Address Delivered at the Annual Dinner of the Traffic Club of Pittsburgh, March 28, 1912.

BY CHARLES A. PROUTY,
Chairman, Interstate Commerce Commission.

I became a member of the Interstate Commerce Commission in December, 1896. The following spring, as I now remember it, the Supreme Court of the United States handed down its decision in what was known as the Maximum Rate Case, holding that the commission had no authority to prescribe a maximum rate. Not long after this I wrote an article, which was published in some magazine, taking the ground that there could be no regulation of the interstate railway rates of this country without the exercise of that power. The views which I then expressed were bitterly condemned by almost every leading newspaper east of the Mississippi and north of the Potomac and Ohio rivers as socialistic and impossible.

What at that time was regarded as an extreme doctrine has come to be axiomatic. It is universally assumed today that interstate rates and practices must be regulated, and that they can only be regulated by prescribing the rate or the practice for the future. Nor is it within the realm of possibilities that the old order of things and the old set of ideas can ever return.

Are conditions today better or worse than they were 15 years ago? From the standpoint of the shipper they are infinitely better. Today every man pays the same rate as his competitor, every man knows what that rate is and can assume that his contract will be fulfilled upon the same rate under which it was made. There is a tribunal with power to hear and correct alleged grievances. Upon the part of the railway the answer should be the same. It must be certainly more comfortable to the traffic official to act within than to be habitually without the law; but disregarding the sentimental and moral aspects and looking only to the financial side, still today is better than then

In 1897 the great railway systems of this country did not establish their rates of transportation. These rates were made by powerful shippers, by insignificant competitors. When once published they could not be maintained. Today, owing partly to a saner way of thinking and in part to a greater unity of operation, railways can control their rates. It would today be possible to very materially advance the published railway rates of this country, and when once the rate has been filed, it must be and is maintained.

Upon the other hand, the government now exercises the right of determining what rate shall be filed. From now on, what the gross revenues of our railways shall be rests with the government, mainly and increasingly with the federal government. This being so, what security can the railway investor feel that this authority will be justly exercised? What assurance is there that rates will not finally be forced down to an unprofitable level or if the increasing cost of operation makes an advance in rates necessary, that this advance will be permitted? In a word, what protection has the vast investment which is represented by the railways of this country?

WHAT PROTECTION HAS INVESTMENT IN RAILWAYS?

First of all, there is the protection of the courts, and this, I think, our financial interests mainly rely upon. In my opinion, that protection will not prove satisfactory. Under the constitution of the United States the functions of government are divided into the executive, legislative and judicial, and the functions of one branch of the government cannot be discharged by any other. The Supreme Court of the United States has itself declared that the making of a railway rate is a legislative function. There is no rule of law by which the reasonableness of a rate can be determined; there is no exact formula upon which it can be computed. When thought out, it will be seen in every case that the determination of a reasonable railway charge involves the exercise of judgment brought to bear upon the circumstances of each case. This is the method by which the traffic official makes the rate, and his action must be revised by the same method if it is to be fairly and intelligently examined.

The constitution of the United States forbids the taking of private property without due compensation. The legislature cannot so adjust the charges of a railway as to deprive that railway of a fair return for the use of its property as a whole. But there is no requirement of the constitution that the rate on sugar shall bear a certain relation to the rate on salt, or that the charge for transporting coal from a certain locality shall bear a given relation to the rate from a certain other locality, nor even that a certain part of the revenue shall come from the handling of passengers and another part from freight. These questions are all legislative. The court can only inquire whether the net result yields to the carrier a fair return, whatever that may signify.

In the past the courts have persisted in invading the legislative domain, but this will not, I think, be permanently permitted. There can be no intelligent review of a legislative act by judicial process. There can be no effective regulation of railway rates so long as the administrative acts of the regulating body can be reviewed by the courts. Ultimately the legislature will be left supreme in that domain where the exercise of legislative judgment is required.

This means that the court can stand between the railway and confiscation, but that it will not be allowed to determine how profitable the railway investment shall be, for that is not the business of a court. In all that vast realm covered by the word reasonable, within that zone bounded by confiscation on one side and a resonable rate on the other the legislature will dominate.

It should also be borne in mind that this protection which our railways now have in the courts, and which I for one would be glad to see left there if properly exercised, can at any moment be taken away altogether. We act under a written constitution, which is at any time susceptible to amendment. If it becomes clearly apparent that in its present form our constitution lends itself to injustice and prevents the accomplishment of the right, then it will in due time be changed. I have for a long time thought that the outcome of all this conflict between legislature and court was likely to be an amendment to our constitution, depriving the court of all power to set aside a legislative enactment dealing with private monopoly. Our courts do not today possess the confidence of the masses, as is evidenced by the favor with which this demand for the recall of judges and the decisions of judges meets whenever it is put to the test of a popular vote. The reason for this is to be found very largely in the disposition of judges, especially of federal judges, to invade the legislative domain and restrain legislative action. In no other civilized land, so far as I know, do courts possess the power to set aside the deliberate act of the legislature, and unless they exercise that power with extreme caution in this land of ours they will be deprived of it.

I have no patience with the idea so persistently urged in certain quarters that no man has any just regard for the rights of property unless he be a judge; that the putting on of a gown, like the anointing of the prophets of old, endues him with some especial spirit of fairness.

The law of the land has declared that the legislative branch

of the government may regulate railway charges. It has provided that the abuse of that power may be restricted by the courts. So long as the power is honestly and fairly exercised, the only relief against it should be by an appeal to the legislature itself. Many years ago I began to urge my railway friends that their true interest lay not in obstructing regulation, but rather in making it fair and intelligent. Every day adds to my conviction that this is profoundly true. Your real protection, gentlemen of the railway world, lies in the intelligence and justice of the regulating body, whatever that may be.

It will come to this: the railway rates of this country will be established by commissions, state and federal, of which the federal commission will be the most significant, both because the rates upon which it acts are of the most consequence and because its decisions will finally command the respect of state commissions. The people will be content to keep their hands off the conclusions of these bodies and will insist in the main that the courts shall be equally respectful. The qualifications of these tribunals is the all-important thing to the railways.

Many years ago I said in jest that if ever the Interstate Commerce Commission was worth owning, the railways would own it. That statement I must retract. The commission has become worth owning, and the railways do not own it. So far as my observation goes, they have never attempted to own it, and let me urge you, gentlemen, to most resolutely persist in this course. If by any chance it should come to be believed that you dominated that body it would be of little service to anybody. Just in proportion as the commission is understood to be and is independent of all influences, both upon the side of the shipper and the railway, it may be of benefit.

PERSONNEL OF THE COMMISSION.

Speaking to the shipper and railway alike, let me say: Put onto that body the strongest men who can be induced to go there. In the past the position has not been especially attractive, but in the future it will be more so. The work is arduous and the responsibility is great, but the position is becoming one of the greatest authority, and the exercise of that authority will finally come to carry with it distinction.

When the proper man is appointed, educate him. Do not call him a fool. You may entertain that opinion, and your opinion may be justified, but, none the less, the process of education is not best conducted in that way. Remember that he is a novice, give him your point of view, get, if possible, his point of view. It may happen that a railway traffic official will himself learn something while educating his commissioner. Let me impress upon you that it is of the greatest importance that you should present accurately and forcefully the considerations which have induced you to make the rates which you defend. I do not say the reasons, because it frequently happens that there are none.

When once you have educated your commissioner, keep him. Even if he be not susceptible of education, according to your way of thinking, still, if he is an honest man, keep him. Age gives to wine a mellowness which nothing else can; time gives to an interstate commerce commissioner ability which nothing else will; he comes to see things from more angles and by a different light. Unconsciously he grows wiser, and without quite knowing how or why, becomes more capable of viewing and deciding. In no places does mere experience count for more.

I do not myself favor a life tenure. The present term is long enough, but reappointment should be a matter of course unless there be some overwhelming reason to the contrary.

What is to be the final effect on railway investments? This is the question to which you desire an answer.

That answer, however, I can give no better than you. When the day of pressure comes, I shall not be there. I know not who my successor will be, nor whom he will have for his associates. Let me, however, state the elements which should determine that answer as they present themselves from my standpoint.

This property of yours is at the foundation of all industrial and commercial activity. Until everything changes, railways will be the same absolute necessity which they are today.

No great railway system today need fear that its business will be seriously invaded by any competitor. The construction of new lines of railway which will seriously interfere with the present flow of traffic is hardly a serious possibility. While the traffic of particular lines may be less, and while there may be serious temporary falling off in the traffic of all lines, broadly speaking, the volume of business transacted by the railways of the United States today will not in the next 100 years decrease.

The character of the business is such, and the conditions under which it is conducted are such, that while transportation charges by rail cannot be indefinitely increased, they can be advanced by the railways, provided the government consents, to a point which will at all times pay munificent returns upon the property invested.

Looking at this matter from all possible angles, there is but one doubtful feature today, and that is the attitude of the government itself. What charges will the Interstate Commerce Commission, if that continues to be the regulating body, permit?

EARNINGS TO BE ALLOWED RAILWAYS.

Every intelligent man knows and must feel that it would be rank injustice to require railway investment to earn less than other investments of the same grade. Every intelligent man must know that to force down railway charges below a fairly remunerative point would so impair the credit of our railways as to prevent them from properly discharging their functions as public servants. When honesty and public interest combine to secure to our railways rates which are fairly compensatory, I cannot believe that this privilege will ever be denied. If the time does come when railway property is sacrificed to popular clamor, when the public demands its confiscation and the regulating tribunal concedes that demand, no property will be of much value. The day will have come when the obligation of private rights is no longer observed.

Please note exactly what I am predicting. It is that under government regulation railway companies will be allowed earnings fairly commensurate with other enterprises of the same class. The happenings of the last fifteen years have entirely changed the character of railway property. No form of investment today is, no form of investment in the future will be, more certain than railway stocks and bonds. As certainty increases, the rate decreases.

I am not saying to you that the average railway dividend of the future will equal the rate of commercial discount. I doubt if it does or should. I am not suggesting for a moment that the income from railway investment will compare with that in manufactures or in commerce, for it ought not to. You should not compare the net proceeds of railways with the proceeds of banks, for example, for the order of the investment is not the same. In the last fifteen years few forms of investment have surpassed banking, but I well remember the time when many of us who owned bank stocks not only lost our entire stock holdings, but were forced to pay assessments of an equal amount. The worst which could happen to the stockholder of any great railway system would be the temporary suspension of dividends, and even this could only occur under very unusual circumstances.

You may not agree, and will not agree with the regulating tribunal as to the amount. My friend Willard, of the Baltimore & Ohio, believes that he should pay his stockholders 6 per cent., and put into his property 1½ per cent. My belief is that 5 per cent. is enough, but I would not find fault if he added to the value of his property 2½ instead of 1½ per cent. In process of time conditions may change so that a rate of return which is today fair will be either too great or too little, but the time never can come, so long as we are a great and civilized people living under a government which respects the rights of private

property, when a legitimate return upon this form of investment will not be permitted.

To my mind the most active storm-center in forecasting the railway future, both as to the investor and the public, is the labor situation.

In the upper stratum of society small progress has been made in the last twenty-five hundred years. Men of the highest intelligence think no better, express themselves no more clearly, live generally in no greater comfort than in the days of Socrates. But in the lower strata the greatest improvement has occurred; and nowhere is the condition of the laboring man probably as good on the whole today as in this land of ours. It is most significant that the English miner is demanding a minimum wage of $1.25 per day, while the anthracite mine workers demand $2.75, if I remember that figure correctly. Even so, it is doubtful whether the laborer yet obtains his proper share of the value of the product which he produces, and, if you can show me any way by which he can be given a greater share, or by which what he earns can be made to maintain him in greater comfort than now, I, for one, stand for it.

WAGES AND RATES.

I believe in organized labor. Capital is of necessity organized, and labor must also organize if it would cope successfully with capital. But combinations of labor, like combinations of capital, are in the nature of monopoly and may be tyrannical and oppressive. No form of labor is more highly organized than railway labor in certain classes, and the very fact of this more perfect organization has enabled that labor to secure, in comparison with other forms of labor, excellent compensation. I do not intimate that railway wages are too high, for I have no thought of that sort. Suppose organized railway labor makes a further demand for increased wages, and that the railways accede to this demand. The increased wage adds to the expense of operation and reduces net revenue. The railway applies to the Interstate Commerce Commission for leave to advance its rates on this account. What, now, is to be the answer of the commission?

The railway rate is paid by the whole body of the public. If, therefore, this increase in wages was unjustifiable, and if on that account an increase in rate is allowed, it results that the general public, including all other forms of labor, is required to pay what is unjust and unreasonable. Must not, therefore, the government be satisfied, not only that the added wages are paid by the railways, but that they are necessarily and properly paid? And is not the railway thus placed in a most unfortunate and embarrassing dilemma?

Consider this matter for a moment now from the public viewpoint. It was recently suggested that certain demands would be made by railway labor in a certain section of this country which would be supported, if not complied with, by a general strike of all classes of trainmen. Such a strike would be altogether possible today. Think for a single moment of the consequences; suffering, riot, death must result. Ought not the public to protect itself against the consequences of such possible action?

We have the Erdman act, and this has given most admirable results, but that is a peace-measure, obligatory upon no one, and of no value in time of war. I have believed that it would finally be found necessary to provide by federal enactment that no strike shall be declared by organized labor upon any interstate railway until the question at issue has been submitted to arbitration, and a certain length of time has intervened after the award, and after notice that the strike would be inaugurated notwithstanding the award. It is doubtful if we could compel either the railways or the employees to comply with the award, but certainly, in view of the stake which the public has, the government may require of the railway, as its servant upon the one hand, and of organized labor, as a condition of its organization upon the other, that the use of these public facilities shall not be interrupted until every attempt has been made to avoid that necessity.

Probably neither party would approve such legislation. The railway manager would say that every arbitration means a compromise; that he must, as a matter of fact, although nominally a free agent, comply with the award, which is probably true, and that, therefore, you take out of his hands the management of his property.

The employee would object because he is thereby to an extent deprived of a weapon of offense in the enforcement of his claim, and since it would be difficult for organized labor to enforce a strike against public opinion in case of an adverse decision.

But is it not after all for the interest of all parties that these questions should be settled by peaceful methods rather than by the waste, the misery, the possible bloodshed of a great strike, and is it not better for both parties that the government should have sanctioned the increase, if one be made, and must, therefore, of necessity sanction the increased rate with which to meet it, if need be?

I have made this suggestion, however, not for the purpose of suggesting a remedy, but simply because the thought has been presented to me as one charged with the regulation of railway rates. It has been to me a difficult question to determine exactly what my duty might be in a case of that sort, and it will come to my successor in precisely the same form. He should, if possible, be relieved from that embarrassment.

PORTABLE ELECTRIC POWER PLANT FOR RAILWAY WORK.*

The locomotive works of the Swiss Federal Railways at Zurich built in 1909 a novel car for generating electric current for the illumination of work in tunnels, under bridges, etc., and for supplying light for cleaning up wrecks at night. This car can travel under its own power. It is fitted with a complete electric generating plant, lamps and a projector, and also with a driving motor. The car was built from a second-hand, four-wheel passenger car, the frame and springs of which were strengthened and the body altered to form two compartments. The weight of the car is 16 tons.

The generating set consists of a vertical four-cylinder gasolene motor, capable of developing 22 h. p. at a speed of 800 r. p. m., and a four-pole, compound-wound-type dynamo capable of generating 13 k. w. at 120 volts and at a speed of 800 r. p. m. The driving motor develops 12 h. p. when running with 120 volts at 400 r. p. m. This allows a speed of 12 miles an hour on the level and three miles an hour on a grade of 1.2 per cent. A speed of 3.1 miles an hour has been attained up a grade of 2 per cent. with 11 passengers on the car. Under ordinary conditions the car, when required at a given point, is attached to a train and hauled to its destination, for it is operated by its own motive power only on the sections on which work is in progress.

The lighting apparatus includes a projector with a parabolic metal mirror 1 ft. 1¾ in. in diameter and taking 20 amperes of current. This projector can be fixed on a stand on the main platform or on a movable stand. Two arc lamps are carried on the roof of the car and serve for lighting work in tunnels. The car is also equipped with four arc lamps used for lighting the track in case of accident, but which may also be fastened to the tops of poles stationed along the track. These poles are supported by wire stays and the current is provided by means of flexible cable, enough of which is carried to light 300 yd. of track. The lighting equipment also includes two rows of incandescent lamps fixed on strips of wood 6 ft. 6 in. long and fitted with semi-cylindrical reflectors, which are used for lighting piers.

This car has been used successfully in the operations involved in taking down the overhead electric installation on the Seebach-Wettingen Electric Railway, which had to be accomplished by night to avoid interruption of the traffic of steam locomotives during the day. It is expected that the car will also be employed in connection with the use of electric drills, rail cutters, etc.

* Abstracted from an article in the March Bulletin of the International Railway Congress Association.

LOCOMOTIVE EXPLOSION AT SAN ANTONIO, TEXAS.

Late reports relating to the Southern Pacific locomotive explosion at San Antonio, Tex., on March 18, state that it caused the death of 28 and injured more than 40 persons. At the time of the explosion the engine was standing outside the engine house near the smith shop, and portions of these buildings were wrecked. Many of the workmen close to the engine and in the shops adjacent were killed by the explosion, or crushed by the falling materials when the walls and roofs fell in.

to take out westbound passenger train No. 9, and a few minutes before the explosion the engineer had taken charge of it to run it to the passenger station for its train. The disaster occurred at 8:53 a. m.

"The hostler who brought the engine out of the engine house testified that he had filled the tank with water, and the oil tanks were also filled, as it was an oil-burning locomotive. When he turned the engine over to the engineer the steam gage registered 190 lbs, and the injectors were working. The engineer tested the gage cocks, looked at the steam gage, and then took his oil can and got down to oil around the engine. The hostler



Fig. 1—Scene of Locomotive Boiler Explosion at San Antonio, Tex.

The photographic illustrations of the scene of the explosion and the different views showing the complete destruction of the engine were furnished at our request by Thornwell Fay, president of the Harriman Lines in Texas and Louisiana, who sent the following description of the conditions of the accident:

"The locomotive in question, No. 704, was a mogul and comparatively new, having been put in service in May, 1908. It had been in the engine house for overhauling for several weeks, and two days prior to the explosion had undergone the annual hydrostatic test, when the boiler was found to be in good condition. Boilers of this type have a working pressure of 200 lbs. The locomotive was fired up on Monday morning, March 18,

left the locomotive and walked to the engine house, and was hardly inside the building when the explosion occurred. In addition to the statements of the hostler we have other evidence corroborating his testimony, including that of the master mechanic himself, who was on the engine only 15 or 20 minutes before the explosion, at which time the steam gage indicated 145 lbs. He had gone to his office and was detained there a few minutes to sign some requisitions when the explosion occurred. The principal parts of the boiler and machinery were thrown by the force of the explosion quite a distance and in all directions."

The running gear, cylinders and most of the machinery re-

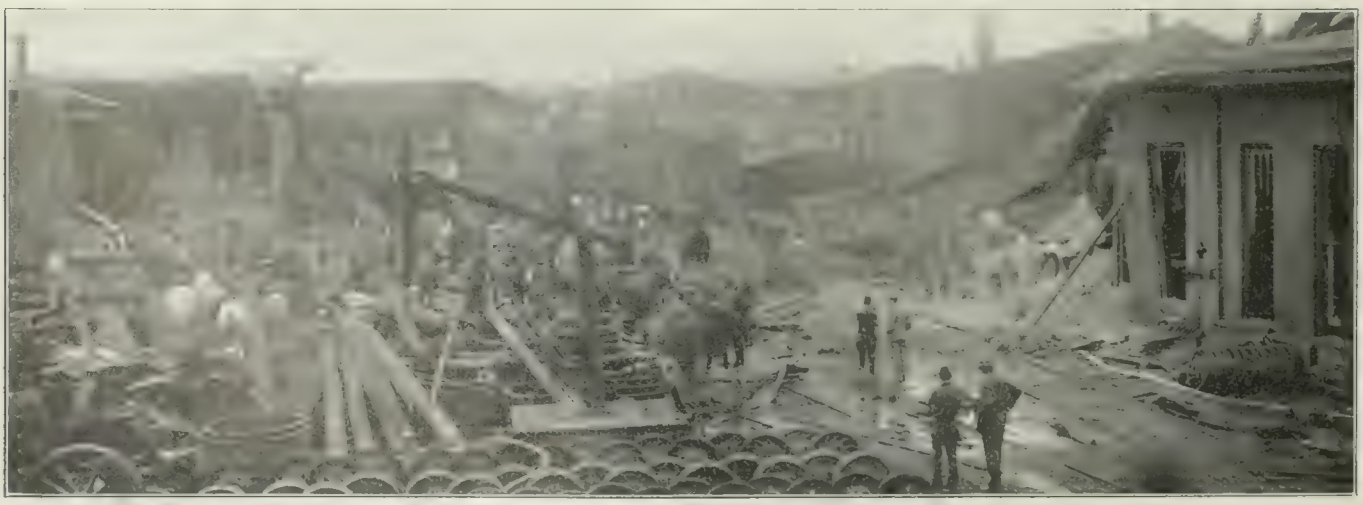


Fig. 2—Showing Damage to Smith Shop and Engine House.

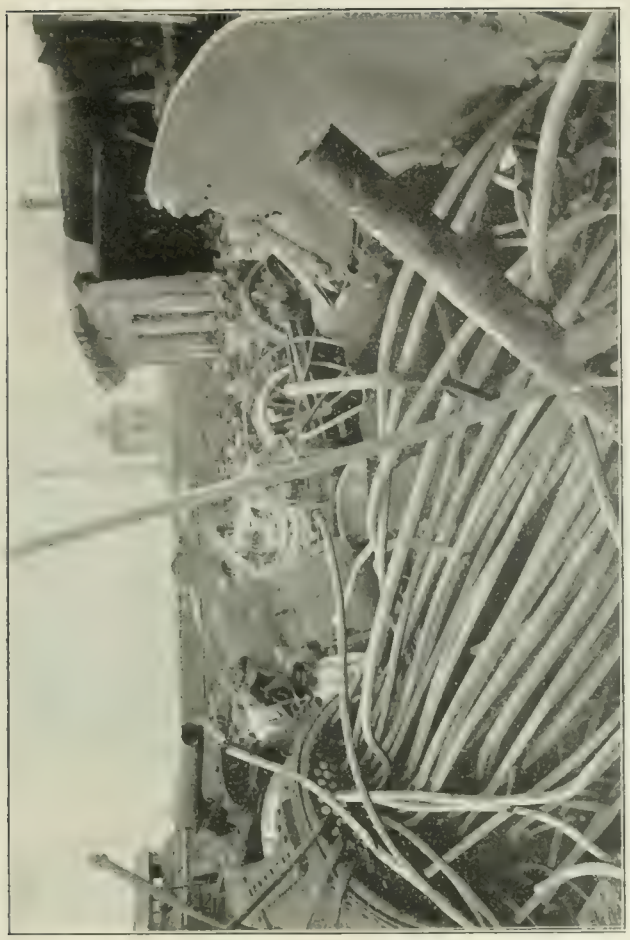


Fig. 4—Tubes, Smokebox and Fractured Edges of Boiler Shell.

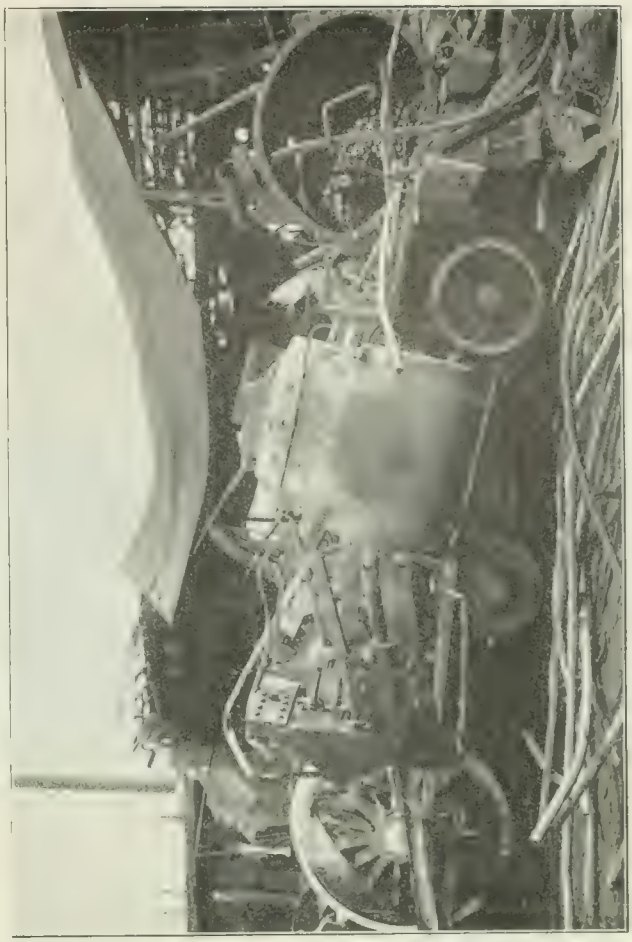


Fig. 6—Cylinders, Crosshead and Engine Track.

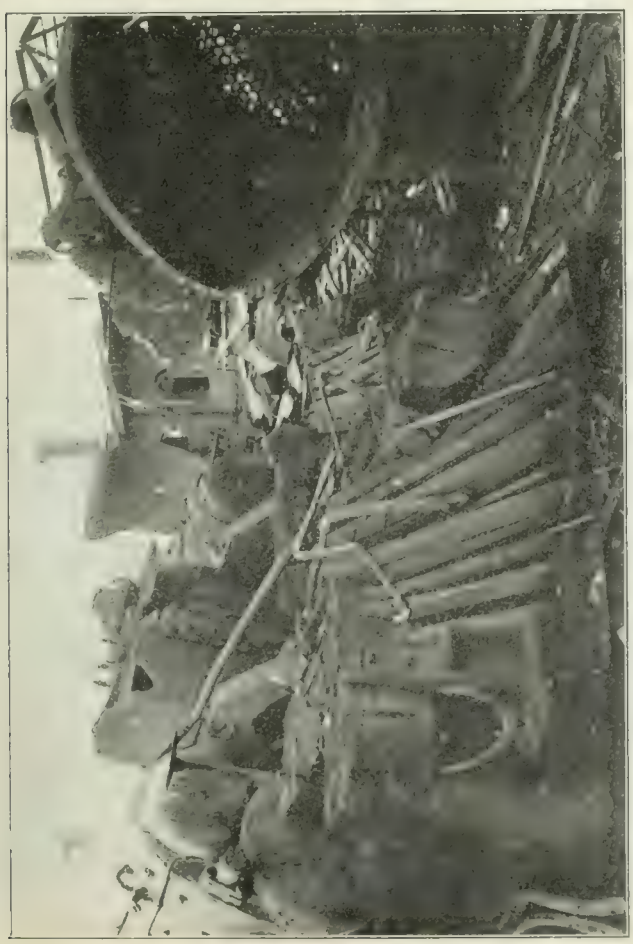


Fig. 3—Fractured Cylinder Saddle; Smokebox at the Right.

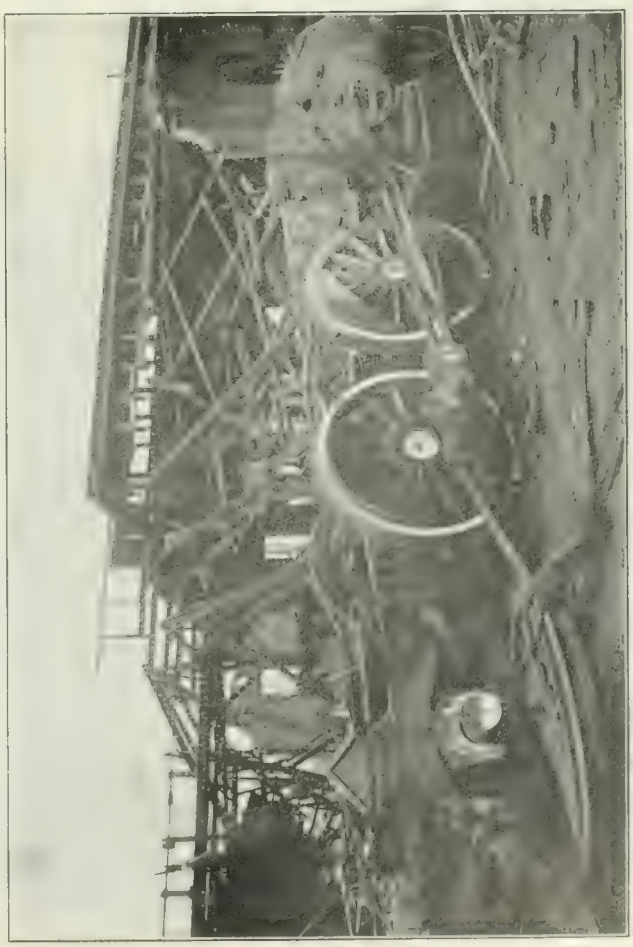


Fig. 5—Right Side of Running Gear.

mained on the track at the place where the engine stood at the time of the explosion, and this is indicated by arrow 1 in the general view (Fig. 1). The position of the smokebox, with many of the tubes, is indicated by arrow 2 in the same view. The firebox and boiler were shattered into small pieces, the dome being projected into a yard some distance away. The tender was driven back 150 ft., and collided with another engine.

The various views taken close to the engine and directly after the explosion serve to illustrate the complete destruction and the results of the terrific forces generated. Fig. 5 is a view a few feet in front of the cylinders. A close view of the smokebox tubes and the fractured edges of the shell sheet are seen in Fig. 4. In Fig. 8 the right main frame is seen badly bent, and small pieces of the firebox stripped from the stays are piled up betwen the frames. A portion of the fractured shell sheets may be seen at the left, mixed with the debris from the shop where some of the workmen were killed. Fig. 6 shows the right hand cylinders, the guides and piston rod badly distorted, and Fig. 3 the broken cylinder saddle, with the smokebox near by and upside down.

The cause of the explosion was carefully investigated, Chief



Fig. 7—Left Side of Running Gear, Smokebox, Tubes and Portion of Boiler Shell.

of the right side of the running gear, showing the rear driver on that side forced off the axle and the side rod twisted. Portions of the firebox have the sheet stripped from every staybolt. The shattered walls and roof of the adjacent shop buildings are seen in the background. Fig. 7 is a view of the left side of the engine, showing the rear driver on that side forced from its axle and thrown forward, bending the side rod into a U shape near the crank pin of the middle driver. The rear axle, 9½ in. in diameter and made of steel, was broken off sharp between the frames. The smokebox, tubes and fractured shell sheets are seen in a position at a right angle to the engine

Boiler Inspector John F. Ensign of the Interstate Commerce Commission having presided at the investigation. He was assisted by the following district inspectors: E. W. Young of Dubuque, Iowa; George E. Dougherty of Houston, Tex.; and John A. Shirley of San Antonio. Mr. Ensign said of the explosion: "I believe it is the worst I have ever seen. I cannot recall an instance where the destruction was so complete and in which the loss of life has been so appalling. The list of injured, too, has been exceptional." Allison Mayfield, chairman of the Texas railway commission, also took part in the inquiry and Mr. Fay and other railway officers assisted the board.



Fig. 8—Portions of Firebox and Distorted Frame; San Antonio, Tex., Locomotive Boiler Explosion.

General News Section.

On April 1 the use of green flags as rear end markers was discontinued on the Rock Island lines.

In a fire at Toronto, Ont., March 27, 270 street cars were burnt up, most of them open summer cars.

Governor Foss, of Massachusetts, has signed a bill increasing the penalty from $5,000 to $10,000 to be imposed on a railway for the loss of life of an employee because of negligence.

The latest returns of the vote being taken by the coal miners in England on whether or not to accept the minimum wage act and return to work indicate that the miners accept and that the strike will be called off.

The Stanley committee has decided to close its hearings atter taking the testimony of James Gayley, vice-president of the Steel Corporation, and of Col. Dan. M. Bacon, T. F. Cole and J. Sellwood. These witnesses are to testify about the ore beds of the Mesaba range. Messrs. Morgan, Phipps and Frick will not be called.

Before a legislative committee at Boston, on March 26, railway men, said to represent the Brotherhood of Railroad Trainmen, remonstrated against the granting of rights to the Southern New England Railroad in Massachusetts, because the parent company, the Grand Trunk of Canada, has, as remonstrants allege, dealt unfairly with trainmen who struck some months since.

The bill to provide for workmen's compensation on interstate railways, which was recently recommended by President Taft, and which has been under discussion by the Senate committee, was reported out by the committee this week, the committee having agreed upon the bill as originally presented, with few and slight changes. It is understood that the changes made in committee on the part of the House are also unimportant.

The stoppage of work in the anthracite coal mines at the end of last week has been followed by the laying off of large numbers of trainmen on the Philadelphia & Reading. At the shops of the Erie at Hornell, N. Y., 700 of the 1,000 employees were laid off at the beginning of this week because of the expected diminution of the volume of coal traffic on the company's lines; and a similar suspension of work was ordered at the shops at Salamanca and Meadville.

"Putting a stop to discriminations and secret arrangements with shippers, with all their evil consequences, has helped everybody. Thousands of railway officials and tens of thousands of shippers find it much easier to be honest, and are not only better but happier for it. Thousands of passengers who debauched train conductors by 'short fares' and laughed over it could now be subjected to severe penalties for such practices. All this is a fine contribution by the generation just passing to the young men just coming on the stage; and all who have participated in promoting business integrity ought to have credit."—*Frank Trumbull; Interview in The Outlook.*

Calling attention to the fact that it is unlawful to carry explosives in passenger trains, General Manager G. L. Peck of the Pennsylvania Lines West of Pittsburgh has posted notices printed in German, French, Italian and Polish, to that effect, throughout the mining districts. In addition, a circular is being sent to newspapers, particularly those published in foreign languages, warning users of explosives, and especially miners who are foreigners not conversant with the English language or the requirements of the federal law, that to include packages of explosives in their baggage on passenger trains or in household furniture shipped by freight is unlawful.

The Western Union Telegraph Company announces that henceforth the company will pay pensions to superannuated employees. A person who has served from 20 to 25 years, inclusive, will receive 1 per cent. of his salary multiplied by the number of years of service. For one serving 26 to 35 years, the rate will be 1½ per cent. for the years above 25; 36 to 40 years' service, 2 per cent. for the additional years; after 40 years of service, the universal rate will be 50 per cent. The minimum pension will be $25 a month, and the maximum, $100. President Vail says that the company has a large number of employees who have been in its service a long time, and that the pensions will cost from $300,000 to $500,000 a year.

The demands presented to the managers of the eastern railways by the locomotive enginemen have aroused other employees, and in New York City this week it was given out that station agents, signal men, signal maintainers, and other classes of employees on a number of roads were preparing to ask for increased pay. A conference held in New York, March 31, was said to have represented men on the Pennsylvania, the Philadelphia & Reading, the New York, New Haven & Hartford, the Boston & Maine, and the Rutland. The shopmen of the New Haven have advised the management that they want 15 per cent. more pay. Committees of the conductors' and brakemen's brotherhoods are reported to be preparing requests for changes in pay and in regulations, to be presented to the principal railways of the southeastern states.

Chief Inspector Belnap has made his report on the accident at Kinmundy, Ill., on the Illinois Central, January 22, 1912, when train No. 3 ran into No. 25, while the latter was taking water. The conclusion of the report is that this accident was caused by the failure of the flagman of No. 25 to properly protect his train. The conductor is equally responsible for not knowing that his train was properly protected. A contributing cause was the failure of the engineman of No. 3 to control the speed of his train, so as not to exceed 10 miles per hour while passing through Kinmundy and to comply with the bulletin order requiring the taking of water at that place. An additional contributing cause was the failure of the operator at Edgewood, the station before Kinmundy, to hold train No. 3 until 10 minutes after the passing of train No. 25.

First Aid Packets for Pullman Cars.

The Pullman Company has completed plans for the adoption of emergency packages for first aid to the injured, which will be installed in all of the cars of the company during the next few weeks. The first aid package consists of a small box 5 in. x 3 in. x 1 in., containing a small supply of sterilized lint, bandage and pins, intended to answer the purpose of a primary dressing, and to remain in place only until the person injured may be able to receive the care of a surgeon. Six of these units will be packed in a carton and will be a part of the equipment of every car. An attempt has been made to bring the first aid package to the greatest possible simplicity in order that it may be available for use by persons who may be entirely untrained in the application of surgical dressings. Although the purpose of the contents will be apparent to anyone in whose hands it is placed, the package contains a few simple directions. A somewhat similar, though rather more complicated first aid package has been in use by the company for a long time in its cleaning yards and other places where workmen are employed, and its usefulness has been demonstrated. It is now proposed to substitute in this service packages similar to those to be installed in the cars.

Steel Postal Car Specifications.

The Special Committee on the Relations of Railway Operation to Legislation has issued Bulletin 29, containing a full report of the conference committee, which co-operated with the post office department in formulating uniform specifications for steel postal cars. As noted in the *Railway Age Gazette* of March 1, page 394, the most important change from the original specifications, which were published in the *Railway Age Gazette* of November 4, 1911, page 1049, was increasing the section moduli of the vertical end members from 35 to 65. Paragraph 29 referring to the floor was also changed to read as follows: "Sub-floor of postal cars to be of iron or steel plate, upper or wearing surface to be of matched wooden flooring, maple or rift-sawed yellow pine or fir, laid longitudinally, or composition, preference in order named. If composition is used, the wearing surface between doors and the standing surface in front of letter tables and paper racks shall be of wood, cork or other suitable material. Proper insulation, including air space, should be provided between upper and lower courses. Floor strips for wood upper

course should be bolted to sub-floor. Composition flooring may be secured by corrugated, keystone, or equivalent style of plate or by wire fastening, anchored to sub-floor."

The bulletin also contains specifications covering fixtures in mail cars, which were prepared by the post office department committee and were informally discussed in the conference. The latter includes detailed descriptions of the distributing tables under letter cases, letter cases, racks for sacks and pouches, paper distributing tables and dumping tray, paper boxes in all mail cars, small cases for slips, portable bins for letter packages, gage for registered mail, order box, hoppers, lavatory, water tanks, wardrobe and mirror, wrecking tools, fire extinguishers, gas plate or steam cooker, cots, stools, deodorants and disinfectants, toilet paper, door fixtures, lighting, rakes for paper boxes, catcher arms, safety bars, cinder guards, safety rods, letter drops and movable stanchions. Both the specifications for the construction and for the fixtures have been referred to the second assistant postmaster general for approval.

Illinois Commission Sees Improvement in Relations Between Carriers and Public.

It is with a degree of satisfaction that we are able to say that the general feeling between the manufacturer, shipper, the people and the common carriers of Illinois is much better than heretofore, and that they are co-operating together with much less friction than at any former time. It is gratifying to the commission to be able to say, from information gathered by the commission throughout the state, that the people today are being, generally speaking, better served by the railways and common carriers (with a few exceptions), both in point of train service and car supply, than at any other previous time. No serious car shortage has been brought to the attention of the commission, except of a temporary character. And shippers located upon even smaller lines have been taken care of better than in times past. This condition arises not from a decrease in business, either freight or passenger, but from a strong effort on the part of the common carrier to give better service, and because of the greater efficiency of the equipment on the part of the carrier.

Your commission believes that one of the difficulties in the past has been that the people and the managers of the common carriers did not mutually understand each other and were working separately for their own interest, rather than working together mutually for the interest of both. By bringing the business men of the state in closer touch with the officials of the common carriers we have been able to bring about a better understanding and many improvements in service that could not have been otherwise brought about. The time has come in the business world for all interests to understand and act upon the theory that each business is more or less dependent upon the other and that there is ample room for all, and the success of any independent business is dependent, in a large measure, upon the success of the other business of a similar character.

Greater publicity of the working of the common carriers by them given to the public will naturally create a better knowledge of conditions, and when the public understands fully the conditions they will be just in their demands in relation to service and the common carrier will have no trouble in receiving at the hands of the people a just compensation for the character of the service rendered the public. And it is along these lines that a commission can render valuable service to the public generally. The regulation of the common carrier by commission is one of the growing reforms of the day, and in a very large measure it is being recognized both by the people at large and the common carrier.—*From the annual report of the Illinois Railroad & Warehouse Commission.*

Governors Before the Supreme Court.

The Supreme Court of the United States on Monday last heard arguments on the twenty or more cases before it, which bring in question the conflicting authority of federal and state laws in relation to railway rates, and the governors of a number of states filed a protest with the court against the proposition to make the federal authority paramount in disputed cases as set forth in the decision of the Circuit Court (Judge Sanborn) in the Minnesota case. This is the first time in the history of the nation that such a protest has been made.

The protest took the nature of a brief filed as "friends of the court" by a committee of governors, Judson Harmon, of Ohio; Herbert S. Hadley, of Missouri, and Charles H. Aldrich, of Nebraska, selected at a conference of governors last September.

The United States Circuit Court in the Minnesota freight and passenger rate cases held that the rates prescribed by state authority were invalid not only as confiscatory, but by reason of their effect on interstate commerce; and this was taken as the text for the governors' protest. It was declared that what was said went directly to the right of every state to regulate state commerce, and the argument is applicable to the Minnesota, Missouri, Oregon, Kentucky, Ohio, Arkansas and West Virginia rate cases now before the court.

Minnesota had required the railways to reduce their rates from St. Paul to Duluth, on the state boundary; at once the interstate business from St. Paul to Superior, Wis., just across the line from Duluth, was affected. Similar conditions were to be found in Kansas City, Kan., and Kansas City, Mo.; East St. Louis, Ill., and St. Louis, Mo.; Omaha, Neb., and Council Bluffs, Iowa; Cincinnati, Ohio, and Covington and Newport, Ky. The vice of the Minnesota decision, it was urged, was not in an incorrect statement of Minnesota geography, but in the plain disregard of the provisions of the federal constitution, which established the relation of the nation and the state by giving one control over interstate matters and the other control over state affairs. It was admitted that there might be some effect on interstate commerce when states regulate state rates, but if a railway enjoys a reasonable return under state rates, it enjoys every right to which it is entitled.

"The test cannot be," declare the governors, "whether the effect of fixing the local rates may or will be to lead the railways to lower their interstate rates, but whether the local rates are fair and reasonable, for if they are so and the sum of them is so much lower than the interstate rates as to lead shippers to take the trouble and risk of rebilling or reshipping at state lines, this is a perfectly lawful condition, the advantage of which the public is entitled to enjoy. And as the cost and convenience of carriage in that way can be no less, but, as is well known, would rather be greater, the advantage would remain with the through rate even if it were reduced so as to equal the sum of the local rates. The railways cannot invoke the commerce clause of the federal constitution to shield themselves against fair and reasonable rates fixed by a state for its own internal business. The effect of these on interstate rates is not only incidental and indirect, but also legitimate under the dual form of government through which we enjoy happiness and prosperity beyond compare. . . .

"The right of a state to regulate, extends to every business conducted within its borders, though such business may also extend into interstate commerce. . . . If the doctrine is to be that the laws of trade may make the performance of a lawful duty by a state in the regulation of corporations doing business therein a regulation of interstate commerce, who is to prescribe the test or rule for applying it? The rate cases involve no conflict between state and federal authority; it is a controversy between the states and the railways. . . . The effect of the decision is not to take power from the states and leave it with Congress, but to take power from the states and leave the railways free to charge whatever rates they please in their traffic within the states; for if the states cannot regulate these rates nobody can. It is not always easy to find the line which separates the domain of public authority from that of private right. But this is not so hard as it would be to trace the indirect effects of regulation by the states and by Congress back and forth across the boundary of their respective jurisdictions."

Discussing the broad questions of state and interstate commerce the governors say:

"In this, as in all other cases where inconvenience arises from the division of powers between state and nation, the only safe and sure reliance is in the intelligence, resourcefulness, patience, and common interest of the American people. They will adjust their business to conditions which result from the form of government they have themselves adopted and require their agents in each branch to co-operate harmoniously and heartily.

"Only the short-sighted, and they are relatively few, will believe that commerce among the states can gain any real or lasting advantage at the expense of local commerce, or that local commerce can thrive long, if at all, from interference with general commerce, even though, by the indirectness of its effect,

such interference may escape the condemnation of the law."

Briefs similar to that presented by the governors were filed by permission of the court by the attorneys general of South Dakota, Nebraska, Iowa, Kansas, Alabama and Oklahoma and by the railway commissions of Nebraska, Iowa, Kansas, South Dakota, North Dakota, Oklahoma, Missouri and Texas.

Bill for Physical Valuation of Railways.

The House committee on interstate commerce has favorably reported the Adamson bill for the physical valuation of railways. The report was unanimous. The full text of the bill follows:

That section 19 of an act entitled "An Act to Regulate Commerce," approved February 4, 1887, and all acts amendatory thereof, and to enlarge the powers of the Interstate Commerce Commission, be amended by adding thereto a new section, to be known as section 19 A, and to read as follows:

Sec. 19 A. That the commission shall investigate and ascertain the value of the property of every common carrier subject to the provisions of this act and used by it for the convenience of the public. For the purpose of such an investigation and ascertainment of value the commission is authorized to employ such engineers, experts, and other assistants as may be necessary, who shall have power to administer oaths, examine witnesses and take testimony. The value shall be ascertained by means of an inventory which shall list the property of every common carrier subject to the provisions of this act in detail, and shall classify the physical elements of such property in conformity with the classification of expenditures for road and equipment, as prescribed by the Interstate Commerce Commission.

In such investigation said commission shall have authority to ascertain and report, in such detail as it may deem necessary and to each piece of property owned or used by said common carrier the original cost for railway purposes, the cost and value to the present owner, and what increase in value is due to cost of improvements. Such investigation and report shall also show separately that property actually used in transportation and that held for other purposes, and shall contain a statement of the elements forming the basis of the estimate of value. They should also show, as the commission may deem necessary, the history of the organization of the present corporation operating such property or of any previous corporation operating such property in such detail as may be deemed necessary, and any increases or decreases of capital stock in any reorganizations and moneys received by any of such corporations by reason of any issue of stocks, bonds or other securities, or from the net and gross earnings of such companies, and how the moneys were expended or paid out for the purposes of such payments.

The said investigation and report shall also show the amounts and dates of all bonds outstanding against each public service corporation and the amounts paid therefor, and the names of all stockholders and bondholders, with the amounts held by each, and also the name of each director on each board of directors; and find and report the facts as to the connection of any bank or bankers, capitalist or association of the capitalists or financial institution or holding company with the ownership, manipulation, management or control of any stocks and bonds of any such company, and the transactions and connections of any bank or banker, financier, financial institution or holding company with the reorganization of any such company in recent years.

The commission shall have power to prescribe the method of procedure to be followed in the conduct of the investigation, the form in which the results of the valuation shall be submitted and the classification of the elements that constitute the ascertained value, and such investigation shall show the value of property of every common carrier as a whole and the value of its property in each of the several states and territories and the District of Columbia.

Such investigation shall be commenced not later than July 1, 1912, and shall be prosecuted with diligence, and thoroughness, and the result thereof reported to Congress at the beginning of each regular session thereafter until completed.

Every common carrier subject to the provisions of this act shall furnish to the commission or its agents from time to time, and as the commission may require maps, profiles, contracts, reports of engineers, and any other documents, records and papers, or copies of any or all of the same, in aid of such investigation and determination, value of the property of the said common carrier and shall grant to all agents of the commission free access to its right of way, its property and its accounts, records and memoranda whenever and wherever requested by any such duly authorized agent, and every common carrier is hereby directed and required to co-operate with and aid the commission in the work of the valuation of its property in such further particulars and to such extent as the commission may require and direct, and all rules and regulations made by the commission for the purpose of administering the provisions of this section and section twenty of this act shall have the full force and effect of law.

Upon completion of the valuation herein provided for, the commission shall thereafter in like manner keep itself informed of all extensions and improvements or other changes in the condition and value of the property of all common carriers and shall ascertain the value thereof, and shall from time to time, as may be required for the proper regulation of such common carriers under the provisions of this act, revise and correct its valuation of property, which shall be reported to Congress at the beginning of each regular session.

To enable the commission to make such changes and corrections in its valuation every common carrier subject to the provisions of this act shall report currently to the commission and as the commission may require, all improvements and changes in its property, and file with the commission copies of all contracts for such improvements and changes at the time the same are executed.

Whenever the commission shall have completed the valuation of the property of any common carrier, and before said valuation shall become final, the commission shall give notice by registered letter, to the said carrier stating the valuation placed upon the several classes of property, of said carrier, and shall allow the carrier thirty days in which to file a protest of the same with the committee. If no protest is filed within thirty days said valuation shall become final.

If notice of protest is filed by any common carrier, the committee shall fix a time for hearing the same, and shall proceed as promptly as may be to hear and consider any matter relative and material thereto which may be presented by such common carrier in support of its protest and filed as aforesaid. If after hearing any protest of such valuation under the provision of this act, the committee shall be of the opinion that its valuation is incorrect, it shall make such changes as may be necessary, and shall issue an order making such corrected valuation final. All final valuations by the committee and the classification thereof shall be published and shall be prima facie evidence relative to the value of the property in all proceedings under this act.

The provisions of this section shall apply to receivers and carriers and operating trustees. In case of failure or refusal on the part of any carrier, receiver, or trustee to comply with all the requirements of this act and in the manner prescribed by the committee, such carrier, receiver, or trustee shall forfeit to the United States the sum of five hundred dollars for each such offense, such forfeitures to be recoverable in the same manner as other forfeitures provided for in this act.

The district courts of the United States shall have jurisdiction upon the application of the attorney-general, at the request of the committee, alleging a failure to comply with or a violation of any of the provisions of this act by any common carrier, to issue a writ or writs of mandamus commanding such common carrier to comply with the provisions of this act.

Good Roads.

The Department of Agriculture calculates that 300,000 miles of road must be improved before the public road system of the country will be of enough consequence to be appreciable. There are now but 190,476 miles of improved roads in this country, or 8.66 per cent. of the total mileage of all public roads, improved and unimproved. The French system of roads, long considered the best in the world, was bonded by Napoleon III for $6,000,000, and something in the neighborhood of $612,775,000 has already been spent on that system. In this country probably $2,000,000,000 will have to be spent before a proper road system is developed. This, however, does not seem so large when it is divided among the states and spread over a period of ten or fifteen years. New York state has bonded itself for $50,000,000, and $5,000,000 a year is now being expended by that state. New York heads the list of states which have made

progress. Georgia is second, and has built 4,344 miles of road in five years. That state employs 4,500 prisoners on the public roads.

American Electric Railway Association.

The officers of the American Electric Railway Association are planning to make a six weeks' trip through the country this spring in the interest of the association. The trip has the entire co-operation of the American Electric Railway Manufacturers' Association, several of whose principal officers will accompany the party. Starting from New York, April 17, it is proposed that the trip shall include a visit to central points in the South, Southwest, Middle West, Pacific slope and extreme Northwest. The object of the trip is to show the interest of the association in its member companies and members generally, located so far from the home office of the association and from its usual convention sites, that they are not kept in close touch with the affairs of the association.

M. M. and M. C. B. Conventions.

Following its usual custom, the Pennsylvania lines will provide a special train, to be known as the Master Car Builders' special, for the accommodation of delegates to the conventions of the American Railway Master Mechanics' Association, the Master Car Builders' Association and the Railway Supply Manufacturers' Association, to be held at Atlantic City, N. J., June 12-19. The train will leave Chicago at 3 p. m., Monday, June 10, and will arrive at Atlantic City at 2 p. m. on the following day. Summer tourist rates will be charged. Accommodations may now be reserved at the ticket office at 242 South Clark street, Chicago, and may be held until June 3.

American Society of Civil Engineers.

At the meeting of the American Society of Civil Engineers, held April 3, a paper by Louis H. Shoemaker, M. Am. Soc. C. E., entitled A Four-Track Center-Bearing Railroad Draw Span, was presented for discussion. This paper was printed in the *Proceedings* for March, 1912.

Maintenance of Way Master Painters' Association.

The Maintenance of Way Master Painters' Association will hold its annual convention in the assembly room of the Permanent manufacturers' Exhibit of Railway Supplies and Equipment in the Karpen building, Chicago, on November 19, 20 and 21.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meetings.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.; annual, May 7-10, Richmond, Va.

American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass.; annual, May 10-11, San Francisco, Cal.

American Association of General Passenger and Ticket Agents.—W. C. Hope, New York; next convention, Seattle, Wash.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Detroit, Mich.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York. Convention, October 7-11, Chicago.

American Electrical Railway Manufacturers' Assoc.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

American Railway Association.—W. F. Allen, 75 Church St., New York. Next session, May 15, New York.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago.

American Railway Master Mechanics' Assoc.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

American Railway Tool Foremen's Association.—M. H. Bray, N. Y. N. H. & H., New Haven, Conn. Convention, July 9, Chicago.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

American Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry. Chicago. Semi-annual, June 11, Atlantic City, N. J.; annual, October 21-25, Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Car Accounting Officers.—G. P. Conrad, 75 Church St., New York. Convention, Oct. 7-11, Chicago.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago. Convention, May 22-25, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

Master Car and Locomotive Painters' Assoc. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass. Convention, September, 10-13, Denver, Col.

National Railway Appliances Assoc.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railroad Club.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Business Association.—Frank W. Noxon, 2 Rector St., New York.

Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

Railway Gardening Association.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.

Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio. Convention, May 20-22, Buffalo, N. Y.

Railway Supply Manufacturers' Assoc.—J. D. Conway, 2135 Oliver Bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

Railway Tel. & Tel. Appliance Assoc.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. Y., Sterling; September, 1912, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; August, 1912.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The bill to abolish the Commerce Court, which has been before the House committee on interstate and foreign commerce for several weeks past, was favorably reported to the House on March 29. It is said that the republican members of the committee will present a minority report.

Assistant Attorney-General Stevenson, of Minnesota, has given the Minnesota railway commission an opinion that it is not unlawful for a public officer who is a railway man to ride on a pass while in the performance of railway work, but that it would be unlawful for him to use the pass in the performance of any duty outside of his regular work.

At a conference of shippers of Spokane, Wash., and traffic officials of the Great Northern, Northern Pacific, Spokane, Portland & Seattle, and the Harriman Lines last week it is reported that an understanding was reached that after the Supreme Court has rendered its decision in the transcontinental rate cases the rate adjustment affecting Spokane will be made the subject of negotiations between the railways and the shippers direct for the purpose of avoiding further litigation on the subject.

The Canadian Pacific has decided to increase its facilities at St. John, N. B., by building a third grain elevator, to have a capacity of 1,000,000 bushels. Work has already been started on the foundation of the building. The company has bought 40 acres of mud flats near Sand Point, which is to be reclaimed and used as a site for yards and tracks, and the Dominion government has given a contract for building a new wharf to cost $800,000 for the use of the Canadian Pacific at Sand Point.

The commercial movements of live stock in February, 1912 at the seven principal interior markets, Chicago, Kansas City, Omaha, St. Louis, St, Joseph, St. Paul, and Sioux City, as reported to the Bureau of Statistics of the Department of Commerce and Labor, show a steady increase as compared with the receipts during the same month of the two preceding years. The total receipts in February, 1912, were 3,815,896 head, a gain of over 20 per cent. when compared with 3,159,118 head received in February, 1911, and of over 38 per cent. when compared with 2,763,204 head received in February, 1910. The receipts in February, 1912, were less than in the preceding month, but greater than in December, 1911. These live stock receipts included cattle, calves, hogs, sheep, horses, and mules.

Express Rate Bill Reported.

The House Committee on Interstate Commerce has reported favorably the Adamson bill fixing maximum express rates. The rates named are for the transportation and delivery of packages not more than 11 lbs. and valued at not more than $80, and apply whether the transportation occurs on the line of a single express company or on a through rate or shipment operated by two or more connecting express companies.

The rates fixed by the bill are as follows:

Between any two points in the United States more than 2,000 miles apart, 12 cents per lb.

Between any two points not more than 2,000 miles apart, 10 cents per lb.

Between any two points not more than 1,200 miles apart, seven cents per lb.

Between any two points not more than 800 miles apart, five cents per lb.

Between any two points not more than 600 miles apart, four cents per lb.

Between any two points not more than 250 miles apart, two cents per lb., provided that express companies shall not be required to carry any parcel for less than 10 cents.

It is further provided that express companies must work in connection with the rural mail routes, receiving and delivering packages to mail agents and patrons on those routes.

Chicago Railway Associations in Joint Headquarters.

The Chicago General Managers' Association has decided to join with the principal traffic associations having offices in Chicago in moving into joint headquarters in the Heisen building, Dearborn and Harrison streets, in accordance with the plan announced in the *Railway Age Gazette* of December 8, 1911. The General Managers' Association now has offices in the Western Union building, and its removal includes the Association of Western Railways, the General Superintendents' Association, the Local Freight Agents' Association, and the Terminal Superintendents' Association. A five-year lease has been taken of the eighteenth, nineteenth, twentieth and twenty-first floors of the building, having a total of 50,000 sq. ft. of floor space, and a total saving in rentals of $28,000 a year will be affected as it will be possible to make joint use of meeting and committee rooms instead of maintaining separate meeting rooms as at present at the headquarters of each association. The General Managers' Association is moving this week. The Central Freight Association, the Central Passenger Association and the Transcontinental Passenger Association, have already moved into the new quarters, and the other associations will do so this month. These are the Transcontinental Freight Bureau, the Western Passenger Association, the Western Trunk Line Committee, the Uniform Classification Committee, the Western Classification Committee and the Western Railway Weighing Association and Inspection Bureau, together with various lesser associations that hold their meetings at the quarters of the larger associations. In recognition of the fact that the building will now be an important center for railway activity, it is proposed to change the name to the Transportation building.

INTERSTATE COMMERCE COMMISSION.

The commission has been considering the regulations governing the issue of passes and has ordered that the regulations, made effective January 1, 1912, be amended by the insertion of a provision that railways at their option permit their principal officers to issue passes to employees who may lawfully be entitled to them without requiring written requests, on condition that receipts for the passes be required which will contain the information required previously in the application for the pass.

Reparation Awarded.

Republic Metal Ware Co. v. Erie et al. Opinion by the commission

The rate on 15 carloads of stamped ware from Buffalo, N. Y., to Pacific coast terminals unreasonable. (22 I. C. C., 265.)

Ludowici-Celandon Co. v. Missouri Pacific et al. Opinion by the commission:

The initial carrier failed to obtain definite instructions, and is therefore liable for misrouting. (22 I. C. C., 588.)

Reparation Denied.

Edward Byrnes, trustee for H. Woods Co., bankrupt, v. Atchison, Topeka & Santa Fe et al. Opinion by the commission:

Weights applied on one-third size crates of cantaloupes from Colorado not found to have been unreasonable. (22 I. C. C., 585.)

Complaint Dismissed.

Paul Stiritz v. New Orleans, Mobile & Chicago et al. Opinion by the commission:

The rate on cross ties from Houston, Miss., to Cairo, Ill., is not found to be unreasonable. (22 I. C. C., 578.)

C. M. McClung & Co. v. Southern Ry. Opinion by the commission:

The rates on L. C. L. shipments of boat spikes shipped with railway spikes from Richmond, Va., to Knoxville, Tenn., not found to be unreasonable. (22 I. C. C., 582.)

A. Priesmeyer Shoe Co. v. Chicago & Alton et al. Opinion by the commission:

Rates on leather from eastern points of origin to Jefferson City, Mo., not unreasonable. (23 I. C. C., 72.)

Alabama Lumber & Export Co. v. Louisville & Nashville et al. Opinion by the commission:

There is nothing to show that the shipment in question was misrouted. (23 I. C. C., 78.)

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF JANUARY, 1912.

Name of road	Mileage operated at end of period.	Operating revenues — Freight.	Passenger.	Total, inc. misc.	Operating expenses — Maintenance — Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Belt Ry. Co. of Chicago	1			$[illegible]	$[illegible]	$[illegible]	$[illegible]	$[illegible]	$[illegible]	$[illegible]	$54,207		$18,300	$35,898	$-3,605
Buffalo, Rochester & Pittsburg	77	$[illegible]	$[illegible]	246,[illegible]	62,[illegible]	1[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$349	17,000	200,[illegible]	4,225
Chicago, Indianapolis & L[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Central Vermont	441	[illegible]	63,6[illegible]	[illegible]	[illegible]	6[illegible]	7,[illegible]	[illegible]	[illegible]	[illegible]	1,[illegible]	[illegible]	1[illegible]	11,085	—66,108
Kansas City, Mexico & Orient	[illegible]	[illegible]	27,[illegible]	1[illegible]	34,[illegible]	17,[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6,750	14,196	— 5,295
Spokane, Portland & Seattle	[illegible]	166,[illegible]	10[illegible]	[illegible]	37,[illegible]	40,[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Western Maryland	4[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

MONTH OF FEBRUARY, 1912.

Atchison, Topeka & Santa Fe	[illegible]	$4,[illegible]	$1,[illegible]	$7,[illegible]	$[illegible]	$[illegible]	$[illegible]	$[illegible]	$[illegible]	$[illegible]	$[illegible]	.....	$[illegible]	$[illegible]	$[illegible]
Atlantic & St. Lawrence	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—4,942	.....	6,650	—11,601	34,857
Atlantic Coast Line	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.....	107,000	986,131	—178,005
Baltimore & Ohio Chicago Terminal	[illegible]	[illegible]	1,[illegible]	[illegible]	11,005	[illegible]	713	70,843	3,611	111,481	—3,861	$868	18,206	91,899	11,856
Bangor & Aroostook	[illegible]	49,3[illegible]	39,[illegible]	30,[illegible]	[illegible]	[illegible]	3,177	103,[illegible]	[illegible]	[illegible]	[illegible]	.....	10,375	94,[illegible]	[illegible]
Bessemer & Lake Erie	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—32,248	.....	9,000	—41,248	—49,712
Boston & Maine	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Buffalo, Rochester & Pittsburgh	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—48		17,000	[illegible]	14,[illegible]
Canadian Pacific Lines in Maine	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.....	7,000	14,552	4,753
Central New England	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,572	9,000	138,684	57,086
Charleston & Western Carolina	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.....	5,000	[illegible]	—48,570
Chicago & Eastern Illinois	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Chicago & Northwestern	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Chicago, Milwaukee & Puget Sound	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Chicago, Milwaukee & St. Paul	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Chicago, Peoria & St. Louis	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.....	[illegible]	[illegible]	[illegible]
Chicago, Rock Island & Pacific	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Chicago, St. Paul, Minneapolis & Omaha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Cincinnati, Hamilton & Dayton	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.....	[illegible]	[illegible]	[illegible]
Cumberland Valley	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Delaware & Hudson Co. & R. R. Dept.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—4,216		[illegible]	[illegible]	[illegible]
Delaware, Lackawanna & Western	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Denver, Northwestern & Pacific	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.....	[illegible]	[illegible]	[illegible]
Detroit & Mackinac	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Detroit, Toledo & Ironton	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Duluth & Iron Range	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
El Paso & Southwestern Co.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Elgin, Joliet & Eastern	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.....	[illegible]	[illegible]	[illegible]
Florida East Coast	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Fort Worth & Denver City	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Grand Rapids & Indiana	[illegible]	[illegible]	5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Grand Trunk Western	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Gulf & Ship Island	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Gulf, Colorado & Santa Fe	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Illinois Central	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Kansas City Southern	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Lake Erie & Western	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Lake Shore & Michigan Southern	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Lehigh & Hudson River	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Lehigh Valley	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Long Island	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Louisiana & Arkansas	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.....	[illegible]	[illegible]	[illegible]
Louisville & Nashville	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Michigan Central	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Maine Central	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Midland Valley	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Minneapolis & St. Louis	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Missouri Pacific	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Mobile & Ohio	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Monongahela	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
New Orleans & North Eastern	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
New Orleans, Mobile & Chicago	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
New York Central & Hudson River	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
New York, New Haven & Hartford	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
New York, Ontario & Western	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF FEBRUARY, 1912 -(CONTINUED).

Name of road.	Mileage operated at end of period.	Operating revenues: Freight.	Passenger.	Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
New York, Philadelphia & Norfolk	112	$360,838	$27,564	$244,152	$30,356	$45,478	$3,913	$106,457	$12,512	$188,686	$55,466	.....	$7,900	$47,566	$18,442
Norfolk Southern	608	181,305	50,933	251,182	30,099	32,791	5,194	89,207	12,087	169,378	81,804	—208	7,500	74,096	- 5,922
Northern Central	473	787,386	156,563	1,003,636	127,472	200,474	14,975	527,585	26,103	956,909	46,727	162	30,175	10,714	40,917
Northern Pacific	6,034	3,071,075	896,052	4,252,928	396,611	548,247	87,734	1,672,409	75,188	2,760,189	1,492,739	10,101	238,079	1,244,559	251,489
Oregon Short Line	1,760	1,093,500	287,075	1,485,804	136,486	161,179	28,236	396,145	36,764	758,810	726,994	—2,833	57,000	667,161	271,490
Oregon-Washington R. R. & Nav. Co.	1,902	771,746	314,019	1,188,629	145,476	147,902	49,965	465,690	48,485	857,518	331,111	4,064	88,088	247,087	103,677
Pennsylvania Co.	1,760	2,347,330	593,730	3,936,067	611,127	807,961	74,348	1,675,406	90,706	3,259,548	676,549	-5,204	198,420	472,925	52,724
Pennsylvania *Railroad*	4,018	9,953,079	2,383,658	13,171,738	1,468,694	2,834,809	184,583	5,294,570	333,531	10,105,187	3,066,551	158,319	564,472	2,343,760	704,835
Pere Marquette	1,336	745,441	216,874	1,048,236	160,911	222,538	34,193	683,428	36,012	1,107,082	59,446	19,687	56,394	-135,527	65,222
Philadelphia, Baltimore & Washington	713	713,688	597,518	1,464,505	305,173	274,035	31,544	708,967	48,188	1,367,167	202,338	.....	49,268	153,070	17,055
Pittsburgh, Cincinnati, Chic. & St. Louis	1,467	2,314,446	512,438	3,187,833	341,570	666,071	61,561	1,305,074	67,142	2,441,418	746,415	- 1,273	120,053	625,089	242,878
Rutland	468	134,148	67,079	237,624	27,990	42,362	5,871	112,093	5,557	198,773	38,851	.....	11,772	17,079	19,314
St. Louis, Iron Mountain & Southern	3,814	1,943,793	469,567	2,551,663	351,011	458,346	51,755	868,107	79,932	1,597,552	984,111	4,746	106,945	872,420	248,040
St. Louis, San Francisco & Texas	344	68,536	19,803	93,382	17,376	14,354	2,150	51,118	5,161	99,659	3,333	.....	1,346	2,107	11,113
San Antonio & Aransas Pass	717	284,765	75,128	331,636	65,103	48,782	5,992	141,617	10,019	268,513	63,123	.....	11,000	52,123	27,998
Southern	7,057	3,[illegible]444	1,[illegible]341	5,[illegible]086	701,[illegible]84	[illegible]3,[illegible]79	146,653	1,850,901	160,817	3,[illegible]094	1,440,111	3,669	404,376	1,032,066	63,549
Southern in Mississippi	181	71,780	24,512	102,697	23,973	8,735	2,363	40,579	4,399	80,049	22,648	.....	4,056	18,592	8,997
Syracuse, Binghamton & New York	89	49,880	25,814	86,073	3,[illegible]66	8,468	2,619	43,907	3,476	62,596	23,476	.....	6,820	19,656	9,562
Tennessee Central	284	76,348	24,576	109,202	10,248	16,204	6,085	56,499	7,256	107,165	1,987	.....	4,212	-2,225	-17,992
Union Pacific	1,107	3,[illegible]718	678,917	3,396,043	36,[illegible]40	536,645	101,[illegible]46	1,143,068	101,[illegible]77	1,[illegible]06,133	1,[illegible]89,909	—30,334	139,980	1,[illegible]19,595	39,817
Union R. R. of Baltimore	9	[illegible]693	19,281	117,745	7,183	.....	1,108	5,684	3,[illegible]8	17,103	101,642	.....	5,414	95,[illegible]28	13,326
Union R. R. of Pennsylvania	31	.....	.....	23,448	26,156	26,569	100	1,[illegible]30	2,[illegible]85	56,174	-2,726	1,600	4,750	-4,876	-12,322
Vandalia	[illegible]	[illegible]2,[illegible]7	167,481	837,[illegible]47	90,[illegible]65	17[illegible],102	[illegible]3,[illegible]82	363,[illegible]31	17,664	671,447	165,805	.....	28,010	137,795	53,580
Vicksburg, Shreveport & Pacific	1[illegible]	81,341	30,865	126,466	17,[illegible]09	21,367	3,297	38,719	4,713	90,405	36,061	38	6,500	29,599	12,903
Virginian	1[illegible]	367,[illegible]31	15,523	39,[illegible]48	49,015	74,674	5,007	113,365	7,897	249,958	143,490	4,446	17,000	129,336	67,348
West Jersey & Seashore	[illegible]1	136,[illegible]83	184,382	348,089	69,013	62,019	9,586	200,189	13,[illegible]3	360,990	-12,951	—4,005	29,902	-46,858	14,468
Western Maryland	343	48,[illegible]50	49,088	553,[illegible]90	35,765	67,361	10,064	241,[illegible]88	13,745	368,193	185,097	.....	21,000	164,097	9,432
Yazoo & Mississippi Valley	1,[illegible]31	542,171	181,962	782,505	65,892	112,830	15,725	375,730	25,824	665,701	116,804	- 128	37,000	119,676	-182,171
SEVEN MONTHS OF FISCAL YEAR, 1912.															
Belt Ry. Co. of Chicago	1	.....	.....	$1,547,342	$97,559	$174,621	$4,[illegible]55	$55[illegible],131	$40,631	$899,197	$648,145	.....	$51,309	$596,836	$30,717
Buffalo, Rochester & Pittsburgh	[illegible]8	$4,780,753	$669,[illegible]39	5,697,338	709,755	1,068,067	68,419	1,[illegible]08,799	140,658	3,[illegible]85,698	1,[illegible]11,640	$1,506	119,000	1,704,146	-283,708
Chicago, Indianapolis & Louisville	346	2,[illegible]01,[illegible]68	1,[illegible]03,179	3,857,745	505,890	537,475	114,682	1,384,142	102,830	2,675,019	1,182,726	.....	163,162	1,019,564	26,793
Central Vermont	411	1,[illegible]45,743	693,361	2,431,[illegible]65	283,[illegible]28	283,[illegible]55	55,095	1,[illegible]37,314	64,661	1,916,[illegible]53	514,[illegible]12	3,820	84,500	434,[illegible]32	- 78,481
Kansas City, Mexico & Orient	807	[illegible]11,[illegible]36	[illegible]0,[illegible]05[illegible]	1,08[illegible],843	[illegible]6,[illegible]74	211,[illegible]13	38,[illegible]33	495,317	67,[illegible]64	1,097,492	.....	.....	39,687	54,343	—99,721
Spokane, Portland & Seattle	[illegible]	1,671,[illegible]40	1,049,[illegible]11	2,90[illegible],377	290,621	264,[illegible]25	49,334	737,[illegible]92	77,551	1,449,[illegible]73	1,486,504	10,112	260,404	1,336,214	104,597
Western Maryland	[illegible]9	3,41[illegible]36	5[illegible],016	4,186,[illegible]97	514,[illegible]95	517,[illegible]79	71,[illegible]38	1,48[illegible],076	95,[illegible]08	2,[illegible]83,876	1,503,021	—393	147,000	1,355,628	- 160,149
EIGHT MONTHS OF FISCAL YEAR, 1912.															
Atlanta, Topeka & Santa Fe	[illegible],[illegible]00	[illegible]8,[illegible]07,[illegible]61	$[illegible]0,[illegible]00,[illegible]30	$[illegible]8,[illegible]90,971	$[illegible],431,[illegible]04	$[illegible],171,[illegible]41	$1,[illegible]05,[illegible]50	$[illegible]7,[illegible]00,[illegible]02	$1,[illegible]71,[illegible]37	$38,[illegible]09,[illegible]73	$[illegible]0,183,[illegible]98	.....	$2,378,141	$17,805,757	- $2,022,595
Atlantic & St. Lawrence	[illegible]07	[illegible],[illegible]43	[illegible]1,[illegible]30	[illegible]94,969	[illegible]50,[illegible]30	171,[illegible]73	[illegible]3,[illegible]87	[illegible]48,[illegible]00	[illegible]2[illegible]75	[illegible]7[illegible],[illegible]00	1,[illegible]00	.....	53,[illegible]69	31,960	-26,915
Atlantic Coast Line	[illegible]	14,[illegible]44,[illegible]49	5,572,[illegible]55	21,[illegible]78,[illegible]15	2,[illegible]38,[illegible]83	3,178,[illegible]85	[illegible]7,[illegible]08	7,[illegible]46,[illegible]88	$[illegible]24,[illegible]08	14,[illegible]41,[illegible]56	7,[illegible]62,[illegible]59	.....	[illegible]56,[illegible]00	6,[illegible]06,[illegible]59	64,066
Baltimore & Ohio Chicago Terminal	[illegible]7	[illegible]8[illegible]3	[illegible],[illegible]4,[illegible]10	[illegible]0,[illegible]00	140,[illegible]49	[illegible]7,[illegible]06	[illegible]76,[illegible]05	[illegible]40,[illegible]36	[illegible]66,[illegible]60	167,311	$6,677	143,[illegible]51	[illegible]8,[illegible]37	7,981	
Bangor & Aroostook	[illegible]7	1,[illegible]44	[illegible]34,739	[illegible]58,[illegible]79	[illegible]0,[illegible]08	[illegible]6,[illegible]60	[illegible]1,[illegible]69	[illegible]02,[illegible]08	[illegible]1[illegible]66	1,[illegible]49,[illegible]91	[illegible]15,588	.....	[illegible]6,[illegible]50	[illegible]9,[illegible]38	45,229
Bessemer & Lake Erie	[illegible]2	[illegible]5,[illegible]00	[illegible]4,[illegible]40	[illegible]5,[illegible]07,[illegible]40	[illegible]3,[illegible]42	1,[illegible]04,[illegible]50	[illegible]6,[illegible]02	1,[illegible]84,[illegible]48	[illegible],[illegible]33	[illegible]3,[illegible]16,[illegible]02	[illegible],[illegible]50,[illegible]91	.....	[illegible]8,[illegible]74	[illegible],[illegible]88,[illegible]17	509,061
Boston & Maine	[illegible]2[illegible]	[illegible]7,[illegible]07,[illegible]00	[illegible]0,[illegible]05,[illegible]00	[illegible]1,[illegible]76,[illegible]58	[illegible],[illegible]16,[illegible]06	[illegible],[illegible]19,[illegible]31	[illegible]6,[illegible]40	[illegible]4,[illegible]01,[illegible]41	[illegible]77,[illegible]08	[illegible]3,[illegible]46,[illegible]76	[illegible],[illegible]30,[illegible]63	136,[illegible]31	[illegible],[illegible]93,[illegible]11	[illegible],[illegible]76,[illegible]82	221,769
Buffalo, Rochester & Pittsburgh	[illegible]5	[illegible]5,[illegible]00	[illegible]27,[illegible]48	[illegible],[illegible]73,[illegible]43	[illegible]84,[illegible]91	[illegible],[illegible]21,[illegible]15	[illegible]7,[illegible]40	[illegible],[illegible]96,[illegible]80	[illegible]8[illegible],[illegible]60	[illegible],[illegible]30,[illegible]65	[illegible],[illegible]03,[illegible]88	1,[illegible]88	[illegible]36,[illegible]00	[illegible],[illegible]26,[illegible]76	—269,006
Canadian Pacific Lines in Maine	[illegible]3	[illegible]7,[illegible]07	[illegible]9[illegible],[illegible]36	[illegible]1,[illegible]38	[illegible]71,[illegible]67	[illegible]33,[illegible]21	[illegible]8,[illegible]05	[illegible]74,[illegible]08	[illegible]4,[illegible]71	[illegible]47,[illegible]06	[illegible],[illegible]76	. .	[illegible]0,[illegible]00	[illegible]4,[illegible]4	41,590
Central New England	[illegible]	1,[illegible]4[illegible]74	[illegible],[illegible]0[illegible]	[illegible],[illegible]05	[illegible]49,[illegible]60	[illegible]7[illegible],[illegible]13	[illegible]0,[illegible]74	[illegible]14,[illegible]03	[illegible],[illegible]89	[illegible],[illegible]73,[illegible]74	[illegible],[illegible]12,[illegible]31	[illegible],[illegible]38	[illegible]7,[illegible]00	[illegible],[illegible]35,[illegible]73	288,649
Charleston & Western Carolina	[illegible]1	[illegible]0[illegible]0	[illegible]2,[illegible]93	[illegible]8,[illegible]08	[illegible]6,[illegible]04	[illegible]8,[illegible]53	[illegible],[illegible]15	[illegible]5,[illegible]46	[illegible]6,[illegible]4	[illegible]7,[illegible]70	[illegible]36,[illegible]08	.....	[illegible]0,[illegible]00	[illegible]6,[illegible]08	[illegible]7,[illegible]89
Chicago & Eastern Illinois	[illegible]5	[illegible]8[illegible]3	[illegible],[illegible]3[illegible],[illegible]78	[illegible],[illegible]8[illegible],[illegible]87	[illegible],[illegible]60[illegible]14	[illegible],[illegible]05[illegible],[illegible]75	[illegible]7[illegible],[illegible]41	[illegible],[illegible]3[illegible],[illegible]55	[illegible],[illegible]6[illegible],[illegible]5	[illegible],[illegible]7[illegible],[illegible]10	[illegible],[illegible]0[illegible],[illegible]49	[illegible],[illegible]56	[illegible]8[illegible],[illegible]93	[illegible],[illegible]6[illegible],[illegible]60	402,746
Chicago & Northwestern	[illegible]8	[illegible]1[illegible],[illegible]48[illegible]	[illegible]3[illegible],[illegible]38,[illegible]14	[illegible]4[illegible],[illegible]81,[illegible]03	[illegible],[illegible]76[illegible],[illegible]19	[illegible],[illegible]38[illegible],[illegible]74	[illegible],[illegible]6[illegible],[illegible]88	[illegible],[illegible]8[illegible],[illegible]29	[illegible]9[illegible],[illegible]26	[illegible]3[illegible],[illegible]4[illegible],[illegible]62	13,[illegible]65,[illegible]81	[illegible]78[illegible]	2,[illegible]00,[illegible]00	11,[illegible]38,[illegible]13	—1,[illegible]9,787
Chicago, Milwaukee & Puget Sound	[illegible]9	[illegible]1[illegible],[illegible]34	[illegible],[illegible]41,[illegible]85	[illegible]5[illegible],[illegible]38,[illegible]14	[illegible]6[illegible],[illegible]61	[illegible],[illegible]0[illegible],[illegible]83	[illegible]3,[illegible]76[illegible]	[illegible]3[illegible],[illegible]56,[illegible]56	[illegible]6[illegible],[illegible]11[illegible]	[illegible],[illegible]44,[illegible]08	4,[illegible]85,[illegible]96	[illegible],[illegible]4,[illegible]49	[illegible]50,[illegible]04	[illegible],[illegible]46,[illegible]31	—[illegible]87,708
Chicago, Milwaukee & St. Paul	[illegible]1	[illegible]3[illegible],[illegible]05	[illegible]7[illegible],[illegible]15	[illegible]1[illegible],[illegible]4[illegible]	[illegible]7,[illegible]77,[illegible]86	[illegible],[illegible]3[illegible],[illegible]73	[illegible]5,[illegible]55	[illegible]7,[illegible]40,[illegible]57[illegible]	[illegible]7,[illegible]14,[illegible]91	[illegible]1,[illegible]70,[illegible]74[illegible]	[illegible]1,[illegible]94,[illegible]74[illegible]	[illegible]1,[illegible]67	[illegible]94,[illegible]67	[illegible]1,[illegible]99,[illegible]07	[illegible]91,584
Chicago, Peoria & St. Louis	[illegible]8	[illegible]86[illegible]4	[illegible]23,[illegible]85	[illegible],[illegible]2[illegible],[illegible]27	[illegible]1[illegible],[illegible]19	[illegible]0[illegible],[illegible]76	[illegible]5,[illegible]33	[illegible]14,[illegible]61	[illegible]8,[illegible]71	[illegible],[illegible]03,[illegible]16	150,[illegible]91	[illegible]7	[illegible]4,[illegible]00	[illegible]15,[illegible]91	-35,473
Chicago, Rock Island & Pacific	[illegible]	[illegible]2[illegible],[illegible]1[illegible]	[illegible],[illegible]49,[illegible]83	[illegible]1,[illegible]87[illegible],[illegible]82	[illegible],[illegible]4[illegible],[illegible]98	[illegible],[illegible]6[illegible],[illegible]06	[illegible],[illegible]7[illegible],[illegible]4	[illegible]0,[illegible]5[illegible],[illegible]80	[illegible],[illegible]8[illegible],[illegible]13	[illegible]1,[illegible]0[illegible],[illegible]83[illegible]	[illegible]0,[illegible]23,[illegible]31	[illegible]26,[illegible]77	[illegible],[illegible]66,[illegible]84	[illegible],[illegible]30,[illegible]70	-1,803,393
Chicago, St. Paul, Minneapolis & Omaha	[illegible],[illegible]4[illegible]	[illegible],[illegible]0[illegible],[illegible]4[illegible]	[illegible],[illegible]17[illegible],[illegible]1[illegible]	[illegible]0,[illegible]2[illegible],[illegible]86	[illegible],[illegible]2[illegible],[illegible]91	[illegible],[illegible]1[illegible],[illegible]48	[illegible]6,[illegible]78[illegible]	[illegible],[illegible]4[illegible],[illegible]37	[illegible]4[illegible],[illegible]84	[illegible],[illegible]7[illegible],[illegible]18	[illegible],[illegible]15,[illegible]58	[illegible],[illegible]71	[illegible],[illegible]24,[illegible]43	[illegible],[illegible]03,[illegible]06	-961,684
Cincinnati, Hamilton & Dayton	[illegible],[illegible]14	[illegible],[illegible]4[illegible],[illegible]0[illegible]47	[illegible],[illegible]13[illegible],[illegible]8[illegible]	[illegible],7[illegible],[illegible]5[illegible],[illegible]2	[illegible],[illegible]1[illegible],[illegible]0[illegible]	[illegible],[illegible]2[illegible],[illegible]7[illegible]	[illegible],[illegible]1[illegible],[illegible]8[illegible]	[illegible],[illegible]34,[illegible]80	[illegible]5,[illegible]48[illegible]	[illegible],[illegible]60[illegible],[illegible]56	[illegible],[illegible]92,[illegible]46	.....	[illegible],[illegible]31[illegible]	[illegible],[illegible]49,[illegible]34	-208,870
Cumberland Valley	[illegible]9	[illegible],[illegible]31[illegible]	45[illegible]	[illegible],9[illegible]8,[illegible]45	[illegible]1,[illegible]13	[illegible]4,[illegible]07	[illegible]6,[illegible]56	[illegible]47,[illegible]70	[illegible]1,[illegible]47	[illegible],[illegible]40,[illegible]78	[illegible]17,[illegible]67	$[illegible]46	47,[illegible]14	573,[illegible]89	-204,[illegible]4
Delaware & Hudson Co. & R. R. Dept.	[illegible]4[illegible]	[illegible],[illegible]71,[illegible]38	[illegible],[illegible]15,[illegible]34[illegible]	[illegible]4,[illegible]05,[illegible]47[illegible]	[illegible],[illegible]21,[illegible]06	[illegible],[illegible]06,[illegible]62	[illegible]5,[illegible]03	[illegible],[illegible]90,[illegible]60	[illegible]3[illegible],[illegible]45[illegible]	[illegible],[illegible]43,[illegible]76	[illegible],[illegible]29,[illegible]70	[illegible]4,[illegible]84	[illegible],[illegible]00,[illegible]00	[illegible],[illegible]78,[illegible]46	-565,937
Delaware, Lackawanna & Western	[illegible]9[illegible]	[illegible],[illegible]29,[illegible]09	[illegible],[illegible]82,[illegible]47	[illegible],[illegible]7[illegible],[illegible]08	[illegible],[illegible]76,[illegible]44	[illegible],[illegible]48,[illegible]13	[illegible]8,[illegible]63	[illegible],[illegible]45,[illegible]10[illegible]	[illegible]5[illegible],[illegible]1[illegible]	[illegible]5,[illegible]12,[illegible]87	[illegible],[illegible]37,[illegible]75	[illegible]8[illegible],[illegible]1	[illegible],[illegible]38,[illegible]80	[illegible],[illegible]57,[illegible]61	-347,583
Detroit, Toledo & Ironton	[illegible]4[illegible]	[illegible]91,[illegible]07	[illegible]25,[illegible]96	[illegible]3[illegible],[illegible]48	[illegible]1,[illegible]37	[illegible],[illegible]33,[illegible]43	[illegible]8,[illegible]61	[illegible]02,[illegible]52	[illegible]7,[illegible]09	[illegible]3,[illegible]85	[illegible]61,[illegible]84	.....	[illegible],[illegible]6[illegible]	[illegible]35,[illegible]24	-6,880
Detroit & Mackinac	[illegible]1[illegible]	[illegible]14,[illegible]81	[illegible]29,[illegible]05	[illegible]94,[illegible]74	[illegible]3,[illegible]44	[illegible]41,[illegible]60	[illegible]0,[illegible]26	[illegible]2,[illegible]43	[illegible]5,[illegible]4[illegible]	[illegible]0,[illegible]46	[illegible]4,[illegible]46	[illegible]48[illegible]	[illegible]5,[illegible]30	[illegible]37,[illegible]74	-56,885
Detroit, Toledo & Ironton	[illegible]4[illegible]	[illegible],[illegible]26,[illegible]40	[illegible]15,[illegible]17	[illegible],[illegible]5[illegible],[illegible]30	[illegible]3[illegible],[illegible]44	[illegible]51,[illegible]14	[illegible],[illegible]4[illegible]	[illegible]5[illegible],[illegible]06[illegible]	[illegible]3,[illegible]4[illegible]	[illegible],[illegible]46,[illegible]17	[illegible]61,[illegible]73	[illegible]	[illegible]8,[illegible]54	[illegible]3,[illegible]66	-108,445

[illegible] Net deficit. [illegible] Deficit. [illegible] Decrease. [illegible] Increase. [illegible] Includes Detroit, Toledo & Ironton.

Complaint Dismissed.

Crescent Coal & Mining Co. v. Baltimore & Ohio. Opinion by the commission:

Again the commission holds that demurrage accruing on account of railways' embargo against connecting line at destination is not unreasonable. (23 I. C. C., 75.)

George E. Pierce v. Pittsburgh & Lake Erie et al. Opinion by the commission:

The rates charged on certain carload shipments of coal from Braznell, Pa., to Erie street, Buffalo, N. Y., are not found unreasonable. (23 I. C. C., 82.)

National Manufacturing Co. v. Atchison, Topeka & Santa Fe et al. Opinion by Commissioner Harlan:

The fact that the complainant, whose factory is at St. Joseph, Mo., cannot market glucose syrup on the Pacific coast is due not to unreasonable rates from St. Joseph but to the high cost of raw materials. (23 I. C. C., 79.)

Rates on Cotton Seed Reduced.

Memphis Freight Bureau et al. v. St. Louis, Iron Mountain & Southern and St. Louis & San Francisco. Opinion by Commissioner Clark:

The rates on cotton seed to Memphis, Tenn., from Missouri, Arkansas, Oklahoma and Louisiana are claimed to be unreasonable in themselves and unjustly discriminatory in favor of St. Louis and various other mill points, and the complainants ask that rates on cotton seed be fixed on a mileage basis corresponding to the "Arkansas court tariff." The Arkansas court tariff was the result of a compromise between the state commission and the railways which, after having been tried out for a year, is now being fought in the federal courts by the railways. The discrimination against Memphis results from the fact that rates to local points are the Arkansas Court rates, and rates to Memphis are the voluntarily established interstate rates. The rates to St. Louis are admitted to be "very low" and "unreasonably and even absolutely low." Prior to the establishment of the Arkansas railway commission in 1900 defendants' rates were lower to Memphis than are the present rates. The movement of seed is largely controlled by the distribution of ownership of mills, and is not affected by slight differences in freight rates. The commission, however, finds that there is not unfair discrimination against Memphis, and, besides fixing a schedule of rates for the St. L. I. M. & S., and for the Frisco, orders that in future rates from certain Oklahoma points to Memphis be 20 per cent. less than the rates from the same points to St. Louis. (22 I. C. C., 548.)

No Discrimination in Sugar Rates.

In re absorptions provided for in tariffs of the Louisiana Railway & Navigation Co. for the movement of sugar. Opinion by Commissioner Clark:

It is claimed that the defendant is transporting sugar at less than cost from New Orleans, La., to Grammercy. The railway commission of Louisiana, intervening, joined with the defendant in claiming that the rate of this railway was not subject to federal regulation. The I. C. C., however, finds that this rate is subject to federal regulation because it is a local import tariff and because the act to regulate commerce gives the commission jurisdiction over commodities shipped from a foreign country to any place in the United States and carried to such place from a port of entry in the United States or an adjacent foreign country. The commission does not find that the charge on this rail haul is less than the service costs. (22 I. C. C., 558.)

No Discrimination Against Baltimore.

Baltimore Chamber of Commerce v. Baltimore & Ohio et al. Opinion by Commissioner Lane:

After investigation of the rates on grain from producing points in Indiana and Illinois to Baltimore, the commission finds that there is no unreasonable discrimination against Baltimore, and therefore dismisses the complaint. Although in recent years Baltimore has suffered as a grain market, it has not been due to the discriminations against it by the defendant, and it is not in the power of the commission to equalize economic conditions or to require the railways to attempt to do so. It is pointed out that the shippers from the producing territory are not complaining and are apparently satisfied with the grain markets that they get. (22 I. C. C., 596.)

Wood Pulp Rates Reduced.

Wisconsin Pulp Wood Co. v. Great Northern. Opinion by the commission:

The rates on lumber to Superior, Wis., are lower than the rates on wood pulp, and the commission orders the wood pulp rate reduced to be no higher than the rate on lumber. (22 I. C. C., 594.)

Minimum Weight on Potatoes Unreasonable.

In re suspension of advances in rates on potatoes. Opinion by Commissioner McChord:

It is plainly shown that Texas and Louisiana potatoes cannot be safely loaded to more than 24,000 lb. to 25,000 lb. The proposed increase in the minimum carload weight from 24,000 lb. to 30,000 lb. is not justified by the railways. (23 I. C. C., 63.)

Rehearing Denied.

Whiteland Canning Co. v. Pittsburgh, Cincinnati, Chicago & St. Louis et al. Opinion by Chairman Prouty:

While there may be cases where railways may properly ask for a reconsideration of some conclusions reached by the commission by reason of the fact that they are indirectly interested in the results and had no notice of the pendency of the proceedings in which a certain order was made, the commission thinks that in the great majority of instances, and in this instance, that is no valid reason for granting a rehearing. (23 I. C. C., 92.)

Hearing on Weighing Practices.

The hearing begun by Chairman C. A. Prouty of the Interstate Commerce Commission at Chicago on March 25 on the subject of alleged irregularities and discrepancies in the weighing of carload freight was continued throughout the week before Examiner Ward Prouty, attorney J. T. Marchand conducting the examination for the commission. A large number of witnesses testified both for the shippers and for the railways regarding discrepancies which had been found prevalent under present weighing practices, and methods of improving the situation. It was announced that the commission intends to make the investigation a very thorough one, and it is proposed to hold hearings at Grand Rapids, Mich., Minneapolis, Minn., and at least one hearing in the East, the South, and probably later on the Pacific coast.

Following the testimony of C. F. Staples, chairman of the Minnesota railway commission, which was reported last week, O. F. Bell, traffic manager for the Crane Company, Chicago, and chairman of the committee appointed by the National Industrial Traffic League, to investigate the subject of weighing, testified to the results of a series of investigations he had made at the company's Chicago plant. During the month of January, 1911, out of 384 cars, on 132 a variation of 500 lb. from the stenciled weight was found; 97 cars weighed 141,350 lb. over the stenciled weight and 35 cars weighed 37,690 lb. under the stenciled weight. During June out of 317 cars, 95 showed variations of 500 lb. or over, 21 weighed 47,300 lb. over the stenciled weight and 74 cars weighed 83,420 lb. under the stenciled weight. Mr. Bell explained that the preponderance of overweight cars in January was doubtless due to the effect of snow and ice on the cars and that variations in weights were frequently caused by large amounts of debris and other foreign substances in the cars. He cited the case in which 760 lb. of sand and dirt were found in a car after it had been loaded with pig iron. His company was a party to a weight agreement with the Western Railway Weighing Association and Inspection Bureau, by which the railways accepted the shippers' weights, and his company's weights were frequently checked by inspectors of the bureau. He had hardly found one car out of ten whose weight agreed with that stenciled on the car. Out of 44 empty cars set for loading at the plant during July and August, 1911, eight weighed 11,080 lb. over the stenciled weights and 36 37,660 lb. less. He cited the case of one car which in the course of tracing a claim was weighed seven different times on different scales, and weights

were found varying from 39,400 lb. to 55,300 lb. The marked weight of the car was 40,000 lb., and his company was asked to pay freight rates on approximately 14,000 lb. of manganese iron which had not been loaded. Mr. Bell thought that cars should be restenciled as soon as a discrepancy amounting to 500 lb. is found to exist.

A. S. Dodge, superintendent of the Western Railway Weighing Association and Inspection Bureau, testified at considerable length to the methods of the association in weighing and inspecting scales by means of test cars owned by individual railways. He said that the scales under the jurisdiction of the association at 738 weighing points are inspected from three to six times a year. There are 142 inspection points under his jurisdiction. He had made a compilation of empty cars weighed by association weighmasters during five months of 1911, showing that 5,283 cars weighed 5,301,643 lb. less than the stenciled weight, an average of 1,003 lb., and that 3,648 cars weighed 3,393,486 lb. more than the stenciled weight, an average of 930 lb. Based on these figures, 59 per cent. of the cars were found to be lighter than the stenciled weight, or to the advantage of the shipper, and 41 per cent. heavier than the stenciled weight, or to the advantage of the railway company. The association has weight agreements with a large number of reputable firms, by which the shippers' weights are accepted. He said that every effort is made to secure adequate inspection by weights and scales, and that many of the weighmasters have been in the employ of the association all their lives. At smaller points the weighing is done by employees of the railways who have other duties to perform. He stated the association has no authority to change the stenciled weights, that within the past few weeks it has adopted the practice of tacking on cars a card showing the correct weight where it had been found to vary 500 lb. from the stenciled weight, and the owner of the car is promptly notified. He thought it was important that some means be adopted to expedite the making of corrections in the stenciled figures, and in reply to a question said he was planning to discuss with the executive committee a proposal that corrected weights ascertained by the bureau be made effective at once.

During the year 1911 the association had weighed a total of 5,709,763 cars, including 1,371,911 weighed loaded and empty, and 4,337,852, using the stenciled tare. Of 213,464 cars check-weighed, only 17,830 cars, or 8.3 per cent., varied 1,000 lb. from the first scale weight. No correction is made in the billing for variations of less than 1,000 lb. In addition, 1,713,029 cars had been handled in 1911 under special weight agreements. Of these 2,737 had been check-weighed and only 284, or 10.4 per cent., had showed a variation of over 1,000 lb. Check weights are taken while the car is standing on the scales and cut from the train. Live stock and some other commodities are usually weighed while cars are in motion. Weighmasters figure on weighing three cars a minute.

He desired to state that of 16,125 lumber claims referred to the bureau in 1911, it had recommended that 62 per cent. be declined, and authorized that 38 per cent. be paid. Six per cent. of the latter were based on estimated weights, 10 per cent. on the lowest scale weights, and 22 per cent. on various conditions. Of 26,088 miscellaneous claims, the bureau had recommended that 48 per cent. be declined and that 52 per cent. be paid. Of these, 2 per cent. were based on estimated weights, 7 per cent. on the lowest scale weights and 43 per cent. on miscellaneous conditions. In 1906 the bureau had received 61,408 lumber claims. That the number had been reduced to 25 per cent. in 1911 he thought indicated a marked improvement in the scale weights. In 1911 the bureau inspectors had reported to members 101,546 less than carload shipments which were found to weigh more than the weights at which they had been billed, either on account of erroneous weights made by the railways or furnished by the shippers. The discovery resulted in an addition of $203,000 to the freight earnings. The bureau will make a special weight agreement with any reputable firm whose records can be checked by the bureau inspectors, except on certain commodities, such as coal and lumber, which, he said, could not be reliably estimated. One hundred and twenty-four roads, operating 105,000 miles, are members of the association. During 1911 its maintenance had cost the roads $765,000, and its inspection service had increased their revenues by approximately $2,500,000.

Ernest L. Ewing, traffic manager of the Lumbermen's Association of Grand Rapids, complained that the railway track scales are inaccurate and not properly maintained, and that foreign substances left in the cars added to the weights on which shippers are required to pay freight.

J. J, Badenoch, a hay and grain dealer, was particularly vigorous in his criticisms of the team track weights of the railways at Chicago. Inaccurate weigths, he said, cost the grain men of Chicago at least $300,000 a year, and he thought that the weights of the Western Railway Weighing Association and Inspection Bureau were entirely unsatisfactory.

Elevator grain at Chicago is weighed in hopper scales under the supervision of H. A. Foss, weighmaster of the Board of Trade. He testified at considerable length regarding conditions affecting the weight of grain. He said that far more accurate weights could be obtained by the hopper scales than by track scales, but that very wide variations were observed in weights which had been obtained under the best of conditions due to natural shrinkage, etc.

F. C. Maegly, assistant general freight agent, Atchison, Topeka & Santa Fe, testified regarding weighing and inspection practices on his road, saying that it has instructions in effect that all cars be weighed standing and cut from the train except live stock at Kansas City.

The 102 track scales in service on the Santa Fe are tested by the standard test car every three to five months, and the company maintains a very elaborate organization for the purpose of keeping its weights accurate. Mr. Maegly exhibited a holder which is placed on cars, into which are inserted small cards showing the tare weight, so that the marked tare can be readily changed, thereby saving approximately a day's time which is required to have the stencil changed.

Paul P. Rainer, chief inspector of the Joint Rate Inspection Bureau, explained the operations of the bureau in detail. Chairman Prouty asked him if there was any reason why scale inspectors and weighmasters might not be appointed by the government and paid by the railways. Mr. Rainer was afraid of the effect of political influence.

Mr. Church, manager of the scale department of Fairbanks, Morse & Company, explained in great detail the mechanical features of scales, saying that there is a risk in weighing cars over track scales when in motion or when coupled in trains. He said scales should be examined carefully every other day, or at least once a week, to guard against scale binding, water in the pit and other factors that might render them inaccurate, and that a maximum variance of 50 lb. can be maintained by close supervision. He admitted that he had had no experience in the actual weighing of cars under service conditions. In cross examination attorneys for the railways brought out many factors other than the inaccuracy of weighing methods or scales which might cause differences in weights taken at different times, such as the natural shrinkage of commodities, the effect of weather conditions on both cars and contents, the loading of coal in such a way that much of it falls off in transit, and the pilfering of coal in transit.

STATE COMMISSIONS.

George V. S. Williams, of Brooklyn, has been appointed by the governor of New York a member of the Public Service Commission for the First district (New York City), succeeding William McCarroll. Mr. Williams is a lawyer, and has been active in democratic politics in Kings county. By the appointment of the same governor Mr. Williams has for some months past been counsel of the State Conservation Commission. He is 43 years old.

The New York Public Service Commission, Second district (up-state), has begun an investigation of the methods of handling and delivering hay at New York, Weehawken and Brooklyn. Complaints have been made as to the long continued embargoes on shipments of hay, C. L., to New York. These complaints say that there was an embargo for 363 days out of 472 days, from September 16, 1910, to December 31, 1911, against hay to be delivered at the N. Y. C. Thirty-third street terminal; and there was an embargo against the delivery of hay at the Sixty-sixth street terminal of 350 days out of the same 472 days. The investigation so far shows that the probable cause of the congestion

is that hay which is received on commission by merchants is not removed from the cars. A further hearing is to be held on April 26.

The application of the New York Central & Hudson River to acquire a majority of the stock of the New York, Ontario & Western has been denied by the New York Public Service Commission, Second District. The commission says that no transfer of a bare majority interest from the New York, New Haven & Hartford to the N. Y. C. should be permitted without reasonably guarding the minority from possible oppression by the majority interest. No means are apparent by which this can be done except by imposing as a condition of the authorization that the Central shall take over the minority stock on the same terms per share as it pays the New Haven. If the minority stockholders availed themselves of this privilege it would make a purchase price to be paid by the Central of about $26,000,000 and involve an annual fixed charge for interest of about $1,150,000. The commission is unwilling to impose this burden upon the N. Y. C. and has had its attention called to no advantage which in its judgment would compensate for the disadvantages involved in such an investment. The continued successful development of the capabilities of the Ontario & Western requires close attention to and careful study of traffic, operating and financial conditions. It is the clear judgment of the commission that the energies of the New York Central and its credit and resources of every nature should properly be devoted to the public duties and burdens with which it is now charged and to the urgently demanded solution of the numerous and complicated problems pressing upon it in connection with the proper growth and development of its existing properties. The New York, New Haven & Hartford owns two shares of the preferred stock and 291,600 shares of the common stock of the Ontario & Western. The New York Central at present owns only 10 shares of the preferred stock. The New York Central asked for authorization to purchase all of the capital stock owned by the New Haven, agreeing to pay the sum of $13,108,397.62 by issuing its 50 year debenture bonds for that amount bearing $583,332 interest payable annually. The price agreed to be paid is 44.94 per cent. of the par value of the stock involved. The commission calls attention to the fact that the New Haven owns a bare majority of the total stock issued, namely $29,-164,000 as against a minority interest of $28,953,983, the difference between the amounts of the majority and minority interests being only $210,017. For several years the Ontario & Western has been paying 2 per cent. dividends on its common stock and 6 per cent. on preferred stock, which amounts to the precise sum which it is proposed to pay on debenture bonds to be issued in payment for the stock. The commission calls attention to the fact that as a necessary result the Central assumes an annual fixed charge of $583,332 which can be met by returns from its investment, provided the Ontario & Western continue to pay a 2 per cent. dividend upon its common stock.

COURT NEWS.

Mrs. Jean McKell representing the estate of Thomas McKell, a late banker of Chillicothe, Ohio, was awarded a judgment of $300,000 against the Chesapeake & Ohio, by a jury in the United States District court at Cincinnati on March 27. The suit has been pending in the Ohio and federal courts for about ten years and grows out of charges that the railway abrogated a contract to take coal from McKell's mines in West Virginia in return for the granting of right of way through the coal lands. The amount of damages asked was $3.750.000.

The government has entered in the Federal Court at New York a civil suit for dissolution of a number of steamship companies engaged in traffic between New York and the far East through the Suez canal. The companies concerned are charged with pooling freights and rebating to concerns who ship only by their lines, in violation of the Sherman anti-trust law. The companies named are the American-Asiatic; Anglo-American Oil; Hamburg American Line; China & Japan Steamship Company, and the Lancashire Shipping Company; Howard Houlder & Partners, Ltd.; Shewan Tomes & Co.; Andrew Weir & Co.; Houlder, Middleton & Company; Dodwell & Co., Ltd.; Bucknell Steamship Line; Isthmian Steamship Lines, and numerous individuals. Government presents copies of agreements signed by the defendant companies in London, April 13, 1905. This agreement, it is charged, provided for methods as to the control of shipping, and the profits were divided equally among the lines concerned. Rebates were given to shippers for their loyalty, or, in other words, for patronizing the companies in the pool. When companies outside the pool put on steamships in competition for the traffic, measures were to be taken to put them out of business, the expense for such an undertaking being paid from the pool funds.

Posting a Tariff Is Not Part of Publishing.

The decision of the Supreme Court of the United States, prepared by Justice Van Devanter, reversing the judgment of a lower court which had sustained demurrers presented by H. C. and M. F. Miller, who had been indicted for securing unlawful freight rates—sustaining them because tariffs showing the legal rates had not been properly posted—holds, in effect, that the posting is not a part of publishing; a tariff may be published even though it be not posted. The decision was on the appeal of two cases from the circuit court for the southern district of Georgia, and was handed down February 26.

The law, in various clauses, speaks of tariffs as being "published and filed." Section 6 requires tariffs to be printed and kept open for public inspection . . . and copies for the use of the public shall be kept posted in two public and conspicuous places, etc., in such form that they shall be accessible to the public and can be conveniently inspected. It was contended that a tariff is not published in the sense in which the act uses that term unless printed copies are "kept posted in two public and conspicuous places in every depot," etc., and it was this contention that prevailed in the Circuit Court. But, says Justice Van Devanter, this view is not sound. Publication and posting in the sense of the act are essentially distinct. This is the import of the provision that the requirements relating to "publishing, posting and filing" may be modified by the commission in special circumstances, for if publishing included posting mention of the latter was unnecessary. And from all the provisions on the subject it is evident that the publication intended consists in promulgating and distributing the tariff in printed form preparatory to putting it into effect, while the posting is a continuing act enjoined upon the carrier, while the tariff remains operative, as a means of affording special facilities to the public for ascertaining the rates in force thereunder. In other words, publication is a step establishing rates, while posting is a duty arising out of the fact that they have been established. Obviously, therefore, posting is not a condition to making a tariff legally operative. Neither is it a condition to the continued existence of a tariff once legally established. If it were, the inadvertant or mischievous destruction or removal of one of the posted copies from a depot would disestablish or suspend the rates, a result which evidently is not intended by the act, for it provides that rates once lawfully established shall not be changed otherwise than in the mode prescribed.

Whether, by failure to comply with the posting clause, a carrier becomes subject to a penalty is apart from the present case and need not now be considered.

The Commerce Court Overruled.

The Supreme Court of the United States decided, on Monday last, that the Interstate Commission has power to require water lines to report to it regarding intrastate as well as interstate business. This was the first case from the Commerce Court to be considered by the Supreme Court, and the Commerce Court is reversed. Justices Lurton and Lamar filed dissenting opinions. The government, in arguing this case, declared that the Commerce Court's decision would mean that railways also would be relieved from the duty of reporting intrastate business, and the commission's whole system of gathering reports relative to commerce would thus be made worthless.

The orders in question required reports regarding operating expenses and operating revenues of water lines, and affected principally lines on the Great Lakes. The Commerce Court held that the commission had power to require reports only regarding traffic carried under joint arrangement with railway carriers, but not as to purely intrastate and port-to-port business.

Justice Day, who wrote the opinion, said a mistake had been made by the Commerce Court in confusing knowledge of intrastate commerce with regulation of it. He said it was within the power of the commission to require full information concerning the whole business, intrastate as well as interstate.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

D'Arcy Tate, solicitor of the Grand Trunk Pacific, with office at Winnipeg, Man., has resigned.

R. G. Lucas has been appointed assistant general counsel of the Denver & Rio Grande, with office at Denver, Colo., succeeding A. C. Campbell, resigned to accept service elsewhere.

T. S. Walton, assistant freight claim agent of the Missouri Pacific-Iron Mountain at St. Louis, Mo., has been appointed freight claim agent, with office at St. Louis, succeeding J. S. Tustin, deceased.

C. D. Sipe has been appointed auditor of freight accounts of the Chicago & Alton and the Toledo, St. Louis & Western, with office at Chicago, succeeding W. R. Mozier, resigned to accept service with another company.

W. E. Hemingway, assistant to the vice-president and general solicitor for Arkansas and Oklahoma of the Missouri Pacific-Iron Mountain system, with office at Little Rock, Ark., has resigned to devote his time to his private practice.

A. H. Smith, vice-president and general manager of the New York Central & Hudson River, has been elected vice-president of the New York Central Lines west of Buffalo in charge of operation, maintenance and construction, with office at New York. J. J. Bernet, assistant to vice-president of the lines west at Chicago, has been appointed assistant vice-president, with office at Chicago. A. T. Hardin, assistant general manager of the New York Central & Hudson River, at New York, has been appointed assistant vice-president, with office at New York, with jurisdiction over the lines east of Buffalo.

Charles E. Schaff, whose election as president of the Missouri, Kansas & Texas, with office at St. Louis, Mo., has been announced in these columns, was born February 4, 1856, in Licking county, Ohio. He began railway work January 4, 1871, as a brakeman, and until July, 1893, he was consecutively fireman, train baggageman, conductor, yardmaster, trainmaster and general superintendent with the Pittsburgh, Cincinnati & St. Louis, now the P. C. C. & St. L.; the Columbus, Hocking Valley & Toledo, now the Hocking Valley; the New York, Pennsylvania & Ohio, now the Erie; the Cleveland, Cincinnati, Chicago & St. Louis and the Peoria & Pekin Union. He was assistant to the president of the Cleveland, Cincinnati, Chicago & St. Louis from July, 1893, to September, 1894, in the latter month became assistant general manager, and in November, 1895, was promoted to general manager. In June, 1906, Mr. Schaff was elected vice-president in full charge of maintenance and operation of the New York Central Lines west of Buffalo, with office at Chicago, which position he has just resigned to become president of the Missouri, Kansas & Texas.

Operating Officers.

D. F. Bucher, superintendent of the Mexico North-Western, with office at Madera, Chihuahua, Mexico, has resigned, effective March 31.

J. A. Hillis, trainmaster of the Texas & Pacific, with headquarters at Fort Worth, Tex,, has had his office removed to Baird, Tex.

P. E. Crowley, assistant general manager of the New York Central & Hudson River, with office at Albany, N. Y., has been appointed general manager of the New York Central & Hudson River Railroad.

C. O. Johnston has been appointed superintendent of dining service of the Missouri, Kansas & Texas, with office at St. Louis, Mo., succeeding T. A. Dempsey, resigned to accept service with another company.

H. T. Malcolmson, chief clerk to the general manager of the Toronto, Hamilton & Buffalo, has been appointed car accountant, with office at Hamilton, Ont., succeeding G. W. Wilson, resigned to go into other business.

W. W. Eggleston, chief train despatcher of the Baltimore & Ohio at Baltimore, and P. J. Judge, chief train despatcher at Grafton, W. Va., have been appointed supervisors of transportation, a new position, reporting to the inspector of transportation.

A. E. Hutchinson, trainmaster of the Gulf, Colorado & Santa Fe at Beaumont, Tex., has been appointed trainmaster of the Dallas terminals at Dallas, Tex. As has been announced in these columns. F. H. Christian has been appointed trainmaster at Beaumont, succeeding Mr. Hutchinson.

P. L. McManus, inspector of transportation of the Chicago, Indianapolis & Louisville at Chicago, has been appointed superintendent, with office at LaFayette, Ind., succeeding P. G. Walton, retired, and W. J. Murphy has been appointed trainmaster, with office at LaFayette, succeeding C. T. McHugh, retired.

F. M. Mitchell, formerly trainmaster of the Baltimore & Ohio Southwestern at Seymour, Ind., and recently promoted to assistant superintendent at Cincinnati, Ohio, has been appointed superintendent of the Illinois division, with office at Flora, Ill., succeeding F. M. Curry, resigned. Effective April 1.

C. L. Vaughn, superintendent of transportation and purchasing agent of the Louisiana Railway & Navigation Company, having resigned, the office of superintendent of transportation has been abolished, and W. H. Coppage, trainmaster at Shreveport, La., has been appointed superintendent, with office at Shreveport, in charge of the Eastern and Western divisions. E. W. Buchanan has been appointed car accountant, with office at Shreveport, and H. L. Graham, assistant trainmaster at Shreveport, succeeds Mr. Coppage.

F. F. Busteed, general superintendent of the British Columbia division of the Canadian Pacific at Vancouver, B. C., was appointed general superintendent of the Manitoba division, with office at Winnipeg, Man., on March 25, but on April 1 he was transferred to the engineering department, with headquarters at Kamloops, B. C., as noted under Engineering & Rolling Stock Officers. D'Alton C. Coleman, formerly acting general superintendent of the Manitoba division at Winnipeg, has been appointed general superintendent of the Manitoba division, succeeding Mr. Busteed.

Xerxes H. Cornell, inspector of transportation of the Chicago & Alton and the Toledo, St. Louis & Western, at Chicago, has been appointed superintendent of transportation, with office at Chicago, a new position. In 1900, Mr. Cornell left the service of the Chicago, Indiana & Southern to go to the Grand Trunk, as chief despatcher. Later, he was made trainmaster at Durand, Mich., and in 1904 he was appointed master of transportation for the same company, with office at Durand. In December, 1910, he went to the Chicago & Alton and the Toledo, St. Louis & Western as inspector of transportation, with office at Chicago, which position he has held up to the time of his recent appointment as superintendent of transportation.



X. H. Cornell.

Samuel George Strickland, who has been appointed assistant general manager of the Chicago & North Western lines east of the Missouri river, with office at Chicago, was born August 15, 1859. He received his education at the collegiate institute and grammar schools at Port Hope and Peterboro, Ont., and began railway work in 1877 as a telegraph operator on the Canadian Pacific. The following year he went to the St. Paul, Minneapolis & Manitoba, now the Great Northern, where he was operator and clerk for two years. He then went with the Chicago, St. Paul, Minneapolis & Omaha as a telegraph operator, and was

successively promoted to agent, general agent, chief clerk to general superintendent, superintendent of terminals, trainmaster, superintendent and general superintendent. In 1908 he was appointed assistant general superintendent of the Chicago & North Western, and in the latter part of 1910 was promoted to general superintendent of the same road, from which office he is now promoted to assistant general manager.

C. L. Vaughn, whose appointment as superintendent of car service of the Kansas City Southern, with office at Kansas City, Mo., has been announced in these columns, was born in December, 1870, and began railway work with the Chicago, Burlington & Quincy as operator at Galena, Ill., in August 1887. In October, 1890, he went with the Great Northern as operator at Moorhead, Minn., and he remained with that road until July, 1901, having been agent and yardmaster at various points, traveling auditor, and in the freight receipts division accounting department. He then resigned to go with the Algoma Central Railway at Sault Ste. Marie, Ont., as inspector of transportation. He was subsequently despatcher, car accountant and trainmaster of the latter road, and in December, 1906, became general traveling car accountant of the Rock Island Lines, with office at Chicago. In October of the following year he went with the Louisiana Railway & Navigation Company as superintendent of transportation and purchasing agent, which office he resigned to accept his present position with the Kansas City Southern.

Walter J. Towne, who has been appointed general superintendent of the Chicago & North Western lines east of the Missouri river, except the Minnesota and Dakota divisions, with office at Chicago, was born in November, 1868, at Leavenworth, Kan., and graduated from Rensselaer Polytechnic Institute in 1895. He began railway work in the engineering department of the Atchison, Topeka & Santa Fe in 1886, and until 1892 he was consecutively axeman, tapeman, rodman and assistant engineer. From July, 1895, to January, 1896, he was assistant engineer in the office of the city engineer of Syracuse, N. Y., and entered the service of the state of New York in the latter month, as assistant engineer on the Erie canal improvement. He went with the Chicago & North Western in February, 1899, as assistant engineer on construction at Boone, Iowa, and has been with that road ever since. For a year and a half from January, 1900, he was assistant engineer on general maintenance work at Kaukauna, Wis.; was then transferred to Escanaba, Mich., where he remained for a year, and from June, 1902 to March, 1906, he was division engineer, first at Baraboo, Wis., then at Chicago, and later at Escanaba, Mich. He was appointed engineer of permanent work in the office of the chief engineer at Chicago in March, 1906, and four months later was made engineer of maintenance of way, with office at Chicago, from which position he has just been promoted to general superintendent.



W. J. Towne.

Samuel G. Strickland, general superintendent of the Chicago & North Western at Chicago, has been appointed assistant general manager of the lines east of the Missouri river, with office at Chicago, succeeding William E. Morse, resigned on account of ill health; and Walter J. Towne, engineer of maintenance of the lines east of the Missouri river at Chicago, has been appointed general superintendent of the lines east of the Missouri river, except the Minnesota and Dakota divisions, with office at Chicago, succeeding Mr. Strickland. George B. Vilas, superintendent of the Madison division, has been appointed assistant general superintendent of the lines east of the Missouri river, except the Minnesota and Dakota divisions, with office at Chicago, and E. E. Nash, superintendent of the Minnesota division, succeeds Mr. Vilas, with office at Baraboo, Wis. W. B. Linsley, superintendent of the Peninsula division at Escanaba, Mich., has been appointed resident superintendent of that division, with office at Escanaba, and he will have direct charge of the tie treating plant and perform such other duties as may be assigned to him. C. E. Andrews, superintendent at Green Bay, Wis., succeeds Mr. Linsley. J. W. Doyle, superintendent of the Dakota division at Huron, S. D., has been appointed superintendent of the Minnesota division, with office at Winona, Minn., succeeding E. E. Nash, and H. E. Dickinson, superintendent at Mason City, Iowa, succeeds Mr. Doyle. H. Rettinghouse, division engineer at Boone, Iowa, has been appointed superintendent of the Iowa and Minnesota division; A. N. LaComb, assistant superintendent at Green Bay, Wis., has been appointed superintendent of the Lake Shore division, and W. H. Dolan has been appointed assistant superintendent of that division. F. D. Pendell, assistant superintendent of the Northern Wisconsin division at North Fond du Lac, Wis., has been appointed superintendent, with office at North Fond du Lac, succeeding A. F. Reiner, resigned, and G. C. Boomer succeeds Mr. Pendell.

Traffic Officers.

C. G. Mell has been appointed assistant commercial agent of the Galveston, Houston & Henderson.

G. A. Gamble has been appointed commercial agent of the Lehigh Valley, with office at St. Louis, Mo.

Charles A. Fullen has been appointed general agent of the Chicago Great Western, with office at Fargo, N. D.

W. W. Gilgas has been appointed traveling passenger agent of the Chicago, Indianapolis & Louisville, with office at Bloomington, Ind.

Isaac Banks has been appointed traveling agent of the Chicago & North Western, with office at Philadelphia, Pa., succeeding J. M. Hutchins, transferred to Chicago.

S. W. Morrow has been appointed traveling pasenger agent of the Missouri Pacific-Iron Mountain system, with office at Little Rock, Ark., succeeding C. S. Blackman, transferred.

W. J. Sheridan has been appointed a traveling freight agent of the Buffalo, Rochester & Pittsburgh, in charge of Canadian territory, reporting to the coal freight agent at Rochester, N. Y.

Charles M. Pendleton has been appointed advertising manager of the St. Louis & San Francisco, with office at St. Louis, Mo., succeeding G. W. Hutchinson, resigned to engage in other business.

W. Corbett, traveling passenger agent of the Canadian Pacific at Toronto, Ont., has been appointed terminal passenger agent at Toronto, and J. J. Anderson, traveling passenger agent at North Bay, Ont., has been appointed traveling passenger agent at Toronto.

John T. Bowe, traffic manager of the Pullman Railroad Company at Chicago, has been appointed assistant general freight agent of the Trinity & Brazos Valley, with office at Houston, Tex., succeeding J. A. Brown, resigned about February 1 to go with the St. Louis & San Francisco lines in Texas.

Herman L. Traber, whose appointment as general freight agent of the Missouri, Oklahoma & Gulf, with office at Muskogee, Okla., has been announced in these columns, has been appointed also general passenger agent succeeding Percy Talbot, general freight and passenger agent, resigned.

L. B. Shepherd, traveling passenger agent of the Chicago & Alton and the Toledo, St. Louis & Western at Denver, Colo., has been appointed Southwestern passenger agent, with office at Dallas, Tex., succeeding George W. Thomas, resigned to accept service with the Texas & Pacific. T. M. Sommers, city passenger agent at Kansas City, Mo., succeeds Mr. Shepherd, and R. A. Pearce succeeds Mr. Sommers.

E. C. Roxbury, traveling freight and passenger agent of the Denver & Rio Grande and the Western Pacific at Kansas City, Mo., has been appointed general agent of those roads, with office at Kansas City, succeeding H. V. Luyster, deceased. O. P. Applegate, traveling freight and passenger agent at Detroit, Mich., has been appointed general agent, with office at Detroit. G. C. Henderson succeeds Mr. Roxbury. J. G. Lowe, traveling passenger agent of the Western Pacific at Kansas City, has been ap-

pointed district passenger agent, with office at San Francisco, Cal., succeeding J. H. Pearman, resigned.

T. J. Turrentine, city passenger agent of the Queen & Crescent Route at Birmingham, Ala., has been appointed traveling passenger agent, with office at Meridian, Miss., a new position. S. H. Johnson succeeds Mr. Turrentine. O. H. Chandler has been appointed traveling passenger agent, with headquarters at Knoxville, Tenn., succeeding T. H. Mitchell. W. W. Dunnavant, traveling passenger agent at Cleveland, Ohio, has been appointed district passenger agent, with office at Pittsburgh, Pa., and R. M. Burr succeeds Mr. Dunnavant. J. W. Cook has been appointed traveling freight agent, with office at Atlanta, Ga., and O. C. Pope has been appointed traveling freight agent with headquarters at Birmingham, Ala. Henry Hoving has been appointed traveling freight agent, with office at Milwaukee, Wis.

Edward S. Sullivan, passenger agent of the Southern Railway at Selma, Ala., has been appointed traveling passenger agent at Seattle, Wash. R. H. Graham, city passenger and ticket agent at Asheville, N. C., has been appointed traveling passenger agent at St. Paul, Minn., and G. W. Carter has been appointed traveling passenger agent at Montreal, Que. All of the foregoing are new agencies. S. M. Dent has been appointed traveling passenger agent at Boston, Mass., and T. B. Martin has been appointed traveling passenger agent, with office at Philadelphia, Pa. Grover C. Robson, city passenger and ticket agent at Selma, Ala., has been appointed traveling passenger agent, with office at Selma, and F. B. Pinson, passenger and ticket agent at Spartanburg, S. C., has been appointed traveling passenger agent with office at Tampa, Fla.

Engineering and Rolling Stock Officers.

D. C. Ross has been appointed master car builder of the Michigan Central, with office at Detroit, succeeding James A. Chubb, deceased.

J. H. Stinson, roadmaster of the Southern Kansas Railway of Texas at Canadian, Tex., has been appointed roadmaster of the Pecos & Northern Texas, with headquarters at Slaton, Tex., succeeding D. O'Connell.

J. E. Fitzsimons, road foreman of engines of the Central Vermont of St. Albans, Vt., has been apointed acting superintendent of motive power and car department, with office at St. Albans, succeeding T. McHattie, resigned.

W. F. Hart, roadmaster of the Southern Kansas Railway of Texas at Woodward, Tex., has been appointed roadmaster, with headquarters at Canadian, Tex., succeeding J. H. Stinson, resigned to accept service with another company.

C. H. Shasteen has been appointed acting roadmaster of the Atchison, Topeka & Santa Fe, with headquarters at Syracuse, Kan., succeeding C. B. Butner, and Samuel McGaughey has been appointed roadmaster, with office at Belvidere, Kan., succeeding John Thorpe.

H. A. Gass, assistant supervisor of the Pennsylvania Railroad at Paoli, Pa., has been appointed assistant supervisor of division No. 9, with office at Altoona, Pa., succeeding T. E. Fugate, and F. H. Bentley has been appointed assistant supervisor of division No. 2, succeeding Mr. Gass.

V. C. Randolph, supervisor of locomotive operation of the Erie at Salamanca, N. Y., has been appointed master mechanic of the Rochester division of the Erie, the New York, Susquehanna & Western, and the New Jersey & New York, with office at Avon, N. Y., succeeding F. G. DeSaussure, transferred.

H. C. Phillips, chief engineer of the Atchison, Topeka & Santa Fe Coast Lines at Los Angeles, Cal., has been appointed valuation engineer of the entire Santa Fe system, with office at Chicago, a new position. G. W. Harris, engineer of construction on the Coleman-Lubbock cut-off of the Santa Fe in west Texas, succeeds Mr. Phillips.

Abram E. Smith, mechanical engineer of the Union Tank Line Company, has been appointed assistant master car builder, with office at New York, succeeding Thomas Beaghen, Jr., promoted. Mr. Smith was born in Hereford, Eng., on February 2, 1879, and entered the service of the Union Tank Line Company on February 12, 1902, as a stenographer and draftsman. During the period 1902 to 1907, he attended the evening classes at Cooper Institute, and later graduated from the Cooper Union School of Science. On May 1, 1907, he was made mechanical engineer of the Union Tank Line Company, which position he held until his recent promotion to assistant master car builder as above noted.

F. F. Busteed, general superintendent of the Manitoba division of the Canadian Pacific at Winnipeg, Man., has been appointed engineer in charge of grade revision and double tracking for lines from Calgary, Alta., west, with headquarters at Kamloops, B. C. F. Lee, division engineer at Winnipeg, has been appointed principal assistant engineer, with office at Winnipeg, and R. C. St. John, assistant engineer at Winnipeg, has been appointed engineer maintenance of way with headquarters at Winnipeg. Frank Taylor, division engineer of the Lake Superior division at North Bay, Ont., has been appointed division engineer of the Eastern division with office at Montreal, Que., succeeding C. B. Brown, promoted.

Paul Hamilton, engineer maintenance of way of the Cleveland, Cincinnati, Chicago & St. Louis at Springfield, Ohio, has been appointed engineer maintenance of way of the Cleveland division, with office at Galion, Ohio, succeeding J. G. Shillinger, resigned to accept service with another company. A. S. More, engineer maintenance of way of the Cairo division at Mt. Carmel, Ill., succeeds Mr. Hamilton on the Cincinnati division, and W. C. Kegler, engineer maintenance of way of the Michigan division at Wabash, Ind., succeeds Mr. More. C. W. Cochran, assistant engineer of the Cleveland division at Galion, Ohio, has been appointed engineer maintenance of way of the Michigan division, succeeding Mr. Kegler.

C. W. P. Ramsey, whose appointment as engineer of construction in charge of the Eastern Lines, of the Canadian Pacific, with office at Montreal, Que., has been announced in these columns, was born in 1882 at Bury, Que. He began railway work with the Canadian Pacific in 1898, and was in the mechanical department of that road until 1900. From 1903 to 1906 he was in the engineering department, and during the latter two years was engaged in location work, and from 1906 to 1910 he was assistant engineer in charge of the construction of new lines and double-tracking work. Mr. Ramsey was appointed division engineer of construction of the Canadian Pacific in 1910, which position he held at the time of his recent appointment as engineer of construction in charge of the Eastern Lines, as above noted.

W. J. Tollerton, assistant general superintendent of motive power of the Rock Island Lines at Chicago, has been appointed mechanical superintendent, with office at Chicago, and his former position has been abolished. J. B. Kilpatrick, superintendent of motive power of the First district at Davenport, Iowa, has been appointed district mechanical superintendent of the First district, with office at Des Moines. S. W. Mullinix, superintendent of motive power of the Second district at Topeka, Kan., has been appointed district mechanical superintendent of the Second district, with office at Topeka, and C. M. Taylor, superintendent of motive power of the Third district at El Reno, Okla., has been appointed district mechanical superintendent of the Third district, with office at El Reno, and the three positions of superintendent of motive power have been abolished.

Thomas Beaghen, Jr., assistant master car builder of the Union Tank Line Company, has been appointed master car builder, with office at New York, succeeding Charles M. Bloxham, who has retired on account of ill health. Mr. Beaghen was born on April 20, 1876, in Hancock, Delaware county, New York. After graduating from the Hancock High School and taking several special courses in mathematics, chemistry, etc., he graduated from Pratt Institute of Technology. He also took a special course of mechanical engineering at Lehigh University. He then entered the mechanical department of the New York Central, and later was connected with the American Steel Foundries Company and the United States Metals & Manufacturing Company. Mr. Beaghen entered the service of the Union Tank Line Company on March 15, 1909, as inspector of materials, and was made assistant master car builder on June 1, 1910, which position he held at the time of his recent appointment as master car builder of the same company.

Henry H. Decker, division engineer of the Minnesota and Dakota divisions of the Chicago & North Western at Winona, Minn., has been appointed engineer of maintenance of the lines east of the Missouri river, with office at Chicago, succeeding Walter J. Towne, promoted. (See item under Operating Officers.) M. E. Thomas, division engineer of the Madison division at Madison, Wis., succeeds Mr. Decker; and S. S. Long, acting division engineer of the Ashland division at Antigo, Wis., succeeds Mr. Thomas. L. J. Putnam, resident engineer at Necedah, Wis., has been appointed division engineer of the East Iowa, the West Iowa and the Iowa and Minnesota divisions, with office at Boone, Iowa, succeeding H. Rettinghouse, transferred to the operating department. J. A. S. Redfield, division engineer of the Sioux City division at Sioux City, Iowa, has been appointed division engineer of the Northern Wisconsin and Lake Shore divisions, with office at North Fond du Lac, Wis., succeeding W. W. Gaffin, resigned to engage in other business; and R. W. Richardson has been appointed division engineer of the Sioux City and Northern Iowa divisions, with office at Sioux City.

Purchasing Officers.

A. M. Darlow, mechanical engineer of the Buffalo & Susquehanna at Galeton, Pa., has been appointed also general storekeeper.

G. E. Smith has been appointed purchasing agent of the Louisiana Railway & Navigation Company, with office at Shreveport, La., succeeding C. L. Vaughn, superintendent of transportation and purchasing agent, resigned to accept service with another company.

OBITUARY.

H. H. Cage, general southern agent of the Erie, with office at Memphis, Tenn., died in St. Louis, Mo., on March 21.

S. C. Clark, southeastern freight agent of the Chicago & Alton, with office at Louisville, Ky., died at Louisville on March 28.

W. B. Kelby, traveling freight agent of the Chicago, Burlington & Quincy, with office at Cincinnati, Ohio, died at that place on March 24.

C. M. Roquette, architect of the St. Louis & San Francisco, with office at Springfield, Mo., died at his home in Springfield on March 24. Mr. Roquette was made architect of the St. Louis & San Francisco in 1901, previous to which year he was architect of the Atchison, Topeka & Santa Fe.

W. M. Clements, who was at one time general manager of the Baltimore & Ohio lines east of the Ohio river, died on March 28, at his home in Summit Point, W. Va., at the age of 72. Mr. Clements was born in West Virginia, and began work on the Baltimore & Ohio as a track laborer. After serving as agent at various stations, he was made general agent at Baltimore, Md. From August to October, 1877, he was assistant master of transportation and then became master of transportation of the same road. In October, 1885, he was appointed general superintendent of the New York, Pennsylvania & Ohio, now a part of the Erie. From July, 1886, to April, 1887, he was general manager of the Erie Express Company, and was then appointed general manager of the Baltimore & Ohio lines east of the Ohio river, serving until May, 1889, when he retired from railway service.

Webster Snyder, formerly second vice-president and general manager of the Gulf, Colorado & Santa Fe, died at his home in Dallas, Tex., on March 26, at the age of 77 years. Mr. Snyder was engaged in railway work from 1856 until 1888. He was with the Union Pacific from 1865 to 1869, first as general freight and ticket agent, and later as general superintendent. From 1869 to 1870 he was general manager of the Bennington & Rutland, now the Rutland Railroad, and was then for a year assistant to the president of the Long Island Railroad. He was general superintendent of the Canadian Southern from 1873 to 1875, and during the next year was general manager of the Long Island. From 1882 to 1884 he was general manager of the Louisville, Evansville & St. Louis, in the latter year went with the Gulf, Colorado & Santa Fe as general manager and chief engineer, and was subsequently made second vice-president and general manager. At the time of his death Mr. Snyder was engaged in the banking business at Dallas.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Grand Trunk is in the market for 25 locomotives.

The Pekin & Kalgan, China, is in the market for 10 locomotives.

The Great Northern has ordered 25 Mallet locomotives from the Baldwin Locomotive Works.

The Union Pacific is making tentative inquiries for 10 mikado locomotives and 25 Pacific type locomotives.

The St. Louis Southwestern is said to be in the market for 25 locomotives. This item has not been confirmed.

The Erie is making tentative inquiries for five Pacific type locomotives. Nothing has been definitely decided on yet.

The Atlanta, Birmingham & Atlantic has ordered 10 mikado locomotives from the Baldwin Locomotive Works.

The United States Metals Refining Company, New York, has ordered two four-wheel switching locomotives from the Baldwin Locomotive Works.

The Charleston & Western Carolina has ordered three consolidation locomotives and three six-wheel switching locomotives from the Baldwin Locomotive Works.

The Chicago, Milwaukee & St. Paul has ordered 50 mikado locomotives from the American Locomotive Company. These locomotives will be equipped with superheaters.

The Taiwan Railway, Formosa, has ordered three Pacific type locomotives from the American Locomotive Company. The dimensions of the cylinders will be 18½ in. x 24 in.; the diameter of the driving wheels will be 63 in., and the total weight in working order will be 156,000 lbs. These locomotives will be equipped with superheaters.

The Duluth, South Shore & Atlantic has ordered two Pacific type locomotives from the American Locomotive Company. The dimensions of the cylinders will be 20½ in. x 26 in.; the diameter of the driving wheels will be 64 in., and the total weight in working order will be 185,000 lbs. These locomotives will be equipped with superheaters.

The Norfolk & Western has ordered 25 Mallet (2-6-6-2) locomotives from the American Locomotive Company. These locomotives will be equipped with superheaters, and will be similar to the 15 locomotives recently ordered from this company, and mentioned in the *Railway Age Gazette* of January 19. The dimensions of the cylinders will be 22 in. and 35 in. x 32 in.; the diameter of the driving wheels will be 56 in., and the total weight in working order will be 405,000 lbs.

The Toronto, Hamilton & Buffalo has ordered two consolidation locomotives and two six-wheel switching locomotives from the Montreal Locomotive Works. The consolidation locomotives will have 23-in. x 28-in. cylinders, 55-in. driving wheels, and in working order will weigh 205,000 lbs. These locomotives will be equipped with superheaters. The switching locomotives will have 21-in. x 28-in. cylinders, 51-in. driving wheels, and in working order will weigh 166,000 lbs.

The Manila Railroad, Philippine Islands, has ordered five consolidation locomotives and five 10-wheel locomotives from the American Locomotive Company. The consolidation locomotives will have 17-in. x 24-in. cylinders, 48-in. driving wheels, and in working order will weigh 118,000 lbs. The 10-wheel locomotives will have 17-in. x 24-in. cylinders, 60-in. driving wheels, and in working order will weigh 118,000 lbs. Both the consolidation locomotives and the 10-wheel locomotives will be equipped with superheaters.

CAR BUILDING.

The Rutland is figuring on a number of passenger cars.

The Lehigh Valley is in the market for 250 refrigerator cars.

The Chicago & North Western is building 60 cabooses at its own shops.

The Illinois Central has ordered six dining cars from the Pullman company.

The Intercolonial has ordered three sleeping cars from the Pullman Company.

The Grand Trunk has ordered six sleeping cars from the Canadian Car & Foundry Company.

The Wabash has ordered 750 automobile cars from the Western Steel Car & Foundry Company.

The Northern Pacific has ordered 50 express cars from the American Car & Foundry Company.

The Texas & Pacific has ordered 70 chair cars and eight coaches from the Pullman Company.

The Delaware, Lackawanna & Western is said to be making inquiries for 200 box cars. This item has not been confirmed.

The International & Great Northern has ordered six 70-ft. chair cars, seven 70-ft. coaches, seven baggage cars and three steel postal cars from the American Car & Foundry Company.

IRON AND STEEL.

The Atlantic Coast Line is in the market for 1,600 tons of bridge material.

The Chicago Great Western is in the market for from 7,000 to 10,000 tons of bridge material.

The Chicago, Milwaukee & St. Paul has ordered 25,000 tons of rails from the Illinois Steel Company.

The Chicago, St. Paul, Minneapolis & Omaha has ordered 11,000 tons of rails from the Illinois Steel Company.

General Conditions in Steel.—The volume of new business booked by the Steel Corporation during the past two weeks has shown a marked decrease. This is due to the recent price advances of about $1 a ton, on the average. The unfilled orders on the books were large, and as prices were exceedingly low, manufacturers raised the prices, believing that consumers would place orders at the higher level. Consumers have felt that the overcapacity of the mills would prevent the manufacturers from raising prices. The result is that there has been a temporary lull in the steel industry, but it is generally believed that there will be a large increase in orders placed about the middle of April and that the present prices will hold. Both production and shipments during March largely exceeded new orders, so a decrease in the unfilled tonnage is expected for that month.

FOREIGN RAILWAY NOTES.

The German consulate at Buenos Ayres reports that during 1911 2,045 miles of new railway were opened in Argentina, 982 miles of which were state railway. The total mileage at the end of the year was 19,963. On the average the railways earned 4¼ per cent. on their capital.

The course of freight car enlargement in Germany has been traced. In Baden 22,000-lb. cars were first built in 1859. Up to that time the standard capacity had been 12,000 lbs., following English practice. In 1892 the standard capacity was raised to 27,500 lb., and in that year a few cars were built to carry 33,000 lbs. The latter are likely soon to prevail; but there are still many 22,000-lb. cars and a very few of the old 12,000-lb. cars.

In Austria the state railways are operated in different systems, whose extent in many cases is that of the companies to which they formerly belonged. Recently a statement has been made of the earnings of each system separately, showing extraordinary results. For instance, the system managed at Vienna earned $10,700,000 gross and only $73,000 net, the operating expenses being 99⅓ per cent. of the earnings. Against this, the system managed at Cracow earned gross $10,300,000 and net $4,140,000, the operating expenses being only about 60 per cent. Three systems fail to earn their expenses, that of Triest spending $3,800,000 to earn $2,900,000, and another whose expenses are 105 per cent. of the earnings, and a third on which they are 121 per cent. The average operating expenses for all the state railways is 79.6 per cent. The total net earnings for all the state railways is $31,000,000 and the total gross earnings is $151,000,000.

Supply Trade News.

Dr. P. H. Conradson, chief chemist of the Galena Signal Oil Company, Franklin, Pa., has cancelled his engagement to lecture on the Lubrication of Steam Engines, in the Karpen building, Chicago, April 10-13.

The sales department of the Union Switch & Signal Company, Swissvale, Pa., changes in the organization of which were noted in the *Railway Age Gazette* of March 29, remains in charge of S. G. Johnson, general sales manager, whose headquarters are in New York.

The McKeen Motor Car Company, Omaha, Neb., has recently opened an office in the Hudson Terminal building, 30 Church street, New York, and has appointed Stephen D. Barnett as eastern representative. This company has recently received an order for two 70-ft. gasolene motor cars from the Weatherford, Mineral Wells & Northwestern. There are now 122 McKeen motor cars in service in the United States, Mexico and Australia.

On March 28, the United States District Court for the district of New Jersey, in an opinion by Judge Cross, handed down its decision in a suit of the Westinghouse Air Brake Company, Pittsburgh, Pa., vs. the New York Air Brake Company, New York. The complainant alleged that patent No. 912,511, covering the K-triple valve, and patent No. 912,512, for a check valve, had been infringed by the defendant. The court decided in favor of the complainant as to the K-triple valve patent, but dismissed the complaint as to the other patent, it being evidently of minor importance and value, and the court holding it invalid.

The Reed-Prentice Company, Worcester, Mass., has recently been incorporated with $2,500,000 capital. This corporation is a merger of the following companies, all of Worcester: The F. E. Reed Company, manufacturer of lathes, with 450 employees; the Prentice Brothers Company, manufacturer of geared head lathes and drills, with 400 employees; the Reed Foundry Company, manufacturer of heavy machinery, with 50 employees; the Reed & Curtis Machine Screw Company, manufacturer of machine screws and machine tools, with 50 employees, and the Crompton Associates, manufacturers of heavy machinery and tools.

TRADE PUBLICATIONS.

Culverts.—The Canton Culvert Company, Canton, Ohio, has published form No. 26 on its Acme Nestable Corrugated No-Co-Ro metal culverts. It is illustrated and gives descriptions and calls attention to the advantages of these culverts.

Equipment and Supplies.—The Walter A. Zelnicker Supply Company, St. Louis, Mo., has published in a small booklet a list of its new and second-hand equipment and supplies, including locomotives, cars, contractors' supplies, track supplies, dredges, derricks, pumps, scales, engines, hoists, steam shovels, etc.

Southern Railway.—The land and industrial department of this company has published a 32-page illustrated booklet on Kentucky, in which it describes the physical conditions, the climate, the resources and the products of this state. This booklet will be found very useful to the prospective home-seeker or investor, as it includes many definite facts on the various industries in Kentucky.

Texas & Pacific.—The passenger department of this company has published the first number of its quarterly for 1912. This issue contains about 100 pages, is fully illustrated and gives detailed information on the productivity and fertility of the territory along the company's lines. Separate discussions are devoted to the different sections of the country, and valuable data are given on the numerous opportunities for both industrial and agricultural enterprises.

The African Midland Railway in German East Africa was completed to Tabora, 526 miles from the coast on February 27, two years before the time specified. This railway was built by a joint-stock company, but Germany owns nearly all its shares.

Railway Construction.

New Incorporations, Surveys, Etc.

Campbellford, Lake Ontario & Western.—See Canadian Pacific.

Canadian Northern.—A bill has been introduced in the Canadian parliament, which provides for the construction of the Canadian Northern Alberta from a point 150 miles from St. Albert, Alta., west to the British Columbia boundary at Yellowhead Pass, 115 miles. The government guarantees the bonds on this section at the rate of $35,000 a mile, and it had previously guaranteed bonds at the rate of $13,000 a mile for the first 50 miles, and at the rate of $25,000 a mile for the next 100 miles of the line from Edmonton. T. Turnbull, assistant chief engineer, Winnipeg.

Announcement has been made that the following improvements are to be carried out by the Canadian Northern during 1912: Construction of a 58-mile section between Montreal and Hawkesburg, near Ottawa, Ont.; from Ottawa west on the Sudbury section, 32 miles; from Ruel west towards Port Arthur, 100 miles; and from Port Arthur east towards Sudbury, 108 miles. Seventy-five miles of main line will be built in British Columbia, about 400 miles of extensions in Alberta and Saskatchewan, and 80 miles of the main line in Manitoba will be relaid with new rails. In addition, the Toronto-Ottawa line will be completed by the construction of 80 miles east from Sydenham. On the completion of these improvements there will be less than 1,000 miles of main line yet to be built to complete the through line from Montreal, Que., west to Vancouver, B. C. T. Turnbull, assistant chief engineer, Winnipeg, Man.

Canadian Northern, Alberta.—See Canadian Northern.

Canadian Pacific.—An officer writes that contracts have been given to Dutton & Timson, Winnipeg, Man., for grading 80 miles from Swift Current, Sask., northwest, also for double-tracking work from Regina west to Pasqua, 35 miles, and from Caron west to Chaplin, 38 miles. J. D. Sullivan, chief engineer, Western Lines, Winnipeg, Man. (March 22, p. 700.)

An officer writes that the Campbellford, Lake Ontario & Western has been leased to the Canadian Pacific. The company plans to build from the Canadian Pacific at a point 15 miles west of Smiths Falls, Ont., southwest to Belleville, 75 miles, thence west along the north shore of Lake Ontario, via Trenton, Cobourg, Port Hope, Bowmanville, Oshawa and Whitby, to a connection with the Canadian Pacific at Agincourt, a total of about 184½ miles. Contracts for grading, track laying, etc., have been let to Deeks & Hinds, Toronto, and the work is now under way. The maximum grades will be .4 per cent., and maximum curvature 4 deg. C. W. P. Ramsey, engineer of construction, Eastern Lines, Montreal. (March 22, p. 700.)

Cape Charles.—See New York, Philadelphia & Norfolk.

Carolina, Clinchfield & Ohio.—See this company in Financial News.

Columbus, Chattahoochee Valley & Gulf.—Application has been made for a charter in Georgia to build from Georgetown, Ga., northwest along the valley of the Chattahoochee river to Atlanta, about 180 miles. Josiah Flournoy, Columbus, Ga., may be addressed.

Erie.—See this company in Financial News.

Fairchild & North Eastern.—An officer writes that bids will be asked for soon to build an extension from the present western terminus at Fairchild, Wis., west to Caryville, about 40 miles. J. H. Thomas, chief engineer, Fairchild. (February 2, p. 221.)

Great Northern.—An officer writes that a contract has been given to Guthrie, McDougall & Company, Portland, Ore., to build from Wenatchee, Wash., northeast to Pateros, 56 miles. A. H. Hogeland, chief engineer, St. Paul, Minn. (March 8, p. 453.)

Gulf, Colorado & Santa Fe.—The San Saba district of the Southern division has been extended from Brady, Tex., west to Eden, 32 miles. F. Merritt, chief engineer, Galveston, Tex.

Holton Interurban.—This road has been extended from Seeley, Cal., to Dixieland. W. F. Holt, president and general manager, Redlands, Cal.

Louisville & Nashville.—A new line has been opened for business from Allingham, Tenn., north to Harriman, 17½ miles. W. H. Courtenay, chief engineer, Louisville, Ky.

Mexican Pacific.—A contract has recently been entered into between this company and the government of Mexico to build from Balsas, the present terminus of the Cuernavaca division of the National Railways of Mexico to the port of Zihuatanejos on the Pacific coast in the state of Guerrero. A branch is also to be built from Las Palomas to El Organal. The concession requires that 65 miles shall be finished from Balsas and 35 miles from Zihuatanejos during the first year. The company plans to have all work finished within three years. Joseph Castlelot, vice-president, Mexico City, Mex.

Missouri, Kansas & Texas.—An officer writes that this company has been considering the question of building from Waskom, Tex., to Lockhart, but has not yet definitely decided to carry out the work. S. B. Fisher, chief engineer, St. Louis, Mo.

Missouri, Oklahoma & Gulf.—This company, which recently gave a contract to McCabe & Steen, Fairland, Okla., to build 300 miles in Oklahoma and Texas, has given another contract to the same contractors to build an extension from Henryetta, Okla., to Oklahoma City, also from Denison, Tex., to Dallas. J. J. Harrison, chief engineer, Muskogee, Okla. (March 29, p. 780.)

Montreal Tunnel Company.—An officer writes that this company has been incorporated in Canada with $15,000,000 capital, to construct a tunnel under the St. Lawrence river from a point on the south shore between Longueuil, Que., and St. Lambert to Montreal, together with connections with St. Helen's Island. D. McDonald, president, and Patrick Dubee, secretary-treasurer, Montreal.

Murfreesboro Electric.—An officer writes that the prospects of building this line are good. The projected route is from Nashville, Tenn., southwest via Murfreesboro to Woodbury, about 50 miles. R. T. Wilson, president, Nashville.

New York, Philadelphia & Norfolk.—The Cape Charles Railroad has been extended from Townsend, Va., to Kiptopeke, 3½ miles. W. A. Patton, president, Philadelphia, Pa.

New York Subways.—The New York Public Service Commission, First district, has given a contract for building section 2-A of the Broadway-Lexington avenue subway to the O'Rourke Engineering & Construction Company, New York. This section extends from Walker street to Howard street, in the borough of Manhattan, and includes the Canal street station.

North & South Carolina.—This road has been extended from Mullins, S. C., to Pee Dee Wye, 22 miles. W. R. Bonsal, president and treasurer, Hamlet, N. C.

Oregon Electric.—This road, which now extends from Portland, Ore., south to Salem, 51 miles, with a branch to West Woodburn and Woodburn, three miles, and from Garden Home west to Forest Grove, 19 miles, is building an extension from Salem south via Albany to Eugene, 70 miles, and a branch will also be built from Tualatin, southwest to McMinnville, 31 miles. A new sub-station is to be put up at Waconda, and four other stations are to be located along the new line from Salem to Eugene. L. B. Wickersham, chief engineer, Portland. (February 23, p. 360.)

Oregon & Southern (Electric).—An officer writes that this company is now letting contracts to build from Medford, Ore., through the Rogue river valley to a point in California, about 63 miles. J. R. Mitchell, chief engineer, Roseburg, Ore.

Petaluma & Santa Rosa (Electric).—Incorporated in California with $250,000 capital, and headquarters at Petaluma. The plans call for building from Liberty, Cal., west via Bloomfield, to a point on the Pacific coast near Bodega, 18 miles. J. E. Alexander, B. Levy, A. F. Hoehmer and D. S. Hyde, all of San Francisco, and W. F. Ferguson, Santa Rosa, are directors of the company.

Piedmont & Northern (Electric).—An officer writes that

work is about finished on the section from Charlotte, N. C., southwest to King's Mountain, and that 23 miles of this section from Charlotte to Gastonia is now in operation. W. S. Lee, vice-president, and E. Thomason, assistant vice-president, Charlotte. (October 27, p. 860.)

Quebec & Saguenay.—Work has been under way for some time between Cap Tourmenti, Que., and Murray bay, and it is expected that track will be laid on about 65 miles before September. When completed the line is to run from St. Joachim to a point northeast of Murray bay at the Falls. Work is now under way on short tunnels at Cap Rouge and at Cap Martin. O'Brien & Doheny, Quebec, are the contractors. An exploration survey was recently made between Murray bay and Ha Ha bay, 73 miles; it is expected that work on the line will be started soon. A. H. N. Bruce, chief engineer, 85 Dalhouser street, Quebec. (March 1, p. 409.)

San Antonio, Rockport & Mexican.—An officer writes that this company, which was incorporated in Texas in September, 1911, will build from San Antonio, Tex., via Crowther and Rockport, to Harbor Island, also from Crowther to a point on the Rio Grande, a total of 337 miles, with 33 miles of sidings. A contract for the construction work has been let to the European Contract Syndicate, Limited, London, England, which has sublet some of the work between San Antonio and Harbor Island to the Shattuck-Edinger Company, of San Francisco, Cal., and Los Angeles. The contract calls for the completion of the work on about 175 miles within 18 months. Work on the section from Crowther to the Rio Grande is to be finished within three years. The plans of the company provide for an extension from the Rio Grande to Tampico, Mex., and the City of Mexico, also from San Antonio, Tex., north to San Angelo. The preliminary surveys for these extensions will be started as soon as the final survey for the line to the Rio Grande has been completed. The line is to be laid with 90-lb. rail on eight inches of rock or gravel ballast, and the bridges are to be of steel and concrete construction. At San Antonio, it is planned to put up a station to cost $125,000. The company proposes to build docks and terminals at Harbor Island, and has secured a frontage of 2,000 ft. on the harbor. E. Cowper-Thwaite, president; S. A. Hopkins, first vice-president; R. R. Russell, second vice-president; J. H. Haile, treasurer; and J. Frank Davis, secretary, San Antonio. (January 5, p. 37.)

Temiskaming & Northern Ontario.—The contract for building the branch from Earlton, Ont., to Elk Lake, about 30 miles, calls for the excavation of about 340,000 cu. yds. of earth and about 1,000 cu. yds of rock work. There is to be a steel bridge 300 ft. long, with one center and two approach spans, over the Montreal river at mile 22.75, and a 600-ft. trestle over the Jean Baptist river at mile 12. The maximum grades will be 1 per cent. compensated, and maximum curvature 6 deg. McCaffery & McQuigge, Toronto, have the contract for all the work except the steel work. S. B. Clement, chief engineer and superintendent maintenance, with headquarters at North Bay, Ont. (March 29, p. 781.)

Three Forks, Helena & Madison.—An officer writes that contracts are to be let at once to build from Helena, Mont., southwest via Radersburg and Three Forks to Yellowstone, on the Oregon Short Line, at the entrance to Yellowstone Park, about 150 miles. The maximum grades will be 1.5 per cent. There will be two steel bridges. The line is to be built to carry ore from Radersburg and wheat and other products. A. D. Adkins, president, and B. L. Allen, chief engineer, with headquarters at Three Forks.

Yadkin River.—An officer writes that the prospects of building this line are good. The projected route is from a connection with the Southern Railway at North Wilkesboro, N. C., west up the Yadkin river to the mouth of Elk Creek, thence via Cook's Gap to Boone, about 45 miles. The work is to be carried out by the company's men, and will be difficult on about 25 miles. Approximate cuts and fills will average 25,000 cu. yds. a mile. The maximum grades will be 2.2 per cent. compensated, and maximum curvature 10 deg. There will be 1,000 ft. of trestles, and 800 ft. of tunnels. The company expects to develop a traffic in lumber, dairy products and iron ore. W. J. Grandin, president, Tidioute, Pa., and H. C. Landon, chief engineer, Lenoir, N. C. (March 1, p. 409.)

RAILWAY STRUCTURES.

Calgary, Alta.—The Grand Trunk Pacific has bought land to be used as a site for a new station to be built at Calgary.

Chicago Junction, Ohio.—The Baltimore & Ohio has given a contract to P. Farrell, Cincinnati, Ohio, for remodeling the passenger station at Chicago Junction. An additional building, 40 ft. square, is also to be built. The cost of the improvements will be $25,000.

Cumberland, Md.—See Hagerstown, Md.

Elkhart, Ind.—Work has been resumed on the $3,000,000 Lake Shore & Michigan Southern shops at Elkhart.

Galt, Ont.—The Canadian Pacific has bought about four acres of land on Main street, to be used as a site for a downtown freight terminus. The plans call for putting up a freight shed, 290 ft. long, and laying seven tracks. The cost of the improvements will be over $100,000.

Hagerstown, Md.—The Western Maryland has given contracts to the Roberts & Schaefer Company, Chicago, for four large Holmen locomotive coaling stations. They are to be built at Hagerstown and at Cumberland, Md., at Rockwood, Pa., and at West Virginia Central Junction, W. Va. Two of the stations will be of 500 tons capacity, and are to be built to span and coal on four main-line tracks, having 24 ft. centers. The same company put up for the Western Maryland at Elkins, W. Va., a similar structure, which is now in operation.

Harbor Island, Tex.—See San Antonio, Rockport & Mexican under Railway Construction.

Nanticoke, Pa.—Residents of Nanticoke have asked the county commissioners to replace the present Market street bridge over the Susquehanna river, with a new concrete and steel structure, to carry double tracks for the street railway companies.

New Orleans, La.—The New Orleans Terminal Company is planning to spend about $1,000,000 in improvements in its terminal, including the construction of new slips at Chalmette, renewing of the old wharf at Port Chalmette with treated timbers, and the erection of a 500,000-bushel elevator, warehouses and cotton sheds.

New York.—Samuel Rea, president of the New York Connecting Railway, announces that a contract for the foundation and masonry of the Bronx viaduct, to be 4,000 ft. long, has been let to Arthur McMullen, New York.

Port Colborne, Ont.—The Niagara, St. Catharines & Toronto has applied for permission to build a bridge over the canal at Port Colborne.

Rockwood, Pa.—See Hagerstown, Md.

Salamanca, N. Y.—The Buffalo, Rochester & Pittsburgh has given contracts to the Pittsburgh Construction Company, Pittsburgh, Pa., to put up passenger and freight stations at Salamanca. The structures are to be of brick and stone construction.

San Antonia, Tex.—See San Antonio, Rockport & Mexican under Railway Construction.

Scranton, Pa.—The Central Railroad of New Jersey is preparing plans for a new passenger station to be built at Scranton.

Waconda, Ore.—See Oregon Electric under Railway Construction.

Walla Walla, Wash.—The Northern Pacific will build a new passenger station to cost about $50,000.

West Virginia Central Junction, W. Va.—See Hagerstown, Md.

When Guyer-Zeller first urged the building of a railway up the Jungfrau, he estimated that it could be built in five years and would cost $1,600,000. It will be about 20 years before the summit is reached, and it will cost at least $3,200,000. The traffic also was underestimated, and instead of 50,000 passengers in the season on the completed road, there were last year 84,000, while the two upper stations had not yet been reached.

Railway Financial News.

Artesian Belt Railroad.—The sale of this road, which runs from Macdonna, Tex., through San Antonio to a point 60 miles south of there, was mentioned in these columns last week. The sale was made for $200,000 to H. E. Hildebrand, who the *Commercial and Financial Chronicle* says will not be in a position to tell what interests he represents until May 1.

Boston & Maine.—See Concord & Montreal.

Carolina, Clinchfield & Ohio.—It is understood that arrangements have been made to finance the building of a line from Dante, Va., the present northern terminus of the road, north over the mountain to a connection with the Chesapeake & Ohio. The estimated cost of this 40-mile extension is said to be about $4,000,000.

Central New England.—Stockholders of the New England Railroad are to vote April 30 on the question of approving a 99-year release of the property to the Central New England. The New England Railroad is now leased to the New York, New Haven & Hartford, and apparently a new lease to the Central New England would be a technical change only since the New Haven leases the Central New England.

Concord & Montreal.—This company, whose property is leased to the Boston & Maine sold at public auction $375,300 of the $400,000 stock recently authorized by the stockholders to President B. A. Kimball for $160 per share, to reimburse the Boston & Maine for its advances for improvements.

Denver & Rio Grande.—Blair & Co., and William Salomon & Co., both of New York, have agreed to underwrite the offer of $10,000,000 adjustment mortgage 7 per cent. cumulative bonds dated April 1, 1912-1932, on the authorization of which issue stockholders will vote on April 27. See also Colorado & Southern.

Erie.—The New York Public Service Commission, Second district, has granted permission to the Erie to issue $10,000,000 3-year 5 per cent. notes. The proceeds of the sale are to be used to build double track and make grade revisions between Marion, Ohio, and North Judson, Ind., and on the Meadville division and between Buck Tooth and Red House.

Lancaster, Oxford & Southern.—This road, which runs from Oxford, Pa., to Susquehanna, 20 miles, has been sold under foreclosure for $50,000 to John A. Coyle and John M. Groff, representing certain bondholders.

Missouri & North Arkansas.—W. S. Holt, J. McDonald and Vice-President and General Manager George Sands have been appointed receivers on the application of the St. Louis Union Trust Co., trustee of $600,000 bonds. The road runs from Joplin, Mo., to Helena, Ark., 359 miles.

Missouri, Kansas & Texas.—B. F. Yoakum has resigned as a director and member of the executive committee. It is understood that his place will be filled by the election of the newly appointed president, C. E. Schaff.

New England Railroad.—See Central New England.

New York Central & Hudson River.—The New Jersey assembly voted against passing the bill to permit the merger of the subsidiary lines of the West Shore with the parent company within New Jersey, and the merger of the West Shore with the New York Central & Hudson River.

See also an item in regard to the refusal of the New York commission to permit the purchase of the New York, Ontario & Western in State Commission News.

New York, New Haven & Hartford.—See Central New England.

New York, Philadelphia & Norfolk.—This subsidiary of the Pennsylvania Railroad has applied to the Public Service Commission of Maryland for authority to issue $1,250,000 new stock to pay for additional equipment and expenses already incurred.

Ohio River & Western.—See Pennsylvania Railroad.

Pennsylvania Railroad.—A press despatch from Zanesville, Ohio, says that the Ohio River & Western, a narrow gage road running from Zanesville to Bellaire, 112 miles, which was recently bought by G. S. Jones, of Toledo, has now been bought by the Pennsylvania Railroad for $3,000,000. It is said that the property includes some coal lands.

Pere Marquette.—This company has failed to secure permission from the Michigan railway commission to issue certain securities, the negotiations of which had already been arranged. The Guaranty Trust Company, New York, will therefore purchase at par the following notes and coupons due April 1, 1912: Flint & Pere Marquette first mortgage coupons; Detroit, Grand Rapids & Western first mortgage coupons; Pere Marquette Pullman equipment series A and series B notes and coupons; Pere Marquette Robert Winthrop & Company equipment notes and coupons; Pere Marquette American Car & Foundry Company equipment notes and coupons; Pere Marquette American Locomotive Company equipment series A and series B notes and coupons.

Pittsburgh, Cincinnati, Chicago & St. Louis.—The New York Stock Exchange has listed $1,498,000 additional common stock, making the total listed $37,382,400. The stock is to be issued to the Pennsylvania Company at par for a like amount of Cincinnati, Lebanon & Northern stock, the entire $1,500,000 of which the Pennsylvania Company now owns.

Pittsburgh, Somerville & Clarion.—This road, which runs from Somerville, Pa., to Clarion, 16 miles, was sold under foreclosure on March 30 subject to $500,000 first mortgage 5 per cent. bonds of 1904-1944.

Quebec Oriental.—The holders of the first and second mortgage Matapedia section bonds will vote in London, April 16, on the question of authorizing $250,000 prior lien bonds or other securities bearing not over 6 per cent. interest, ranking in priority to the first and second mortgage Matapedia section bonds, and secured on the Matapedia section.

Union Pacific.—Julius Kruttschnitt and Louis J. Spence have been elected directors, succeeding William Bayard Cutting, deceased, and Clarence H. Mackay, who refused re-election. A member of the executive committee is quoted in the *Wall Street Journal* as saying that neither the Union Pacific nor the Southern Pacific will sell any bonds or do any other kind of financing for some time to come.

Virginian Railway.—Holders of the $2,625,000 5 per cent. first lien equipment notes, series A, and 5 per cent. second lien equipment notes dated November 1, 1908, are offered the privilege of exchanging their holdings for 5 per cent. cumulative preferred stock at the rate of $1,050 preferred stock for each $1,000 note. (March 29, p. 782.)

Wabash Railroad.—Bernard M. Baruch has been elected a member of the executive committee of the Wabash, succeeding Edwin Hawley, deceased.

West Shore.—See New York Central & Hudson River.

FOREIGN RAILWAY NOTES.

The railway in Egyptian Soudan from Khartum southwestward 233 miles to El Obeid, the chief town of Kordofan, was opened February 27 in the presence of General Kitchener and various sheiks. This railway follows the White Nile for about 100 miles and then turns westward. There is another railway from Khartum which extends southeastward up the Blue Nile. Both have their rail outlets at Snakin, on the Red Sea.

Accompanying the estimates of the Baden State Railway, Germany, of its expenditures for the year beginning with April, is a statement of the amounts expended and to be expended for building and rebuilding stations. From this it appears that the new station at Heidelberg will cost when completed more than $9,000,000; the removal of the Carlsruhe station, a trifle more; the rebuilding of the Basel station, more than $12,000,000; the Offenburg station, $4,800,000; the exterior at Pforzheim more than $2,000,000. Altogether the new station work will cost $38,500,000, though the costliest of these stations is across the border in Switzerland. Nearly $13,000,000 of this has been already expended and $12,500,000 is required for this year—this in an old country where very little new railway has been built for many years.

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IN looking over the illustrations in this issue, which show how box cars may be pilfered from without breaking the seal, one is reminded of the story of the Indian who robbed a United States mail bag . After slitting open the bag and removing the mail he grunted, "White man, fool! Put a brass lock on a canvas bag." Fourteen per cent. of the amount paid out for loss and damage to freight on the Frisco Lines last year was directly traceable to robbery. A large part of the pilfering was probably accomplished by forcing open the side and end doors without breaking the seals, or leaving any evidence that the car had been broken into. In such cases it is practically impossible to get any clues as to just where the pilfering was done. It is, of course, always an easy matter to break the seal, but employees of the railways are not going to take this chance of being detected. There are a number of different devices for making the side and end doors burglar proof, which are well known to practical car men. In most cases they do not add very much to the cost of the car, and it is, therefore, surprising to find that cars which have been built within the past year or two are not equipped with such devices. In the case of the door shoes or guides, it is not an expensive process to gradually apply burglar-proof shoes to the older equipment. It is only necessary to apply a burglar proof shoe at the rear of the door and the older, non-burglar proof shoes can be laid aside and be used for making repairs or replacements as the shoes at the front end of the door fail or are lost. The door hasp fastenings, even for strength and reliability under average conditions, should be more substantial than the defective type which is illustrated, and yet there are a large number of these defective fastenings in service. Possible criticism for publishing descriptions of methods of pilfering from box cars was carefully considered when the article was written. It was felt that the reason cars were allowed to remain in a condition such that this was possible was because railway executives generally do not know that a great number of cars can be entered without breaking the seals and that if they did they would take immediate steps to remedy this condition.

THE Safety Committees of the Baltimore & Ohio have made marked progress during the brief period since their establishment last November, and there, as on the North Western and other roads where the officers and employees have been aroused on the subject of protecting lives and limbs, the interest manifested among all classes seems to be deep and genuine. A report of one of the recent "mass meetings" held by the B. & O. general committee is given on another page. One evidence of the intelligence of the interest shown by employees in this reform was the applause which was elicited at this meeting by the pictures which Mr. Egan showed with the stereopticon. These pictures, showing not only shields for shop machines, etc., like those given in the *Railway Age Gazette* last December (page 1115), but also dangerous situations in yards, such as where a man kicks a car coupler into place or jumps on the front of a moving switching engine, illustrate all degrees of carelessness and thoughtlessness, and suggest varying degrees of bragadocio mixed with the carelessness; and it was plain that the assembled employees appreciated the lessons according to their importance—according to the seriousness of the foolishness illustrated. Presumably, the Baltimore & Ohio has its share of reckless men; but it is clear that it also has an adequate leavening of those who know the value of caution and who therefore will be able, by precept and example, to admonish those who are reckless or ignorant. Not the least important feature of the safety measures of the B. & O. is the fact that the vice-chairman of the general committee (J. W. Coon, assistant to the general manager,) devotes his whole time to this work. No important enterprise can succeed unless some one strong man makes that enterprise his principal business; and this fundamental principle is here duly recognized. Officers from all of the outdoor departments of the road must, of course, be interested, but no man who is engrossed in other work, even for half his time, can feel assured that he is accomplishing all that ought to be accomplished in an important new field like this. The general committee follows up the records very closely, as shown in our report, allowing nothing to be neglected because of any avoidable delay. Another thing to be done henceforth is to have one or more of its members present at the superintendent's investigation of every collision or derailment that may occur. Still another significant incident is the cultivation of acquaintance with the trainmen on their own ground. Members of the general committee accepted an invitation from a local lodge of the Brotherhood of Railroad Trainmen to attend a regular lodge meeting (in Baltimore) and they report the discussions there held as the most profitable in their experience. The one distinctive thing about the "safety movement" is the idea of getting each

individual employee to think and act, for his own safety and the general good, on his own initiative; and no railway officer needs to be told that to accomplish this it is essential to disarm every last vestige of suspicion—suspicion that the company has an ulterior, sinister purpose or motive. Giving all employees full opportunity to ask every possible question is a simple way to do this.

THE refusal of the New York Public Service Commission, Second district (up-state) to approve the New York, New Haven & Hartford's proposed sale of the majority of the New York, Ontario & Western stock to the New York Central & Hudson River is in conformity with the recommendations of the Securities Commission report. The Securities Commission recommended that a law be passed which should make it illegal for a railway company to buy the majority of another railway company's stock without offering to buy the minority stock at the same price per share as was to be paid for the majority stock. The reasons for such a recommendation and the reason underlying the refusal of the Public Service Commission to permit the New York Central's purchase are obvious. An individual who buys control of a railway company must depend for his legal profits on the earnings of the property in which minority holders of stock share pro rata; but when one railway company buys control of another, it may well be that it can afford to take an actual loss on its investment, as an investment, in order to secure advantages to itself which are not shared in by minority holders of the controlled company. The protests of the preferred stockholders of the Rutland, of the income bondholders of the Central of Georgia and of the preferred stockholders of the St. Joseph & Grand Island, claiming that their properties are managed for the benefit of the controlling railway at their expense, regardless of whether or not the protests have merit, illustrates what may happen to minority stockholders. Of course, if minority holders of stock are offered a chance to sell their securities at the same price the majority is receiving, and they do not take advantage of it, any future hardship will be the result of their own bad business judgment. There is one point that the Public Service Commission did not discuss, but which deserves notice. The original intention was to have the New York Central & Hudson River pay for the New York, Ontario & Western stock through the issue to the New York, New Haven & Hartford of a single large debenture. The Ontario stock was originally paid for by the New Haven through the issue of its own debenture bonds. As long as the New Haven retained in its own treasury the debenture that the New York Central gave it in exchange for its Ontario stock there would be no duplication of securities in the hands of the public. Were the New Haven, however, to sell this N. Y. C. debenture, or use it as part collateral for an issue of securities of its own which it would sell to the public, there would be a clear case of such duplication. The public would be buying securities back of which there was no new tangible property or new investment in such property. It is understood that there was to be nothing in the wording of the debenture or its indenture which would make it non-negotiable or prevent the New Haven from selling it or using it as collateral security.

A DISTINCT improvement in the efficiency of operation of the New York Central Lines during the year 1911 as compared with 1910 was noted in our reviews of the annual reports of the principal companies of the system in the *Railway Age Gazette* of March 22. On the New York Central, the Lake Shore and the Big Four there was an important increase in the train loading, without corresponding increases in the loading per car, which to a large extent counteracted the effect on the cost of conducting transportation of increased wages. In the case of the Lake Shore this was a large factor in actually reducing the cost of conducting transportation $1,198,000. On the New York Central the transportation cost was $996,504 larger than in 1910; on the Big Four it was reduced $430,408, and on the Michigan Central it was increased only $25,000, while the pay of road enginemen alone increased $82,000 during the year. Inquiry as to the means by which the increased cost of labor employed in train movement was partially, or wholly, or even more than wholly, offset on the various lines, has elicited the information that an extensive adoption of superheaters on the locomotives of the system has made possible a large increase in capacity per locomotive, making it practicable to haul additional cars per train at proportionately lower cost, and with a large saving in engine mileage, which was also appreciably affected by the reduced need for double headers. About 25 per cent. of the locomotives on the western lines have been equipped with superheaters during the past year or so, and the number is being rapidly increased all over the system. Of course, other factors have affected the result, particularly the unremitting effort to improve efficiency which has led to the seeking of every opportunity to secure better service from power and equipment. The average train load on the Lake Shore, which in the past has been heavy, was increased last year from 594 tons of revenue freight to 635 tons. Car loading was practically the same in 1911 as in 1910, but on the average there were 46 cars per freight train in 1911 as against 42 in 1910. On the New York Central the average freight train load was increased from 417 tons to 430 tons, adding 1.87 cars per train, with only a slightly better car loading. On the Big Four there was an increase from 431 tons to 445 tons and of three cars per train, with no change in average car loading. Although the total empty car mileage on all of the lines was greater than in the year before, it was handled by increasing the length of trains instead of with a proportionate effect on train mileage. On the New York Central, although freight car mileage increased over 50,000,000 miles, the freight train mileage increased only 250,860 and the freight locomotive mileage only 71,764 miles. In the passenger service the car mileage increased 2,123,790 miles, while the passenger train mileage shows a decrease of 348,800, and the passenger locomotive mileage was reduced by 743,326. On the Michigan Central there was a decrease of 1,310,000 miles in the total locomotive mileage and a decrease of 480,000 miles in the total train mileage; while on the Big Four the locomotive mileage decreased by 1,453,000 miles and the total revenue train mileage was reduced by 978,594.

GOVERNMENT OPERATION OF THE PANAMA RAILROAD.

THE advocates of government ownership of railways tell us that under public ownership the roads would be more economically managed and the public would receive the benefit in the form of lower rates. The government of the United States now owns a railway. It has owned and operated it for several years. This is the Panama Railroad. The efficiency with which it has been managed and the rates it has charged may throw more light on what the results of public ownership of all our railways might be than many bald assertions. B. L. Winchell, president of the Frisco Lines, has issued a statement regarding government operation of the Panama Railroad, which we give on another page, and which contains some highly interesting information. It shows that from the very time the government began to operate the road its operating ratio began to increase. This was in spite of the fact that its traffic was growing with almost unparalleled rapidity, the gross earnings of the railway and steamship lines together having increased 84 per cent. in seven years, while their operating expenses increased 110 per per cent.

The Panama Railroad now handles a little more freight per mile than do the railways of the United States on the average,

and has a much heavier passenger traffic per mile. Therefore, we might expect to find that its operating expenses per mile are higher. But who would be prepared to find that they are almost seven times as large as those of the railways of the United States? Panama seems to be an inviting field for the application of Harrington Emerson's theories of scientific management. It takes a heap of money to pay the operating expenses of the Panama Railroad, which average $49,482 per mile—as compared with only $27,677 per mile for the Pennsylvania Railroad, which handled three-fourths as many passengers per mile and five times as much freight per mile—and, therefore, Uncle Sam has to get very high rates. His average rate per ton per mile on the Panama Railroad is 4.14 cents. His rate on commercial freight crossing the isthmus is $3.67 for a haul of 50 miles, or over 7 cents per ton per mile; while he charges the Isthmian Canal Commission for the same haul, only $1.09, or about 2 cents per ton per mile. In the United States of America there is a law entitled the Act to Regulate Commerce, which prohibits unfair discrimination between shippers under stringent penalties. But down in Panama Uncle Sam thinks it is all right to haul goods for himself at a rate of 2 cents per mile and then "stick" the commercial shipper for 7 cents per mile.

It is well known that the government, with its customary efficiency, very greatly underestimated what the Panama canal was going to cost. What would the Panama canal cost if the rates of the Panama Railroad for the handling of freight for the Isthmian Canal Commission were the same as its rates for handling freight for commercial shippers? Of course, the Panama Railroad belongs to the government, and the Isthmian Canal Commission is a government body, and the charges that the government makes on its own railway for hauling the freight of its own commission are largely a matter of accounting. But it will be noted, as is usually the case with governments, that the accounts are being so kept as to reflect glory where it will do the powers that be the most good. And, in the meantime, commercial shippers are paying rates which are 250 per cent. higher than those that are being paid by the Isthmian Canal Commission.

The theory on which the shippers and regulating authorities of the United States have acted is that a railway's rates should go down as its traffic and earnings go up, especially if it is earning a fair return or more. The government paid about $60,000 a mile for the Panama Railroad. Its net earnings per mile in 1911 were $30,816, or more than 50 per cent. on its cost. In two years, at that rate, the railway completely pays for itself. One would think that that should be considered a fair return, because the railways of the United States have to be satisfied with net earnings of only $3,895 per mile on a capitalization of a little larger than the cost of the Panama Railroad. But Uncle Sam is not satisfied with net earnings of 50 per cent., and so, after having earned this much in the fiscal year 1911, he announced last fall that hereafter his railway and steamship lines would appropriate 40 per cent. of the through rail and water rate between the Pacific and the Atlantic coast, instead of 30 per cent. as heretofore. Also, prior to that time Uncle Sam had been satisfied with a monopoly of the steamship business between Colon and the port of New York, but he then extended his monopoly to include also all business between Colon and the port of Philadephia.

If there was a railway in the United States which was earning as much money per mile as the Panama Railroad, and charging rates anywhere near as high, the Interstate Commerce Commission would step in and make sweeping reductions in the rates. But Uncle Sam is too good a business man to let the Interstate Commerce Commission have anything to do with his railway. Its rates are made by the arbitrary fiat of its officers, and there is no appeal to the commission.

Is it any wonder that the advocates of government ownership have never used the government-operated Panama Railroad as an argument for their cause?

DEFECTIVE BOX CARS.

BETWEEN eleven and twelve per cent. of the money paid out for freight claims on the Frisco system for the year ending June 30, 1911, was for damage which was directly traceable to defective equipment. If it were possible to add to it that part of the damage caused by rough handling, robbery and wrecks, which was primarily due to defective equipment, this percentage would probably be increased two or three times. The railways at large paid out about $30,000,000 in freight claims last year, and at least $4,000,000, and probably as much as $10,000,000 of it, was caused by defective equipment. When we also consider what this defective equipment must mean in the increased expense of maintenance due to poor design and construction, we are forced to conclude that some radical steps should be taken to bring about better conditions. A careful study of the defects which are responsible for the greater part of this damage indicates that remedies are available which if applied would practically prevent the larger part of the damage now charged against defective equipment, and at the same time would considerably reduce the charges against robbery and would possibly also affect the damages due to rough handling and wrecks.

In a series of articles, the first one of which appears in this number, an attempt has been made to locate such defects in box cars, and at the same time to suggest remedies which will overcome them, thus making the criticism thoroughly constructive. Moreover, it is realized that the railways under ordinary conditions will not promptly make the necessary changes and improvements in either the new equipment which they order, or in the older equipment, which is in such serious condition as to warrant immediate action being taken to put it in first class shape. This for the reason that any one road that might improve its equipment in this respect would not obtain the full benefit, because of a large proportion of its cars being off the system most of the time. To get the best results, therefore, all of the roads should act together.

E. D. Levy, assistant general manager of the St. Louis & San Francisco, in a paper read before the Association of Transportation and Car Accounting Officers, which met at Colorado Springs, Colo., June, 1910, suggested the desirability of having the American Railway Association appoint a committee which should pass on all plans and specifications for new freight car equipment, with a view to pointing out and remedying defects which would cause loss or damage to the commodities carried by such cars, making them water proof, grain tight and burglar proof.

In the working out of this scheme it would undoubtedly be necessary to form a bureau which would work under the direction of the committee, and which would be controlled by men of considerable experience in the design and operation of freight cars and with a knowledge of their suitability for service from a freight claim standpoint. Mr. Levy's suggestion also included a number of inspectors who would be located at the various car building works throughout the country and who would also direct the work of making the necessary improvements and changes in the equipment already in service on the various roads. The remaining articles in the series will consider the various defects which cause loss and damage to freight and will give suggestions as to how they may be overcome.

It may be argued that it will cost more to make the cars water, burglar and grain leakage proof than to pay the claims caused by defective equipment. Even if this were so, and it is extremely doubtful if it is, it is the duty of the railways to make this expenditure, because when they sign a bill of lading for freight it is their duty to transport it to its destination and deliver it in its original conditon. Even though it might be convenient and less expensive for them to continue maintaining the equipment as they have in the past, and pay the claims, they are not warranted in continuing this policy and forcing loss and inconvenience on the shippers, who are only partially compensated by the payment of claims for the actual loss sustained.

THE CONSTRUCTION OUTLOOK.

ACTIVE preparations are now being made for the railway construction work to be done this year. It is of interest to take inventory of the work already authorized and to note to what degree the construction outlook reflects the general commercial conditions of the country. In most business lines a more optimistic view of the prospects for the future is evidenced in spite of the fact that it is a "presidential year." The belief is prevalent that the lowest point of the depression has been passed, and that business is now on the upward trend.

That this same feeling is present in the railway field is evidenced by the construction plans already announced for this year. The past two years, and especially the last year, have witnessed the completion of large projects already started rather than the inauguration of much new work. A comparatively large amount of money has been spent, but it has been spent in finishing rather than in beginning projects. Conspicuous examples of this were, the Santa Fe extension across western Texas and the Delaware, Lackawanna & Western Hopatcong cut-off. Improvements advisable but not absolutely necessary were postponed until business conditions should improve.

This spring the conditions are more favorable. While the announcement of the resumption of work has not been general and many roads are still planning for a very quiet year, several new and expensive pieces of work have been announced. Conspicuous among these is the new double-track line of the Louisville & Nashville, between Nashville and Birmingham, with the second track on the present alinement south from Birmingham. These improvement will involve some very heavy work and will cost about $15,000,000. Contracts have already been let for a large part of them and work is now under way. This is one of the most important moves made up to this time by any of the railways to provide facilities for the handling of the increased north and south business which is expected to develop after the opening of the Panama canal. Another very heavy piece of work for which contracts were let within the past month is the Delaware, Lackawanna & Western's revision of grade and alinement between Clark's Summit, Pa., and New Milford. This is a further step in the policy illustrated in the construction of the Hopatcong cut-off, whereby this line, already the shortest between Buffalo and New York, is to be further shortened to handle more economically a very heavy freight tonnage. Another heavy expenditure recently authorized in the East is for the New York, New Haven & Hartford's electrification from Stamford to New Haven, which will give continuous electrical service from New York to New Haven, about 70 miles.

In the middle West the Chicago, Milwaukee & St. Paul has announced the most aggressive programme, consisting principally of heavy grade reduction and realinement in connection with the construction of a second track on the Chicago-Omaha line through Iowa. The demand for increased facilities here arises largely from the closer traffic relations that have been formed between the Milwaukee and the Harriman Lines, which were indicated by the recent inauguration of increased through passenger service following closely on the announcement of the tariff agreement between the Chicago and North Western and the Northern Pacific for the handling of through passenger business. The Chicago & North Western has let contracts within the past month for a 90-mile extension from Peoria south to the central Illinois coal fields which will involve some very heavy work, including the separation of all crossings with other railways. The Denver & Rio Grande has just announced its intention to provide a second track over Soldier's Summit and for some distance west of the continental divide, requiring an expenditure of over $3,500,000. In the far west the Harriman Lines have announced their intention of building several branch lines in central Oregon which are, however, for the most part comparatively inexpensive. The Northern Pacific has recently let the contract for the construction of a cut-off between Tenino, Wash., and Tacoma, which will complete the second track between Tacoma, Wash., and Portland, Ore. This will involve the building of several tunnels and very heavy work throughout.

All of these large improvements, and others that might be mentioned are, in addition to the usual amount of grade reduction, second track and terminal work which is necessary from year to year, and indicate a belief on the part of the railways that the present depression will soon be a thing of the past, as well as a realization of the necessity for increasing their facilities to handle the increased business which will surely come.

THE PRESS, THE PUBLIC AND THE RAILWAYS.

IN a speech at Baltimore last December, President Willard of the Baltimore & Ohio mentioned the change in the attitude of the press toward the railways that has taken place. "Five years ago," he said, "out of 100 articles, taken from as many papers, having reference to railways, at least 65 would be found to be distinctly hostile to the roads, and the remaining 35 indifferent or merely lukewarm in their support. Now, a similar investigation would show at least 90 distinctly favorable to the roads and practically none opposed." Mr. Willard's statements still hold good. There are yet some newspapers and magazines that attack the railways on every possible occasion, but their number is small, and their influence is declining. There has been a corresponding change in the attitude of the public, which the Illinois railway commission called attention to in its recent annual report. We gave in our issue of April 5, page 810, some extracts from the Illinois commission's significant observations on this subject.

The former hostility of public and press was due to two causes. First, there were many widely prevalent abuses in the railway business. Second, there were many conditions which were misunderstood, which were criticised because they were misunderstood, but criticism of which railway men habitually ignored. The change in the attitude of press and public is due, as the Illinois commission intimates, to the fact that the officers of the railways recently have been sincerely and zealously endeavoring to remedy the conditions of which there was just complaint, and also defending and giving publicity to the facts about the features of their business which have been unjustly criticised because misunderstood. Regarding the improvements in railway operation the Illinois commission says:

> "It is gratifying to be able to say, from information gathered by the commission throughout the state, that the people today are being, generally speaking, better served by the railways and common carriers (with a few exceptions), both in point of train service and car supply than at any previous time."

And the commission averts in the following sentence to other things of hardly less importance that the railways have been doing:

> "Greater publicity of the workings of the common carriers by them given to the public will naturally create a better knowledge of conditions, and when the public understand fully the conditions they will be just in their demands in relation to service, and the common carrier will have no trouble in receiving at the hands of the public a just compensation for the character of the service rendered the public."

One of the means that have been very influential in educating public and press regarding railway conditions has been the semi-monthly bulletin of the committee on Relations Between Railways of the American Railway Association, summarizing car shortages and car surpluses. Fortnight by fortnight for five years these bulletins have set forth the car situation, at present and also back to 1907, and during four of the five years they have shown that the surpluses were steadily exceeding the shortages—in other words, that the railways were providing more equipment than there was traffic for. These statistics will be

of even more value in the future when, probably, car shortages will return, for while they will show that for brief periods the equipment supply may be inadequate, they will also show that there have been periods of years at a time when the roads have had millions of money tied up in cars for which no traffic was forthcoming, and that if they do not provide enough equipment to handle readily the maximum amount of traffic the country can possibly furnish them at certain times, there is good reason why they should not do so.

The attempts of the railways to advance their freight rates, and the resulting hearings and decisions, also have exerted an important educational influence. They had for years been on the defensive in regard to rate matters. In the rate advance cases they assumed the offensive, and contended—and, in the opinion of many persons, demonstrated—that freight rates in the greater part of this country not only are not too high, but are too low. Even the attacks on the efficiency of their management had effects that were beneficial, for they served to direct attention to the fact that the main obstacle to the adoption of some plans for increasing efficiency has been the opposition of the labor unions, and that the demands of labor for ever increasing wages and easier conditions of employment have been tending powerfully to increase the cost of operation.

About a year and a half ago the railways established at Washington the Bureau of Railway Economics to study railway economic conditions and furnish information about them to railway men and to such newspapers and magazines as might care for it. Some newspapers thought that the bureau had been established merely to supply the kind of publicity matter with which newspaper men are familiar, and assumed an attitude of hostility toward it. The bureau went on, nevertheless, making its investigations and issuing its publications. Soon many newspaper men began to find that its monthly bulletins summarizing the earnings and expenses of steam roads contained the earliest correct and comprehensive information on the subject available. In consequence, its statistics have been increasingly quoted and commented on. It has issued a number of valuable and instructive pamphlets, such as its study of the valuations of railways that have been made in the various states and its study of the cost of transportation on the Erie canal. While the bureau is supported by the railways, its publications have been devoid of a tone of partisanship, and no serious inaccuracy has, we believe, ever been detected in its statements. They have been as free from bias as those of the Interstate Commerce Commission. All these things have tended to increase the confidence of press and public in the bureau's work, and to make it an influential instrumentality for the collection and diffusion of correct and timely information regarding railway affairs.

Another potent educational influence has been the work of the Special Committee on the Relations of Railway Operation to Legislation. It has collected and diffused a large amount of information bearing on the various phases of railway operation which Congress and the state legislature have been regulating, or considering regulating. Through its members, and spokesmen chosen by them, it has had numerous public conferences with representatives of the labor brotherhoods, and with the interstate and state commissions and committees of Congress. It has not considered it to be its function to oppose all legislation, but has opposed only legislation which seemed sure to be harmful both to the railways and the public, and has cooperated in framing legislation which seemed desirable in the public interest, even though it might tend to impose additional burdens on the roads.

Meanwhile, the presidents and other officers of individual roads have been participating more and more courageously and frankly in the discussion of questions mutually concerning the railways and the public. The change in the attitude of the press and public toward the railways unquestionably is chiefly due to the change in the attitude of the railways toward the press and the public, which the developments mentioned illustrate. The manifestation of a disposition of fair dealing and frankness on the one side is calling forth manifestation of a similar disposition on the other side—as, indeed, it almost invariably does in all affairs. The success that is attending the present policy of the railways should encourage them to persevere in it with increased zeal and confidence. A persistent prosecution of the work of righting the rapidly lessening number of things that are wrong in the transportation business, and defending the greatly preponderant and fast growing number of things that are right in it will in the long run effectually protect reasonable net earnings and render futile all the arguments of the advocates of unreasonable regulation or of government ownership.

DELAWARE & HUDSON.

THE Delaware & Hudson is a north and south line, in trunk line territory, with almost no branches, and reaching neither the Lakes nor the Atlantic coast. This in itself makes it an exception to other roads in its territory. Its reason for existence is that it taps the anthracite coal fields in Pennsylvania, supplying New England and eastern Canada with anthracite coal, and connects Albany with eastern Canada. Its most obvious competitors for the coal business are the New York, Ontario & Western, which, through its connection with the New York, New Haven & Hartford, supplies coal to New England, and the New York Central Lines, which, through their connection with the Delaware, Lackawanna & Western, can compete on coal for Canada. About 50 per cent. of the total tonnage carried by the D. & H. is anthracite coal, and 15 per cent. additional is other products of mines. Manufactures form about 14 per cent. of the total tonnage.

The Delaware & Hudson only operates 878 miles of line, and, as we have said, this is nearly all main line. The map shows what part of this road is double track. The importance of the property both as an earner and as a carrier is not adequately measured by the mileage operated. In 1911 total operating revenues amounted to $21,420,000, an increase over 1910 of $990,000. The added revenue in 1911 came largely in an increase in revenue from carrying coal. This revenue amounted to $9,850,000 in 1911, which is more by $1,120,000 than the revenue from the same source in 1910. The tonnage of coal carried in 1911 was 9,295,000 tons as against 8,270,000 tons carried in 1910. The total number of revenue tons carried one mile was 2,610,000,000, an increase of 153,000,000 ton miles. The average haul, was 131 miles, or very slightly more than in 1910; and the average revenue per ton per mile was 6.8 mills, or exactly the same as in 1910.

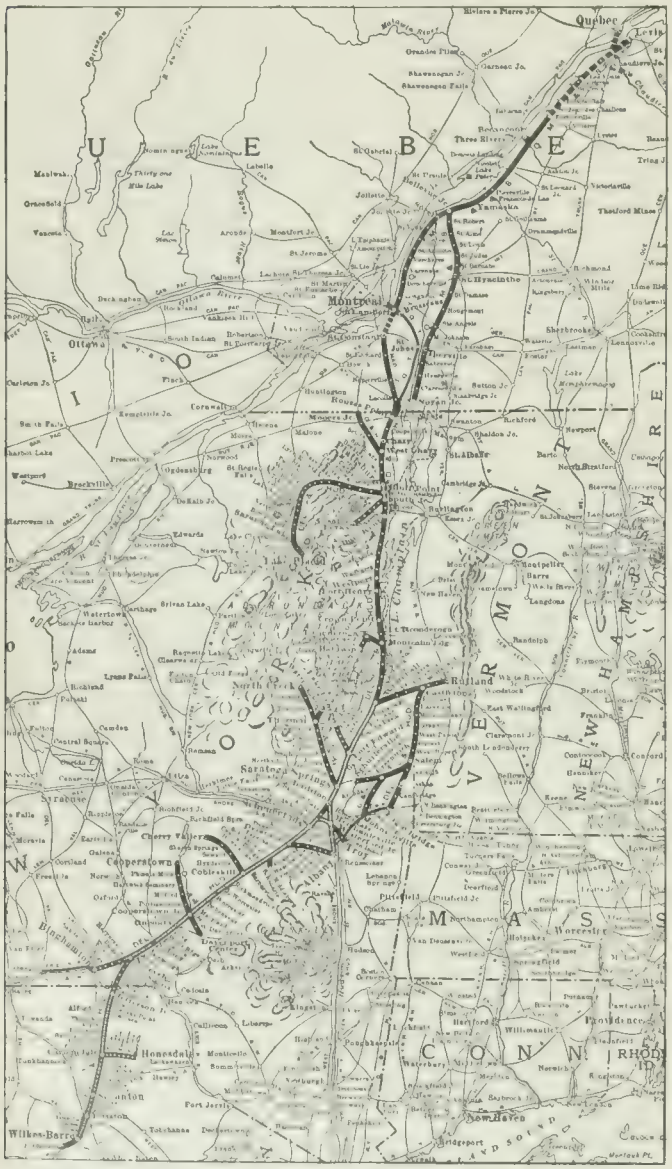
Passenger business, from a revenue point of view, on the D. & H. is comparatively unimportant, but it is interesting to watch the results from this business, because the D. & H. divides up its earnings from the different classes of passenger service, and on this road the receipts from commutation tickets are not very much smaller than the receipts from other ticket sales. In 1911 total passenger traffic revenue amounted to $2,970,000, an increase of about $60,000 over 1910. The receipts from ticket sales were $1,590,000, or 7.49 per cent. of total revenue from transportation, and only slightly less than the receipts from ticket sales in 1910. Receipts from commutations amounted to $1,160,000, which was an increase of $40,000 over the year before, and amounted to 5.43 per cent. of the total transportation revenue.

With revenue greater by $990,000 in 1911 than in 1910, and business greater by 153,000,000 ton miles and 4,410,000 passenger miles, total operating expenses increased by $560,000 and amounted to $12,760,000 in 1911. With the exception of a decrease of about $170,000 in other income, in part offset by a decrease of $65,000 in deductions from income, the income account below "net operating income" shows few changes. After paying interest and rentals there was available for dividends $5,240,000 in 1911, or 12.32 per cent. on the outstanding stock, comparing with

$5,330,000 available for dividends in 1910, or 12.54 per cent. on the outstanding stock.

The increase in expenses is explained by an increase of $220,000 in cost of maintenance of equipment and $350,000 in transportation expenses. There were 13,000,000 locomotive miles run in 1911 as against 12,690,000 miles in 1910, and loaded freight car mileage increased from 102,950,000 miles to 107,370,000 miles, while empty freight car mileage increased from 43,710,000 miles to 50,910,000 miles.

It will be recalled that in 1911 the Delaware & Hudson sold $7,000,000 additional first and refunding mortgage 4 per cent. bonds at a discount of $175,000. The balance sheet at the end of 1911 shows cash on hand of $1,920,000, as compared with $1,780,000 cash at the end of 1910 and $597,000 deposited with



The Delaware & Hudson.

the trustee as unexpended balance of the proceeds of the bond sale to pay for additions and betterments. Loans payable at the end of 1911 amounted to $900,000 as against $4,490,000 in 1910. During the year $2,370,000 was spent for additions and betterments to road, and $315,000 for additions to equipment. It is rather interesting to note that the D. & H. estimates that the safety appliance act of 1911 will involve an expenditure of about $315,000, which will extend over about five years. The D. & H. is now equipping 1,800 coal cars and 600 box cars with steel underframes, and when this work is completed 70 per cent. of the revenue freight car equipment will have steel underframes.

The following table shows the principal figures for operation in 1911 as compared with 1910:

	1911.	1910.
Average mileage operated	879	843
Coal freight revenue	$9,847,194	$8,724,581
Merchandise freight revenue	8,027,413	8,052,705
Passenger revenue	2,967,129	2,910,026
Total operating revenues	21,421,817	20,431,800
Maint. of way and structures	1,488,757	1,557,913
Maint. of equipment	3,060,739	2,842,069
Traffic	250,285	249,933
Transportation	7,414,071	7,066,049
Total operating expenses	12,758,159	12,198,287
Taxes	562,410	497,408
Operating income	8,101,248	7,736,105
*Gross railway corporate income	9,476,245	9,286,911
*Net corporate income	5,237,681	5,330,189
Dividends	3,825,270	3,825,270
Surplus	1,412,411	1,504,919

*Excluding the gross income from the coal department, which amounted in 1911 to $284,219, and in 1910 to $485,751.

NEW BOOKS.

The American Year Book. F. G. Wickware, editor. New York: D. Appleton & Co. Cloth; 5 in. x 8 in.; 863 pages. Price, $3.50 net.

This is the second volume of this annual record, the first having been issued in January, 1911. It is the work of 119 editors, all of them prominent specialists, and nearly all of them being either well-known authors or connected with well-known American educational establishments. They seem to have done their work with great thoroughness. This enterprise was established in 1910 by conferences of the members of national societies, and the Supervisory Board then organized has been incorporated as the American Year Book Corporation, with Prof. A. B. Hart, of Harvard, as president, and Prof. G. W. Kirchwey, of Columbia, as secretary. Thirty-nine of these professors and specialists constitute the board which has supervised the preparation of the present volume. About all of the learned societies of the country are represented, though we miss one prominent name—that of the American Society of Civil Engineers. The 38 chapters of the book are grouped under the following heads: comparative statistics; history and politics; government; economic and social questions; public works and national defence; industries and occupations; science and engineering; the humanities, and current record. Chapter 25, trade, transportation and communication, fills 30 pages, and its editor is Grover G. Huebner, of the University of Pennsylvania, who was joint author with Professor E. R. Johnson of "Railroad Traffic and Rates," an excellent compendium which was issued last year. Perhaps the most useful part of this chapter is the record of state legislation concerning railways, which, severely condensed, fills four pages. Another page is given to rulings of the Interstate Commerce Commission, and six of the leading court decisions of the year are noticed.

Proceedings of the Fourteenth Annual Meeting of the American Society for Testing Materials, held at Atlantic City, N. J., June 27, 1911. Volume XI. Cloth, 890 pages, 6 in. x 9 in. Edited by the secretary and published by the Society, University of Pennsylvania, Philadelphia, Pa.

This large volume shows the growing importance of the Society for Testing Materials, and indicates the extent of the business transacted at the last meeting. In addition to the usual committee reports on various specifications for iron, steel, cement, paints, protective coatings, etc., there are quite a number of important papers giving the results of special investigations. Among those of more special interest to railways are: The proposed specification for steel wheels; the heat treatment of steel axles; revised specification for locomotive cylinders; and the tempering of spring steel. The principal individual paper is an elaborate article covering 100 pages on the structure of steel by the president of the society, Henry M. Howe. There is also an interesting paper by A. S. Cushman on the manufacture of pure iron in open hearth furnaces. This material has been defined as one which contains less than .03 per cent. carbon. A very original investigation is reported by A. E. Outerbridge on Florescent Tests of Oils. There is also a series of papers on hardness in metals. The volume is well printed and thoroughly indexed.

Letters to the Editor.

AGENTS' REQUISITIONS FOR STATIONERY.

Ottawa, Ont., March 27, 1912.

To the Editor of the Railway Age Gazette:

The short article on this subject by a "clerk in the superintendent's office" in a recent issue of your paper (February 16, page 286) is amusing in that it shows how much thought a man may give to a matter, and yet find no means of improving it because he does not see that the method that he has always followed has always been wrong, and that instead of trying to improve the method it should be discarded, and a new one adopted.

The clerk in the superintendent's office remarks with delightful naivete that one road checked the agents' requisitions three times, and that, no doubt, as good results would have been obtained by one checking. He came close to the light there, but still remained in utter darkness. If he had stopped when he came to the fact that three checks, or ten checks, were of no benefit, and found out why they were not, he would have seen the light, and would not have gone to the trouble of outlining a new form, and saying "if this is used right it will be all right" or words to that effect. But his form is just as useless as all other forms in use, because the same men who filled in the old forms would fill in the new. And the reason the three checks were of no benefit was because they were made by the wrong man or men. There is only one man on any railway who can intelligently check a stationery requisition, and that is the man who fills them, and he can't do it today because he has not been allowed to do it. So there is really no man today who can do it. The superintendent's clerk could qualify for the job, but it would take him some time, and greatly increase the work in his office. Why should he do it when his company is already paying another man who can more quickly qualify, and then do it much better?

Here is the situation: to qualify for the job of intelligently checking the agent's requisitions, the superintendent's clerk must first acquire a good working knowledge of the stations on his road. Then he must classify them according to their importance and the number of men employed in each, the volume of business done, etc. Then he must view each requisition carefully with a picture of the station in his mind, allowing what he knows is required. Then he must keep a copy of that requisition on file, and next month check the requisition by his general knowledge of the station and the requisition for the previous month. In six month's time, if he does this carefully, he will be doing it intelligently. There is no other way for him, and he must not shirk his duty; he must do it carefully all the time. But he won't do it carefully, simply because he is human, and no human being ever has done or ever will do a thing carefully that he considers of secondary importance to many other things he has to do.

The man who can quickly qualify for the job is the stationery man. In the first place, the stationery is his business, first, last and all the time. As he is situated all he needs to do is to acquire a knowledge of the stations he is supplying and classify them. The remainder he now has in his own hands. And don't forget that until he does this he is not doing the work he is paid to do. Today he is doing part only. One end and the middle, the receiving and caring for, he controls. But the other end, the issues, the end that controls all the rest, he has nothing to do with beyond sending out what these thrice and uselessly checked requisitions call for.

This seems so plain to me that I cannot understand why there should be any discussion on it. Why send a requisition to a man for approval, when that man has no knowledge by which to check it?

Let us take the example the "clerk" has given us of the case where a small agency was found with six quarts, or two years' supply, of ink on hand. Who would refuse to pass a requisition for such a necessary thing as a quart of ink? Is there any man from the president down who could do this except the stationery man, the man who knows the class of the station and who sent the previous supply of ink? This applies to all items.

One Who Has Filled Requisitions.

POOLING OF EQUIPMENT.

Houston, Tex., February 9, 1912.

To the Editor of the Railway Age Gazette:

The question of car service rules rivals the ghost of Banquo, the late lamented Peter Grimm and the proverbial "good man" in its refusal to be kept down.

The latest rattling of the skeleton is the recent decision of the Interstate Commerce Commission (Opinion No. 1,693) in the Illinois Central coal case.

The commission in its ruling lays down a postulate that might be geometrically expressed, "All railways are the same railway," and having thus applied its mathematical fingers to the tip of its analytical nose and gravely wiggled them at the shade of the Hon. John Sherman, whose name is honored by its ancient connection with a well-known legal weapon that has in these latter days become at once a delight to the demagogue and a menace to the monopolist, the commission solemnly warns the roads that they must "get together" on the question of car supply, and that in the event of the failure to so assemble, it will be the painful duty of the august commission to constitute itself a proxy for the purpose of bringing about a "community of interest" in the matter of providing "means of transportation," particularly cars, to the satisfaction of the clamorous shipper.

Which is to say, either the railways must provide efficient and sufficient rules to insure the free circulation of freight car equipment, or the commission will provide such rules and will see that they are enforced.

There is a large class of transportation men who pin their faith to the application of existing rules, and who insist that the solution of the problem lies in strengthening the car service rules by including them in the per diem rules agreement and thus making them a part of a binding contract. The advocates of this policy reject the "panacea" of "equal interchange," "zone pool," and "general pool," and assert that the benefits claimed for these methods are visionary. They say it is absurd to suppose that a corporation will turn over the control of its property to some person or persons not answerable to its stockholders. Further, that there is absolutely no economy in the way of empty haul or switching expense to be effected by the common use of freight cars; that a loaded movement presupposes a return empty movement, either partial or entire, according to the traffic, and that the loaded mileage must eventually be equalized by an empty haul, whether the cars are owned individually or pooled.

It is rather curious that among those most opposed to the pooling of equipment are large systems that have pooled the cars of their constituent properties and seem to justify in practice what they condemn in theory. True, a pooling of "system" equipment does not permit the control to pass from the duly authorized representatives of the stockholders, etc. But what about the "control" over the 45 per cent. of owned equipment that is off the lines of these same carriers practically nine months of the year? And if there is no saving in empty haul under a pool plan, why does a road with a straight line of 1,000 miles hold on its eastern and western divisions cars of system ownership returned or made empty in those territories, while cross-hauling empty cars, west or east, as the case may be, to effect delivery to the foreign lines owning them. And would control over the corporate property by a political body be any less irksome than control vested in a committee or commission composed of railway men?

But it is not my purpose to repeat the many arguments that

are advanced on the two sides of the pool question. I merely wish to point out what seems to me will be the result of a failure on the part of the railways to act on the suggestion of the commission in its ruling No. 1693.

The commission has ruled that a road cannot refuse to allow its cars to be loaded off its rails, and that the carriers must provide for rules that will protect the car owner.

It seems to me that we must be woefully shortsighted if we cannot foresee the first difficulty that would confront us were we to rely on a strict application of present rules as a solution of the difficulty. It is true these rules, if strengthened by inclusion in the per diem rules agreement might insure to a car owner a reasonably prompt return of his cars. But how about the road that is compelled to return the cars? Let us suppose a road having on its line a given number of empty cars of a certain class, and let us also suppose a shipper on the line of that road who has loading for those cars. Suppose, further, that the cars happen to belong to another railway, and because the road holding the cars is obligated by the rules to return to their owner these *particular identical* cars, they must be hauled empty past the shipper's full warehouse, the while he demands and pleads in vain for equipment to move his goods. Has not the commission said that "all railways are the same railway"? Is there any ground for the hope that the general principle that has been invoked to send a road's cars away from home will be abandoned the minute they are released, and the cars be permitted to scamper home, their task only half fulfilled? I trow not.

And, getting right down to brass tacks, would it be possible, even if it were permissible, to bring about an absolutely strict observance of rules that are opposed to the natural circulation of freight cars, and which tend to limit their efficiency?

It has been some ten years since the effort was begun to influence the movement of cars by the application of per diem charges, and we have seen these charges run the gamut from 20 cents to $1 (penalty included), and back again to 30 cents, the theoretical cost of owning a car; but is there any one who will attempt to demonstrate that any particular per diem rate has had any particular result on car movement, especially to secure the return of a car to its owner when needed, or to prevent its return empty when no longer required?

Unless it is practically nothing per day the per diem rate cannot be made low enough to keep foreign cars from pointing their prows toward the lines of their owners in a mad home rout when their usefulness has been temporarily outlived. "Leave them alone and they'll go home if you put per diem behind them."

And, per contra, we cannot conceive of any probable per diem rate that will be high enough to discourage the use of a foreign car when it is needed for business that is in sight. Not even the daily earnings of the car would prove a penalty strong enough to prevent the use of foreign cars in some cases, while there are numerous instances in which the carrier is practically helpless to stop the misrouting of cars by shippers to whom they are given for loading.

To get back to the commission's "one railway" idea, can you name a large system on which the distribution officer depends on either car service or per diem rules to work his cars to the divisions or stations where needed, or to hold them stationary when business falls off?

Does it not seem that the next logical step in rule framing is toward a recognition of the rule laid down by the Interstate Commerce Commission? So far as the actual practice is concerned this rule has been followed for years, with the possible exception of the ridiculous cross haul of empties that characterizes every slight recession in traffic.

Unfortunately, however, the application of the rule has been absolutely without regulation, and as a natural consequence some have profited while others have suffered.

Are the railways going to provide the regulation themselves, or will they cling to the remnants of the old-time methods of car handling until they have forced upon them the "regulation" so strongly hinted at in the commission's recent decision?

TRANSPORTATION.

IDENTIFYING APPLICANTS FOR EMPLOYMENT.

St. Louis, Mo., March 1, 1912.

To the Editor of the Railway Age Gazette:

During the rush periods on the railways from one-third to one-half of the men filing applications for employment give fictitious names, for one reason or another. It is very easy for a bad man to assume the name of some good man whom he knows to have been recently in the service at a remote place and to have quit, or, to assume the name of some other man, under still different circumstances, without detection. In some cases men engaging in the saloon or other business, with previous railway experience, will voluntarily lend their service certificates to others. In this way many undesirables get into the service.

It would be entirely practicable at employment stations to keep kodak pictures of applicants. Three pictures should be developed; one for the application, one for the employing officer's gallery, and one for the superintendent's office. Each should have the man's signature attached, so that when a new man entered the service the clerk to the subordinate officer and the application clerk in the superintendent's office might immediately go to the list of photographs before attempting an investigation of the application.

Under such a scheme a man's picture should be held on file from three to five years, so as to put a practical limit on the working gallery. This would successfully guard against the reemployment of objectionable men, whom the railways, as well as officers of the labor organizations desire to have weeded out of their respective ranks.

There are a sufficient number of good, conscientious, competent men to supply the railways with the right kind of employees, and the labor organizations with respectable membership. Men who habitually persist in doing wrong should not be trutsed in responsible positions; in positions where they are a menace to the interest of the railway and to the safety and standing of brotherhood men having good intentions. It is a criminal imposition on passengers, railway owners and trustworthy employees to be subjected to the work and conduct of incomeptents, drunkards, liars, thieves and other such like.

This fraud is continually growing. The more often it is worked successfully the more often it will be attempted. It seems to me that it is growing, proportionately, more rapidly than the number of railway employees is growing.

There should be more certainty on the individual railway, and more uniformity as between all of them, in taking applications, towards guaranteeing that candidates for employment give their correct names. For a man to give an alias in seeking employment, under any circumstances, must be illegal, therefore, it is fair, just and lawful for officers to take steps towards the enforcement of such a guarantee.

CHARLES BURLINGAME,
Supt. St. Louis Transfer Ry.

The Salta to Mejillones Railway, Chile, has secured funds for the construction of its line and work will be pushed forward from the Chilean and Argentine termini as rapidly as possible. The construction work on the Argentine side will start from Cesrilios in the Lema valley and at Mejillones on the Chilean side. A branch line will be built to Chimba, Chile. The cost of the railway is estimated at $20,000,000. The Argentine government has granted a subvention to the road amounting to $250,000. In Chile the line will afford transportation to the sulphate region near the Laco mountain, traverse the Emilac pass, and enter the nitrate zone of Augusta Victoria.

DEFECTIVE BOX CARS AND DAMAGED FREIGHT.

Extent of Loss for Which Condition of Equipment is Responsible and How It May Be Materially Reduced.

I

The Interstate Commerce Commission statistics for the year ending June 30, 1909, show that the railways in the United States, except for the very small ones, paid out $24,754,508 for loss and damage to freight; or $1.58 was paid out in this way for every $100 of operating expense. A railway is only liable for loss or damage to freight when it can be shown that it is due to a fault of transportation. Logically, therefore, the investigation and payment of claims should be in the hands of the operating department. Measures should be taken to overcome the cause of the failure, or defect, and not to treat the effect, as is ordinarily the case where the claims are handled by a claim department, which is an adjunct to the traffic or accounting department. With this in view the operating department of the St. Louis & San Francisco Lines undertook the handling of claims for loss and damage to freight in 1909, with the result that a large decrease has been made in the amount paid out for loss and damage, largely because the source of the trouble has been located, and in many cases eliminated. For instance, the operating freight revenue has increased more than 17 per cent. for the three years ending June 30, 1911, and the amount of loss and damage has decreased 24 per cent. in the same time.

One fact which has been clearly revealed by the studies which have been made on the Frisco is that a considerable portion of the damage and loss to freight is directly due to defective equipment. This may be seen by reference to the accompanying table, showing the amount of damage due to various causes for a period of four years, or one year longer than the present method of handling claims has been in use. For instance, in the year 1911, $43,160.09, or 8½ per cent. of the amount paid out for damage and loss to freight could be directly traced to defective equipment. Stated in another way, $2 was spent for damage due to defective equipment for every $100 which was paid out for the maintenance of freight equipment.

CLASSIFICATION OF DAMAGES TO FREIGHT; ST. LOUIS & SAN FRANCISCO LINES.

Damage due to—	1908.	1909.	1910.	1911.
Robbery	$131,788.43	$86,823.37	$86,894.76	$70,828.37
Rough Handling	130,459.17	94,263.44	105,386.40	123,745.49
Delay	136,037.83	111,864.64	91,153.13	79,094.99
Defective Cars.	44,661.04	40,572.32	53,603.98	43,160.09
Wrecks	76,751.40	38,181.48	26,705.36	52,312.92
Miscellaneous...	145,277.49	136,567.53	142,741.57	136,180.92
*Total	$664,975.36	$508,272.98	$506,485.20	$509,495.15
Revenue from Freight	$23,976,296.87	$25,262,515.93	$27,645,863.48	$28,071,781.86
Maintenance of Freight Cars...	1,734,161.91	1,536,133.62	2,018,268.72	2,078,078.97

*Exclusive of fire.



Fig. 1—How Much Was the Lading Damaged When This Bumping Post Was Distorted?

However, the damage due to defective equipment is very much larger than is indicated by these figures. A considerable part of the damage due to robbery was undoubtedly caused by the lack of burglar proof cars. Damage charged against rough handling was in many cases increased or was entirely due to poor equipment, and there is also no question but what many wrecks may be traced to the same cause. Assume that a car with a weak end construction, or even one with the standard thickness of inside lining and ordinary end framing, was being placed in the yards when the rough handling indicated by the distorted bumping post, shown in Fig. 1, took place. If the inside lining or end should give way certain kinds of lading might be seriously damaged. Unfortunately an examination of the bumping posts in the freight terminal yards indicates that this sort of handling is not infrequent. The despatcher's train sheet on some roads has a column which must be filled in by the despatcher, showing the amount of excess wages which are paid to crews due to the trains being delayed beyond schedule time. A suggestion has been made that workmen in the shops would be far more careful if they were furnished with statements of the exact cost of any work which they spoiled. A good effect might also be secured if the shifting crews were furnished with statements of the damages done by them on the preceding day.

It will also be noted that a large amount of damage was charged to miscellaneous causes, and it is quite probable that some of this was primarily due to defective equipment. Then, too, the actual loss in money is only a small part of the problem. The shipper, even if he is paid for the full value of the damage to the goods, is not fully compensated. His business is affected by the failure to deliver the goods properly and a spirit of criticism and antagonism is often generated, which may result in a lack of co-operation and sympathy on the part of the shipper, and to legislation, which not only hampers the railways but is unfair to them.

Because of the earnest efforts which have been made by the Frisco to reduce the amount of the claims the figures for that road are probably more favorable than they would be on many others. For instance, the ratio of all claims paid on the Frisco lines, exclusive of damage caused by fire, to the revenue from freight for the year ending June 30, 1908, was 2.85 per cent.; while for the year ending June 30, 1911, it was only 1.85 per cent., or a decrease of over 35 per cent. The ratio of the damages and losses directly traceable to defective equipment to the freight revenue was .18 per cent. for 1908, and .15 per cent. for 1911, or a decrease of 16 per cent.

The most serious losses chargeable to defective equipment are caused by leaky roofs; by doors which are not cinder, water, burglar and grain leakage proof, and to other defects, such as weak ends and defective sides and floors. It is believed that if the seriousness of these losses were really understood radical measures would be taken to put the equipment in such shape that they would be practically entirely eliminated. Too much attention is paid to keeping the first cost and the weight of the cars to a minimum and too little attention is given to making the box cars so that they will protect the contents from loss and damage. There is no question but that the mechanical defects responsible for this loss and damage can be largely or entirely overcome.

The series of articles, of which this is the first, will go into this

matter fully, illustrating and commenting on the defects which cause such loss and damage, and in every case suggesting a remedy for it. It will be shown that a satisfactory car can be built at a reasonable price, not only causing a reduction in the damage and loss to the lading, but at the same time reducing the cost of maintenance of the car. Why, then, is the equipment on many roads in such unsatisfactory condition as concerns the loss and damage to freight, and why are new cars turned out of the builders' shops in an unsatisfactory condition from this viewpoint? Possibly for two reasons; first, the seriousness and the extent of the damage is not fully realized, because the claims are handled by a department which is remote from the operating and mechanical departments, the tendency being to treat the effect rather than the cause. In the second place, if a road considers the problem of going to extra expense to provide satisfactory equipment, it is quite liable to be influenced by the fact that half of the equipment will be off its own lines all the time and that other roads will be securing the benefit of it, while the road which goes to the extra expense will be using its neighbor's defective equipment.

To overcome this and to secure the thorough and hearty co-operation of all the roads E. D. Levy, assistant general manager of the Frisco, suggested at the June, 1910, meeting of the Association of Transportation and Car Accounting Officers at Colorado Springs, Colo., that the American Railway Association form a bureau in charge of competent men who shall pass upon the design and see that all new equipment is so constructed as to prevent loss and damage to the freight, and that the roads at large take the proper steps to improve their equipment as it goes through the shops or repair yards for heavy repairs. The bureau would, of course, have to have a corps of inspectors, and provision should be made for the enforcement of the rules and regulations formulated by it. Its work would be similar, in many respects, to that of the bureau of explosives.

Some idea of the importance and extent of the work which could be accomplished by such a bureau will be gained from the study of the defective box cars which follows. The first problem considered, to which the remainder of this article is devoted, is that of the ease of pilfering from many box cars because of the lack of burglar proof fastenings for the side doors.

PILFERING.

A great many box car doors are fitted with bottom shoes or guides at the rear end of the door, when it is closed, which may easily be removed, allowing the door to be sprung open without breaking the seal, and thus making it possible to remove a part of the contents of the car without leaving any evidence that it was broken into, or where the pilfering took place. If the packages are not broken into but are removed entire, leaving no evidence of pilfering inside the car, the assumption is, when the articles are reported missing, that they were loaded in the wrong car or otherwise went astray. Employees who steal from the cars usually know enough to remove the entire package, leaving no traces of pilfering. There are several types of burglar proof door shoes on the market, but in spite of this many cars of recent construction will be found in service which are defective in this respect. It is only necessary to use the burglar proof shoe at the rear end of the door, as the front end cannot be sprung open without breaking the seal.

A car equipped with an ordinary type of guide, which is not burglar proof, is shown in Fig. 2. Ordinarily the three bolts which fasten the shoe to the car pass through the side sill and the nuts are on the inside of the sill. In such cases it is only necessary to remove two of the nuts and push the bolts out, allowing the shoe to slip down, as shown in Fig. 3. In the case illustrated, however, the bolts were passed through the sill from the inside and the nuts were placed on the outside. It was only necessary to remove two of the nuts and push the bolts back with the end of a hammer handle. Although the door shown is only 5 ft. 6 in. wide, it was an easy matter for one man to spring out the lower corner of the door, allowing the other one to climb inside, as shown in Fig. 4. It was a matter of only a few minutes, less than five, for the man to loosen the shoe, climb inside the car, get out and replace the shoe. The seal was not broken or interferred with in any way, and there was absolutely no trace left of the car having been pilfered. An enlarged view of a shoe similar to the one used on this car is shown in Fig. 5. In this case the shoe is held by a lag screw at the bottom and two bolts at the top, the nuts being placed on the outside, as shown.

A door with a slightly different type of shoe or guide, but hav-



Fig. 2—An Easy Door to Open Without Tampering with the Seal.



Fig. 3—Rear Door Shoe Loosened and Dropped Out of the Way.



Fig. 4—A Man in the Act of Entering the Car; Seal Undisturbed.



Fig. 5—Not a Burglar Proof Door Shoe.



Fig. 8—Type of Shoe on Door Shown in Figs. 6 and 7.

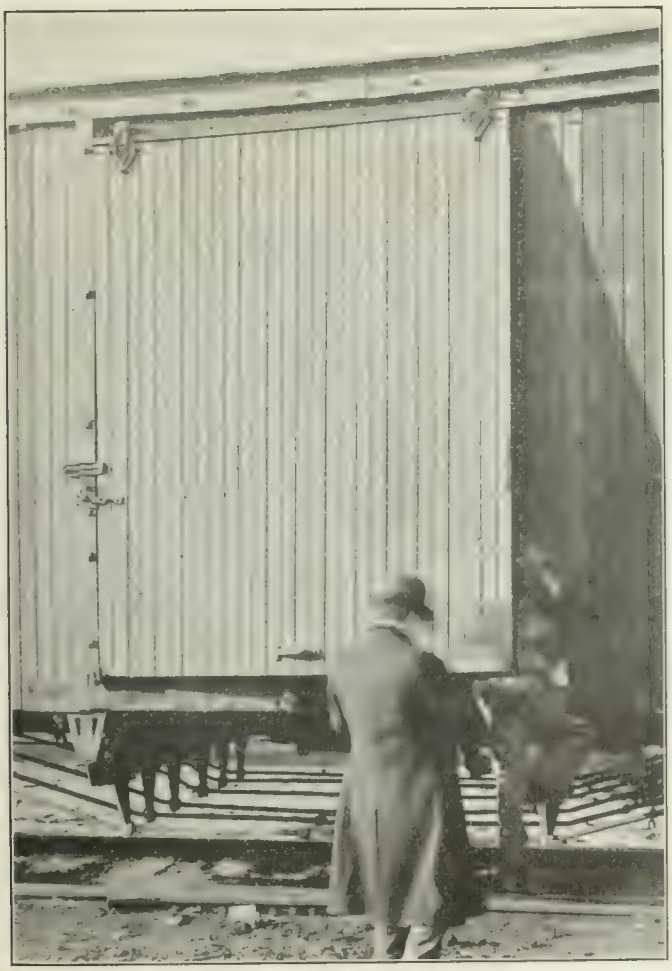


Fig. 6—Entering Another Box Car Door Without Breaking the Seal.

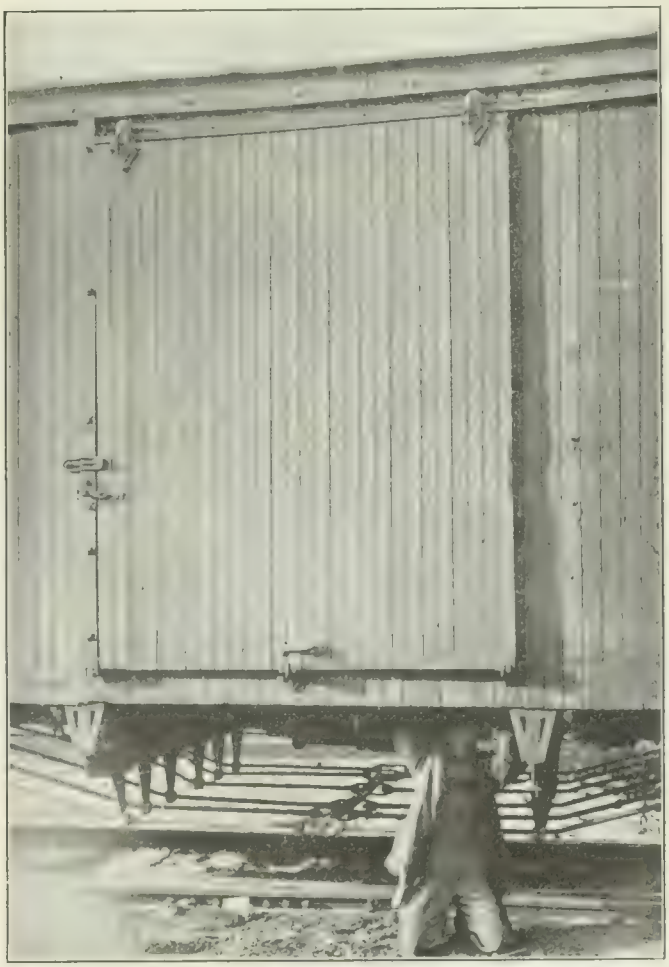


Fig. 7—Door Shoes Being Replaced, Leaving No Evidence of the Door Having Been Opened.

ing three of them, one at each end and one at the middle, is shown in Figs. 6 and 7. Each one of the shoes is held by two bolts, the nuts being placed on the inside of the side sill. It was only necessary to remove one bolt on each shoe and allow the shoes to swing downward. The door was 6 in. wider than the one shown in Figs. 2, 3 and 4, and the man had no difficulty in climbing inside with the assistance of a confederate, who held the door back. One of the men is shown in the act of replacing the end shoe in Fig. 7. The seal was not tampered with in any way and no evidence was left that the car had been broken into The entire operation, from the time the man started to loosen the first bolt until he had replaced the shoe after climbing inside the car, and after five exposures had been taken with the camera, was a little less than five minutes.



Fig. 9—A Poor Door Fastening.

There are several door shoes or guides on the market which are burglar proof, or at least cannot be tampered with without damaging the car and leaving unmistakable evidence of its having been entered; any practical car department officer or foreman is familiar with them. While they cost more than the type of door shoe shown in the illustrations, the additional expense is not very great. Moreover, it is only necessary to use one of the burglar proof shoes per door, and that should be placed at the end opposite the seal. With a proper door fastening it is impossible to open the door at the front end without breaking the seal,

There are, however, a great many doors in service which are fitted with fastenings similar to the one shown in Fig. 9. It is a comparatively simple job to open one of these doors without disturbing the seal in any way, without removing the door shoes, and without leaving any evidence of the fastenings having been tampered with. The way in which this is done is shown in the series of illustrations, Figs. 10 to 14, inclusive. The pointed end of a car repair bar is slipped under the hook, a block of wood being used as a fulcrum to pry it open, as shown in Fig. 10. In this case the first block was not thick enough and a second one was slipped under the bar, as shown in Fig. 11. The door was pried open after the hook had been forced out, as shown in Fig. 12, but the burglar was sadly disappointed, for instead of the car containing whiskey or tobacco it was loaded with company material, consisting largely of cast iron car wheels.



Fig. 11—Hook Forced Out; Door Can Now be Pried Open.



Fig. 10—Forcing the Hasp Hook Out.



Fig. 12—Door Opened Without Breaking the Seal.

After looking over the contents of the car the door was closed, as shown in Fig. 13. A slight blow of the hammer drove the hasp back, so that the hook slipped into place and a good blow on top of the hook drove it home, as shown in Fig. 14; there was absolutely no evidence left of the lock having been tampered with.

There is really very little excuse for not making the doors bur-

glar proof as far as the employees are concerned. It is always an easy matter to break the seals, but employees will not take this risk. The seal records are taken so frequently that it is always possible to locate the approximate point at which a seal was broken, and thus trace the culprit. There is little excuse for using either door shoes or door hasps which can be manipulated, as shown above, without leaving traces of the robbery. Where the



Fig. 13—A Blow on the End of the Hasp and One on Top of the Hook Completes the Job.

car can be tampered with in this way—leaving no evidence of its being entered—the railways are put to considerable unnecessary expense in trying to trace the shortage. A large part of the pilfering is done by employees, and if this can be eliminated and other pilfering can be traced, due to the breaking of the seal or damage to the door or its fixtures, the amount of claims for lost and damaged freight can be greatly reduced. There is no need of



Fig. 14—Car Door Closed Again.

illustrating or giving the trade names of burglar proof door shoes or fastenings, because of the number of such devices which are available and which can readily be used at no great expense if those in charge of designing and building the cars will awake to the necessity for providing them. A burglar proof box door will, however, be illustrated in the next article in connection with another phase of this subject.

(To be continued.)

AN INTERESTING RATE DECISION BY THE CANADIAN RAILWAY COMMISSION.

The Canadian Railway Commission recently rendered a decision in the case of the Dawson Board of Trade versus the White Pass & Yukon Route, operating railway, steamship and stage lines in Alaska, British Columbia and Yukon Territory, rescinding an order of January 18, 1911, which reduced the freight and passenger rates on the rail division between Skaguay, Alaska, and White Horse, Yukon Territory, by 33⅓ per cent. Although a portion of the route is in Alaska, the commission had reduced the rates on through traffic as well as on local traffic between points on a portion of the road in Canada.

The case, which had been before the commission for about five years, is especially interesting in that it involved many points almost exactly similar on a small scale to points involved in the railway situation in this country, and the opinion rendered by Chief Commissioner J. P. Mabee, indicates an attitude toward railway regulation on the part of the Canadian Board somewhat different from that which has often been displayed by regulating authorities in the United States. The final order was entered after a rehearing of the entire case, the reduction of the rates required by the first order being postponed after the company had appealed to the Governor-General-in-Council and after the railway company had introduced much additional evidence. Two of the railway commissioners had personally inspected the railway and the chief engineer of the commission had made a complete physical valuation of it.

Preceding the rehearing of the case, O. L. Dickeson became vice-president and general manager of the White Pass & Yukon, and later president. The previous management, says the chief commissioner in his opinion, had contested the jurisdiction of the commission at every step "and some years' delay, during which the companies were making large profits, was successfully accomplished by these tactics. The books of the companies were kept at Skaguay, and excuses were made for not bringing them within the jurisdiction of the board. They were placed at the disposal of the board's chief traffic officer at Skaguay for inspection, but in the light of subsequent developments, most material features of the companies' operations and system of bookkeeping were suppressed, and have only subsequently come to light, I understand, through disclosures made by discharged officials of the company. References to these matters do not materially assist in determining what is proper now to be done, but these developments show reasons why the then management of these companies regarded an investigation into their finances with a jealous eye; and little wonder that, while the management had secret accounts in the books showing the payment of hundreds of thousands of dollars by way of 'refunds,' as they were called, although in truth they were 'rebates' in most part, no more assistance would be given to the board in its inquiry than was absolutely necessary. However, the management is changed, and since the spring of 1911, when Mr. Dickeson became the general manager of these companies, the board has no reason to suppose that the law has been violated, but, on the contrary, has every reason to suppose that he has endeavored to operate the rail division in accordance with the requirements of the law."

During the hearing of the case the complainants sought to make much of the rebates mentioned in the opinion. But this phase of the question was quickly disposed of when Mr. Dickeson promptly produced a book containing the record of the payment of refunds and rebates covering a period of 10 years. After announcing that the record contained dates, amounts and names of the recipients, Mr. Dickeson said that he had no objection to its introduction as evidence; but the complainants, many of whose own names appeared in the accounts, appeared to lose interest in the subject when the specific facts were produced, and the record was not received as evidence! It appeared that the majority of the rebates had been paid during the years

before they were made illegal and that, contrary to the history in this country, they had been paid mainly to small instead of large shippers, as an offset to competitive underselling by the latter.

In appealing from the order reducing the rates, the company had presented its confidential statement for the year 1910, showing gross earnings on the rail division of $752,879. Reducing this by one-third would have given $506,727, leaving, after the deduction of $438,377 for operating expenses, a surplus of $68,350 to pay $195,911 interest on bonds, or a deficit of $127,560. At the rehearing it was shown that in 1911 the companies had earned $149,700 less gross than during 1910, although the rates were the same, the deficit having been caused by a general decline of business. Over 7,000 tons less freight had been moved, and after a large reduction had been made in operating expenses by a reduction of forces the company was able to pay a dividend of only 1 per cent. for the year. The opinion continues:

"Many more matters could be recited that have been placed before the board upon the hearing to show that the order of January 18 could not be put into effect; but sufficient has been said to make it clear that the reduction in rates then directed would be an outrage upon the stockholders in these railways. In the earlier years, when the Yukon was not only prosperous, but booming, these railways were profitable, and then was the time for rate reduction. Had the management been as economical then as now, with the large earnings in those days, no doubt substantial reductions could have been made without hardship upon the stockholders; but this matter can be dealt with only upon conditions as they exist today. It was urged that the stockholders, in stock and cash dividends, had been repaid all the moneys originally invested. There is nothing, however, in this argument, even if such were the fact; profitable rates in the past are no argument for present-day reduction, without regard to all existing conditions, and even if stockholders in railways have, during a period of years, been repaid in dividends the sum total of the original investment, this forms no reason why they should not continue to receive a fair return upon the capital invested.

"It will not be thought that this matter is being considered solely from the standpoint of the stockholders in these railways. It is not. The board is alive to the burdens of the freight rates upon this route upon the people of the Yukon, and the record is full of high-handed and unreasonable treatment of the public by those in charge of the operation of these companies. It would gladly interfere, and require very substantial reductions, were that course at all reasonable or possible. It is clear that these companies are bordering upon receivership, and it is not in the interest of either the public, or those whose moneys are invested in these enterprises, that any action of the board should force them into that position. It is of great importance that not only the people of the Yukon, but for that matter that the people everywhere, should be protected from extortionate or unreasonable transportation charges; but to my mind it is of equal importance that the capital invested in transportation companies should be permitted to earn fair and reasonable dividends. Railway construction in Canada depends entirely upon outside capital; thousands of millions must be borrowed within the next generation or two. We have in Canada less than 30,000 miles of railway, as against more than 235,000 miles in the United States. Within fifty years Canada will require a greater railway mileage than now exists in the United States; the money for the construction of this must, for many years at least, largely come from abroad; and how long would these investments continue if it were known that their earning power might, at any moment, be terminated by the intervention of this board? While our duty to interfere and reduce rates in all proper cases is plain, surely it is equally clear that we should not require a reduction where the effect would be to prevent the investment earning a fair return."

In dealing with this feature of the case the commission desires to be understood as referring only to the money that was honestly invested, because the stock is held entirely by the original builders of the railway and has not passed into the hands of the general public. The physical valuation of the rail division made by the board's chief engineer, Mr. Mountain, showing a cost of $5,932,474, or $48,738 per mile, is then cited and the commission says:

"The statement furnished by the companies puts the original cost at $62,000 per mile. This includes a profit of 15 per cent. to the construction company, $90,000 for the Dyea Trail, $85,000 for the White Horse Tramway Company, and some other smaller items which Mr. Mountain does not think should form part of the capital account. Another item that went to swell the cost of construction was the expense and loss by reason of the continual disorganization of the construction gang by their stampeding to placer mines that were being discovered. Mr. Mountain thinks the road could be duplicated for $50,000 per mile, but does not desire to go on record as saying that original construction did not cost $62,000 per mile. It does not, however, become necessary to decide which should be the proper sum, in view of the lean earnings. It is altogether likely that the stockholders would, in the meantime, be glad to obtain an earning of, say 4 per cent. upon Mr. Mountain's valuation, were that possible. Taking the average dividends paid from the beginning of operation, the shareholders have not realized more than about 6 per cent. upon their investments; from now on, unless the traffic increases greatly, even at present rates, the earnings must be of a nominal character only.

"It may not be improper to advert to some of the conditions under which this road is operated. In the first place, there are only about four or five months of the year that there is any freight moving. From November to May there is a large annual loss in operation. Mr. Dickeson said that only during July, August and September could a surplus above cost of operation be earned. In November last, there was a loss of $36,000. Speaking on December 6, Mr. Dickeson said:

" 'Last year's figures show, worked out by days, that we ran the train fifteen days without a single passenger or a single pound of freight. We had three engines back of a snow-plow, plowing snow forty miles with three crews and a rotary crew of nine men, and about sixty men to keep the right of way clear for the purpose of handling a mail sack locally between Skaguay and White Horse with weather all the way from 20 to 40 deg. below zero.' "

Some substantial reductions both in freight and passenger rates which Mr. Dickeson voluntarily agreed to put into effect at once if the order was rescinded are enumerated with the following comment:

"It will be seen from the foregoing that reductions are made that in no event could the board order, and are directed upon the lines of assisting mining development.

"The board has been strongly impressed with the argument that if it enforced the order of January 18, 1911, or even made it more drastic, it would work to the advantage of the companies in attracting additional traffic to this route; that it would assist in developing the country, and form an inducement to prospectors and miners to explore and make investments. How this might be is a matter of opinion. If the earning capacity of these roads was cut in two, and the traffic did not increase, the result would be that the board would have wrecked the capital invested, forced the companies into receiverships, and probably done the country and the people irreparable harm, to say nothing of the perhaps greater question of shaking the faith of the investing public in Canadian securities. It might be that the reductions demanded would cause increased traffic, although, at the moment, I am at a loss to see where it would come from. White Horse and Dawson are no more stagnant than Skaguay, and its degeneration is not to be laid at the door of the White Pass companies; at any rate, it is much easier to advance arguments of this kind than to take the responsibility of putting these claims in the form of a concrete order. I am not pre-

pared, upon all the information the board has, to assume the responsibility and risk attendant upon such a course.

"I am of the opinion that a great deal of the dissatisfaction that has existed in the Yukon over the rates and other matters connected with the White Pass route could have been largely eliminated had there been a more intelligent and less domineering management. I am also of the opinion that these interests, under the direction of Mr. Dickeson, will stand in better favor among the people there than they have in the past; at any rate, the better course is to give him an opportunity to develop certain plans he has formed for the improvement and advancement of the country.

"The board will retain the matter until the completion of the fiscal year of the companies; they will be asked to furnish detailed information of the year's operation, and further intervention will depend upon the result of such statements."

The board has since formally rescinded its order of January 18, 1911.

CAR DESIGN IN THE TECHNICAL SCHOOLS.

In an editorial on the Car Shop Apprentice in our issue of March 15, reference was made to special courses in car design which are now administered in several of the engineering schools. We have requested information as to the character of this instruction and have asked how many graduates enter the car departments of railways, and we have received the following replies:

Pennsylvania State College, Prof. Arthur J. Wood.—We have included in our course in railway mechanical engineering for next year, some time in steel car design, in the senior year. The time given to it will be approximately the equivalent of three hours a week for some one semester of 16 weeks. Three of our recent graduates in mechanical engineering have gone into the car departments of railways. One of these left the service of the company for other work; the second, I understand, has been doing special work in car design, and the third has risen to the position of foreman of a railway car shop. You ask what, in our position, would be the best way to interest technical graduates in car work. Personally, I do not feel that the technical course can give very much special training along this line. I believe the general principles for framing, especially for steel cars, and the general design of buildings, will give them as good a preparation to start with as we can hope for. I should not be inclined to favor too much over-specialization in car design in our college courses. I may state further that my impression is that it requires men of certain mental types and caliber for this work. Certain men will not be satisfied to remain indefinitely in car design, and my impression has been that few who have gone into that line have taken up construction work sufficient to warrant their advance to a position of great responsibility. We have here a locomotive, dynamometer car, latest E-T air brake equipment, electro-pneumatic switch and signal apparatus set up for instruction, axle lighting sets and car heating apparatus. This has been mostly the development of the last two years and promises to advance further in the near future.

Purdue University, Prof. C. H. Benjamin.—An outline of our course in car design is as follows: Each man is given an assignment, consisting of capacity, light weight and over-all dimensions, for some type of steel freight car. He is required to make the necessary calculations, shear and stress diagrams, and to logically design the following: Axle, springs, center plate, truck bolster, truck side frames, center and side sills with the necessary cross-carriers, and the brake system. Detailed drawings are required for all the parts designed.

The student also makes an assembled drawing of the truck, showing the details that he has designed, together with standard M. C. B. journal boxes and bearings, cast-iron wheels, etc. Finally, the complete car is assembled, showing the general plan and necessary cross sections.

In addition to the drawing room work, lectures are given on car heating and lighting, interchange rules, steel versus wooden construction as to repairs and costs, couplers, draft gears, brake shoes, manipulation and repairs of air brake equipment.

I can only give you the numbers of men entering railway service during the past five years. We have no means of knowing just how many of these are employed on car work. The special apprentices spend a part of their time in the car shop, and those men accredited to the car construction companies are probably all engaged in this work.

Special apprentices	[illegible]
Assistant master mechanics and mechanical engineers	4
Car construction companies	12
Assistant engineers of tests	5
Engineer of tests	1
Draftsmen at various grades	[illegible]
Roundhouse foremen	[illegible]
Material and machinery inspectors	[illegible]
General railway service	[illegible]

Some of the last class are inspectors, apprentices, instructors, etc. The small salaries at present paid in car shops are not calculated to interest technical graduates since they are as a rule lower than those paid for similar work in ordinary manufacturing plants.

University of Illinois, Prof. Edward C. Schmidt.—Such instruction as we give in car design to our students in railway mechanical engineering is included in a course called "Car and Locomotive Design," given to our senior students throughout their fourth year. This course has allotted to it nine hours per week throughout the year. Some of our other courses are related to it and lead up to it. Roughly, one-third of this time has been devoted to car design and the remaining two-thirds to locomotive design. None of the men who have graduated here in railway engineering have been or are now in the car department of any railway. One of them is with the American Steel Foundries, but I do not know whether his work is specially related to car construction or not.

We are trying to fit men for service in the motive power department, and I think there is nothing in the way we lay the emphasis on the various parts of our work to deter them from success in the car department if they chance to be interested in that work. The fact that none of our men have entered it is, I suppose, largely accidental, their opportunities happening to lie in other directions. Moreover, it is rather unsafe to generalize from the amount of data which we have at hand, because since the organization of the department we have not graduated a large number of men in railway mechanical engineering.

The Stevens Institute of Technology does not have any special course in railway mechanical engineering.

Cornell University, Sibley College of Mechanical Engineering, Prof. Dexter S. Kimball.—We no longer have a special course in railway engineering. We had such a course for a number of years, but when Prof. Hibbard, who was in charge of it, left the university the course was dropped. I would say that our attitude here in Sibley College is to lay a great deal of stress on fundamental training engineering, and less stress on the particular subject which the boy may expect to take up after leaving college. The engineering field has developed so rapidly that it is practically impossible to have special courses for all the various parts of the field. While on the other hand the growth of general engineering knowledge will make it necessary for all the engineering schools to either confine themselves very closely to fundamentals, or greatly extend the period of the college training. The latter is, of course, undesirable as students now go out into the field late enough in life, and we feel it is better to give them a sound fundamental training and let them acquire the details of their specialties in the field. Students, in some cases, do not know what portion of the field they will enter, and those who do and have their minds made up to enter certain specialties in many cases go into entirely different lines of work.

The University of Pennsylvania, Philadelphia, Pa., has no course in car design in the department of engineering, and the records of their graduates show that very few have entered the shops of railways or locomotive companies.

TWIN CITY-TWIN PORTS LINE OF THE SOO.

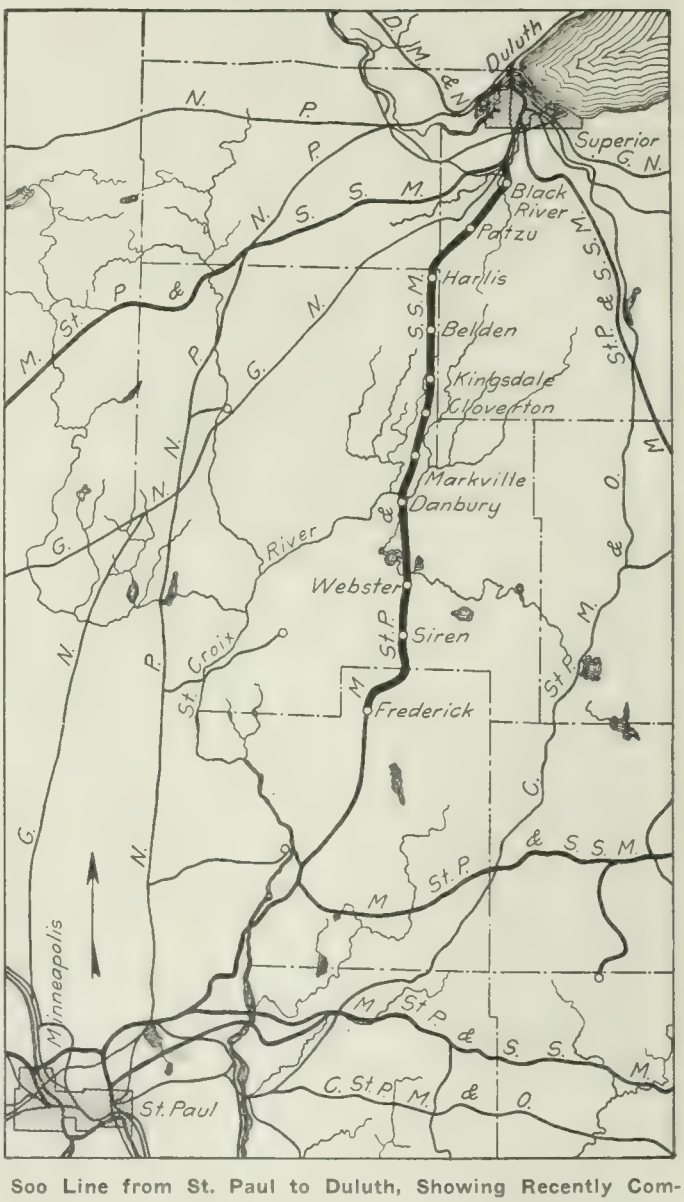
Construction of the Closing Section of the Direct Low Grade Route from St. Paul and Minneapolis to Superior and Duluth.

The Minneapolis, St. Paul & Sault Ste. Marie has just completed the construction of an extension from Frederick, Wis., to Boylston, just south of Superior, which is the closing section of a direct low grade line from St. Paul and Minneapolis to Superior and Duluth. The traffic between the industrial district tributary to the Twin Cities and the ports at the head of the lakes is very heavy and has become so desirable that four roads are now competing for it. Before the completion of the new Soo Line the Great Northern and the Northern Pacific had the shortest connections between these points, while that of the Chicago, St. Paul, Minneapolis & Omaha is considerably longer. The Soo Line entered the twin ports in 1909, first, by the completion of the Wisconsin Central extension from Ladysmith, and later, by the completion of the Brooten line, providing connection with its western system. Neither of these entrances, however, is so located as to furnish a direct connection from the Twin Cities to the head of the lakes and neither could compete on an equal basis with the shorter lines of the Great Northern and the Northern Pacific.

In the fall of 1901 the Soo opened a branch line from Summit, Wis., to Frederick, with the primary object of reaching a rich timber and agricultural territory. The possibility of extending this line to Duluth, however, was an important consideration in its construction. The distance from St. Paul to Frederick is 71.9 miles. The new line extends 73.2 miles to a connection with the Brooten-Duluth line at Boylston, 6.6 miles south of the Superior station. This makes a total length of 151.7 miles from St. Paul to Superior, which is shorter than that of any competing road between these points. Statements of relative distances between the Twin Cities and the Twin Ports are likely to be misleading, however, on account of the arrangement of terminals at both ends. For example, it can be shown that the Great Northern has the shortest line between Minneapolis and either Superior or Duluth, while the Northern Pacific has the advantage in distance between St. Paul and Duluth. These differences are all so slight, however, that the three roads can now be considered of equal length.

The location of the new line was begun in December, 1910, and most of it was completed during winter weather, which is the most desirable season for location work in the territory through which the line runs. Construction work was started in May, 1911, and was pushed to completion during the summer, the grading being finished about December 1, the bridge work about March 1. Operation will be begun early this season. The southern 50 miles of the line was built through an unbroken forest of mixed hard wood, pine, balsam and tamarack. Some construction camps had to be located at points at least 25 miles from the nearest railway station, necessitating heavy teaming to secure supplies. The summer during which the work was carried on was very rainy and considerable trouble was experienced on that account. In some cases the wagon roads reaching the line were so nearly impassable that it required three days for a four horse team to haul a load of supplies to camp. One contractor had to corduroy 12 miles of wagon roads approaching his camp.

A variety of material was handled in the grading. Considerable hard pan was encountered in the lake country, in a number of cases deposits of quicksand being found below it. Near the highest point on the line the contractor had to remove a steam shovel from a cut in which it had mired down in quicksand. For about 20 miles south of this point marshy ground predominated and several sink holes developed. There were several small rock cuts and also considerable excavation in a red clay which when wet becomes very difficult to handle. Foley Bros., and Stewart Welch of St. Paul had the contract for the excavation on the entire line, most of which was handled by sub-contractors, who, in turn, sublet a great deal of the light work to "station" men. One of the accompanying cuts shows a bad piece of station work near the point where the steam shovel mired down. The grade line was 6 ft. below the surface of a swamp in which soundings showed solid foundation to be 15 ft. below the surface. As shown in the photograph, the ditches, which



Soo Line from St. Paul to Duluth, Showing Recently Completed Extension from Frederick.

are the most important part of such a cut, were opened first and kept well below the level of the work. The method of handling the muck by wheelbarrows is clearly shown. At this point the grade was falling toward a small creek which made drainage comparatively easy. At a point about 4 miles south, however, it was necessary to lower the head waters of Black river 3 ft. for a distance of five miles to secure drainage for two soft cuts. The heavy work handled by sub-contractors was done principally with steam shovels and

team or car outfits. One contractor on the north end used a drag line excavator to good advantage. Near the close of the work he found it advantageous in making a long cut from which the material was to be wasted to take out the bulk of the excavation with the drag line operating on one bank of the cut and to trim the slopes with a steam shovel operating on the center line of the subgrade. The same contractor had a 40-ton Bucyrus shovel working in a red clay cut near this point which loaded the material into dump wagons, from which it was wasted on a dump parallel to the cut. By the use of six wagons this shovel was able to handle 500 yds. to 600 yds. in a 9-hour shift when the clay was dry enough to work readily. This method was adopted in order to utilize available equipment.



Nemadji River Bridge, Completed.

The new line is built to Soo main line standards. The grading provides for a 30-ft. base in cuts and 16-20-ft. crown on fills. The track is laid with 80-lb. rail and gravel ballast. A Roberts Bros. track-laying machine was used, being handled by company forces. It averaged about 1½ miles of track laid per day.



Black River Bridge During Erection.

The worst sink hole on the line developed near the summit of the grade just south of the new town of Harlis in a swamp which had been the bed of an old lake. Soundings showed a depth to gravel and sand foundation varying from 10 ft. to 35 ft. for a distance of about 800 ft. along the line. The grade line was about 9 ft. above the original surface. The first dump had been carried up to a height of about 4 ft. when a section of the surface about 800 ft. long broke irregularly along one side and turned completely over, carrying with it about 200 ft. of track. A new track was laid alongside the hole and dumping was renewed, but the surface again broke, so it was considered advisable to bridge 200 ft. under which the depth to solid foundation was 35 ft. The remaining distance gave considerable trouble, requiring about 85,000 yds. of filling material. The accompanying photographs show the method adopted to dump material into the hole after the surface had broken. Poles as long as could be secured along the right of way were laid across the hole, directly supporting the narrow gage track. One of the photographs shows a train dumping entirely outside the limits of the fill in order to get a solid bank to support these poles across the hole which had been formed on the line. The material for the fill was taken from an adjacent clay and gravel cut which was widened considerably to furnish the necessary amount of material.

The line crosses seven streams which required structures more than 500 ft. long, four of them being more than 1,600 ft. long. Pile or framed trestles were used throughout for short crossings and for all but two of the longer ones. The St. Croix river is crossed by three 100-ft. deck plate girders on timber framed towers approached by 1,430 ft. of timber trestle. The Clam river is crossed by one 75-ft. deck plate girder with 1,550 ft. of timber approach trestle. The Black river and the Nemadji river are crossed by steel tower and

deck plate girder trestles 1,600 ft. and 1,440 ft. long, respectively. The Black river viaduct consists of nine 40-ft. towers supporting eight 75-ft., six 90-ft. and one 100-ft. intermediate girders. The maximum elevation is 104 ft. from top of pedestals to base of rail. The Nemadji river viaduct consists of one 35-ft. and six 40-ft. towers, with thirteen 75-ft., one 90-ft. and one 100-ft. intermediate girders, the maximum elevation of base of rail above top of pedestals being 62.9 ft. The girders are 8 ft. center to center; all bents are battered 1:6.

The steel work is designed for Cooper's class E55 loading. The foundations are of concrete, U abutments and square pedestals being used. The typical pedestal is 4 ft. 4 in. square on top, 10 ft. 6 in. square at the bottom and at least 10 ft. high. Where necessary, piles spaced 2 ft. 6 in. center to center in both directions were driven under each pedestal. In one bent in the Nemadji river structure a reinforced concrete tie had to be provided between pedestals to secure the necessary stability. This tie was 1 ft. 6 in. wide and 2 ft. deep,



Dumping Into Sink Hole from Track Laid Across the Break on Poles.



Filling in Sink Hole off the Line to Get a Shoulder from Which to Work.



Swamp, before Fill Was Started, where Largest Sink Hole Developed.



Station Work in a Swamp; Minneapolis, St. Paul & Sault Ste. Marie.

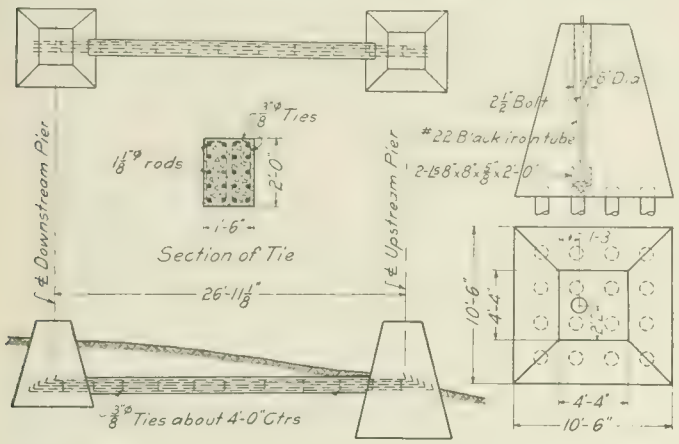


Trestle and Chute for Placing Concrete in Pedestal Forms.



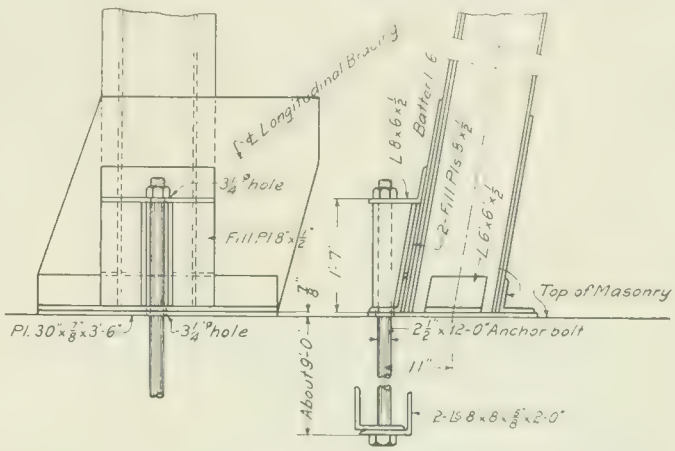
Steam Shovel Cut in Hardwood Forest.

reinforced by twenty 1⅛-in. bars tied with ⅜-in. bars spaced 4 ft. center to center. Each anchor bolt in the pedestals was enclosed in a No. 22 gage black iron cone 8 in. in diameter at the top and 2½ in. at the bottom. The lower ends of the anchor bolts, which are 2½ in. in diameter and about 12



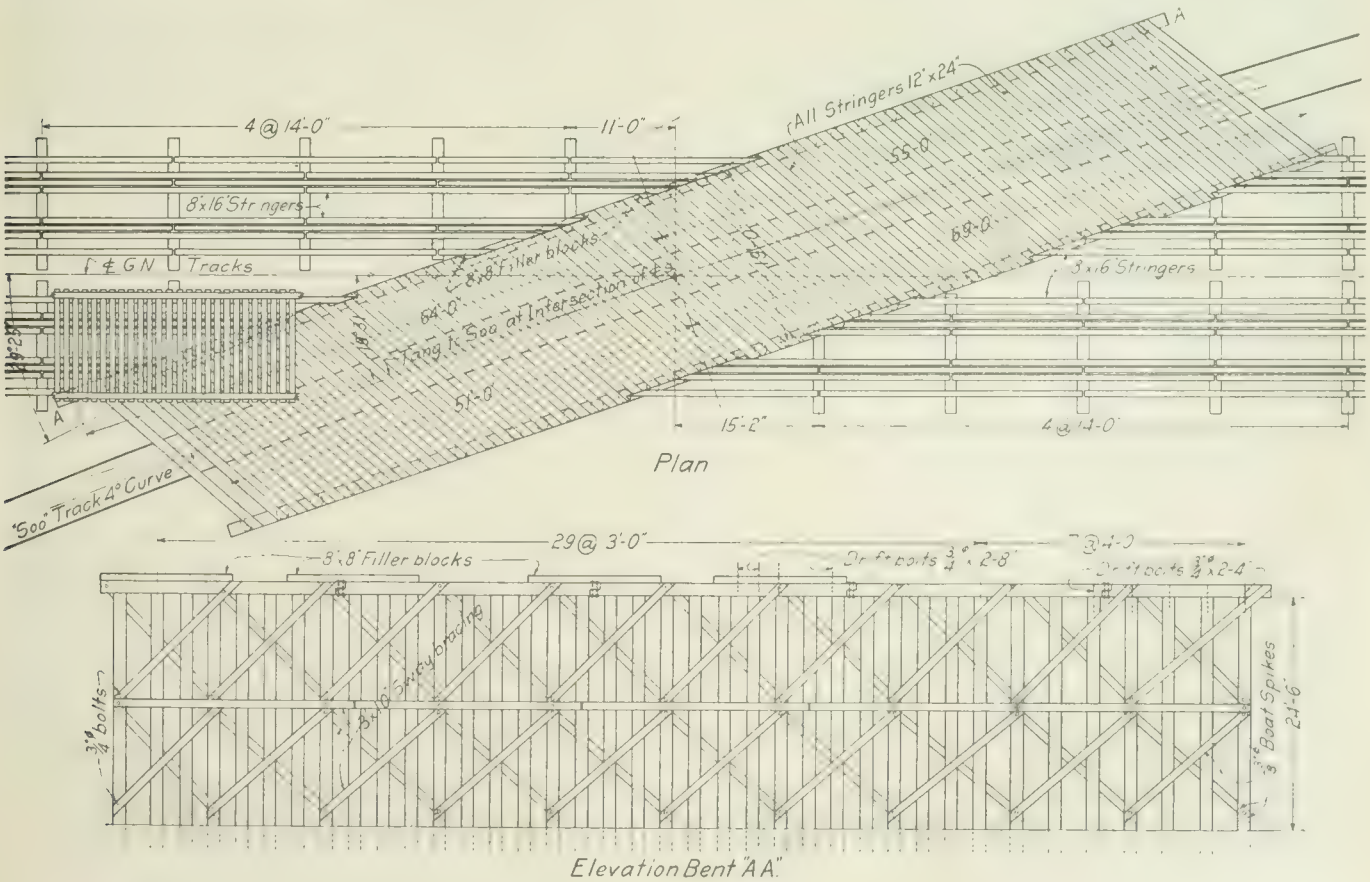
Detail of Concrete Tie between Pedestals and Cone Used for Adjusting Anchor Bolt; Nemadji River Viaduct.

ft. long, are held by a nut which engages the bottom flange of a horizontal anchor beam composed of two 8 in. x 8 in. x ⅝ in. angles 2 ft. long. This arrangement provided sufficient clearance to allow the bolts to be moved in any direction to connect to the tower posts or to allow for any irregularities in construction. After erection the bolts were grouted in, fixing them firmly in position and protecting them from corrosion. The method of handling the foundation work was essentially the same for both these viaducts. The foundations were placed by company forces, mixer plants being located on each side of the river near the bottom of the bank slope. The plants were located at these points in preference to the tops of the banks in order not to delay the erection of the steel. Smith ½-yd. mixers were used. Materials were delivered at the plant by wagons and the gravel and sand were stored in open piles. Work was carried on during freezing weather by heating the water in a barrel equipped with steam pipes and thawing the gravel and sand by the application of live steam. This steam was applied to the storage piles by 10-ft. sections of 1-in. pipe in which numerous holes were punched, one end being closed and pointed and the other being fitted with a T connection to a hose from the boiler.



Detail of Post Anchorage; Nemadji River Viaduct.

The man who was kept on duty at the plant at night could keep fire in the 10 h. p. mixer boiler which supplied steam to two of these points and was sufficient to thaw from 50 to 100 yds. of material each night. The mixers dumped into small side dump cars of about 1-3-yd. capacity running on trestles built on the center line of the bridge. For placing the



Details of Frame Trestle Structure at Under Grade Crossing of the Soo Line and the Great Northern.

pedestals under the central bents, which are practically on the same elevation, these cars were pushed out by hand to points over each pedestal and the concrete dumped directly to place. To place the pedestals on the steep banks the cars were drawn up the inclined trestle by a hoisting engine at the mixer plant, using a ⅜-in. cable carried from the drum of the hoist up over a sheave at the upper end of the trestle and back to the car. Wooden chutes were provided to guide the concrete dumped from these cars into the pedestal forms. Each plant was able to place about 90 yds. per day. The steel was erected with a stiff-leg derrick shown in one of the accompanying cuts.

The new line crosses the double track line of the Great Northern near the junction with the Brooten line at Boylston. At this point the Great Northern is parallel to and about 100 ft. from the old line of the Soo, necessitating an acute angle crossing and sharp curve to carry the new road under the Great Northern and up to a junction with the present line. A 4-deg. curve is used, the angle of crossing being 19 deg. 31 min. The Great Northern tracks were on about a 5-ft. fill. The Soo was carried down to an elevation about 12 ft. below the natural ground surface, and by revising the Great Northern grade to elevate the tracks about 12 ft.



Placing 100-Ft. Girder over Channel; Nemadji River Bridge.

at the crossing, the necessary clearance was secured. During the raising of the Great Northern tracks all traffic was alternately diverted to one track. Pile bents were driven through the embankment to form permanent trestle approaches to the crossing and the fill at the point of crossing was removed by a car outfit. The westbound track is carried on 31 bents and the eastbound on 40, the bents being spaced 14 ft. center to center and built to the standard Great Northern trestle construction, except immediately adjacent to the crossing.

The details of the timber structure over the crossing are shown in the accompanying drawing. Two bents of 38 and 39 piles, respectively, spaced 19 ft. center to center, were driven parallel to the Soo Line tangent at the intersection of center lines. These bents were cross-braced with 3-in. x 10-in. timbers. The bents were capped with 16-in. x 16-in. timbers, and connected by 12-in. x 24-in. stringers 24 ft. long spaced on 22-in. centers. These stringers were covered with No. 22 gage galvanized iron before the ties were laid.

The entire building of this extension was carried out under the direction of Thomas Greene, chief engineer; C. N. Kalk, principal assistant engineer, and G. M. Huss, division engineer, to all of whom we are indebted for information concerning the work.

"SAFETY MEETING" AT CUMBERLAND.

The General Safety Committee of the Baltimore & Ohio, A. H. Boyd, Jr., J. W. Coon, E. Stimson, C. W. Egan and Dr. J. F. Tearney, held a general meeting for the employees at Cumberland, Md., on the evening of April 3, and some five or six hundred employees of the operating department of the road were present, most of them coming from Cumberland and points on the divisions centering in that city. This meeting was one of a series of the same kind which have been held at Baltimore, Brunswick, Chicago Junction, Connellsville, Pittsburgh, New Castle, Cleveland, Newark, and other division terminals. Employees have been invited to bring their wives to these meetings, and at Brunswick, Md., nearly half of the audience was composed of women. At Chicago Junction, which, like Brunswick, is largely a railway town, a choral society of fifty voices, made up mostly of railway men and their families, furnished the music for the meeting. At Cumberland there was music by a band.

While the committee manages the meetings, the general officers of the operating department attend, so far as practicable, and the first speaker at Cumberland was General Manager A. W. Thompson. Mr. Thompson opened with a reference to the first trip made by a locomotive on the Baltimore & Ohio, over 80 years ago, and to the fact that on that first trip the man who ran the engine injured his hand. From that beginning the road has grown to a system of 4,600 miles, employing over 60,000 persons, and running 2,200 locomotives. Now, as in 1830, accidents are to some extent unavoidable, but the duty of reducing the record to the lowest terms rests upon all. Investigation shows that 80 per cent. of the personal injuries to employees could be done away with if everybody were careful and observed the rules and all reasonable precautions. The company has spent large sums of money in providing safety devices and intends to do all in its power to carry out the present purpose in which it asks the employees to join. Conservation of men is as important as conservation of forests or water power. Calling a fellow employee's attention to a violation of safety rules may sometimes bring out an impertinent or ungentlemanly answer; but the serious and important matter at issue must be kept in mind, and hasty words overlooked. We shall strive for greater safety, even if we have no higher motive than cold economy or selfishness. With experienced men, work is done more efficiently and economically, and every time an employee is killed or seriously injured an inexperienced man has to be taken into the service. No employee is required to take chances; on the contrary, the management urges that everyone think of safety first.

Following Mr. Thompson, Mr. Boyd, chairman of the committee, called attention to numerous specific rules and precautions, and gave results of the studies of the committee. Statistics were also given of the accidents on different divisions and in the different departments, with comparisons showing where progress has been made.

Mr. Egan followed this talk with about 50 colored lantern pictures, shown on a large screen, illustrating dangerous conditions in shops contrasted with the improvement made by the addition of shields and other safety devices. The pictures included, also, a large number taken in yards and on cars and engines, showing how thoughtlessness or disobedience to rules involves danger, and pointing out the simplest ways of avoiding these dangers. The exhibition ended with a picture of what Mr. Egan declared to be the most insidious danger in the railway service—a glass of liquor.

This ended that part of the evening's exercises devoted to safety, and the assembled employees were then addressed by Daniel Willard, president of the road, who set forth the most important aspects of the "railway problem" as it now confronts the American railway manager, and especially as it should appeal to all railway men, whether managers or employees.

Each of the general meetings held by the safety committee on the B. & O.—those at which large numbers of employees

have been present—has been made the subject of a bulletin, the seventh of which has just been issued. Each bulletin contains the principal address delivered at the meeting, together with statistics of personal injuries classified by divisions and set forth in sufficient detail to enable comparisons to be made between the yards, shops, etc., of different divisions. These statistics are supplemented by summaries of causes. For example, the injuries in road and yard service throughout the system in the month of December are tabulated as follows:

	Number Injured.
Road and Yard Service—	
Slipped in jumping on or off cars or engines	20
Lump of coal falling off tender	4
Fell over grade stake	2
Stepped in hole	3
Caught in wire hoop	1
Fell over large piece of coal, stone or other obstacle (one had leg crushed)	19
Falling over signal wire	2
Falling over iron on station platform—fractured rib	1
Struck by torpedo	3
Lifting knuckle lock with hand in switching	4
Struck by water spout	4
Struck by buildings not clearing	5
Struck by switch light	2
Struck by mail crane	1
Cars on adjoining tracks not clearing	2
Slipped on coal on deck of engine	1
Brake club broke	3
Fell in lighting headlight	5
Jumping from top of box car to tank—foot cut off	1
Ran nail in foot	1
Miscellaneous -	
Shoveling ashes put hand on rail, cut off	1
Car repairer caught foot in guard rail—leg cut off	1
Passenger walking on platform being repaired stepped on board which had not been nailed—leg badly bruised, passenger also thrown in ditch	1

The records kept in the office of the general committee at Baltimore not only contain statistics of all personal injuries to employees, classified in the minutest detail, but along with them such data as has been gathered by the committee in its studies of causes. In other words, the inspections and observations of committees, together with recommendations which are made to them by individual employees, are, with the least possible delay, made to apply as practical lessons to the cases of actual injury occurring from day to day. Below we give two sample pages from a record of the observations and suggestions which have come to the general committee, one page from a shop committeeman, and one from a yard committeeman. The figures at the left hand of the column indicate the nature of the item, "1" meaning local, and "2" meaning an item that affects the entire road. The letters "O. K.", in the last column at the right, indicate that the danger referred to has been properly cured or done away with.

James Pratt—Shop Committeeman.

	Cost.	Reported.	Completed.
2. When chipping there should be curtain or canvas made to keep flying parts from hitting other employees	....	Nov. 25	.....
2. Machine shop employees should not use gloves on light work	....	Nov. 25	O. K.
2. In blocking up engine in shop, an experienced man should supervise the job	....	Nov. 25	.....
2. Notice hostlers moving engines and bumping into other engines without ringing bell or sounding whistle—dangerous practice	....	Nov. 25	.....
2. Caution employees about starting machines before work is properly fixed, also about leaving tools where they can be hit by other parts of machine	....	Dec. 9	.....
2. Better inspection of freight car doors and roofs, have had trouble with car doors falling off and loose boards on roof	....	Dec. 9	.....
2. Call attention to employees to go and see doctor as soon as injured—a man contracted blood poisoning from not doing this	....	Dec. 16	O. K.
2. Old and new pipe lying on floor in round houses. Rack should be erected for pipe, and the floor kept clean—pipe liable to roll when stepped on	....	Dec. 16	.....
1. Electric lights in shops should be turned on at 6:50 a. m. so that employees can have good light while going through shops before starting to work; light should be turned on early in evening and on dark days	....	Dec. 16	.....
1. *Suggest board walk be built on Bridge No. 1 over first span from east end,* or wire netting put up under bridge so as to catch employees from falling into river—*lives have been lost at this bridge*	....	Dec. 23	.....
1. Snowball throwing in and about shops should be discontinued as same can result in personal injury in many ways	....	Dec. 23	O. K.

R. B. Brown Yard Committeeman.

	Cost.	Reported.	Completed.
1. On bridge, switch dangerous, small platform hardly large enough to stand on, no railing, if slipped would fall 18 or 20 feet; there should be railing	....	Nov. 25	O. K.
1. Penstock at coal chute, Monongah Yard, very bad shape, about half the water is wasted, no spout and this makes the grab irons and steps dangerous from water freezing	....	Nov. 25	.....
1. Suggest arc light near yard and telegraph office, several injured from falling—the tool house not needed—move it to Yard Office	....	Nov. 25	.....
1. Star Oil Works—pile of dirt between tracks where cars are cleaned out, dangerous for night crew—ties piled too close	....	Nov. 8	O. K.
1. Camden—switch ties piled too close	....	Nov. 8	O. K.
1 Engine Siding—derail closed instead of being open and locked	....	Nov. 10	.....
1. Engine 321 cut off chain broken and cut off lever inoperative	....	Nov. 10	O. K.
1. Guard rails with several blocks gone at several points in yard dangerous	....	Nov. 10	.....
1. Block in guard rail at Steel Plant too short—man's foot can go between rails	....	Dec. 17	.....
1. Electric light poles at East End freight house and posts of freight house do not clear properly on account of spikes in same	....	Dec. 26	O. K.
1. About 400 feet of the railing along the edge of passenger platform be fastened or braced in some way as this is very dangerous	....	Dec. 26	O. K.

The contract of the Northwestern Railway Company of Peru for the construction and exploitation of the Lima to Huaco railway, has been rescinded by the government of Peru for nonfulfillment of its terms. The government will take over the line after an inventory of all property has been made and an indemnity paid in accordance with the terms of the contract. The estimated value of the constructed part of the railway is $2,185,925, which amount is subject to a penalty discount of 10 per cent.

By the treaty of Portsmouth, accepted by China, Russia and Japan were to operate the railways which Russia had built in Manchuria, and further were authorized to keep a military force of 25 men per mile to guard the roads, Manchuria being infested with robbers. The result is, that while the rest of China is torn up by a revolution, Manchuria is kept peaceful by these foreign troops. Japan is said to be making money on its part of the railways, which are in a fertile country, with valuable coal mines, and is doing much for the comfort and education of the railway employees, through associations patterned after our Railway Men's Christian Associations, with lecturers, teachers, etc.

The new railway from Gabrova, Bulgaria, to Tzareff, was opened in February. This 11-mile line connects Gabrova, an important industrial town, with the trans-Balkan line from Tirnova to Stara Zagora, which was opened a few years ago. With a view to further development of the railway system the Bulgarian minister of communications has asked for the following appropriations: $60,000 for enlarging the Sofia workshops; $40,000 for repairs to railway lines in Southern Bulgaria; $42,000 for the construction of two bridges between Sarembey and Phillipopolis; $800,000 for the purchase of rolling stock; $150,000 for the purchase of rails, etc.; and $80,000 for water conduits. Should these appropriations be made, bids will eventually be invited for the requisite material.

The government of Venezuela has granted a concession for the construction of a steam or electric railway from Caracas to Guatire, via Guaremas. This railway will pass through a fertile agricultural and stock-raising section, and will open up to development and exploitation a rich timber and mining zone. The line is to be completed within four years after the commencement of the work, and on the expiration of 99 years, will become the property of the government with all its rolling stock and appurtenances. The gage of the railway is to be 3 ft. 3 in.; the minimum radius of curves, 62 yds.; and the maximum grade 3 per cent. The freight and passenger rates to be charged to the government are to be one-half of the regular tariff rates, and the mails are to be carried free.

OPPORTUNITIES FOR ECONOMY ON RAILWAYS.

Fourth Article in This Series. How to Reduce the Number of Personal Injuries and the Amount of Loss and Damage.

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The railways of the United States expended $57,406,007 for loss and damage for the fiscal year ended June 30, 1909. This expenditure was made up of the following items:

1.	Injuries to persons	$20,618,385
2.	Loss of and damage to freight	24,916,280
3.	Loss of and damage to baggage	299,028
4.	Loss of and damage to property	4,553,041
5.	Loss of and damage to live stock	3,488,628
6.	Clearing wrecks	3,530,545
		$57,406,007

This amounts to over 3½ per cent. of the total operating expenses of the railways, and is a sum entirely disproportionate to the actual necessities of the case. It represents the results of the "haste makes waste" feature, which is a dominant characteristic of our national life.

The above amount does not include other millions of losses annually occurring and borne by railways, such as fire losses, damage to railway property in wrecks and other losses which are charged to other accounts. It simply represents the losses paid to others, due to damage to persons and property for which the railway is liable.

The assertion is ventured here, that if liability companies would undertake to protect railways against the expense due to loss and damage enumerated above, a means would be developed whereby such expense would be greatly decreased. As an instance to support this statement, it can be shown that the losses by fire on railways have been greatly reduced in recent years through the operation of inspection bureaus of fire underwriters carrying insurance on railway property. If, by such modern methods the fire losses on railways can be reduced, then it follows that losses of other kinds can likewise be reduced by the application of the same careful, modern and scientific methods.

The question is, to what extent is it reasonably possible to reduce these annual losses, which are entirely unnecessary and an evidence of the lack of extreme care and precaution in railway operation?

One reason why these losses amount to such enormous sums is that our railway systems are becoming such large unit organizations, and such masses of detail are involved, that careful supervision is often sacrificed. This is proved by the loss and damage records on small roads which show a total of only about 2 per cent. of operating expenses, while on large roads the total aggregates over 3½ per cent., or 80 per cent. more in proportion.

There is a reason for this, and it would appear to be that there is closer supervision over operations on smaller roads than on our large, modern systems.

There is a greater lack of supervision of the right kind in railway management than in any other branch of industry in our industrial life. This alone accounts for the enormous wastes which are found in railway operation. The result of this condition has awakened a sense of responsibility on the part of railway managers, and the efforts made within the past year alone bear evidence to the beneficial results that may accrue from a greater efficiency in operations most of which is the direct result of closer supervision.

The writer has urged the supreme importance of intelligent supervision to the extent of advocating the creation of a department in charge of a vice-president on each large system whose sole duty it should be to supervise intelligently the operation as a whole. If this experiment is ever attempted by the railways it will show marvelous results in eliminating the wastes that now prevail.

If the smaller roads can, by the exercise of reasonable care and precaution, keep the items of loss and damage within 2 per cent. of the total of operating expenses, it is conservative to expect the larger roads to be able to do likewise. If this were done this class of expenditures on the railways of the United States would be reduced annually about $25,185,174.

The increasing loss and damage expense is by some attributed to a growing tendency on the part of railway employees generally to take less and less personal interest in the welfare of the company employing them.

Years ago when railway systems were small there was a closer relation between the officials and the rank and file. Managers of such railways often knew intimately most of the employees and took a personal interest in them and their welfare. This, in turn, evoked in the employees a loyalty to the management which was reflected in the service. Now our systems have expanded so that the managing officers are entire strangers to the rank and file, and the lack of personal contact and association has caused an estrangement between the employee and the higher officials. The *esprit de corps* has been greatly reduced through this development of large systems. Loyalty is a quality which is rapidly growing conspicuous by its absence. The "railway families" which existed on many roads a few years ago have been almost entirely obliterated. Strangers have taken the place so long and familiarly held by the "old man" whom every employee knew and loved and loyally served, and under whom they felt secure in their employment as long as they served the company loyally and well. We now have large systems of many thousands of miles operated from headquarters located a thousand miles from base, and by men totally unknown to the rank and file and whose sympathies are not in unison with them.

These are some of the fundamental causes for the increases in such expenses as loss and damage which are largely the result of a lack of interest in the welfare of the company, which was the predominating characteristic of the *esprit de corps* of the smaller systems which are so rapidly passing away.

The policy of the modern transportation organizations seems to be to consider the system as a large machine and each man a cog in the machine. If the cog becomes slightly worn and no longer fits into the machine it is discarded and another put in its place and the machine moves on. This makes the human element in the organization purely mechanical, and the results indicate that the employee is rapidly becoming a part of the machine, doing his appointed task, no more and no less, and taking little or no interest in matters that were formerly his concern and his interest in, which resulted in co-operation and large benefits to the organization.

In every human being there lives the instinct of manhood. If this is appealed to it will respond in loyalty and helpful service, but if dwarfed and thwarted it will lie dormant and engender another characteristic which is the opposite of loyalty.

In order to reduce the annual loss and damage to property, we must make employees feel a personal interest in the property intrusted to them, and this can only be accomplished by a proper consideration of the employees' interest by those under whose jurisdiction they are employed. There will be a quick and ready response when such appeals are "from man to man."

The fact that loyalty of employees to the interests of the company is one of the most valuable assets which it can possess, and that it is directly reflected in the items of expense herein considered, is corroborated by the experience of the Pennsylvania system, which indicates that while the items named for the year

1909 on the railways of the country as a whole averaged over 3½ per cent. of operating expenses, on that system they averaged only 164/100 per cent., or just about one-half as much. This meant, in effect, a reduction in these items on that system of over $3,000,000 in one year, most of which is attributable directly to the splendid loyalty existing on that road among its rank and file of employees.

Analysis of the expenditures for loss and damage on a road on which an almost complete change of management has taken place during the last year, with its attendant feeling of uncertainty among the rank and file, shows that these items of expense averaged 4 per cent. of operating expenses, or higher than the average for all roads, and two and one-half times the rate on the Pennsylvania. It is almost possible to establish the degree of loyalty of the employees of a railway by the proportions of certain items of expense of operation, such as those herein discussed.

INJURIES TO PERSONS.

This item includes all expenditures for injuries to persons, including employees and others, for which the carriers are liable. These items for one year by departments are as follows:

Maintenance of way	$1,500,000
Maintenance of equipment	1,100,000
Transportation	18,000,000
	$20,600,000

Many accidents on railways are caused by unavoidable circumstances or unforeseen conditions and are beyond reasonable and prudent care and precaution to prevent.

When it can be shown that a carrier has used all reasonable diligence and precaution to guard against accidents, the law should hold it blameless for any resulting responsibility for damages. Unfortunately, while this is a rule of law, it is not always so applied in railway damage cases. The "ambulance chasers" and pettifogging lawyers are ever watchful, like vultures, to persecute the railways, and through their persistence millions of dollars are paid out for damage claims for which railways should not legally be held liable.

There are so many contingencies in transportation that make the occurrence of accidents probable, that if they were enumerated and each possibility doubly safeguarded against, accidents would still happen, and although doubly reasonable care were exercised to prevent the accidents, railways would still be held liable.

The splendid ability and foresight of railway managers is attested by the fact that so few accidents occur on railways, due to neglect of provisions to prevent accidents. Structures and equipment are provided with large factors of safety and no chances are taken which human foresight can foresee. Rules and regulations are framed that if strictly observed would practically eliminate accidents, except those due to causes to which no human agency or foresight can avoid.

Most of the disastrous accidents on railways are caused by the failure of employees to observe the rules and regulations provided for them. If stringent laws were passed holding employees criminally liable for failure to perform their duty, when such failure results in loss of life or injury to persons, and if such laws were enforced many deaths and injuries as well as loss of property due to railway accidents would in future be avoided.

A number of railways have recently adopted a system of safety committees to prevent accidents. These committees are organized in such a way that the entire service is completely covered. A central committee consisting of higher officials exercises jurisdiction over the entire plan. Divisional committees consisting of the principal division officials have jurisdiction over the respective divisions. Subcommittees at important points and stations have charge of distinct territories and branches of the service.

The simple instructions given to these committees individually and collectively are that they shall be ever on the watch to do anything and everything which comes under their observation that will tend to prevent the occurrence of accidents to persons or property. This plan carried out to its fullest extent must result in tremendous good and increase the safety of travel and employment in the railway service.

As an illustration of what is possible under this plan one important railway reports that the results secured on its system indicate a reduction in accidents as follows, as set forth in the *Railway Age Gazette* of December 22, 1911, page 1287.

47 per cent. in trainmen killed,
40.8 per cent. in trainmen injured,
30.7 per cent. in switchmen killed,
18.5 per cent. in switchmen injured,
50 per cent. in stationmen killed,
10.5 per cent. in stationmen injured,
32 per cent. in trackmen injured,
34 per cent. in bridgemen injured,
11.4 per cent. in shop and round house men injured,
85 per cent. in car repairers and inspectors killed.

Total reduction of 17 employees killed,
Total reduction of 2,144 employees injured,
70 per cent. reduction in passengers killed,
10 per cent. reduction in passengers injured.

The period covered is the eleven months preceding December, 1911.

If such results can be secured on one system, what may we not hope to see accomplished if this method is followed by all the railways of the country?

It is a humanitarian work, it begets loyalty in the service and promotes the sympathy of one class of employees for another, and altogether it is a labor of love and duty, and brimful of the "milk of human kindness."

If one road has done so much, is it not likely that by a universal application of the same principles we may reduce our accidents one-half, and, therefore, the expenses due to these accidents correspondingly and save not only many lives and painful injuries but an annual loss of $10,000,000?

LOSS OF AND DAMAGE TO FREIGHT.

The annual expense due to loss of and damage to freight is, in round figures, $25,000,000.

This item has increased rapidly during the past ten years. Many causes contribute to it, one of the principal ones being the destruction of and damage to freight occasioned by rough handling of equipment for which the employee is primarily responsible, but the blame for which is promptly placed upon the automatic coupler and the air brake, now universally used on freight equipment. The switching of cars in gravity yards has also been charged with a part in this wholesale destruction, but the blame does not properly belong there. That a part of this damage is due to modern equipment is no doubt true, but nine-tenths is due to the rough handling by trainmen which goes on unchecked from year to year until it has become a custom that will require years to break up.

It is only necessary to observe the operations in switching in any freight yard to realize the extent of this evil practice and the almost entire absence of any effort being made to remedy it. The damage to the contents of cars is equal to only a part of the total damage done to the equipment. It is necessary to make extensive repairs of some kind to each freight car on an average of once per month, and this is directly due to the rough handling in yards and on trains, most of which is avoidable.

The claim is made that rough handling is unavoidable on account of the length of trains, high speed and the rapidity with which work is required to be done in switching operations. This haste is accomplished at the expense of heavy payments for damage to freight and equipment, and it would be far more economical to require care in handling even at some additional transportation cost than to continue the present destructive methods. There must be a change in the handling of equipment by train and yard crews if this unnecessary loss is to be avoided, and it can be accomplished by applying the proper remedy.

Another source of damage to freight is improper loading of cars. Merchandise in less than carload lots is loaded by railway employees, and much of the damage caused in transit is due to improper loading, or "stowing" of freight in cars, which can

be avoided if proper care is used. Recently a set of rules have been prepared for the safe loading of explosives and dangerous articles. These rules were accompanied by diagrams showing the method of bracing such loading in order that it may be transported safely. Also the Master Car Builders' rules provide for properly loading freight on open cars. If rules were made and carried out for the proper loading of less than carload shipment, much damage to such freight with consequent damage claims, would be avoided.

The loading in mixed carloads of articles that by their close proximity to other freight causes damage to the latter is also a fruitful source of loss and damage claims, as also is the practice of loading cars unfit for receiving certain classes of freight, cars with leaky roofs, cars with dirty floors and sides, or otherwise in unsuitable condition.

Payments for what are known as O. S. & D. claims (over, short and damage claims), aggregate a large proportion of the amounts annually paid out by railways. These claims have their origin in the carelessness primarily of the shipper in not properly marking and packing shipments, and secondarily, of the carrier in accepting shipments in bad condition. Rules have been promulgated to remedy these defects, but they are not stringent enough, and are not fully enforced. There is room for much improvement in remedying these troubles.

The system of loading merchandise at many large freight stations is defective, and freight is often loaded in wrong cars and goes to wrong destinations, incurring at once an "over" at one point and a "short" at another. There are several simple and effective plans for guarding against wrong loading, any one of which saves not only many claims, but annoyance to shippers and loss of traffic to the railways.

A careful check of over, short and damage reports at each station is productive of good results in tending to reach the real causes and correcting wrong practices. A central point of collection of all "over" freight as a clearing house also tends to promptly detect shortages elsewhere and saves claims. An interchange of over and short reports among terminal point agents is also productive of good results.

The handling of freight claims as far as over, short and damage claims are concerned is properly a function of the operating department. Such claims are charged to operating expenses and being caused by the neglect of that department, and should be under its full jurisdiction. Where such claims are handled by the traffic or accounting departments, it is not possible to secure as prompt and efficient results in reducing them and correcting the evils.

Railways are receiving rates for their services that are far from being in proportion to the risk they assume in handling freight, being held to strict accountability for all loss and damage incurred in their care, even when they have exercised the utmost care in handling the shipment. It should be the rule, that if they can prove the exercise of reasonable care, which is the law in all other respects, their responsibility should cease. Railways are being made the common prey of many unscrupulous shippers who underestimate weights or overestimate values, and almost invariably the carrier is obliged to pay the claims under penalty of losing traffic or prosecution, while a verdict for the shipper is a foregone conclusion.

As a means of preventing losses due to incorrect weights, some railways that have made a specialty of weighing bureaus, whose duty is to provide adequate and correct scale facilities, see that all freight transported is accurately weighed, and stand upon these weights.

In this connection, the weighing of empty cars at stated periods is a most important factor. The effort and expense involved in conducting weighing bureaus on a modern up-to-date basis is returned many fold in increase in revenue and reduction of claims due to weights.

The handling of live stock entails many claims which are forced on railways, some of the causes of which are entirely beyond their power to regulate, even if the utmost care and precaution is taken to avoid them. State and federal regulations, however, place the burden upon the carrier. This makes the shipper careless, many times intentionally so, and makes the carrier the victim of unscrupulous shippers.

In the interest of fair play and honesty, shippers should be held to the same degree of responsibility. This would make unnecessary the payment annually of thousands of dollars in claims now paid under compulsory regulations from which the carrier has no relief.

The same statements apply with equal force to perishable freight shipments. On many roads there is little margin left after the payment of excessive claims on live stock and perishable shipments, and the high cost of handling such shipments due to fast schedules and empty movements in one direction, but common carriers must accept them and be responsible for them under their obligations to the public. However, there is much room for improvement in regulations that are now framed largely in the interests of the shipper and impose undue responsibility upon the carrier.

The expense due to claims for loss of and damage to baggage represents a comparatively small item, but is doubtless susceptible of reduction by the exercise of the utmost care and precaution. The system and despatch with which baggage is handled on American railways is superior to that in any other country of the world, and where such a quantity is handled as in this country, the record of loss and damage is remarkable and a proof of the splendid system in use.

While baggage is often handled roughly, causing damage which may be concealed so that no claim is filed, the rough handling is largely due to the limited time allowed for handling.

The expense of loss of and damage to property amounts to over four and one-half millions of dollars annually. A large part of this damage is caused by destruction of and damage to property, such as crops, buildings, lands, fences, etc., adjacent to the right of way.

When the amount of property adjacent to the railways of the country which is exposed to the possibility of damage by fire from locomotives is considered, it is remarkable that the damage is not greater. There are frequently large individual losses for which railways are held liable where the real causes are doubtful, but because of the inability to prove the exact cause, and the readiness with which juries return verdicts against railway corporations, they are often unjustly required to pay heavy claims for damages for which they are not responsible. In the cotton territory of the South many fires have occurred in cotton compresses, resulting in losses of many thousands of dollars where the fires were doubtless caused by the carelessness of employees of the compresses, and where abundant proof is given either that no locomotive was in the vicinity of the fire preceding it, or that netting was in first class order, nevertheless the loss is charged to the railway company.

There are numerous ways, however, by which railways may reduce these losses. Clean rights of way and co-operation with adjoining land owners to protect against the spreading of fire by plowing furrows just inside or outside the right of way lines tend to reduce these losses.

There is much carelessness in permitting the accumulation of rubbish at stations. This is a ready and prolific source of fires which often destroy much valuable property.

Railway property, by reason of its exposure to fires from locomotives, is subjected to heavy losses, but careful systems of inspection inaugurated by many roads, tend to greatly reduce these losses not only of railway property, but other property for which liability is incurred.

The use of locomotives burning oil or coke is often resorted to where lines are operated in lumber or cotton districts, or other points where highly inflammable or valuable property is exposed. The proper location of buildings to prevent spreading of fires is also an important matter, and in many instances is not given due consideration, or is entirely disregarded.

The same care and judgment that is being exercised in the prevention of accidents to persons through the operation of safety committees can with profit be extended to the prevention of destruction of property and reduction of the losses now annually incurred in this direction. Division officers who pass often over their territory have excellent opportunities to act as inspectors and remedy conditions which cause damage to railway and other property. It is surprising what good results can be accomplished in this manner.

The annual losses due to damage to live stock killed and injured on right of way amounts to about three and one-half million dollars. One of the causes contributing to these losses is the absence of laws preventing stock running at large. This is especially true in many southern states. Railways cannot be held accountable for this lack of adequate laws, and are powerless to secure their passage. This condition is a menace to the safety of life as well as property and in the interest of the public good such laws ought to be enacted.

Railways are made victims by many unscrupulous owners of worthless live stock by the collection of fictitious sums for stock killed, and on the whole are far more just in their dealings with the public in this matter than is the owner of the live stock killed or injured.

The neglect by railways, however, of the maintenance of right of way fences contributes to these losses often in amounts which would meet the cost of fencing and its maintenance. Self-closing farm gates are also possible and leave no excuse for the farmer to neglect to close them. Often through the landowner's neglect the railway company suffers a heavy loss.

Enginemen by carefulness can often prevent a heavy stock claim. A slight delay to a train to avoid striking stock on track may save hundreds of dollars, or a possible more serious result in the nature of a wreck.

Clearing wrecks cost the railways annually about three and one-half million dollars. While many wrecks are the result of unavoidable causes, on the other hand many result from carelessness in operation or management.

With the reduction of accidents from avoidable causes, which is possible, a corresponding reduction can be made in this item of expense. This does not include all the loss consequent upon accidents, but merely covers the cost of replacing equipment on track, clearing up wrecks and repairs to roadway. The larger losses by damage to equipment, personal injuries and other incidental damage is not included. Therefore, while the aggregate amount of this item seems small for all railways, when it is considered that it covers only a small part of the total losses which accidents involve, it is large and is susceptible to material reduction, principally through the exercise of greater care on the part of the employees and the operating officers of the railway companies.

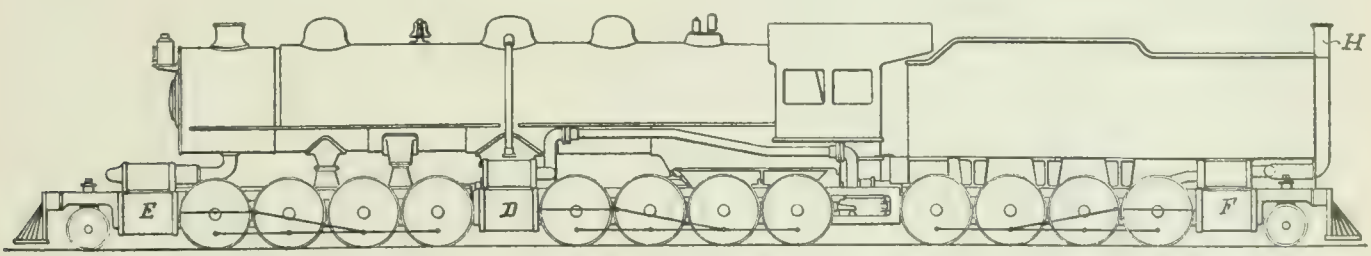
A recent accident in which a number of prominent railway officials lost their lives is still fresh in the memory of all, and is an apt illustration of an unnecessary accident caused by pure carelessness and neglect. There are many such accidents on our railways which ought to be prevented by a means that would hold criminally liable employees who are found guilty of violating through wilful neglect the rules and regulations prescribed for the safe conduct of the business of transportation.

TRIPLEX COMPOUND LOCOMOTIVE.

The weight of the loaded tender of Mallet locomotives is usually 40 to 50 per cent. of that of the engine ready for service. Some of these loaded tenders with four-wheel trucks weigh 175,000 to 180,000 lb., and those with six-wheel trucks as much as 230,000 lb. This has suggested the idea that the weight of tenders, when only 25 per cent. of the load of coal and water remains, would be sufficient for the adhesion required by a pair of large compound cylinders. The weight of the tender with 25 per cent. load would be over 100,000 lb., which furnishes a sufficient load for a tractive effort of 25,000 lb., and the weight of the locomotive running gear and machinery adds enough for the desired tractive effort.

An interesting and ingenious design which is based on this principle is illustrated herewith. The engine is practically an ordinary Mallet with a working tender, but, instead of having the high and low pressure cylinders of different sizes, the locomotive is constructed with a pair of high pressure cylinders attached to the frames connected with the back part of the boiler and two pairs of low pressure cylinders, one in front and one at the rear of the tender; all the cylinders are of the same size, so that a compounding ratio of two to one is obtained. For instance, if the boiler carries 200 lb., there would be 100 lb. back pressure in the high pressure cylinders. This would give a mean effective pressure of 100 lb. per sq. in. in all of the cylinders with the reverse lever in the corner.

The horizontal pipe with a ball joint in the cylinder saddle, which takes the exhaust from the high pressure cylinders to the low pressure cylinders, has given practically no trouble in Mallets now in service, and this is simply duplicated in the rear of the new design by making a pocket with a ball joint in the foot plate and taking the exhaust steam from the high pressure cylinders back to this foot plate, as well as forward to the front cylinder. The reason the cylinders on the tender are placed at the rear end is in order to make a suitable length swivel pipe which has the ball joint in the foot plate and which is analogous to the receiver pipe connecting the high and low pressure cylinders at the front of the engine. This pipe would be entirely too short for good service if the cylinders were at the front end of the tender, and, besides, it allows a truck at the end, so that the locomotive can be run in either direction with equal satisfaction.



Proposed Triplex Compound Locomotive with Engine on Tender.

This engine has been worked out from a Great Northern locomotive as a base, and it is found that with a slight increase in the weight and cost, and without any increase in length, there is obtained about 50 per cent. more tractive effort, the working tender being so arranged that with only 25 per cent. of fuel and water remaining there will be sufficient weight to give the full adhesion.

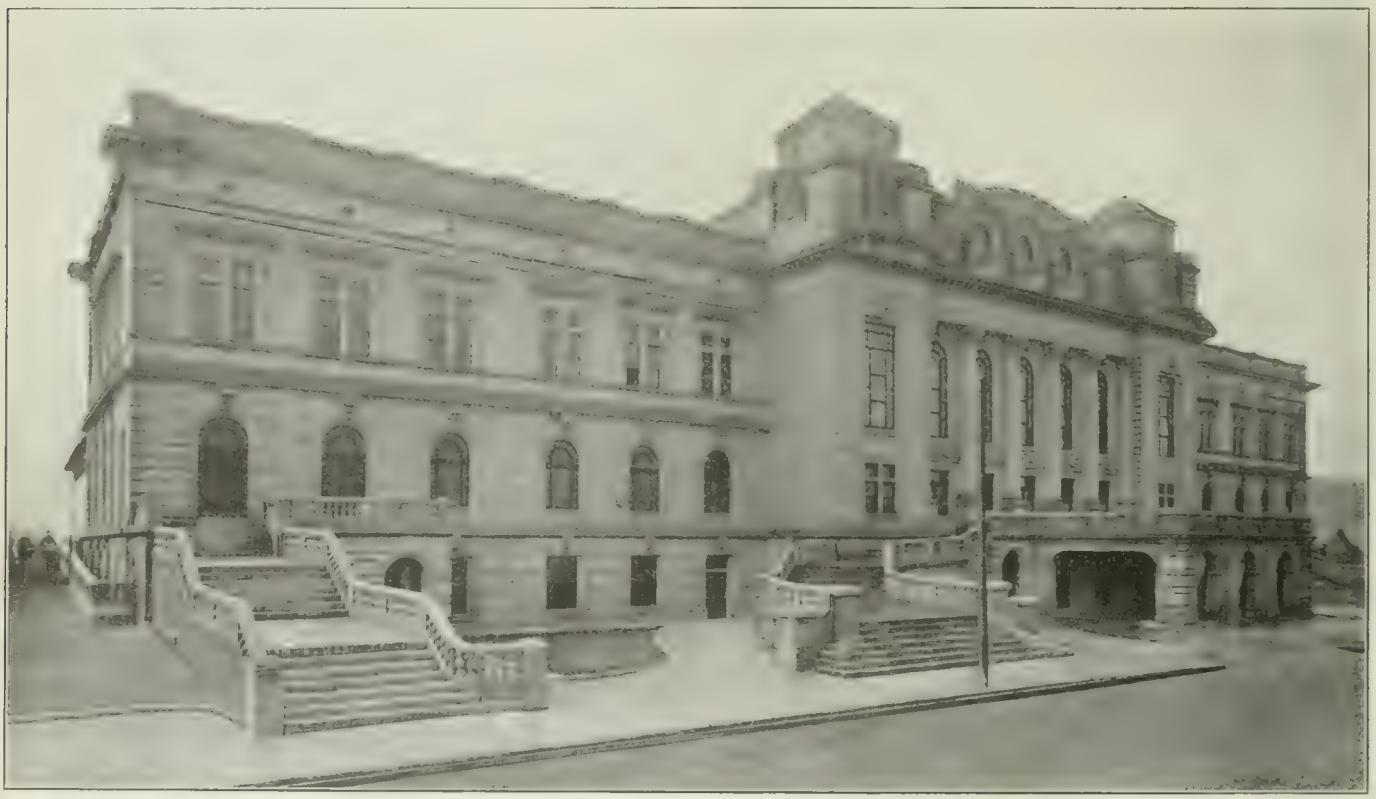
Since the cylinders are all of the same size, the pistons, valves, crossheads, and even rods are the same throughout the engine. The link motions will be practically the same and the spring riggings are the same on the front and back sections. The driving boxes may be made alike and this, together with the fact that there is really nothing in the way of experiment in the separate elements of the design, should make it a desirable type for heavy grade work. It is intended to take the exhaust from

the rear section and pass it to the atmosphere by a separate pipe, or, if desired, it can be used for heating the water in the tender in cold weather. The special features of this locomotive plan have been patented by George R. Henderson, and assigned to the Baldwin Locomotive Works.

MEMPHIS UNION STATION.

The new union station at Memphis, Tenn., was occupied by the St. Louis, Iron Mountain & Southern, the St. Louis Southwestern, the Nashville, Chattanooga & St. Louis, the Southern and the Louisville & Nashville on April 1. The building is located near the business district of the city and within easy reach of the other railway terminals. The ground consists of four city blocks, comprising an area of about 25 acres, bounded by Calhoun and Railroad avenues, Rayburn boulevard and South Second street. When this tract was purchased several years ago it was partially covered with rubbish, partly built over with straggling, tumbledown tenements, and was crossed by the Bayou Gayoso, a stream averaging about 16 ft. deep and 25 ft. wide. It involved considerable work to prepare this site before any work could be done on the structure proper. A fill of 150,000 yds. was made, the dirt being hauled in by trains from outside the city. This work alone required four months. The stream was taken care of by building a reinforced concrete storm sewer 8 ft. x 14 ft., in section and more than 2,000 ft. long, which cost about $90,000 and required eight months to build. The street traffic formerly crossing the site was cared for by building subways at Carolina avenue and Rayburn boulevard.

Actual construction work on the building was begun about April 1, 1910. The plant consists of the station building proper, 84 ft. x 285 ft., three stories high; the train concourse, 241 ft. x 95 ft.; the express building annex, 40 ft. x 275 ft.; the power house, interlocking tower and roundhouse. In the design, future developments have been carefully considered and facilities provided which should be adequate for at least 25 years. The entire plant is fireproof and has been constructed with an eye to climatic conditions, giving the traveling public the maximum of convenience and comfort. The design of the main building follows the early Italian renaissance. The materials used are Vermont granite, Bedford limestone, steel and concrete. All stone was cut and dressed at the quarries, and considerably facilitated the construction. The main building is rectangular, surmounted by twin towers over the central portion connected by an upper story, forming a sort of facade on the north. The main approach is by a crescent-shaped staircase rising to a broad balcony over a porte cochere. This approach is lighted by large electric globes carried on bronze standards of artistic design. Rising above the balcony to the upper story are six columns of monolithic limestone. The large windows on the front of the station are arched, the casements and frames being of cast iron fitted with Imperial plate glass. At the northeastern corner of the building a separate stairway is provided for the accommodation of colored passengers, allowing them to enter their own waiting rooms directly. Baggage and express are handled from wagons directly to the baggage and express rooms on the street level, the entrance being on the west side. An ample carriage stand for public and private vehicles is provided just east of the station.



Exterior of Memphis Union Station.

The main waiting room is 76 ft. wide and 100 ft. long. The ceiling is very high, and is carried by steel trusses. It is tiled in artistic designs and is lighted by 210 Tungsten incandescent lamps. The walls are finished in tiling and native and Italian marbles, the prevailing shades being green and brown. Twenty-four triple lights, carried in heavy brass fixtures, are provided around the walls. Wide balconies run along two sides of this waiting room on the mezzanine floor, from which passengers may obtain an unobstructed view of the terminal yards and train shed on the south or of the city of Memphis on the north and east. The room is furnished with massive settees of Honduras mahogany resting on Verde Antique marble bases.

Facing this main waiting room are the ticket offices, the telegraph offices, baggage check room, parcels check room, news

stand, Pullman office and information booth. Telephone booths, sanitary drinking fountains, bulletin boards and other conveniences are also arranged around the room. The ladies' waiting room, which opens out of the main waiting room, is finished in the same style, and, in addition to the mahogany settees, contains numerous wicker rockers and other facilities for the comfort and convenience of women travelers.

Adjoining the waiting room is a lunch room, 40 ft. x 83 ft., finished in Alabama white marble, with mosaic floor. The counters are of white marble and seats of polished mahogany, all the equipment being of the latest design. The dining room just beyond this lunch room is finished in intricate designs of Italian sienna, Alabama white and blue cloud marble. The floor is also of marble designed to harmonize with the walls and ceiling. The furnishings are of Honduras mahogany, harmonizing with those in the remainder of the building. The lunch and dining rooms are served from a spacious kitchen equipped with the most modern culinary devices.



Main Waiting Room of Memphis Station.

The waiting room for colored passengers is 39 ft. x 69 ft., and is finished in marble and tile, with mosaic floor of ornamental design. A separate lunch room is provided, and all the facilities found in the main waiting room are duplicated in this portion of the building.

A commendable feature of the building is its clock system. In all public rooms there are large clocks electrically connected with one master clock, insuring correct time.

The train concourse on the same level with the main waiting room is 95 ft. wide and 241 ft. long. It is built of steel and concrete, and faces south towards the terminal yard. It is roomy and well ventilated, and affords a lounging place for patrons who have to wait for trains. It is also connected with the street by direct exit. The train sheds are of the butterfly type, built of steel and reinforced concrete. This type is preferred in southern climates to the enclosed types, since it allows very much freer ventilation, which is especially appreciated by the patrons of sleeping cars which stand in the terminal until a late hour.

On the ground floor a large rest room is provided for passengers who have to spend the day in the station and who may desire to eat their meals in the building or secure greater privacy than is possible in the main waiting room. This also has a ladies' retiring room, a well equipped barber shop and tub and shower baths. Provision has also been made for a drug store and a billiard room on this floor. The baggage room, which is also on the ground floor is 64 ft. x 88 ft., and is supplemented by an overflow baggage room about half as large and by an annex baggage room 75 ft. x 240 ft. This room is connected with the baggage check room adjoining the main waiting room by a tube system, to facilitate the checking out of baggage. All baggage is handled to the trains through a subway 15 ft. wide running the entire length of the track yard and connecting with cross subways which reach hydraulic elevators located between tracks opposite points where baggage and express cars stop. The remainder of the ground floor is taken up with the railway mail room, express companies' offices, locker and rest rooms for trainmen and Pullman conductors' room. The third floor of the station is given up entirely to offices.

The power house is located about 1,300 ft. south of the station building, with which it is directly connected by a tunnel 8 ft. square, accommodating all electric conduits, steam and water pipes. The boiler room of the power plant contains four 300-h. p. Stirling water tube boilers, equipped with Roney mechanical stokers. The engine room contains three 187½ k. w., 2,300-volt generators for furnishing power and lighting current to the station building and other facilities. Two 2-stage, 1,500 cu. ft. air compressors furnish compressed air for operating the

electro-pneumatic interlocking plant and the deep well pump. The artesian well from which all water for the station is taken is 560 ft. deep, and has a capacity of 700 gal. per minute. Water storage is provided by a 100,000-gal. tank which is always kept full for emergency use. The water for drinking purposes is cooled by a 10-ton refrigerator plant. The station building is heated by the hot water system from the power house, the water circulation being controlled by a centrifugal pump driven by a turbine engine. Coaches standing in the yard are heated by steam also furnished from the power house. A system of air pipes is laid throughout the yard for use in cleaning coaches. The coal supply for the power house is dumped directly from standard cars into bunkers below the track, from which it is drawn through breakers and conveyed by electric hoists to the mechanical stokers. The ashes are drawn off on the basement floor level and elevated to reinforced concrete hoppers of two-car capacity, from which they are dropped into standard cars for removal. The power house chimney is 168 ft. high and 12 ft. in diameter at the base, tapering to 8½ ft, at the top. It is built of reinforced concrete lined with fire brick for 65 ft. from the bottom.

The interlocking plant is housed in a brick tower located still further south, the plant being of the electro-pneumatic type. Engines are cared for in a reinforced concrete engine house, to which is connected a shop equipped for making minor repairs. The coal used by locomotives will be handled by a locomotive crane direct from cars to locomotives.

The work of building the new station was under the direction of J. L. Lancaster, president of the Memphis Union Station Company; J. Werness, chief engineer, and W. F. Schulz, engineer of construction. The plans were drawn by John A. Galvin, Louisville, Ky. The total cost of the work is about $2,500,000. We are indebted to the St. Louis, Iron Mountain & Southern for photographs and information contained in the preceding article.

BUREAU OF EXPLOSIVES REPORT.

The Bureau for the Safe Transportation of Explosives and Other Dangerous Articles has issued the report of Colonel B. W. Dunn, chief inspector, for the year ending December 31, 1911. The number of railway lines belonging to the bureau has risen to 228, embracing nearly all the important roads in the country, and the work of the bureau is expanding both in amount and importance. Great improvement has been made in the transportation of dangerous articles, but still a large number of packages are found unsafe and condemned, as appears from the third and fourth items in the following table, which is condensed from a larger one which appears in the report.

	1911.	1912.
1. Number of railways members	228	174
2. Inspections of stations	8,572	8,031
3. Boxes of high explosives condemned as unsafe for transportation	6,591	10,902
4. Kegs of black powder thus condemned	1,205	1,291
5. Cars in transit inspected	1,412	647
6. Ditto, seriously violating regulations	210	235
7. Express inspections	1,027	.....

The chemical laboratory has inspected during the year 955 samples of explosives, fireworks, inflammable and cartridge paper.

The inspectors have been called upon to give so many lectures that they have not made as many inspections as otherwise would be possible. Ten accidents in transportation of explosives during the year caused $34,761 damage, as compared with $43,636 damage from 16 accidents in the preceding year. The number of persons killed was one in 1911 and two in 1910. Fires occurring in the transportation of dangerous articles other than explosives in the year 1911, numbered 222, and the property loss was $255,612. In this list of fires, the article which appears most frequently is charcoal, and the next, matches. Fires in heater cars numbered 27, causing a loss of $151,115. The disastrous explosion at Communipaw, N. J., occurred within the year covered by this report (February 1, 1911), and Colonel Dunn's report on it is printed in an appendix, but the case is not included in the tabular summary, for the reason that this freight had reached destination and had been delivered to the consignee. The property loss at Communipaw was not less than $250,000.

Two explosions of dynamite occurred where the shipment had been left on the railway premises longer than was necessary. The bureau has had difficulty in making consignees remove dangerous shipments promptly, but the revised regulations, now in force, empower the carrier to adopt extreme measures to secure the prompt removal of dangerous freight. It is expected that the railways will be induced to establish increased charges for storage on dangerous articles. In England explosives must be taken away from a freight station within twelve hours after arrival; if not taken, the goods may be sold by the company. Inflammable liquids must be taken away within four hours, or if not taken may be subjected to a storage charge of five shillings per ton per hour.

The revised regulations for the transportation of explosives, which have been issued by the Interstate Commerce Commission, and which went into effect January 1, 1912, contain specifications for shipping containers. It is impossible to secure uniform and efficient packing for dangerous articles, except through a mandatory law. The only way that a carrier can enforce proper rules is to refuse the freight, and under the present rigid law this can be done. The bureau expects to extend its activities over the railways of Canada.

Colonel Dunn offers a blank form for reporting violations of the law, and one for reporting accidents, which he recommends carriers to use. Some officer of the transportation department should see that regular reports are made and are sent to the chief inspector of the bureau.

The inspection of cars of explosives at junctions in the night time may be unsatisfactory, and Colonel Dunn recommends that where practicable cars should be shipped so as to pass interchange points in the day time.

Rough handling of cars bearing explosive placards still continues. One of the bureau's inspectors, who has had long experience as a yardmaster, is making a tour of the entire country to try and improve the practice in the large yards. On the 58 roads for a single year recently the payments for loss and damage of freight amounted to more than $26,000,000, of which a considerable percentage is undoubtedly due to rough handling of cars. A modern car will stand more rough handling than will the packages in it. Every large freight station should have a specially skillful loader to attend to dangerous freight.

The demand for lectures by the inspectors of the bureau has increased rapidly. The railway officers are urged to have their employees attend the lectures. A thousand persons can be instructed as easily as a small number.

Action has been taken by the bureau looking to the proper inspection and safeguarding of dangerous articles imported from foreign countries.

The Manizales to Rio Cauca railway has been subventioned by the federal government of Colombia at the rate of $15,920 per mile of railway constructed. The subvention is payable in gold or in 5 per cent. bonds. Arrangements are to be made for the construction of 62 miles of the line at once.

The Russian ministry of ways of communication has proposed spending $15,672,000 for locomotives and cars for the Amur railway. The estimate is now before the council of ministers. It includes as necessary stock 245 locomotives (of which 38 are for passenger trains and 207 for freight trains) 376 passenger cars and 6,569 freight cars. Although these quantities are put in the estimate it is proposed to use them only as they may be required, that is as the various sections of the line are opened for traffic. The minister of ways of communication desires authority to order now 200 locomotives, the cost of which should appear in the estimates of 1913.

General News Section.

The Chicago, Indianapolis & Louisville has increased the pay of its firemen, the advance amounting, it is said, in most cases, to 10 per cent.

The St. Joseph & Grand Island roundhouse at Hiawatha, Kan., together with a locomotive, several tenders and a motor car, were destroyed by fire on April 4.

The Bureau of Railway Economics has just issued an elaborate and comprehensive study of railway statistics based on the returns made to the Interstate Commerce Commission for the years 1900 to 1910 inclusive.

The Canadian Pacific has plans under way for the electrification of the section of this line known as the Rossland subdivision of the British Columbia division, between Castlegar Junction, B. C., and Rossland, 29 miles.

Beginning June 1 the hours of the day will be numbered from 1 to 24, from midnight to midnight, on all French railways and in the postal and telegraph service. A partial test in the telegraph service has given satisfactory results.

The lectures on First Aid to the Injured, given for the benefit of the employees of the Pennsylvania Railroad during the past year, numbered 270, and the attendance at these lectures aggregated 9,180 employees. Many local firemen and policemen attended these classes, being also invited to the lectures.

Several thousand clerks of the New York, New Haven & Hartford have made a formal demand for a revision of their rates of pay, asking for a general increase. It is said that most or all of these clerks had their pay increased in 1907, and that 2,000 of them received an additional 10 per cent. in June, 1910.

The Chicago & Eastern Illinois has placed in service between Chicago and St. Louis a new type of car, called the Lounge-Grill, in which a complete meal may be served at any time. Parties of four or six are accommodated in separate compartments. The car also contains the library and other facilities usually found in buffet cars.

The Chicago, Rock Island & Pacific has issued instructions that hereafter no reservations for Pullman space or accommodations will be made on Rock Island trains for persons traveling under any form of free transportation except on the understanding that it will be subject to sale for revenue business on demand before the departure of trains.

President B. L. Winchell, of the St. Louis & San Francisco, has invited the National Good Roads Association to appoint a committee of five representative clubwomen who are interested in the good roads movement to accompany the "good roads" train now being operated over the Frisco system during its trip through Illinois this summer.

The Covington amendment to the Panama Canal bill, which would compel all railways to divest themselves of ownership in water transportation lines will probably be amended in the House. It is hoped to secure the adoption of a clause permitting railways, the Interstate Commerce Commission assenting, to own and operate steamship lines that are a prolongation of their railway lines.

Emery R. Johnson, professor of transportation and commerce in the University of Pennsylvania and special commissioner on Panama traffic and tolls, in a statement made before the senate says that the operation of the canal will cost the government $30,000,000 a year. The items are: Expenditure attending operation of canal, $4,000,000; interest on investment, $11,000,000; military etsablishment of Canal zone, $15,000,000.

Statistics compiled by the Southern Pacific show that the mileage of its main line and second track protected by automatic block signals has increased from 102½ miles in 1902 to over 3,000 at present. More than 70 per cent. of the main line mileage is protected by block signals, of which approximately 100 miles are protected by the manual block signal system. In 1902 less than 3 per cent. of the company's mileage was equipped with block signals, and in 1903 the percentage had increased to over 60 per cent.

The results of the balloting of the eastern enginemen on whether to support their leaders to the extent of a strike had not been announced up to the time of our going to press. The conference committee of managers last week prepared pamphlets containing the demands of the men, the answer of the railways and editorials reprinted from a number of the country's leading newspapers. Each of the roads involved is sending copies to bondholders, shareholders, members of boards of trade, chambers of commerce, and other commercial bodies in its territory. About 175,000 have been printed.

H. G. Askew, statistician of the Texas railways, has made a compilation from the Interstate Commerce Commission reports to June 30, 1910, showing that for 17 years the Texas roads paid out in settlement of personal injury cases a yearly average of $117.74 per mile, while the roads of the United States, exclusive of Texas, paid out a yearly average of $59.88 per mile for this purpose. The total for the Texas roads during the period covered was $22,047,880, and for roads exclusive of Texas, $196,002,187. The percentage to gross earnings for the Texas roads was 2.137 per cent., and for the roads outside of Texas, .671 per cent.

The House committee on interstate and foreign commerce appears to be one of the most radical sections of the present Congress, numerous bills proposing important changes in transportation and other matters having already been reported. One of these bills was that prescribing a zone system of rates limiting the charges to be made for the transportation of parcels by express companies. This was only a week or two ago, but this week it is reported that the committee is considering in private sessions the Goeke bill, providing that the government shall take over the express companies, condemn their property and pay for it by the issue of government bonds.

Thomas Saddington, manager of the school of telegraphy, maintained by the Pennsylvania Railroad at Bedford, Pa., reports that since the establishment of that school in 1907, 214 students have been graduated and are now employed as telegraphers. This is a little less than two-thirds of the students that have been enrolled. The school has lately been equipped with a section of miniature double track railway with crossovers, sidings, and manual block signals. Although the telephone is now used extensively on the Pennsylvania, the teaching of the Morse telegraph is kept up. Students are also given a full course of instruction in the office work of a station agent.

Progress of the Safety Campaign.

The executive safety committee of the Chicago Great Western, which was organized early in the year, has issued a circular announcing that owing to the relief from the severe weather conditions of the winter the question of appointing local safety committees will be taken up at once, and that hereafter reports will be rendered monthly. A record will be kept by the executive safety committee of suggestions of employees which are adopted in order that the person proposing them may receive full credit for his ingenuity, thoughtfulness or interest in the welfare of the company and employees. In the circular are included a large number of suggestions addressed to various classes of employees regarding the avoidance of small acts which tend to cause accidents. A portion of the circular reads as follows:

"Causes of railway accidents may be divided into three classes, viz.: Carlessness, thoughtfulness and braggadocio.

"Carelessness may injure the one who is careless, or some innocent co-worker may suffer.

"Thoughtlessness is akin to carelessness, and is the outcome of trying to work with hands alone, when to do good work the brain must work in conjunction with the hands.

"Braggadocio is simply trying to show off. If you are on the vaudeville stage it is all right to pull off some stunt which will amuse onlookers and cause admiration, but railroading is too serious a business for showing off. Don't try to board an approaching switch engine by standing in the center of the track ahead of it. Don't wait until your train has gotten under fast headway before trying to board it. Don't flirt with the farmer's daughters from the top of a freight car when you ought to be looking out for that next bridge. In simple words, don't be foolish about a serious business."

General Manager H. J. Slifer has also issued a small vest-

pocket books of rules for train and engine employees, in which are printed in red and green ink several of the most important rules of caution.

F. G. Pettibone, second vice-president and general manager of the Gulf, Colorado & Santa Fe, has issued a circular to employees, calling attention to the fact that the number of persons killed on this road during 1911 showed an increase of ten over the year 1910, and asking the co-operation of employees in the effort to reduce the number of casualties. The circular gives a list of the fatalities to employees during the two years, together with the causes of the accidents, when known, and a large number of suggestions for the observance of employees in the effort to reduce accidents.

A "safety meeting," held at Cumberland, Md., on the Baltimore & Ohio, April 3, is reported on a preceding page.

The establishment of safety committees on the Wheeling & Lake Erie is noticed under another head. See also under State Commissions.

Governor Foss on the Lease of the Boston & Maine to the New Haven.

Governor Eugene N. Foss of Massachusetts, in a "message to the public," advocating the creation of a public service commission to improve the railway service, said in part: "If the legislature creates a powerful public service commission to control our railway service, then are the people ready to permit the New York, New Haven & Hartford to lease the Boston & Maine on the condition that it expends $100,000,000 in the actual connection of the tracks on the north and south of Boston, making a four-track tunnel under Boston for that purpose, electrifying all their combined trackage within the metropolitan area and bringing the whole system up to the highest standard of efficiency?

"No such lease ought to be granted unless the state first asserts its power of regulation and creates a commission powerful enough to enforce it.

"I think the designations New York, New Haven & Hartford, and Boston & Maine should be abandoned and the name New England Lines substituted; that this new corporation should maintain general offices in Boston and that all new securities must be offered for public sale in Boston on as favorable terms as in New York."

An Interesting Fruit Exhibit.

A number of employees of the Atchison, Topeka & Santa Fe shops at San Bernardino, Cal., were recently awarded a loving cup and a check for $100 as the first prize for the best exhibit at an orange show. The accompanying illustration shows the exhibit. The roadbed and the top of the engine tank were decorated with 1,400 dozen lemons. The boiler, cab and side of the tank were decorated with 700 dozen oranges, and the dome, front end, cylinders and air drums were decorated with 200 dozen tangerines. The locomotive is complete, even to the safety appliances. While on exhibition the wheels were made to revolve. The refrigerator car and caboose were complete models of Santa Fe equipment built to a small scale. Dolls, properly dressed, represented the engine and train crews. The engineer is shown leaning out of the cab window. The head brakeman is sitting in front of the refrigerator car and the conductor with a lantern in his hand is shown standing in the door of the caboose. The exhibit was prepared under the direction of H. S. Wall, superintendent of the San Bernardino shops.

Coal Mining Situation.

The anthracite coal operators, at the conference with the miners' representatives on April 10, proposed that the Anthracite Strike Commission of 1902 be reconvened with a view to arranging a new working agreement. This was in answer to the miners' contention that conditions have changed since the 1902 award. After discussion it was agreed to hold the proposition in abeyance and appoint a sub-committee to go over the whole situation. The sub-committee was then formed, composed of four of the operators' representatives and four of the miners, to make recommendations on which the conference can act later. There will be no further conferences until the sub-committee reports.

It is believed that the bituminous miners will be generally at work by about May 1.

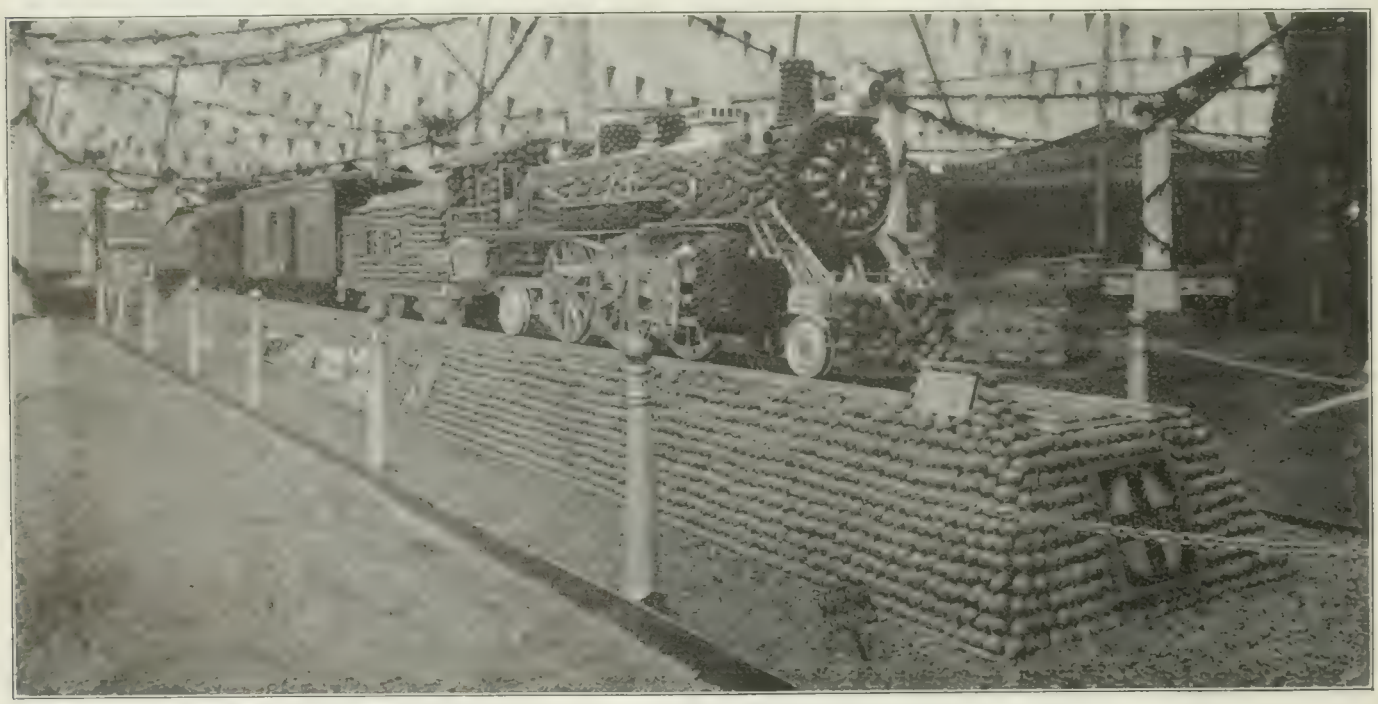
The majority of the British coal miners have resumed work.

"Safety First" on the Wheeling & Lake Erie.

B. A. Worthington, receiver of the Wheeling & Lake Erie, has issued a circular, dated March 30, establishing safety committees, like those on the Chicago & North Western and certain other roads. Following are the principal parts of this circular.

Notwithstanding the safeguards that have been provided and the precautions that have been taken to prevent accidents, the number of persons injured in the operation of railways has gradually increased from year to year, and the accidents which have occurred by reason of failure to use necessary care and diligence have more than kept pace with the accidents which are incident to the hazards of the service.

From the results of investigations, as well as personal observation, and from comparison of our records with the reports of other lines and with the reports of the Interstate Commerce Commission, it is pleasing to say that the record of the Wheeling



Fruit Exhibit Prepared by Santa Fe Employees at San Bernandino, Cal.

& Lake Erie with respect to accidents resulting in personal injuries has been comparatively good, and I take this opportunity of expressing my appreciation of the diligence and care that has been manifested by our employees.

However, many accidents might be prevented by the use of due care. Out of the total of 715 personal injuries reported during the year ending December 1, 1911, 414, or 58 per cent., were sustained in car and locomotive shops and roundhouses, where none of the occupations are considered as being hazardous. Although 99 per cent. of the engines and cars in the United States are equipped with automatic couplers, 209 employees were killed and 2,966 injured in one year in coupling and uncoupling cars, of which at least 86 of the deaths and 1,266 of the injuries were unquestionably due to the manner in which employees operated the automatic equipment.

This letter, however, is not written for the purpose of criticising employees, but to call attention to the plan which has been adopted for the betterment of present conditions, and to ask your hearty co-operation in the movement to secure greater safety and better results. This is a work that will be participated in by officers and employees alike. A central (or advisory) committee has been appointed, consisting of the following members:

H. T. Douglas, Jr., chief engineer, chairman; C. C. Needham, tax commissioner, vice-chairman; J. G. Code, superintendent; C. W. Coe, superintendent; J. E. O'Hearne, master mechanic; C. S. Morse, master car builder; J. F. Marshall, purchasing agent, and C. H. Holmes, secretary to receiver.

In addition to this committee, sub-committees have been appointed . . . . which will meet in the first week of each month. These will make their recommendations to the central committee, which will meet on the second Tuesday of each month. . . . This work is not inaugurated from selfish interests on the part of the company, but is a matter that directly concerns every employee. The company will continue its efforts to reduce and remove the elements of danger that may surround your work, and only asks that you assist in this work by reporting to your superior officer or to any member of the various sub-committees, conditions of ways or structures that appear to threaten injuries. *No safety appliance is effective in the hands of a careless man.*

If all employees will respond and will also endeavor to admonish or educate new or careless employees, a large decrease in personal injuries can be accomplished. . . .

From personal observation I know that we have in our service a great many employees, particularly among the older men, who observe every possible precaution to preserve the safety of passengers, of property and of themselves and other employees, and of these men I make a special request that they use their efforts to educate the men who are young in the service, by kindly advice as to proper methods of doing their work and the avoidance of unnecessary risk. . . .

Accompanying the receiver's circular Chairman Douglas announces that a meeting of the five local committees was held at Brewster on March 4, at which time the definite object of the organization and the methods of work were fully explained by Mr. Worthington. Another meeting of the Central Committee was to be held this week. Circulars are to be issued each month, calling attention to accidents which have resulted, and explaining in detail how such accidents could have been avoided, that the employees interested may carefully study the cause of the accident and benefit by the particular case as an object lesson for future guidance.

Government Operation of the Panama Railroad.

B. L. Winchell, president of the Frisco lines, has given out the following statement regarding some of the striking features of the operation of the Panama Railroad under government ownership:

The United States government, about six years ago, acquired the Panama Railroad and the steamship lines owned by it, and has since been operating them. The results will scarcely be used by those familiar with them as an argument for public ownership. The last year that the property was under private ownership and operation was 1904. The last full year of its ownership and management by the government was the fiscal year ended June 30, 1911. Very interesting and significant comparisons may be made between the statistics for those two years.

In 1904 it cost 62.9 per cent. of the gross earnings of the company—including both those from the railway and the steamship line—to pay total operating expenses. Never, during a period of ten years under private control, was the ratio of operating expenses to gross earnings more than 66 per cent.

In 1911, under government ownership the operating ratio was 70.8 per cent.; and while this was a much worse showing than had been made in any of the last ten years of private management, it was a relatively good showing for the government, for the operating ratio in 1905 under government management was 77.49 per cent.; in 1906, 79.54 per cent.; in 1908, 74.49 per cent.; and in 1910, 71.4 per cent.

These figures showing the larger ratio of operating expenses to earnings under government management would be of less significance if the amount of traffic handled and the total earnings from it had declined since the government took over the property. A declining traffic is likely to cause an increasing operating ratio. But the fact is that, owing to the large increase in the business of the railroad and its steamship lines due to work on the construction of the canal and to other causes, there has been an enormous increase in the traffic and earnings. The gross earnings of the railway and steamships in 1904, under private ownership, were $3,267,859.62; the total operating expenses were $2,024,180.81, and the net earnings, $1,243,678.81. In 1911 the traffic had so increased that the number of tons and the number of passengers hauled one mile per mile of road were actually greater than on the average railway of the United States. (The number of tons hauled one mile per mile of road was 1,186,344, as compared with only 1,071,086 ton miles per mile of road on the railways of the United States. The number of passengers hauled one mile per mile of road was 566,763, as compared with only 138,169 on the railways of the United States.) In consequence of this fine growth in traffic there was a great increase in earnings. The gross earnings of the railway and steamship lines in 1911 were $6,009,555.52, an increase over 1904 of 84 per cent.; operating expenses were $4,257,038.10, an increase over 1904 of 110 per cent.; and the net operating revenue was $1,752,517.42, an increase over 1904 of 41 per cent. It will be seen that even with the magnificent increase in gross earnings the increase in expenses was still greater in proportion.

Of the gross earnings of the company $4,149,444.66, were derived from the operation of the railway. The railway's mileage is fifty miles, so that its gross earnings were $80,298 per mile. Does the reader grasp the significance of that figure? If he does not, let him remember that the average gross earnings per mile of the privately owned railways of the United States in the year ended June 30, 1910, were but $11,553, or about one-seventh as much as those of the Panama Railroad.

One might be disposed to think that, as Uncle Sam is able with so little effort to earn gross receipts of over $80,000 per mile with his railway, while the managements of the privately owned railways of the United States are able to earn only about $11,000 per mile, Uncle Sam is the better business man. It would be well, however, before jumping to that conclusion, to inquire how much it costs Uncle Sam to handle the business, and still more important, how much he *charges* for handling it. The official figures show that while it costs the railways of the United States only $7,658 per mile to operate their lines, it costs Uncle Sam $49,482 per mile to run his railway. This leaves the Panama Railroad net earnings of $30,816 per mile, as compared with only $3,895 net per mile for the railways of the United States. This still seems a good showing until we examine the freight rates of the Panama Railroad, and find that in 1911 they averaged 4.14 cents per ton per mile, as compared with an average on the railways of the United States for the year ending June 30, 1910, of only 7.53 mills. In other words, the freight rates on the Panama Railroad under government ownership are five and one-half times as high as they are on the railways of the United States under private ownership. If the Panama Railroad had received in 1911 only the average rate per ton per mile that the railways of the United States received in 1910, its earnings per mile from freight traffic would have been reduced by about $40,000 per mile. As its net earnings per mile were $30,816, it would have failed by $9,184 per mile to earn enough money to pay its operating expenses, with the same average freight rate as obtained on the privately owned railways of the United States (and which it seems rather difficult to secure official sanction for increasing). If its passenger rates had been reduced to the same basis as those

in the United States its operating deficit would have been substantially larger.

Furthermore, its rate on "commercial freight"—that is, the rate paid by shippers other than the Isthmian Canal Commission—is very much more than its average rate of 4.14 cents per mile. The "commercial" rate across the Isthmus from Panama to Colon is $3.67 per ton, or over seven cents per ton mile, nearly ten times the average ton mile rate permitted our home roads, while that charged the Isthmian Canal Commission is only $1.09, or about two cents per ton mile.

But this is not all. After the extraordinary showing during the fiscal year 1911 already outlined, those charged with the operation of the Panama Railroad, and its subsidiary steamship lines, notified the steamship companies operating from San Francisco to the west coast of Panama that in future the railway and its steamships would demand for the movement between Panama and New York forty per cent. of the rates between San Francisco and New York. Previously they had accepted thirty per cent. Next year's ton mile earnings should loom even larger. Previously, the government had kept for its own steamship lines a monopoly of the business between Colon and New York by refusing to make through rates between the Panama Railroad and independent steamship lines to New York, but had allowed independent steamship lines to operate between Colon and Philadelphia. At the same time that it increased its proportion of the through rates it announced that the Panama Railroad would no longer make through rates in connection with independent steamship lines operating to and from Philadelphia. In other words, it took a monopoly of business moving through the port of Philadelphia, as it had before of business to and from New York.

When the railways of the United States tried to raise their rates, a law was passed giving the Interstate Commerce Commission control of such advances. Efforts to advance rates on the part of those handling the railway properties within the states are met by a demand for proof that the roads are economically and efficiently operated before they can increase their tariffs. It may be asked, why does the Interstate Commerce Commission not intervene to reduce or at least prevent advances in the rates of the Panama Railroad? The answer is that while the government has given the Interstate Commerce Commission authority to regulate the rates of the privately owned railways of the United States, it has not given the commission any authority to regulate the rates of its own railway. Uncle Sam as a railway proprietor evidently does not like the medicine he mixes for other railway owners. The rates on his railway are fixed by its management, from which there is no appeal to any other body.

Railway Tax Men's Association.

A national organization to be known as The Railway Tax Men's Association was organized at a meeting of tax officers and attorneys representing 25 railways, held in the offices of the Chicago & North Western, at Chicago on April 3, and a large number of members not present at the first meeting have since been enrolled. The following officers were elected: President, Frank P. Crandon, tax commissioner Chicago & North Western; vice-president, W. W. Baldwin, vice-president Chicago, Burlington & Quincy; secretary, Alfred E. Patten, tax agent Chicago, Burlington & Quincy; treasurer, J. W. Mulligan, assistant real estate and tax agent Chicago, Rock Island & Pacific; executive committee: The officers, G. G. Tunell, Atchison, Topeka & Santa Fe, and M. T. Sanders, tax commissioner Northern Pacific.

The object of the association, as set forth in the constitution, is "the consideration of the various taxing problems which arise in different states, for the purpose of devising accurate and adequate methods of determining the assessable value of railway property and its relation to the assessment of general property in the states in which it is located, and in the case of interstate roads to devise methods for apportioning the ascertained value of railway property to the different states and lesser taxing districts; also that aid may be given to the inauguration of a uniform, simple, efficient and equitable system of railway assessment and taxation throughout the country."

Members will include tax officials and attorneys of railways and other individuals of experience in taxation affairs that may be chosen by the unanimous vote of the members present at any meeting. It is intended to hold three meetings a year, on the second Wednesday of January, April and October, usually at Chicago. Speakers to address the meetings will be selected by the executive committee. At the organization meeting J. C. Davis, attorney for the Chicago & North Western at Des Moines, Ia., read a paper on Railway Taxation in Iowa.

Atlantic City Pier Fire.

On March 24 fire destroyed Young's amusement pier at Atlantic City, N. J. The fact was published in a large number of newspapers, with the result that some railway men and railway supply men got the impression that the pier that was burned was Young's Million Dollar Pier, on which the exhibition of railway appliances in connection with the annual conventions of the Master Car Builders' and Master Mechanics' associations will be held in June. This item is printed to make it clear that the latter pier was in no way involved.

Cleveland Engineering Society.

At the meeting of the Cleveland Engineering Society, held April 9, there was a symposium on the Elimination of Grade Crossings. Papers were presented on: Elimination of Grade Crossings from the City Standpoint, by Robert Hoffmann, city engineer; Elimination of Grade Crossings from the Railroad Standpoint, by Albert J. Himes (N. Y. C. & St. L.); and Embellishment of Railroad Crossings, by Frederick W. Striebinger.

American Institute of Electrical Engineers.

The two hundred and seventy-first meeting of the American Institute of Electrical Engineers will be held at Portland, Ore., April 16-20, 1912, at the Multnomah Hotel. On Thursday, April 18, A. H. Babcock, electrical engineer of the Harriman lines, will present a paper on The Operation of the 1200-v. System of the Southern Pacific Company. Several trips have been arranged to electrical plants of interest in the vicinity of Portland.

American Electric Railway Association.

The American Electric Railway Association has published convention bulletin No. 2, giving information on the hotel rates and the halls in which the exhibits will be shown in connection with the annual convention in Chicago, October 7-11.

American Railway Engineering Association.

The offices of the American Railway Engineering Association at Chicago will be removed on May 1 from the Monadnock block to Room 1011, Karpen building, 900 South Michigan avenue.

Western Railway Club.

Plans are being made for an elaborate vaudeville entertainment to be given in connection with the annual meeting of the Western Railway Club on May 21.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.; annual, May 7-10, Richmond, Va.

American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass.; annual, May 10-11, San Francisco, Cal.

American Association of General Passenger and Ticket Agents.—W. C. Hope, New York; next convention, Seattle, Wash.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Detroit, Mich.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York. Convention, October 7-11, Chicago.

American Electrical Railway Manufacturers' Assoc.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

American Railway Association.—W. F. Allen, 75 Church St., New York. Next session, May 15, New York.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago.

American Railway Master Mechanics' Assoc.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

American Railway Tool Foremen's Association.—M. H. Bray, N. Y. N. H. & H., New Haven, Conn. Convention, July 9, Chicago.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.
American Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.
Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.
Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.
Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry. Chicago. Semi-annual, June 11, Atlantic City, N. J.; annual, October 21-25, Chicago.
Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.
Association of Transportation and Car Accounting Officers.—G. P. Conrad, 75 Church St., New York. Convention, Oct. 7-11, Chicago.
Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.
Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.
Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.
Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.
Civil Engineers' Society of St. Paul.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.
Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.
Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.
Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.
General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.
International Railway Congress.—Executive Committee, 11, rue de Louvain, Brussels, Belgium; convention, 1915, Berlin.
International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago. Convention, May 22-25, Chicago.
International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.
International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.
Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.
Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.
Master Car and Locomotive Painters' Assoc. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass. Convention, September, 10-13, Denver, Col.
National Railway Appliances Assoc.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.
New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.
New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.
Northern Railroad Club.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.
Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.
Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.
Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.
Railway Business Association.—Frank W. Noxon, 2 Rector St., New York.
Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.
Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.
Railway Gardening Association.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.
Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.
Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.
Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio. Convention, May 20-22, Buffalo, N. Y.
Railway Supply Manufacturers' Assoc.—J. D. Conway, 2135 Oliver Bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.
Railway Tel. & Tel. Appliance Assoc.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.
Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.
Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling, Ill.; September 10-13, 1912, Buffalo, N. Y.
St. Louis Railway Club.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.
Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.
Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.
Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.
Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.
Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.
Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.
Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.
Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.
Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.
Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.
Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.
Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; August, 1912.
Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.
Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.
Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

A shipment of Bibles filling a 36-ft. box car is being taken westward over the Atchison, Topeka & Santa Fe en route from New York to Los Angeles for the Gideon society.

The Chicago freight and passenger offices of the Pennsylvania lines have been removed to the eighth floor of the new Insurance Exchange building, 175 West Jackson boulevard.

A special train of mail cars, which arrived at Oakland, Cal., from the East over the Southern Pacific on April 5, delivered there 350 tons of mail, the trains for several days having been detained by floods in Nebraska and east of there.

At the annual meeting of the Cincinnati Passenger Traffic Club on April 6, C. H. Wiseman, district passenger agent of the Baltimore & Ohio Southwestern, was elected president, and W. D. Cornell, traveling passenger agent of the Chicago & Alton, was re-elected secretary and treasurer.

The Business Men's League of St. Louis has appointed F. L. Robinson as traveling service agent in connection with the St. Louis package car service. Mr. Robinson's duties will be to keep in close touch with the merchants and to co-operate with the railways in improving the service.

The freight carried over the Tehuantepec National Railway during the last fiscal year amounted to 924,900 tons, an increase of 292,218 tons over the preceding year. The movement from the Pacific to the Atlantic terminus was 478,888, and in the opposite direction, 445,202. In the preceding year the eastward movement was 366,826, and the westward, 265,046. A large part of the eastbound freight is sugar from the Hawaiian Islands, which, when the canal is finished, will be carried across the Isthmus of Panama.

The Illinois railways at a hearing before the Illinois railway commission last week voluntarily withdrew a proposed advance in the rates on gravel to Chicago from so-called "inner zone" points. The advance from 1½ to 2 cents per 100 lbs. was attacked in a complaint by ten sand and gravel companies that asked that a new rate of one cent be established. When the advance was withdrawn the complainants also withdrew their petition. A hearing was held at Chicago on Monday before Examiner Burchmore of the Interstate Commerce Commission on the proposed advance from 1¾ to 2 cents to Chicago from so-called "outer zone" points, including Beloit and Janesville, Wis.

The Chicago, Rock Island & Pacific, through the medium of the *Rock Island Employees' Magazine*, has invited any of its general office employees who may be in the clutches of so-called loan sharks on account of indiscretions or misfortunes to take advantage of the services of the legal department without cost to them in the proper adjustment of their claims. It is announced that admission of being in the hands of the sharks will not prejudice the position of any such employees and will not be held against them in their record. It is stated that as a rule nothing can be done unless the employee has already paid the lender at least the amount of cash actually received, together with the legal interest thereon to date. The offer is made to the general office employees first; later it will be extended to other branches of the service.

The National Industrial Traffic League has promulgated a copy of a proposed uniform code of demurrage and car service rules as recommended by a joint conference committee representing the league and the American Railway Association which met at Atlantic City on March 28, Interstate Commerce Commissioner Franklin K. Lane presiding. With the joint conference code are presented in parallel columns the present rules and a set of rules recommended by a conference of the League's committee together with representative shippers not connected with the league held at Washington on February 27 and 28, for the purpose of drafting a new code to be made the basis of negotiations with the committee from the American Railway Association. With the conclusion of certain preliminary steps to be taken by the American Railway Association committee, the joint conference recommendations will be submitted to the Interstate Commerce Commission for approval.

Demurrage Rates to Come Before Commission.

The Pacific Car Demurrage Bureau, San Francisco, reports for the month of February that the proportion of intrastate freight cars held overtime was 1.4 per cent., while on cars carrying interstate traffic the percentage held beyond the free time was 2.13, the rate on the former being $3 a day, and on the latter $1 a day. The better result shown by the operation of the higher rate is only a repetition of what has been shown in former months, as the readers of the *Railway Age Gazette* have been informed. On January 29, last, the Bureau issued a tariff announcing that after March 8 the $3 rate would be applied to all cars, including those carrying interstate shipments, but on February 29 the Interstate Commerce Commission suspended this tariff until July 6, "it appearing that the rights and interest of the public would be injuriously affected" by the proposed incerase. Mr. Mote, the manager, naturally feels disappointed at this long postponement, declaring with reason, that the two years' experience of the bureau with a $6 rate and a $3 rate ought to be sufficient to convince anyone of the justice and economic advantage of a high rate.

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association in presenting statistical bulletin No. 115-A, giving a summary of shortages and surpluses by groups from November 23, 1910, to March 27, 1912, says:

"The total surplus March 27, 1912, was 52,682 cars; March 13, 1912, was 46,028 cars; March 29, 1911, was 196,217 cars. Compared with the preceding period there is an increase of 6,654 cars, of which 1,771 are box and 2,696 are coal cars. The increase in box cars is principally in groups 1 (New England Lines) and 6 (Iowa, Illinois, Wisconsin, Minnesota and the Dakotas). The increase in coal car surplus is general except in groups 2 (New York, New Jersey, Delaware, Maryland and eastern Pennsylvania) and 10 (Oregon, Idaho, California, Arizona and Washington).

"The total shortage March 27, 1912, was 33,974 cars; March 13, 1912, was 42,985 cars; March 29, 1911, was 1,330 cars. Compared with the preceding period there is a decrease of 9,011 cars, of which 6,176 are box and 3,550 coal cars, with an increase in miscellaneous cars of 712. The decrease in box cars is general throughout the country, with the exception of groups 1 (as above) and 3 (Ohio, Indiana, Michigan and western Pennsylvania), where there is a slight increase. The decrease in coal cars is mainly in groups 2, 3 (as above) and 4 (the Virginias and Carolinas). Compared with the same date of 1911 there is a decrease in total surplus of 143,535 cars, of which 25,865 is in box and 97,387 in coal cars; and an increase in total shortage of 32,644 cars, of which 19,029 is in box and 8,148 in coal cars. Improved weather conditions have probably contributed to the increase in surplus cars as compared with the preceding period as well as to the reduction in the total shortage."

The accompanying table gives car surplus and shortage figures by groups for the last period covered in the report, and the diagrams show total bi-weekly surpluses and shortages in 1907 to 1911.

North Western to Advance Chicago Suburban Fares.

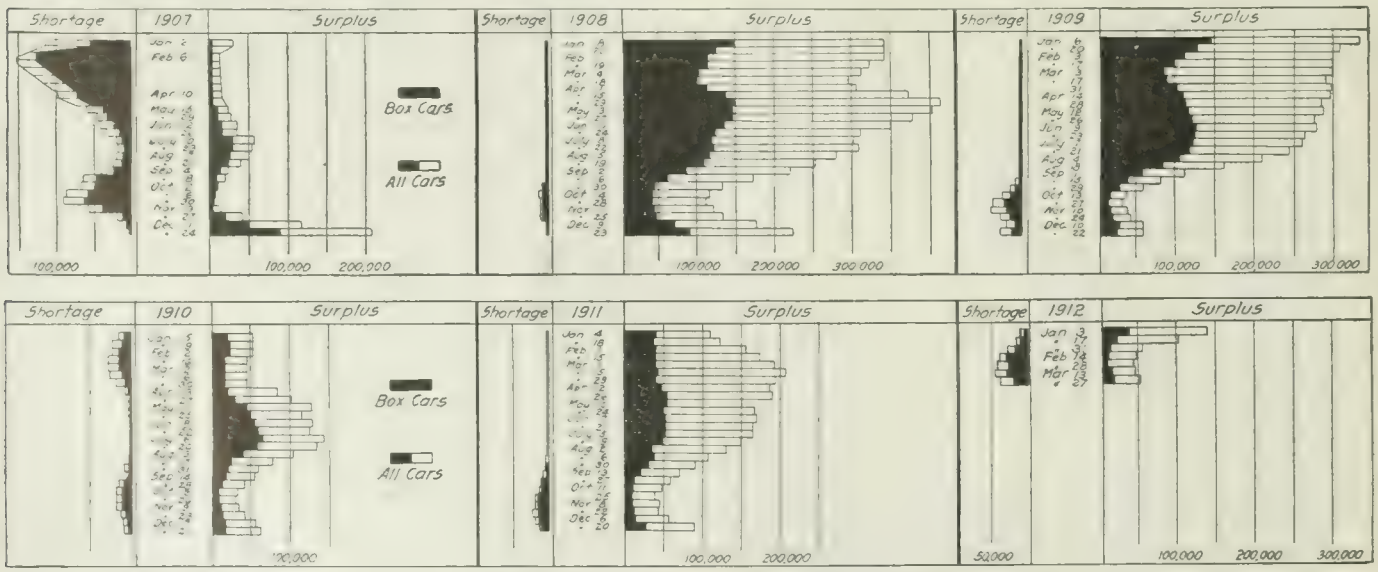
The Chicago & North Western has announced its intention of advancing the rates for its 25-ride commutation tickets on April 25, in the Chicago suburban district, which extends as far north as Waukegan, Ill., by amounts ranging from 25 to 40 cents a ticket. The present rates on these tickets average about half a cent a mile. On Sunday, March 31, twelve trains in the suburban service were discontinued and additional cars were placed on some of the trains.

Increases in the cost of operation, particularly in the fuel item,

Car Surpluses and Shortages.

Date.	No. of roads.	Surpluses— Box.	Flat.	Coal gondola and hopper.	Other kinds.	Total.	Shortages— Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1.—March 27, 1912	7	680	1,390	1,102	148	3,320	287	63	200	194	744
" 2. " 27, 1912	6	302	97	1,200	523	2,122	1,047	0	2,097	177	3,321
" 3 " 27, 1912	29	0	397	1,185	2,162	3,744	5,796	158	1,674	2,085	9,713
" 4.— " 27, 1912	10	189	48	353	1,027	1,617	2,179	168	3,234	409	5,990
" 5 " 27, 1912	[illegible]	79	49	55	697	[illegible]	2,136	85	811	105	3,137
" 6 " 27, 1912	[illegible]	3,703	233	3,102	3,497	10,535	2,192	59	65	252	2,568
" 7. " 27, 1912	3	135	227	980	[illegible]	1,551	0	0	0	0	0
" 8. " 27, 1912	15	2,520	515	1,622	1,795	6,452	40	30	63	705	838
" 9 " 27, 1912	[illegible]	1,799	130	200	[illegible]	2,764	50	0	[illegible]	40	90
" 10 " 27, 1912	21	5,274	3,091	2,741	8,304	19,410	15	15	15	0	45
" 11. " 27, 1912	5	[illegible]	133	0	154	287	5,671	326	0	1,531	7,528
Total	166	14,681	6,310	[illegible]	19,151	52,682	19,413	904	8,159	5,498	33,974

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages in 1907 to 1912.

are given by the railway as reasons for the advance in rates and the reduction in service. It is declared that suburban service was operated during the last six months of 1911 at a loss at the rate of about $200,000 a year. On the Galena division the average number of passengers per train was 63, on the Milwaukee division, 98, and on the Wisconsin division, 72. The average number of cars per train was 4½, 6 and 4½ respectively.

Before definite announcement of the advance in rates a warning was given the public, in the form of a statement to the newspapers, by A. C. Johnson, passenger traffic manager, saying that it was not impossible that some increases would be made in suburban rates of fare. The statement said in part:

"The railways that operate their own coal mines, thereby providing fuel at practically first cost, express great anxiety on account of the recent advance in the price of mining, which will add virtually 10 cents a ton to the cost of production. This is on top of a similar advance made only two years ago; the advance in the two periods, i. e., 1910 and 1912, aggregates 20 cents a ton, and to a road burning 12,000 or 15,000 tons of coal every 24 hours, this means a very large cost in operating expense, which it is extremely difficult to neutralize or nullify by the inauguration of economies in any direction.

"The North Western claims it is particularly hard hit on account of having such a large proportion of its coal consumption in passenger service. There is very much less efficiency developed in a ton of coal in passenger service than in freight due to high speed, light train load, frequent stops, etc., and this is aggravated in the case of suburban service like the Illinois Central and North Western maintain.

"North Western statistics show that while 15 per cent. of its passenger train mileage is suburban, or short haul, at least, 30 per cent. of its passenger train consumption of fuel is in this same service. Scientific railroading has developed numerous ways and means by which railways economize in the handling of freight, i. e., heavier locomotives, larger trains, better car loading, slower speed, etc., but none has been able, thus far, to develop economies of any particular moment in passenger service. The current increases in prices of coal will doubtless inspire them to renewed activities along these lines, and it is not impossible that they may make some increases in suburban rates of fare."

Report of Waterways Commission.

The National Waterways Commission has made a report recommending that additional legislation be enacted to prevent the elimination of water competition and to protect the public against the raising of water rates. The Interstate Commerce Commission should be clothed with greater control over water lines. Every water carrier engaged in interstate commerce which is owned or controlled by a railway, or in which a railway is in any way interested, and also every independent water carrier which operates over a specified route should be placed under control of the Interstate Commerce Commission. It is also recommended that the Interstate Commerce Commission be empowered to establish physical connection between the terminals of railway and boat lines where possible. Adequate terminal facilities for water lines should be provided. Where water frontage necessary for the establishment of public terminals is held undeveloped by private interests, a special act of the legislature should be passed empowering the state or municipal officers to condemn such property for public use.

There is great need of increasing the power of the Interstate Commerce Commission over joint rates and through routes between rail and water lines. . . . It is also desirable that the commission have power to compel railways to charge less than the local rates to all lake, river and seaports on through traffic to be exchanged with boat lines engaged in domestic trade. Such reduced rates are now voluntarily granted in some cases, especially along the Great Lakes. . . . The protection afforded the waterways by section 4 of the act to regulate interstate commerce, as amended in 1910, is not sufficient for the preservation and the growth of water transportation. The lack of adequate regulations makes it possible for the railways to effectually control or to crush out water competition through their ownership and control of boat lines. It is a well-known fact that the trunk line railways through their control over terminals at Buffalo and their ownership of steamship companies on the Great Lakes have been able to dominate the lake and rail package freight business between New York and Chicago, also to a considerable extent the grain traffic.

On the business thus controlled the water rates have risen, while on the coal, iron and grain traffic not controlled by railways the water rates have steadily declined. In like manner the New York, New Haven & Hartford practically dominates water transportation on Long Island Sound. Independent companies have been unable to compete successfully. The steamship companies plying between the north Atlantic and Southern ports in the coastwise trade are likewise working in harmony with the connecting and competing railways by which they are owned or controlled, so that little if any active competition exists. Also on some rivers the railways have acquired control of packet lines.

While this rapidly increasing control of railways over water lines tends to bring about that harmony and co-operation between them which is necessary for the development of transfer traffic, it also has possibilities of harmful results which require regulation. Where the railways grant prorating arrangements to boat lines which they own or control while denying the same privilege to competing independent lines the latter are practically precluded from securing any transfer traffic.

Crop Conditions.

The crop reporting board of the United States department of agriculture estimates that the average condition of winter wheat on April 1 was 80.6 per cent. of a normal, against 83.3 on April 1, 1911, 80.8 on April 1, 1910, and 86.1, the average condition for the past 10 years on April 1. There was a decline in condition from December 1, 1911, to April, 1912, of 6.0 points, as compared with an average decline in the past 10 years of 3.3 points between these dates.

The average condition of rye on April 1 was 87.9 per cent. of a normal, against 89.3 on April 1, 1911, 92.3 on April 1, 1910, and 89.8, the average condition for the past 10 years on April 1.

Comparisons for winterwheat and rye states follow, figures representing per cent. normal:

State or Division.	Winter Wheat. Condition April 1.			Condition Dec. 1,	Rye. Condition April 1.			Condition Dec. 1,
	1912.	1911.	10-yr. av.	1911.	1912.	1911.	10-yr. av.	1911.
Vermont	..	..	..	..	95	93	98	100
Massachusetts	..	..	..	..	93	87	92	98
Connecticut	..	..	..	..	93	89	96	97
New York	89	85	89	98	90	88	91	97
New Jersey	88	89	89	90	89	91	91	94
Pennsylvania	85	87	88	92	85	90	90	93
N. At. Div.	86	87	88	93	87	90	91	94
Delaware	88	84	88	94	90	85	88	94
Maryland	90	81	87	94	90	84	90	92
Virginia	89	85	86	94	88	88	87	95
West Virginia	89	85	84	95	91	87	87	94
North Carolina	87	89	89	88	89	88	88	92
South Carolina	83	87	88	87	85	88	88	93
Georgia	81	90	88	89	84	90	90	94
S. At. Div.	88	89	87	92	89	88	89	94
Ohio	63	84	82	83	72	86	85	88
Indiana	61	86	84	82	72	92	89	92
Illinois	62	82	88	79	75	90	92	92
Michigan	80	88	85	86	86	90	88	89
Wisconsin	92	85	90	94	93	91	93	95
N. C. East.	64	85	85	82	86	90	90	92
Minnesota	..	..	..	..	92	85	89	96
Iowa	91	87	86	96	93	92	94	97
Missouri	76	91	87	85	83	92	90	94
North Dakota	..	..	..	..	87	80	..	93
South Dakota	..	..	..	..	90	89	92	95
Nebraska	93	87	89	92	95	86	91	95
Kansas	85	75	84	88	89	75	87	89
N. C. West.	85	81	86	89	91	85	90	95
Kentucky	70	89	86	83	75	91	87	88
Tennessee	81	86	86	88	82	88	87	92
Alabama	83	91	88	90	86	88	89	89
Mississippi	79	86	88	87	..	..	..	..
Texas	88	85	80	72	80	95	78	80
Oklahoma	82	55	81	78	85	65	84	74
Arkansas	75	87	87	86	83	88	87	87
South Central	80	76	83	80	79	92	86	89
Montana	94	96	..	94	95	93	96	97
Wyoming	95	95	..	96	95	98	95	98
Colorado	92	92	..	88	93	82	88	93
New Mexico	91	..	..	77	94	..	..	..
Arizona	94	..	..	100	95	..	..	..
Utah	93	95	..	96	90	98	100	98
Nevada	97	105	..	93	97	..	..	..
Idaho	97	98	86	94	97	98	99	97
Washington	96	97	90	91	97	95	94	96
Oregon	98	97	92	98	100	98	96	100
California	80	88	92	75	85	96	93	82
Far Western	94	94	91	91	94	97	94	94

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF FEBRUARY, 1912.

Name of road.	Mileage operated at end of period.	Operating revenues: Freight.	Passenger.	Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Alabama & Vicksburg	143	$94,380	$32,364	$147,512	$18,922	$32,254	$3,998	$49,416	$4,913	$109,503	$28,014	$892	$4,400	$22,922	$5,479
Alabama Great Southern	309	68,183	91,104	183,305	45,299	80,670	11,593	128,097	9,599	275,208	110,097	- 880	14,485	94,762	605
Ann Arbor	257	124,115	29,388	163,163	13,765	21,125	3,661	67,358	6,767	112,176	50,987	- 3,966	13,985	33,036	3,514
Arizona Eastern	360	147,813	33,974	191,309	22,784	14,765	2,305	46,941	7,093	93,888	97,321	215	8,100	89,436	69,908
Atlanta & West Point	93	61,177	35,539	106,342	11,140	18,971	4,989	31,906	4,386	71,392	34,950	345	5,189	30,106	1,776
Atlanta, Birmingham & Atlantic	661	214,661	43,785	275,326	29,530	46,452	17,747	117,765	12,874	223,868	51,458	.....	15,700	35,758	- 14,329
Atlantic City	167	86,360	37,195	98,799	24,242	13,477	1,447	63,950	758	103,874	- 5,075	4,483	7,900	16,558	10,786
Baltimore & Ohio System	1,4337	5,546,395	899,231	6,802,614	670,483	1,392,796	156,708	2,588,384	170,550	5,508,921	1,573,693	- 31,883	246,099	1,295,741	83,214
Buffalo & Susquehanna R. R.	365	137,731	6,886	144,199	26,593	29,542	1,490	64,559	6,758	128,942	15,257	.....	2,600	12,657	—5,115
Buffalo & Susquehanna Ry.	91	37,986	5,670	45,503	7,373	25,165	503	27,771	2,575	63,387	—17,884	- 8	1,400	19,292	—1,467
Carolina, Clinchfield & Ohio	2384	163,403	9,160	175,583	10,893	22,129	5,802	34,604	6,826	80,254	95,329	.....	8,000	87,329	21,521
Carolina, Clinchfield & Ohio of S. C.	18	1,088	1,347	13,714	533	84	1,084	2,795	394	4,890	8,824	.....	500	8,324	3,756
Central of Georgia	1,915	840,898	269,237	1,222,550	157,010	176,651	31,033	433,201	37,541	835,436	387,114	5,614	54,100	338,628	13,388
Central of New Jersey	675	1,684,143	354,314	2,144,857	161,452	316,809	26,572	690,866	34,182	1,229,821	915,036	1,495	180,495	736,036	160,872
Central Vermont	411	290,409	56,874	380,515	27,476	52,912	9,440	183,521	8,401	278,750	1,765	221	13,000	10,656	12,588
Chesapeake & Ohio Lines	2,815	2,222,850	334,060	2,666,019	218,435	578,577	49,506	908,774	65,303	1,820,595	845,424	4,551	84,750	756,123	137,837
Chicago & Alton	1,025	800,098	274,647	1,168,401	106,888	280,947	40,775	476,343	30,373	935,326	232,878	—2,060	36,000	194,818	6,042
Chicago & Erie	470	338,507	89,706	470,377	- 1,945	96,569	22,362	253,598	10,458	383,042	87,335	.....	16,450	20,885	—5,856
Chicago, Burlington & Quincy	9,0749	4,842,159	1,370,011	6,771,718	518,496	1,226,651	176,666	2,531,638	190,683	4,594,134	2,177,084	14,293	272,105	1,890,686	86,827
Chicago, Indiana & Southern	559	343,741	19,331	392,105	49,343	92,714	8,974	147,576	8,659	300,266	71,839	111	13,000	58,728	39,847
Chicago, Indianapolis & Louisville	617	344,190	102,458	493,348	71,73[illegible]	83,184	17,306	204,280	13,246	389,748	103,600	.....	22,652	80,948	—4,792
Chicago, Rock Island & Gulf	4778	161,030	45,640	233,39[illegible]	27,066	21,441	10,633	89,815	8,267	157,222	66,017	265	8,122	57,630	—3,732
Chicago, Terre Haute & Southeastern	351	160,415	13,521	177,695	17,612	28,700	3,499	61,647	7,546	119,004	58,691	- 334	8,700	49,657	27,111
Cincinnati, New Orleans & Texas Pacific	337	591,781	150,312	781,081	76,653	193,374	20,361	239,977	20,717	551,082	229,999	—3,467	21,800	204,732	26,604
Cincinnati Northern	245[illegible]	84,498	12,153	100,541	17,881	27,303	2,835	52,130	3,549	103,688	- 3,147	.....	5,300	- 8,447	- 6,469
Cleveland, Cincinnati, Chic. & St. Louis	2,012[illegible]	1,731,665	496,003	2,424,027	254,852	455,953	68,074	1,150,576	51,053	1,980,508	443,519	—4,047	95,000	344,472	59,605
Colorado Midland	338	93,180	13,309	118,665	12,900	20,990	7,040	58,240	5,465	104,635	14,030	—320	8,000	5,710	12,689
Colorado & Southern	1,053[illegible]	502,786	70,818	630,948	63,526	128,038	10,798	214,155	22,585	439,102	181,846	—947	29,200	151,699	22,959
Denver & Rio Grande	2,545[illegible]	1,272,791	264,312	1,613,552	150,137	356,495	47,856	626,176	50,855	1,231,519	382,033	—8,535	78,000	295,498	22,237
Detroit, Grand Haven & Milwaukee	191	93,009	33,500	147,722	16,114	30,526	5,919	105,718	4,740	163,017	—15,295	—16	2,880	—18,191	- 12,725
Duluth, Missabe & Northern	34[illegible]	115,366	30,349	150,752	44,077	44,709	1,600	74,011	11,025	175,422	—24,670	—823	6,110	- 31,603	- 95,466
Duluth, South Shore & Atlantic	6[illegible]	102,980	49,563	203,763	33,579	33,100	8,405	103,479	7,228	185,791	37,972	- 2,414	18,000	17,558	20,032
Erie	1,995	2,896,989	573,084	3,797,889	284,510	757,261	91,207	1,528,907	102,184	2,764,069	1,033,820	—57,976	163,026	812,818	—117,260
Galveston, Harrisburg & San Antonio	1,339	543,976	264,418	868,949	103,735	160,812	35,381	342,279	29,571	671,778	187,171	—2,538	35,404	149,229	—37,643
Georgia	307	211,037	63,663	293,706	27,614	45,665	10,979	145,695	7,395	237,348	55,358	.....	6,775	48,583	—7,953
Georgia Southern & Florida	395	117,770	70,158	210,536	21,122	39,908	7,812	81,635	8,414	158,891	51,645	.....	10,123	41,522	- 3,696
Great Northern	7,345[illegible]	3,139,050	828,676	4,322,292	444,229	662,914	90,832	1,399,269	90,277	2,687,521	1,634,771	—11,799	294,213	1,328,759	670,198
Hocking Valley	352[illegible]	494,339	53,468	570,430	50,470	97,337	8,100	193,899	16,046	365,845	204,585	.....	28,800	175,785	97,129
Houston, East & West Texas	191	75,840	19,775	102,061	18,674	10,583	2,128	38,370	3,647	73,402	28,659	.....	3,916	24,743	—5,485
Houston & Texas Central	789	94,[illegible]91	100,531	381,337	76,342	80,099	22,955	230,933	19,589	429,918	—48,581	- 1,403	20,558	- 70,542	—94,709
Indiana Harbor Belt	105[illegible]	.....	.....	233,571	18,194	29,820	3,041	109,487	6,951	167,493	66,078	175	5,000	61,253	45,260
Louisiana Western	308	96,878	57,776	162,616	18,653	25,728	8,100	59,062	6,224	117,767	44,849	876	6,902	38,823	—13,704
Louisville, Henderson & St. Louis	200	69,068	29,473	106,072	18,508	13,436	4,493	36,922	2,845	76,204	29,868	309	3,000	27,177	13,778
Missouri, Kansas & Texas	1,744[illegible]	910,309	303,362	1,303,173	100,366	194,978	38,622	468,391	41,668	844,025	459,148	- 2,588	52,000	404,560	9,328
Missouri, Kansas & Texas of Texas	1,346[illegible]	521,559	226,030	810,197	151,597	84,926	24,598	520,113	30,390	811,624	- 1,427	2,810	22,011	- 26,248	—99,007
Morgan's La. & Tex. R. R. & S. S. Co.	404	251,149	116,353	394,399	60,093	51,246	14,019	170,840	12,980	309,178	85,221	- 2,334	18,698	64,189	13,706
Nevada Northern	165	110,820	10,822	124,544	11,437	15,574	356	26,841	3,514	57,722	66,822	.....	5,947	60,875	21,539
New Orleans, Great Northern	282	91,308	25,226	126,812	18,370	16,575	2,719	43,881	7,049	88,594	38,218	69	1,800	36,349	—13,483
New York, Chicago & St. Louis	562	808,946	74,959	913,835	93,870	119,020	48,557	448,114	17,306	726,867	186,968	- 2,522	32,000	152,446	22,901
New York, Susquehanna & Western	152	156,865	41,146	224,691	14,848	22,459	1,252	100,537	3,832	142,928	81,763	- 5,003	17,874	58,886	—27,119
Norfolk & Western	2,104[illegible]	2,661,855	266,631	3,049,562	323,041	654,061	49,784	1,007,455	59,160	2,093,501	956,061	—507	120,000	835,554	137,157
Northwestern Pacific	404[illegible]	71,819	113,592	206,677	49,675	36,723	3,211	95,947	9,629	195,185	11,492	.....	11,077	415	9,490
Pecos & Northern Texas	479[illegible]	137,151	31,080	179,753	12,215	35,473	3,340	63,093	6,585	120,906	59,047	.....	6,209	52,838	51,817
Peoria & Eastern	352	199,947	45,776	263,507	29,711	40,828	4,520	118,805	5,534	199,398	63,109	.....	9,800	53,309	33,951
Philadelphia & Reading	1,014[illegible]	2,989,696	472,569	3,617,915	254,331	673,368	42,090	1,298,293	62,918	2,331,000	1,286,915	7,381	90,556	1,203,740	210,119
Pittsburgh & Lake Erie	215[illegible]	1,114,777	104,322	1,257,911	138,701	175,978	12,014	347,444	23,425	697,562	560,349	—362	31,000	528,987	95,304
Pittsburgh, Shawmut & Northern	278[illegible]	154,024	6,566	162,368	11,286	30,418	1,008	49,847	4,161	96,720	65,648	.....	1,571	64,077	48,495
Port Reading	21	131,363	.....	131,648	6,645	121	30	47,835	99	54,730	76,918	9,695	3,800	82,813	18,824
Richmond, Fredericksburg & Potomac	83	100,955	97,519	224,328	18,718	24,596	2,785	85,848	5,688	137,635	86,693	.....	1,094	85,599	11,298
St. Joseph & Grand Island	319	78,762	24,572	114,382	12,214	27,865	4,511	53,129	4,859	102,578	11,804	102	6,396	5,510	10,824

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF FEBRUARY, 1912—(CONTINUED).

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
St. Louis & San Francisco	4,732	$2,175,143	$780,376	$3,208,919	$293,940	$427,782	$103,968	$1,258,497	$104,903	$2,189,070	$1,019,849	.....	$158,677	$861,172	$2,443
St. Louis, Brownsville & Mexico	510[26]	106,991	62,442	183,021	41,649	15,650	2,928	71,960	4,542	136,729	46,292	.....	5,150	41,142	8,334
St. Louis Merchants' Bridge Terminal	9	.....	350	166,708	22,807	9,296	428	89,764	4,908	127,203	39,505	.....	5,600	33,905	28,403
St. Louis Southwestern	843[27]	538,453	90,890	660,707	60,030	99,746	28,280	158,877	22,793	369,726	290,981	—$1,021	22,563	267,397	25,205
St. Louis Southwestern of Texas	703	262,297	58,548	347,454	62,415	82,117	13,786	171,284	17,947	347,549	- 95	—249	10,945	—11,289	—64,770
San Pedro, Los Angeles & Salt Lakes	1,115[28]	465,344	233,132	742,169	73,723	189,003	30,809	268,773	16,744	579,052	163,117	—2,489	24,701	135,927	133,967
Seaboard Air Line	3,070[29]	1,337,496	453,484	1,970,456	289,189	240,887	61,584	734,682	54,655	1,380,997	589,459	—2,430	75,000	512,029	—134,822
Southern Kansas of Texas	155	79,357	14,997	101,339	10,913	23,457	2,213	40,350	3,868	80,801	20,538	.....	2,572	17,966	13,339
Southern Pacific Co.	6,704	3,910,762	2,439,913	6,829,873	752,777	925,645	177,959	2,104,084	201,753	4,161,188	2,668,685	—8,906	359,420	2,300,359	218,785
Sunset	591	53,955	14,474	70,758	11,101	868	40	20,861	1,065	33,935	36,823	.....	3,390	33,433	—8,790
Terminal R. R. Ass'n of St. Louis	35[30]	.....	236	248,115	29,700	27,962	635	95,366	3,881	157,544	90,571	9,552	26,643	73,480	20,241
Texas & New Orleans	458	207,044	77,240	307,392	48,637	70,640	9,063	136,333	16,754	276,427	30,965	267	13,683	7,549	—57,701
Texas & Pacific	1,885	1,004,865	281,092	1,371,944	197,578	224,921	31,265	710,796	49,710	1,214,270	157,674	7,506	54,793	110,387	—25,693
Toledo & Ohio Central	441[31]	326,973	89,032	480,817	48,282	84,067	6,172	167,173	8,651	314,345	66,472	—637	20,385	45,450	44,677
Toledo, Peoria & Western	248	74,877	20,892	109,832	12,696	24,854	2,436	43,857	3,365	87,208	22,624	.....	5,000	17,624	3,288
Toledo, St. Louis & Western	451	241,912	22,307	283,437	25,546	60,875	8,335	117,256	7,954	219,966	63,471	.....	15,750	47,721	- 1,754
Trinity & Brazos Valley	463	207,281	30,223	245,645	39,428	28,672	9,004	110,067	12,293	199,464	46,181	.....	3,500	42,681	51,529
Virginia & Southwestern	246[32]	114,962	10,879	139,240	15,712	30,120	1,802	42,464	3,174	93,272	45,968	.....	5,332	40,636	12,652
Wabash	2,515	1,444,602	397,512	2,031,013	198,205	436,253	75,096	1,045,473	70,506	1,825,533	205,480	- 3,181	71,655	130,644	- 156,987
Washington Southern	36	30,677	46,124	101,830	12,693	11,875	1,232	40,097	2,822	68,719	33,111	.....	3,245	29,866	440
Western Pacific	935	257,777	57,737	326,658	68,294	37,084	33,593	158,814	24,633	322,418	4,240	- 4,727	18,249	—18,736	.....
Western Ry. of Alabama	133	72,786	38,643	120,441	18,112	22,172	5,649	39,468	5,829	91,230	29,211	100	4,612	24,699	4,665
Wheeling & Lake Erie	457	511,320	38,663	577,138	52,472	112,593	7,056	208,296	14,166	394,583	182,555	701	32,237	151,019	54,825

[1] Miles operated in previous period 1,355; [2] 4,434; [3] 236; [4] 31; [5] 2,232; [6] 9,091; [7] 341; [8] 471; [9] 246; [10] 1,979; [11] 1,173; [12] 2,542; [13] 317; [14] 611; [15] 7,774; [16] 350; [17] 113; [18] 1,737; [19] 1,348; [20] 1,990; [21] 376; [22] 296; [23] 1,042; [24] 191; [25] 240; [26] 501; [27] 795; [28] 1,105; [29] 3,046; [30] 187; [31] 57; [32] 34; 444; [33] 242. - Indicates Deficits, Losses and Decreases.

Anthracite Shipments.

The total quantity of anthracite coal shipped from the mines in the month of March was 6,596,687 tons, said to be the largest monthly movement on record. The shipments in February aggregated 5,875,968 tons. The shipments in March by the different roads were as follows:

	1912.	1911.	Changes.
Philadelphia & Reading	1,472,696	1,057,279	+415,427
Lehigh Valley	1,225,019	1,086,580	+138,439
Central R. R. of N. J.	848,110	768,031	+180,079
Delaware, Lack. & W.	916,[illegible]	738,499	+178,[illegible]
Delaware & Hudson	528,[illegible]	[illegible]	-110,[illegible]
Pennsylvania R. R.	537,470	586,016	— 48,546
Erie	261,[illegible]	311,[illegible]	— 49,[illegible]
Ontario & Western	226,843	250,740	— 23,897
Total	6,596,687	5,088,894	+1,507,793

New York Chamber of Commerce Calls for Conservatism in Railway Regulation.

The Chamber of Commerce of the State of New York, accepting the report of its committee on internal trade and improvements, has unanimously adopted the following resolution:

"Whereas, Traffic has increased so rapidly and railway facilities so slowly since 1907, that a small further enlargement of tonnage would produce a net car shortage and seriously handicap shippers; and

"Whereas, The Hadley Railroad Securities Commission, authorized by Congress, and composed of impartial experts of the highest standing, declares that 'the necessary development of railroad facilities is now endangered by the reluctance of investors to purchase new issues of railroad securities in the amounts required,' and the amounts issued since 1907 have been totally inadequate to supply the facilities needed; therefore, be it

"Resolved, That the Chamber of Commerce of the State of New York, in the interest of shippers and of the well being of the country as a whole, urges upon the Interstate Commerce Commission and all state railway commissions the importance, for the future, of so carefully weighing and considering the effect to be produced upon the railways in the making of any necessary readjustments of freight rates, that the same may be accomplished without further curtailing the total revenue of the railways, upon which their borrowing credit depends, bearing in mind, as stated by the Railroad Securities Commission, that 'a reasonable return is one which under honest accounting and responsible management, will attract the amount of investors' money needed for the development of our railroad facilities,' and also bearing in mind that the development and prosperity of the railroads mean development and prosperity of the country.

"Resolved, That copies of this resolution be sent to the Senators and Representatives in Congress from this state, to members of state railway commissions and to the members of the Interstate Commerce Commission, with the request that they give it careful consideration."

In presenting the report the chairman, Mr. Fairchild, said: "It has been estimated by competent statisticians that it will require in the next five years, to maintain railway facilities equal to the enormous traffic of the country, the immense sum of $8,500,000,000, of which three and a half billions would be for additions, increase in taxes and return on new securities, and five billions for the maintenance of the plant. This sum is eight times the national debt; it is more than two and a half times the amount of money in circulation; it is equal to all the deposits in the national and state banks, and nearly equal to the entire money value of all the farm products of the country in one year. It is over three times the annual gross revenue of the railroads, and it amounts to nearly one-half the existing railway capital represented by stocks and bonds. Are the eight and a half billions to be obtained out of the current earnings of the railways? That is manifestly impossible. Are they to be obtained by issue of new securities? If so, how are investors to be induced to put their savings into these new securities? Under the present demands for increased service, better equipment, new terminals, faster transportation, more expensive provision for insuring safety; the demand for higher compensation for labor, and the demand for cheaper rates of carriage for both passenger and freight, railway capital is forced to accept reduced returns upon its investments. . . . If this public pressure is continued, the credit of the railways and their ability to market their securities will be impaired, and the commerce of the nation crippled. So rapid has been the growth of this country that, in its great

business transactions, it expands 100 per cent. every ten years. Its rate of expansion may be retarded in a period of industrial depression, but not stopped. The annual tonnage of the railways is now vastly greater than the high point of 1907, and the growth in passenger traffic has been even more remarkable. . . . It is apparent that the time has arrived when the business interests of the country should rally to the support of the railways. Past abuses have been removed. Needed reforms have been instituted. The principle of government regulation has been established. The rule of justice, between individuals and communities and sections, is being more and more enforced. Labor has been more liberally remunerated and protected. Many improvements and economies in service have been introduced. One thing more is needful, namely, a larger recognition of the right of railway capital to an adequate reward."

INTERSTATE COMMERCE COMMISSION.

The commission has suspended until August 8 freight tariffs filed by F. A. Leland, naming increased rates on fresh meats and packinghouse products from Wichita, Kan., to points in Louisiana and elsewhere.

The commission suspended Docket No. 92 which involves the cancellation by the Chicago & Alton of through rates on coal with the Chicago, Burlington & Quincy, from mines on the line of the Chicago & Alton to Clinton, Ill., and Lyons, Iowa, and East Clinton. This results in an advance of 12½ cents per ton on pea, slack and screenings, and involves a charge of $3 per car switching on all coal from C. & A. mines to industries on the C., B. & Q. at Clinton, Iowa. There is no cancellation of through routes to Davenport, Iowa, and to other points, thus making an apparent discrimination against Clinton, Lyons and East Clinton.

No Discrimination Against Baltimore.

Merchants & Manufacturers Association of Baltimore, Md., v. Atlantic City Railroad et al. Opinion by Commissioner Meyer:

Complainant alleged that the defendants subject Baltimore to undue prejudice in certain passenger excursion fares from Baltimore to Atlantic City, and give unreasonable preference to New York in similar fares from New York to Atlantic City; also that the fares from Baltimore are unreasonable. The evidence indicates that the lower fares from New York are forced by competition and that the volume of the traffic from New York is about six times that from Baltimore. There is also a difference in mileage in favor of New York, though this is not controlling. It is held that the allegations of undue prejudice to Baltimore in these fares are not sustained, and that the excursion fares from Baltimore to Atlantic City are not shown to be unreasonable.

Conference Rulings.

If a railway and a water carrier separately publish and file their rates applicable to through shipments, traffic over such route may be lawfully transported under through bills of lading even though the rates are not joint through rates. A water carrier may not lawfully accept shipments for transportation on through bills of lading issued by a railway unless the water carrier has published and filed rates applicable thereto. Acceptance by a water carrier of through traffic on through bills of lading issued by a rail carrier is an evidence of an arrangement for continuous carriage which subjects the traffic to the provisions and jurisdiction of an act.

Under transit tariffs which require the payment of the full rate to final destination at the time the shipment is delivered at the transit point it sometimes occurs that the shipment is never forwarded to the destination to which charges have been paid. In such instances it is not unlawful or improper to refund the charges that have been paid in excess of what the lawful charges on the shipment would have been if the transit point had been its final destination. Subject to the time limit of ticket, the same rule applies where a passenger has purchased a ticket and has abandoned his journey at a point short of the destination shown on his ticket; and also to a prepaid shipment of freight that is stopped and delivered at a point short of that to which prepaid.

It is the view of the Commission that it is lawful for a railway which, by foreclosure or otherwise, has bought another railway, to give free transportation to the widow during widowhood, and minor children, during minority, of persons who died while in the service of the company formerly operating the road.

A shipment by water from one point to another in the territory of the United States is coastwise business; and shipments by water from a port of the United States to a port of any foreign country, even though adjacent, would be export business.

On inquiry as to whether or not, under conference ruling 327, carriers might send at their expense over shippers' names telegrams directing the routing of certain traffic, it is held that carriers may not pay for such telegrams.

Adjustment of Colorado Coal Rates.

Nebraska State Railway Commission v. Chicago, Burlington & Quincy et al. Opinion by Commissioner Meyer:

In the application of rates on coal from the Walsenburg district of Colorado to numerous points in Nebraska, defendants provide a rate of $3.50 per net ton to one group of stations and a rate of $3.75 to a second group. The complainant, in substance, asks that certain points now taking the $3.75 rate be included within the $3.50 rate group, and that certain points taking the $3.50 rate be divided into two new groups to which shall apply rates of $3 and $3.25, respectively. The rates involved have been considered in other cases, and upon further consideration it is held that the defendants subject Minden "K" to undue and unreasonable prejudice in charging a higher rate than applies at Minden, and that for the future the rate to Minden "K" should not exceed the rate contemporaneously maintained to Minden. Under the readjustment required by this finding, the rate to Minden "K" should not be exceeded at the intermediate stations of Keene, Wilcox, Ragan, Huntley, Alma, Orleans, Carter, and Sacramento.

Readjustment of Rates on Grain to Sioux City.

Sioux City Terminal Elevator Co. et al v. Chicago, Milwaukee & St. Paul et al. Opinion by Commissioner Clements:

Sioux City, Iowa, asks for lower local rates on inbound grain and the establishment of proportional rates on outbound grain to Chicago, Minneapolis and the Southeast. Such proportional rates are now given to Omaha, Neb., and Sioux City claims that it is discriminated against. Omaha pays a local rate in and proportional out to ultimate destination, the proportionals being lower than the outbound locals from Omaha to the same destination, whereas Sioux City has no proportional rates outbound but pays the joint rate to ultimate destination, with privilege of stopping grain at Sioux City for transit purposes. Proportional rates are asked for in addition to joint rates with transit privileges. Petitioner also claims the local rates to Sioux City from the grain States are unreasonable per se. The defendants claim that Sioux City is on an absolute parity with Omaha on South Dakota grain to the Southeast and say that there is a substantial difference in conditions on other grain at Sioux City and Omaha. The commission finds that the principal markets of Chicago and the Southeast are opened to the great bulk of the Sioux City grain on equality with Omaha. Omaha's natural advantage of location with respect to the Southeast cannot be controlled by any order of the commission. Conceding Sioux City's best development to be dependent on proportional rates, there remains the question of the justification for an order by the commission. It is established by this record and others before the commission that competition has played an all-important part in Omaha and Kansas City's proportional rates. Manifestly it is no part of the commission's duty or right to equalize markets except as that result may be incident to the correction of a substantial injustice in rates. The one substantial advantage to Omaha is the back haul privilege. The commission cannot, however, see that Omaha's advantage on this comparatively small tonnage subjects Sioux City to such general disadvantage as to warrant an order in disturbance of the whole western fabric of rates on grain, with substantial loss of revenue to the railways.

The local rates into Sioux City are found to be unreasonable in themselves and the commission expects an adjustment of these rates to be made. (23 I. C. C., 1.)

STATE COMMISSIONS.

The Chicago offices of the Illinois Railroad and Warehouse Commission will be removed this month from the Continental National Bank building to 718-724 Insurance Exchange building.

The Indiana commission has issued to the railways of the state a circular recommending that every company organize safety committees like those of the Chicago & North Western, the Baltimore & Ohio, and other roads. The commission believes that safety committees are no longer an experiment.

The railway commission of California has rendered a decision in the so-called San Joaquin Valley rate case, reducing the class rates of the Southern Pacific and the Atchison, Topeka & Santa Fe, between San Francisco, Los Angeles, Stockton, Fresno and Bakersfield and San Joaquin Valley points. It is estimated that the decision will cost the Southern Pacific about $500,000 a year and the Santa Fe between $200,000 and $300,000.

COURT NEWS.

The Supreme Court of the United States has assigned the inter-mountain rate cases for hearing October 15. These cases were argued last February, but the court says that, by reason of their importance, they should be heard by a full bench. There was a vacancy in the court in February.

Commerce Court Finds I. C. C. Without Jurisdiction in Switch Connection Case.

Baltimore & Ohio Southwestern and Norfolk & Western v. U. S. and Cincinnati & Columbus Traction, I. C. C. intervener. Opinion by Judge Archibald:

This is a petition to set aside an order of the I. C. C. compelling the B. & O. S. W. and the N. & W. to make a switch connection with the Cincinnati & Columbus Traction, and to secure through routes and joint rates. The provisions of the act with regard to compelling switch connections contain the following: "If any common carrier shall fail to install and operate any such switch or connection as aforesaid on application therefor in writing by any shipper *or owner of such lateral branch line of railway*, such shipper *or owner of such lateral branch line of railway* may make complaint to the commission. . . ." The words in italics were not in the act at the time the application for switches in question was made to the railways nor at the time of the complaint to the commission, but were put in as an amendment in 1910. At the time the proceedings were instituted the Traction company had no right to file the complaint, and the commission in consequence, except for the change in law, would have been without authority to entertain it. Immediately after I. C. C. v. D., L. & W. 216 U. S. 531, which held that in such a case a complaint could not be sustained, and after testimony had been taken before the I. C. C. but before a decision had been rendered, the case was reopened to permit two shippers along the line to be added as complainants. The commission's order was objected to on the ground that the admission of new complainants vitiates the whole proceeding; that the commission did not determine how the expense should be borne, and finally that it is in excess of its powers, or even of Congress itself, to order an interchange of cars along with through billing. These are serious objections which would have to be carefully considered except for the conclusion which we have reached on the underlying question as to weather the Traction company's road is a lateral branch line of railway within the meaning of the statute, which if found against that company is conclusive, since the law compels switch connections only with laterals.

The Cincinnati & Columbus Traction is intermediate between the B. & O. S. W. on the north, and the Norfolk & Western on the south, and substantially divides the diamond like section of territory lying in between them. In the total six miles east of Norwood the Traction company's line parallels and is contiguous to the right-of-way of the B. & O. S. W., and at Parinton it practically adjoins the right-of-way of the Norfolk & Western, which it similarly parallels for about four miles, and at Hillsboro again parallels the B. & O. S. W. for four or five miles. In considering whether the Cincinnati & Columbus Traction is a lateral branch railway, according to the test applied by the commission, it is held to be such as to places and shippers along its line in the intermediate territory between Dodsonville and Boston, remote from and not sufficiently served by the trunk lines it is a lateral railway but not as to those east or west of there. But it is obvious that this is not and cannot be the correct criterion. A road is or is not a lateral or branch railway according to the relation which it bears to the line with which a switch connection is asked, and this relation is one of road to road and not of shippers or territory. The Traction company's line is a competing line and is clearly not a lateral or branch line railway. The commission, therefore, was without jurisdiction to make the order and the temporary injunction, granted in the case, is made final.

Commerce Court Sustains the I. C. C. in N. & W. Grain Case.

Norfolk & Western et al. v. U. S., I. C. C., Corporation Commission of North Carolina. Opinion by Judge Hunt:

The original complaint was made by the Corporation Commission of North Carolina to the Interstate Commerce Commission, and after a hearing the commission ordered the Norfolk & Western to reduce its local class rates on traffic from Roanoke, Va., to Winston-Salem, N. C., and from Lynchburg, Va., to Durham, N. C. The reduction is indicated by a reduction in the first class rates from 61 cents per 100 lb. to 52 cents. The appeal is taken on the ground that the rates reduced were not in the issue before the commission and the order of the commission defeats its own purpose, and that the order compels the application of lower rates on certain traffic than the commission found to be reasonable, and that the commission erred in disregarding the interests of the railways other than the Norfolk & Western. It is easily gathered that the local rates were involved in the issue before the commission, and, considering the liberality of statements which is allowed in pleadings before the commission, the investigation into such local rates was authorized.

Petitioners urge that the commission in prescribing maximum through rates from Cincinnati to Winston-Salem and Durham, disregard the method of construction of a through rate on any article from a western city to Winston-Salem or Durham by adding a fixed proportional of the rate proper between the western city and the Virginia city to the local between the Virginia city and the North Carolina destination. Before the I. C. C. order the rates from Louisville to Winston-Salem and Durham were the same as from Cincinnati to these points. Granting that the order, which is only made specifically against the Norfolk & Western, affects rates on other roads running from other points than Cincinnati, there is no sufficient reason why this court should enjoin against this order. Of course, adjustments of rates often do affect adjacent territory. These matters were considered and expressly referred to by the commission in its report. Ordinarily rates not involved in the inquiry before the commission will adjust themselves to the conditions brought about by the order, but even though the assumption that they will adjust themselves is erroneous, and the basis for the assumption involves a mistaken factor as to such other rates, still it does not necessarily lead to the conclusion that the regulation of the rate directly involved in the order is invalid, or that the order fixing such a rate should be annulled by judicial authority, provided, always, the rate so directly involved and fixed is reasonable for shippers and carriers with relation to the particular destination concerned. It is not for us to say whether the commission has properly attached great or little weight to evidence adduced on a given point. If the particular matter in issue and inquired into was one of fact, and a full hearing was afforded, and the conclusion is supported by substantial evidence, it will not be nullified by the courts. Stress is laid on what is called a misconception of the relations of other carriers to the western business. Again we encounter what was a question of fact. The report of the commission refers to the pressure on the attention of the commission of the possibility of disaster to the interests of the intervening carriers. The rates ordered to be put in force by the Norfolk & Western being reasonable, we cannot say that because other roads have not met the reduced rates and are losing traffic as a consequence, the order of the commission should be interfered with.

Commerce Court Upholds Commission's Jurisdiction Over Movement of Freight Within a State.

Denver & Rio Grande v. I. C. C., U. S. intervening. Opinion by Presiding Judge Knapp:

The suit was brought to set aside an order of the I. C. C., which in effect reduced the rate on beer in carloads from Pueblo, Col., to Leadville, Col., when part of a through transportation from St. Louis, Mo., to Leadville. The principal ground on which the order of the commission is claimed to be invalid is that the order relates to the transportation of property received, handled, transported and delivered wholly within one state which is claimed to be not within the jurisdiction of the I. C. C. It is conceded that the transportation in question was interstate commerce. The shipments in question were hauled by the Missouri Pacific from St. Louis to Pueblo and turned over to the Denver & Rio Grande without break of bulk, which hauled them to Leadville. There was no joint rate of the two roads applying from St. Louis to Leadville and the through charge was the local rate of the M. P. from St. Louis to Pueblo, plus the local rate of the D. & R. G. from Pueblo to Leadville. The physical movement and handling of the car was precisely the same as would be the case under a joint rate and the through bill of lading.

It is claimed that the commission has no jurisdiction over the Pueblo-Leadville rate, because section 1 of the act says: "Provided, however, that the provisions of this act shall not apply to the transportation of passengers or property, or to the receiving, delivering, storage or handling of property wholly within one state and not shipped to or from a foreign country or to any state or territory aforesaid. . . ." The petitioner claims that the proviso in section 1 cannot be taken as aiming to exclude only strictly intrastate business, because of the excluding phrase in regard to traffic from foreign countries, because intrastate business destined to or coming from a foreign country is not excluded; and that therefore it follows that as there may be foreign business handled wholly in one state and not excluded, so there may be interstate business handled wholly in one state which is excluded. But it would follow that Congress, in devising a system of railway regulation, took care to include the intrastate carriage of foreign commerce, comparatively small in amount, and yet purposely exempted the intrastate carriage of interstate commerce, which aggregates a very large volume. It was interstate rail transportation that Congress primarily sought to regulate, not interstate water transportation, and not the rail part within a single state of rail and water interstate transportation unless the rail carrier and water carrier were under a common control arrangement. The proviso must be regarded as a disclaimer and not as an exception. This construction gives consistent and appropriate meaning to those provisions of the first section which define the scope and application of the entire exactment. The sixth section of the act gives the commission jurisdiction over separately established rates applied by a carrier on through traffic when there is a through route but no joint rate. This rate in question from Pueblo to Leadville seems to us clearly of the latter class. We do not say that a carrier located wholly within a state may not so conduct its business as to be in fact and in law a purely intrastate carrier. It is sufficient to decide this particular case. The petition should be dismissed.

The plan and survey of the Linares to Colbun railway, Chile, have been modified, and the Chillan to Las Termas railway, which was damaged by floods, has been almost entirely reconstructed. Work was recently begun on the Rucapequen to Tome and Penco railway, and the Pua to Curacutin railway has been constructed up to kilometer 24.

At the beginning of the present year rails had been laid on 235 of the 271 miles of the railway from Arica, Chile, to La Paz, Bolivia, railway, leaving 36 miles still to be laid. The principal tunnels have been bored, and the work of strengthening them is being rapidly carried on. The station at Arica will soon be completed, and the telegraph line is being extended ahead of the track-laying sections. Up to the first of the year this railway had cost $15,240,000. The rails of the two divisions were united March 2, 1912. Formal opening of this international line will take place during the summer.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

C. W. Hotchkiss, general manager of the Chicago, Indiana & Southern at Chicago, has been elected president of the Illinois Tunnel Company, with office at Chicago, effective May 1.

L. B. Jones, assistant auditor of the Atchison, Topeka & Santa Fe Coast Lines at Los Angeles, Cal., has been appointed auditor, with office at Los Angeles, succeeding W. J. Healy, deceased.

C. F. Parker, purchasing agent of the Illinois Central, and vice-president of the St. Louis, Belleville & Southern, with office at Chicago, has been elected also vice-president of the Central of Georgia.

W. R. Mozier, formerly auditor of freight accounts of the Chicago & Alton and the Toledo, St. Louis & Western at Chicago, has been appointed auditor of the Pacific & Idaho Northern, with office at New Meadows, Idaho.

Frank W. Blair, Dudley E. Waters and Newman Erb, having been appointed receivers of the Pere Marquette, William Cotter, president and general manager, has been appointed general manager; J. L. Cramer, vice-president and comptroller, has been appointed comptroller; and J. E. Howard, secretary and treasurer, has been appointed treasurer; all with office at Detroit, Mich.

A. H. Smith, whose election as vice-president of the New York Central Lines West of Buffalo, with office at New York, has been announced in these columns, was born 48 years ago, and has spent his entire railway service on the New York Central Lines, beginning in 1879 as a messenger boy on the Lake Shore & Michigan Southern at Cleveland, Ohio. He was later in the purchasing agent's office, and then went to the engineering department, and was for several years at work on a change of grade and reconstruction of the Lake Shore, west of Toledo, during which time he was foreman and then general foreman of construction work. In 1890 he was made superintendent of the Kalamazoo division, and was then consecutively superintendent of the Lansing, the Franklin and the Michigan divisions. In 1901 he was appointed assistant general superintendent of the Lake Shore & Michigan Southern, and was subsequently made general superintendent. He was transferred as general superintendent in 1902, to the New York Central & Hudson River. In 1903 he was promoted to general manager and in 1906 was elected vice-president and general manager of the same company. Mr. Smith remained in that position until his recent election as vice-president of the lines west of Buffalo, in charge of operation, maintenance and construction of all lines in the New York Central System, east and west of Buffalo, with the exception of the New York, Chicago & St. Louis, and the Pittsburgh & Lake Erie, west, and the Boston & Albany, and the Rutland roads east of Buffalo.



A. H. Smith.

Abraham Tracy Hardin, who has been appointed assistant vice-president of the New York Central Lines East of Buffalo, N. Y., with office at New York, was born in 1868 in South Carolina, and graduated from the University of South Carolina with the degree of civil engineer in 1894. Previous to graduation, he had been a telegraph operator in 1882, on the Richmond & Danville, and from 1882 to 1890 he was agent and stenographer on

the same road. He attended college from 1890 to 1894, and then for four years was in the maintenance of way department of the Southern Railway. From 1898 to September, 1899, he was supervisor and division engineer of the Eastern division of the New York Central & Hudson River. He was then promoted to engineer of track, and from February, 1903, to July, 1905, he was engineer of maintenance of way, and then for about one year was assistant to the general manager of the same road. In June, 1906, he was appointed assistant general manager, which position he held at the time of his recent appointment as assistant vice-president, as above noted.

Operating Officers.

M. Dailey has been appointed superintendent of the Missouri, Oklahoma & Gulf of Texas, with office at Denison, Tex., succeeding D. Sallee, resigned.

S. J. Jones has been appointed superintendent of transportation of the Alabama, Tennessee & Northern, and the Tombigbee Valley, with headquarters at Mobile, Ala.

A. B. Class has been appointed chief train despatcher of the Atchison, Topeka & Santa Fe, with headquarters at Newton, Kan., succeeding E. J. Cunningham, deceased.

L. Harold has been appointed assistant trainmaster of the Grand Trunk, with office at Hamilton, Ont., succeeding C. H. Brown, resigned to go to another company.

The general offices of the Oklahoma Central having been moved from Purcell, Okla., to Chickasha, W. G. Choate, general manager, has had his office transferred to the latter place.

M. J. Griffin has been appointed trainmaster of the Missouri, Kansas & Texas of Texas, with office at Hillsboro, Tex.; P. O. Penn, whose appointment to this position was recently announced in these columns, having died on the day of his appointment.

H. W. Henderson has resumed his duties as general manager of the Guayaquil & Quito Railway, with office at Huigra, Ecuador, succeeding M. K. Jones, granted leave of absence for three months, and A. R. Morris has been appointed superintendent of telegraph and telephone, succeeding G. R. Perry, resigned.

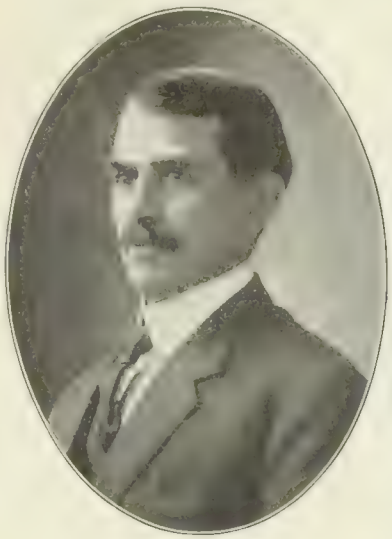
P. G. Cromar, assistant superintendent of the Lake Superior division of the Canadian Pacific at North Bay, Ont., has been transferred as assistant superintendent to Schreiber, and E. J. O'Brien, trainmaster at Schreiber, has been appointed assistant superintendent, with office at Chapleau, succeeding W. Bartlett, transferred.

J. H. Boyle, assistant superintendent of the Eastern division of the Canadian Pacific at Ottawa, Ont., has been appointed acting superintendent, with office at Ottawa, succeeding to the duties of H. B. Spencer, superintendent, granted leave of absence, and A. Williams, chief train despatcher at Woodstock, N. B., has been appointed assistant superintendent of the Lake Superior division, with office at North Bay, Ont.

P. L. McManus, inspector of transportation of the Chicago, Indianapolis & Louisville, having been appointed superintendent, with office at La Fayette, Ind., as has been announced in the *Railway Age Gazette,* his former position has been abolished. D. E. Murphy, who has been terminal trainmaster at South Hammond, Ind., and not W. J. Murphy, as stated in this column last week, has been appointed trainmaster of the Second division, succeeding C. T. McHugh, resigned. W. H. Gunzleman, chief despatcher, having resigned, W. H. Fogg has been appointed chief despatcher of the First division, and J. R. Stemm has been appointed chief despatcher of the Second division.

G. B. Vilas, who has been appointed assistant general superintendent of the Chicago & North Western, with office at Chicago, as has been announced in these columns, was born in April 1868, at Ogdensburg, N. Y. He attended Phillips Exeter Academy, Exeter, N. H., from 1885 to 1887, and began railway work in September of the latter year with the Chicago & North Western, and he has been with that road ever since. Until May, 1890, he did station work at Eagle Grove, Iowa, and Madison, Wis., and was agent at Kenosha, Wis. He was then for six years local freight agent at Milwaukee, and from September, 1896, to February, 1903, he was trainmaster at Milwaukee. In the latter month he was transferred to Baraboo, Wis., with the title of assistant superintendent, and was made superintendent in February, 1910, from which position he has just been promoted to assistant general superintendent at Chicago.

P. E. Crowley, whose appointment as general manager of the New York Central & Hudson River, with office at New York, has been announced in these columns, was born in August, 1864, at Cattaraugus, N. Y., and began railway work with the Erie as messenger boy in 1878. The following year he was promoted to telegraph operator, and was later station agent and then train despatcher on the same road. In 1890 he entered the service of the New York Central & Hudson River as train despatcher on the Rome, Watertown & Ogdensburg division, and was promoted to chief train despatcher in 1891. The same year he was made trainmaster, and in September, 1900, was appointed chief trainmaster of the Pennsylvania division. He was promoted to superintendent of the Pennsylvania division in August, 1901, and was made assistant general superintendent in December, 1904. Mr. Crowley was appointed general superintendent of the same company in June, 1905, and was promoted to assistant general manager in March, 1907, which position he held at the time of his recent appointment as general manager.



P. E. Crowley.

Traffic Officers.

H. W. Hawley has been appointed division freight agent of the Erie, with office at New York.

F. W. Hancock has been appointed traveling freight agent of the Southern Railway, with office at Philadelphia, Pa.

J. H. Harper, general agent of the Kansas City, Mexico & Orient, with office at St. Louis, Mo., has resigned to engage in other business.

O. A. Brown, division freight agent of the Atchison, Topeka & Santa Fe, with office at Wichita, Kan., has resigned to engage in other business.

C. F. Vigor, general agent in the traffic department of the Chicago & Alton and the Toledo, St. Louis & Western at Buffalo, N. Y., has had his title changed to commercial agent.

The general offices of the Oklahoma Central having been moved from Purcell, Okla., to Chickasha, B. M. Haile, traffic manager, has had his office transferred to the latter place.

C. M. Low, contracting freight and passenger agent of the Illinois Central at Denver, Colo., has been appointed traveling freight and passenger agent, with office at Denver, and A. O. Coke succeeds Mr. Low.

C. W. Carstens has been appointed traveling freight agent of the Kanawha Despatch, with headquarters at St. Louis, Mo., succeeding W. R. Miller, deceased. F. A. Miller has been appointed traveling freight agent, with office at Kansas City, Mo.

Augustin Miranda, assistant general freight and passenger agent of the Southern Pacific Railroad of Mexico, at Mexico City, Mex., has been appointed assistant general freight agent of the National Railways of Mexico, with office at Mexico City, succeeding F. L. Wemple, resigned to accept service with another company.

E. H. Smith, general agent of the Charleston & Western Carolina at Atlanta, Ga., has been transferred to Cincinnati, Ohio. W. H. Sedam has been appointed soliciting agent at Cincinnati, and J. G. Stanberry, soliciting agent at Atlanta, has been appointed commercial agent, with office at Atlanta, and his former position has been abolished.

Engineering and Rolling Stock Officers.

H. F. Howe has been appointed chief engineer of the Guayaquil & Quito Railway, with headquarters at Huigra, Ecuador.

W. O. Galbreath has been appointed engineer maintenance of way of the Missouri & North Arkansas, with office at Eureka Springs, Ark.

H. J. Anderson has been appointed roadmaster of the Chicago & North Western, with office at North Fond du Lac, Wis., succeeding J. H. Brown, resigned.

Pearl F. Smith, chief draftsman of the Chicago, St. Paul, Minneapolis & Omaha, at St. Paul, Minn., has been appointed mechanical engineer, with office at St. Paul.

T. M. Vickers, formerly master mechanic of the Missouri Pacific at Coffeyville, Kan., has been appointed master mechanic of the San Pedro, Lose Angeles & Salt Lake, with headquarters at Milford, Utah.

C. I. Knowles, assistant general foreman of water works of the Illinois Central, has been appointed general foreman of water works, with office at Chicago, succeeding C. E. Thomas, resigned to go with the Central Material & Construction Company at Mt. Pulaski, Ill.

J. C. Holden, assistant engineer of the Manitoba division of the Canadian Pacific at Winnipeg, Man., has been appointed division engineer of that division, with office at Winnipeg, succeeding F. Lee, promoted. C. H. Fox, resident engineer at Ft. William, Ont., succeeds Mr. Holden.

Henry Hatfield Decker, whose appointment as engineer of maintenance of the Chicago & North Western, with office at Chicago, has been announced in these columns, was born May 25, 1873, in New York City. He graduated with the degree of civil engineer from the Rensselaer Polytechnic Institute at Troy, N. Y., in June, 1897, and from that time until February 28, 1899, he was engaged in engineering work in Connecticut. He began railway work on the latter date as rodman on second track construction in Iowa on the Chicago & North Western; was subsequently instrument man, and in September, 1899, became assistant engineer on second track work. He was assistant engineer on construction, maintenance and location until May, 1907, and was then promoted to division engineer of the Minnesota and Dakota divisions, with headquarters at Winona, Minn. In May, 1909, he was appointed resident engineer of construction on lines in South Dakota, and returned to the position of division engineer at Winona in October, 1910, from which office he has just been promoted to engineer of maintenance of the lines east of the Missouri river.



H. H. Decker.

OBITUARY.

F. M. Welch, vice-president of the New Iberia & Northern, with office at New Iberia, La., died on April 6. Mr. Welch began railway work as a switchman, and was later brakeman and then conductor on various roads. He was then emigrant agent of the Texas & Pacific at New Orleans, La., and later built the railway of which he was vice-president at the time of his death.

E. C. Hawkins, chief engineer of the Copper River & Northwestern, with office at Seattle, Wash., died on April 9, at New York, following an operation. Mr. Hawkins was born in 1860 at Brook Haven, N. Y., and graduated from Rensselaer Polytechnic Institute, Troy. After graduation he was engaged in railway construction in Colorado, and in 1898 he was placed in charge of the construction of the first railway in Alaska. He built the White Pass & Yukon and the Copper River & Northwestern railways.

Bernard H. Bail, formerly vice-president and general traffic manager of the Philadelphia & Reading, at Philadelphia, Pa., died on April 7, at White Plains, N. Y. He was born on May 5, 1849, at Verona, N. Y., and began railway work in 1863 as a clerk on the New York Central. He entered the service of the Philadelphia & Reading in May, 1888, as assistant general freight agent, and since that time had been general freight agent and freight traffic manager. In December, 1909, he was elected vice-president and general traffic manager, but resigned immediately after on account of ill health.

C. D. Morris, assistant general freight agent of the Southern Railway at St. Louis, Mo., died on April 8. Mr. Morris was born on February 7, 1870, at Fairfield, Ill., and graduated from Hayward College, Fairfield, at the age of 17. He began railway work as a clerk on the Lake Erie & St. Louis, and the following year was promoted to contracting agent, which position he held until 1890. He then entered the general freight office of the same company at Louisville, Ky., as a clerk, and in 1897 was appointed assistant general freight agent. In January, 1901, when the Lake Erie & St. Louis was taken over by the Southern Railway, he was made chief clerk in the assistant general freight office, and in 1907 was appointed assistant general freight agent of the St. Louis-Louisville lines of the Southern Railway, which position he held at the time of his death.

J. E. W. Fields, formerly general freight and passenger agent of the Trinity & Brazos Valley at Cleburne, Tex., and subsequently with the Frisco lines at Houston, died on April 7. Mr. Fields was born on November 27, 1853, at Hayneville, Ala., and began railway work in 1881 as a track laborer on the Houston & Texas Central. He was later brakeman on the Missouri Pacific, and then, successively, check clerk, cashier and chief clerk on the Missouri, Kansas & Texas, at Waco. His next position was in the general freight office of the Texas Central, and in February, 1893, he was made general freight and passenger agent of the Waco & Northwestern. In August, 1897, he was made general freight and passenger agent of the Atlanta, Knoxville & Northern, and from January, 1899, to February, 1903, was traffic manager of the same road. He was out of railway service for a short time in 1903 until his appointment in September of that year as general freight and passenger agent of the Trinity & Brazos Valley. He left the service of this company in 1910 to go to the Frisco lines.

Amos Lawrence Hopkins, formerly and for many years a prominent officer of the Wabash and other roads in the "Gould system," died on April 4 at his home in Boston, Mass. Mr. Hopkins was born on April 10, 1844, in Williamstown, Mass., being the son of President Mark Hopkins of Williams College. He entered college with the class of 1863, but left at the outbreak of the war to become lieutenant in a Massachusetts regiment. He returned in time to graduate with his class and receive his degree. He was promoted repeatedly for bravery in action until the close of the war, when he had risen to the rank of major. He began railway work in 1867. He resigned as general superintendent of the Housatonic Railway in 1869 to become general superintendent of the Kansas City, St. Joseph & Council Bluffs, and from 1872 to 1873 he was vice-president of the Illinois Central. From 1874 to 1880 he was receiver of the Toledo, Peoria & Warsaw, and from 1876 to 1879 he was also vice-president and general manager of the Wabash Railroad. He was vice-president of the Wabash, St. Louis & Pacific from November, 1879, to February, 1889; and from April, 1883, to February, 1889, was also second vice-president of the Missouri Pacific and of the other companies composing the Gould system, which included the Missouri, Kansas & Texas, the Central Branch, Union Pacific, the Sedalia, Warsaw & Southern, the St. Louis, Iron Mountain & Southern, the Texas & Pacific, and the International & Great Northern. From May, 1895, to 1897 he was receiver of the Chicago & Northern Pacific, and from June, 1895, to July, 1898, was also president of the New York, Susquehanna & Western. He retired from active business life several years ago.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Union Pacific is making tentative inquiries for 25 switching locomotives.

The Wabash has ordered 10 mikado locomotives from the Baldwin Locomotive Works.

The Boston & Albany is said to be figuring on 19 locomotives. This item has not been confirmed.

The Georgia, Florida & Alabama has ordered 4 locomotives from the Central Locomotive Car Works.

The St. Louis & Hannibal has ordered one mogul locomotive from the Baldwin Locomotive Works.

The Atlantic Coast Line has ordered 1,200 tons of bridge material from the Pennsylvania Steel Company.

The Baltimore & Sparrows Point has ordered one six-wheel switching locomotive from the Baldwin Locomotive Works.

The Pennsylvania Equipment Company, Philadelphia, Pa., is in the market for two mogul locomotives and two heavy 10-wheel locomotives.

The St. Louis Terminal Railroad Association, St. Louis, Mo., has ordered 15 switching locomotives from the American Locomotive Company.

Hayden Machinery & Supply Company, New York, has ordered four 4-wheel switching locomotives from the Baldwin Locomotive Works.

The Ann Arbor has ordered three consolidation locomotives from the American Locomotive Company. These locomotives will be equipped with superheaters and will have 25 in. x 30 in. cylinders, 57 in. driving wheels, and in working order will weigh 231,000 lb.

The Green Bay & Western has ordered one mogul locomotive and one 6-wheel switching locomotive from the American Locomotive Company. The mogul locomotive will have 19 in. x 26 in. cylinders, 56 in. driving wheels, and in working order will weigh 136,000 lb. The switching locomotive will have 19 in. x 26 in. cylinders, 50 in. driving wheels, and in working order will weigh 126,000 lb.

The Kanawha & Michigan has ordered 10 consolidation locomotives and 2 eight-coupled, double-end locomotives from the American Locomotive Company. The consolidation locomotives will have 25 in. x 30 in. cylinders, 57 in. driving wheels, and in working order will weigh 138,000 lb. These locomotives will be equipped with superheaters. The eight-coupled, double-end locomotives will have 19 in. x 26 in. cylinders, 49 in. driving wheels, and in working order will weigh 229,000 lb.

CAR BUILDING.

The Boston & Maine is in the market for one scale car.

The Rutland is in the market for 500 forty-ton box cars.

The Grand Trunk is in the market for 36 sleeping cars and dining cars.

The Detroit & Mackinac has ordered 200 box cars from the American Car & Foundry Company.

The Georgia, Florida & Alabama has ordered 100 cars from the Central Locomotive & Car Works.

The New England Coal & Coke Company, Boston, Mass., is in the market for 500 fifty-ton coke cars.

The Wabash has ordered 12 combination passenger and baggage cars, eight chair cars, and four coaches.

The Aliquippa & Southern is in the market for sixty 100-ton gondola cars, and seventy-five 55-ton hopper cars.

The Cincinnati, New Orleans & Texas Pacific, is having 100 cars rebuilt as automobile cars by the Lenoir Car Company.

The Great Northern is said to have ordered 500 automobile cars from the Haskell & Barker Car Company. This item has not been confirmed.

The Harriman Lines are said to have prepared specifications for about 9,000 freight cars of various types. This item has not been confirmed.

The Algoma Central & Hudson Bay has ordered 70 Otis composite general service cars from the Hart-Otis Car Company. These cars will be built by the Canadian Car & Foundry Company.

O'Brien, Fowler & McDougall Brothers, Ottawa, Ont., have ordered 20 Hart convertible ballast cars from the Hart-Otis Car Company. These cars will be built by the Canadian Car & Foundry Company.

The Pennsylvania Equipment Company, Philadelphia, Pa., is in the market for one business car, two or three combination passenger and baggage cars, 10 coaches, five caboose cars, and from 15 to 20 steel dump cars, of from 40- to 50-tons capacity.

The Illinois Central has ordered 10 coaches, 10 compartment coaches and 20 combination coach and smoking cars, 26 baggage cars, ten 60-ft. and seven 70-ft. mail compartment cars, and 9 passenger and baggage cars from the American Car & Foundry Company, four cafe-coaches, one observation car, three parlor cars and 10 chair cars from the Pullman Company.

The Chicago, Milwaukee & Puget Sound, as mentioned in the *Railway Age Gazette* of March 15, has ordered 500 steel underframe automobile cars to be built at the Milwaukee shops of the Chicago, Milwaukee & St. Paul. These cars will have a capacity of 80,000 lbs. The inside measurements will be 50 ft. ⅛ in. long, 9 ft. wide and 10 ft. 6¾ in. high. The overall measurements will be 50 ft. 10 13/16 in. long, 10 ft. ¼ in. wide and 15 ft. 4⅞ in. high. Some of the special equipment will be as follows:

Bolsters—Bettendorf.	Couplers—Major.
Trucks—Bettendorf.	Doors—Security.
Brakes—Westinghouse.	Roofs—Hutchins.
Brakebeams—Ajax.	Wheels—Cast iron.
Brasses—Hewitt.	Draft Gear—Miner friction.

The Chicago, Milwaukee & St. Paul is in the market for 55 all-steel passenger cars, including coaches, cafe cars, cafe observation cars, sleeping cars and dining cars. This company, as mentioned in the *Railway Age Gazette* of March 1, has ordered 2,000 steel underframe box cars to be built at its Milwaukee shops. The specifications for the first 1,000 include a capacity of 80,000 lbs., and inside measurements, 41 ft. ½ in. long, 8 ft. 6⅜ in. wide and 8 ft. 8½ in. high. The overall measurements will be, 42 ft. 1⅝ in. long, 9 ft. 3⅝ in. wide, and 14 ft. 8 in. high. The specifications for the second 1,000 have not been decided upon. Some of the special equipment will be as follows:

Bolsters—Bettendorf.	Doors—Security.
Brakes—Westinghouse.	Draft Gear—Miner friction.
Brakebeams—Ajax.	Roofs—Chicago.
Brasses—Hewitt.	Trucks—Bettendorf.
Couplers—Major.	

IRON AND STEEL.

The Norfolk Southern has ordered 2,000 tons of mayori steel rails from the Maryland Steel Company.

The International & Great Northern has ordered 12,000 tons of rails from the Tennessee Coal, Iron & Railroad Company.

The Atlantic Coast Line has ordered 1,900 box cars from the Mount Vernon Car & Manufacturing Company, and 100 flat cars from the Standard Steel Car Company.

General Conditions in Steel.—There has been but little change in the steel industry during the past week. The Steel Corporation is operating at about 90 per cent. of its capacity and is booking new business at the rate of 30,000 tons a day. In March, the Steel Corporation established a new high record for production for one month. The Steel Corporation has on its books about 5,000,000 tons of business which was secured at the extreme low prices, so it is believed that it will be well into August before the corporation will really be able to benefit from the higher prices.

SIGNALING.

New Installations of Block Signals, Interlocking, Telephones for Train Despatching, Etc.

The Wabash plans to put up within the next three months 800 miles of telephone lines for use in train despatching.

The Chicago & Eastern Illinois, following a conference with the state railroad commission of Indiana, has decided to install automatic block signals from Atherton to Terre Haute, 10 miles, and from Terre Haute to Spring Hill, five miles.

Supply Trade News.

The Laconia Car Company, Boston, Mass., has moved its general offices from 141 Milk street to 60 Congress street.

R. L. Langtim has been appointed mechanical superintendent of the Western Railway Equipment Company, St. Louis, Mo., with office in that city.

The McKeen Motor Car Company, Omaha, Neb., has received an order from the Jamestown, Chautauqua & Lake Erie for one 55 ft., 200 h. p. gasolene motor car.

The Transue & Williams Company, Alliance, Ohio, manufacturer of drop forgings, has let contracts for a 400 ft. x 60 ft. building and a 275 ft. x 60 ft. building. These buildings will be of fireproof construction.

The Orenstein-Arthur Koppel Company, Pittsburgh, Pa., has completed the extension to its plant at Koppel, Pa., and is now, on a larger scale, making, selling and renting its steel underframe, contractors', square-box, 4-yd. dump cars.

Interests associated with the Nova Scotia Car Works, Halifax, N. S., have organized the Ontario & Western Car Company, Limited, with a capitalization of $5,000,000, and have announced the intention of erecting immediately a modern car-building plant at Port Arthur, Ont., to employ about 1,000 men.

The Ralston Steel Car Company, Columbus, Ohio, is making extensive improvements to its plant by enlarging the buildings and adding new machinery. When these improvements are completed the company will have a capacity of at least 40 cars a day. The improvements were started about March 15 and are expected to be completed about June 15.

The American General Engineering Company, New York, has enlarged its offices and established a railway department which will be operated jointly by George E. Austin, president of the company and John B. Given, in charge of sales. Mr. Given was for several years with C. H. Whall & Company, Boston, Mass., and will in the new department devote a considerable part of his time to the needs of steam railways which are in the early stages of electrification or to those roads contemplating electrification.

The design of the Strauss Bascule Bridge Company, Chicago, has been adopted by the Canadian Pacific for a 108-ft. 8-in. span over the Saskatchewan river near Medicine Hat, Alta., and by the Isthmian Canal Commission for a 106-ft. 2-in. span over the Gatun river at Colon, Panama, for the Panama Railroad. The Strauss company will on April 15 move its general offices from the Ft. Dearborn building to 608-614 Monroe building, 104 South Michigan avenue.

The Coppus Engineering & Equipment Company, Worcester, Mass., has been incorporated in Massachusetts to deal in and make machinery and mechanical appliances, particularly the Coppus turbo blower, a device for increasing the capacity of boilers and chimney drafts, invented by Frans H. C. Coppus, of Worcester. The officers of the company are as follows: President and treasurer, Frans H. C. Coppus; vice-president, Fritz W. Schmidt; directors, Linwood M. Erskine, Frans H. C. Coppus and Fritz W. Schmidt, all of Worcester.

Judge Sanborn, of the United States District court at Milwaukee, on April 6, appointed receivers for the Allis-Chalmers Company, Milwaukee, Wis., on the application of the First National and Wisconsin National banks of Milwaukee, both creditors of the company, and W. W. Nichols, of New York, a bond and stockholder. D. W. Call, president of the company, and Otto H. Falk, president of the Merchants' and Manufacturers' Association, were named as receivers. It is reported that the proceeding is intended to facilitate an early reorganization of the company.

There will be a meeting of the stockholders of the Westinghouse Air Brake Company, Pittsburgh, Pa., in Wilmerding, on April 24, to vote on the question of increasing the stock from $14,000,000 to $20,000,000. If this increase is made a dividend will be declared of 33⅓ per cent., payable in the stock of the company at par, out of the earned surplus of the company, which is now about $7,000,000. The rate of future cash dividends declared on the increased stock will probably be proportionately reduced. The purpose of the proposed increase is to make the amount of stock held by the company's shareholders more nearly represent the company's assets.

The National Tube Company, Pittsburgh, Pa., which recently sold $10,000,000 bonds, as mentioned in the *Railway Age Gazette* of March 29, will increase its capital stock from $9,000,000 to $13,000,000. This $4,000,000 stock will be bought at par by the Federal Steel Company, New York, which is a subsidiary of the United States Steel Corporation, and which now owns all the outstanding stock of the tube company. The proceeds of the sale of the bonds and stock will be used to reimburse the United States Steel Corporation and subsidiary companies of the corporation for money borrowed from them to pay for actual outlays, for additions and extensions to the tube company's plant, and for working capital. When this has been done the National Tube Company will have no floating debt.

The Greenfield Tap & Die Company, Greenfield, Mass., was organized in Boston on April 2 as a holding company. The capital of the company will consist of $1,000,000 preferred stock and $1,000,000 common stock. The company owns two-thirds of the stock of the Wiley & Russell Manufacturing Company, Greenfield, manufacturer of taps and dies, and a controlling interest in the Wells Brothers Company, Greenfield, also manufacturer of taps and dies, and expects soon to own the entire stock issue of the latter company. Charles P. Russell, president and treasurer of the Wiley & Russell company, will retire from active business. The officers of the Greenfield Tap & Die Company will be as follows: President, F. O. Wells, of Greenfield; vice-president, W. M. Pratt, of Greenfield; treasurer, F. H. Payne, of Boston; directors, F. O. Wells; W. M. Pratt; F. H. Payne; J. W. Stevens, of Greenfield; A. C. Dutton, of Springfield; J. H. Drury, of Athol; and W. J. Carlin, of Boston.

John Mather Wallis, assistant to the president of the Safety Car Heating & Lighting Company, New York, since 1909, died of heart disease at his home at East Orange, N. J., April 5. Mr. Wallis was born at New Orleans, La., December 10, 1853. After graduating from the Stevens Institute of Technology in 1876, he entered railway service in the Baltimore, Md., shops of the Northern Central. He was assistant road foreman of engines of the Northern Central and Baltimore & Potomac, November, 1879, to December, 1881; assistant engineer of tests of the Pennsylvania Railroad at Altoona, Pa., December 1, 1881, to June 1, 1882; superintendent of motive power of the Northern Central, June 1, 1882, to June 1, 1883; superintendent of motive power of the Philadelphia, Wilmington & Baltimore, June 1, 1883, to June 1, 1890; superintendent of motive power of the Pennsylvania Railroad division of the Pennsylvania Railroad, June 1, 1890, to October 26, 1896; general superintendent of the Philadelphia & Erie and the Northern Central, October 26, 1896, to January 1, 1899; general superintendent of the Pennsylvania Railroad division of the Pennsylvania Railroad, January 1, 1899, to 1903. In 1903 Mr. Wallis retired from railway service, and in 1909 he went to the Safety Car Heating & Lighting Company as assistant to the president.

The report of the Western Electric Company, Chicago, for the year ended December 31, 1911, shows that the gross sales were $66,211,975. The total income was $66,549,268; manufacturing costs, $62,414,067; and the net earnings, $4,135,201. Comparison of the year 1911 with the preceding year is difficult because the 1910 report included 13 months in order to make the fiscal year correspond with the calendar year. Taking twelve-thirteenths of the 1910 figures as a basis for comparison, which, of course, is inaccurate, the gross sales in 1911 increased $3,096,463 over the preceding year, the total income increased $2,984,460; the manufacturing costs increased $3,851,967, and the net earnings decreased $867,107. In 1911 $980,292 was carried to surplus, a decrease of $574,440 from the previous year. In 1911, nearly 22 per cent. was earned on the common stock. This is more than twice the regular 8 per cent. dividend, plus the usual extra 2 per cent. Gross sales in 1911 were the second largest in the history of the company, being only exceeded in 1906, when they were $69,000,000. The balance sheet shows that the accounts receivable are about $700,000 less than in 1910, which is more than offset by the decrease in accounts payable of about $1,280,000. The company charged off $800,000 to a reserve fund against depreciation of patents, etc.

TRADE PUBLICATIONS.

Tool Steel.—The Tool Steel Gear & Pinion Company, Cincinnati, Ohio, has issued a small illustrated booklet containing service records for gears and pinions in use on a number of electric railways.

Chicago, Burlington & Quincy.—The passenger department of this company has issued an illustrated folder giving fares and information concerning several tours to Colorado and the Yellowstone Park.

Car Roofing.—The Hutchins Car Roofing Company, Detroit, Mich., has issued a new illustrated catalog describing and illustrating both by detail drawings and photographs, its various types of outside metal roofs, inside all-metal roof, and plastic car roofing.

Electric Tools.—The Chicago Pneumatic Tool Company, Chicago, has issued bulletins E 19, E 20, E 21 and E 23, describing its Universal electric drill for direct or alternating current, a new line of electric drills for heavy duty, the Duntley electric track drill, and air-cooled direct current drills.

Building Materials.—The American Sheet & Tin Plate Company, Pittsburgh, Pa., has published a booklet entitled Better Buildings, giving information on the uses of formed metal roofing and siding materials. These products are fully described and illustrated and the methods of their application are outlined.

Thermostats.—The Railway Utility Company, Chicago, has issued an illustrated folder devoted to a description of the Utility electric thermostat for regulating the temperature of rooms, also an illustrated booklet on the regulation of temperature in railway cars, describing the method by which the thermostat is used for automatically maintaining a uniform temperature. The device is operated by the making and breaking of an electrical circuit through the expansion and contraction of a column of mercury.

Pneumatic Tools.—The Independent Pneumatic Tool Company, Chicago, has issued a new catalog, No. 9, 118 pages, relating to the Thor pneumatic tools, including air drills; reaming, tapping and wood boring machines; grinders, riveters and chipping, calking and beading hammers. It also includes pneumatic staybolt drivers, hoists, motors and tube expanders. All these are illustrated by excellent drawings of the complete tools and general views showing their application in building and repairing locomotives and cars. There are complete catalogs of repair parts which are each illustrated and numbered. The Corliss valve motion used in the drills and one-piece riveting hammers, and the valve mechanism in chipping and calking hammers are claimed to be the latest and most scientific improvements in air tools. Since the last catalog was published a number of improvements have been made in these tools, the most important of which is the adoption of roller bearings and a one-piece connecting rod in all drills. The tabular specifications for Thor air tools include, in addition to general dimensions, the weight, the amount of air in cubic feet per minute, speed and capacity.

The Cuban Central Railway proposes to construct a railway from Fernandez to Placetas, provided the government will grant a subvention of $19,200 per mile. The company estimates the construction and equipment of the railway at $48 per mile. The proposed railway would pass through Villa de Trinidad and would penetrate a rich agricultural and stock-raising country.

The proposed Northern Railway, Cuba, will run from Caibarien, via Mentas, to Moron, passing through a rich agricultural, stock-raising, and mining country. The construction company has petitioned the Cuban congress for a subvention of $9,600 per mile, and if this subvention is granted or a satisfactory arrangement with the interested parties effected, the work of building the railway will be commenced within a very short time.

Construction work on the Pacific Railway, Colombia, which starts at Buenaventura and has a length of 105 miles, has been completed to kilometer 140, and the working force at present employed upon the line, including laborers, engineers, experts, and other persons, numbers about 1,600 men. The rails are laid to within 19 miles of Cali, and the road is rapidly approaching that city. It is estimated that the entire line, which is being constructed with English capital, will be completed in 1913.

Railway Construction.

New Incorporations, Surveys, Etc.

Canadian Pacific.—Plans are now under way for the electrification of the section of this line known as the Rossland subdivision of the British Columbia division, between Castlegar Junction, B. C., and Rossland, 29 miles. J. G. Sullivan, chief engineer, Western lines, Winnipeg, Man.

According to press reports, this company will construct a large yard at East Kildona, adjoining Winnipeg, Man. The new yard is to be two and one-half miles long and one-half mile wide, and it is to have 100 miles of track. J. G. Sullivan, chief engineer, Winnipeg.

Cedar Rapids & Iowa City.—An officer writes that this company will let contracts in April to build an extension from the Cedar river at Cedar Rapids, Iowa, southeast via Bertram, to Mount Vernon, about 25 miles. The work involves handling about 20,000 cu. yds. a mile. There will be a steel bridge 75 ft. long, another 225 ft, long, and a third 300 ft. long. J. D. Wardle, chief engineer, Cedar Rapids.

Crossett, Monticello & Northern.—An officer writes regarding the reports that this company will build a line from Cremer Junction, Ark., via Fountain Hill, to Crossett, that the company was organized to operate about 43 miles, of which more than half will be in operation within the next 60 days. The plans also call for a number of extensions. A. Trieschmann, Crossett, may be addressed.

Durham & South Carolina.—An officer writes that the company expects to begin track laying in May on the extension from Bonsal, N. C., southast to Rawles, about 12½ miles, and expects to have the work finished this coming summer. R. A. Honeycutt, chief engineer, Durham. (December 1, p. 1148.)

Estacado & Gulf.—This company will be in the market soon for cross ties, bridges, and for 56 or 60-lb. rails to complete four miles of unfinished work into Roby, Tex. The company would also like to hear from a construction company that will take receiver's certificates, or bonds, for pay. Contracts for extensions are to be let in the near future. M. J. Healy, president, Roby.

Grand Trunk Pacific.—An officer is quoted as saying that about 6,000 men will be put to work this coming summer to complete the grading work started last year on the Prairie section, and that about 610 miles of track will be laid on the following lines: Regina south, 155 miles; Alberta coal branch, 20 miles; Regina-Moose Jaw, 100 miles; Tofield-Calgary, 90 miles; Prince Albert, 20 miles; Battleford, 50 miles; Cut Knife, 50 miles; Biggar-Calgary, 100 miles, and Brandon, 25 miles. On the western section 105 stations were built in 1911, and about the same number will be built during 1912. Charters for additional branch lines have recently been granted, and surveys will be made for these lines this spring. On the eastern section, which is being built by the National Transcontinental, there remains only 58 miles of grading to be carried out and 247 miles of track to be laid to complete the line from Superior Junction, Ont., now known as Graham, east to Cochrane, 524 miles. From Cochrane east to the Quebec boundary the main line has been graded and track has been laid on 72 miles. B. B. Kelliher, chief engineer, Winnipeg.

Gulf, Texas & Western.—An officer writes that the company is not planning to build an extension to Lubbock, Tex. Surveyors are now at work locating the line from Jacksboro, south to Mineral Wells, about 30 miles. J. J. Jermyn, president, Scranton, Pa.

Kettle Valley.—An officer writes that the company plans to build from Coldwater Junction, B. C., on the line south of Merritt, southwest to Hope on the Fraser river, about 50 miles. The route follows the Coldwater river to its source, thence to the Coquihalla river and along that river to Hope. The company expects to build about 12 miles this year, and to finish all the work in 1913. There is to be a bridge to cost about $750,000, over the Fraser river at Hope, which will be finished by about the time the line is completed to Hope. A. McCulloch, chief engineer, Penticton, B. C. (March 29, p. 780.)

Manitoba Northern.—A bill has been presented to the legislature of Manitoba, calling for the construction of a line from Winnipeg, Man., north through Kildona, St. Paul, St. Andrews, Gimli, Bifrost and Sturgeon Bay, to Grand Rapids, thence north and east to Hudson Bay, with branch lines to other points in the province. The company has a capital of $1,000,000, and the headquarters are at Winnipeg. C. W. N. Kennedy, C. Vokes, Winnipeg, A. C. Clare, Parkdale, and B. S. Benson, Selkirk, are incorporators.

Missouri, Oklahoma & Gulf.—An officer writes that contracts for all the work to be carried out on new lines have been let to the Fidelity Construction Company, Kansas City, Mo., of which J. W. Hoffman is president. This work includes the northern line from Wagoner, Okla., to Joplin, Mo., and to Pittsburg, Kan. The distance from Wagoner to Pittsburg is 127 miles. The Fidelity Construction Company has sublet about 70 per cent. of the grading work, and are letting contracts for the rest of the grading work. They are now at work on the removal of about 300,000 cu. yds. of heavy rock work, and will lay about 40 miles of track with their own forces from Wagoner to Spavinaw creek. McCabe & Steen has the contract for track laying, bridging and fencing for the rest of the line, also for a section of the line to Oklahoma City, which is not being carried out by the Fidelity Construction Company. The work is being started all along the line and track laying will be begun about June 1 at both Fairland and at Wagoner. It is expected that the line will be in operation by November, 1912. J. J. Harrison, chief engineer, Muskogee, Okla. (April 5, p. 824.)

See Wagoner, Okla., under Railway Structures.

Northern Pacific.—Announcement has been made that double tracking work and increased terminal facilities on lines in the state of Washington will be carried out during the next two years. The line between Seattle, Wash., and the Canadian boundary is to be straightened and the grades and curves reduced. Double tracking work is now being carried out in the Cascade mountains, and new storage yards are being constructed at Auburn, at Pasco, at Centralia, and at Spokane. W. L. Darling, chief engineer, St. Paul, Minn.

Port Huron & Northern.—An officer writes that this company plans to build during 1912 from Port Huron, Mich., north via Lakeport, Lexington, Croswell and other places to Sandusky, about 40 miles. There will be three steel bridges. The company will use gasolene motor cars for operating the line. William E. Bolles, treasurer, 502 Wayne Bank building, Detroit.

San Antonio & Northern.—Under this name a line is to be built, it is said, from Comfort, Tex., north to Brownwood, or Brady, on the Frisco, it will be between 100 and 125 miles long. It is understood that the Frisco interests are back of this project.

San Benito & Rio Grande Valley.—Announcement has been made that this company, which was organized to build from Santa Maria, Tex., west to Mission, 40 miles, is to be extended from Mission, up the valley of the Rio Grande to interior points of Zapata county, about 120 miles. Residents of Rio Grande have granted a bonus of $25,000. It is understood that the project is backed by the Frisco interests. Work is now under way on a line to Brownsville, following the valley of the Rio Grande to a point near the mouth of the river. S. A. Robertson, president, and C. E. Ensminger, chief engineer, San Benito.

Syracuse, Watertown & St. Lawrence River (Electric).—The New York Public Service Commission, Second district, has authorized this company to make a mortgage. The proceeds are to be used to build from a point near Cicero, Onondaga county, N. Y., on the Syracuse & South Bay Electric, north to Brewerton on the shore of Oneida lake, over six miles. The company was incorporated about a year ago with $1,250,000 capital. H. C. Beatty, president, H. D. Brewster, secretary, and W. W. Foster, treasurer, with headquarters at Syracuse.

Valley & Siletz.—This company, which was incorporated recently with $300,000 capital, to build from Falls City, Ore., south to Simpson, about 10 miles, has filed supplementary articles of incorporation in Oregon, to build from Independence, Ore., west to Newport, about 50 miles. The incorporators include F. S. Velcher, H. A. Packard and T. V. Littlefield. (February 9, p. 263.)

Wabash.—An officer writes that contracts have been left for grading embankment for second-track between Oakwood, Mich., and Milan, about 30 miles, also from New Haven, Ind., to Fort Wayne, about five miles, and from Taylorville, Ill., to Litchfield, about 33 miles. A. O. Cunningham, chief engineer, St. Louis.

RAILWAY STRUCTURES.

Harbor Island, Tex.—The Arkansas Harbor Terminal Railway has awarded the contract to J. T. Nelson, San Antonio, Tex., for the building of wharves, docks and warehouses, on Harbor Island, at an estimated cost of $200,000, to be connected with the mainland at Aransas Pass by a terminal railway about 6 miles in length.

Hope, B. C.—See Kettle Valley under Railway Construction.

Independence, Kan.—Work is to be started about July 1 on the construction of a new brick and tile passenger station for the Missouri Pacific to cost about $34,000.

Nashville, Tenn.—An officer of the Louisville & Nashville writes that a contract has been given to the Foster-Creighton-Gould Construction Company, Nashville, Tenn., to build the new bridge over the Cumberland river at Nashville.

New York.—The New York, Westchester & Boston, will ask for bids in about two weeks for putting up a new brick station and office building. The new structure is to be built on Morris Park avenue, between 180th and Adams streets, in the borough of the Bronx, and will cost $150,000.

Norfolk, Va.—According to press reports, the Norfolk Southern will build a new repair shop at West Munden, near South Norfolk. Land has been bought as a site for the new shop. It is expected that the work will be started this coming summer.

Norwood, Ohio.—The Norfolk & Western has awarded a contract for the construction of a freight station to cost about $15,000.

Pelham, Ga.—An officer of the Flint River & Northeastern writes that bids are wanted April 20, by J. L. Hand, president, Pelham, for putting up a brick and stone station to be two stories high, 48 ft. x 200 ft., at Pelham. The cost of the improvements will be $10,000.

Princeton, W. Va.—An officer of the Virginian Railway writes that a contract has been given to the George B. Swift Company, Chicago, for building an erecting shop at Princeton. The Roanoke Bridge Works has the contract for the steel work. The structure is to be 55 ft. high, 127 ft. 6 in. x 270 ft., and will be of steel and brick construction with gravel roof. The improvements will cost $80,000, not including one 20-ton and one 200-ton cranes, which have been orderd from the Niles-Bement-Pond Company. The same contractors have been given a contract to build an extension to the stripping shop, 70 ft. x 100 ft., to cost about $12,000, to be used as a boiler shop. This building is to be of steel and brick construction, and will be equipped with a 30-ton crane. An additional contract has been given to the George B. Swift Company, for the foundations for a transfer table, 75 ft. x 410 ft., to cost about $13,500, and to the Whitney Foundry & Equipment Company for the table.

Wagoner, Okla.—An officer of the Missouri, Oklahoma & Gulf, writes that contracts for bridge work have been given to Hancock & McMahan for the piers at the two crossings of the Grand river, also for those at Spring creek, at Saline creek, at Spavinaw creek, and at the Neosho river, and to the Missouri Valley Bridge Company for the piers over the Canadian river, also the erection of the steel work at the Canadian river, and for all the steel work at the Grand river; to the Fort Pitt Bridge Company for fabricating the truss spans for bridges over the Canadian river, the Neosho river, at Spavinaw creek, and at Spring creek; and to the Wisconsin Bridge Company for building the girders to be used for the two crossings of the Grand river and the smaller girders required for the rest of the work on the extensions being built in Oklahoma, Missouri and Kansas. (See Missouri, Oklahoma & Gulf under Railway Construction.)

The Borsig locomotive works, Berlin, Germany, had turned out 8,000 locomotives by last October. The number reached 7,000 in June, 1909, 6,000 in November, 1906, and 5,000 in May, 1902.

Railway Financial News.

Atlanta, Birmingham & Atlantic.—It is said that plans have been completed to renew for three years at 5 per cent. $6,239,200 collateral trust joint notes of the Atlantic & Birmingham Construction Company and the A. B. & A., when they come due May 1. It is understood that holders of over 90 per cent. of the notes have already agreed to the extension plan. Those noteholders who refuse to agree to the plan will have the collateral behind their notes sold at auction. The plan involves a change in the collateral back of the notes by the exchange of $5,000,000 par of Birmingham Coal Company stock for $4,000,000 stock of the Woodward Iron Company, a consolidation of the Birmingham Coal & Iron Company with the Woodward Coal & Iron Company. This $4,000,000 Woodward stock has been appraised at a figure nearly equaling the par value of the joint notes.

Birmingham & Northwestern.—A bill asking that a receiver be appointed for this company has been filed by J. W. Wright, Jr., a contractor, of Union Springs, Ala., who has been building the road. It is claimed that before the road was completed the construction company and the railway company ceased to furnish material.

Boston & Albany.—This company has petitioned the Massachusetts railway commission for authority to issue $1,000,000 4½ per cent. 25-year bonds to pay for additions and improvements made and to be made.

Canada Southern.—The stockholders of the Michigan Central, to which the Canada Southern is leased, will vote on May 2 on the question of authorizing the guaranty by the Michigan Central of the principal and interest of $40,000,000 50-year consolidated mortgage bonds of the Canada Southern, interest not to exceed 5 per cent. The present issue is to be $22,500,000 to refund $14,000,000 first mortgage 6 per cent. bonds due January 1, 1913; $6,000,000 second mortgage 5 per cent. bonds due March 1, 1913, and to cover the cost of improvements made and to be made to its property. Stockholders will also vote on the question of authorizing the Michigan Central to join in the Canada Southern mortgage to secure the consolidated bonds, so as to cover its leasehold in that property.

Central of Georgia.—A. G. Hackstaff has been elected a director of this company.

Central Pacific.—See Nevada & California.

Chicago, Milwaukee & St. Paul.—The directors have authorized a new issue of $35,000,000 4½ per cent. convertible debenture bonds, which will be offered to stockholders, both preferred and common, at par. These bonds will be convertible into common stock at par at any time between June 1, 1917, and June 1, 1922. The proceeds of this sale will be spent for improvements and equipment of the company's old line.

Copper River & Northwestern.—It is understood that this road has been offered for sale to the United States government at its cost price.

Detroit, Toledo & Ironton.—The sale of this property has again been postponed from April 9 to October.

East Pennsylvania Railroad.—The Philadelphia Stock Exchange has listed $178,600 additional stock, making the total amount listed $2,126,900. The new stock was issued to reimburse the Reading Company for expenditures on double-tracking and other improvements. This road runs from Reading, Pa., to Allentown, 35 miles.

Erie.—This company has sold to J. P. Morgan & Co., New York, $10,000,000 three-year 5 per cent. notes recently authorized. These notes are secured by deposits of $10,000,000 Erie convertible bonds, $1,000,000 general lien bonds, $3,000,000 Erie & Jersey first mortgage 4 per cent. bonds and $2,000,000 Genesee River first mortgage 4 per cent. bonds. The proceeds of the notes will be used to double-track, reduce grade and realign portions of the track on the Western division.

Michigan Central.—See Canada Southern.

Missouri & North Arkansas.—Application will be made for authority to issue receiver's certificates to finance needed improvements and equipments which, it is said, will require $2,000,000.

Nevada & California.—The property of this company, whose entire capital stock has heretofore been owned by the Southern Pacific, was on February 29 deeded to the Central Pacific. The road was mortgaged last year to secure an authorized issue of $15,000,000 first mortgage 6 per cent. bonds of November 1, 1911-1941. The $8,500,000 outstanding bonds, representing advances by the Southern Pacific, have been assumed by the Central Pacific and turned over by that company, along with $1,060,052 cash, the remainder of the purchase price of the property, to the Southern Pacific. The Nevada & California runs from Hazen, Nev., to Mojave, Cal., about 480 miles.

New York Central & Hudson River.—The Public Service Commission, Second district, has granted the application of this company to purchase the stock of the Rome, Watertown & Ogdensburg at $128 a share. The outstanding capital stock of the R. W. & O. is $10,000,000. The commission has also granted the application of the New York Central & Hudson River to buy 11,030 shares of the stock of the Utica & Black River at $180 a share. The total amount of stock outstanding of the Utica & Black River is 22,230 shares, of which the N. Y. C. & H. R. owns all but 11,030 shares. (See *Railway Age Gazette* of March 15.) The N. Y. C. & H. R. is also authorized to issue $16,429,000 4 per cent. 30-year debenture bonds to complete the purchase. These bonds will be offered to the holders of the above mentioned stock at 92 and interest.

Ohio River & Western.—See Pennsylvania Railroad.

Oklahoma Central.—Federal Judge Campbell, at Muskogee, Okla., has ordered this road to be sold to satisfy a mortgage of $10,000,000 on the petition of the Western Trust & Savings Bank of Chicago. This road has been in the hands of a receiver since June, 1908. The road runs from Lehigh, Okla., to Chickasha, 128 miles.

Pennsylvania Railroad.—The purchase of the Ohio River & Western by this company for $3,000,000, which was mentioned in the *Railway Age Gazette* of April 5, will give the Pennsylvania Railroad the rights of 25,000 acres of Pittsburgh No. 8 coal lands. The Ohio River & Western runs from Zanesville, Ohio, to Bellaire, 112 miles.

Pere Marquette.—The Michigan railway commission last week again denied the application of this company for authority to issue $4,000,000 bonds. On April 5 an order was obtained from Judge Angell, in the United States district court, Detroit, Mich., placing the property in the hands of Frank W. Blair, of Detroit; Dudley E. Waters, of Grand Rapids, and Newman Erb, of New York, as receivers. The action was taken on a petition filed by the American Brake Shoe & Foundry Company, Mahwah, N. J., on the claim of $7,164.

Protective committees have been formed by the holders of Pere Marquette 6 per cent. debenture bonds due July 1, 1912; the 4 per cent. refunding bonds due 1955, and the first and second preferred stocks. The Guaranty Trust Company of New York, and the Old Colony Trust Company of Boston, are the depositories for the debenture bonds, and the Bankers Trust Company of New York, and the Old Colony Trust Company for the refunding bonds. The debenture bondholders committee consists of Alexander J. Hemphill, chairman; C. W. Cox, F. R. Hart, E. V. R. Thayer and A. H. Wiggin. The refunding bondholders committee consists of Benjamin Strong, Jr., chairman; Franklin Q. Brown, Francis R. Hart, E. V. R. Thayer, James N. Wallace and Frederick Strauss. The stockholders committee consists of Philip Stockton, chairman; C. W. Cox, John M. Graham, Guy Norman, W. J. Wollman and F. W. Denio.

Southern Pacific.—See Nevada & California.

Wabash-Pittsburgh Terminal.—F. H. Skelding, co-receiver with Henry W. McMaster of this company and the West Side Belt Railroad, has tendered his resignation to the United States district court on the ground of ill health.

ANNUAL REPORT

THE DELAWARE AND HUDSON COMPANY.

GENERAL OFFICE.

New York, N. Y., March 27, 1912.

To the Stockholders of
The Delaware and Hudson Company:

The President and the Board of Managers submit the following statements of the affairs of the Company for the year ended December 31, 1911:

The results from operation of the Coal Mining Department were:

Year.	Coal Mined.	†Revenues.	‡Expenses.	Net Revenue.
1911	7,280,939 tons.	$13,355,014.38	$13,238,304.12	$116,710.26
1910	6,647,659 "	11,806,887.89	11,448,226.16	358,661.73
Increase ...	633,280 tons.	$1,548,126.49	$1,790,077.96	*$241,951.47

†Excluding dividends received from stock of Coal Companies owned.
‡Excluding taxes.
*Decrease.

The results from operation of the Railroad Department were:

Year.	Miles Operated.	Operating Revenues.	*Operating Expenses.	Net Operating Revenues.	Percentage of Expenses to Revenues.
1911	877.60	$21,421,816.83	$12,758,159.48	$8,663,657.35	59.56
1910	843.46	20,431,800.43	12,198,287.13	8,233,513.30	59.70
Increase.	34.14	$990,016.40	$559,872.35	$430,144.05	†.14

*Excluding taxes.
†Decrease.

FINANCIAL.

Capital Stock and Funded Debt.

Additional Capital Stock of The Delaware and Hudson Company to the amount of $1,000 was issued during the year in exchange for $1,000 of

RAILROAD DEPARTMENT.

Revenues and Expenses.

The general distribution of the Operating Revenues and of the Operating Expenses of the Railroad Department was as follows:

	1911.	1910.	Increase.	Decrease.
Revenues:				
From Coal Freight Traffic	$9,847,193.63	$8,724,580.82	$1,122,612.81	
" Merchandise Freight Traffic (including switching)	8,027,412.72	8,052,704.99	.....	$25,292.27
" Passenger Traffic	2,967,128.84	2,910,025.98	57,102.86	
" Express Traffic	235,338.64	209,210.11	26,128.53	
" Transportation of Mails	119,349.88	119,378.67	.....	28.79
" Miscellaneous Sources	225,393.12	415,899.86	.....	190,506.74
Total Operating Revenues	$21,421,816.83	$20,431,800.43	$990,016.40	
Expenses:				
For Maintenance of Way and Structures	$1,488,756.81	$1,557,912.63	.....	$69,155.82
" Maintenance of Equipment	3,060,739.03	2,842,069.20	$218,669.83	
" Traffic Expenses	250,285.23	249,932.55	352.68	
" Transportation Expenses	7,414,071.40	7,066,049.09	348,022.31	
" General Expenses	544,307.01	482,323.66	61,983.35	
Total Expenses	$12,758,159.48	$12,198,287.13	$559,872.35	
Net Revenue from Operation	$8,663,657.35	$8,233,513.30	$430,144.05	
Percentage of Expenses to Revenues	59.56	59.70	.....	.14

GENERAL INCOME ACCOUNT OF THE DELAWARE AND HUDSON COMPANY, YEAR ENDED DECEMBER 31, 1911, IN COMPARISON WITH YEAR ENDED DECEMBER 31, 1910.

	1911.		1910.		Increase.	Decrease.
Coal Mining Department:						
Gross Revenues	$13,355,014.38	.....	$11,806,887.89	.....	$1,548,126.49	
Gross Expenses	13,238,304.12	.....	11,448,226.16	.....	1,790,077.96	
Net Revenues	$116,710.26	.....	$358,661.73	.....	.....	$241,951.47
Taxes Accrued	141,011.00	.....	316,739.00	.....	.....	175,728.00
Operating Income	Loss $24,300.74	.....	$41,922.73	.....	.....	66,223.47
Other Income:						
Dividends and Interest	308,519.84	.....	443,828.27	.....	.....	135,308.43
Gross Income Coal Department	.....	$284,219.10	.....	$485,751.00	.....	201,531.90
Railroad Department:						
Gross Operating Revenues	$21,421,816.83	.....	$20,431,800.43	.....	990,016.40	
Gross Operating Expenses	12,758,159.48	.....	12,198,287.13	.....	559,872.35	
Net Operating Revenues	$8,663,657.35	.....	$8,233,513.30	.....	430,144.05	
Taxes Accrued	562,409.66	.....	497,408.19	.....	65,001.47	
Operating Income	$8,101,247.69	.....	$7,736,105.11	.....	365,142.58	
Other Income:						
Hire of Equipment	$150,503.27	.....	$196,168.29	.....	.....	45,665.02
Outside Operations	Loss 14,435.79	.....	Gain 1,163.08	.....	.....	13,598.87
Dividends and Interest	1,167,020.41	.....	1,274,018.61	.....	.....	106,998.20
Miscellaneous Items	69,908.94	.....	79,455.76	.....	.....	9,546.82
Total Other Income	$1,374,996.83	.....	$1,550,805.74	.....	.....	175,808.91
Gross Income Railroad Department	.....	9,476,244.52	.....	9,286,910.85	189,333.67	
Deductions from Income:						
Rentals	$2,022,925.80	.....	$2,045,083.70	.....	.....	22,157.90
Interest on 1st and Refunding Mortgage Bonds (1943)	1,087,159.98	.....	828,160.00	.....	258,999.98	
Interest on 1st Mtge. Bonds (1917)	350,000.00	.....	350,000.00			
Interest on Debenture Bonds (1916)	558,926.22	.....	559,001.11	.....	.....	74.89
Interest on 1st Lien Equipment Bonds (1922)	436,454.88	.....	443,621.25	.....	.....	7,166.37
Interest on Debenture Bonds (1914)	20,000.00	.....	28,000.00	.....	.....	8,000.00
Interest on Divisional Bonds	75,000.00	.....	75,000.00			
General Interest and Discount	35,199.70	.....	191,672.42	.....	.....	156,472.72
Total Deductions	.....	4,585,666.58	.....	4,520,538.48	65,128.10	
Net Income Railroad Department	.....	$4,890,577.94	.....	$4,766,372.37	124,205.57	
General:						
Miscellaneous Income:						
Dividends and Interest on Securities Owned	$11,296.00	.....	$56.00	.....	11,240.00	
Rentals, Real Estate	21,069.98	.....	31,454.05	.....	.....	10,384.07
General Interest and Discount	39,280.44	.....	46,555.62	.....	.....	7,275.18
Total Income	$71,646.42	.....	$78,065.67	.....	.....	6,419.25
Taxes Accrued	8,762.59	.....	.....	.....	8,762.59	
Net Income General	.....	62,883.83	.....	78,065.67	.....	15,181.84
Net Income Carried to General Profit and Loss	.....	$5,237,680.87	.....	$5,330,189.04	.....	92,508.17
		12.32% on		12.54% on		
Percentage to Capital Stock	.....	$42,503,000.00	.....	$42,502,000.00		

The Delaware and Hudson Company's Debenture Bonds of 1916, and for $1,000 of the Albany and Susquehanna Railroad Company's First Mortgage Three and One-Half Per Cent. Bonds of 1946.

The amount of Debentures of 1916 shows a reduction of $1,000, one bond having been exchanged for Capital Stock of The Delaware and Hudson Company.

The outstanding Debentures of 1914 were reduced $200,000, the bonds maturing January 1, 1911, having been paid off and cancelled.

The amount of First Lien Equipment Bonds of 1922, outstanding December 31, 1911, was $9,698,000, bonds aggregating $9,000 having been retired during the year through the operation of the Sinking Fund established in connection with their issue.

The 1910 annual report stated the purposes for which the Company contemplated an issue of $7,000,000 additional First and Refunding Mortgage Gold Bonds of the Company. The Company realized from the sale thereof $6,825,000; and the discount of $175,000 was charged to the General Profit and Loss Account.

Floating Debt.

The Floating Debt of the Company decreased $3,594,320 during the year.

Sinking Funds.

During the year there was paid into the Sinking Fund under the First and Refunding Mortgage the sum of $277,040, being one per cent. of the par value of the First and Refunding Mortgage Gold Bonds outstanding May 1, 1911, making the total paid to date, $619,470. In accordance with the terms of the trust agreement, this money has been expended in additions and betterments to the property coming under the mortgage.

A Summary of the operations of the Sinking Fund under the First Lien Equipment Trust Indenture, from the date of its creation to December 31, 1911, follows:

Receipts:		
Annual payments to Trustees, years 1908, 1909, 1910 and 1911, $650,000 per year	$2,600,000.00	
Interest on cash balances and investments	58,187.74	
Total		$2,658,187.74
Disbursements:		
Forty-seven (47) locomotives acquired	$1,153,985.05	
Three hundred and two (302) D. & H. Co. First Lien Equipment Bonds purchased and retired (including accrued interest)	308,067.38	
Securities and Cash in hands of Trustees	1,196,135.31	
Total		$2,658,187.74

In accordance with ordinance passed May 9, 1899, and amended at annual meeting of stockholders held on May 10, 1910, there was accumulated in the Coal Department Sinking Fund $321,536.21. Of this amount $260,000.00 were appropriated towards the cost of coal lands purchased in the Wyoming Section, and the balance was applied to the advances to The Schuylkill Coal & Iron Co. and the Shanferoke Coal Co. for the acquisition of anthracite coal lands in Schuylkill County, Pa.

Dividends.

On December 27, 1911, a dividend for the year 1912, upon the outstanding $42,503,000 of Capital Stock of the Company, at the rate of nine (9) per cent. upon the par value thereof, and amounting in the aggregate to $3,825,270, was declared out of the earnings for the current and preceding years payable as follows:

Two and one-quarter (2¼) per cent. upon the Capital Stock, in favor only of the stockholders of record upon February 26, 1912, and payable upon March 20, 1912.

Two and one-quarter (2¼) per cent. upon the Capital Stock, in favor only of the stockholders of record upon May 28, 1912, and payable upon June 20, 1912.

Two and one-quarter (2¼) per cent. upon the Capital Stock, in favor only of the stockholders of record upon August 28, 1912, and payable upon September 20, 1912.

Two and one-quarter (2¼) per cent. upon the Capital Stock, in favor only of the stockholders of record upon November 27, 1912, and payable upon December 20, 1912.

GENERAL REMARKS.

Coal Department Operations.

There were mined 7,280,939 tons of anthracite coal out of a total of 69,954,299 tons produced in the region, including product of washeries.

Increase in the mining of this Company was 633,280 tons and the increase in production of the entire region was 5,048,513 tons.

During the year, construction was commenced on a new colliery at Archbald, Pa., at an estimated cost of $300,000, and having a capacity of 1,500 to 1,800 tons daily. This will open up new coal lands, and by abandoning the present White Oak Colliery, having a capacity of 675 tons, and passing the coal through the new colliery, more economical operation will be secured.

At Legitt's Creek Colliery three large air compressors were added to the compressor plant which supplies power for the compressed air locomotives in the mines of the Legitt's Creek, Marvine, Dickson and Von Storch operations; the haulage underground being mainly by the use of air locomotives. Twelve additional air locomotives were also placed in the Legitt's Creek Mine.

Many wooden barns in the mines have been replaced by concrete barns, and considerable progress has been made in the installation of protective apparatus for fires, to safeguard the Company's property and the lives of its employes.

During the year the pumping, transportation and ventilating facilities were increased to correspond with the [illegible] and development work continued, in order to maintain the output.

The Coal Department Expenses, Outside Construction and Betterments amounting to $823,654.71, as against $766,673.73 in 1910, as follows:

New Engines, New Boilers, Boiler Houses and Fittings	$222,175.54
Sinking Shafts and Shaft Improvement	[illegible]
Rope Haulage, Slopes, Planes and Rope	[illegible]
Electric Plants and Machinery	37,104.70
New Pumps and New Pump Rooms	82,243.65
Tracks, Locomotives and Compressors	40,279.99
Improvements to Breakers and Washeries	14,401.75
Tunnels and New Openings	87,868.95
Conveyors	[illegible]
Other New Buildings	2,818.56
Concrete Barns, etc.	65,672.49
Miscellaneous	34,008.17
Total	[illegible]

Railroad Department Operations.

The total increase in Revenue from operation was $990,016.40.

The Revenue from Coal Freight traffic increased $1,122,612.81, the Revenue from Merchandise traffic decreased $25,292.27, the Revenue from Passenger traffic increased $57,102.86 and the Revenue from miscellaneous traffic decreased $164,407.00.

The total increase in Operating Expenses was $559,872.35. Maintenance of Way and Structures Expenses decreased $69,155.82; Maintenance of Equipment Expenses increased $218,669.83; Traffic Expenses increased $33[illegible]68. Transportation Expenses increased $348,0[illegible]31, and General Expenses increased $61,983.35.

The ratio of Operating Expenses to Operating Revenues shows a decrease [illegible] per cent. under 1910.

There were received during the year the four Mallet Articulated Compound Locomotives, the six Ten-Wheel Locomotives and the one Consolidation Pusher Locomotive which were ordered in 1910, paid for from the funds accumulated under the First Lien and Equipment Trust Indenture.

During the year 1911 a contract was entered into with the American Locomotive Company for the acquisition of three new Mallet Articulated Compound Locomotives and twelve Class E-5 Consolidation Locomotives for delivery in March and April, 1912. Arrangements were also made for the acquisition of five new Standard Steel underframe milk cars, fifteen four (4) wheel caboose cars, and one passenger and baggage gas-electric car. All of this additional equipment will be paid for from the funds accumulated under the First Lien Equipment Trust Indenture.

There is now under way the work of equipping with steel underframes 900 coal cars of 60,000 lbs. capacity, 900 coal cars of 80,000 lbs. capacity and 600 box cars of 60,000 lbs. capacity, at a total estimated cost of $1,088,000. When completed approximately 70 per cent. of the revenue freight car equipment of the Company will be equipped with steel underframes.

The purchase of the Salem Branch, from Greenwich to Salem Junction, N. Y., a distance of 10.20 miles, was completed on May 17, 1911. Work has progressed rapidly on the new shops and terminals at Watervliet, N. Y., the coal storage and transfer facilities at Glenville, N. Y., the new round house and terminal facilities at Carbondale, Pa., and other items referred to in the Annual Report for the year 1910, and which will be paid for from the proceeds of the $7,000,000 First and Refunding Mortgage Bonds. At the close of the year there remained with the Trustee an unexpended balance of $596,678.43, all of which will be expended during the year 1912.

Work is in progress on the construction of a mile of double track north, from the end of Binghamton yard. This work will be completed early in 1912 at a cost of about $30,000 and will avoid delays heretofore experienced in the movement of freight trains in and out of the yard.

In order to properly take care of the heavier power in use on the Susquehanna Division, there has been constructed a new 10-stall engine house together with complete equipment of ash-pits, coaling plant and water supply system at Binghamton, N. Y. This work cost about $75,000.

In order to permit one locomotive to haul between Nineveh and Oneonta, the same tonnage that is handled over the heavy grades out of Carbondale and Binghamton with the aid of a pusher, the grades between Nineveh and Oneonta, a distance of 37 miles, have been reduced from 36 feet per mile to 15.8 feet per mile. This will permit of an increase of 250 tons in the tonnage hauled by one locomotive. The work is practically completed, and the total cost will be about $160,000.

The total expenditures during the year on Account of Additions and Betterments to the Company's Railroad (and including expenditures on account of the items mentioned above) amounted to $2,681,387.55, details of which are as follows:

Road:		
Right of Way and Station Grounds	$115,476.41	
Widening Cuts and Fills	296.82	
Protection of Banks and Drainage	211.31	
Grade Reductions and Changes of Line	292.67	
Bridges, Trestles and Culverts	12,172.48	
Increased Weight of Rail	45,827.77	
Improved Frogs and Switches	134.83	
Track Fastenings and Appurtenances	11,158.43	
Additional Main Tracks	13,848.79	
Sidings and Spur Tracks	143,168.16	
Terminal Yards	1,894.78	
Fencing Right of Way	1,317.33	
Elimination of Grade Crossings	54,831.42	
Interlocking Apparatus	9,748.26	
Block and Other Signal Apparatus	15,303.97	
Telegraph and Telephone Lines	2,728.81	
Station Buildings and Fixtures	63,069.50	
Roadway Machinery and Tools	37,582.59	
Shops, Engine Houses and Turntables	622,917.72	
Shop Machinery and Tools	107,138.94	
Water and Fuel Stations	[illegible]	
Other Additions and Betterments	3,416.08	
Work in Progress	1,074,518.02	
Total for Year		$2,366,052.54
Equipment:		
Steam Locomotives	[illegible]	
Passenger Train Cars	[illegible]	
Freight Train Cars	(Cr.)73,755.29	
Work Equipment	[illegible]	
Miscellaneous	[illegible]	
Total for Year		315,335.01
Grand Total 1911		[illegible]

The Safety Appliance Act, passed by Congress in the year 1911, requires the installation of side ladders on cars that now have only end ladders and the installation of end ladders on cars that now have only side ladders, the replacement of old appliances with new appliances of approved design, such as putting on new brake wheels to take the place of those now in service that are not of the required diameter, and the replacement of welded brake staffs with those made of a solid piece with upset ends, and the re-arrangement and relocation of existing devices, such as couplers and [illegible] on cars. It will require an expenditure on behalf of the Company of approximately $315,000, which will be begun in 1912 and extend over a period of about five years.

The form of General Balance Sheet as promulgated by the Interstate Commerce Commission, and effective July 1, 1909, requires the carriers to include in the "Cost of Road and Equipment," any and all Additions and Betterments to the property made subsequent to June 30, 1907, and paid for through Income Account or charged to Profit and Loss Account, and that a corresponding amount be shown on the liability side of the Balance Sheet under "Appropriated Surplus—Additions to Property since June 30, 1907, through Income"; the said date being the time when Section 20 of

the Act to Regulate Commerce extending the jurisdiction of the Commission over the accounts of the carriers became effective. The Board of Managers of your Company have readjusted the accounts so that the transactions prior to June 30, 1907, will conform to the practice subsequent to that date as prescribed by the Interstate Commerce Commission and have transferred to the cost of property $6,751,837.48, being the amount of current or accumulated income expended for Additions and Betterments prior to June 30, 1907, and a like sum has been credited to "Appropriated Surplus—Additions to Property Prior to June 30, 1907, through Income"; and the said account for the first time appears in the Balance Sheet of December 31, 1911, which forms a part of this Report.

These expenditures, aggregating $6,751,837.48, extended over a period of years and were incurred on account of the following items:

Right of Way and Station Grounds	$75,189.28
Widening Cuts and Fills	2,069.58
Grade Reductions and Changes of Line	111,084.72
Tunnel Improvements	6,255.31
Bridges, Trestles and Culverts	582,222.83
Increased Weight of Rail	635,035.49
Track Fastenings and Appurtenances	11,507.54
Ballast	131,919.82
Additional Main Tracks	142,993.67
Sidings and Spur Tracks	906,491.38
Terminal Yards	466,232.36
Fencing Right of Way	13,259.05
Under and Over Grade Crossings	111,240.63
Elimination of Grade Crossing	226,313.27
Interlocking Block and Other Signal Apparatus	745,156.37
Telegraph and Telephone Lines	25,599.50
Station Buildings and Fixtures	232,270.31
Shops, Engine Houses and Turntables	672,762.65
Shop Machinery and Tools	146,888.15
Water and Fuel Stations	228,294.87
Grain Elevators and Storage Warehouses	1,570.22
Dock and Wharf Property	3,691.32
Electric Light and Power Plants	6,651.76
Other Additions and Betterments	10,944.40
Cost of Road	1,256,193.00
	$6,751,837.48

Allied Steam Railways.

The Greenwich and Johnsonville Railway Company conveyed to The Delaware and Hudson Company, on May 17, 1911, its Salem Branch. Its Operating Revenues show a decrease of $5,807.93 for the year 1911, its Operating Expenses an increase of $5,797.20, making a decrease in Net Operating Revenues of $11,605.13. The Net Income for the year was $17,067.82, an increase of $1,778.64 over 1910. The increase in Operating Expenses is largely due to unusual expenditures for maintenance of equipment during the year.

The Quebec, Montreal and Southern Railway Company shows an increase in Operating Revenues for the year 1911 of $73,435.58 as compared with the previous year. The Operating Expenses show an increase of $108,632.73, making a decrease in Net Operating Revenues of $35,197.15. The Net Income, independent of interest charges due The Delaware and Hudson Company, amounted to $136,819.80, a decrease of $41,736.94. The decrease in Net Operating Revenues is due largely to the extraordinary charges for maintenance during the year, there being an increase of $14,878.81 in Ties and $22,198.54 in Bridges, Trestles and Culverts. The Frappier Bridge burned twice in the month of August making necessary heavy temporary repairs. Maintenance of Equipment shows an increase of $14,519.35 due to repairs and renewals of steam locomotives and freight train cars.

The Napierville Junction Railway Company shows an increase in Operating Revenues for the year 1911 of $1,386.28 as compared with the previous year. The Operating Expenses show an increase of $5,821.45, making a decrease in Net Operating Revenues of $4,435.17. The Net Income amounted to $21,910.09, or 3.65 per cent. on the Capital Stock outstanding. The decrease in Net Operating Revenues is due largely to an increase in amount paid for injuries to persons.

Allied Electric Railways.

Work is in progress on the United Traction Co., placing under ground the feeder wires extending from Broadway and Beaver Street to Madison Avenue and South Pearl Street in the City of Albany, and for a short distance in Rensselaer, N. Y. Three submarine cables were laid under the Hudson River connecting the feeder lines in Albany and Rensselaer. The total cost will be about $84,000. During the year there were rebuilt forty-one (41) passenger cars, increasing the capacity approximately ten per cent.; and there were placed in service twelve (12) new "Pay Enter" cars.

The Hudson Valley Railway Company and the Schenectady Railway Company have entered into an arrangement for the operation of through cars between Albany and Glens Falls via Schenectady, effective October 16, 1911. During the winter, cars in through service leave terminals every two hours, while in the summer they will probably be operated on an hourly schedule. This improvement in the service should result in an increase in the passenger traffic.

Increases in Net Operating Revenues were as follows: United Traction Company, $19,344.31; Hudson Valley Railway Company, $38,020.88; Schenectady Railway Company, $25,327.35; Troy and New England Railway Company, $1,538.87; Plattsburgh Traction Company, $2,786.29.

Dividends of 4 per cent. for the year 1911 were declared on the Capital Stock of the United Traction Company; 6 per cent. on that of the Schenectady Railway Company; 4½ per cent. on that of the Troy & New England Railway Company, and 6 per cent. on that of the Plattsburgh Traction Company.

Allied Boat Lines.

The new steamer "Horicon," capacity 1,800 passengers, made its first trip on Lake George on August 20, 1911. This steamer will perform the principal trip on Lake George, handling the through passengers traveling via Lake George and Lake Champlain.

The Motor Boat "Pampero," capacity 30 passengers, experienced a successful season in 1911. A second Motor Boat, capacity 75 passengers, has been contracted for, which will operate upon the upper end of Lake George.

Hotels.

The Hotel Champlain, located at Bluff Point on Lake Champlain and The Fort William Henry Hotel, located at Lake George, N. Y. on Lake George, were completed in the spring of 1911 and opened for business on June 17, 1911. The new buildings are of fireproof material, steam heated throughout, amply supplied with bathrooms, and of the most modern construction.

Both hotels experienced a successful summer season. Hotel Champlain closed on October 1, 1911. The Fort William Henry Hotel is being operated throughout the year.

Litigation.

There has been no final determination of the litigated matters mentioned in this Company's last Annual Report; the suits then referred to are still pending.

By order of the Board of Managers,

L. F. LOREE,
President

BALANCE SHEET.

Assets.

Items.	1911.	1910.	Increase.	Decrease.
Unmined Coal Owned and Controlled	$16,667,697.24	$16,828,496.90	.....	$160,799.66
Advances on Unmined Coal	361,129.44	598,125.72	.....	236,996.01
Real Estate	4,846,119.40	4,730,624.12	$115,495.28	
Road and Equipment—The D. & H. Co.	58,858,151.17	48,838,359.29	10,019,791.88	
Road and Equipment Controlled Lines	6,308,139.71	6,287,591.80	20,547.91	
Floating Equipment	[illegible]	9,880.00	.....	9,849.00
Coal Department Equipment, Cars, Motors, Mules, Horses, etc.	1,263,292.17	1,179,953.82	83,338.35	
Coal Handling and Storage Plants	95,877.17	270,309.76	.....	174,432.59
Stocks and Bonds	27,014,189.46	23,967,687.46	3,046,502.00	
Cash	1,921,783.81	1,782,372.47	139,411.34	
Fire Insurance Fund	336,723.56	316,762.85	19,960.71	
Cash and Securities in Special Reserve Funds	9,393.00	.....	9,393.00	
Equipment Trust Fund	1,196,135.31	817,566.69	378,568.62	
Special Deposits	596,678.43	.....	596,678.43	
Supplies on Hand	2,885,682.49	2,395,259.85	490,422.64	
Bills and Accounts Receivable	2,790,468.68	5,778,401.10	.....	2,987,932.42
Advances for Construction and Acquisition of New Lines	2,047,128.62	2,020,799.58	26,329.04	
Total	[illegible]	[illegible]	$11,376,429.52	

Deficit Appropriated Surplus—Additions to Property prior to June 30, 1907 through Income and Betterments.

Liabilities.

Items	1911.	1910.	Increase.	Decrease.
Capital Stock	$42,503,000.00	$42,502,000.00	$1,000.00	
Funded Debt:				
Delaware & Hudson Canal Co. Mortgage Gold Bonds, 1943, 4%	2,700,000			
Mortgage Gold Bonds, 1943, 4%	700,000			
The Adirondack R'y. Co. 1st Mtge. Bonds, 1942, 4½%	1,000,000			
Schenectady & Duanesburgh R. R. 1st Mtge. Bonds, 1924, 6%	500,000			
Debentures, 1916, 4%	13,973,000			
1st Lien Equipment Bonds, 1922, 4½%	9,698,000			
Debentures, 1914, 4%	500,000			
	58,375,000.00	51,585,000.00	6,790,000.00	
Loans Payable	900,000.00	4,494,320.00	.....	$3,594,320.00
Interest, Dividends, etc., Accrued	1,371,743.86	1,066,359.17	305,384.69	
Interest, Dividends and Bonds due and not yet collected	210,796.31	196,848.10	13,948.21	
Taxes Accrued	109,644.57	310,242.66	.....	200,598.09
Special Reserve Funds Accounts	9,393.00	.....	9,393.00	
Audited Vouchers and Pay Rolls	2,773,500.85	3,088,773.52	.....	315,272.67
Other Accounts Payable	707,107.15	181,807.92	525,299.23	
Appropriated Surplus—Additions to Property prior to June 30, 1907 through Income	6,751,837.48	.....	6,751,837.48	
Total Liabilities	$113,711,031.37	$103,425,351.37	$10,286,671.85	
General Profit and Loss, being excess of Assets over Liabilities	13,486,597.71	12,396,840.04	1,089,757.67	
Total	$127,197,629.08	$115,822,191.41	$11,376,429.52	

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WE give in our News Section the programme adopted by the joint committee on arrangements for entertainment in connection with the conventions of the Master Mechanics' and Master Car Builders' Associations at Atlantic City, June 12-19, inclusive. Secretary Taylor's letter, in which the programme is sent out, suggests two thoughts. The first is that the mechanical associations are trying to get not only their conventions, but also everything connected with them, on a basis where they cannot be justly criticised. In the past the Railway Supply Manufacturers' Association has borne all the expense of the entertainment features. This year the expense is divided between the railway associations and the supply men's association. Furthermore, the entertainment programme has been radically changed so that there will be less formal and more informal features. There has been complaint that the formal entertainment features of past years have caused a rivalry in expenditure for dress, etc., which to many was both excessively costly and embarrassing. It is expected that the greater informality of this year's entertainment features will make them immune from this criticism. The second thought that a glance over the programme suggests is that the impression which many seem to have been given that there is to be almost no entertainment, and that therefore the conventions and the events associated with them will be of interest only to those who care exclusively for the technical reports and discussions and the exhibit of railway supplies, is quite wrong. There will be plenty of opportunity for inexpensive amusement for all those who in past years have attended the conventions; and those having in charge the arrangements hope and expect that the attendance not only of members of the associations, but also of their families, will be as large as usual. It is also hoped that there will be an increased attendance of operating executive officers.

MR. DELANO has seldom been an alarmist or a pessimist regarding railway conditions. Some of his utterances regarding railway regulation—notably in reference to the decisions in the rate advance cases—have been much more optimistic than the views held and expressed by most railway officers. His natural mental attitude is fair and judicial. When a man of his optimistic and judicial temperament speaks in alarming and pessimistic tones, as he did at Detroit on Wednesday night, railway men, shippers, regulating authorities and the public may well take note of his remarks. Doubtless, it will be said that the opinions he voiced were largely shaped by the fact that he has recently, after years of struggle to avert that result, seen his own road go into bankruptcy. But Mr. Delano is not the kind of a man who judges of the entire railway situation by the condition of one road. Those who investigate will reach the same conclusion that he has, namely, that the conditions on some roads are bad, and that on many other roads they certainly are far from good. The railways have been beset with increases in operating expenses due to increases in wages and the cost of materials and to various forms of government regulation; by increases in the rate of interest; by a winter almost unprecedented for extreme cold and heavy snows; and many of them, finally, by extensive floods. The cold, snow and floods, which have increased operating expenses, have also reduced traffic and earnings. The margin between gross earnings and operating expenses on a railway may be large in absolute amount, and yet so small in proportion that a comparatively small reduction in earnings or increase in expenses will create a dire situation. The various conditions mentioned have put a good many roads where if there should be a large and sudden increase in their business they would be incapable of handling it. The commercial associations of Michigan, whom Mr. Delano addressed, have raised the question, What is the matter with the railways? One of the main things the matter with them is that the people of the United States have been using a minimum of horse sense and a maximum of power in regulating them; and one remedy for the situation is the exercise for the public for some time to come of less authority and more sense.

The Railway Tax Men's Association, which was organized at Chicago recently as a national association of tax officials and attorneys, should be able to perform a useful function not only in the interest of the railways but for the benefit of the public at large. That it has a wide field in which to work is indicated merely by a consideration of the multiplicity of intricate problems continually arising in the relations between railways and the various local taxing bodies with which they have to deal. The most important of these problems, as outlined in the stated objects of the association, are to devise accurate and adequate methods of determining the assessable value of railway property and its relation to the assessment of general property, and in the case of the interstate roads to devise methods for apportioning the ascertained value of railway property to the different states and lesser taxing districts. It will be the endeavor of the association to assist as much as possible in the formulation of "a uniform, simple, efficient and equitable system of railway taxation throughout the country." The complications in which taxation problems are involved are greatly increased by varying laws and ideas which govern the state and local taxing authorities. There are now 24 state tax commissions, all of which vary more or less in their requirements as to the forms in which railways shall make their returns for taxation purposes and the principles which shall govern; and where specific requirements are not made by the authorities different railways are likely to present returns to the same bodies based on entirely different principles. Wide variations are also common in the relations accepted in different localities between the values of railway and other property. All of these considerations demand more uniformity in the method of making returns, and the increasing demand for physical valuation of railways for rate-making as well as for taxation purposes opens a wide field in which the concentrated experience and knowledge of the railway tax experts can be of the greatest aid in the effort to formulate definite and equitable principles to be applied.

DID you ever watch a passing freight train or walk by a long string of box cars and notice the doors? If you have not, take the first opportunity of so doing and it will possibly be a revelation to you. Box cars are expected to be used interchangeably for transporting merchandise, and yet if flour or grain or any other material, which will be injured by moisture and cinders, is to be carried, it is either necessary to make a special investigation to secure cars with doors and roofs which are cinder and water proof, or else it is necessary to take chances on the goods being delivered before a storm is encountered. Box car doors will be found in every imaginable condition, a few of them being well secured and fastened, while by far the greater proportion are either warped or hang too loose, or are otherwise defective, some of them so much so that they will be found patched up in various ways, or may even be nailed to the car. The lack of proper bracing and the use of inferior fixtures may not be noticeable when the car is first turned out of the shop and goes into service, but it soon becomes apparent and the increased maintenance cost quickly eats up the difference between the cost of a good door and that of a poor one. An article on another page of this issue calls attention to some of the more important defects in box car doors and suggests remedies. A similar article last week directed attention to the ease with which many box car doors may be opened, allowing the car to be robbed without breaking the seal or leaving evidence of its having been entered. The loss due to defective doors, both because of damage to and loss of freight and the increased cost of maintenance, is so large that radical steps should be taken to overcome it. So important is this question of building box cars to properly protect the lading and thus eliminate freight claims chargeable to defective equipment that the American Railway Association could well afford to adopt the suggestion in our issue of April 12 to the effect that a bureau be inaugurated under the direction of that association to see that all new cars are properly designed and constructed from the standpoint of loss and damage to freight, and that provision also be made for adapting the cars now in service to give more satisfactory service in this respect.

THE QUALITY OF AIR BRAKE HOSE.

THE use of inferior air brake hose on freight cars in interchange is responsible for numerous expensive delays and accidents, and, though a matter of long standing, the improvements in the M. C. B. specifications for this material and its inspection have not made conditions better, but they appear to be growing worse. The increasing use of rubber goods has caused such a demand for pure rubber that its price has advanced so as to encourage the extensive use of substitutes, adulterants and fillers; and experience with these has resulted in the production of a material for hose which will meet specifications for strength and elasticity when new, but which depreciates rapidly and has a short life.

The statistics relating to the average life of hose are complicated by the fact that gradual depreciation, due to the quality of the rubber and the way it is made, is not entirely separated from the failure of hose due to mechanical abuse. Investigations made several years ago demonstrated that 65 to 70 per cent. of the hose failed from damage due to mechanical abrasion or blows, and 95 per cent. of this occurs at the nipple end. Part of this destruction originates from external causes, and a large part—probably 15 per cent.—from internal puncture when mounting. About 10 per cent. of the air brake hose is injured by pulling apart when trains separate with couplers closed.

More recent investigations have shown that the bursting at the nipple end is often due to the puncture of the inner tube while forcing on the nipple with machines operated by air cylinders. The hose is forced on under heavy pressure when it is not in line with the axis of the nipple, and the edge of the latter cuts into the rubber tube and weakens the hose at that point. When in service under pressure the air escapes through the puncture and is gradually forced through the different layers until the outer tube is ruptured locally and it is no longer good for service. The machine might be improved so that the hose would be kept in true alinement when the fixture is mounted, but some of the larger lines are now having the work done by hand, so as to avoid this wholesale abuse of the hose.

The mechanical injury to air brake hose is so extensive that when added to the fact that inferior rubber is used in its manufacture, the average age of the hose is only about 8 months, while the normal life of good hose should be two or three years. This short life is so largely due to influences entirely apart from the quality of the rubber that railways have concluded that it is extravagant to pay a high price for high grade hose when it will be destroyed by carelessness or abuse of some kind within the year, and that a less expensive grade would render an equal service. This reasoning carried to the extreme has resulted in less rigid inspection, a gradual deterioration in the quality of the hose and the purchase by a few railways of hose which does not meet M. C. B. specifications when new, in order to save the slight amount due to the lower price.

The inferior quality of air brake hose is due to cheap methods of manufacture as well as to low grade stock in the rubber tubes. The M. C. B. specifications require the tube to be hand made and composed of three calendars of rubber, and very little air brake hose is made in this way. The object of the three layers is to cover up small holes in one sheet by a solid layer in the other sheets and thus produce a tube which will not leak. This method of making the tube by the use of three calendars adds to the expense, and few inspectors go to the trouble of ascertaining whether they are getting hose made in that way. The simplest remedy would be to inspect general methods of manufacture at the factory where a uniform and continuous practice can be depended on. It has been suggested that the middle layer of the three calendars be colored so that when a

section of it is cut through the three layers will be indicated by the different colors.

As such a large proportion of air brake hose is made with a single layer tube, and much of it is sound enough to resist train pipe pressure, it is a question whether the three calendars should be retained in the specifications, as it only tends to lower the respect due to other requirements if any of them, even the more essential, are habitually disregarded. But a very small proportion of the leakage in the train pipe system is due to the porosity of the hose, and the majority of it comes from leaky gaskets and pipe joints.

The quality of the rubber in the tube, whether it is solid or calendared, is the most important factor and the most difficult to guard so as to insure a proper grade and one which will not rapidly deteriorate after inspection. The price-lists of natural gums or rubbers include grades which sell as low as 25 cents per lb., while the best Para rubber is now quoted at $1.25 per lb.; so there is a wide range in the grades of the natural rubber from which to select the stock for air brake hose. The low-priced rubbers are so full of bark, earth and other impurities as to be unsuitable for a rubber exposed to pressure. Some of the by-products from the glucose factories were formerly used as fillers, but this is a dead and weak material which must affect the strength of the product if used in any large proportion. Reclaimed stock from old hose, tires, gum shoes, etc., is of varying quality, depending on the grade of rubber originally used, and this finds its way into the mixture for air brake hose.

During the past five or six years guayule has been used extensively in rubber manufacture, and its use has done more to depreciate the quality of rubber used for air brake hose than that of any other substance. It is made from a weed which grows in Colorado and Mexico, and has many of the qualities of natural rubber, but it fails more particularly in durability. When first introduced it sold as low as 25 cents per lb., but the demand for it has been so great that the price has advanced to 80 and 90 cents. Hose made with guayule as the principal ingredient will meet the M. C. B. specifications as to strength and elasticity when new, but it rapidly depreciates, and in a month or two, and after a short exposure to the weather, it is rendered unfit for air brake purposes. To guard against the use of this inferior hose it ought to be possible to arrange for a test of seasoned stock, or to exact some guaranty of strength in samples tested after several months' exposure.

The current price of air brake hose made from good rubber and which will meet the principal requirements of the M. C. B. specifications is 36 to 40 cents per foot, while inferior grades sell at 30 cents or less per foot, and bear labels stamped M. C. B. standard with the name of the maker. The use of this label has done much to discourage the use of hose made of inferior rubber, and it should be possible to segregate the makers who are willing to risk the use of their names on such material. The difficulties of inspection of air brake hose in interchange render it hard to condemn the inferior hose unless it exhibits a mechanical defect, but the names of makers who are known to make poor hose and sell it at a low price should render their product open to suspicion and I encourage special inspection whenever possible. Federal inspection of safety appliances could be extended to air brake hose and require it to be strictly M. C. B. standard, and it may be necessary for the railways which use good hose, and are willing to pay the standard price for it, to request the protection of federal authority against those lines which deliberately buy inferior hose and place it on their neighbor's cars.

Good hose is not always secured where the standard price is paid, on account of poor inspection. Some railways pay inspectors low wages and it is not surprising if the quality of the work proves poor in proportion. A testing department under the direction of the railway mechanical associations has been frequently suggested, and the testing of air brake hose for the railways would furnish profitable occupation for a portion of the time of such a bureau. If the railways do not take proper measures for securing good hose on all cars in interchange they will invite a further extension of the sort of public regulation which they so much deprecate.

THE MUCKRAKER, THE RAILWAYS AND THE COURTS.

EVERYBODY'S MAGAZINE recently has been publishing a series of articles by C. P. Connolly entitled, "Big Business and the Bench." Thus far the articles have been devoted mainly to an attempt to show that the railway's influence, or even dictate, the election and appointment of many judges, and that these judges, either from motives of gratitude to their corporate creators, or because of improper influence brought to bear on them during their incumbency, have been systematically interpreting the various constitutions and statutes, so as to give to the roads an unfair advantage over other litigants, and especially over their employees who bring suits against them for personal injuries or on other grounds. Mr. Connolly attempts to support his generalization that "there is a railway sidetrack leading into the courtroom and that a locomotive blocks the door of justice," by citing a rather scanty number of specific examples of decisions in railway cases and generally embroidering them with the sort of cheap attempt at breezy comment which has made the Charles Edward Russell-Lincoln Steffens school of writers more or less famous; they all write according to the same formula. The scientist, no less than the logician, has taught us for long the danger of basing sweeping generalizations on one or a few facts, however indisputable the facts may be. When the facts are not only few, but also disputable, the dangers of this kind of ratiocination are much more serious. Yet Mr. Connolly, like the entire modern school of muckrakers, takes a few incidents, the facts as to every one of which are open to controversy, and erects on them a gigantic inverted pyramid of innuendo regarding the railways and the courts. He implies that the courts generally are now subject to corrupt influence by the railways, and yet he does not give a single instance indicating the existence of the state of affairs he describes. All of the examples he uses to substantiate his statements as to contemporary conditions are taken from the history of past years.

One of them is a case in which, as is alleged, M. J. Gordon, an attorney for the Great Northern in Washington, and a former chief justice of the supreme court of that state, prepared an opinion in a proceeding against the Great Northern and got the supreme court to substitute it for an opinion already prepared, the effect being, as is asserted, to change the law as previously laid down by the court. The *Railway Age Gazette* knows nothing about the facts in this case, but it is notable that, although cited as "typical" of what is going on now, the alleged incident happened three years ago, and was cited as an example of judicial corruption in *Collier's Weekly* on July 10, 1909; and by Carl S. Vrooman in his book "American Railway Problems," published in 1910. Does not the very fact that all the muckrakers use this one case as typical show that it is not so at all, but exceptional? For it is not true, as the old adage says, that the exception proves the rule, but quite the contrary.

Very much more light is thrown on the nature of the "typical" instances cited by Mr. Connolly by consideration of the case of *Oglesby v. Missouri Pacific Railroad Company*, which he describes at length to show alleged conditions in Missouri. Mr. Oglesby, who is now chairman of the Missouri railway commission, was formerly a brakeman on the Missouri Pacific, and lost a leg in an accident in 1892. He sued the road and got a judgment in the lower court for $15,000. The case was appealed and the Missouri supreme court remanded it for a new trial. Again in the lower court Oglesby was successful; again the case was appealed, and this time the court completely reversed the decision. This was during the period when Col. "Bill" Phelps was the lobbyist of the Missouri Pacific at the state capital and the champion pass distributor of the railways of Missouri. In

these capacities he was a very influential man in Missouri politics. Mr. Connolly implies that it was the corrupt influence of the railways, and particularly of the Missouri Pacific, that prevented Oglesby from finally winning his case. The *Railway Age Gazette* happens, for reasons that need not be stated, to be peculiarly familiar with the conditions existing in Missouri at that time; and it is true that the railways then ran and corrupted the politics of the state. But the implication of Mr. Connolly that the supreme court was dominated, and was known by those then living in Missouri to be dominated, by the railways, is absolutely false; and every man who was then in close touch with public affairs in that state knows it.

Law Notes, a legal publication, in its issue for April, 1912, presented facts which indicate why no such impression obtained, and why it should not have obtained, and which show that at the time of the decision in the Oglesby case the Missouri supreme court was very far from being unduly influenced by the railways. If it had been dominated by them we should doubtless find that at the same terms at which the Oglesby case was heard decision in other railway cases would also have reflected the situation. What are the facts? *Law Notes* states them as follows:

"In the first place, the decision of the supreme court in the case of *Oglesby* v. *Missouri Pacific R. Co.*, a personal injury case, reported on the first appeal in 150 Mo., 137, and on the second appeal in 177 Mo., 272, is attacked by the writer. For the present purpose we will assume, without admitting, that the court erred on both appeals in reversing a judgment for the plaintiff, and will content ourselves with noting the fact that on the first appeal the court stood as follows: Three judges for affirmance, two for reversal and remanding for a new trial, and two for reversal without remanding, the latter two eventually agreeing to a reversal and remanding in order to dispose of the case. On the second appeal the court stood four for reversal and three for affirmance. Now, what do the volumes of the reports in which the Oglesby case is reported show? In 150 Mo. there are reported, exclusive of the Oglesby case, four cases against railway companies, which were disposed of as follows: *Corby* v. *Chicago, Rock Island & Pacific R. Co.*, p. 457—suit to enjoin defendant from building side track—judgment for plaintiff affirmed, all concurring; *St. Louis* v. *Kansas City R. Co.*, p. 453—condemnation proceedings—assessment of defendant's damages at $5,500 affirmed on railway's appeal, all concurring; *Sweeney* v. *Kansas City Cable R. Co.*, p. 385—action for negligence—judgment for $5,000 affirmed, all concurring; *Hogan et al* v. *Citizens' R. Co.*, p. 36—action for negligence—verdict of jury for defendant and judgment entered thereon affirmed, all concurring. In 177 Mo. there are reported, exclusive of the Oglesby case, three cases against railway companies, which were disposed of as follows: *Holden* v. *Missouri R. Co.*, p. 456—action for negligence—order granting plaintiff a new trial, after peremptory instruction to find for defendant, affirmed, all concurring; *Western Sash & Door Co.* v. *Chicago, Rock Island & Pacific R. Co.*, p. 641—action for damages to freight—judgment for plaintiff affirmed, all concurring; *McGrew* v. *Missouri Pacific R. Co.*, p. 533—action to recover penalty for making illegal freight charges—judgment sustaining demurrer to petition reversed, all concurring. So, out of seven cases reported in the two volumes of Missouri reports in which the Oglesby case is reported, in all but one case the railway company was unsuccessful on appeal to the supreme court which the writer in *Everybody's* denounces as a railway court, and in the case in which the railway was successful *a jury* had determined that the plaintiff was not entitled to recover."

Does it seem probable that out of eight decisions at these two terms the court would have rendered six against the railways and only two for them if it had been railway ridden, as is charged? This muckraker has done just what those of his class habitually do; viz., picked from a record of eight cases the particular one that seemed to serve his purpose, built his generalizations upon it and utterly ignored seven other cases, all of which were equally in point.

In the same article Mr. Connolly, to show the depths to which the supreme court of Missouri had sunk, cited an instance where one of its judges incorporated in a "decision" a budget of statistics prepared by railway agents which had not been introduced as evidence in the case. The case referred to was *Murphy* v. *Wabash Railroad Company*, 228 Mo., 109; and *Law Notes* shows that the matter to which Mr. Connolly refers appeared, not in the majority opinion, but in the *dissenting opinion* of Woodson, J., and that the *decision* of the court was against the railway and affirmed a judgment for $8,000 in favor of the representatives of a person who had been killed in a railway accident. In other words, Mr. Connolly deliberately or ignorantly falsified the record and conveyed to his readers a wholly erroneous impression.

The foregoing facts regarding some of the cases cited to show the corruption of the courts indicate how much reliance may be placed on Mr. Connolly's statements. It will be noted, in passing, that the Oglesby case and the case of *Murphy* v. *Wabash Railroad Company* are, like the Gordon case, ancient and not modern instances. The Oglesby case was finally decided nine years ago; there has since been a political revolution in Missouri, several changes in the personnel of the court, and important legislation and decisions modifying the law of master and servant.

By a coincidence, at the very time that Mr. Connolly's series of articles, which are intended to show that the railways own the courts, are coming out, there has been published a document which demonstrates that in personal injury cases the roads have usually found it more to their interest to make voluntary settlements than to trust to the determination of judges and juries. We refer to the report of the federal Employer's Liability and Workmen's Compensation Commission. In an appendix to this report are given statistics regarding the experience of railways having one-half the mileage in the United States, and the tables presented show that on the average the judgments for damages that have been rendered against the roads have been twice as large as the amounts that they have had to pay when they have made voluntary settlements. If the railways had owned the courts it seems hardly probable that they would have used them for the purpose of mulcting themselves in twice as great damages as they have had to pay when they made voluntary settlements.

The *Railway Age Gazette* a short time ago analyzed the statement about railway accidents made by Charles Edward Russell in an article entitled "Speed," published in the *Hampton-Columbian Magazine*. (See *Railway Age Gazette*, December 8, 1911, page 1166; January 19, 1912, page 80; March 8, 1912, page 412.) We showed in an article and two editorials commenting on Mr. Russell's article that there was hardly a statement in it that was true, and that even most of those statements that were true were made in such a way as to convey a false impression. The facts that we have cited in regard to Mr. Connolly's article show that this writer and his articles are in the same class with Mr. Russell and his articles. *Everybody's Magazine* touts him as an "able lawyer," "a trained investigator," etc. The muckraking magazines have a happy way of handing to persons nobody else ever before heard of a volume of the decisions of the supreme court, a volume of the statistics of the Interstate Commerce Commission, a formula for writing a la Charles Edward Russell, and thereby apotheosizing them into "great lawyers" and "eminent authorities on railway affairs." But when it comes to dealing with facts, these "great authorities" are all alike. Every incident, however exceptional, which can be tortured into such shape as to make a narrative that will reflect on the honor, the honesty, the capability of any public official, judge or business man, who does not believe that everything in American business and political life is rotten and should be extirpated, is meat for their sausage mills.

The lobbyists used to make their money—and some of them do yet—by one class of corrupt methods. The muckrakers are making their money by another class of equally vicious methods—methods which are adapted and seem intended to mislead and corrupt public opinion. In a famous speech when he was in the heyday of his political prosperity, "Bill" Phelps said: "Stone and I both suck eggs, but he hides the shells." (The Stone referred to is William J. Stone, now a United States senator from Missouri.) The muckrakers, unlike "Bill" Phelps, embalm all their calumnies of American business and political institutions with the hypocritical pretense that they are written solely to further the public good. But decent and intelligent people long since learned how to gage such pretensions when associated with such methods; and the time will come when the American public generally will see that those two thirty-third degree hypocrites, Tartuffe and Pecksniff, were sincere and simple-minded gentlemen compared with the members of the modern fraternity of muckrakers.

NEW BOOKS.

Comparative Analysis of Railroad Reports for the year ended June 30, 1911. New York: H. H. Copeland & Son. A series of ten charts, covering 150 roads. Price, $100 for the set; single charts, $15 each.

Moody's Analysis of Railroad Investments. Edition of 1912. By John Moody. New York: Analyses Publishing Co., 35 Nassau street. Cloth, 11½ in. x 9 in.; 636 pages. Price, $12.

These two statistical works, while very different in method of preparation and scope, are both important aids to bankers or railway statisticians in helping to give some real meaning to the mass of figures which railways are required to report to the Interstate Commerce Commission. Neither of these works can be properly made use of without a considerable knowledge of railway statistics and statistical methods. The Moody book, however, contains an introductory essay on the art of selecting investments, and gives in a quite readable and fairly simple form the principles which should guide an investor in making a study of different classes of railway issues. To make the fullest use of the book one should thoroughly understand all the principles laid down in the introduction; but for the benefit of private investors, a great majority of whom do not understand these principles thoroughly enough to depend on their own ability to analyze the security and probable future value of railway bonds and stocks, Mr. Moody in the body of the work rates each issue according to his own judgment and his analysis of its position. All of the important railway companies are given a chapter of analysis in which are shown the physical factors; a ten year average comparison with four properties in similar territory; earnings and their distribution per mile of road, and a comparison with similar properties; capitalization; the bond record and bond rating; and the stock record and stock rating. The banker or statistician can therefore draw his own conclusions from the figures which are given, while the layman can get the benefit of Mr. Moody's conclusions from the analysis. Bonds are rated from A a a down to D and E. For instance, Lake Shore & Michigan Southern first and refunding 4s are rated A, and Wabash first and extension 4s are rated D. Stocks are rated in the same way, although, of course, a stock which is rated A a a is not comparable as an investment to a bond that is rated A a a, because of the difference in the class of investment. The rating, either of bonds or stocks, of course, is arbitrary, but from what one can judge by a superficial examination, Mr. Moody has used good judgment in his rating and has apparently been conservative.

The Copeland analysis of railway reports is not intended at all for the use of the layman who is unfamiliar with railway statistics. Its appeal is to the banker dealing in railway securities and to the higher railway officer. Each chart is divided into two parts, and each chart gives a showing for 15 roads, so that in all 150 roads are comprised in the series. The first part of each chart makes an analysis of income, of expenditures and of profit and loss for each one of the 15 roads for the fiscal year ended June 30, 1911. No comparison is given with the figures for the previous year. The total figures for the road are given; they are then averaged per mile of road operated, per revenue train mile, and per ton and per passenger mile; and expenditures are shown on a unit basis wherever this is possible. The figures are taken from the returns made by the roads to the Interstate Commerce Commission, and so far as can be judged, the analysis is carefully and intelligently made. Things are compared which can be compared, and in general no attempt is made to compare things which are not comparable. The different roads that are put on one chart are selected, so far as is possible, so as to form groups, all of the roads in which, have somewhat similar operating conditions, so that unit statistics as between these roads may roughly be compared. These charts have been published for two or three years, but the present edition is a considerably more complete and comprehensive analysis than has ever been made before. This year for the first time the figures for all the roads in each group are combined and the averages are shown for the group. These averages, if careful allowances are made, are of considerable value in checking up the showing made by any one road in a group. The second section of the chart gives an analysis of the balance sheet, capital changes and physical statistics of the 15 roads. There are a number of figures shown which are not reported in the annual reports which the roads make to their stockholders, and this additional information makes the charts of great value to bankers and to railway officers.

Both of these works are well worth a place in any comprehensive statistical library.

Railway Transportation. By Charles Lee Raper, Professor of Economics, Dean of the Graduate School, University of North Carolina. George P. Putnam's Sons, New York. Cloth, 5⅜ in. x 8½ in. 320 pages. Price, $1.50 net.

Prof. Raper's book will at once take rank among standard authorities. The author states that it is based on President A. T. Hadley's "Railroad Transportation," and the views expressed on railway economics are very similar to those of Dr. Hadley. But, as a matter of fact, they are no more similar to Dr. Hadley's than they are to those of that large majority of authorities on railway economics, who agree with Dr. Hadley, and Prof. Raper's volume is anything but a slavish imitation of that of Dr. Hadley.

The first chapter is devoted to a brief history and general discussion of modern transportation. Succeeding chapters take up in turn railway transportation in Great Britain, France, Italy, Germany and the United States; and contains a large amount of up-to-date and valuable statistics and information regarding the organization, rates, service, financial return, etc., of the railways of these countries. The last chapter is a study of "State Operation of Railways," based especially on the experience of Belgium, Austria, Italy, France and Germany.

Prof. Raper has a clear, direct, interesting style, and his work indicates very extensive reading. He has also traveled over the railway systems of various countries, studying them at first hand. He is an advocate of the use of the principles of both cost of service and value of service in rate making. He thinks state railways tend to put too much stress on cost of service, and in consequence make their rates inelastic and ill-adapted to the development of commerce and industry; and he cites numerous examples of such rate-making on government-owned lines. On the other hand, he thinks the cost of the service should in future play a greater part in rate making in the United States than it has in the past.

His investigations lead him to the conclusion that few, if any, state railways, have been successful financially, but those of Germany, and that the financial success of the German roads is exaggerated. He finds, also that ordinarily the service under state operation is not apt to be as good under private ownership, naturally, he comes to the conclusion that public ownership is not the most expedient policy, especially in a democratic country, such as the United States, where the votes of railway employees would be such a large factor in elections, and where we have not developed the sort of government that makes possible such success as the Germans have attained in the operation of their railways.

Prof. Raper's book has one marked shortcoming that should be mentioned. He constantly uses the operating ratios of the railways of different countries as almost conclusive tests of the efficiency with which they are managed. The operating ratio of a railway depends on the amount of its rates and on many other factors that have no relation to the efficiency with which it is managed, and should not therefore be used as Prof. Raper uses it, except very guardedly and with many qualifications. But in spite of some such shortcomings the book is a really admirable one, and should be in the library of every person who is interested in its subject.

The congress of Chile has recently passed a law, which has been approved by the president, creating the new department of railways in charge of the ministry of industry and public works.

Letters to the Editor.

"THE RAILWAY LABOR SITUATION," AS VIEWED BY AN EMPLOYEE.

Salt Lake City, Utah, March 22, 1912.

To the Editor of the Railway Age Gazette:

Your series of papers on "The Railway Labor Situation" is well timed, and outlines a situation that calls for serious consideration; just how serious may be conjectured from the ineffectual efforts of some of the most clever railway men in this country towards its solution. Its very complexity is its danger.

Referring to your fourth paper on this subject (*Railway Age Gazette,* March 15, page 464) we find in the letter from Mr. Delano, a practical suggestion for arbitration and yet not acceptable if it should be compulsory. The late Mr. Melcher, in his comment on Mr. Delano's letter, went right to the point, and still left the problem unsolved. The "case" simply goes back to the court of public opinion, and the verdict, "influenced" by the public convenience to the harm of one side or the other, is still open to contention and bitter resentment. In groping through this problem we are going about in circles, for when the employee returns with further requests we have established no logical methods or precedent, and we again run a gauntlet of strikes and lockouts and other customs peculiar to the dark ages. Where does this lead to? What is the solution?

Speaking for the employees collectively, I may say they only desire a fair consideration, and the observance of their agreements. For the railways we may say the same. Then where is the common ground, the stable rule to compute from?

When the Supreme Court, in the Standard Oil decision, took high ground and announced the "rule of reason," it did not settle the trust problem, but it defined a common point where sensible people may get together and agree to recognize each other's rights, and observe their agreements without detriment to others.

The court compromised and deferred.

I may say, without doubt, the most prolific source of friction and conflict between railway and employee is the violation in spirit, and often in letter, of the wage and working agreement. The monetary loss is as nothing when compared to the demoralizing effect upon the men. Its effect is all bad. Without attempting to excuse an unreasonable employee, there is nothing in my estimation, that will excuse or justify the going behind the agreement, on various pretexts, with a net loss to the men in wages or favorable conditions. All the good effects of the favorable settlement are nullified and only the good influence of some clever official and a "patching up" by the local committee will prevent a second outbreak. Then what becomes of that effort towards friendly relations?

If I am not mistaken as to the trend of present and prospective legislation, our friend, the public, will soon take in hand the solution of our "railway labor situation." The danger of it will not deter the public, so let us hope for the best.

Referring to a suggestion by "D. A. D." for a combination of train and engine service, I am much impressed with its possibilities. If every man on the train, available and in service as fireman or brakeman, conductor or engineman, could change about as the company's convenience might warrant, being subject to call in either service and required to pass a standard examination on train rules, orders, and change of card, machinery, airbrakes and block signal, and with uniform salary and uniform responsibility—except, of course, the student, who comes in as apprentice—nearly always the crew would be "fullfledged." Efficient service would be the word. I wonder do the railways appreciate "D. A. D."? A dreamer and theorist he may be, but he is a constructive thinker, and a daring apostle of progress. At the head of a government department or railways he would revolutionize the business. What an opportunity for him!

Continuing along the lines of the above suggestion by "D. A. D." the arrangement, as outlined, would certainly result in more efficient service. There would be more stability to the men, there being a better understanding, and more interest in the work. These two small branches of the service should really be one, with all of the men available for either train or engine board. The trainman of several years' experience, when he has passed a satisfactory examination on machinery, will make a capable engineman. The two "lines" would finally merge. "D. A. D." has made many clever suggestions. For instance, that for pay of train and enginemen by the hour, with a proviso for a minimum day. This method, properly installed, would simplify many of the vexing wage problems.

I assume your purpose in your editorials on "The Railway Labor Situation" to be a better understanding between company and men. As this would naturally precede any wage agreement. I may safely say, excepting a few individuals, the men are well disposed on wage agreements. They are sometimes unreasonable on interpretations of some particular portions of their agreement, but that is usually an honest difference of opinion, to be adjusted, mutually. The unreasonable employee is in the minority and must be overruled.

In regard to the assertions and views of "Nutlock," in your issue of March 15, I may say, there is no disposition on the part of the employee to find excuse or defense for the careless and negligent workman. Brother Nutlock severely arraigns the Interstate Commerce Commission and a labor journal for their efforts for the correction of a threatening condition in the service. Publicity for the facts seems the natural remedy. Controversy between the railways and the steel trust over rail contents and treatment and a few more rail failures, will result in a government standard. Reasoning along these lines, the publicity of the "gross carelessness" of the workman, so desired by "Nutlock," will inevitably bring that final remedy, the automatic train control appliances, with absolute "block" for front and rear. I think we may all say, "Speed the day." But are the railways prepared for such legislation?

The *Railway Age Gazette* is covering its chosen field in a most thorough and efficient manner, and its efforts toward the solution of the labor problem are further assurance of good faith. May the good work continue.

William J. Tierney,
Secretary, General Committee, Order of Railway Conductors,
San Pedro, Los Angeles & Salt Lake.

The work on the railway across the Brazilian-Uruguayan frontier between the cities of Santa Anna do Livramento in Brazil and Rivera in Uruguay, has been completed. This will allow passengers and freight to be transported from one country to the other without change, as it connects the railway systems of the two republics which are already in operation.

The Paloma to San Marcos railway, Chile, has been completed, and work on the Choapa to Salamanca railway has been temporarily suspended. On the Copiapo to Lagunas railway rails have been laid for a distance of 108 miles, and a complete survey of the Serena to Copiapo railway and the staking of the line for a distance of 186 miles have been made, while the Vallenar to Algarrobal railway, which is to be included in the same railway system, will be completed in the near future.

A serious study has been given to the project of constructing a railway as a prolongation of the system of the Central of Brazil from a point near the station at Pirapora, in the state of Minas Geraes, almost due northward across the interior of Brazil to the city of Para at the mouth of the Amazon river. This will be substantially a trunk line connection between the north and south, making no detour to reach the seaports. These can, however, be joined to the through line by branches, thus placing the seaboard and the interior in close touch with each other and with the capital, Rio de Janeiro. The entire distance in a straight line may be about 1,900 miles, and the new lands to be opened are highly productive, suitable to colonization, and of great future economic value.

WHAT IS THE MATTER WITH THE RAILWAYS?*

National Policy of Country Seems to Be to Reduce Them to Starvation. Criticism of Regulation and Labor Unionism.

BY E. A. DELANO,

President and Receiver, Wabash Railroad.

Business men and prominent manufacturers of Michigan have met together in convention, to ask the question, "What is the matter with the railways?" I am here today, by invitation, to give an answer to this question as I see it.

Most railway men would like to reply that the railways are *all right;* that they neither need your help nor your sympathy; but the fact of the matter is that they are not all right, and that the national policy of this country seems to be to reduce them to starvation. In any starvation process, of course, it is obvious that those with ample resources will survive a good deal longer than those that are poor. This is no less true of railways than of individuals. In this connection it would be amusing, if it were not so sad, to see the frequent references in the public prints, magazines, etc., to the carelessness of railway managers in letting their property run down. It is said, with a great show of wisdom, that the railways should put their property in splendid condition during the summer, repair all their locomotives and cars, so as to be in good condition to go through the winter. Unfortunately, the railway manager with interest charges and a payroll to meet must "cut his garment according to the cloth." Many of them have shown uncommon resourcefulness in getting along under uncommonly difficult conditions, but when all facilities have been strained to the utmost, and on top of that we have a winter like the one just past, a complete collapse ensues, and the demoralization is sometimes so great that the public marvels at the utter lack of foresight on the part of the railway officials.

I do not claim that railway officials are more far-seeing or wiser than the rank and file of men who manage the commercial, mercantile and manufacturing business of the country. I do contend that they average up with the rest. They come from the same general stock, and their education—whether in book-learning or in the school of hard knocks—is equal to that of other men. So far as I know, they work just as hard. It is only fair to assume that they are fully up to the average of intelligence.

No one has to tell a railway man that if he doesn't put his motive power in good condition, he is bound to suffer when bad weather comes, or when he has a rush of business. He knows that perfectly well. The inevitable question with him always is, "Where is the money coming from?" If he doesn't make a good showing in low operating expenses and a safe margin between expenses and earnings, his *credit* suffers and he can't borrow any more money to buy new cars and engines The constant question with every railway manager is how close he can cut his expenses and still not go beyond the danger line of a safe reserve. If last winter had been a normal winter, or, like some of the winters we have had recently, abnormally mild, most of the railways in the country would have come through quite comfortably. It so happened that it was an abnormally bad winter, and, therefore, even roads that were well equipped suffered seriously. Indeed, it is a remarkable thing which most railway men fully appreciate, that the margin is very narrow between close and successful operation on the one hand, and overloaded facilities, with demoralized operation, on the other.

RAILWAY REGULATIONS.

Most thinking men today, whether in railway service or not, are convinced that the regulation of public service corporations, including the railways, is necessary and desirable. The only difference of opinion is as to *how far* this regulation should go. In the last few months the shippers of the country have suffered severely from the failure of the railways to furnish prompt and adequate facilities; and I understand the object of this convention is to consider, in a frank and free discussion, what the causes of that failure have been.

In my humble opinion, the causes—stated in a few words—are these: First, that the railways have been starved by reductions in rates, and by increases in taxes, wages and cost of materials, to a point where the margin between income and outgo has diminished to an alarming extent. Even the strongest and most fortunately located railways of the country have suffered a serious shrinkage in net earnings, and their credit has thereby been impaired, whereas, weaker and less fortunate roads have been pushed to the wall.

The effect of this has been that the railways have done just what any individual or corporation would do: They have had to skimp wherever they could. Like the man who can't afford to buy a new pair of shoes, he manages to make the old pair do the work. If the old pair happens to be pretty thin in the soles, and the winter proves to be very cold, he suffers in consequence.

THE 16-HOUR LAW.

The second and very obvious cause of the trouble has been restrictive laws to which railways have been forced to accede. These are: First, the so-called "16-hour law," under which no engine or trainmen can be kept in service longer than sixteen hours, without rest. Granting, at least for the sake of argument, that the 16-hour law was desirable or even necessary, the effect of it is as follows: The railway divisions usually are adjusted for runs of 125 to 175 miles, the average being not far from 150 miles. Coarse and heavy—that is to say, *drag* freight trains (in contradistinction to merchandise and perishable trains) make runs of this length over single-track roads, allowing for delays in passing tracks, at a speed of from 10 to 12 miles per hour, including detentions. It will thus be seen that under normal conditions the division will be covered in from 15 to 16 hours; but longer than this when the conditions are abnormal or congested.

Without question, this was a long day's work; but under normal conditions, the men who made the run had a long rest at the end of it. When the 16-hour law came into effect the railways were forced to one of two alternatives: Either to change the length of their engine runs, which involved a very large expense, or to run the trains lighter (that is to say, with less tonnage) so that they would make higher speed between division points; and, in a few cases, to cut the divisions in two—a very expensive expedient on account of the rule imposed by engine and trainmen upon the roads that a minimum pay of 100 miles a day shall be paid, even if less than 100 miles *is* made; in other words, the so-called "bonus mileage" rule.

In a severe winter, such as we have gone through, the experience of every railway has been that all expedients have broken down. Engineers and conductors, firemen and brakemen, have, on reaching a side-track or passing track at the end of 16 hours, notified the despatcher—as the law permits them to do—that their 16 hours were up and have deliberately abandoned their trains. I suppose it is safe to say that there isn't a road north of the Ohio river that hasn't had many of its trains thus abandoned and the engines frozen up. The splendid *esprit de corps* which used to exist, where the engine and train crew would keep going, and, like the captain on the bridge of the ocean steamer, bring the train into her "port," is a myth of the past; and, worse than this,

*Address before the Convention of Commercial Associations of the State of Michigan, at Detroit, on April 17.

one of the effects of trades unionism and meddling legislation between the employer and the employee has been that in such severe weather as we have recently had the old and well-tried men have laid off; that is, demanded furloughs, and the railway has had to call on its younger and less experienced men to man its trains. Small wonder that it cost a number of well-conditioned trunk lines in January last more to operate than they received in gross earnings.

THE BOILER INSPECTION LAW.

Another law which was urged by the trades union element in Congress, and which—while undoubtedly well meant by many of the men who voted for it—has had a very disastrous effect, is the so-called "boiler inspection law." Under the terms of this law, the chief inspector at Washington employs an army of inspectors who go over the country and without hesitation condemn locomotives, which, while not in first-class condition, are unquestionably safe to run. As is well known, all boilers are built with a very large factor of safety, and perfection in a locomotive boiler is not to be expected. A modern locomotive boiler has from 1,200 to 1,500 staybolts, between 4 and 5 in. apart, on all sides of the firebox. Under the law, five broken staybolts are sufficient to condemn an engine. This means that a locomotive boiler must be more than 99 per cent. perfect to meet approval; and yet it is safe to say that no high-pressure boiler can be cooled down and reheated again (as it must be for each washing out) without breaking at least this number of staybolts. In my early railway experience in locomotive shops, we used to consider that if there were not more than 5 staybolts in one cluster broken, the engine was safe; and I do not recall the bursting of a boiler due to broken staybolts in the side sheets of an engine. The worst effect of such broken staybolts would be the bulging of the sheet and consequent serious leakage of the engine.

The bursting of a fire tube or flue in an engine is a common thing, and in old days it used to be considered good practice to plug such a flue and to run the engine until the damage could be repaired. Under the rules today, no engine is permitted to run out of a terminal with a burst flue. Thus, without going into further details, it is safe to say that the present law in regard to boiler inspection will require the railways of the country to maintain from 15 to 25 per cent. more power to move the same volume of freight than was formerly necessary, and yet this law became effective at very short notice.

A number of other laws have added very much to the cost of railway operation and maintenance, such, for example, as the safety appliance act, in regard to freight cars, the mail compensation order, the automatic ash pan law, the steel mail car law, the third brakeman law in some states.

ECONOMIC CONDITIONS.

It is, perhaps, unnecessary to dwell on the fact that the cost of living has increased in the last five or ten years and that the railways have felt this very seriously. The principal "food" of the railway is coal, ties, lumber, steel rails, iron, etc. There has been a general advance in the price of practically all articles used by railways, from the low level of '93 to the present day, with the one exception of cement. The advance in the cost of coal and in the cost of ties has been very great in this period. The railways have had nothing to offset this advance in the cost of material and in the cost of doing business, except economy in railway service incident to the increased volume of business and increased efficiency of railway operation—handling of larger train units, etc. But, in spite of all efforts, it has been impossible in the last few years to stem the tide in many cases. Railway freight rates have been substantially stationary for a number of years. Up to 8 or 10 years ago, they moved progressively downward. Perhaps some rates are too high today, and railway men would be inclined to admit this in particular cases; but with the public attitude opposed to the advancing of any rate, no traffic manager or executive officer would dare to lower a rate, even if he thought it would encourage the volume of business and consequent earnings.

Passenger rates in all the states of the Middle West, and north of the Ohio river, have been reduced, generally to a level of 2 cents per mile; and yet the demand of communities for low rates for special occasions is just as great as ever it was. It is almost unnecessary to point out that in the days when 3 cents was the regular fare for ordinary travel, the railways were ready to give half rates, and even lower, for special occasions, to stimulate travel, etc.; but with the maximum fare reduced to 2 cents, it isn't possible to do this.

To add to our other difficulties, railway taxation has advanced steadily upward for a long period of time, and in this respect the state of Michigan has taken the lead and has well-nigh taxed the railways out of existence. It would be a bold man who would project the building of a steam railway in the state of Michigan today, in the light of your very drastic taxation methods. Undoubtedly, you can hold on to what you have got, because a railway isn't like a factory—it can't pull up stakes and go somewhere else. Even though it may be unfortunately located and prove to its owners a liability, rather than an asset, it must go on and on, assessing and reassessing its owners until enough money has been put in the foundation to make a superstructure which will sustain itself.

It is a favorite theme with a certain class of politicians to tell of the fabulous profits of railways. They do not tell of the fortunes that have been lost in railways—of the frequent reorganizations, nor of the wiping out of capital actually invested. Because we are a hopeful nation, and because there is always a fresh crop of investors coming along, there is always new money to be found to refinance an old property or to float a new one; but there has been a marked checking of the enthusiasm in this direction.

Few people, apart from those engaged in finance, comprehend the constant requirement of railways for cash for development work. The needs of this country in normal years are not far from five hundred millions per year. Now, this money must be drawn from the investor—the banker, the trustee, the insurance company and the savings bank—by the issuance of securities, backed by a valid promise of repayment of the principal and a fair rate of interest on the investment. The railway cannot sell securities—that is to say, *borrow money*—without credit, it has no credit unless its operations show a fair profit; it cannot show a fair profit if starved and strangulated by legislation; and who suffers most? The public, whose servants the legislatures and the commissions are. In this endless chain of circumstance, what is the answer?

CONCLUSIONS.

My conclusion is that the only remedy in the situation is cooperation. The railways do not complain of supervision so long as that supervision is intelligent and takes a fair share of the responsibility for its acts. When a man or a body of men negotiate for an interest which they represent, it is their duty to do the best they can for their client; but it is never advisable to press the bargain so far that the service demanded cannot be performed under the conditions of the bargain. There is such a thing as "killing the goose that lays the golden eggs." Railway men sometimes complain (and certainly with some show of justice) that the legislatures and commissions have only one interest, viz., to drive a sharp bargain for the benefit of the public, and thereby acquire merit in the public estimation; but, after all, if the legislatures or commissions take this view, it is a very short-sighted view, because obviously if railway business is unprofitable and continues in that condition for several years, the public interests of the country will suffer, just as the interests of you gentlemen have suffered this winter. You are calling a convention here to find out what the trouble is. You are calling on me for an expression of opinion, and, admittedly, my opinion is an *ex parte* statement of the case; but I have tried to be frank and straightforward with you.

But in the consideration of this question it would be well for the manufacturing and commercial interests to remember

that the idea of government regulation is spreading. No corporation can exist except by reason of charter rights from the government. There is scarcely a corporation but what sustains some public relation, and to which the broad and elastic phrase so often used by the courts, "affected with a public use," applies. From little beginnings we shall soon find a greater and greater disposition to extend the limits of corporate control and supervision. And, while I shudder to think of the multiplication of government bureaus, I think it is the duty of business men to study the problem in its broadest sense and try to work out some method of partnership between public interests and private control, which shall produce the best results for all. In the case of the railways, I think it would be well for the public to see that it is essential that the capital invested in railways should yield a fair return and that unless this condition exists, railways will be starved to death and service will become poorer, instead of better.

Perhaps we shall never instill into the mind of the public this idea of the absolute need of co-operation, unless there is an actual sharing of the profits. If, in lieu of taxation, the public could have a share in the net profits (as is done in Chicago in the case of the street railways), we would come nearer to fair conditions for all and the public would appreciate that they were not only indirectly, but also directly interested in prosperous conditions for the railways. In this way, and perhaps in no other way, will this hostile legislation against railways cease—legislation which with each succeeding year puts upon them new burdens and exactions, yet affords no means to the railway manager for increasing earnings or diminishing expenses.

THE BLOCK SIGNAL BOARD'S INSPECTION REPORTS.*

Appendix "C" to the fourth annual report of the Block Signal and Train Control Board contains what are stated to be "the results of inspections of signal appliances, systems, and methods" conducted by the board during 1911. This appendix is far from a creditable piece of work. It does not deserve to be included with the other work of the board.

From the title it would seem that the inspections were intended to discover what kind of signal appliances, systems, and methods are in use on the railways of the United States, and what effect these have upon operation—as to whether they are safe or unsafe. There is no doubt that inspections of the proper kind would reveal many conditions that could be improved, for there is probably not a road in the United States which is not somewhat lax in discipline or somewhat careless in the conduct of its physical properties. Such inspections should be carefully and comprehensively made by men who are fitted by education, training and experience for the purpose; and they should take into account not only the actual visible conditions, but also what defenses of these conditions can be offered. "The test of the pudding is in the eating," and a good many conditions which, viewed superficially, may appear dangerous are really not so when the special requirements which led to their use are understood. Proper allowances should be made also for special requirements imposed by local conditions. The results obtained ought then to be presented in such form that they would be useful. In reports of inspections which are properly conducted and which have in view the discovering and remedying of the wrong conditions, very little space would require to be given to accepted practices.

But the reports of the board's inspectors are by no means of this kind. For the most part they do not deal with signal appliances, systems, and methods, as the title would imply; and there has been little or no attempt to put them in shape so that such criticisms as they contain will be useful. Even a casual reading will show that the inspections were most superficial, and that the inspectors, instead of getting at the big things which are thought to be wrong in operating practice, devoted most of their time to enlarging upon isolated and non-representative cases.

The inspectors visited parts of 38 roads, of which the names are given. A considerable portion of their report is devoted to explanations of principles which have been so long accepted as standard, and are in such common use, especially on the larger roads to which the inspection appears to have been confined, that there would seem to be no good reason for devoting so much, or even any, space to them. The fact that they have received such an amount of attention might appear to indicate that, old as they are, they are still somewhat new to the inspectors of the board, which reflects no credit on the competency of the inspectors. For example, six lines are used to describe a time release arrangement whereby a leverman is prevented from accidentally taking away a clear signal from a train. Time locks similar to this for holding signals and routes have been installed on most of the interlocking plants built within the last 10 years, and have long since ceased to be novel except in the manner of their design, which, of course, has nothing to do with their application, inasmuch as they all effect the same result.

Wholesale condemnation of roads is rather frequent throughout the entire report. The condemnation is expressed in terms which the officers of the roads in question will have no difficulty in proving do not represent the conditions correctly. The inspections could not have been thorough, or the fact that there are perfectly good reasons for some of the practices which are mentioned would have become evident. For example, it is said that on the Chicago, Burlington & Quincy, "At crossovers trains stop before making the crossover movement regardless of the position of the signal." This road has very little automatic signal mileage, and it has been standard practice for many years in non-automatic territory to use normally clear station protection signals at station crossovers and passing tracks. Before the trains leave the main track at one of these points the station protection signals are pulled to the stop position by the trainmen, and are left in that position for rear end protection until after the main line has been cleared. Otherwise the operation at crossovers, so far as stopping is concerned, is similar to that on all other roads in the country, and is the same as it has been for many years. If this statement was intended to be a criticism it was obviously made in ignorance of the facts. If it was intended to commend the road's practice the effort might well have been directed along more profitable lines. If it was included merely to show that the inspectors were "on the job" and had the C. B. & Q. under surveillance, the energy was wasted.

In one instance 700 miles of road are condemned in two lines, and in another nearly 10,000 miles of track in 15 words. In several other places there is a marked tendency to apply the same terms that are used to describe a single special case to conditions on a whole system—in other words, to generalize from a single incident.

The Chicago & North Western comes in for some scoring of this kind. The report says with reference to this road: "One important interlocking plant was inspected. It was very poorly maintained. The inspector reports that it was in the worst condition of all the plants in large terminals that he had ever seen. As a rule the signalmen and repairmen were of a poor class." No one who has visited the new North Western terminal needs to be told that this could not possibly be any of the plants connected with it. The plant which was so poorly maintained might have been—in fact, it undoubtedly was—the old plant at the Wells street station, Chicago, which was abandoned when the new terminal was put in service, and on which for some time previous to abandonment, there naturally was not spent any more money than was absolutely necessary to keep it working. The statement that the signalmen and repairmen were of a poor class, following as it does the comment upon the badly maintained interlocking plant, would seem to have been an inference made by the inspector from the condition of the plant. In this case the report appears to indicate lack of discrimination on the

*Editorial in *The Signal Engineer* for April.

part of the inspectors as to what is representative of conditions on railways, and to show also very little idea on their part, of constructive criticism. At least the fact that the old plant which was in such bad condition was going to be taken out of service in the near future should have been mentioned.

In view of the nature of the wholesale condemnation the commendation which is given certain roads does not amount to much. The terms used are so general and so ambiguous, and the information on which the reports are based is so palpably incomplete, that there is probably very little satisfaction in getting a clean bill of health from inspectors of such demonstrated ignorance and incompetency.

They say of the Baltimore & Ohio: "Electro-gas automatic signals are in use on this road. They are maintained in excellent condition, and the track work was well constructed and well maintained." As a matter of fact there are a great many more electric automatic signals on the B. & O. than electro-gas, yet a reading of the report would not lead to such a conclusion.

There is a similar ambiguity in the description of the signals on the Maine Central. The Northern Pacific gets an O. K. in seven lines. Two interlocking plants were looked over, and the rest of the road was evidently inspected from the rear end of a train. The signaling on the Pittsburgh & Lake Erie was thoroughly approved in seven lines, but the statements are so general, so lacking in detail and judgment, that this approval will hardly be satisfactory even to the officers of the road.

Much of the effort of the inspectors seems to have been wasted either upon trivialities which mean nothing one way or the other to persons familiar with signaling, or upon practice which is already standard. For instance, in three cases, it is said in effect that signal blades were so dirty that it was impossible to tell the color of the blade a short distance away. This expresses a very common condition in and about yards—a condition which it is almost impossible to prevent, but which it is not worth while to prevent, simply because enginemen do not run according to the colors of signal blades, but according to their positions!

In dealing with things which are already accepted as standard practice and used wherever there are signals, the inspectors have, perhaps, unwittingly, expressed themselves in language as subtle in its innuendo as that of the sailor who, after he had been chided by his Puritanical captain for being drunk, wrote in the ship's log, "The captain was sober today." A case in point is the statement that, "On the Lehigh Valley switch boxes are installed on all switches in main tracks and switch indicators are used." In reference to the New York Central the report reads, "Switch boxes are applied to all main track switches and switch indicators are used," and on the Maine Central, "proper fouling and switch box protection is furnished for all switches and sidings leading to the main track." Fortunately the innuendo is harmless. It is true there is no better way to find out whether a road uses switch boxes than to look for them, but to conduct inspections on the supposition that they do not use them in automatic territory would seem, to railway men at least, to be about as useless an expenditure of effort as to inspect passenger cars to see if they are equipped with couplers.

Some parts of the report are so lacking in detail and so unintelligible that they are likely to be of little use to any body. For example, an interlocking plant is described as follows: "Track circuits are used only on the tracks of the Pennsylvania and extend only to the heel of the crossing frog. With this arrangement clear signals may be given on the Pennsylvania when the crossing is occupied by a train on the Lake Erie, Alliance & Wheeling." This seems to refer to a mechanical plant. If the description means that clear signals may be given on the Pennsylvania when a route is set up for a train on the other road the inference would be that there is no mechanical locking in the machine—such an unusual condition that if it were actually found it should have been exactly described. If, however, the statement is intended to mean that a train might be standing between the derails on the L. E. A. & W. while blocking the crossing for Pennsylvania trains, so that clear signals could be given on the tracks of the latter, the words merely express a condition which, until the comparatively recent adoption on a large scale of route locking, was the most satisfactory one that had been devised, and one which, on account of the unusual combination of circumstances which would be necessary to bring about a collision, was not considered dangerous. If the inspectors intended to criticize the roads interested for the lack of route locking, why wasn't the criticism made in specific terms?

Other portions of the report indicate a similar lack of acquaintance on the part of the inspectors with railway operating practice. In two places it is noted that some of the switches within the limits of the interlocking plant were not interlocked. This in itself means nothing, as there are many plants in the country where switches within the interlocking limits are purposely left out for convenience in operating, especially in connection with switching movements, and the leaving out of which does not increase the liability to accident. In fact, it is believed by some signal engineers that the tendency to interlock everything within a certain distance of an interlocking tower has led to a large unnecessary expenditure in a good many installations.

It is apparent from a careful reading of the entire report that a large number of the inspections were conducted from the back ends of trains. Considerable information also seems to have been gathered from talks with individual signalmen. The practice as to flagging on several roads is set forth in general terms, whereas the terms used should have been restricted to the single isolated cases from which the inspectors were led to draw their general conclusions.

The foregoing are sufficient to show the inadequacy and incompetency of the report, either as such an authoritative commendation of operating methods as should emanate from so high an authority as the Block Signal Board, or as such a criticism as will lead to any greater safety on the railways of the country. It is to be feared that the report will be considered by many railway men as an excellent example of the animus of the inspector who is hired to inspect, and who would not be thought to be doing his work properly unless he criticized without caring much about the intrinsic value of his criticism.

Even the reader who knows nothing of railway work will readily discern that the inspections which are reported are superficial and do not represent the conditions they are intended to cover. And perhaps he will wonder, since the reports are not creditable to the board, why such inspections are made at all. The natural supposition would be that if the board is to conduct inspections they should be conducted in such a way as will do the most good—or, at least, some good. If, for instance, the inspectors had reported a year ago that certain roads on which traffic was so intensive that it ought to have been handled by automatic block signaling, were still using the time interval principle of operation on their main lines, some of the recent awful accidents might have been prevented. Appendix "C" ought to be recalled. It ought not to be permitted to remain among the reports of a body whose work has been of so much value and of such a uniformly high quality heretofore that the contrast with Appendix "C" only serves to bring out more strongly the incompetency, and even imbecility, of the latter.

TRAFFIC STATISTICS IN 1910.

The accompanying table is an abstract from a compilation of figures made by the Bureau of Railway Economics from reports of railways to the Interstate Commerce Commission. The Bureau of Railway Economics' compilation gives figures for the years 1900 to 1910, inclusive. Our abstract gives the figures for 1910 only and, as will be noted, our abstract gives round numbers only. The figures in general are self explanatory. The per cent. which each group bears to the total United States is shown where possible. By "Miles of line" is meant road mileage, and by "Mileage operated, main tracks" is meant track miles, including first, second, third, etc., tracks and branch line track mileage, but excluding miles of yard tracks and sidings.

Traffic Statistics.

Index.	United States.	Group I.	Per cent.	Group II.	Per cent.	Group III.	Per cent.	Group IV.	Per cent.	Group V.	Per cent.	Group VI.	Per cent.	Group VII.	Per cent.	Group VIII.	Per cent.	Group IX.	Per cent.	Group X.	Per cent.
1. Miles of line operated—single track †	241	8	3	24	10	26	11	14	6	28	12	52	22	14	6	34	14	18	8	23	9
2. Mileage operated—main track †	266	10	4	34	13	31	12	15	6	29	11	57	21	15	6	35	13	18	7	23	9
3. Mileage operated—yard track and sidings †	86	4	5	16	19	14	16	4	5	8	9	17	20	4	4	9	10	4	5	6	7
4. Mileage operated—all tracks †	352	14	4	50	14	45	13	19	5	36	10	74	21	18	5	43	12	23	6	29	8
5. Population **	92	7	7	20	22	11	12	7	7	12	13	15	16	2	2	7	8	5	6	5	6
6. Area †	2,970	62	2	108	4	125	4	140	5	299	10	372	13	412	14	367	12	325	11	759	26
7. Density of population	31	106	..	185	..	92	..	48	..	41	..	41	..	5	..	20	..	16	..	7	..
8. Population per mile of line	382	807	..	840	..	438	..	477	..	435	..	291	..	148	..	219	..	284	..	235	..
9. Population per mile of main track	346	647	..	594	..	366	..	444	..	424	..	266	..	142	..	215	..	282	..	231	..
10. Square miles of area per mile of line	12	8	..	5	..	5	..	10	..	11	..	7	..	30	..	11	..	18	..	34	..
11. Number of locomotives *	58,9	3,3	..	13,6	..	8,10	..	3,1	..	4,7	..	10,7	..	2,5	..	5,10	..	2,4	..	3,7	..
12. Locomotives per 1,000 miles of line	245	406	..	571	..	344	..	222	..	168	..	207	..	178	..	176	..	132	..	161	..
13. Number of freight cars †	2,135	83	..	516	..	403	..	124	..	171	..	428	..	74	..	189	..	60	..	87	..
14. Freight cars per 1,000 miles of line *	8,9	10,2	..	21,7	..	15,4	..	8,9	..	6,1	..	8,3	..	5,3	..	5,6	..	3,3	..	3,8	..
15. Number of passenger cars *	47,1	5,4	..	12,3	..	5,6	..	2,1	..	3,4	..	7,6	..	1,7	..	3,9	..	1,5	..	3,7	..
16. Passenger cars per 1,000 miles of line	195	660	..	516	..	214	..	150	..	122	..	147	..	121	..	114	..	82	..	163	..
17. Total number of cars †	2,290	93	..	547	..	423	..	131	..	183	..	455	..	83	..	207	..	66	..	102	..
18. Total cars per 1,000 miles of line *	...	...	..	...	..	...	..	...	..	...	..	...	..	...	..	...	..	...	..	...	..
19. Tractive power of locomotives (lbs.)	Total, U. S., 1,588,894,480. Ave. per loco., U. S., 27,282.																				
20. Capacity of freight cars (tons)	Total, U. S., 76,578,735. Ave. per car, U. S., 36.																				
21. Freight train mileage—revenue service **	635	25	4	128	20	112	18	32	5	65	10	122	19	27	4	66	10	29	5	31	5
22. Mixed train mileage—revenue service ¶	35,8	1,2	..	3,1	..	2,3	..	2,7	..	5,3	..	7,8	..	1,5	..	5,2	..	2,9	..	3,8	..
23. Tons of revenue freight carried **	1,026-(b)	...	..	...	..	...	..	...	..	...	..	...	..	...	..	...	..	...	..	...	..
24. Tons per inhabitant	11.16-(b)	...	..	...	..	...	..	...	..	...	..	...	..	...	..	...	..	...	..	...	..
25. Tons carried one mile ¶¶	255	7	3	66	26	52	20	14	6	19	8	47	18	11	4	19	7	8	3	13	5
26. Freight train density	2,669	3,148	..	5,376	..	4,277	..	2,288	..	2,330	..	2,354	..	2,030	..	1,955	..	1,587	..	1,411	..
27. Freight density †	1,071	874	..	2,797	..	2,021	..	1,098	..	716	..	907	..	781	..	566	..	421	..	586	..
28. Ton miles per inhabitant	2,773	1,068	..	3,295	..	4,544	..	2,175	..	1,592	..	3,081	..	5,156	..	2,508	..	1,451	..	2,402	..
29. Freight revenue **	$1,927	$78	4	$423	22	$307	16	$96	5	$157	8	$350	18	$100	5	$182	9	$80	4	$155	8
30. Freight revenue per mile of main track	$7,239	$7,706	..	$12,564	..	$9,778	..	$6,389	..	$5,455	..	$6,175	..	$6,909	..	$5,260	..	$4,330	..	$6,705	..
31. Freight revenue per train mile	2.862	$2.937	..	$3.216	..	$2.686	..	$2.761	..	$2.227	..	$2.697	..	$3.549	..	$2.554	..	$2.524	..	$4.416	..
32. Freight revenue per ton mile	$.753	$1.115	..	$.641	..	$.588	..	$.655	..	$.802	..	$.751	..	$.945	..	$.971	..	$1.056	..	$1.196	..
33. Freight train miles per freight locomotive *	18,2	18,3	..	15,7	..	20,6	..	17,0	..	24,10	..	18,5	..	17,3	..	17,9	..	18,1	..	14,3	..
34. Ton miles per train mile (tons per train)	380	264	..	502	..	457	..	424	..	278	..	359	..	376	..	263	..	240	..	369	..
35. Average haul per ton (miles) (a)	250	94	..	128	..	117	..	193	..	150	..	141	..	271	..	183	..	132	..	175	..
36. Ton miles per freight locomotive †	7,304	4,798	..	8,071	..	9,616	..	7,872	..	7,588	..	7,077	..	6,862	..	5,103	..	4,781	..	5,972	..
37. Ton miles per freight car mile (tons per car)	13.4	10.5	..	15.2	..	14.9	..	14.6	..	12.2	..	12.9	..	12.2	..	11.0	..	10.5	..	12.9	..
38. Passenger train mileage (revenue service) **	549	38	7	115	21	78	14	23	4	48	9	103	19	24	5	54	10	23	4	43	8
39. Number of revenue passengers carried **	972	153	16	332	34	101	10	30	3	53	6	144	15	17	2	54	6	23	2	65	7
40. Average number of trips per inhabitant	10.56	23.30	..	16.60	..	8.79	..	4.49	..	4.40	..	9.57	..	8.01	..	7.26	..	4.46	..	12.11	..
41. Passengers carried one mile §	32.3	2,10	9	7,4	23	4,0	13	1,1	3	2,1	7	5,9	18	1,6	5	2,9	9	1,2	4	3,1	10
42. Passenger train density	2,306	4,734	..	4,814	..	2,976	..	1,692	..	1,713	..	1,986	..	1,856	..	1,619	..	1,271	..	1,952	..
43. Passenger density †	138	375	..	314	..	158	..	82	..	79	..	115	..	115	..	90	..	70	..	143	..
44. Average number of miles traveled per inhabitant	352	457	..	368	..	352	..	163	..	176	..	390	..	756	..	393	..	237	..	584	..
45. Passenger revenue **	$629	$51	8	$126	20	$75	12	$24	4	$49	8	$111	18	$32	5	$61	10	$29	5	$72	12
46. Passenger service train revenue **	$765	$60	8	$153	20	$96	13	$29	4	$60	8	$137	18	$39	5	$75	10	$34	4	$82	11
47. Passenger revenue per mile of main track	$2,365	$5,083	..	$3,733	..	$2,386	..	$1,588	..	$1,695	..	$1,959	..	$2,224	..	$1,763	..	$1,549	..	$3,125	..
48. Passenger revenue per train mile	$1,147	$1,349	..	$1,094	..	$.963	..	$1,015	..	$1,023	..	$1,082	..	$1,321	..	$1,119	..	$1,247	..	$1,687	..
49. Passenger revenue per passenger mile (cents)	1,938	1,718	..	1,695	..	1,846	..	2,176	..	2,256	..	1,887	..	2,073	..	2,079	..	2,321	..	2,292	..
50. Passenger service train revenue per mile of main track	$2,873	$5,911	..	$4,556	..	$3,054	..	$1,959	..	$2,059	..	$2,413	..	$2,712	..	$2,177	..	$1,816	..	$3,567	..
51. Passenger service train revenue per train mile	$1,304	$1,522	..	$1,298	..	$1,193	..	$1,115	..	$1,113	..	$1,237	..	$1,517	..	$1,259	..	$1,300	..	$1,747	..
52. Passenger train miles per passenger locomotive *	40,2	29,7	..	35,5	..	42,5	..	43,5	..	49,0	..	44,8	..	43,5	..	37,1	..	45,2	..	44,1	..
53. Passenger miles per train mile (passengers per train)	56	76	..	63	..	51	..	42	..	41	..	53	..	60	..	49	..	48	..	67	..
54. Average journey per passenger (miles)	34	20	..	23	..	41	..	36	..	40	..	41	..	94	..	54	..	53	..	48	..
55. Passenger miles per passenger locomotive †	2,35	2,30	..	2,38	..	2,21	..	1,95	..	2,18	..	2,57	..	2,77	..	2,01	..	2,44	..	3,08	..
56. Passenger miles per passenger car mile (passengers per car)	15.8	22.2	..	16.9	..	14.8	..	12.7	..	12.7	..	15.6	..	15.7	..	14.3	..	13.9	..	17.1	..

* Two zeros omitted. † Three zeros omitted. ‡ Four zeros omitted. ¶ Five zeros omitted. ** Six zeros omitted. § Eight zeros omitted. ¶¶ Nine zeros omitted.

(a) Average haul per ton over all roads of the United States and other groups regarded as one railway system.

(b) Covers only freight reported by railways as originating on their own line and not freight delivered to them by connecting carriers.

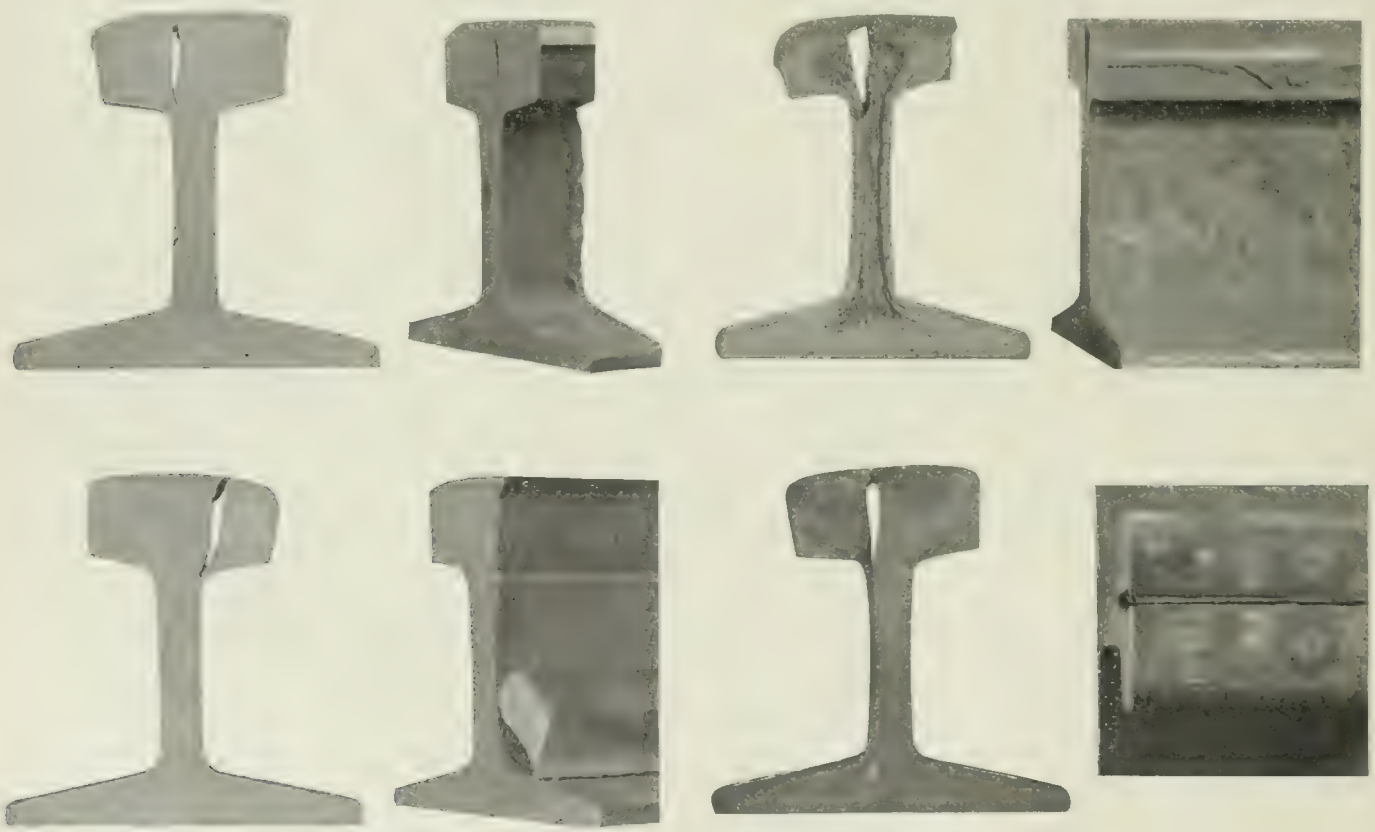
RAIL FAILURES DUE TO ECCENTRIC LOADING.

Stresses Resulting from the Use of the Present Sections Under Coned Wheels Exceed the Elastic Limit of the Metal.

BY C. A. MORSE.

Chief Engineer, Atchison, Topeka & Santa Fe System.

The question of rail failures is a very live one at the present time, and is naturally the subject of investigation by every railway and by all railway associations interested in maintenance. It has perhaps been natural for railway companies to feel that the quality of rail furnished in the larger sections was not equal to what had formerly been furnished in the smaller sections. This has caused the manufacturers to investigate the quality of steel rails being made at the present time. Accidents due to broken rails, such as that on the Lehigh Valley, have started the national government investigating the same subject, and some of the state railway commissions have also begun to look into the matter. In the report to the Interstate Commerce Commission on the Lehigh Valley accident, James E. Howard, of the United States Bureau of Standards, intimates that the limit of wheel loads for steel rail has been reached. Apparently, however, the investigations and inquiries are all pointed solely to the chemical composition of the steel in the rail and to the process of manufacture. Little, if anything, has been said, or apparently done within the last decade looking to improved design of rails and wheels, except the adoption of the American Railway Association rail sections and a little change in the radius of the fillets for car wheel flanges.



Sections of 85-Lb. Rails, Showing Failures from Split Heads.

In the transactions of the American Society of Civil Engineers for September, 1889, D. J. Whittemore, past president of that society, and the then chief engineer of the Chicago, Milwaukee & St. Paul, wrote an exhaustive article on the subject of "Cylindrical Wheels and Flat Top Rails for Railways." At the time this paper was written, axle loads were only about half what they are now and rails were very much lighter, but Mr. Whittemore called attention in this paper to the fact that even under the wheel loads of that period, owing to the small area of contact between the wheel and the rail, the elastic limit of the metal in the rail was exceeded. If that was true at that time what must be the condition at the present time with 20,000 lb. wheel loads on 34 in. wheels and 30,000 to 35,000 lb. wheel loads on 69 to 79 in. wheels.

One point which Mr. Whittemore did not bring out in his paper, as the trouble from it under the wheel loads at that time was not acute, is the eccentric loading of the rail. The M. C. B. standard car wheel has a taper or coning of one in twenty. This has existed for years, and is one of those things that have come down from early days and the necessity for which has apparently been taken for granted. The writer was taught in Henck's field book over thirty years ago that the wheel was coned for the purpose of tending to equalize the diameter of the wheel in passing around curves; that owing to the widening of gage on curves and the play in the boxes of the truck the larger diameter of the wheel was brought in play on the outside rail and the smaller diameter on the inside rail tending to prevent slippage and to overcome the difference in distance around the curve on the two rails, which was a very good theory, but under present conditions has no value. At the present time it is considered good practice not to widen the gage up to and including 8, or even 10, deg. curves. The wear on the tread of the wheels soon does away with the coning, with the result that there is practically no difference in the diameter

of the wheel in the width that the play in the boxes of the truck permits.

In the case of a new wheel and a new rail the coning of the wheel causes the line of pressure in the case of an M. C. B. wheel and a 90 lb. A. R. A. rail to be located 0.7 in. away from the center of the rail toward the inner edge of the head, thus loading the rail eccentrically and tending to split the head, to split the web of the rail longitudinally, and, owing to the area of contact being only from one-third to one-half a square inch, exceeding the elastic limit of the metal, causing a flow, this flow naturally being toward the inside edge of the rail. In the design of structures, eccentric loading is studiously avoided, but in the case of a steel rail, subject, as it is, to continuously repeated application of loads, this matter seems to have been ignored completely. Broken tires are increasing practically as fast as broken rails. They have not attracted the attention of the public, but they are worrying mechanical officers nearly as much as broken rails are worrying maintenance officers.

The strains in the head of a rail due to wheel loads are so numerous that the combined effect of a number of them is very hard on the rail. Referring to Fig. 1, they can be enumerated as follows:

First. Direct crushing stress due to the wheel load at the point A.

Second. Vertical shearing stress along the line BD owing to the wheel load at A.

Third. Longitudinal shearing stress along the line BD owing to tractive force applied at A.

Fourth. Bending stress at B due to the vertical wheel load at A.

Fifth. Horizontal side pull at B due to sidewise slipping of the wheel.

Sixth. Longitudinal stress in the rail head lying to the right of the line BD due to tractive force applied at A.

Seventh. Stress due to load at A; rail considered as a simple girder.

Owing to the conditions of surface, grade and speed, these different strains can be combined in a variety of ways, each combination tending, however, to disrupt the head of the rail, split the web or cause the metal to flow over the edge, and when these combinations of strains are repeated thousands of times, it is not strange that the material is ruptured. The use of a heavy steel tie plate from 3/8 to 5/8 in. thick makes the effect of the continuous pounding on the rail much more destructive than it was when the rail rested directly on a wooden tie, which served to cushion the blow to some extent.

The rail failures due to head troubles have become so numerous during the past few years as to attract special attention. For instance, on one road during 1910 there were 1,146 breakages of 85 and 95 lb. rails, of which those due to a head and web troubles were as follows:

	On tangent.	On curve.	Total.
Crushed head	134	87	221
Split head	181	93	274
Flow of metal	10	5	15
Split web	47	21	68
	372	206	578

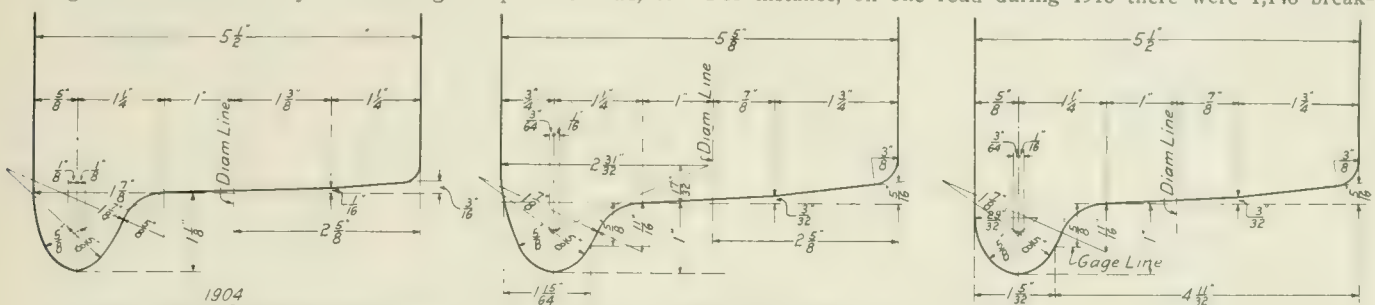
In 1911 out of 1,350 breakages in 85 and 90 lb. rails there were:

	On tangent.	On curve.	Total.
Crushed head	184	65	249
Split head	313	107	420
Flow of metal	11	5	16
Split web	110	43	153
	618	220	838

Fifty per cent. of the total breakages in 1910 and 62 per cent. in 1911 were in the head and web.

By doing away with the coning of wheels and having a cylindrical wheel the bearing of the load would be in the center of the head directly over the web, doing away with the eccentric loading which tends to split the head and split the web. With the point of contact in the center of the head of the rail any wear or flow of metal would immediately tend to increase the area of contact and decrease the pressure per square inch, thus reducing the tendency to crush the rail, split the head or cause the metal to flow. Our present A. R. A. section has a radius for the top of the head of 14 in. By increasing this radius to 20 in. the area of contact would be greatly increased between a new rail and a new wheel, and thus the tendency to wear and flow would be materially reduced.

The argument is made that the rail and the tire become worn shortly so as to give a larger area of contact and that, therefore, they give this larger area under the present section of rail and tire. This is true to a certain extent, but on lines running heavy power they are constantly laying new rail, receiving new

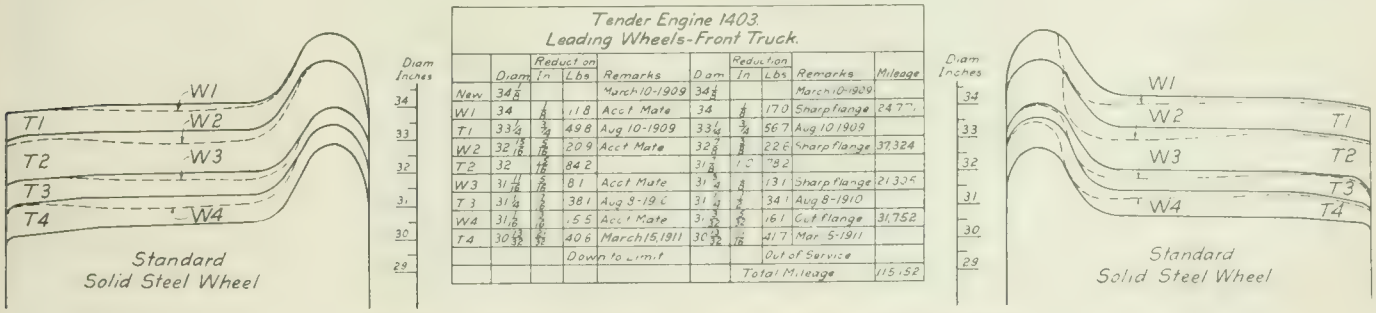


1904 Standard Wheel Tread and Flange for Road Eng Driving Wheels, Eng Truck Wheels, Trailers and Tender Truck Wheels.

Standard Wheel Tread and Flange M.C.B Standard of 1909, Cast iron Wheels

Wheel Tread and Flange for Steel and Steel tired wheels: Taken from the proceedings M.C.B. Vol, 44-1910.

Development of Standard Wheels.

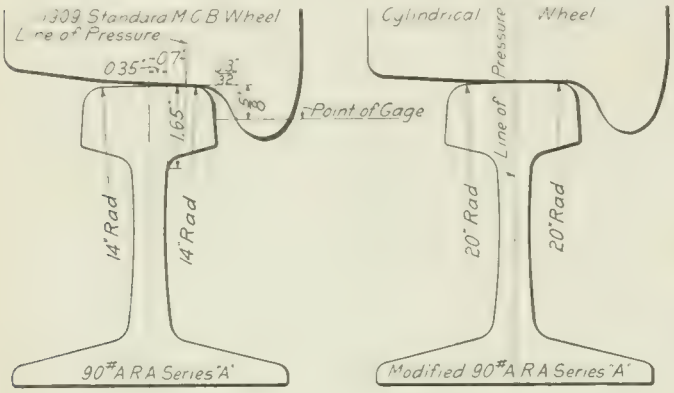


	Diam	Reduction In	Reduction Lbs	Remarks	Diam	Reduction In	Reduction Lbs	Remarks	Mileage
New	34 7/8			March 10-1909	34 5/8			March 10-1909	
W1	34	3/8	1118	Acct Mate	34	3/8	170	Sharp flange	24771
T1	33 1/4	3/4	498	Aug 10-1909	33 1/4	3/4	567	Aug 10 1909	
W2	32 15/16	15/16	209	Acct Mate	32 3/8	7/8	226	Sharp flange	37,324
T2	32	1 7/16	842		31 3/8	1 0	782		
W3	31 1/16	5/8	81	Acct Mate	31 3/4	5/8	131	Sharp flange	21,335
T3	31 1/4	5/8	381	Aug 9-1910	31 1/4	5/8	341	Aug 8-1910	
W4	31 1/16	5/8	155	Acct Mate	31 5/32	5/8	161	Cut flange	31,752
T4	30 23/32	5/32	406	March 15, 1911	30 5/32	1/8	417	Mar 5-1911	
				Down to Limit				Out of Service	
								Total Mileage	115,152

Graphical Record of Wear of Front Truck Tender Wheels.

cars and equipping old cars with new wheels, and our locomotive wheel tires are turned down often enough to give the effect of a new wheel.

Some railways and locomotive works have adopted the practice of reducing the coning or taper on locomotive tires to one in 38 instead of one in 20. This is a step in the right direction,



Present and Suggested Sections of Wheels and 90-Lb. Rails, Showing Point of Application of Load.

but why one in 38? Why not level? It would seem that the most direct way to get relief would be for the committees of the Master Mechanics, Master Car Builders and American Railway Engineering Associations to take this question up together, with the idea of re-designing the rail and tire sections, as the tire wear can be reduced and number of broken tires lessened by the same remedy that helps the rail.

MANUAL BLOCK SYSTEM ON SINGLE TRACK.*

In the last annual report reference was made to the introduction of the block system on the Baltimore & Ohio Southwestern (now operated directly as a part of the Baltimore & Ohio). On 180 miles of this company's line, nearly all single track, the necessary apparatus for the operation of the manual block system was installed in less than one week, 62 offices being equipped with telegraph instruments and batteries and a new telegraph wire being put up throughout the length of the line (the poles being already in place).

Including other sections on which the block system was introduced about the same time, the length of road now operated is 254 miles, and the number of regular passenger trains each way daily is from 9 to 13 (on different parts of the road). The number of station operators now in service is 110, the pay rolls amounting to $6,262 a month. The number of telegraphers in service before the adoption of the block system was 64 and the total increase in operating expense made necessary by the change was $2,459 a month. The outdoor signals used are those formerly used to stop trains for despatchers' orders.

On the question of the number of permissive movements necessary, which is one of the primary questions in the introduction of the block system on lines over which the volume of traffic is moderate, the record of three days of average traffic in the month of November, 1911, shows that the freight trains received clear signals at nearly nine-tenths of the block-signal stations. The figures for the three days are given in the table below. On the section of line here referred to no permissive signaling is allowed for any train following a passenger train. For passenger trains following freight, permissive signals are allowed, and in the record here shown 86 such movements were made.

The headings of the columns are as follows: (1) Date; (2) number of passenger trains on train sheet; (3) number of freight trains on train sheet; (4) absolute clear signals given to freight trains; (5) permissive signals given to freight trains; (6) permissive signals given to passenger trains following freight trains.

Clear and Permissive Block Signals; Baltimore & Ohio Southwestern.

1	2	3	4	5	6
Date.	Passenger trains.	Freight trains.	Clear freight.	Permissive freight.	Permissive passenger.
Cincinnati district eastbound:					
Nov. 2	9	9	134	9	6
Nov. 3	9	6	96	7	4
Nov. 4	11	9	124	9	5
Washington-Louisville district eastbound:					
Nov. 2	13	17	130	20	12
Nov. 3	13	14	122	14	10
Nov. 4	14	16	126	18	13
Cincinnati district westbound:					
Nov. 2	9	6	96	5	8
Nov. 3	9	6	90	10	8
Nov. 4	9	8	126	8	10
Washington Louisville district westbound:					
Nov. 2	13	15	122	17	4
Nov. 3	13	15	116	29	3
Nov. 4	13	14	123	8	3
Total	135	135	1,405	154	86

The rules in force on this line contain the usual provisions for moving trains according to time-table rights and despatchers' orders whenever the block-signal wire fails. Meeting points are fixed by time-table and by despatchers' orders, as in the general American practice on single-track lines. In addition to the ordinary requirements, a rule on this division (Rule S. 6) provides that when a meeting order is sent to trains a copy of the order shall be sent to the signalman at the meeting point; and also that this requirement shall be carried out even when the meeting point is a non-telegraph station; this by sending a copy of the order to two telegraph offices—one on each side of the meeting point; the operator at each of these stations being required to give a card to the train which passes him.

This and other examples of practice are given for the purpose of illustrating the facility with which the block system can be and is used with only the minimum expenditures for signals, wires, apparatus and attendants. This memorandum is not to be taken as an expression concerning the correctness in detail of the practice referred to, nor as an approval either of permissive signaling in general or of its use in these particular instances; but the data given, while incomplete in some respects, show that on the lines cited nearly all passenger trains and a large part of the freight trains are constantly being run by the space-interval system, doing away with numerous, varied and troublesome risks of the time-interval system. This is a definite improvement accomplished. But, what is of equal and potentially greater significance, the facilities are always at hand for enforcing the absolute block system at any time for *all trains*. In case of snowstorms or dense fogs, making it difficult or impossible for enginemen to see ahead, or when from any cause special caution becomes necessary, a word from the despatcher puts into effect at once the rule forbidding all permissive blocking. Where it is necessary to provide against dangers from sudden local fogs, station telegraphers can be authorized to adopt this rule on their own motion without waiting for special authority.

The bills which have been presented in Congress by Hon. John J. Esch, of Wisconsin, as well as the recommendations which have been put forth by the Interstate Commerce Commission and by the Block Signal and Train Control Board, have all been drawn in conformity to the condition which is here illustrated and which, indeed, prevails to a greater or less extent on nearly all railways which use the manual block system. That is to say, the primary idea is the establishment and maintenance of the facilities for enforcing the space interval between trains. The extent to which exceptions or suspensions may be allowed, while not unimportant, is, from a governmental standpoint, a secondary question.

*From the annual report of the Block Signal and Train Control Board of the Interstate Commission

THE "TITANIC" DISASTER.

The sinking of the new steamship Titanic of the White Star Line by an iceberg in the Atlantic ocean, 1,150 miles east of New York, on the morning of April 15, about two o'clock, appears to have resulted in the loss of over 1,300 lives, the number saved out of the 2,200 total of passengers and crew being given at 868. Two prominent railway men were aboard, Charles M. Hays, of Montreal, president of the Grand Trunk, and John B. Thayer, of Philadelphia,, second vice-president of the Pennsylvania. Other prominent persons on the ship were John Jacob Astor, of New York, a director of the Illinois Central and the Delaware & Hudson; Isidor Straus, of New York, merchant and former congressman; Benjamin Guggenheim; J. Bruce Ismay, managing director of the White Star Line, and Col. Archibald Butt, military aide to President Taft. At this writing the reports indicate that Mr. Thayer and Mr. Ismay are the only ones of these who were saved. An account of Mr. Hays' career is given below.

The Titanic was the largest ship in the world, being a little larger than her sister ship, the Olympic, and was on her first voyage. She was 882 ft. long, or nearly 100 ft. longer than the Mauretania; 92 ft. wide and 94 ft. deep; tonnage, 46,000. She had 15 watertight compartments. She had accommodations for 3,500 passengers, and carried a crew of 860. She is said to have cost $10,000,000. The aggregate losses of ship and cargo (which included diamonds worth $5,000,000), added to the insurance on the lives of passengers are estimated at from 15 to 25 millions of dollars. The disaster occurred in west longitude 50.14, north latitude 41.46. All of the survivors are being brought to New York on the Cunard steamship Carpathia. The signals of distress given by the Titanic were first received on Sunday night at 10:25 [presumably Greenwich time] by the station at Cape Race, Newfoundland; and the first vessel to respond and start for the scene was the Virginian of the Allan Line. The Virginian, however, was 170 miles away and did not arrive soon enough to be of any assistance. The first ship actually to reach the survivors was the Carpathia. This was at daybreak, or some eight hours after the sinking of the Titanic. All of the survivors were in the boats, and all of the boats were accounted for.



Charles M. Hays.

Mr. Hays was one of the most widely known railway men in America; and Sir Wilfred Laurier at a dinner of the Canadian Club once said of him. "He is beyond question the greatest railway genius in Canada. As an executive genius he ranks second only to the late Edward H. Harriman."

Mr. Hays was born on May 16, 1856, at Rock Island, Ill., and began railway work in November, 1873, as a clerk in the passenger department of the Atlantic & Pacific at St. Louis, Mo., and was later clerk in the auditor's and the general superintendent's offices of the same road. In 1887 he was appointed secretary to the general manager of the Missouri Pacific, and from 1884 to 1886 he was secretary to the general manager of the Wabash, St. Louis & Pacific, and then for one year was assistant general manager of the same road. In 1887 he was appointed general manager of the Wabash Western, and later of the consolidated Wabash System, becoming vice-president and general manager of the Wabash in 1894, remaining in that position until December, 1895. During that period he was a director of the Chicago & Western Indiana, the Belt Railway of Chicago, the Detroit Union Railroad & Station Company, the Hannibal Union Station Company, the Keokuk Union Station Company, the Kansas City Union Station Company, and the Terminal Road Association of St. Louis, of which latter company he was also chairman of the executive committee. He represented the Wabash in the Western Traffic Association, in the Central Traffic Association, and in the Joint Traffic Association. He became general manager of the Grand Trunk on January 1, 1896, and left that company in January, 1901, to become president of the Southern Pacific Company. When this property changed hands he resigned and returned, in 1902, to the service of the Grand Trunk, as second vice-president and general manager. He was elected president of the Grand Trunk in October, 1909.

During the period of Mr. Hays' control the original Grand Trunk has not only been rebuilt, but its terminal facilities have been extended and improved, and its earning capacity increased by the reduction of grades, construction of second-track and heavy bridges and laying heavy rails throughout. In addition, increased mileage has been added by the control of the Central Vermont and the absorption of the Canada Atlantic, and by the joint control of the Detroit & Toledo Shore Line. The most important undertaking, outside of the direct operation of the Grand Trunk, has been the building, under Mr. Hays' direction, of the Grand Trunk Pacific, which is being built from Moncton, N. B., west to Prince Rupert, B. C., on the Pacific coast, and is to have 3,550 miles of main line.

Mr. Hays was very self-possessed, seldom showing irritation or anger, and his capacity for work seemed unlimited. He had an exceptionally strong physique, and took every opportunity to get hard outdoor exercise. If there were any reasonable chance of a man surviving the disaster to the Titanic except through the life boats, Mr. Hays would be that man; he never let go as long as there was anything to be gained by holding on.

Construction work on the San Bernardo to Volcan railway, Chile, is actively progressing, some variation having been made in the line at the point where it crosses the Yeso river. On the Rancagua to Donihue railway the rails have been laid for a distance of about 6 miles, and on the Alcones to Pichilemu railway the work of corstruction is slowly progressing, while the Curico to Hualane railway will be completed about May 1, 1912.

DEFECTIVE BOX CARS AND DAMAGED FREIGHT.

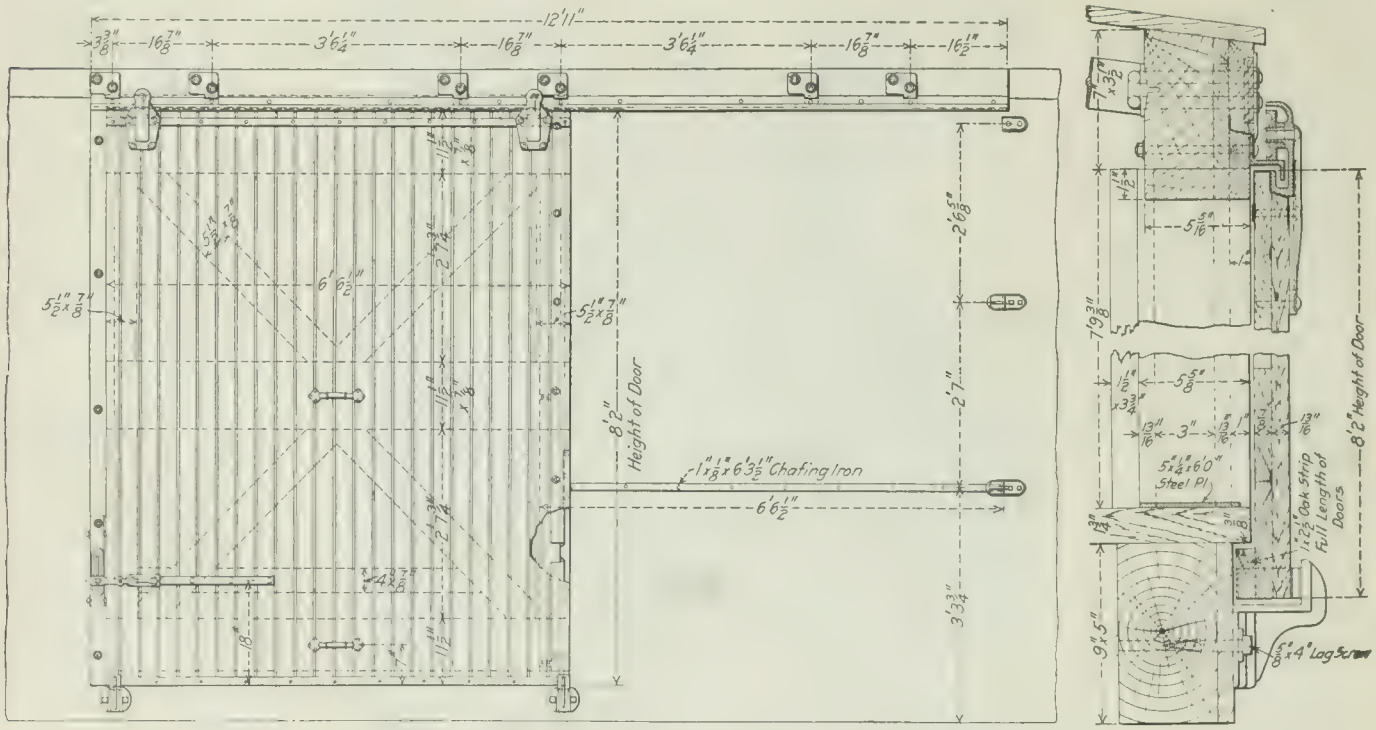
Second Article. Few Side Doors Are Cinder and Water Proof. How They Can Be Made So. A Good Grain Door.

The first article of a series on this subject appeared in the issue of April 12. The large amount of damage to freight due to defective equipment was considered at length, and the necessity for making box car doors burglar proof was strongly emphasized. This article, the second of the series, will consider the problem of making the doors cinder and water proof, and will also present methods of making the grain doors tight and of protecting flour against the entrance of cinders and water through the openings about the edges of the ordinary box car door, which is far from proof against these elements.

SIDE DOORS.

A satisfactory side door for box cars has four requirements. It must be rain proof, cinder proof, and burglar proof when first applied and should be so constructed as to remain in that condition indefinitely. One trip through a freight yard will demonstrate that very few of the doors on box cars meet all of these requirements, and yet each one of them is vitally important. A condition which is not at all unusual is shown in the photograph, Fig. 16. This view was taken inside of the car and while the door was locked and sealed; the crack at the rear is from 9/16 in. to ⅝ in. wide; and at the middle of the door at the bottom it is fully 1 in. wide. This door is not on an old car, but on one which was built within the past three or four years; a car, by the way, which was widely heralded at the time of its building, because of its light weight and supposedly superior construction. It may readily be seen that cinders and rain will have easy access to the car, which is a rather serious defect, particularly when it is loaded with flour, grain, or similar commodities.

A door which possesses a number of advantages from the standpoint of being cinder and water proof is shown in Fig. 15. It is an application of the Security door to an Atchison, Topeka & Santa Fe box car, and is illustrated, not because there may not be other doors just as good, but because it is used on a car which is better constructed from the viewpoint of protection to the contents than any other which has come to our attention. The U-strip at the end of the door, which fits over the flat strip on the rear door post, prevents any rain or cinders from getting into the car from that direction. It also obviates the necessity of using a burglar proof bottom door shoe or guide. The 1 in. x 2½ in. oak strip, which extends the full length of the door at the bottom, fits underneath the floor strip, which extends 1 in. beyond the side of the car, and forms a fairly dust-proof joint at the bottom. The door laps 1½ in. at the front, and this joint is possibly more open to criticism than any other feature of the door. If the door or the post should warp it might cause trouble, although it is doubtful if any serious damage is caused by the entrance of cinders or rain at this point. The door fixtures at the top of the door are said to have given good results. The precaution has been taken, however, of furnishing the heavy plate clamps at the top of the Z bar where the U-bolts are fastened, which hold the carlines in place.



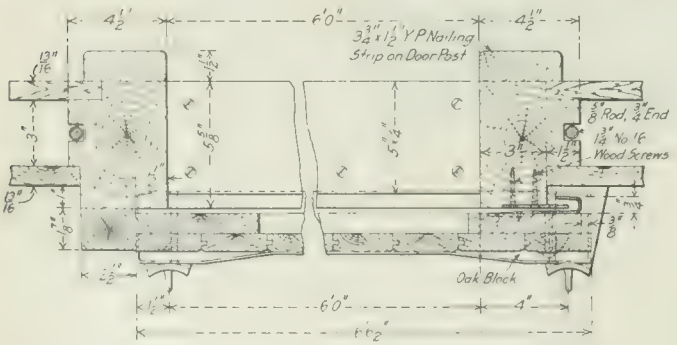


Fig. 15—Application of a Security Door to a Santa Fe Box Car.

A large number of the box car doors, which were examined on different classes of box cars, were found to be more or less badly warped out of shape, making it impossible to keep them in a tight condition, no matter how good the fittings might be. It is the practice on a number of roads to overcome this by placing angle irons, T-irons or wooden strips across the door, as shown

in Figs. 17 and 18. The best practice is to have two of these on each door, as shown, and to make them of metal, as the wooden strips are liable to warp. A Frisco car with a heavy angle near the bottom of the door is shown in Fig. 18. The present practice on that road, however, is to use two such strips, the upper one being placed about the same distance from the top as the lower one is from the bottom. A door with a wooden reinforcing strip is shown in Fig. 26.

Another common defect on box car doors is the splitting of the wooden door posts, as shown in Fig. 19. These views were not taken in the car repair yard, where the worst examples are usually found, but were taken in the freight yard and are typical examples of what can be found almost anywhere. Not only do these defective door posts allow the door to become loose and

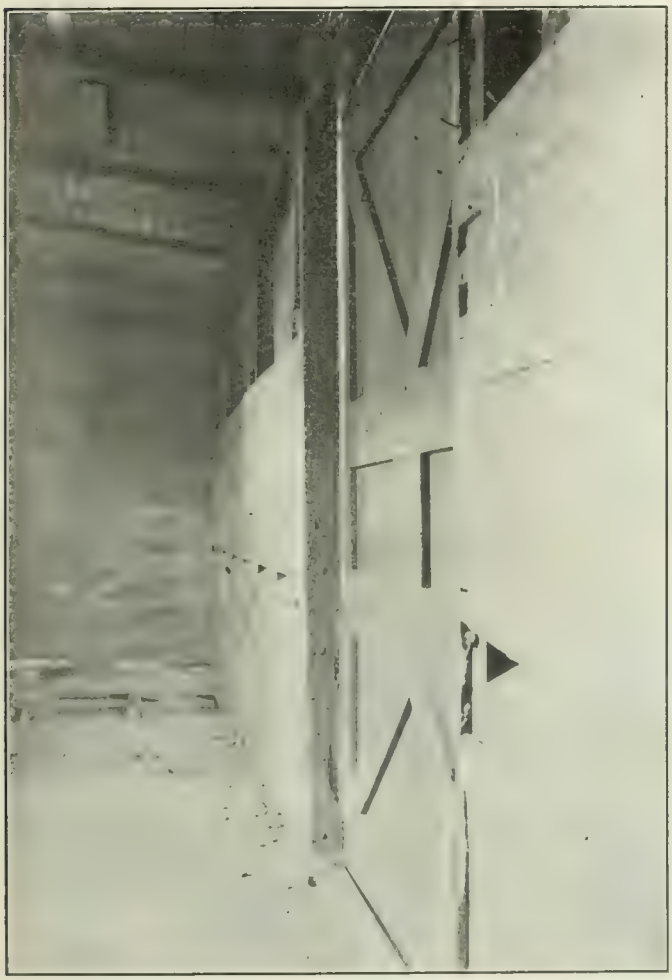


Fig. 16—Note the Cracks About the Door Which is Fastened and Sealed on the Outside.

to be easily pried open, but they are a serious problem from the maintenance standpoint, as they frequently have to be replaced, taking the car out of service and adding to the cost of maintenane. There are several ways of overcoming this, two of which are illustrated herewith. One of them, shown in Fig. 20, is a patented device and consists of a malleable casting which reinforces the door post.

Another scheme, which is used on the Santa Fe 36 ft. 40-ton box cars, is shown in the drawing, Fig. 21. The wooden door post is simply reinforced by a pressed steel angle, 14¾ in. long, 3/16 in. thick, and having legs 2½ in. and 1⅞ in. wide, so as to neatly fit the post. One flange is fitted into the side of the post adjacent to the door, while the other fits underneath the door post. This angle is secured to the door post by two ⅜ in. counter-sunk head bolts in addition to those which hold the post and the lock in place. Note that there is little danger of the door

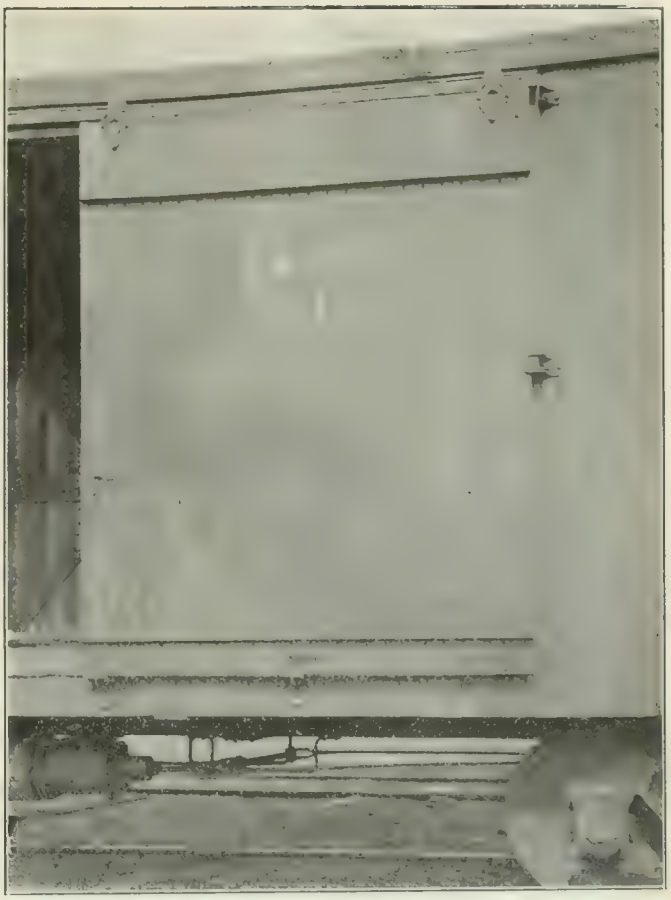


Fig. 17—Car Door Strengthened and Stiffened by Angle Irons.

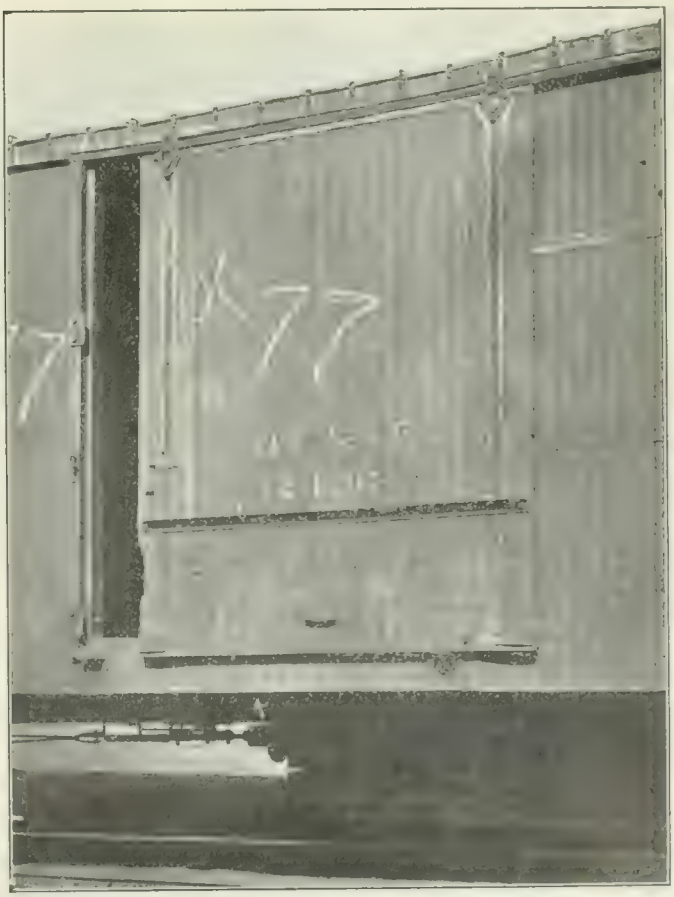


Fig. 18—A Frisco Car Door Reinforced with a Heavy Angle Near the Bottom.

hasp fastening being tampered with, as was described in our issue of April 12, without causing serious damage to the door, and at the same time leaving unmistakable evidence of its having been broken into.

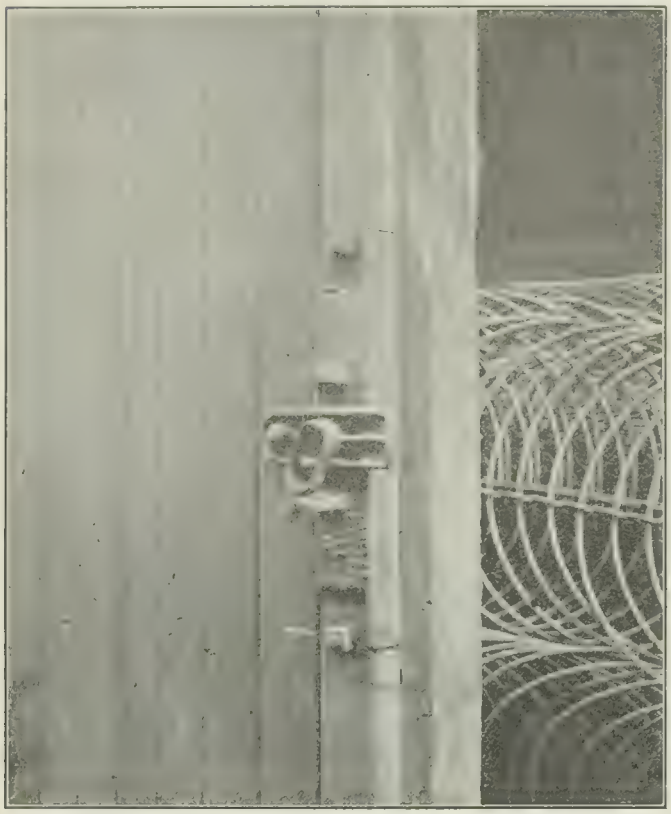


Fig. 20—A Patented Device to Reinforce the Box Car Door Posts.

GRAIN DOORS.

The following data concerning grain claims was developed by the freight claim agent of the Texas Lines of the Missouri, Kan-

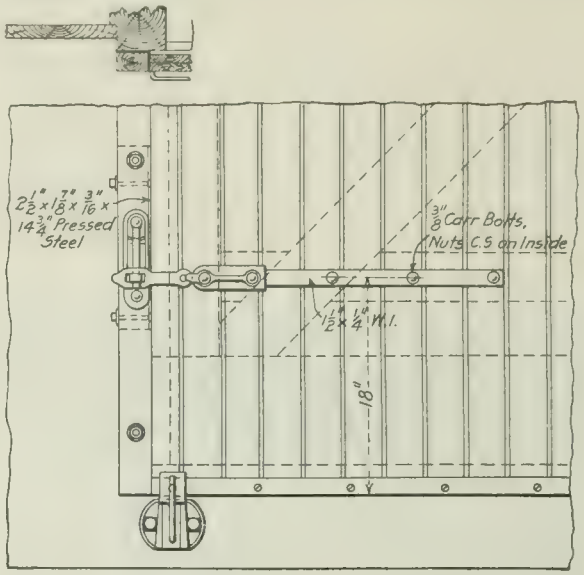


Fig. 21—The Santa Fe Method of Reinforcing a Box Car Door Post.

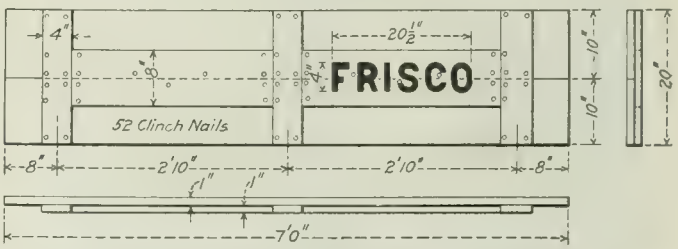


Fig. 22—Section of a Frisco Grain Door.



Fig. 19—Typical Examples of Cracked and Defective Box Car Door Posts.



Fig. 23—A Standard Frisco Burlap Covered Grain Door.

sas & Texas. A test inspection was made of 7,429 cars of grain, which were unloaded at the elevator of the Galveston Wharf Company, Galveston, Texas. Of these 4,859, or 67.4 per cent., were found to be leaking grain. About half of the leaks, or exactly 3,281, or 49 per cent. were grain door leaks. The other 51 per cent. were due to other defects.

To eliminate the leakage due to defective grain doors, the Frisco decided to make a radical change in the grain door. The doors formerly used cost from $1.50 to $2 per car, but for several reasons did not seem to give proper protection against the loss of grain. For instance, the nails were not always removed from the door post, thus preventing the grain door from properly fitting against it and permitting a leakage of small grain. The grain doors, although they were of the standard dimensions did not appear to be stiff enough and were often forced outward, allowing the grain to escape. When the grain was unloaded the door went back to its original position and did not appear to be defective. To overcome the difficulty the Frisco now uses grain doors similar to the one shown in Fig. 22. These are made of yellow pine, or well seasoned gum, as specified by the road. There are three battens on one side with cover strips between them, the battens and strips being secured with seven-penny wrought nails. Either two or three boards may be used, but they must be well battened. Three of these sections are used for each door and are nailed to the door post with eight-penny nails. Care is taken to see that they are fitted properly and have no holes in them. Strips of 8-oz. burlap, 8 ft. long and 40 in. wide are then fastened over the grain door, as shown in Fig. 23. The lower strip is allowed to lap over the floor for 10 or 12 in., but is not tacked to the grain door. The top strip laps over the lower one from 6 to 8 in., but must be tacked to the top of the grain door. The wooden strips, which are made of scrap material, are placed over the edges of the burlap (which extend 6 in. on either side of the door) and are nailed to the sides of the car, as shown.

A better idea of the arrangement of the grain doors and bur-

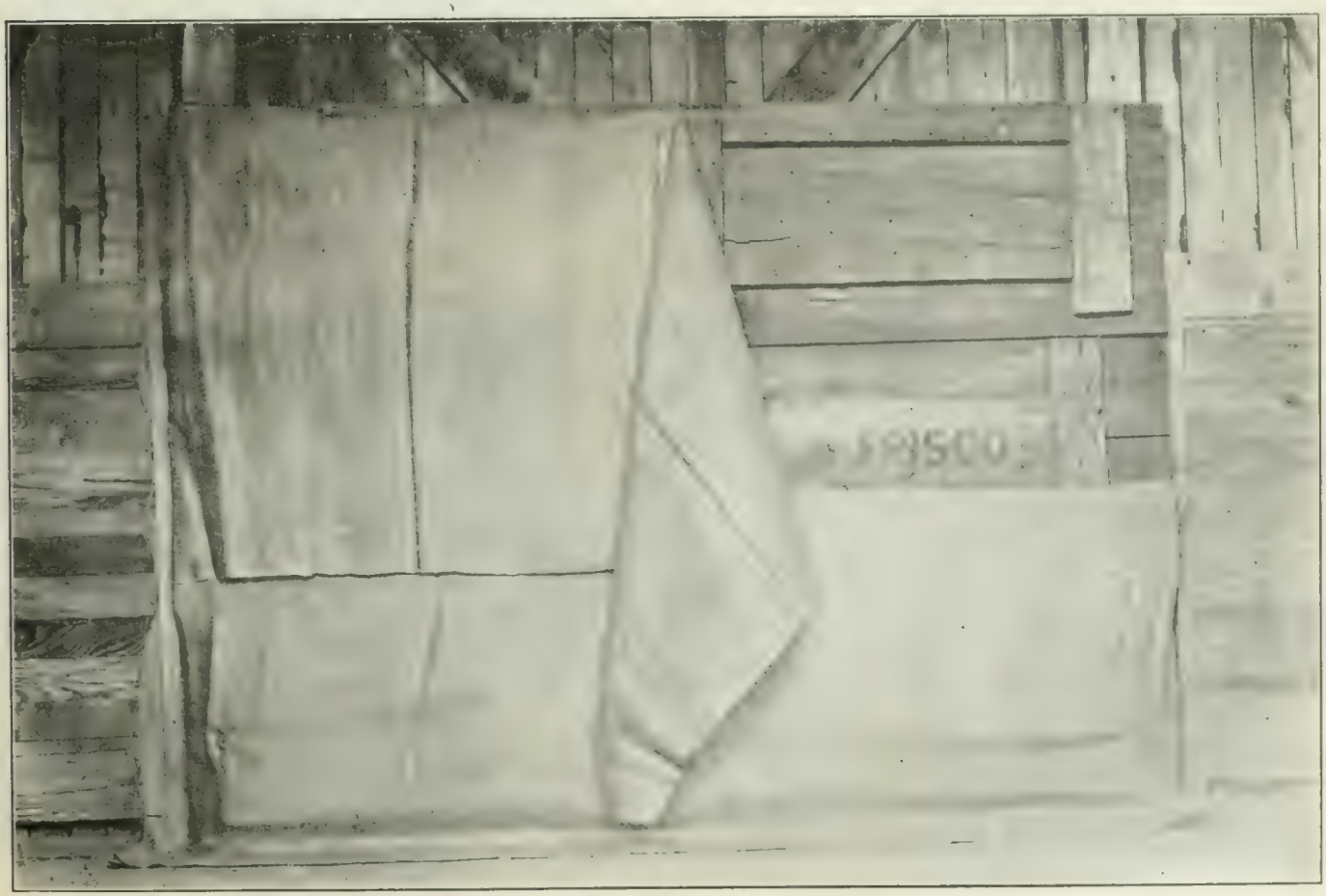


Fig. 24—Application of Burlap to Frisco Grain Door.

lap may be obtained from Fig. 24, which shows one corner of the upper piece of burlap loosened and drawn back, allowing a portion of the grain door to be seen. The burlap should be applied loosely, so that if the grain doors bulge out it will not be torn, but will remain grain proof. The grain doors and the burlap, including the nails and the wooden strips, cost about $2 per car. Each section of the grain door costs twenty-five cents, and usually six of these are required per car. The burlap, including the wooden strips and nails, costs about fifty cents. Some roads use a more expensive wooden door, costing about $.35 per section, or $2.10 per car, but it does not afford as good protection as the cheaper wooden door covered with the burlap.

Where the draft bolt passes up through the floor of the car pieces of burlap 3 ft. long and 40 in. wide are tacked over it. Also when the sides or ends of the car are in such shape that leakage of grain is liable to occur narrow strips of burlap are tacked on the side of the car and lap over on the floor, as shown in Fig. 25.

BOX CAR DOORS AND FLOUR.

It requires very little moisture and cinders to discolor and damage flour which is loaded in white cloth sacks. The average car door will not keep out a driving rain. The Frisco found that even though it might make its own box car doors water and cinder proof it would still be subjected to many claims of this sort, because of flour and mill products being loaded in foreign cars. The following scheme has been devised to make the doors water proof, and has greatly decreased the damages to this class of lading. The mills are furnished with water proof asphalt paper, wooden strips, nails and wooden wedges, and are asked to place them on the car at their own expense, as shown in Fig. 26. The water-proof asphalt paper is used in preference to tar paper, because the odor of the latter might damage the flour. A wedge is driven between each door shoe and the door, requiring two wedges for each door, or four for the car. This forces the door tightly against the side of the car, tending to prevent the rain and snow from entering. Strips of the asphalt paper, 11 in. wide, are then placed over the joint at the sides of the door and are held in place by thin strips of wood, which are nailed over the paper. The paper is not drawn tight, but is left loose, so that the distortion of the car and the door while in motion will not tear it.

The strips are sawed from scrap lumber at the company's shops. The cost is, therefore, nominal, including only the labor and the cost of the nailing. The wedges are also made from scrap material; they are necessary because doors were found which had from ¼ in. to 2 in. of play while the car was in motion, thus tearing the paper. The cost of the paper, nails and strips is only about twelve cents a car. The mills in most cases have been very glad to co-operate with the railway, and the flour claims have been practically eliminated on cars fitted up in this way.



Fig. 26—Frisco Method of Making Box Car Doors Tight for Carrying Flour.

Other precautions have also been taken in connection with the loading of flour, which will be considered in another part of this series of articles in connection with leaky roofs and sides of cars.

(To be continued.)

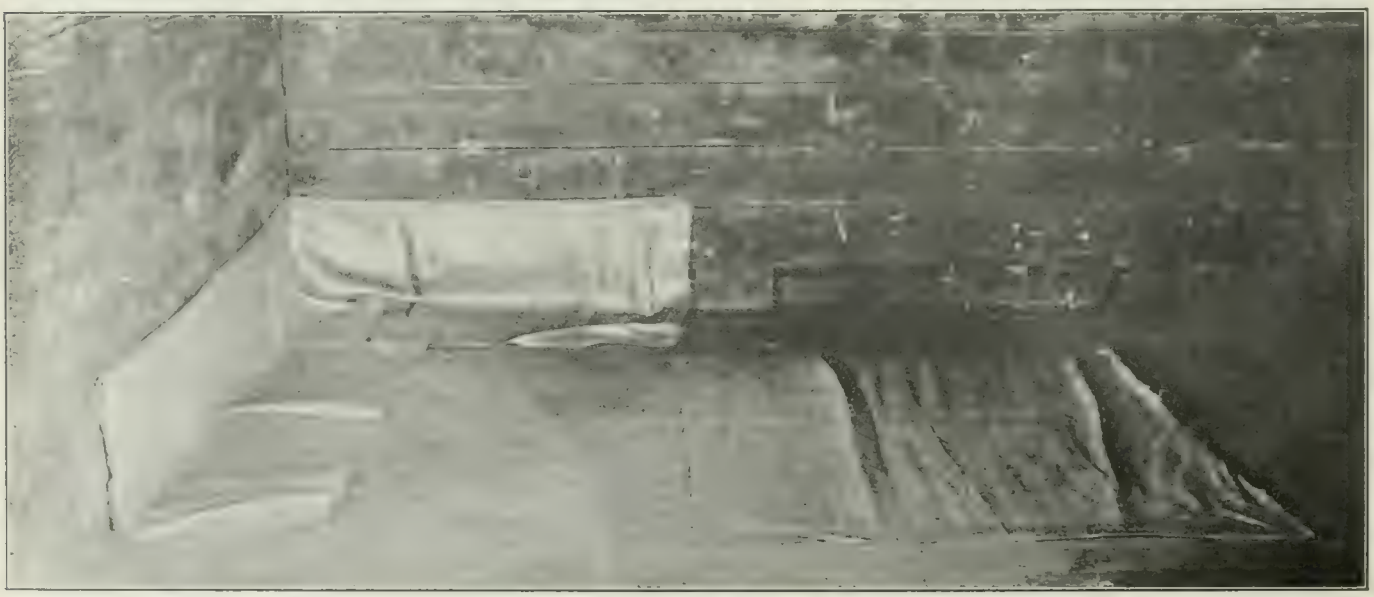


Fig. 25—Burlap as Applied to Prevent Leakage of Grain at King Bolt and Defective Sides or Ends of Car.

THE COST OF WORKMEN'S COMPENSATION TO THE RAILWAYS.

Edward Bunnell Phelps, editor of *The American Underwriter*, has issued a pamphlet reprinted from an article in that publication on the probable cost of workmen's compensation to the community and to various industries, based on the provisions of the proposed bill for the protection of interstate railway employees recommended by the United States Employers' Liability and Workmen's Compensation Commission, now pending before Congress, and the draft of a bill proposed by the National Civic Federation. Mr. Phelps calculates that from the voluminous report recently filed by the commission in connection with its bill, it is now for the first time possible to work out a reasonably specific estimate of what such a plan of workmen's compensation would cost in the case of the railways of the country, and that as railroading is conceded to be an exceptionally hazardous occupation, a safe maximum figure for the loss cost of the plan in the case of mechanical and manufacturing industries in general is thus made available.

From the data collected by the commission as to the previous experience of the railways in compensating for accidents, Mr. Phelps estimates that under the proposed bill the annual increase in cost to all the railways of the United States would be less than $2,750,000. The methods by which he has obtained this figure with reference to the railways are fully explained in the following excerpts from the article:

"Through the many courtesies of the chairman of the United States commission, Senator George Sutherland, of Utah, I have been able to obtain the text of the commission's report fresh from the presses of the government printing office. There are 8 pages of tables, closely set in small type, and the tabulations dealing with a total of 2,641,715 employees for three years are equivalent to a three-year record of 880,572 men, and 'represent the experience of railway companies operating approximately one-half of the total railway mileage of the United States, employing nearly 57 per cent. of all railway employees, excluding officers, and paying 59.3 per cent. of the wages of all railway employees, excluding officers, and cover the three years of 1908, 1909, and 1910.' Surely, so broad a tabulation of the industrial accident experience of American railway employees is fairly representative of the industry as a whole.

"I have endeavored to condense into the two tabulations hereafter given the real essentials for the purposes of this paper of all the 81 pages of tables actually presented in the commission's report. Table I summarizes the three-year accident and compensation experience of the railways employing nearly 57 per cent. of all the railway employees of this country, officers not included; and Table II presents a detailed analysis of that experience. In both cases the employees are grouped in five classes, Class A including those earning $125 and upward a month, Class B, those earning from $100 to $125 a month; Class C, those earning from $75 to $100 a month; Class D, those earning from $50 to $75 a month, and Class E, those earning less than $50 a month. With the figures thus grouped, the tabular summaries which I have compiled from the many tables in the commission's report are as follows:

Table I. A Summary of the Accident and Workmen's Compensation Experience of More Than One Half the Total Number (57 Per Cent.) of American Railway Employees for the Three Years, 1908-1910.

Wage Class.	Number of Employees (3 years).	All Accidents (disabling over 2 weeks). Number.	All Accidents (disabling over 2 weeks). Rate per 1,000 Employees.	*Compensation Cost (3 years). Settlements and Judgments.	*Compensation Cost (3 years). Expense of Administration.	Payroll (3 years). Aggregate.	Payroll (3 years). Annual Average Earnings.
Class A	125,724	4,726	37.59	$2,235,152	$388,417	$209,105,090	$1,663
Class B	189,202	9,625	50.87	3,052,441	616,708	226,938,448	1,199
Class C	386,670	19,868	51.38	5,128,272	1,185,750	355,223,518	919
Class D	870,185	28,631	32.90	4,465,612	1,269,074	606,403,633	697
Class E	1,069,934	25,632	23.95	3,059,154	1,245,637	435,643,909	407
Totals	2,641,715	88,482	33.49	$17,940,631	$4,705,586	$1,833,314,598	$694

*Total of amounts paid and amounts estimated for outstanding cases.

Table II.—A Detailed Résumé of the Number, Ratio and Cost of Fatal Accidents, Permanent Total Disabilities, Permanent Partial Disabilities, and Temporary Disabilities, in Each Class of American Railway Employees for the Three Years, 1908-1910.

Injuries.	Class A.	Class B.	Class C.	Class D.	Class E.	Total.
Fatal Accidents						
Number of deaths	417	721	1,414	1,510	1,886	5,948
Ratio per 1,000	3.32	3.81	3.66	1.74	1.76	2.25
*Compensation paid	$1,200,614	$1,261,094	$1,923,524	$1,710,632	$1,168,914	$7,264,778
Average payment	$2,879	$1,749	$1,360	$1,133	$620	$1,221
Annual payroll cost	.574%	.556%	.541%	.282%	.268%	.396%
Annual per capita cost	$9.55	$6.66	$4.97	$1.97	$1.09	$2.75
Permanent Total Disabilities						
Number of cases	15	48	81	71	64	279
Ratio per 1,000	.12	.25	.21	.08	.06	.11
*Compensation paid	$56,652	$277,808	$413,470	$256,132	$178,216	$1,182,278
Average payment	$3,777	$5,788	$5,105	$3,607	$2,785	$4,238
Annual payroll cost	.027%	.122%	.116%	.042%	.041%	.065%
Annual per capita cost	$0.45	$1.47	$1.07	$0.29	$0.17	$0.45
Permanent Partial Disabilities						
Number of cases	115	344	764	730	689	2,642
Ratio per 1,000	.91	1.82	1.98	.84	.64	1.00
*Compensation paid	$330,557	$632,049	$1,263,887	$874,695	$604,815	$3,706,003
Average payment	$2,874	$1,837	$1,654	$1,198	$878	$1,403
Annual payroll cost	.158%	.279%	.357%	.144%	.139%	.202%
Annual per capita cost	$2.63	$3.34	$3.27	$1.00	$0.57	$1.40
Temporary Disabilities (over 2 weeks)						
Number of cases	4,179	8,512	17,609	26,320	22,993	79,613
Ratio per 1,000	33.24	44.99	45.54	30.25	21.49	30.14
*Compensation paid	$647,329	$881,490	$1,527,391	$1,624,153	$1,107,209	$5,787,572
Average payment	$155	$104	$87	$62	$48	$73
Annual payroll cost	.310%	.388%	.430%	.268%	.254%	.316%
Annual per capita cost	$5.15	$4.66	$3.95	$1.87	$1.03	$2.19
All Deaths and Disabilities						
Number of cases	4,726	9,625	19,868	28,631	25,632	88,482
Ratio per 1,000	37.59	50.87	51.38	32.90	23.95	33.49
*Compensation paid	$2,235,152	$3,052,441	$5,128,272	$4,465,612	$3,059,154	$17,940,631
Average payment	$473	$317	$258	$156	$119	$203
Annual payroll cost	1.069%	1.345%	1.444%	.736%	.702%	.979%
Annual per capita cost	$17.78	$16.13	$13.26	$5.13	$2.86	$6.79

*Total of amounts paid and amounts estimated for outstanding cases.

"As will be noted by reference to Table II, the compensation for accidents actually paid in the three years 1908-1910, in the form of both judgments and mutually-agreed settlements, by the railways employing more than one-half of all railway workers in this country, averaged $1,221 for fatal accidents, $4,238 for permanent total disabilities, $1,403 for permanent partial disabilities, $73 for temporary disabilities, or $203 for all of the 88,482 accidents of all kinds figuring in the returns. The total compensation paid amounted to .979 per cent. of the annual payroll of the 880,572 employees in question, or an annual per capita cost of $6.79. If the expenses of administration, including nearly $1,250,000 of court costs and attorneys' fees, were to be added to the compensation paid, the aggregate cost to the railways in question of workmen's compensation in the three years 1908-1910 was $22,646,217, or 1.24 per cent. of the total payroll of $1,833,314,598, or an annual per capita cost of $8.57.

"The figures on which these showings are worked out, dealing with about 59.3 per cent. of the wages of all railway employees in this country, officers excluded, presumably the total annual cost of the system in question of workmen's compensation, exclusive of administration expenses, for all the railways of the United States, would be $10,084,672, or $12,729,745 if administration expenses were to be included. The United States commission calculates that the enactment of the bill introduced by it would increase the compensation cost by about 25 per cent., and thus bring the total annual output for workmen's compensation of practically all American railways up to approximately from $12,000,000 to $13,000,000. This would mean an annual compensation cost of about 1.22 per cent. of the payroll, or about 1.54 per cent. of the payroll for both compensation and administration expenses should the administration expense ratio remain the same as formerly. Of course, the last-named possibility is extremely remote, as one of the fundamental purposes of the workmen's compensation movement is to practically eliminate the heavy court costs and attorneys' fees involved in the litigation of industrial accident claims. In any event, it would therefore seem to be safe to assume that the outside annual cost of both compensation and administration expenses to the railways of the plan recommended by the commission would not exceed 1.5 per cent. of the payroll.

"It seems to me that this process of reasoning establishes a bed-rock figure for the probable outside cost to American industries in general of even such an extremely liberal workmen's compensation act as that which Congress is now considering. And the bill in question, mark you, provides for compensation for all occupational accidents to railway employees disabling for over two weeks, and not self-inflicted or resulting from intoxication while on duty; for as high as fifty per cent. of the victim's wages for eight years in some cases for fatal accidents; for fifty per cent. of the injured man's wages for the remainder of his life in case of total permanent disability; for fifty per cent. of the wages for anywhere from four months to six years in the case of specified permanent partial disabilities; and for fifty per cent. of the wages for temporary total disabilities. Apparently even a system of compensation so liberal as this would not cost the railways at the outside, expenses included, over 1.5 per cent. of their annual payroll.

"The cost in 1908-1910 of the present system of compensation for occupational accidents, administration expenses included, having amounted to 1.24 of the payroll, or $22,646,217, an increase to a cost of 1.5 per cent. would mean an actual total increase in three years of less than $5,000,000 to the railways whose returns figure in the preceding tabulations, or an annual increase of a trifle less than $2,750,000 for all the railways in the United States. This fact would seem to demonstrate conclusively the absurdity of the cry heard in some quarters, that the introduction of workmen's compensation would prove ruinous to the great industries of this country.

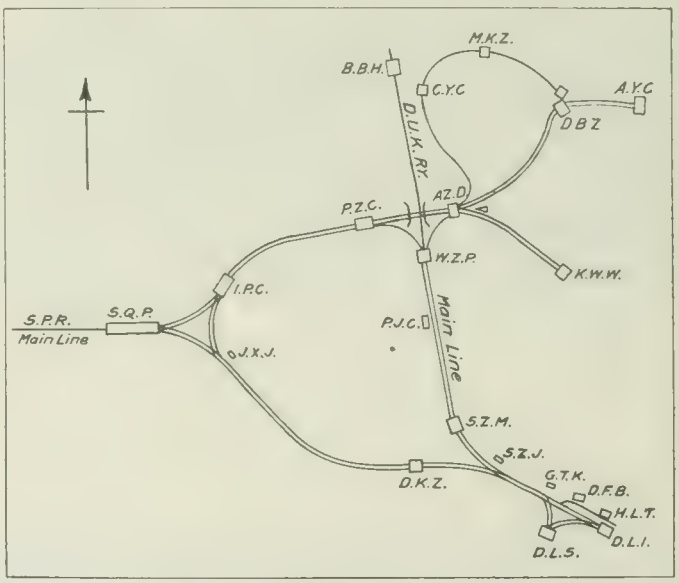
"A complete shift to the public by American railways of the entire presumable cost of the United States Commission's plan of workmen's compensation, as the Commission figures it out, would add 89/100 of 1 per cent. to the operating expenses of the railway service of this country—had not a large part of the cost already been included in their expenses for the last three years. Even if the entire 89/100 of 1 per cent. were to be added, and the cost evenly distributed all along the line, the man who had been paying $50 for a railway ticket, or for the use of a freight car, would be asked henceforth to pay precisely $50.45 for that same service."

HANDLING THE TRAFFIC AT THE DELHI DURBAR.

BY LEWIS R. FREEMAN.

Neither in rolling stock, in the shops, nor yet in their systems of management do the railways of British India reflect American influence; considering which it will be of especial gratification to American railway men to learn that the success—I may, indeed, term it a triumph without exaggeration—of handling the enormous traffic incident to the late Delhi durbar is largely credited to an improved American system of despatching—the A B C system—an innovation which was looked upon with many misgivings by those not familiar with it, but which, nevertheless, stood the test of one of the most intense rushes in the history of world railroading.

The Curzon durbar of eight years ago, while a pronounced success from a spectacular standpoint, was a chaos on the score of management, and especially that of transportation; the late



Delhi Durbar Railway; Broad Gage Lines.

durbar, profiting by the mistakes of its predecessor, was made an absolute military marvel of management, and the masterly handling of the great volume of extra traffic is generally credited with being the principal factor in this most felicitous consummation.

"I believe," said Sir Henry Burt of the Northwestern Railway, in a conversation I had with him in Lahore a short time ago, "that the preparations we made for handling the durbar traffic were quite without precedent for an event of the kind. In America and Europe greater trackage and more elaborate terminal facilities have been provided for several of the great expositions which have run for six or eight months, but, to my knowledge, nothing so complete as our installation has ever been attempted for an event lasting but ten days."

This is undoubtedly a well-advised and conservative statement, and to it I may add that at no one of the great American expositions of the last two decades, not even that at St. Louis, have the extra railway facilities—both trackage and stations—been

constructed with so much of an appearance of permanence and borne so little of the suggestion of "makeshift."

The problem presented for solution to those in charge of the durbar traffic arrangements was practically unique. Delhi is situated 900 miles to the northwest of Calcutta and the same distance northeast of Bombay, the two points from which the greatest streams of traffic were to come. The city, which is a kind of clearing house between the rich and fertile Punjab and the eastern and western coastal ports of India, is served, directly or indirectly, by a half dozen railways, and, in normal times, has ample station and track facilities. The population—225,000—is almost exclusively native, the permanent civilian European residents probably not exceeding a hundred or so. There are but three or four small hotels, and at ordinary times a hundred tourists, arriving unannounced, would have difficulty in finding comfortable accommodations. It was upon such a place that the durbar was to result in the sudden dumping—no other term so well describes the precipitancy of the invasion—of 200,000 people, more or less, all of whom must be housed and fed and entertained for ten days and then, even more suddenly than they were brought, be picked up and carried away again.

The difficulty of the transport problem arose from the character of the gathering rather than from the mere size of the crowd to be handled. The East Indian Railway annually puts down at, and takes away from, Allahabad over a million people for a single Hindu festival in January, and this so smoothly that the casual traveler by that ably-managed line would hardly be aware that anything greatly beyond the normal traffic was being handled. But these pilgrims, for the most part, are third class passengers, carrying the greater part of their luggage on their heads or under their arms. The durbar involved the actual creating of a city covering 25 square miles, to be almost, if not quite, as densely populated as the average American or European city of the same number of inhabitants. Moreover, it was to be a city of palaces—canvas palaces, to be sure, but not any the less splendid in the elegance and comfort of their interiors.

The site of the durbar camp was a bare and treeless plain to the north of the city, and all that could be done on the spot in the way of beautification was to grade the roads and drives and seed down the lawns; everything else that went to make up this marvelous ten-day city had to be brought by train or by cart from a distance. The potted chrysanthemums for the gardens of a single one of the hundred or more camps of the native princes could not be carried on a single goods train, and the 2,000 motors in use during the durbar must have required a score or more of specials. All of the provincial camps were small towns in themselves, often covering close to a quarter of a mile square, and having their own ball, billiard and reception rooms and wide drives and spacious lawns.

Titanic as was the task of building up the great camp itself, it was not there that the real rub was to come, for most of that work could be extended over weeks if not months; nor yet was it in the bringing in of the fifty thousand soldiers, this being a comparatively simple piece of unrushed mobilization and concentration. It was in the handling of the great streams of passenger traffic on the days immediately preceding and following the durbar that the real test of the transportation facilities was to come, the times at which there was such hopeless chaos at the Curzon durbar.

The king, the viceroy, and the governors and lieutenant-governors were to come in specials; likewise several score of the native princes, while a large part of the tourist influx was to be handled in extra trains routed direct to the durbar camp. Long before the durbar the railway people were confronted by the appalling problem presented by the certainty of having to send well over a hundred trains a day into Kingsway (the main durbar camp station), where the maximum number that could be handled using the regular Indian "line-clear" [manual block] system, with the utmost facilities practicable to provide, was about eighty. It was at this juncture that Major H. F. E. Freeland R. E., of the Northwestern Railway and traffic manager of the Delhi Durbar railway, came forward with a proposal to install a system of despatching by telephone, similar to one he had observed while traveling in America several years ago.

The amazing smoothness with which the railway traffic—which turned out even heavier than had been anticipated—was handled was one of the marvels of the durbar, and how much of this success was due to the new system of despatching may be gleaned from the following extract from a letter which Major Freeland has courteously written me on the subject.

"I am pleased to hear that you were interested in my control station at Kingsway. Without it we could never have handled the extremely heavy traffic offered to us, and by us, through three big junctions—Delhi Main, Delhi Sadar and Shakurpur, to say nothing of the minor junction of Dazirpur.

"That the control system adopted here has enabled us to handle 170 trains in 19 working hours, between Delhi and Brewery Cabin, as against the maximum previously attained of 84 trains in the same time, speaks for itself. The great advantage of the system lies in the fact that we have absolutely reliable visual indication [on the train sheet] of the position of any train at any moment, and knowing the running time between stations or signal boxes, the control operators have thus been enabled to take intelligent action to move the traffic under the varying conditions inseparable from all railway working. Normally Indian railway trains are worked from station to station by "line clear," or by some electrical substitute therefor, and when once a train leaves a junction its subsequent movements are, in this country, dependent on the idiosyncrasies of the Indian station master at each point, uncontrolled by European supervision.

"While in America in the winter of 1908 I was enabled, by the courtesy of Mr. W. H. Boardman, editor of the *Railway Age Gazette,* to pay a visit to Spokane, where I found in operation a system of train operation evolved by Mr. A. Beamer, superintendent of the Northern Pacific, which system is practically a combination of the American train despatcher and our Indian line clear system. It is called by Mr. Beamer the A. B. C. system, on account of its simplicity, I presume. This system I have elaborated, with the assistance of Mr. E. A. Scott, signal engineer, Northwestern Railway, and although our telephone arrangements have been somewhat out of date, the train movements accomplished and controlled have far transcended even my hopes. I can say, without undue boasting, that if the control had not been established we could not have dealt with the traffic, and I must add that I owe all the success attained to the loyal co-operation of the control and operating staff. The system is to be adopted on certain single lines with heavy traffic on the Northwestern Railway, and I understand that other prominent Indian railways are also favorably impressed."

In addition to the control system of which Major Freeland writes so enthusiastically, a measure which operated strongly to prevent confusion in the great rush of departure was a hard-and-fast rule requiring that, unless absolutely necessary, no one of the almost countless specials should be broken up after its arrival. Many miles of siding were built to accommodate these trains, and there they were stabled until their schedule time of departure arrived, thus completely avoiding the delays and confusion of the endless shunting which would otherwise have been imperative.

Another rule which was an important factor in preventing at Kingsway the appalling congestion so characteristic of Indian station platforms when there is any rush of passenger traffic, was that requiring that all luggage should be removed within half an hour of its arrival. In America, where one may obtain anything he desires at a few moments' notice by simply calling up and asking for it on a telephone, a man may—and often does—set out and travel across the continent and back with nothing but a hand bag. In India, where one must often carry with him everything from knives and forks to bed, tent and bath tub, one rarely leaves home for over night without taking with him a small mountain of luggage. As there are no regularly author-

ized transfer companies, luggage means coolies, and coolies mean confusion; and a stranger will find that he has never realized the meaning of that word until he has seen an Indian railway platform. Lines of coolies mix and mingle, mountains of luggage topple over upon each other, and, with every other coolie watching his chance to make off with a package on his own account, one is lucky indeed if he emerges from the melee with everything that he took into it. It is a common saying in India that visitors to the Curzon durbar are still engaged in trading back their mixed up luggage.

The cool shaded platforms and the roomy, comfortable waiting rooms are largely responsible for the confusion in stations at rush times—through making it convenient for passengers to take ten or twelve hours in getting away. By the simple expedient of providing very spacious but unshaded platforms, doing away entirely with waiting and parcel rooms, and requiring that luggage should at once follow its owner out of the station this annoying difficulty was obviated to such an extent that one found elbow room at Kingsway at the times of the heaviest rush. The handling of the durbar traffic was an illuminating example of what sane, intelligent prevision can accomplish, and to me it has been one of the most interesting features of the great gathering.

In addition to its broad gage line connecting with the several trunk lines to Delhi, the Durbar Railway Company built and operated nine miles of double track narrow gage line on which was shouldered the bulk of the local passenger traffic between Delhi and the camp, and between the various points within the camp. The track materials were lent by the Indian government, and were drawn from the large stock that is kept ready along the Northwestern frontier against the time when it will be necessary to throw a British army into Afghanistan. The construction work was thoroughly and expeditiously performed by companies of miners and sappers from the army, who demonstrated their ability as practical and efficient railway builders by their quick work. The main branch of the line was practically stone ballasted throughout, and the one over-bridge, where the great thoroughfare called the mall was crossed, was an unusually solid piece of construction. It is the largest piece of work on the line and necessitated great labor throughout the hot weather in rock cuttings and embankments along the top of a ridge, with an interlocked junction and signal cabin at Ridge Junction. The bridge itself is 60 ft. span double pin Warren girders, to carry the two tracks, with a ten-foot pathway on the north side of the road; and is built with quarried stone abutments and pier.

From the nature of the work of this line—that of carrying passengers for short distances—grade crossings could not be avoided, and on one branch of the line there were 20 of these, and on the other 21. A hundred soldiers and fifty coolies were on duty at the crossing gates, and so efficiently was their work done that not a single accident is recorded. At two of the stations overhead crossings were provided, and a soldier was on hand at each side to see that they were used. The stations were small but well constructed of brick, and at several of them attractive lawns and gardens were laid out and kept up.

The comfort of the passengers was heightened by the use of coke as fuel on the engines, and by the thorough oiling of the track. The rolling stock, like the track, came from the frontier, and though the cars were small and the seats hard, the train proved preferable to all other means of conveyance on account of the congestion of traffic on the streets. The fare for any distance was one rupee (32 cents) for first-class passengers, and four annas (8 cents) for the lower class, with higher charges for passage on special occasions. This little line proved very useful in relieving both the main lines and the wagon roads of much burdensome traffic, and I shall not be surprised to hear that it has paid for itself and left a handsome surplus.

Since the decision of the government to move the capital of India to the site of the durbar camp has been announced orders have been issued that nothing is to be done for the present toward removing the railways that were built to serve the camp, and there would seem to be little doubt that the Delhi Durbar Railway will become a permanency and play quite as important a part in the creating of the new capital as it did in making a success of the record-breaking coronation durbar of 1911.

The broad gage lines of the railways are shown in the accompanying sketch, not drawn to scale. The distance D. K. Z. to J. X. J. is 3 miles; from I. P. C. to P. Z. C. 1¼ miles. At the most important signal cabins four operators were employed, their periods of service being six hours each. A temporary book of rules was issued in which provision was made for the use of the simple manual block system in case the communication with the despatcher (controller) should be cut off. Each order of the controller was verified by cipher, the cipher word being the last in each order.

TECHNICAL MEN IN THE CAR DEPARTMENT.

The necessity of giving more attention to the car shop apprentice was discussed in an editorial in the *Railway Age Gazette* of March 15, 1912, page 463. J. T. Wallis, general superintendent of motive power of the Pennsylvania Railroad has furnished the following information concerning the car shop apprentice course on that system:

"We have in the car department an apprenticeship leading to the trade of car builder. In addition, our first class regular apprentices at the Altoona machine shops, who are graduates of high or manual training schools, spend five months of their course in the car shops, and the special apprentices, who are appointed from among the graduates of technical schools, spend seven months there, their time being divided between the passenger car shop, steel freight car shop, cabinet shop, outside repair tracks and car inspecting.

"Applicants for appointment as special apprentices must be graduates of technical schools and under 25 years of age at the time of appointment. A man desiring to apply, fills out one of our standard application blanks and sends it to us accompanied by his photograph. If, on looking over his application, he appears to be eligible, we ask him to come to Altoona in order that we may have an interview with him and show him through the shops, after which his name is placed on our list, from which, each year, we select a limited number of applicants. Priority of application has some weight, but we reserve the right to select from our list those applicants who impress us as being the most desirable.

"The rates of pay per hour of the special apprentices and the time spent in each shop are as follows: First year, 17.9 cents; second year, 20.6 cents; third year, 23.1 cents; fourth year, 25.7 cents. The time in the various shops is distributed as follows:

Erecting shop	6 mos.	Boiler shop	1 mo.
Machine shop No. 1	4 mos.	Electrical department	3 mos.
Miscellaneous shop	1 mo.	Engine house	4 mos
Machine shop No. 2	2 mos.	Firing	3 mos.
Air brake shop	2 mos.	Store house	1 mo.
Blacksmith shop	1 mo.	Shop clerk's office	2 mos.
Iron foundries	2½ mos.	Motive power clerk's office	1 mo.
Car shops	7 mos.	Special duty	7 mos.
Brass foundry	½ mo.	Total	48 mos.

Practically all of our master mechanics have had some experience in the car department."

Another large railway reports that in the summer time it is obliged to lay off large numbers of shop men on account of the lack of work, especially after the winter work of repairing, painting and cleaning passenger equipment ready for the excursion season is over. It is difficult, therefore, to add to the payroll in the summer season. The superintendent says, "We have no objection to employing college graduates provided they intend to stay and go to work the same as the rest of us. Our experience has been that the special apprentices we have taken care to educate have not remained with us, and I have not found that any of them want to go into the car department, as they have larger ideas in the way of advancement."

Maintenance of Way Section.

THE warm weather of the past two weeks has stimulated spring track work, and preparations are being very generally made to begin the heavier work of the season. One roadmaster on a main line district near Chicago already has four steel gangs relaying rails, and gangs are being put on all over the country. A discussion of the proper organization and use of extra, or floating, gangs is, therefore, most timely now. If the best results are not being secured a discussion of the reasons and means of overcoming them will be valuable. The experiences of those who have changed the handling of their gangs in some way with good results may be instructive to others. Those planning to send contributions to the contest on the extra gang problem, which was announced in our issue of March 15, should do so promptly, as contributions must be received not later than April 25 in order to be considered by the judges. We will pay $25 for the best and $15 for the second best papers submitted on this subject, while others accepted and published will be paid for at our regular space rates. All contributions should be sent to the civil engineering editor of the *Railway Age Gazette,* 417 South Dearborn street, Chicago.

THE next contest will be on Bridge Kinks, and will include kinks of any kind applicable to either maintenance or construction work in the bridge department. Those kinks relating to bridge and concrete work which were excluded from the construction kink contest last fall are eligible at this time. A description of any method or device which will prove economical of either time or money, and connected with the construction, maintenance or repair of either permanent or timber bridges, will come within the limits of this contest. The construction of concrete piers or arches in isolated places where it is difficult to install extensive equipment, or where it is not economical to do so because of the limited amount of work to be done, frequently afford opportunities for much ingenuity. The unusual floods of the past few weeks in several parts of the country, which have washed out many bridges and sections of track, have given rise to many kinks of another kind. The repair or renewal of structures under traffic also introduces complications and the necessity of doing work between trains frequently renders the adoption of special methods necessary. These suggest but a few of the many kinds of kinks used in the bridge department, and it is hoped that our readers will send them in for publication. We will pay $25 for the best and $15 for the second best kinks submitted, and will pay our customary space rates for other contributions accepted and published. All contributions must be in the hands of the civil engineering editor of the *Railway Age Gazette,* 417 South Dearborn street, Chicago, not later than June 25.

STUDIES of various phases of the economics of maintenance labor have been assigned to the committees on Track, Roadway, and Signals and Interlocking of the American Railway Engineering Association, as mentioned elsewhere in this issue. Although the increasing importance of this subject has been realized by a majority of the officers and members of the association, active interest was focused on it by the recommendation of L. F. Loree, president of the Delaware & Hudson, in his address prepared for the recent annual dinner of the association. Mr. Loree pointed out that of the $300,000,000 annually spent for maintenance of way in this country, about 56 per cent. is paid to labor, and his specific recommendation was that a committee on Maintenance of Way Labor be created to "investigate the conditions of employment of, and the relation of, maintenance of way labor to, reasonable supply and demand; and to consider questions of economic organization, education, discipline and equipment of forces for various kinds of work." The Board of Direction has decided to divide this study among three committees already established whose work is most closely connected with the labor problem rather than to create a new committee to study labor alone. The rank and experience of the members of these committees make them well fitted to handle the subject, and their reports should prove as valuable as any ever presented to the association.

SPECIAL attention is called to the article by Mr. Morse on Rail Failures Due to Eccentric Loading, which is printed in a preceding part of this issue of the *Railway Age Gazette,* rather than in the Maintenance of Way Section, because of its interest to mechanical as well as operating and engineering men. The point raised by Mr. Morse, that many rail failures are due to the eccentric loading resulting from the coning of the wheels, is worthy of careful consideration now, when the entire subject of rail failures is receiving so much attention. With the heavy service now required of rails, it is not advisable to increase the loads on them any more than is necessary; and unless some definite benefit is gained by the present coning of the wheel it would appear best to deliver the load from the wheel as nearly as possible over the center of the rail. That the advantage derived from coning the wheel is largely a theoretical one is attested by an examination of wheels after a short time in service. In this connection it is interesting to note in Forney's Catechism of the Locomotive, 1911 edition, the statement that the conical form of the wheels does not have much influence on their action on curves, as the axles of the two pairs of such wheels are held parallel to each other in a truck frame; also, as the influence of the conical form of the wheel diminishes as the distance between the axles increases, the effect of the coning is almost if not quite inappreciable. A conference between the proper committees of the Master Mechanics', the Master Car Builders' and the American Railway Engineering Associations to discuss the necessity for the coning of the wheels, as well as the proper curve for the top of the rails, might result in beneficial changes in both.

THE contest on the Section Foreman Problem, which has just closed, was the most successful one conducted thus far in the Maintenance of Way Section, both in point of the number of contributions received and the quality of the material in the contributions. Because of the large number of papers sent in the work of the Judges, H. G. Hetzler, president Chicago & Western Indiana; H. J. Slifer, general manager, Chicago Great Western, and E. P. Bracken, assistant general manager, Chicago, Burlington & Quincy, was more than usually difficult. After a careful study of the papers they awarded first prize to A. E. Hansen, roadmaster Atchison Topeka & Santa Fe, Topeka, Kan., and second prize to George E. Lowe, supervisor Delaware, Lackawanna & Western, Elmira, N. Y. Other papers were received from Sam Lincoln, roadmaster G. C. & S. F.; Temple, Tex.; L. W. Strayer, maintenance of way department B. & O., Pittsburgh, Pa.; John Carmichael, Baltimore, Md.; George J. Sharkey, chief clerk supervisor of track's office N. Y. C. Lines, Kingston, N. Y.; J. T. Bowser, chief clerk maintenance of way Q. & C., Danville, Ky.; C. C. Cook, division engineer B. & O., Philadelphia, Pa.; C. Clay, A. T. & S. F., East Las Vegas, N. M.; T. W. Whitney, supervisor N. Y. S. & W., Blairstown, N. J.; Edgar W. Walsh, roadmaster C. & N. W., Ironwood, Mich.; L. Brumaghim, supervisor of track N. Y. C. & H. R., Kingston, N. Y.; A. Swartz, division engineer Erie, Huntington, Ind.; W. K. Walker, division engineer M. P., Wichita, Kan.; P. J. Keenan, supervisor Erie, Cuba, N. Y.; B. A. West, roadmaster A. T. & S. F., Pueblo, Colo.; F. E. Crabbs, roadmaster C. & N. W., Chicago; P. H. Hamilton, S. L. & S. F., Pittsburg, Kan.; S. B. Peter, roadmaster S. L. & S. F., Pittsburg, Kan.; Wm. E. Bohl, fore-

man A. T. & S. F., Belpre, Kan.; C. C. Henkel, section foreman Erie, Paterson, N. J.; P. J. M. Weslyng, roadmaster A. R. & I., Lethbridge, N. W. T., Canada; C. King, supervisor Long Island, Jamaica, N. Y.; E. W. Gulley, roadmaster C. R. I. & P., El Reno, Okla.; J. W. Foote, division engineer N. Y. S. & W., Jersey City, N. J.; E. R. Lewis, division engineer M. C., Bay City, Mich.; M. Henry, supervisor C. & E. I., Salem, Ill.; J. D. Archibald, assistant supervisor N. C., Baltimore, Md.; M. Ganley, roadmaster A. T. & S. F., Argentine, Kan.; J. F. McNally, assistant superintendent A. T. & S. F., Chanute, Kan.; James Sweeney, supervisor C. & E. I., Danville, Ill.; D. C. Baird, supervisor P. R. R., Reading, Pa.; W. W. Greenland, assistant engineer Wabash, Moberly, Mo.; P. J. McAndrews, roadmaster C. & N. W., Belle Plaine, Ia.; Arthur Jung, roadmaster A. T. & S. F., Newton, Kan.; W. H. Cleveland, roadmaster A. T. & S. F. Wellington, Kan.; E. J. McVeigh, storekeeper G. T. Ottawa, Ont.; William J. Potter, University of Pennsylvania, West Philadelphia, Pa.; B. M. Hudson, T. & B. V., Teague, Tex.; A. W. Kauffman, M. W. & S. clerk P. R. R., Oil City, Pa.; F. H. Carpenter, roadmaster A. T. & S. F., Hutchinson, Kan.; J. E. Tobin, roadmaster I. & G. N., Houston, Tex.; M. B. Whitney, San Francisco, Cal.; J. L. Taylor, assistant division engineer G. R. & I., Ft. Wayne, Ind.; E. M. Lewis, assistant engineer C. G. W., St. Charles, Ill.; James Ryan, Jr., supervisor C. & E. I., Villa Grove, Ill.; John C. Pierson, Meadville, Pa.; D. F. Harvey, supervisor P. & L. E., Beaver Falls, Pa.; Jos. J. Morgan, storekeeper N. Y. C. & H. R., Kingston, N. Y.; F. M. Patterson, assistant engineer C. B. & Q., Chicago; V. P. Drugan assistant supervisor B. & O., Philadelphia, Pa. A number of these papers appear in this issue and the others will be printed in early succeeding numbers.

WATERPROOFING.

WHILE the waterproofing of engineering structures has received great attention within recent years, and has been much discussed, it must still be regarded as largely in an experimental stage. The most rapid development of waterproofing has occurred within the last few years, and it has received its greatest impetus from the large amount of track elevation work done where it is necessary that the streets below the structures be protected from seepage of any kind from the tracks above. As is to be expected during the rapid growth of any industry, numerous products and methods of widely varying effectiveness have appeared. The discussions for the most part have centered about the relative merits of these different products. For this reason the paper by Mr. Finley, which appears in this issue, is especially valuable, as it discusses the broader problem of waterproofing, including protection against the disintegration of masonry by water as well as the prevention of the passage of water through the structure. While the usual idea of waterproofing is that of a means to prevent water from passing through a structure, Mr. Finley was first drawn into a study of this subject by the disintegration of masonry structures by water, and the first waterproofing he did was to prevent water from disintegrating stone arches. This is one application of scientific waterproofing which is frequently not considered.

The most important point emphasized in Mr. Finley's paper relates to the proper design of a structure for waterproofing. Waterproofing is but a means to an end, and the water itself must be disposed of as quickly as possible. While the general practice has been to slope the surface of the bridge from the center towards each end and to conduct the water down behind the abutment, this is in many cases not the best method. On large structures it frequently means the accumulation of a large amount of water which could be disposed of more readily by the construction of down spouts along the curb lines or at other points. By decreasing the amount of water present the burden on the waterproofing is correspondingly reduced. After designing to dispose of the water as quickly as possible, the structure should be designed for facility in application of the waterproofing. Instances are frequent where the structure has been designed without any reference to the waterproofing, with the result that unnecessary obstacles are encountered in its application and it is not given a fair opportunity to fulfill its purpose. Rather, the waterproofing should be considered as an integral part of the structure and kept in view in the entire design the same as erection details and other fixed conditions. It is gratifying to notice the increased attention paid to this matter recently.

The details of the application of waterproofing and the relative merits of the different compounds are the subject of much argument. For most railway structures a protected coating is now generally considered more desirable than a compound tending to make the concrete itself impervious, for the greatest trouble is experienced with water percolating through cracks and joints rather than with seepage through the walls and slabs themselves. While there is a wide variety of products used, it must be remembered that good results depend very largely upon proper application. This not only includes proper heating and handling of the materials, but also selection of the most favorable weather conditions possible for doing the work. Even with the use of the best products and of great care in applying them, the results are likely to be unfavorable if the work is done late in the season or during a period of stormy weather. This should not, however, reduce the incentive for using the best products, for as the cost of waterproofing bears such a small relation to the cost of a railway structure, and as water is capable of doing so much damage, it is economy to use a thoroughly reliable product.

One point of difference developed in the discussion of Mr. Finley's paper was regarding the advisability of bonding the waterproofing layer to the concrete or masonry. In some cases this has been hard to do, but by using the method outlined in his paper Mr. Finley has been able to secure a good bond. The objection to bonding waterproofing to the concrete is that any movement or settlement of the structure will cause the waterproofing to crack. If the waterproofing is not bonded to the concrete any puncture of this layer will enable the water to collect under the entire surface and seepage is very likely to result.

THE SECTION FOREMAN PROBLEM.

THE increasing difficulty of securing an adequate supply of good section foremen is giving railway managers serious concern. The need for more good foremen is not confined to one locality, but prevails all over the country. A survey of this subject shows that several conditions stand out prominently. (1) The quality of foremen and laborers has steadily deteriorated during the past decade, and is still declining. (2) The demands made on the tracks by heavier trains running at higher speeds require not only a heavier and more complicated track construction but more careful maintenance as well. (3) It is almost certain that the cost of track maintenance is increasing more rapidly than the cost of other railway operation, although it is not possible to mathematically demonstrate this.

Twenty years ago section laborers were almost universally English-speaking, and in most cases native Americans. Conditions have gradually changed, until now a large proportion of track laborers belong to inferior classes of foreign labor.

At the present rate of increase of foreign foremen it will not be many years before the native foreman will be the exception. While some foreign laborers make efficient foremen, most maintenance officers find that they often are not satisfactory, as it is more difficult to get them to understand any new development and they do not tend to remain as long as the native. Furthermore, the average foreign laborer is not capable of filling a foreman's position. A canvass of 45 assistant foremen on one main line division of a large railway system disclosed that 9 of them were Irish, 24 Italian, 7 American, 1 Welsh, 3 Polish and 1 English. Twenty-five had a common school education, 15 a poor education and 5 none. A study of 119 track walkers showed that 11 were English, 7 Irish, 6 German, 3 Polish, 1

Austrian, 90 Italians and 1 Russian. As the section foremen are generally selected from the assistant foremen and trackwalkers, some idea can be gained as to the future foremen.

This gradual change in the character of foremen is a natural result of the economic development of the country, combined with the fact that the wages paid for track work have not kept pace with those in other industries, and in other branches of railway work. The young men who now enter railway service naturally turn toward the train service or mechanical department, where the wages are much higher and have been continually increasing; the railway has been and is competing with itself to the detriment of the track department.

In spite of this decline in the quality of the track labor, the loads on the track have increased greatly and the track structure has been greatly strengthened to withstand the stresses to which it is subjected. The methods of track maintenance have likewise changed, and the foreman accustomed to the track of 20 years ago, mud ballasted and track laid with 60-lb. rails, would be at a loss to know what to do on the main line track of today. Rail anchors, tieplates, bond wires, split and movable point switches, etc., all so common today, were unknown then

It is to be expected that under these conditions of operation and maintenance the cost of track work will increase. An increase in track maintenance cost even in proportion to the increase in traffic might even be admitted to be natural. But the deterioration in the quality of track labor has contributed largely toward increasing the cost of maintenance; and the poorer quality of foremen has had an even more decided effect. Even with poor labor comparatively good results may be secured by competent supervision.

The true seriousness of the problem presented by the scarcity of good section foremen is evidenced by the 53 contributions to the contest on this subject conducted by the *Railway Age Gazette,* and which closed on March 25. These contributions came from all parts of the United States, from New York to San Francisco and from northwestern Canada to Texas; and their authors discuss plainly the question as it confronts them on their individual divisions and give their ideas of the proper remedy to apply. Several of their papers are presented in this issue; and others will appear in later issues.

While several things can be done to improve the situation, two means seem especially to require adoption. The first is an increase in the wages of especially competent foremen sufficient to induce good men to enter and remain in the service. The second is to find some plan to attract enough capable young men into the service, and then educate them for future foremen.

A suggestion for a voluntary increase in the wages of members of any class of employees is likely to meet with opposition from many railway managers. The managers have been in recent years constantly struggling with the problem of meeting increasing transportation costs in the face of stationary or declining passenger and freight rates. It has taxed the capacity of the executives to meet the pressing demands, and the policy of deferring every increased expenditure as long as possible, even if shortsighted, is a natural one under the conditions. The fact is, nevertheless, that the wages paid section foremen have not increased as much in proportion as the wages paid to other classes of railway employees, general office clerks excepted; and probably it is this more than any thing else which has driven many of the older men into other work and prevented capable young men from entering section work. At one time the wages of the section foreman were practically equal to those of a trainman and higher than those of a telegraph operator. Today, however, the trainman receives practically double the wages of the foreman, and the operator somewhat more, in addition to having their hours of labor limited by federal and state laws. The report of the Interstate Commerce Commission for the year ending June 30, 1910, gives the following average wages per day: Enginemen, $4.55; conductors, $3.91; firemen, $2.74; machinists, $3.08; trainmen, $2.69; telegraph operators and despatchers, $2.33; station agents, $2.12, and section foremen, $1.99. This compares with the wages paid the same employees in 1892 as follows: Enginemen, $3.68; conductors, $3.07; firemen, $2.07; machinists, $2.29; trainmen, $1.89; telegraph operators and despatchers, $1.93; station agents, $1.81 and section foremen, $1.76. In other words, the increases given organized labor have been greater both absolutely and in proportion than those of unorganized labor. Much as the railways deplore many of the methods of unionism, they are in reality penalizing those who do not organize and thereby furnishing to unorganized employees the strongest argument in favor of organization. The unrest evident among track men in many quarters is a sign of future trouble unless it is arrested. The strike of maintenance forces on the Chicago terminals and on the Delaware, Lackawanna & Western last year show how the wind is blowing. The Grand Trunk Pacific also had trouble with its maintenance employees over a year ago, and an arbitration committee appointed by the Minister of Labor of Canada made material increases in the wages of men and foremen. The railways may be able now to prevent organization by adopting a scheme of wages for section foremen based on individual merit. Ordinarily horizontal increases in wages are undesirable; but the present discrepancy between the pay of track men and other employees invites disturbances and interferes with efficiency; and it would seem that the best means of meeting the situation would be to provide a wage scheme under which the pay of the more capable foremen would be increased in proportion to efficiency.

While many men believe it would be economical to pay a high enough rate to secure native labor in the gangs, this is very doubtful. Rather, it would be advisable to pay high enough wages to foremen to get men who would obtain the best results possible from the present inefficient labor. The increase in efficiency would be gradual, but once the grade of men was raised to the proper standard it would remain there. If the roads can raise the standard of men without unionism, the general efficiency can be increased, but if the standard of wages is raised as a result of unionism, past experience does not indicate that efficiency will be increased.

However, an increase in wages alone will not solve the foremen problem. Attention must also be given to the education of the future foreman. To induce young men to enter the service, provision should be made to pay a slightly higher rate than the average laborer's rate to one man in each gang, or at least in each three or four gangs, with the understanding that he is to remain in the service and be given opportunity to develop into a foreman. One criterion of a good roadmaster is his ability to build up an organization of foremen about him. With a wage of $1.75 to $2 per day, a promise of continuous employment through winter, and the prospects of securing a foreman's position at $75 to $90 per month, it should be possible to secure competent young men. By the roadmaster giving personal attention to the student foremen and seeing that they are placed under a number of capable foremen who will each give them the proper instruction, workmen will be developed from which capable foremen can be selected as needed. This plan is now in use with various modifications on several roads.

Other things suggest themselves which, although incidental to the two remedies given, are of importance. One is payment for overtime. On many roads the section foremen are subject to call at any time to patrol track during a storm or to help clear a wreck. In some cases it is the practice to do heavy track work, such as the renewal of crossings, etc., on Sunday when the traffic is light. The operating man knows just what chance he has of getting trainmen to work under these conditions without paying them, yet the section foreman is not paid for overtime.

The rapidly increasing use of motor cars and the experimental combination of maintenance forces on the Union Pacific indicate the present tendency towards a reorganization of track work. If a portion of the savings effected by these changes be applied towards an increase in the foremen's wages, this will contribute very materially towards a solution of the foreman problem, and there will still be shown a net saving.

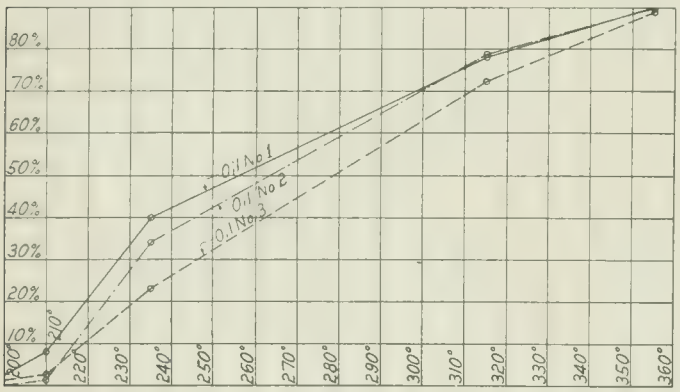
Letters to the Editor.

STANDARD CREOSOTE SPECIFICATIONS.

New York, N. Y., March 19, 1912.

To the Editor of the Railway Age Gazette:

In your issue of February 16, there appeared an editorial on the subject of "Creosote Oil Specifications," in which you discussed the papers presented by Dr. H. Von Schrenk and the writer at the recent meeting of the Wood Preservers' Association. In view of the interest in this matter, I submit an abstract of a communication which has been received from the writer to V. K. Hendricks, chairman of a sub-committee of the Wood Preservation Committee of the American Railway Engineering Association.



Distillation Tests of Oils.

"The argument in favor of the present specifications has been that oils containing higher percentages of oil distilling below 235 deg. were not stable in character, owing to their greater evaporative loss. It seems, of course, perfectly rational to suppose that evaporative loss in creosote should bear some definite relation to the distillation range of the oils. Believing that the elimination of oils distilling below 210 deg. would materially reduce the evaporative loss of a given creosote, we have recently been making a number of tests to demonstrate this point.

"The procedure was as follows: Three creosote oils were prepared by combining the fractions of oil obtained from one still of tar in such a way that oil No. 1 contained a rather larger percentage of the fraction distilling below 210 deg., and a moderate percentage of the naphthaline fraction (210 to 235 deg.), No. 2 contained a minimum of oil distilling below 210 deg. and exactly the same percentage of distillate between 210 deg. and 235 deg., as No. 1. No. 3 was exactly in compliance with your standard specification, viz., less than 5 per cent. below 210 deg. and less than 25 per cent. total distillate below 235 deg. These three oils were strictly comparable; all being prepared from the same tar, the character of the various fractions did not differ in composition.

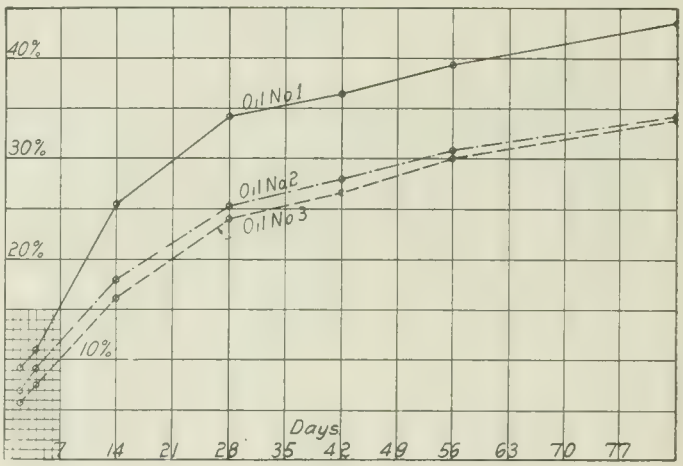
"A number of very thin pieces of wood, 3 in. sq., were treated with the three different oils by dipping in hot and cold oil. One series of blocks was poplar and another North Carolina pine. After draining, the blocks were carefully weighed on the laboratory balance and hung up on a line. In each series of tests three blocks were treated with each preservative, and untreated blocks were also weighed and hung up for controls to determine whether any unusual amount of moisture absorption took place during any period.

"One of the accompanying diagrams shows the evaporative loss from the North Carolina pine blocks. Weighings were made after 2, 4, 14, 28, 56 and 84 days' exposure. The results demonstrate very clearly that oil No. 2 with 32 per cent. of naphthaline has practically the same loss as oil No. 3 with 21 per cent naphthaline. Both of these oils contained approximately the same percentage of light oil (about 2 per cent.), whereas oil No. 1, with 32 per cent. of naphthaline and 8 per cent. of light oil has a markedly higher evaporative loss.

"The same was true, even to a more marked extent, with poplar blocks where there was hardly any penetration and the oil was practically all on the surface. Evaporation under these conditions was of course more rapid. At the end of two weeks, oil No. 1 had lost 74.4 per cent.; No. 2, 57.7 per cent., and No. 3, 56.7 per cent.

"The evaporative loss of oil in a compartively short period, particularly in the last-mentioned series of tests, seems alarmingly high, but it should be remembered that the conditions were most favorable to accelerated results. The surface exposure, compared with the amount of oil injected, was, of course, tremendous. At the same time we believe the results to be more rational than results obtained by allowing oil to evaporate from the open vessels, as in the foregoing tests evaporation took place under conditions which very closely resembling service tests, whereas in evaporation from the 'pans' surface tension may affect the results.

"While we do not claim that great importance should be attached to the results of any one series of tests, yet these results are certainly significant and are exactly in line with indications which we previously obtained under conditions less closely



Evaporative Loss of Oil from Wood.

controlled. It is our intention to have many more experiments made along these lines, and we wish that independent investigators would also have tests made to determine whether these results would be substantiated. It is needless to say if they were substantiated this would be a matter of great importance to all consumers of creosote oil, as it would render available for the highest grade of preservative work a considerably greater amount of oil distilling from coal tar than the present standard specifications will allow."

S. R. CHURCH,
Manager, Research Department, Barrett Manufacturing Company.

The proceedings of the eighth annual convention of the American Wood Preservers' Association, which was held in Chicago on January 16, 17 and 18, 1912, have just been issued. The continued steady growth of the association is indicated by the increased size of the annual volume of Proceedings from year to year. In this volume are included the papers presented before the annual convention of the American Wood Preserver's Association, abstracts of most of which have been printed in *The Railway Age Gazette*, together with the discussions, constitution, list of members, etc. A considerable amount of statistical information regarding the number of ties purchased, amount of timber treated and preservatives used, etc., is also included in the back of the book.

THE PROBLEM OF THE SECTION FOREMAN.

Contributions Received in the Prize Contest, Discussing Methods of Providing a Satisfactory and Sufficient Supply.

FIRST PRIZE—USING "STUDENT FOREMEN."

BY A. E. HANSEN,

Roadmaster, Atchison, Topeka & Santa Fe, Topeka, Kan.

At least 85 per cent. of the regular section laborers in the East and North are white, English speaking, American laborers. While they are not all of the class that possess the desired qualifications to make a first-class track foreman, I think at least 15 per cent. of these laborers could be trained to make first-class track foremen in a very short time, if proper financial inducements were offered them, and skillful and systematic teaching was provided by competent track foremen and roadmasters. But the situation on Western and Southern roads is almost the reverse, where about 85 per cent. of the section laborers are foreigners who do not intend to make this country their permanent home and consequently do not try to master the English language or American track work well enough to make first-class track foremen, except in very rare cases. I think the time is opportune for maintenance officers, especially in these sections of the country, to devise some means to strengthen their track departments.

While roadmaster on a northern road some time ago, I had permission to keep a few young men on my division at increased salary for the purpose of training and educating them for the position of section foremen, and in nearly every case they matured into successful foremen.

The title of these young men was "Student Foremen." I selected them as young as possible, near the 21-year mark, unless I found one a little older, partly matured, who possessed the required qualifications. I always made sure of a first-class physical condition, good moral character, at least a good public school education and a desire to remain in the track department for the purpose of promotion. I placed these young men with the very best section foremen on the division and instructed the foremen to thoroughly post them as to the best manner of doing track work and supervising a crew of men, and as to the general rules of the company. The foremen were made to understand that it would be a credit to them and would be much appreciated if they trained these young men to be first-class foremen. After working a while on one section I would change a student to a different section under another good foreman, giving him an opportunity to see work done in different ways, and I always gave the students as much of my personal time as I could possibly spare for instruction and encouragement. After having far enough advanced in ordinary section work so that they had a fair knowledge of the proper way of doing common repair work and properly handling an ordinary section crew, I placed them in extra gangs as assistant foremen under good, up-to-date extra gang foremen, where they had a better opportunity to learn surfacing of track out of face, general lining, relaying rail out of face, constructing new tracks, and managing a large crew of men, which is the stumbling block in the path of many of our old-time section foremen. When extra gangs were taken off at the close of the summer season I would place these young men with some good yard foremen, where they would have an opportunity to familiarize themselves with that class of work.

After going through these three ordeals, if I found them sufficiently matured to be capable of handling a section, I would call them into my office and spend a whole day with them, first going over every detail in connection with track work, questioning them as to their manner of doing the work and if I found any weak spots or flaws in their planning and execution of the work, I would advise them of better methods. I would then turn them over to the clerk in the office for a couple of hours' good schooling to get them familiar with the handling of reports of all kinds and other work pertaining to the office.

After this I would have them fill out the regular section foreman's examination book, composed of from sixty to seventy-five questions pertaining to the general rules prescribed for the section foreman. I would look over their answers and if I found any of them that showed a shade of doubt as to the correct understanding, I would set them right. After they had passed the physical examination I would declare them extra section foremen and would use them as relief foremen until I could place them as permanent section foremen.

I was always proud of these young self-made foremen; their work was modern and up to date; their daily, weekly and monthly reports were made up neatly and promptly; they led in intelligence; they were capable of protecting and properly representing the company's interests along their sections and in the community in which they lived; in fact, they stood head and shoulders above the majority of our average old-time section foremen.

I firmly believe that if every roadmaster was permitted to employ ten such young men on a 30 section division, paying them at least five cents per hour more than the other laborers and could handle them on a plan similar to the one I tried he would find his track supervision improving from year to year where foreign laborers are used exclusively. This additional supervision would pay big dividends from the very day of its inauguration. There are but two questions to be asked: First, will the management invest a little additional money? And, second, will the roadmaster and section foreman interest themselves enough in these young men to carry out their part successfully?

SECOND PRIZE—HOW TO PROVIDE A FUTURE SUPPLY OF SECTION FOREMEN.

BY GEORGE F. LOWE,

Supervisor, Delaware, Lackawanna & Western, Elmira, N. Y.

In the first place, to be a good competent foreman a man must be able to read and write the English language fairly well and be fairly well versed in the common branches of mathematics so as to be able to handle the time of the men in his charge and fill out the various forms in use. The question is ofter raised as to whether the American or foreign born is the better class to pick from. We should choose the man who can meet the requirements regardless of his nationality. I believe all roads employ enough intelligent laborers to supply good foremen. I mean young, ambitious men with enough "get up" in them to handle a gang of men, providing they can be induced to stay at the work long enough to acquire the experience necessary to make them good foremen. Under the system now in vogue on most roads this is almost impossible, because a young, intelligent man will not work with the ordinary laborers long enough to get the necessary experience. He only stays on the track as laborer until he finds other work which he thinks is more fitted for him and this is easy to find owing to the general demand for laborers who are a little above the average in intelligence.

All railway companies should offer such young men an inducement. The roadmaster or supervisor should be in a position to go to a young man and say, "John, I want to make a foreman of you. I want you to take the job of assistant foreman, then when you are capable of handling a section I'll give you a chance. Now the pay as assistant foreman will be 10 to 15 dollars a month more than you can make doing ordinary labor and you will be able to get the necessary experience required to handle a section." This will appeal to any young man who has an ambition to make a good foreman. As a rule a roadmaster or supervisor has charge of from 15 to 50 section gangs. I do not advocate an assistant foreman on every section, but there are from three to seven sections on each division which are

hard or yard sections which have from six to twelve men when reduced to winter basis. These are the sections where an assistant foreman would get the most experience and be able to do the most good for the company, providing, of course, he has been placed with a competent foreman. Not all foremen who are capable of handling a section are fit to train an assistant foreman. The foreman who is to train an assistant should be a man big enough for the job and one who will give the assistant a good square deal. There is always some one in the gang who will test the assistant's authority as soon as an opportunity presents itself, and this has been the cause of the downfall of many an assistant foreman and has nearly condemned the practice of having assistant foremen on many roads. An assistant foreman should be given authority to discipline his men and if necessary to go as far as to suspend or discharge a man and be upheld by his superior, for an assistant foreman without this authority will surely be a failure. I think under this system, if properly handled, not only will the assistant foremen earn the additional wages paid but a supply of good competent foremen for the future will be provided.

PROVIDING A DIVISION FOREMAN TO TRAIN MEN FOR SECTION FOREMEN.

BY J. J. MORGAN,
Storekeeper, New York Central, Kingston, N. Y.

The first step in training future section foremen is to secure the services of an expert trackman, who should also possess a thorough business education. Call him the division foreman, although a more appropriate title might be suggested, with headquarters at the terminal of the division on which his territory is located. It is understood from the title that my idea is to have one of these foremen on each division, unless the territory is so small that he could cover two or more divisions. Starting at the most convenient point on his division, he would visit each section, spending at least half a day with each gang, watching the men carefully, correcting their errors, and giving them pointers. His main object, however, would be to watch for good trackmen, men who understand their work and perform their duties faithfully and carefully, without shirking under difficulties. These are the men of whom he is to make the section foreman of tomorrow. This foreman, on visiting each section, would keep a record of these "live wires," watching them particularly and taking notes of their good and bad features. After he has visited each section two or three times, he would have a list of the cream of the division as regards section laborers.

The next step for the division foreman is to teach these future foremen to read and write, supplying them with the necessary stationery, etc., and issuing instructions. He should endeavor to secure the co-operation of the section foremen in assisting the men in this respect. By keeping in touch with the men, the division foremen can ascertain when they are ready for the next step, furnishing them with reading matter that would tend to better their education. After they have mastered reading and have acquired a good legible handwriting, and the division foreman feels that they are competent to understand what they read, each man should be instructed and drilled on the book of rules until he is able to answer any question that may come up. There is no limit to the amount of study required on these rules, which, if followed carefully, would do away with a great many complaints.

The last step, although by no means least in importance, is to instruct the men in making out all the reports that the section foreman has occasion to use. They should be instructed on these reports until they are able to make out each report fully and sensibly. They should be furnished with a copy of each report properly made out, in order that they may study them in detail, and then make out others, altering the circumstances, and forward them to the division foreman, who would make any corrections necessary. This matter of knowing how to make out reports correctly is a very important one, which if properly inculcated in the minds of the men at the start, would save a great deal of trouble and extra correspondence. It is often necessary to return reports two or three times and sometimes a personal interview is necessary before the desired information can be procured, thereby causing delay. This is sometimes true with foremen who have been in the service for years on account of the fact that they received the wrong impression in the beginning.

As an inducement to keep the men interested. I should consider it a good idea to offer two or three prizes annually of $5 each to the laborers who contribute the best ideas on track improvements and maintenance.

There are men working in section gangs today who would make the kind of section foremen so much in demand if someone would only take an interest in them and teach them to read and write the English language. Why let these "live wires" pass unnoticed, when for a comparatively meager cost they could be instructed and would make section foremen of the highest type.

THE NECESSITY FOR INCREASED WAGES.

BY JAMES SWEENEY,
Supervisor, Chicago & Eastern Illinois, Danville, Ill.

In looking for foremen for the future we naturally investigate the ever diminishing supply of good foremen we now have. In the early days of railroading there was a steady migration of young men from Ireland who were tired of fighting against adverse conditions at home. When they landed in this country there were very few fields open to them except as laborers on public work and this class of work was more plentiful on the railways than anywhere else. Changing conditions have combined with the increased demand upon the section foreman to prevent the Irish laborer from entering railway work on the section. Better conditions at home have retarded emigration, shorter hours and higher pay in the building trades have offered inducements that have practically stopped such laborers from going on the section and advancing to foremanship.

As a result the railways have employed Americans wherever possible for foremen but the American who would make a good foreman has a desire to work for himself or to get into a field where advancement is faster and he no sooner sees an opportunity to get into the train or engine service than he leaves the section. Not finding a sufficient number of Americans for foremen the railways have hired foreigners, taking first the Norwegians, Swedes and other Northern European peoples and later the Italians and Greeks, and are still promoting them to foremen with varying success. All of these people are handicapped in that they cannot speak our language when they come here and after they do learn to speak the language it is a much longer time until they can be depended upon to read with understanding. It must not be lost sight of that for a man to be a success as a section foreman he must have as much education as a trainman, not only to interpret the instructions given him as to his work, but to satisfy the federal government through the Interstate Commerce Commission by giving to the railway management correct data on a multitude of happenings which only the foreman can supply.

The solution of the whole question is in the wages paid both to the laborers and the foremen. Twenty years ago we paid less wages than we are paying today, but the wages paid bought more then than they do today. As proof of this, some section laborers at that time owned their own homes, while today very few foremen and practically no laborers are property owners. Work is not as steady now as it was in the past owing to construction work having practically stopped. The country is so well equipped with railways that the great majority of construction work will be on short connecting lines that will give no great amount of work to the section men in dull times. Other fields of work have opened along the line of every railway in the small industries that are steady bidders for common labor and are pay-

ing as much or more for labor than the railways. Since these industries are growing concerns, they are giving steadier work than the railways. Farm products have increased in price to such an extent that the farmer can and does pay better wages than the railways and the laborer on the section has been attracted to the farm. The above conditions have made it impossible to get the best class of men for section laborers and without the laborers we have no way of securing material for foremen.

I have tried paying more for the most competent man in the gang when recommended by the foreman in the hope of holding good men for foremen and I regret to say that out of nine main line sections where the experiment was tried there were but five men recommended for the increase and one of the five was an Italian. On two of my yard sections I have been able in the past four years to educate two young men from timekeepers and they are making excellent foremen, yet in this time I can recall as many as ten who were in the same position and left either to take better positions or were discharged for incompetency.

Every railway through its roadmasters is trying to find foremen and there are as many methods as there are roadmasters. In my mind, however, the supply of foremen will equal the demand only when we admit that the section foreman is worthy of the wages he has earned but never received. When the foreman receives more than a brakeman there will be no inducement for a track man to leave the track and when the laborer is paid more than laborers in the vicinity we will have men who will crowd the incompetent section foreman off the road.

ECONOMY OF INCREASED WAGES.

BY J. E. TOBIN,
Roadmaster, International & Great Northern, Houston, Tex.

To provide a future supply of good track foremen it will be necessary to increase the present rate of wages. Able-bodied, intelligent, English-speaking white men are the proper men for section foremen on American railways. It is necessary for a track foreman to work as a laborer for some time before being placed in charge of a section. The present rate of wages for section laborers is no encouragement to able-bodied, intelligent young men to work as laborers on track, so it will be necessary to increase the wages of the laborers as well as the foremen.

It is customary now on a great many railways to specify a certain amount of money on each roadmaster's division to pay the wages of laborers, foremen and others connected with the maintenance of track. Let each roadmaster select one first-class track foreman at say $125 per month, and place him in charge of an extra gang of 12 to 25 men paid at a rate of wages on a sliding scale, three-fourths of the gang at $2 per day, one-eighth at $2.25 and one-eighth at $2.50; the men to fill out the regular form of application, which should specify qualifications required with a view to making those men foremen. Of course, it would be understood that the oldest man in the service would be promoted as vacancies occur, others advanced along the line in the gang and a new man hired at the low rate. This gang could be known as the "school gang" and moved to different points along the line, making all kinds of track repairs. This gang would accomplish 100 per cent. more work in a given time than is done by an equal number of the present section forces, besides doing a better class of work. Increase the section foremen's wages to $100 per month and one laborer on each section to $2.50 per day, the balance of the section gang to remain at the present rate. Of course, it would be necessary to reduce the force to avoid an increase in the pay roll. This would stimulate both the laborers and foremen and result in a better class of men, as well as better track. Rough track damages the rolling stock and creates expense for labor and material in the machine and car shops.

Get good intelligent white track foremen, abolish the positions of traveling, commercial and soliciting freight and passenger agents, stock claim agents, their offices and clerks, and let the track foremen, who knows every man, woman and child in the territory through which his section runs, handle that end of the business. He knows of freight shipments to be made as well as the people liable to ride in passenger cars; knows the value of dead stock as well as the circumstances surrounding the killing or injury, and can in most cases adjust the matter with owners without going off the right of way or interfering with his duties as section foreman. His influence in the town and neighborhood will be increased by the increase in his wages, and he can control business for the railway that perhaps the traveling agent would not find.

SOLVING THE PROBLEM BY ATTRACTING AMERICAN BOYS.

BY C. C. HENKEL,
Section Foreman, Erie, Paterson, N. J.

With the advent of the foreign track laborer the problem of securing competent foremen is becoming more and more difficult. The Italian, Hungarian, or other south of Europe track laborer who will make a good foreman is the exception rather than the rule. The lack of knowledge of the English language is against him; he doesn't thoroughly comprehend our method of doing things, and is usually of a timid disposition and so afraid of losing his job as to prevent his using very much originality in doing his work. I think it is generally conceded that native Americans should be employed as track foremen, the foreign laborer being used only as a last resort.

How are we to attract American boys to track work? A large railway system in the West has adopted a plan of employing students of technical schools as trackmen during their summer vacations. After graduation these men return to the railway as section foremen. This is a very philanthropic act on the part of the railway company, as the supply of technical graduates every year greatly exceeds the demand. Unfortunately the average college man is of little or no use on a railway.

One cannot learn from books how to become a successful track foreman, but must work in the gang, tamp ties, help with the tongs, drive spikes, tighten up bolts, etc. From this it is evident that any scheme for securing men and training them to become successful track foremen depends almost entirely on the foreman in charge of them. The supervisor is the man best able to judge which of his foremen are most capable to train the men. The foreman's interest in the matter must first be aroused. I would suggest that his prejudices could best be overcome by paying him a small extra compensation each month for each student foreman in his charge, or by payment of a lump sum when the man under his care is promoted to be a foreman.

Almost every section foreman knows of two or three young fellows in his neighborhood who have a common school, or better yet, a high school education and who would make good timber for track foremen. He should have no difficulty in pointing out to them that to become a machinist they would have to serve as an apprentice for four years at about $1 a day, while it is possible to get $1.50 a day as a track laborer and become a section foreman in one year's time at a monthly salary as good as if not better than that received by the machinist, to say nothing of the greater fascination of the work, the larger authority, greater freedom, and better health secured from working out of doors. It would seem best to put two or three young fellows in the same gang in order that they may have a little social intercourse. This gives them an opportunity to exchange ideas and to talk over the work they are doing. If the foreman takes a real interest in the boys, and if they make the most of their opportunities there is no reason why any ambitious young man should not be able to take charge of a section on a branch line in a year's time. The supervisor can greatly aid the work of the foreman in educating the young men by showing that he is interested in their progress.

Another thing which is going to aid greatly in securing com-

petent men for foremen is the introduction of labor saving machinery, such as section motor cars in track work. In this connection, I might also mention the recent movement to include all the branches of maintenance work under the section foremen, that is, the signal work, both mechanical and electrical, wire repairs, and light carpenter jobs, such as putting in a pane of glass, etc. I have actually seen the track foreman and his men, the mechanical maintainer and his helper, a gang of wire men and the electrical retainer and his batteryman, all start out to work in single file with two hand cars and two speeders.

There is no reason why the section foreman, if furnished with a good assistant, could not look after interlocking, signals and batteries, and wire repairs, in addition to his track work. The improvement in organization and efficiency gained thereby would make it possible to materially increase the wages of section foremen so that they would compare favorably with those of men engaged in the train service and the question of where to secure a supply of competent track foremen would be a thing of the past.

REORGANIZATION TO SOLVE THE PROBLEM.

BY C. CLAY,

Atchison, Topeka & Santa Fe, East Las Vegas, N. M.

Educating foreign labor will not solve the problem of securing good section foremen. The one thing to do is to reorganize to a certain extent, and then use American labor. Pay a higher wage to laborers; give them a chance for promotion, and promote according to ability as shown by examination. Each gang should include one or more Americans who are desirous of promotion. Wages should not be less than $1.75 per day. A saving of seven-tenths of the men required can be made in this way owing to the men being more efficient. There would also be a decrease in the cost of material and tools owing to the greater efficiency of the men, but this amount could only be determined by actual test.

Equip each section with a motor car and extend its length to 10 miles but not to exceed 12. Increase the foremen's wages to $75 per month or higher, according to locality. Doubling the length of sections would release 50 per cent. of the present foremen, allowing the roadmaster to pick the best and place the others as laborers with preference over laborers then in service as to date of examination for promotion. They would, if they desired promotion, feel this displacement and work all the harder and possibly surpass some of the foremen who had been retained. No man should be promoted unless he can read, speak and write the English language. The cost of motor cars will be more than offset by the decrease of time taken to get from place to place.

Extra gang foremen should be paid not less than $90 per month or higher, according to locality, and they should be required to pass a more extended and harder examination than section foremen and should be promoted from section foremen. Assistant extra gang foremen should take the same grade as section foremen. The offset to this increased expenditure would be higher efficiency. The roadmaster's clerk should be promoted from an extra gang foreman. The experience in the office will give him an idea of the executive part of a roadmaster's work, and you will then have a competent man to take a roadmaster's position at any time that one is needed. There should be a general roadmaster who would have sole charge of the track department in his jurisdiction and report direct to the general superintendent. This would save the division superintendent a great deal of work and would mean a greater effectiveness in the distribution of material and labor. There would be scarcely any increase in expenditure by the appointment of a general roadmaster, as the increased expense of himself and staff would be offset by the number of maintenance clerks that would be released from division offices. While some of the changes would take time to effect, a general roadmaster who is competent and not afraid to work could reorganize his department and have it working on a sound basis under this plan with plenty of men working for promotion within a year.

A GRADUATED SCALE FOR SECTIONMEN.

BY E. W. GULLEY,

Roadmaster, Chicago, Rock Island & Pacific, El Reno, Okla.

It is my opinion that a graduated or sliding scale of wages will solve the section foremen problem. Since 12½ cents per hour is a common standard of pay for section labor, I will take that as a standard. After a laborer has worked a given length of time, say six months, increase his pay to 14 cents per hour, then after another period of six months, increase his pay to 15 cents per hour. As he has then been in the service one year, the foreman and roadmaster should be able to judge whether or not he would be desirable material for a foreman, and, if so, his wages should be increased to 16½ cents per hour, with the understanding that he must "get into the harness" with a view of making a foreman out of himself. After another period he may be used as a relief foreman on various sections. This will develop to the entire satisfaction of the roadmaster whether or not he is a man of the right material for a permanent foreman, and if he is not, then he must stand for his own weakness and be set back to the 15-cent rate. It is to be understood that not all section labor will receive the benefit of these raises, but where a laborer sticks for six months, he is entitled to the first raise of 14 cents, and if he remains on the same section for the second period, he is entitled to the second raise, namely, 15 cents per hour, but unless he is considered as available material for a foreman, he will not receive the third raise.

CLASSES FOR TRAINING EMERGENCY FOREMEN.

BY D. C. BAIRD,

Supervisor, Pennsylvania Railroad, Reading, Pa.

Our superintendent instituted a method a few years ago by which a supply of trained and competent section foremen is provided. Each foreman is asked to recommend a man, or men, from his gang whom he thinks may in time by proper training make a foreman. The men whose names are thus submitted by the foremen are closely observed by the supervisor, if he is not already well acquainted with them, and those who are thought to be capable of development are formed into a class which at frequent intervals is called together and instructed by the supervisor in the time table, book of rules, standard maintenance of way material and its economical use, methods of doing track work, the making out of rolls, monthly and other reports, the handling of men for efficiency and their own personal safety; in short, everything pertaining to the duties of a section foreman. Throughout the period of instruction the men of the class are taken from their own gangs whenever work which is out of the ordinary routine is being done on other sections and are put on such work where they are closely looked after and instructed by the foreman in charge. In this way the men are brought into close actual contact with much work which must be done quickly, accurately and safely and they gradually develop the ability and confidence which make them competent foremen. After some months of instruction under the supervisor and participation in the installing of turnouts and crossovers, laying rail, cutting into service new tracks, heavy lining or raising under traffic, etc., the class when deemed ready for the supervisor is turned over to the division engineer for a final rigid examination preparatory to the making of appointments. The men who pass the best examinations, a certain standing being required, are given the title of "Emergency Foremen," and are available for duty as foremen whenever required. Ordinarily, these men work as laborers in their respective gangs, but whenever a regular foreman is off duty one of these emergency foremen takes his place.

We have made foremen by this method with perfect success and have today three emergency foremen under each supervisor ready to take sections of their own. In any considerable number of men, whether American, Italian, Hungarian or other nationality, there will always be found a few capable of becoming leaders. If the foreman question is ignored until a vacancy exists there will be trouble in filling it, but if the pick of the track men be trained the answer to the foreman question will be found.

ORGANIZING A ROADMASTER'S DIVISION TO TRAIN FOREMEN AND ROADMASTERS.

BY M. B. WHITNEY,

Student in Railway Operation, Southern Pacific, San Francisco, Cal.

In this discussion it is assumed that the problem is to increase the number and improve the quality of the American-born track foreman, as the foreign-born foreman is at the best only a makeshift. We now obtain our American-born foremen from other railways or from other districts of our own road. The best foremen, who are satisfied and efficient, hold their positions. Those traveling around looking for new work are as a rule inferior men who have been in track work many years, have their own set way of doing everything, and listen to the instruction of the roadmaster with the secret intention of following them as little as possible. The roadmasters, in busy seasons especially, being eager for anything that looks like a foreman, hire these applicants only to find their real worth in a few months. Then the foreman leaves, moves along to a new position, and the process is repeated. Even this floating class of white foremen is becoming depleted, for each year they grow older, and few men new foremen are made. The only exception to this class of foremen are those who come from eastern railways attracted by the higher salaries paid in the West, and those who move from one road to another in search of better climatic conditions. As a rule these men are efficient.

The responsiblity for the foreman situation does not lie with the roadmasters. They would be very willing to train up young men if they only had some to train. Unfortunately the present daily wage paid to track laborers is insufficient to tempt a capable young American to perform manual labor for a year or two in a gang of foreigners, in the hope of getting a section in the end. A man should, however, undergo an apprenticeship as laborer before he can qualify for the position of foreman. We cannot provide for the training of young American-born foremen without the authorization of an expenditure of more than the minimum sum required to do the regular track work. This money must be paid in the form of higher returns to the white laborers.

Each roadmaster might have a fixed number of apprentice foremen continually under him, at a fixed monthly salary, prescribing whatever training he thinks best. The apprenticeship should last from one to two years according to the ability of the man and the immediate need for new foremen. It would be unnecessary for these apprentices to spend their entire time as laborers, and when the need arose they could be of considerable value as assistant foremen of extra gangs and as substitute section foremen. A supplementary value of these apprentices would be that the knowledge that they were "coming along" would spur the regular foremen to better efforts.

The second problem is to hold the men after they are obtained and trained. One improvement over present practices would be to make a few gradations in the desirability of the different sections on each roadmaster's district. A brakeman can bid in a more or less desirable run according to the length of time he has been in train service. On some runs the work is easy, but the returns are low; while on others the work is more difficult but the returns are higher in proportion. Similarly station agents and operators are not paid uniform salaries, their salaries varying according to the size of the station and the value of the position. On most railways, however, each road section pays the same return, and also each yard section. When a section foreman after long service becomes old enough to be given preference in the choice of a section, having no chance for a higher salary, he chooses a section on which the work is light or one which is near a school for his children; yet these experienced foremen are the very men needed on the difficult sections, not the light ones.

Would it not be well to have two or three different grades of section, each grade paying a different salary, and to fill the higher grades with the older foremen, assuming that they are equally as efficient as the best younger foremen. The lowest grade would be sections on branches or main line sections where traffic is light; the second, main line sections in localities not commonly subject to emergencies; and the third, such as washouts and slides.

The next step would be to reorganize the yard section at the roadmasters' headquarters. Make this the most desirable section, giving the foreman the additional title of assistant roadmaster, with authority to handle material on the roadmaster's district, and to take charge of routine correspondence and emergencies in the absence of the roadmaster. Under the assistant roadmaster let there be an assistant foreman in charge of the yard gang, this assistant foreman to receive less salary than any other section foreman, his position being a stepping stone between apprentice and foreman. The combination yard foreman and assistant roadmaster would be in a class by himself. He would have more salary and more authority than any other foreman, in fact, his function would be much like that of the assistant roadmaster discussed in one of D. A. D.'s letters. The cost of him and his assistant foreman would be but little more than the combined cost of a yard section foreman and a roadmaster's clerk, but the value received would be greater. The assistant roadmaster would be a potential roadmaster in case the roadmaster was wanted for a higher office, and his presence at headquarters would enable the roadmaster to spend more time where he belongs, supervising the work.

DEVELOPING FOREMEN.

BY P. H. HAMILTON,

St. Louis & San Francisco, Pittsburg, Kan.

There is plenty of available material for section foremen if it is developed. The old-time foreman or roadmatser will possibly say, "No one ever helped me. I got all of my experience from hard knocks." That is true; but he will not deny that if he had received assistance he would have developed much faster. The average roadmaster never looks for a foreman until he needs him; and then he is hard to find.

The roadmaster should know what kind of men he needs and should develop them after that type. An efficient roadmaster will insist on efficient foremen; and efficient foremen will insist on having efficient men—provided they are allowed to pay sufficient wages. Efficient men can be easily developed into efficient foremen. To get good men the foreman should be allowed to pay wages that will compare favorably with common labor. This would allow him to get men with experience, ability, ingenuity and ambition. These men could be relied upon and they would not be of a transient disposition, as their jobs would mean something to them. There would be competition and each man would put forth his best efforts. The foreman should be allowed to keep a number of such men continuously employed. Then the roadmaster would be able to develop a sufficient number of foremen.

To produce efficiency in any department it is necessary for the men to become interested in the work. It is impossible to interest a man in his work when he is making barely enough to live on. He holds a grudge against his employer for treating him so shamefully. He does not care to excel in his work and he only aims to do as much as his neighbor, and his neighbor only tries to keep pace with the poorest man in the gang. He has no fear of being discharged, for he can get plenty of jobs as good as or better than the one that he has. The result is that in some places we get the poorest class of men for track work; men who are morally, mentally and physically incompetent.

In this locality the foremen are much more efficient than they were years ago. We have a bunch of strong, upright Americans who are not addicted to drink, and who are interested in their work. The hilarious, rollicking "Larry" is no where to be seen. Our foremen are all intelligent, have common educations, and several are excellent penmen. The efficient foreman should not only be able to keep his track in shape with a limited allowance, but should be able to make comprehensive reports. In

times past I have known of foremen who had to keep men in their gangs to read the "butterflies" that the roadmaster would throw off of trains. In my opinion our foremen are more efficient than at any previous time, and I believe that they could continue to be so.

Good men can be kept on the sections as long as they have steady work, even though the rate of pay is slightly less than that paid for common labor. But when gangs are being cut down to the minimum one month and then increased to a large number the next month, and then cut down again in a few weeks, it demoralizes the force for the entire division. Good men soon get discouraged with this and look elsewhere for steady employment. The roadmaster should be allowed to maintain a uniform number of men, cutting forces during the winter months and increasing to a reasonable number in the spring. It should not be necessary for him to hire an extraordinarily large number of men during the hottest month and then reduce to the minimum the next month, thus discouraging the new men.

Another thing that discourages good men is to have the roadmaster bring in new foremen from the outside without first canvassing the division for a trackman suitable to be made foreman. The roadmaster should show all of his men that he has confidence in them. When a foreman asks for a few days "lay off" the roadmaster should first ascertain if there is a man working for that foreman who could handle the section for a few days. If there is not he can probably send a good man from some other section. These little tryouts give the roadmaster an idea as to the various candidates for foremanship, and it gives the candidate a chance to get some good experience. When a new foreman is needed the roadmaster can pick his man.

We have recently issued instructions, and the foremen understand that if they have a man who is ambitious to become a foreman, and they think him capable, they should have the man assist with the reports and should instruct him along that line. In this way there is no confusion in the clerical work when a new man takes charge of a section. This does not insure the man a job, but makes his chances for a foremanship much better. Any man who is ambitious to become a foreman is willing to put in a few moments in the evening occasionally with the foreman if there is a chance of advancement.

While it is impracticable for any one roadmaster to inaugurate an education system among the men, I believe that he should encourage the men to self help. We have a number of foremen and laborers who are now enrolled with the International Correspondence Schools, and without exception these are the best. On roads where the company has no educational bureau the roadmaster should encourage the men to take courses with correspondence schools. Any man who will put in an hour's time each evening at study after a hard day's work is bound to make a good man.

There are thousands of young men today, some of whom are high school graduates, working in stores and driving delivery wagons, who are receiving less wages than the average trackman. One of these young men in each gang would be developed into a good foreman. In hiring men the foreman and roadmaster should not only take into consideration what he can do now, but should consider whether or not he can be developed.

INCREASED PAY FOR FOREMEN AND ROADMASTERS.

BY F. E. CRABBS,

Roadmaster, Chicago & North Western, Chicago.

The causes of the lack of supply of section foremen are: First, the pay is no inducement for laborers. Second, the pay for foremen is not a sufficient enucouragement. Third, without capable young men growing up in this kind of work the supply of first-class foremen and roadmasters is getting shorter each year.

The first remedy for more and better men is to materially increase the pay of the present foremen and roadmasters. Regular section foremen should receive $65 per month and yard section foremen $75 per month. All foremen should be paid for actual hours of overtime put in at night doing such work as cannot be done during the day or emergency work which is done on Sunday. Each foremen should get one week's vacation each year with pay. Each superintendent should be permitted to employ five substitute foremen under the different roadmasters on his division at a salary of $50 per month. On regular sections where the section foreman has charge of the coal sheds he should be paid $5 per month extra for looking after these sheds. Roadmasters should be promoted according to their ability as an encouragement to the younger men who are entering the service.

The roadmasters and foremen have sons growing up who are naturally track men and should fill the larger part of these places, but today some roads will not permit a son to work with the father and therefore the son seeks other employment so that he may remain at home and be brought up properly.

FIGHTING SNOW IN KANSAS.

BY L. C. LAWTON,

Division Engineer, Atchison, Topeka & Santa Fe, Newton, Kan.

The snow storms of the winter of 1911-'12 will long be remembered in Kansas for their unusual circumstances; not only by the railways, but also by the people living there or caught entrain. The record for depth of snow and height of drifts in the first storm was not only a new one for the state, but the second entirely outclassed it and a third late in March holds all records for depth. On December 20 from 12 to 20 in. of snow fell throughout the western part of the state. No wind accompanied it, and sunny days with cold nights made a heavy crust. By all precedent this would have been safe from the railway standpoint, but on the last day of the month a severe blizzard came which lasted ten days. Not much snow fell, but the wind managed to get under the crust of snow, often around weed stocks, filling every depression and leaving huge drifts in the lee of every wind break. It was not content to blow up snow alone, but a great deal of sand was blown into many cuts. This was accompanied by some sunshine and very cold nights with a temperature of 20 deg. below zero, which congealed the drifts into masses of ice and sand.



Engine With V Plow Working in Dodge City Yard.

Not since 1886 has traffic on our road been seriously interfered with by snow, and in fact, since that time, very little use had been found for rotary plows or snow fences. Several of the former were held in the terminals for such emergencies, but it was necessary to train a new set of enginemen to handle them. The snow fences had disappeared, and on right of way lines had been replaced with wire. The younger officials and a majority of train and trackmen had never

been up against such a proposition. The rotaries were not entirely successful, as the ice broke many blades as well as several eccentrics and shafts, and at best they could only take care of the main line, leaving several hundred miles of branch lines for the old "V" or wedge plow, built up on the front of an engine.

Little that was new was developed in the use of the rotaries, except in the speedy repair of broken parts. Two heavy engines were used and a work train with a large extra gang kept near it to help through the heavier cuts. A closer organization was kept on the branch lines, as they were farther from headquarters and relief of any kind. A unit there consisted of three engines, to one of which was fastened the



Rotary Snow Plow on Great Bend Branch.

plow, two gangs of 30 or 40 men each, bunk, kitchen and dining cars, extra train and engine crews and often the business car of the official in charge, who was usually superintendent or even the general superintendent. Work was pushed night and day when possible, with 10 or 12-hour shifts, but the superintendent was frequently not out of his working clothes for four or five days at a stretch. Twenty cents per hour and board were given laborers on the Santa Fe, and no trouble was met in getting good men.

Experience proved that it was safer and surer to use but two engines in bucking drifts, especially on branch lines with light rail. When these would fail to get through a drift the



Opening Branch Line Cut by Shovelling Onto Cars.

third, which was following with the work train, would pull out the other two and after the rail was flanged they would go at it again. If the snow was unusually deep or icy, the extra gang would cut trenches 3 to 5 ft. wide, and 9 to 12 ft. apart, at right angles to the track which made the breaking through much easier. It was not unusual to find drifts extending out from the windward side of the cut in such a manner that there would be 10 ft. of snow on one rail, while the other was swept clear. These had to be dug down or they would throw engines from the track, by turning them over or by breaking



Rotary Working East of Wright, Kan., February 26.

the rail, if not by derailing the engines. The engines were handled by special signals from one man, so that no time was lost at any point. Another detail which had to be watched very carefully was the flanging of the rail before a second run was made into the drift. The weight on the wheels compressed the snow on the inside of the rail into a mass of ice as high or higher than the rail, and this caused almost certain derailment if taken at high speed.

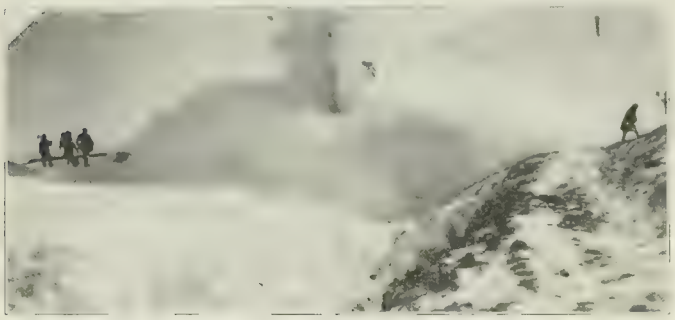
The second storm began on the morning of February 25, changing from a very wet snow to a fine, dry one as the day got colder, and the wind increased to an unusual velocity, even for Kansas. The storm was much heavier and covered a larger territory than the first, and at noon of the first day



Branch Line Cut Opened by Shovelling Onto Cars or Over Bank. The Last Snow Thrown Out Required Five Lifts.

all trains stopped running. At the end of 24 hours, there was from one to two feet over almost the entire state, but everywhere piled into immense drifts, dwarfing those of the first storm. This snow was exceedingly heavy and damp, packing into cuts in such a way that it was hard to move with any kind of a plow. Methods were employed similar to those used in the first snow, except in a few places where drifts up to 20 ft. deep were encountered in rather narrow cuts. There was nothing to do but shovel these out, and two methods were used. By making several lifts much of it was shoveled out of the top of the cut, and at the same time a train of coal

cars was run into the face of the drifts and filled by a relay of shovelers working from the end car. As soon as the drift was opened a section gang was left with it, to remove all snow from the center of track and for a foot or so beyond the end of each tie. There was little thawing weather during the next three weeks, and we had three or four light snows accompanied by heavy winds which would fill these cuts almost to their first height. This kept several outfits on the branches all the time, as while the rotary had little trouble in keeping the main line open it was not advisable to take it away from there. The removing of all snow from the track in cuts proved of value here, as it made the re-



Rotary Passing Through Side Drift Which Had Been Cut Down to Prevent Derailing Engine.

opening much easier. Its greatest value has been felt, however, since the snow has been melting, as it has left the center of the track dry while the ditches have been full of water. At the date that this article is written, after all except the very heaviest drifts have melted, all track, where well ditched, is in very good condition for earth or screening ballast.

The third snow which reached a depth of 26 in. in places, fell on March 23. There was some wind and considerable delay to trains, but no tie-up occurred, and it has metled quickly.

The Santa Fe had hoped with the opening of the Belen cut-off to be able to keep one road to the coast open at all times. However, these heavy snows extended into Northern Texas and tied up the line there for the larger part of two



Rotary Starting Through a Cut.

days. After this the through trains were sent by that route until Western Kansas was open. A number of trains were blocked in small towns where the passengers were fed at the best hotels or at private houses, but where possible they were held at points having railway hotels. Agents were instructed to entertain all passengers as well as possible, and many novel entertainments were gotten up. In many places the town people joined in showing the travelers a good time, as they were themselves "shut-ins."

The railways were caught unawares by this extreme winter, but the outlying towns and ranches were in even worse conditions for such a siege. On account of a dry year, it was known that some stock food would be shipped in, but with an open winter the amount would have been small. The getting of this in after the snow had covered all forage was the most serious question, but later a shortage of fuel and even provisions was felt in many places. As tracks were opened trains of provisions and coal were given precedence over all others. Of course, the business of the majority of the branch lines at this time of the year did not justify even a small part of the expense taken in opening them, had there not been this imperative need which was almost a life and death matter. In many places the people turned out and helped open the tracks, and in other ways showed their appreciation. At the end of one branch they took possession of a train and with the help of the engine crew, opened the entire branch line before it could be reached from the main line.

At another town a merchant got together a large party and with no train help cleared a number of miles of bad drifts. In other places agents did the same thing, and several conductors opened up long pieces of road with one engine and a large bunch of laborers, running only under protection of flag, as the wires were not yet up. These men were all paid the regular rate, whether engaged by employees or not. For several years there has been a good deal of enmity against the railways in Kansas but it is hoped that this will bring us nearer together. If so, this winter may not be a losing deal after all.

NEW SANTA FE MAINTENANCE OF WAY DEPARTMENT RULE BOOK.

The Atchison, Topeka & Santa Fe has just published a book of rules for the guidance of employees in the maintenance of way department, in which a number of features have been included which are not usually covered in such books. The duties of the various officers of the maintenance of way organization, including the roadmasters, section foremen, bridge and building foremen, division engineers and signal supervisors have been fully covered, and a number of sketches are included, showing the right and wrong ways to do different pieces of work. The organization of the maintenance department showing to whom each officer reports, is shown clearly in a sketch.

One feature of interest in this book is the instructions for the treatment of persons injured until the arrival of medical aid, covering two pages. Another new section is that in which instructions are given for the proper care and operation of hand, motor and push cars. A number of rules are here given, observance of which will largely eliminate the common accidents occurring from collisions or men falling from such cars. The usual set of standards for roadbed and turnout is given at the back of the book.

On March 14 Panama canal steam shovel No. 124, a 70-ton Bucyrus shovel, loaded 290 small Western dump cars containing a total of 2,900 cu. yds. of material in the working day of eight hours. In this period the shovel was delayed one hour and 50 minutes waiting for cars. This is the highest daily output for a 70-ton shovel since commencement of the work on the Isthmus of Panama by the United States.

The Canadian Railway Commission has issued a fire guard regulation governing all railways in the provinces of Alberta and Saskatchewan, which provides that on or before August 1 of each year the railways must construct along each side of the right of way, and not less than 300 ft. distant from the center, a fire guard consisting of a plowed strip of land not less than 16 ft. in width. This fire guard must be kept free from dry gases, weeds and other combustible material, between August 1 and December 1.

WATERPROOFING ENGINEERING STRUCTURES.

Abstract of a Paper Before the Western Society of Engineers, March 18, 1912, Describing Successful Methods of Protection.

BY W. H. FINLEY,
Assistant Chief Engineer, Chicago & North-Western.

My attention was first directed to the necessity for some method of waterproofing engineering structures by the number of limestone masonry arches that were slowly but surely deteriorating, due to the infiltration of water. Investigation disclosed that very little had been attempted along this line, and no definite information could be obtained regarding methods or materials. The waterproofing of a masonry arch presents no very difficult features, and my earlier attempts in this direction met with a fair degree of success. However, since the extensive introduction of the elimination of grade crossings in cities by the elevation of the railways, the problem of waterproofing has been greatly complicated by the necessity for making the subway bridges water tight.

This has caused very rapid development in both methods and materials for waterproofing, until now you can get all sorts of information as to how it should be done and what materials to employ, and yet the problem is far from being satisfactorily solved. Engineers have received some very rude shocks in this line of work, causing them, at times, to doubt whether it was possible to do a satisfactory job of waterproofing. The rapid expansion in this field has brought into existence the waterproofing "expert," who takes his place along with the paint expert, who has for years periodically offered us a paint that would at last prevent the corrosion of metal structures; and yet the corrosion of metal structures still goes on.

While listening to the rival claims of advocates of different methods of waterproofing, the engineer must not lose sight of the fact that waterproofing, at best, is but an expedient, and will not take the place of proper designing, or correct poor construction. Water is a universal dissolvent, and if not gotten rid of in time will seep through the ordinary materials of construction. The first requisite in the designing of any structure that must be water tight is to provide means of getting rid of the water as directly and quickly as possible. In the numerous track elevation bridges around Chicago, whatever the type of construction, the usual practice has been to slope the floor from the center to each end, carrying the water away back of the abutments, and right here is where much trouble has developed. Although one may place broken stone filling and tile drains back of the abutments, when the surface ice and snow melts in the springtime and the filling back of the abutments is still in a frozen condition, the water does not escape freely, but piles up and eventually seeps through at the end of the bridge and flows over the face of the abutment. In bridges having supports on curb lines and in the middle of the street, whether of flat slab construction or metal troughs filled with concrete, cracks are likely to appear where joints are not provided for over these supports, and where joints are provided for, trouble is likely to be experienced in preventing the seepage of water.

I will now take up, in a general way, the different methods and materials in use, and will first mention what is called the integral method. This method consists in adding a paste, powder, or lixivating water to the concrete, mixing it with the cement, the mass of concrete as a whole or with the water. While there is no doubt that any of these methods will make concrete impervious to water, as indeed can be done with ordinary concrete by careful proportioning and selection of aggregates, with subsequent care in placing, yet we know that monolithic concrete is apt to develop cracks from a variety of causes, and when that occurs you are likely to have seepage of water through the mass. For that reason I have always preferred for waterproofing engineering structures what has come to be called the membrane method.

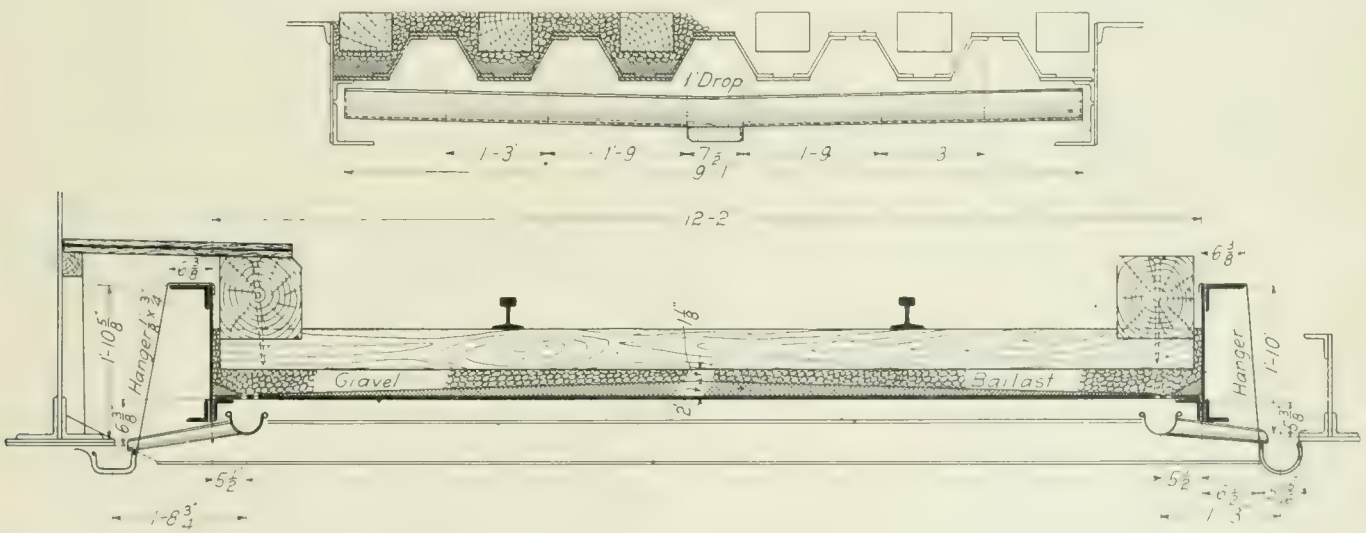


Fig. 1—Section of Bridge Over Main Street, Rockford, Ill., Built in 1893.

When I first took up the question of a suitable material for waterproofing engineering structures, I investigated the respective merits of asphalt and coal tar pitch. The only instance of the use of the latter with which I was familiar had not proved very satisfactory, and I decided to use asphalt. At that time there were few, if any, artificial asphalts on the market, and I necessarily used a natural asphalt. The structures then waterproofed are still in good condition. Since that time there has been an extensive development of artificial asphalts from petroleum oils. In nearly all cases it is claimed that the artificial asphalts offered for waterproofing purposes have a Gilsonite base. Gilsonite is described by G. H. Eldridge in his article on "The Asphalt and Bituminous Rock Deposit of the United States," as "a black, tarry-looking substance of most brilliant luster, normally of absolutely homogeneous texture and

exceedingly brittle." It is found in the Minta basin, Utah, and takes its trade name from S. H. Gilson, an early prospector. It occurs in vertical veins in enclosing sandstone, and the veins vary from a knife edge to 30 in. in thickness. It is generally conceded that the origin of Gilsonite and other hydrocarbons may be traced to petroleum. Inasmuch as the sandstone in which Gilsonite occurs contains no trace of petroleum, it is evident that it was forced up from a great depth by an enormous pressure. Gilsonite is a very pure form of hydrocarbon, and is used in a variety of ways in the arts and trades. It is used in varnishes and baking Japans, insulating materials in electrical work, and for making mineral rubber, as well as in the artificial asphalts. Taking the amount of waterproofing asphalts that are turned out every year I was interested in learning the total production of Gilsonite. I found from a reliable source that the total production last year was in the neighborhood of 30,000 tons, and the previous year somewhat less. I am afraid that the Gilsonite base of our artificial waterproofing asphalt is a very thin one. Petroleum oil is not a uniform product, varying very much at different places, and for that reason I have always been fearful that in asphalts made from petroleum oil we would not get a uniform product. However, I have had tested a number of artificial asphalts and found them to fill the following specifications very easily.

Material.—1. (a) Asphalt shall be used which is of the best grade, free from coal tar or any of its products, and which will not volatilize more than ½ of 1 per cent. under a temperature of 325 deg. F. for seven hours. (b) It must not be affected by a 20 per cent. solution of ammonia, a 25 per cent. solution of sulphuric acid, and a 35 per cent. solution of muriatic acid, nor by a saturated solution of sodium chloride. It should show no hydrolytic decomposition when subject, for a period of ten hours, to hourly immersions in water with alternate rapid drying by warm air currents.

Range of Temperature.—2. (a) For metallic structures, exposed to the direct rays of the sun, the asphalt must not flow under 212 deg. F., nor become brittle at 0 deg. F. when spread thin on glass. (b) For structures underground, such as masonry arches, abutments, retaining walls, foundation walls of buildings, subways, etc., a flow point of 185 deg. F., and a brittle point of 0 deg. F. will be required. (c) A mastic made from either grade of asphalt by mixing it with sand in the proportion of one of asphalt to four of sand, must not perceptibly indent, when at a temperature of 130 deg. F. under a load of 20 lbs. per sq. in. It must also remain pliable at a temperature of 0 deg. F.

In asphalting a metal surface it is imperative that the metal be cleaned of all rust, loose scale and dirt, and if previously coated with oil this must be burned off with benzine or by other suitable means. The metal surface must be warm to enable the asphalt to adhere to it, and the warming is best accomplished by covering it with heated sand, which should be swept back as the hot asphalt is applied. When waterproofing concrete structures it is very necessary that the surface be thoroughly brushed with wire brushes to remove all loose particles and get rid, as far as possible, of what the French call "laitance." It should then be coated with a liquid asphalt primer, and I believe that better results will be obtained if, just ahead of the application of this primer coat, the surface is swabbed with gasolene.

I am not an advocate of felts or burlaps for ordinary waterproofing. I believe that an ordinary concrete surface, whether in a slab bridge or an arch, needs nothing but an application of a primer coat of asphalt and then a coat of liquid asphalt, after which a hot sand mastic, composed of one part of asphalt to four of sand, can be applied with hot smoothing irons. On top of this it has been my practice to put on a swabbing coat of hot asphalt and then to cover the whole surface with washed gravel, particularly where rock ballast was to be used. Over joints and ends of bridges it may be necessary to use burlaps for the added strength they give the asphalt in taking care of any slight movement. However, in cases of expansion joints, where any defined amount of movement is to take place, I believe that special means, such as copper flash joints, should be used. Burlap is a vegetable fiber and if used should be thoroughly saturated in a bath of hot asphalt of such temperature that it will not char or destroy the fiber. To apply asphalt to raw burlap in the field I think is wrong. If the asphalt is hot enough to penetrate the fiber it is likely to be so hot that it will char or destroy it, and if the asphalt is not hot enough one gets only a surface coat.

I would like to repeat what I have previously said about the necessity for so designing your structure that the water can be disposed of as directly as possible. If more care were taken in designing, elaborate or expensive forms of waterproofing would be unnecessary.

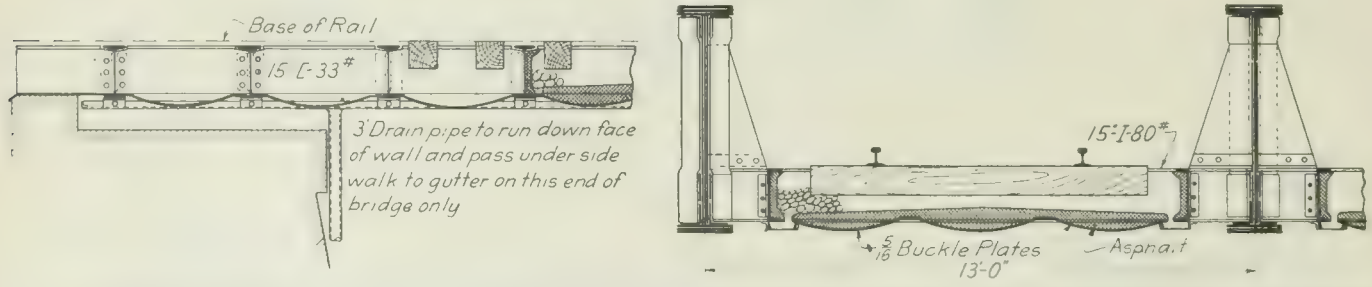


Fig. 2—Shallow Ballasted Floor Bridge in Highland Park, Ill., Where Water is Carried Down Face of Abutment by Troughs and Downspouts.

Asphalt has no affinity for water, and all surfaces that are to be coated with asphalt should be as dry and clean as possible.

The methods I have used in preparing the asphalts are as follows:

The asphalt should be heated in a suitable kettle to a temperature not exceeding 450 deg. F. If this is exceeded it may result in "pitching" the asphalt. Before the "pitching" point is reached the vapor from the kettle is of a bluish tinge which changes to a yellowish tinge after the danger point is passed. If this occurs the material should be tempered by the addition of fresh asphalt. The asphalt has been cooked sufficiently when a piece of wood can be put in and withdrawn without the asphalt clinging to it. Care should always be taken not to prolong the heat to such an extent as to pitch the asphalt. Should it become necessary to hold the kettle for any length of time, bank or draw the fire, and introduce into the kettle a quantity of fresh asphalt to reduce the temperature.

There is a wide difference between the requirements for damp proofing waterproofing to take care of ordinary rainy weather and waterproofing where it is necessary to take care of the hydrostatic pressure of a head of water. In the latter case felt, and burlap mat properly reinforced with concrete, will be necessary.

One of the early applications of waterproofing was made on a stone arch bridge over Turtle creek near Shopiere, Wis., on the Chicago North Western. This bridge consists of five 50-ft.

arches, and was built in 1869 of Joliet and local limestones. The seepage of water through the ring and parapet walls reached such a stage that it seriously threatened the life of the structure. In 1887 this arch was uncovered, and the top thoroughly waterproofed with California asphalt. Three years ago I removed the filling and took up some of this natural asphalt, finding it in first-class condition. The waterproofing of this arch at this time prevented any further leakage, and unquestionably prolonged the life of the structure. I have waterproofed a number of old stone arches that were showing signs of disintegration due to the lack of drainage. In 1896 a couple of 30 ft. arches over streets in the town of Janesville, Wis., were in such condition that it was a question whether they should be rebuilt or not. These arches had been built in 1864 of limestone with lime mortar. Inasmuch as the double tracking of this portion of the road some time in the near future was completed, it was desirable to carry these arches as long as possible. They were uncovered and thoroughly waterproofed with asphalt. This prevented any further deterioration from the seepage of water, and in 1906, over ten years after the waterproofing was applied, these arches were replaced by double track concrete arches. The asphalt was found to be in excellent condition and a part of it was used in waterproofing the new arches.

Figure 1 is a view of a three-track bridge over Main street, Rockford, Ill. This bridge was built in 1893, and waterproofed with California natural asphalt. During the 18 years it has been in place there has been no complaint regarding the dripping of water or leakage from the bridge, although it is over the principal street in Rockford. I attribute this largely to the fact that the water is drained from each floor trough into drainage troughs and carried by pipes through the abutment and outside of the dump. This is one instance of getting rid of water as directly and as quickly as possible. It avoids the trouble that is usually experienced at the end of the bridge where the drainage is carried from the center to each end. The only

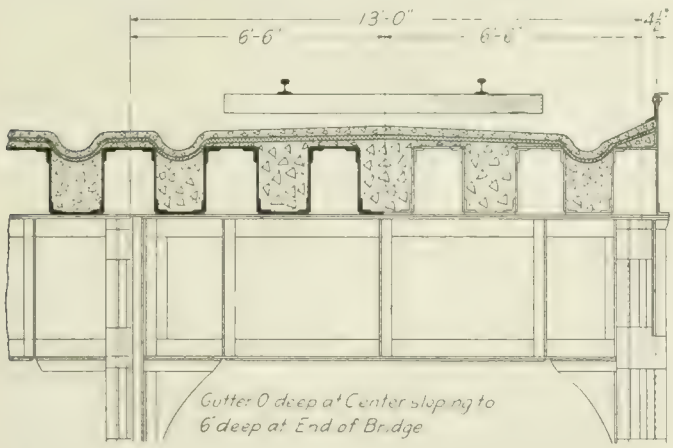


Fig. 3—Section of Subway Over Kinzie Street, Chicago.

trouble experienced with these troughs is from birds building their nests in the same during extended dry spells. These troughs have been renewed once since they were first installed. In later work troughs for a similar purpose were made of a much heavier material. The locomotive stands on this bridge while discharging and taking on passengers at the Rockford station, and I have seen locomotives with their waste water cocks open pouring large quantities of water on this floor, which was carried off directly and quickly without any trouble.

Figure 2 shows a very shallow ballasted floor bridge over Vine avenue, Highland Park, Ill. It was necessary to provide a water tight floor at this point, and this type of floor was adopted. It has troughs, and instead of carrying any of the water back of the abutments it is actually carried down in front of the abutment through troughs and down spouts. These troughs can be so arranged that it would be impossible for any trouble to occur from birds building their nests and stopping the troughs. This bridge was built in 1902.

Figure 3 is a view of a subway on what is called the Kinzie street track elevation, Chicago. You will note in this case the water is carried from the center of the subway to each end. A somewhat different method than I usually employ was used in waterproofing this bridge. The asphalt is imported mastic fluxed with Trinidad and Bermuda, and the asphalt mastic is covered by a layer of reinforced concrete. This work was done in 1905, and has proved very satisfactory, with the exception that there is some seepage of water at the ends of the bridge over the abutments. The method employed in sealing for the

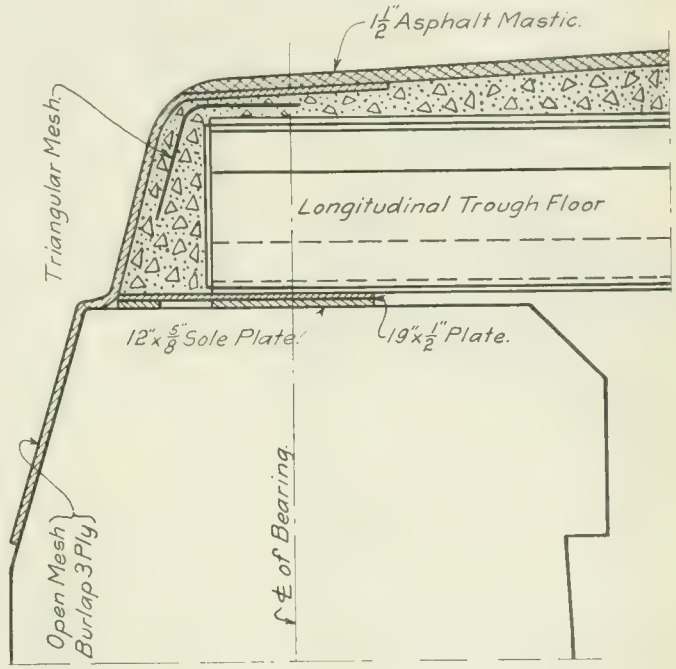


Fig. 4—Proposed Treatment of the Ends of Subways.

end, as shown in this view, did not seem to be completely satisfactory.

Figure 4 shows a proposed treatment of the ends of city subways to prevent the possibility of water getting through and flowing down the face of the abutment. This is an attempt to seal it off completely by the use of a burlap mat instead of the usual bent plate method that we have previously used.

The bridge over Wauwautosa avenue in the town of West Allis, Wis., is similar in construction to the Vine avenue structure. Last fall it was necessary to remove this bridge to make way for improvements at that point, and I was very much gratified to see how thoroughly the iron had been protected by the asphalt mastic. A bridge of this type with such a shallow floor is subject to more or less vibration and deflection that would, under ordinary conditions, make it very difficult to waterproof. However, in this case, when the bridge was taken apart and the asphalt removed there was no indication of any rust or seepage of water through or under the asphalt.

The production of rails during 1911 is reported by the American Iron & Steel Association as 2,822,790 tons, comparing with 3,636,031 tons in 1910, and the record tonnage of 3,977,887 tons in 1906. The United States Steel Corporation rolled 55.5 per cent. of the total production, representing a slight decrease in the proportion as compared with previous years. Rail exports amounted to 420,874 tons, the largest on record. The production of Bessemer rails amounted to 1,138,633 tons and of open hearth 1,676,926, this being the first year in which the total production of open hearth rails has exceeded that of Bessemer.

A. R. E. A. COMMITTEE ASSIGNMENTS.

Full Lists, with Names of Members Appointed and Subjects Given for Investigation and Report During Ensuing Year.

The new committees selected by the board of direction of the American Railway Engineering Association, together with the subjects assigned to the various committees for study, are as follows:

COMMITTEE I.

Roadway.

1. Present formulae of general application for determining waterway areas under varying conditions, including consideration of hydraulic features.

2. Report on and recommend unit pressures allowable on roadbeds of different materials, conferring with Committee on Ballast.

3. Report on tunnel construction and ventilation.

4. Economics in roadway labor.

W. M. Dawley (Erie), chairman; J. A. Spielmann (B. & O.), vice-chairman; J. R. W. Ambrose (Grand Trunk); John C. Beye (C. R. I. & P.); Ward Crosby (C. C. & O.); W. C. Curd (M. P.); Paul Didier (B. & O.); R. C. Falconer (Erie); S. B. Fisher (M. K. & T.); Frank Merritt (G. C. & S. F.); C. S. Millard (C. C. C. & St. L.); W. D. Pence (University of Wisconsin); A. C. Prime (P. R.); H. J. Slifer (C. G. W.); John G. Sullivan (C. P. R.); F. L. Wheaton (D. L. & W.); J. E. Willougby (Carribbean Construction Co.); W. P. Wiltsee (N. & W.).

COMMITTEE II.

Ballast.

1. Continue investigations on gravel ballast and recommend methods for grading the different qualities.

2. Report on proper depth of ballast of various kinds to insure uniform distribution of loads on roadway, conferring with Committee on Roadway.

3. Continue the study of physical tests of stone for ballast.

H. E. Hale (M. P.), chairman; J. M. Meade (A. T. & S. F.), vice-chairman; W. J. Bergen (N. Y. C, & St. L.); A. F. Blaess (I. C.); T. C. Burpee (Intercolonial); L. W. Baldwin (I. C.); O. H. Crittenden (I. & G. N.); F. T. Darrow (C. B. & Q.); J. M. Egan (I. C.); T. W. Fatherson (C. R. I. & P.); H. L. Gordon (B. & O.); G. H. Harris (M. C.); C. C. Hill (M. C.); S. A. Jordan (B. & O.); William McNab (G. T.); A. S. More (C. C. C. & St. L.); J. V. Neubert (N. Y. C. & H. R.); S. B. Rice (R. F. & P.); E. V. Smith (B. & O.); F. J. Stimson (G. R. & I.); S. N. Williams (Cornell College).

COMMITTEE III.

Ties.

1. Report on the effect of design of tie-plates and track spikes on durability of ties.

2. Continue study of the stresses to which crossties are subjected, and determine size required.

3. Report on economy in labor and material effected through use of treated ties compared with untreated ties.

4. Continue the compilation of information as to the use of metal, composite and concrete ties.

L. A. Downs (I. C.), chairman; G. W. Merrell (N. & W.), vice-chairman; H. W. Brown (Penn. Lines); W. J. Burton (M. P.); L. C. Hartley (C. & E. I.); E. D. Jackson (B. & O.); F. G. Jonah (St. L. & S. F.); H. C. Landon (Watauga R. R.); F. R. Layng (B. & L. E.); E. R. Lewis (M. C.); R. J. Parker (A. T. & S. F.); L. M. Perkins (N. P.); J. G. Shillinger (Rutland); G. D. Swingly (B. & O.); D. W. Thrower (I. C.); H. S. Wilgus (P. S. & N.); E. C. Young (N. Y. P. & N).

COMMITTEE IV.

Rail.

1. Present recommendations on standard rail sections.

2. Continue investigation of rail failures and present conclusions drawn therefrom.

3. Continue special investigation of rails.

W. C. Cushing (Penn. Lines); chairman; R. Montfort (L. & N.), vice-chairman; E. B. Ashby (L. V.); J. A. Atwood (P. & L. E.); A. S. Baldwin (I. C.); J. B. Berry (C. R. I. & P.); M. L. Byers (D. & H.); Chas. S. Churchill (N. & W.); F. A. Delano (Wabash); Dr. P. H. Dudley (N. Y. C. Lines); C. H. Ewing (A. C. R.); L. C. Fritch (C. G. W.); C. W. Huntington (C. R. of N. J.); John D. Isaacs (Harriman Lines); Thos. H. Johnson (P. C. & Y.); Howard G. Kelley (G. T.); C. A. Morse (A. T. & S. F.); George W. Kittredge (N. Y. C. & H. R.); J. T. Richards (P. R. R.); J. P. Snow (consulting engineer); A. W. Thompson (B. & O.); Robert Trimble (P. L. W.); M. H. Wickhorst (engineer of tests).

COMMITTEE V.

Track.

1. Present general specifications for track bolts, nutlocks, tie-plates, common and screw track spikes.

2. Continue study of design of main line turnouts.

3. Economics in track labor.

J. B. Jenkins (B. & O.), chairman; G. J. Ray (D. L. & W.), vice-chairman; Geo. H. Bremner (C. B. & Q.); A. Bruner (N. & W.); Garrett Davis (C. R. I. & P.); Raffe Emerson (D. L. & W.); E. G. Ericson (P. L. W.); J. M. R. Fairbairn (C. P. R.); T. H. Hickey (M. C.); E. T. Howson (*Railway Age Gazette*); J. R. Leighty (M. P.); Thomas Maney (L. & N.); Curtiss Millard (C. G. W.); P. C. Newbegin (B. & A.); R. M. Pearce (P. & L. E.); H. T. Porter (B. & L. E.); W. G. Raymond (Iowa State College); S. S. Roberts (I. C.); L. S. Rose (C. C. C. & St. L.); H. R. Safford (G. T.); C. H. Stein (C. R. R. of N. J.); F. S. Stevens (P. & R.); A. H. Stone (K. C. T.); W. J. Towne (C. & N. W.); C. C. Wentworth (N. & W.).

COMMITTEE VI.

Buildings.

1. Present principles covering the design of inbound and outbound freight houses.

2. Report on recommended methods of heating, lighting and sanitary provisions for medium-sized stations.

3. Complete report on roof coverings.

4. Report on the advantages and disadvantages of various types of freight house floor construction.

Maurice Coburn (Vandalia), chairman; M. A. Long (B. & O.), vice-chairman; G. W. Andrews (B. & O.); J. P. Canty (B. & M.); O. P. Chamberlain (C. & I. W.); D. R. Collin (N. Y. C. & H. R.); C. G. Delo (C. G. W.); W. T. Dorrance (Maine Cen.); C. H. Fake (M. R. & B. T.); C. F. W. Felt (A. T. & S. F.); W. H. Finley (C. & N. W.); G. H. Gilbert (Q. & C.); A. T. Hawk (C. R. I. & P.); E. N. Layfield; H. A. Loyd (Erie); L. G. Morphy (B. & A.); C. W. Richey (P. R. R.); W. S. Thompson (P. R. R.).

COMMITTEE VII.

Wooden Bridges and Trestles.

1. Report on formulae for use in determining the strength of sheet pilling.

2. Report on fire protection of wooden bridges and trestles.

3. Complete report on the use of guard rails for wooden bridges and trestles.

H. Rettinghouse (C. & N. W.), chairman; I. L. Simmons

(C. R. I. & P.), vice-chairman; H. Austill, Jr. (M. & O.); F. H. Bainbridge (C. & N. W.); F. E. Bissell (A. C. & Y.); W. S. Bouton (B. & O.); R. D. Coombs (consulting engineer); E. A. Frink (S. A. L.); E. A. Hadley (M. P.); Hans Ibsen (M. C.); Henry S. Jacoby (Cornell University); P. B. Motley (C. P. R.); W. F. Steffens (B. & A.); H. B. Stuart (G. T.).

COMMITTEE VIII.

Masonry.

1. Report on waterproofing of masonry and bridge floors, including methods, cost and results, with definite recommendations.

2. Report on the effect of concrete structures of rusting of the reinforcing material.

3. Report on the principles of design of plain and reinforced concrete retaining walls, abutments and trestles.

G. H. Tinker (N. Y. C. & St. L.), chairman; F. L. Thompson (I. C.), vice-chairman; Robert Armour (G. T.); G. J. Bell (A. T. & S. F.); C. W. Boynton (Universal Portland Cement Co.); T. L. Condron (consulting engineer); J. K. Conner (L. E. & W.); L. D. Crear (Erie); L. N. Edwards (G. T.); A. H. Griffith (B. & O.); G. W. Hegel (C. J.); L. J. Hotchkiss (C. B. &. Q.); Richard L. Humphrey (consulting engineer); W. H. Petersen (C. R. I. & P.); Philip Petri (B. & O.); J. H. Prior (C. M. & St. L.); F. E. Schall (L. V.); G. H. Scribner, Jr. (contracting engineer); A. N. Talbot (University of Illinois); Job Tuthill (C. H. & D.); J. J. Yates (C. R. of N. J.).

COMMITTEE IX.

Signs, Fences and Crossings.

1. Report on the relative advantages of the different kinds of fence posts, with definite recommendations.

2. Report on the best form of track construction and flangeways at paved street crossings and in paved streets, with definite recommendations.

3. Continue the investigation of ways and means for securing a proper quality of fence wire to resist corrosion and secure durability.

C. H. Stein (C. R. of N. J.), chairman; G. E. Boyd (D. L. & W.), vice-chairman; R. B. Abbott (P. & R.); H. E. Billman (M. P.); E. T. Brown (B. & O.); J. T. Frame (C. G. W.); C. M. James (A. C. L.); L. C. Lawton (A. T. & S. F.); G. L. Moore (L. V.); J. B. Myers (B. & O.); F. M. Patterson (C. B. & Q.); C. H. Splitstone (Erie); W. F. Strouse (B. & O.); W. D. Williams (C. N.).

COMMITTEE X.

Signals and Interlocking.

1. Continue investigation of outline description of a comprehensive and uniform signal system, suitable for general adoption, conferring with proper committee of the American Railway Association.

2. Report on the effect of treated and metal ties on track circuits.

3. Economics in labor of signal maintenance.

A. H. Rudd (P. R. R.), chairman; L. R. Clausen (C. M. & St. P.), vice-chairman; Azel Ames; C. C. Anthony (P. R. R.); H. Baker (C. N. O. & T. P.); H. S. Balliet (G. C. T.); W. B. Causey (C. G. W.); C. A. Christofferson (N. P.); C. E. Denney (L. S. & M. S.); W. J. Eck (Southern); W. H. Elliott (N. Y. C. & H. R.); G. E. Ellis (K. C. T.); W. J. Harahan (Erie); M. H. Hovey; A. S. Ingalls (L. S. & M. S.); J. C. Mock (D. R. T.); F. P. Patenall (B. & O.); J. A. Peabody (C. & N. W.); W. B. Scott (U. P.); A. G. Shaver (C. R. I. & P.); Thos. S. Stevens (A. T. & S. F.); H. H. Temple (B. & O.); Edwin F. Wendt (P. & L. E.); J. C. Young (U. P.).

COMMITTEE XI.

Records and Accounts.

1. Make a comprehensive study of the forms in the manual which were adopted a number of years ago and bring forms up to date.

2. Continue study of the economical management of store supplies.

3. Recommend feasible and useful subdivisions of I. C. C. classification account No. 6, with a view of securing uniformity of labor costs.

H. J. Pfeifer (T. R. A. of St. Louis), chairman; M. C. Byers (St. L. & S. F.), vice-chairman; J. M. Brown (C. R. I. & P.); W. A. Christian (C. G. W.); Walter Dennis (C. R. I. & P.); F. B. Freeman (B. & A.); G. J. Graves (A. T. & S. F.); Edward Gray (Southern); E. E. Hanna (M. P.); G. D. Hill (L. & N.); Henry Lehn (N. Y. C. & H. R.); J. H. Milburn (B. & O.); Orlando K. Morgan (C. C. & O.); C. W. Pifer (I. C.); Frank Ringer (M. K. & T.); Guy Scott (P. L. W.).

COMMITTEE XII.

Rules and Organization.

1. Continue the compilation of rules for the government of maintenance of way employees.

2. Formulate rules in the nature of specifications or instructions regarding the conduct of work, making use of the recommendations of the various committees dealing with these subjects, and of the best practice of railway companies as embodied in their books of rules.

J. O. Osgood (C. R. of N. J.), chairman; G. D. Brooke (B. & O.), vice-chairman; F. D. Anthony (D. & H.); S. M. Braden (C. & N. W.); J. B. Carothers, (B. & O.); S. E. Coombs (N. Y. C. & H. R.); J. B. Dickson (Erie); C. Dougherty (C. N. O. & T. P.); W. T. Eaton (St. L. S. W.); J. A. Gordon (C. G. W.); K. Hanger (C. R. I. & G.); B. Herman (Southern); Jos. Mullen (C. C. C. & St. L.); F. L. Nicholson (N. & S.); W. C. Smith (N. P.).

COMMITTEE XIII.

Water Service.

1. Report on the design and relative economy of track pans from an operating standpoint.

2. Report on design of water stations, using deep wells as a source of supply.

3. Report on recent developments in pumping machinery.

Robert Ferriday (C. C. C. & St. L.), chairman; J. L. Campbell (E. P. & S. W.), vice-chairman; H. M. Church (B. & O.); C. C. Cook (B. & O.); G. M. Davidson (C. & N. W.); A. F. Dorley (M. P.); J. H. Gibboney (N. & W.); E. G. Lane (B. & O.); Curtiss Millard (C. G. W.); A. Mordecai (consulting engineer); W. A. Parker (St. J. & G. I.); Chas. E. Thomas (I. C.).

COMMITTEE XIV.

Yards and Terminals.

1. Report on typical situation plans of passenger stations of both through and stub types, with critical analyses of working capacity, and include a review of the different methods of estimating their capacity.

2. Report on developments in the handling of freight by mechanical means.

3. Report on developments in the design and operation of hump yards.

C. H. Spencer (Washington Terminal), chairman; E. B. Temple (P. R. R.), vice-chairman; W. G. Arn (I. C.); Hadley Baldwin (C. C. C. & St. L.); W. C. Barrett (B. & O.); C. H. Burgess (D. & H.); A. E. Clift (I. C.); H. T. Douglas, Jr., (W. & L. E.); A. C. Everham (K. C. T.); Geo. P. Johnson (N. & W.); D. B. Johnston (P. L. W.); H. A. Lane (B. & O.); L. J. McIntyre (N. P.); B. H. Mann (M. P.); A. Montzheimer (E. J. & E.); W. L. Seddon (S. A. L.); E. E. R. Tratman (*Engineering News*); M. K. Trumbull (C. & W. I.); W. L. Webb (C. M. & St. P.); J. G. Wishart (C. R. I. & P).

COMMITTEE XV.

Iron and Steel Structures.

1. Report on rules for instruction and guidance of inspectors in mill, shop and field.

2. Report on the methods of protection of iron and steel structures against corrosion.

3. Study the design of built-up columns, co-operating with other investigators and committees of other societies.

A. J. Himes (N. Y. C. & St. L.), chairman; O. E. Selby (C. C. C. & St. L.), vice-chairman; J. A. Bohland (G. N.); A. W. Buel (W. M.); Chas. Chandler (C. G. W.); C. L. Crandall (Cornell University); J. E. Crawford (N. & W.); J. E. Greiner (B. & O.); W. H. Moore (N. Y. N. H. & H.); Albert Reichmann (American Bridge Company); A. F. Robinson (A. T. & S. F.); C. C. Schneider (consulting engineer); C. E. Tebbetts (K. C. T.); L. F. Van Hagan (Wisconsin Railway Commission); F. O. Dufour (University of Illinois); C. E. Smith (M. P.); I. F. Stern (consulting engineer); F. E. Turneaure (University of Wisconsin).

COMMITTEE XVI.

Economics of Railway Location.

1. Continue the consideration of all questions connected with railway location, alinement, grades and improvement of grades and lines, affecting the economic operation with relation to traffic, tonnage ratings, speed, density of traffic and financial considerations, with the special aim in view of establishing uniform methods and unit values for investigating and comparing different routes and making improvements in alinement and grade.

A. K. Shurleff (C. R. I. & P.), chairman; R. N. Begien (B. & O.), vice-chairman; F. H. Alfred (P. M.); A. C. Dennis (contracting engineer); C. P. Howard (I. C.); F. W. Green (L. & A.); Fred Lavis (consulting engineer); F. W. Smith (C. C. C. & St. L.); H. J. Simmons (E. P. & S. W.); Walter Loring Webb (consulting engineer); M. A. Zook (C. G. W.).

COMMITTEE XVII.

Wood Preservation.

1. Continue investigation of proper grouping of different timbers for antiseptic treatment.

2. Investigate the merits of various preservatives, giving special attention to oil from water-gas tar, and to the use of refined coal-tar in creosote oil.

Earl Stimson (B. & O.), chairman; E. H. Bowser (I. C.), vice-chairman; G. M. Davidson (C. & N. W.); H. B. Dick (B. & O. S. W.); C. F. Ford (C. R. I. & P.); Dr. W. K. Hatt (Purdue University); V. K. Hendricks (St. L. & S. F.); C. E. Knickerbocker (contracting engineer); George E. Rex (A. T. & S. F.); E. A. Sterling (consulting forester); C. M. Taylor (C. R. of N. J.); Dr. Hermann Von Schrenk (C. R. I. & P.); T. G. Townsend (Southern).

COMMITTEE XVIII.

Electricity.

1. Continue the consideration of the subject of clearances.

2. Report on the effect of electrolytic action on metallic structures and the best means of preventing it.

3. Continue the preparation of a standard specification for overhead transmission line crossings.

George W. Kittredge (N. Y. C. & H. R.), chairman; J. B. Austin, Jr., (Long Island), vice-chairman; D. J. Brumley (I. C.); R. D. Coombs (consulting engineer); A. O. Cunningham (Wabash); L. C. Fritch (C. G. W.); George Gibbs (P. T. & T.); G. A. Harwood (N. Y. C. & H. R.); E. B. Katte (N. Y. C. & H. R.); C. E. Lindsay (N. Y. C. & H. R.); W. S. Murray (N. Y. N. H. & H.); Frank Rhea (commercial engineer); J. R. Savage (Long Island); Martin Schreiber (Public Service Railway); W. I. Trench (B. & O.); H. U. Wallace (consulting engineer).

COMMITTEE XIX.

Conservation of Natural Resources.

1. Continue the study of tree planting and general reforestation.

2. Continue the study of coal and fuel oil resources.

3. Continue the study of iron and steel resources.

E. O. Faulkner (A. T. & S. F.), chairman; William McNab (G. T.), vice-chairman; R. H. Aishton (C. & N. W.); Moses Burpee (B. & A.); F. F. Busteed (C. P.); A. W. Carpenter (N. Y. C. & H.); Howard Elliott (N. P.); C. H. Fisk (C. S.); W. A. McGonagle (D. M. & N.); G. A. Mountain (Canadian Railway Commission); W. L. Park (I. C.); G. H. Webb (M. C.); R. C. Young (L. S. & I.).

SPECIAL COMMITTEES.

Uniform General Contract Forms.

1. Complete report on general contract forms.

W. G. Atwood (L. E. & W.), chairman; J. C. Irwin (Rutland, Vt.), vice-chairman; C. Frank Allen (Massachusetts Institute of Technology); E. F. Ackerman (L. V.); W. L. Breckenridge (C. B. & Q.); R. G. Kenly (M. & St. L.); E. H. Lee (C. & W. I.); C. A. Paquette (C. C. C. & St. L.); H. C. Phillips (A. T. & S. F.); J. H. Roach (L. S. & M. S.); C. A. Wilson (consulting engineer); H. A. Woods (G. T.).

GRADING OF LUMBER.

1. Continue the collection of current specifications, grading and inspection rules for maintenance of way timber and lumber not heretofore reported on, and present same for all classes of maintenance of way timber and lumber, which will conserve the interests of railways and be acceptable to manufacturers' associations; conferring with committees of this association and with other organizations whose work is affected.

Dr. H. Von Schrenk (C. R. I. & P.), chairman; B. A. Wood (M. & O.), vice-chairman; W. McC. Bond (B. & O.); D. Fairchild (N. P.); R. Koehler (S. P.); A. J. Neafie (D. L. & W.); W. H. Norris (M. C.); J. J. Taylor (K. C. S.); F. B. Walker (N. P.).

THE MANUFACTURE OF CROSS-TIES FOR PRESERVATIVE TREATMENT.*

BY HOWARD F. WEISS,
Assistant Director, Forest Products Laboratory.

At the present time the price of cross-ties in this country, other things being equal, depends on the species of wood used and the size specified. The quality for practically all grades is about the same and is usually specified in language somewhat as follows: "All ties must be cut from sound timber of good quality, peeled, free from shakes, loose or decayed knots, or other imperfections that would impair their strength or durability. They must have two parallel faces sawed or hewed smooth with the ends cut square."

It is the opinion of the writer that it would be to the decided advantage of certain railways to consider one other factor in cross-tie specifications as a basis for fixing prices—viz., their sapwood content. This is particularly true for ties intended to be treated.

The number of cross-ties purchased by railways in the United States for four years as shown by the United States Bureau of Census, has been;

Year.	Total.	Hewed.	Sawed.
1907.....	153,703,000	118,385,000	35,318,000
1908.....	112,476,000	91,982,000	20,484,000
1909.....	123,751,000	95,499,000	28,252,000
1910.....	148,231,000	.....	.....

It will be seen that by far the larger number of ties are hewed, the percentage varying from about 75 to 82 per cent. of the total number cut. It is apparent that the methods of manufacture are not undergoing any marked general or permanent changes. The reasons for this are perhaps as follows:

(1) The general impression among railway engineers has been, and in some cases still is, that hewed ties shed water better than sawed ties and hence are more durable. All attempts which I have made to secure authenticated data substantiating this belief have failed, and even if this claim were valid, it would be of no

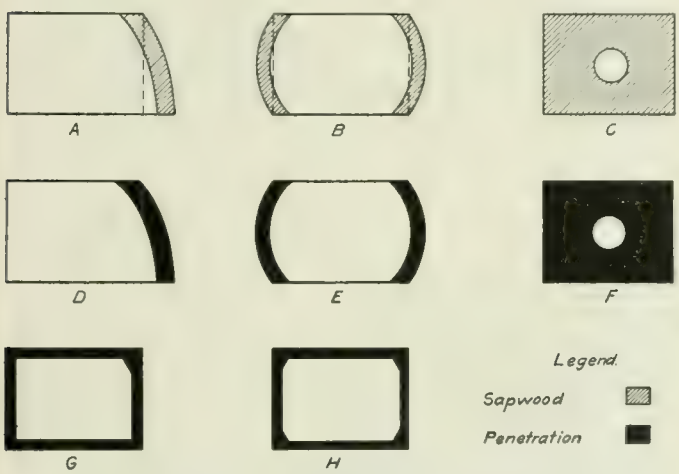
*Modified from an address delivered before the Eighth Annual Convention of the American Wood Preservers' Association.

practical importance when the ties are given a preservative treatment.

(2) Hewed ties are generally cut with a straighter grain than sawed ties, and hence are claimed to have superior strength. This may be true only when the fibers of the wood are at variance with the axis of the tie; and even when the fibers are thus distorted, the difference in the strength of a hewed tie and a sawd tie is probably of little significance, for in both cases more or less of the fibers are bound to be ruptured in manufacture.

(3) In ordering hewed ties it is claimed that the railway gains by securing a volume of wood larger than if the ties were sawed, because when sawed, the ties are cut to fixed dimensions, whereas in hewing they are usually cut only to keep above the minimum dimensions, and this volume consequently is generally greater than that specified. While this claim is unquestionably true in many instances, nevertheless it is more than offset by the disadvantage of this method of manufacture.

(4) Perhaps the chief and best reason why most ties now used are hewed is the economic condition surrounding their production. Railways generally secure cross-ties from three sources; from tie companies, from farmers and other holding



Showing Influence of Sap Wood on Penetration of Preservatives.

small bodies of timber along the right-of-way, and from cuttings on their own holdings. It frequently happens that it is easier and cheaper for a farmer to hew a few ties, hauling them to the railway or town for sale, than it is for him to haul his logs to a sawmill and have them sawed. Where such and similar conditions exist, the hewing of ties is justifiable, as it is the best practical means for utilizing the timber. However, there are many instances where large owners of timber could saw it into ties rather than have it hewed, and by so doing would not only bring about a closer utilization of their own material, but would furnish the railway companies with a better product. It is largely this class of operators who can bring about a most immediate improvement in the method of manufacturing wooden ties.

The chief reasons why sawed ties should be used are as follows:

(1) Hewing cross-ties results in waste of much valuable material, the aggregate volume thus wasted being even greater than the volume of the wood in the tie. This is an absolute waste, being put to no use whatever, since the refuse is left in the woods to rot. When logs are sawed into ties rather than hewed, much of this material can often be utilized, especially in the case of large logs which are capable of furnishing more than the volume of one tie. In addition to the boards which can thus be obtained, there is an enormous amount of wood which even now has value as fuel, and there is no doubt but that this value will be increased in the immediate future due to the utilization of the waste wood for the manufacture of other products.

(2) A sawed tie is cut to specific dimensions except when it is made from a small-sized log and only slabbed on two faces. With this more accurate volume, it is much easier when the ties are placed in a treating cylinder, to determine the absorption of the preservative per cubic foot than when the volume of the ties is extremely variable. Most treating specifications call for an absorption of a definite quantity of preservative per cubic foot of wood, and unless the volume of the wood is accurately known, the absorption per cubic foot can not be accurately applied, and the treatment is bound to be at variance with the specification.

(3) More sawed ties can as a rule be piled on a cylinder buggy than hewed ties. This not only increases the output of the plant but decreases the cost of treatment.

(4) Ties are very seldom hewed so carefully that tie plates or rails will bear uniformly upon them; consequently, it is almost invariably necessary to adze hewed ties in order to secure a satisfactory bearing for the rail. With sawed ties such adzing can generally be entirely eliminated.

(5) Hewed ties possess much needless volume and also have much needless weight, hence they are more expensive to handle and transport than ties whose volume and weight are more uniform.

The above remarks apply to present practice. Entirely aside from them there is a very important point in manufacture which is greatly overlooked. It is the distribution of the sapwood in the tie. It is just as logical to specify how ties to be treated shall be sawed or hewed as regards their sapwood content and its distribution, as it is to specify a difference in price due to a difference in the kind of wood. Exceptions will, of course, occur. Sapwood is very easy to impregnate with preservatives, while heartwood in most species is very resistant. This difference in the resistance to treatment between the sap and heartwood of the same tie is often very much greater than the difference in treatment between two ties of widely different varieties of wood. In certain species like the red oak and the ash, which have a very porous structure, this condition is not true, but in the vast majority of cases it is. With most ties composed of part heart and part sapwood, when placed in a cylinder and injected with a preservative, most, if not practically all, of the preservative will go into the sapwood. To secure the best results it is of considerable importance, therefore, to specify how this sapwood should be distributed. The best kind of cross-tie intended for treatment is one which has a uniform distribution of sapwood on all surfaces, as shown at c in the accompanying figure. A tie of this kind can be very efficiently protected against decay.

Unfortunately, only a comparatively small number of ties are of this kind, and even those that are, are usually of low crushing strength. By far the largest percentage of ties now used are composed mostly of heartwood or needless sapwood, as shown at a and b. When ties of this kind are treated according to the ordinary specifications, practically all of the preservative will go into the sapwood in most species, leaving the heart faces with only a superficial penetration. The greatest wear on a tie comes on its face immediately under the rail or plate, and this is the portion which should have the greatest and not the least protection. If ties of the type shown in figures a and b are treated, they can unquestionably be made to absorb the amount of preservative specified—say 10 lbs. per cu. ft.—but most of the preservative will be in those portions of the tie where it will do the least good. If, however, these ties were sawed as indicated by the dotted lines, it would be possible to secure just as long a life from them with a much less consumption of preservative.

For example, consider a modern treating plant having an output of approximately 800,000 ties per year: If the ties are impregnated with 10 lbs. of creosote per cubic foot, the oil costing 6 cents per gal. and the ties containing approximately 3 cu. ft., the total amount of the oil used would be approximately 24,000,000 gal. If the ties had been cut as indicated in the sketch, it

would be possible with a consumption of about 6 lbs. of creosote per cu. ft. to protect them as effectively as with 10 lbs. in the former case. This would result in a net saving of approximately 4 lbs. per cu. ft., or 12 lbs. per tie, equivalent to about 9 cents per tie for cost of preservative, or $72,000 in one year's operation of the plant.

There are other ways in which this point could be argued. For example, if this unnecessary sapwood were removed, could not the life of the tie be increased over what it would have been, provided the quantity of oil injected in both cases remained the same? A company would be justified in paying more for properly sawed ties intended for treatment than for ties which are improperly sawed or hewed, especially when the treatment is one using straight coal-tar creosote. It is the author's opinion that roads using this method of treatment could very well afford to insert another clause in their specifications for cross-ties, concerning the amount and distribution of sapwood, and even go to the extent of paying a higher price for ties in which the sapwood was properly distributed. They would thereby save an appreciable item in the cost of treatment. The roads which do not use treated ties or which adhere to a zinc treatment would not be benefited to the same degree by a requirement of this kind. The difficulties in putting it into practical use would, in some cases, be insurmountable, but where conditions of production are such that a requirement of this kind could be employed, it is believed its adoption would unquestionably result in decided profit.

In the accompanying sketch figures A, B, and C represent the cross sections of three ties, the shaded portion being sapwood and the white, heartwood. The dotted lines show how these ties could be improved by slabbing the sides. If impregnated with creosote, the ties would appear as in figures D, E, and F, showing the heavy impregnation on the sides and the very slight impregnation on the faces in figures D and E. Figures G and H represent ties A and B slabbed on the sides and then impregnated with creosote, showing the even distribution of the preservative and the heavier injection on the faces than in B and D, thereby giving greater protection to the tie where it is most needed and at the same time consuming less of the preservative.

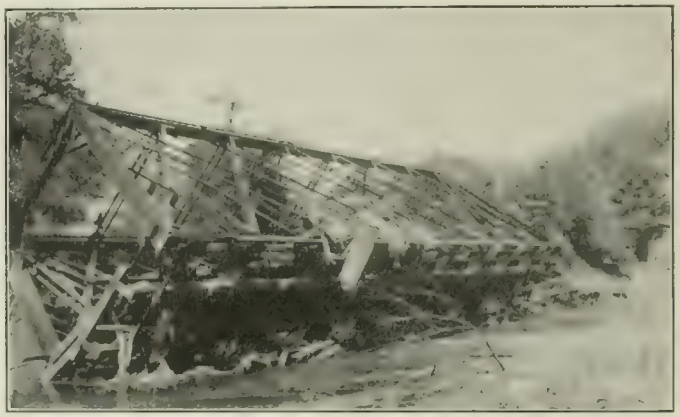
REPLACING STEEL BRIDGES ON THE BUFFALO & SUSQUEHANNA.

The flood resulting from the bursting of the dam at Austin, Pa., on September 30, 1911, in sweeping down the valley gathered up lumber and wreckage, which struck two bridges of the Buffalo & Susquehanna, lifted them from their abutments and deposited them on either side of the track some distance down stream. One, a through-plate girder span 85 ft. long, and weighing 52 tons, was left bottomside up 700 ft. down the creek from its original location in the track. The other, a through lattice truss span, 145 ft. long, weighing, exclusive of the track, 98½ tons, was left on its side 445 ft. down stream with its nearest end 300 ft. from the track. The bottom of the creek being rocky, piling could not be driven, and frame trestles were built in opening the road for traffic. The danger, however, from the large quantities of ice and drift brought down by the spring floods rendered it necessary to replace the truss span, and a contract was accordingly let to the Lackawanna Bridge Company.

The bridge was jacked up on cribbing and skidded across the stream by means of tackle and a hoisting engine, shown in an accompanying illustration. Eighty-lb. rails were laid on cribbing on both banks of the stream with a grade of 15 ft. in 300 ft. to a point by the side of the temporary trestle. When the bridge had been pulled into this position the temporary false work was taken out and the steel bridge shipped sideways into place.

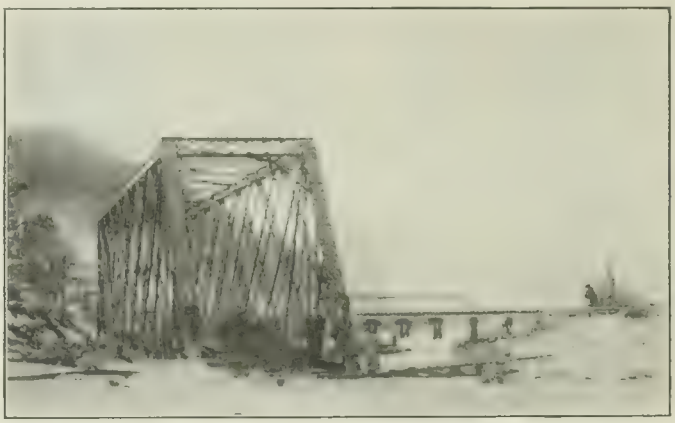
The through plate girder bridge was turned right side up and skidded up one side of the stream to the track. It was then placed lengthwise of the track and jacked up. Rollers were placed beneath it and the plate girder was rolled on top of the temporary trestle across the stream. The bridge was jacked up, the rails and false work taken out from beneath, and the bridge lowered into position.

A small hoisting engine with block and tackle was used to pull



Bridge as Left by the Flood.

the bridges into position. A derrick, engineer and seven steel bridgemen were used, also three local helpers, and a man with a team. F. Herbst, of the Lackawanna Bridge Company, supervised the work. The railway company took out the temporary



Bridge After It Had Been Righted.

false work and replaced the abutments, also laid the new track on the bridges with a crew of eight bridge carpenters. This work was under the supervision of Daniel Fitzpatrick, master carpenter.

REMOVING SNOW FROM SWITCHES.

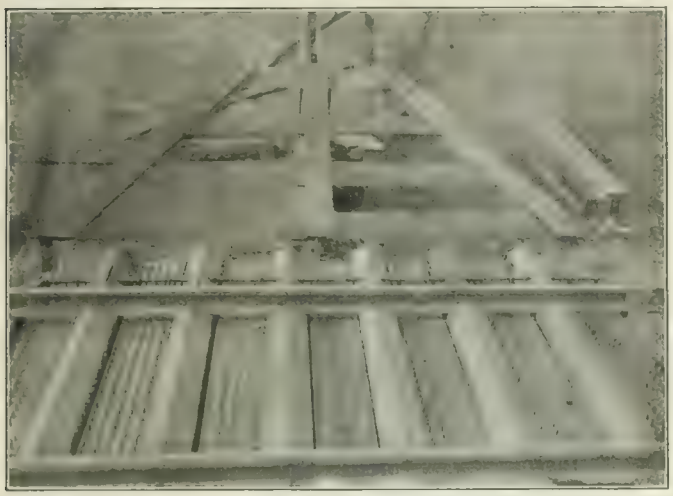
BY M. GANLEY,

Roadmaster, Atchison, Topeka & Santa Fe, Argentine, Kan.

On March 23 we had 25 to 30 in. of snow in the vicinity of Kansas City. To eliminate the difficulty of keeping the switches open by sweeping where the wind and engines quickly dragged the snow back, I used the following method: Two 12-in. x 14-in. bridge caps were laid across the rails, one on top of the other, with a track tie on top of the caps. A loaded 50-ton coal car was pushed up against these caps and a second track tie inserted between the wheels and the lower cap. A switching engine then pushed this coal car with the timbers ahead of it down the switching leads, which leveled off the snow to the top of the rails in the same manner as ballast is frequently leveled. Fifteen men were used to clean switches behind the car, and eight men handled the timbers. In six hours this force was able to clean 12 leads with about 160 switches. The snow between the rails was pressed down quite solid and appeared to melt off a great deal faster than where it was lying loosely.

A NEW TYPE OF TRACK CATTLE GUARD.

The Kent Oscillating Cattle Guard Corporation, Johnson City, Tenn., recently has placed on the market a new type of track guard for highway crossings, which has been used successfully by several railways in the southeastern part of the United States. Guards of this type placed where semi-wild cattle and hogs of the mountain sections have been accustomed

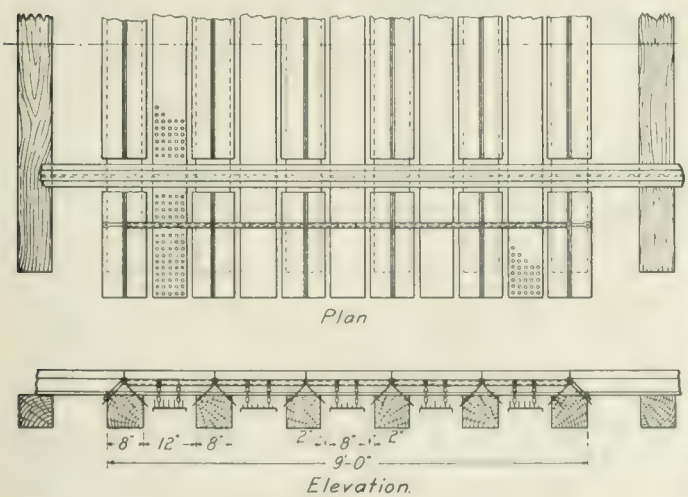


Kent Oscillating Cattle Guard in Track.

to follow along the right-of-way, are said to have blocked effectually the passage of such stock.

The details are shown in one of the drawings, and the accompanying photograph gives an idea of the guard in place. The guard can be made for any length of track desired. The one shown here occupies the space between eight cross ties. On each of the six intermediate ties is placed a cover presenting a sharp angle at the top. This cover has been made of wood, but metal can be used if desired. It comes about half way up on the rail. In the peak of the cover are placed spikes or a saw tooth extending up to the level of the head of the rail.

Two 1-in. iron rods extend the length of the guard parallel

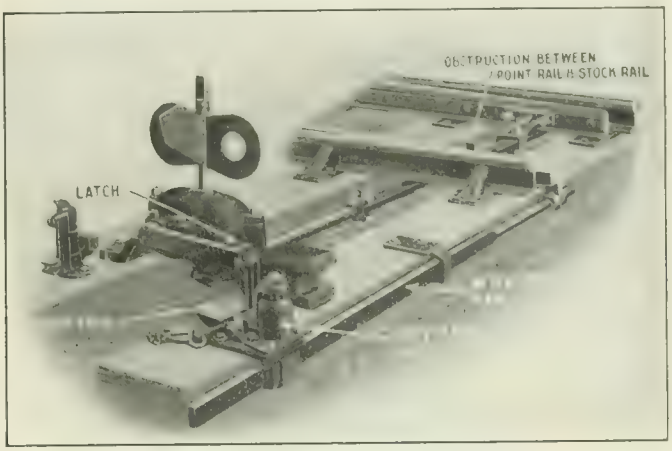


Kent Oscillating Cattle Guard.

with the rails, about 1 ft. from each end of the cross ties. These are fastened securely to the tie at both ends of the guard. Flat pieces of board or steel, 8 to 10 in. wide and occupying the space between the ties, are suspended from these iron rods at the four corners by chains attached to the iron rods. These boards are just wide enough to swing clear between the ties, and extend 6 in. beyond the end of the latter. The upper surface is studded with rows of spikes spaced 1½ in. apart and extending up 2½ to 3 in. At least a 4-in. clearance is left under the boards so they may oscillate beneath the rails. The chains by which the boards are suspended are attached either by a washer or a clevis. The covering on the ties and the oscillating boards extend out to the wing fences, leaving no room for pigs or other small animals to pass between the guard and the fence.

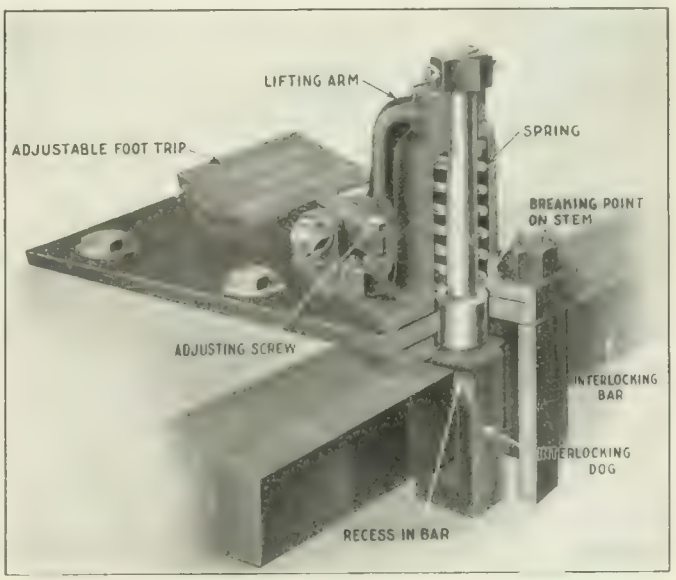
THE ANDERSON SAFETY SWITCH LOCK.

An improved type of switch lock in combination with a switchstand has recently been placed on the market by the American Valve & Meter Company, Cincinnati, Ohio. The interlocking feature insures the closing of the switch before the stand is padlocked and prevents the switch from opening under a train if the switchtstand should be destroyed or the switch rods disconnected. The lock is separate from the switchstand, although one lever operates the switch, the lock and the target in one movement. The mechanism is enclosed to protect it from snow,



Installation of Anderson Switch Lock.

ice or dirt. The interlocking feature is provided by a dog which, when the switch is in the closed position, engages a notch in the lock rod connected to the switchpoint. This dog is made to drop quickly into the notch by a coil spring around the stem which supports it. A foot trip which operates a lifting arm is provided to raise the dog out of engagement with the notch when it is desired to open the switch. This foot trip also operates the latch which holds down the operating handle of the switchstand. The same downward movement of the foot trip which unlocks the lock rod also releases the handle, allowing the



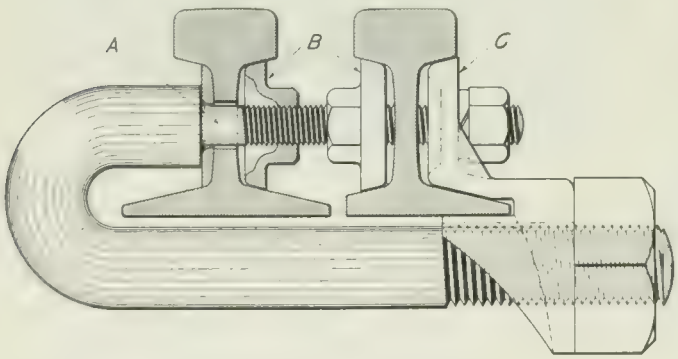
Details of Anderson Switch Lock.

lever to be thrown to open the switch. When the switch is closed this lever is thrown over into the latch, and if the switchpoints have actually moved to the closed position and the block rods are not disconnected the interlocking dog will drop into the notch in the lock rod, which will raise the foot trip and allow the counterweighted latch lock to engage the switchstand lever. In this position the holes provided in the latch for the padlock are uncovered, allowing the mechanism to be securely locked with the switch in the closed position. In the design of the stem supporting the interlocking dog, a short length just above the dog is reduced in cross section to provide a point which will be weaker than any other portion, and will break first in case the stand and lock are struck by a mail sack or similar object. If the stem is broken at this point the lock is still operative to hold the switch closed.

A NEW TENSION GUARD RAIL CLAMP.

The difficulty of holding a guard rail in position has long been recognized. Many roads have been drilling both the main and guard rails and inserting cast iron separating blocks passing bolts through both rails and blocks to maintain the flangeway. These bolts have broken so frequently that other clamping devices have of necessity come onto the market. The common forged yoke with filler blocks and wedges as now seen on the main lines of most of our large systems.

The illustration shows a device for clamping a guard rail



Tension Guard Rail Clamp.

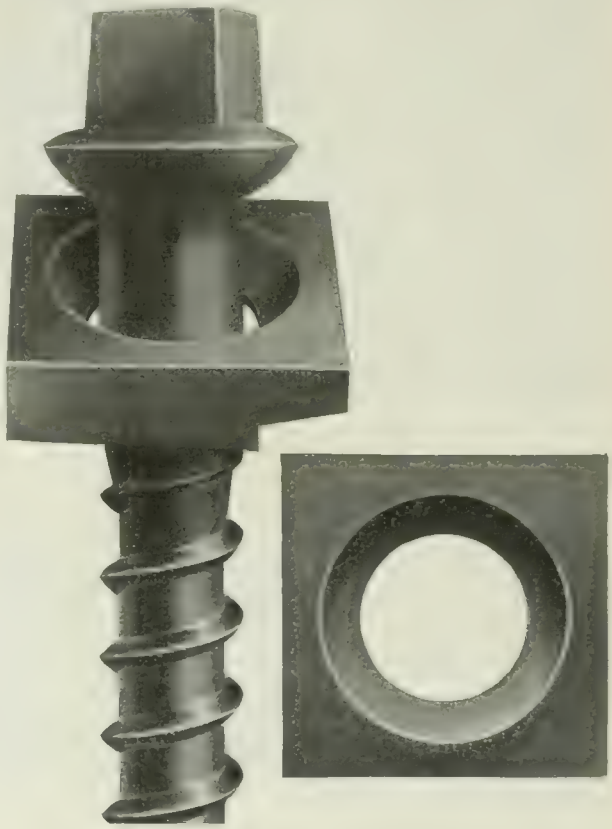
which is always kept in tension, similar to a link of a chain, and which is now being carefully tested out in the track. It is made of 2 in. round stock, wrought iron, reduced to 1 in. diameter where it passes through the rails and separating the spool fillers. At the point of reduction, "A," a fillet is formed which matches with one on a cast washer that fits in the fishing space of the main rail. The reduced portion of the bolt is threaded to allow for the adjustment of spool fillers "B," which can be tightened with the standard wrench required for 1 in. track bolts.

To brace the guard rail a casting, "C," is attached which permits the large end of the bolt to pass through its lower portion and the smaller end through its upper part, both ends of the bolt being fastened by nuts, thus forming a continuous link about both rails permitting them neither to spread, cant nor tilt. The spool fillers act as a nut locking device upon the outside nut, as they relieve a considerable amount of the strain on the bolt. Coming in contact with both the underside of rail head and upper side of rail base, they are thus kept tight. As the rails wear through the throat, the track walker can easily adjust the fillers by using his wrench. Both the large nut and small one can be locked by the use of sheet metal washers that can be bent over the flat of the nut. The cost of the tension clamp is very little more than that of the ordinary bolt and filler block.

Another type of the same device using square filler blocks with adjusting corrugations, has also been developed. Both types are made by the Q. & C. Company, New York.

THE UNIVERSAL COMBINATION SCREW SPIKE.

One of the most recent developments in the screw spike field is the Universal Combination screw spike, the essential feature of which is the clip, or washer, which is so designed that the head fits into it in the nature of a ball and socket joint. It is essentially a standard screw spike with the underside of the head hemispherical in shape to fit into a depression of the same shape in the washer. This construction enables the washer to adjust itself so that it affords a full bearing for the head of the spike



Universal Combination Screw Spike.

and compensates for any inaccuracies in boring the tie or driving the spike. With this clip the spike can be used with any tieplate, or even without a tieplate. The bearing on the rail is secured for the full width of the clip, and as the spike is driven close to the rail the portion bearing on the base of the rail is in compression between the flange and the spike. This spike is made by the American Iron & Steel Manufacturing Company, Lebanon, Pa.

The permanent survey of the railway from Parkes, New South Wales, to Peakhill has been completed. It has not yet been decided as to when construction work will be begun. A proposal for a railway from Redhead to Swansea, New South Wales will be submitted to the Public Works committee.

The yards of the Cotton Belt and Iron Mountain routes at Bird's Point, Mo., on the Mississippi river just above Cairo, Ill., have been threatened by floods at three different times. The cost of protection work for the last two floods was given by A. M. Van Auken in a discussion before the American Railway Bridge and Building Association. In 1897, 5,200 lineal ft. of bank were riprapped at a cost of $37,028. In 1903 the so-called David Neale system was used for a distance of 4,700 ft. at a cost of $29,140. In 1905, however, all of the Neale protection was gone and all but 400 ft. of the riprap.

General News Section.

The Chicago, Milwaukee & Puget Sound was fined $100 on each of 33 counts for violation of the federal 16-hour law, in the United States district court at Spokane, Wash., on April 10.

Effective on May 1, the Master Car Builders' rules of interchange will be adopted without exceptions on all of the St. Louis terminal lines, following the adoption of a similar practice in Chicago on April 1.

The car sheds and a small repair shop of the Illinois Central at East St. Louis, Ill., were destroyed by fire in the company's yards on April 9, causing a property loss of approximately $75,000 and the death of a mechanic.

The Denver & Rio Grande has made an adjustment with its employees by which the firemen will receive an increase in wages of 7 per cent., and the management will make no objection to the affiliation of 95 per cent. of the yardmen with the Brotherhood of Railway Trainmen.

Officers of the Harriman Lines have announced that hereafter supplies will be bought, wherever practicable, in "home" territory. President Sproule of the Southern Pacific says that the company expects to spend between $4,000,000 and $5,000,000 a year in California for supplies.

According to a press despatch from London, April 10, experiments made by British army officers, in conjunction with the Marconi Wireless Telegraph Company, have resulted in sending messages both to and from an aeroplane flying in the air, at points several miles from the station on the ground.

Fifteen pleas of guilty were entered in the federal court at Topeka, Kan., on April 8, by railway companies charged with violations of the 28-hour law in the transportation of live stock. Fines of $100 were imposed for each violation, except in the case of the Atchison, Topeka & Santa Fe, which was fined $25 on each of 19 counts.

St. John's Orphanage, Philadelphia, is now called the John Edgar Thomson School. The privileges of this school are for the daughters of employees who have been killed while in the discharge of their duty in the service of the Pennsylvania Railroad. The school was endowed by John Edgar Thomson, late president of the Pennsylvania.

W. B. Spaulding, chairman of the Central Safety Committee of the St. Louis & San Francisco, has addressed a communication to each of the governors of the states through which the Frisco lines run, asking them to co-operate with the company in reducing the number of accidents resulting from the large number of trespassers on trains and on the right of way of the railway.

The bill which is under discussion in Congress to extend to other industries the Erdman law, providing for mediation in disputes with employees, has the support of Judge Knapp and Commissioner Neill, mediators under the present law, who appeared before the House committee this week and advocated the extension of governmental mediation to all branches of industry.

The second annual convention of the National Drainage Congress, which was organized in Chicago last fall, was held at New Orleans, La., April 10-14. About 400 delegates, representing about 30 states were in attendance. The congress was organized for the purpose of promoting a policy of reclaiming overflowed lands similar to that adopted with reference to irrigation.

At a meeting of the legislative committees of the four principal railway brotherhoods at San Antonio, Tex., on April 11, resolutions were passed protesting against the policy of the Mexican government in discriminating against American railway employees in an alleged effort to eliminate them from the service of the Mexican railways for the purpose of replacing them with Mexicans.

Superior Court Judge James C. Rives of Los Angeles county, California, holds a remarkable record for travel over one line of railway. Judge Rives lives in the town of Downey, which is about twelve miles from Los Angeles on the Southern Pacific, and every weekday for 27 years he has traveled back and forth, a total of over 130,000 miles. During this time the schedules of the trains on which he rides have not been changed more than 10 minutes.

The Central Vermont has awarded to the Harlan & Hollingsworth Corporation, of Wilmington, Del., the contract for building the two new steamers recently announced, which are to be run between New York and Providence. These steamers will each be 332 ft. long and 48 ft. beam; and will carry 700 passengers and 500 tons of freight. The steamers are to be finished in about one year.

A meeting of the representatives of the machinists, blacksmiths', carmen's, boilermakers' and sheet metal workers' organizations on western railways was held at Kansas City this week for the purpose of organizing a federation of shop employees of all railways west of the Mississippi river. The movement is an outgrowth of the organization of federations of the employees of the Illinois Central and the Harriman lines, which led to the shop strike last fall.

The American conductors and enginemen employed on the Northern and Gulf divisions of the Mexican national railways all left their work on April 17, the cause of the strike being the refusal of the officers of the road to limit the percentage of Mexicans who should be employed as conductors and enginemen. It is said that President Garretson, of the Order of Railway Conductors has approved the strike of conductors, and that 600 members will be affected.

The Kansas City Board of Trade has passed resolutions addressed to the receivers of the Kansas City, Mexico & Orient and to Judge J. C. Pollock, who has jurisdiction over the receivership, protesting against a proposed removal of the general offices of the road from Kansas City to Wichita. The resolutions state that the board is especially desirous of having the offices maintained at Kansas City, in order that the increasing grain business may be facilitated by the presence of the general officers.

The proposition before Congress to establish the United States government as a builder of railways in Alaska has been expanded into a bill proposing that 1,000 miles of line be built, and that a commission of five persons be appointed by the President to take charge of the enterprise. This bill, which has been introduced by Senator Smith, carries an appropriation of $1,000,000 and provides for the issuance of bonds. This proposal seems to be independent of, and perhaps in conflict with, that which was laid before Congress by the President.

On April 12, Grand Chief Stone of the Brotherhood of Locomotive Engineers, informed the managers that the enginemen on the 50 eastern roads had voted 93.3 per cent. in favor of supporting their representatives to the extent of declaring a strike if necessary. He asked that the managers offer some proposal which would bring about a settlement. The committee of managers met on April 17 to consider the situation, and continued the meeting to the following day. It is expected that an early meeting between the managers and the representatives of the enginemen will be arranged for.

The Wisconsin division of the Chicago & North Western has been awarded a banner for having the best accident record during the year of the divisions of the road, taking into consideration the volume of business done and other conditions. The banner was presented by President W. A. Gardner, with an address, at a meeting of the division officers and employees composing the division safety committee on Monday. The Wisconsin division is the one on which Mr. Gardner received most of his early training. Last year the banner was awarded to the Sioux City division.

The Interstate Commerce Commission has issued the report of Inspector Belnap on the rear collision which occurred at Odessa, Minn., December 18, in which 10 persons were killed. The conclusion of the inspector is that the accident was caused by the failure of the flagman to properly protect his train. A contributing cause was the despatcher's directing the operator to admit the second train to the block while it was still occupied by the first. And three other persons are at fault; the con-

ductor for entering the block which he knew was occupied without first having a permissive card; the operator for the same fault, and the operator at Odessa for leaving his signal in the clear position while taking an order from the despatcher. The report describes the construction of the steel passenger cars, and has five full page half-tone illustrations showing the condition of these cars after the collision.

The Southern Pacific in Mexico suffered seriously last week from the revolutionary disturbances. In the state of Sonora several bridges were destroyed and trains were attacked by the rebels, who, it appears, were probably Yaqui Indians. On April 10, a few miles south of Guaymas train No. 1, on which was vice-president Charles Hine, was fired on by a dozen armed men, and one passenger was killed. The engineman did not stop, however. On the same day train No. 2 ran on to a burned bridge near Empalme and the engine was wrecked; the engineman and fireman were killed and three other trainmen injured. Two other bridges were destroyed by fire.

The St. Louis & San Francisco on April 11 withdrew from service its fast mail train No. 1, running between St. Louis and Vinita, Okla., and carrying eastern mail for Oklahoma and Texas points. The Missouri, Kansas & Texas also discontinued the connecting mail train between Vinita and the Texas cities. Mails that have been carried on these trains have been transferred to the Frisco's California Express. The discontinuance of the trains is said to have been caused primarily by the action of the postoffice department in sending periodicals by freight, and thereby curtailing the amount of mail to be carried on mail trains. It is also said to be part of a general policy of retrenchment which has been manifested on both roads.

At the annual meeting of the United States Steel Corporation, held in Hoboken, N. J., this week, a committee of stockholders of which Stuyvesant Fish was chairman, made a report on the labor conditions at the mills of the corporation. The committee finds that 26 per cent. of the employees work 12 hours a day, mostly in rolling mills and other places where the process is continuous. The committee declares that the seven day week is detrimental to the employees morally and physically. Much of the Sunday work was done away with several years ago, and the committee believes that most of the rest of it can be abolished; but the reform will be difficult unless other mills will also carry it out. A proposal by one stockholder that the work at the steel mills should be done in three shifts of eight hours each was discussed, but was withdrawn. The committee finds that many employees desire to work long hours in order to increase their income. Complaints that by the piece work and bonus systems the men were oppressed are declared to have no reasonable foundation.

The educational bureau of the Illinois Central has announced the company's plan for paying employees for useful ideas. It is a combination of the Pennsylvania Railroad's plan (*Railway Age Gazette,* January 26, 1912, page 163), with the added offer to recognize and pay for suggestions that are in use only locally. Each employee is offered the opportunity to present to the educational bureau for consideration any idea he may have thought out or worked out for promoting the interests of the company in any manner. Such ideas may be original in so far as the company is concerned, may be adoptions of plans that have been heard of or that may be in effect on some other railway, or may be descriptions of quick and economical ways and means of doing various kinds of work, which have been put into practice locally and which have proven that they were successful. The bureau calls attention to the wide field for suggestions, particularly along the line of improvements in station service, reductions in the number of reports necessary, improvements in terminal work, switching, etc., systematizing of files and office methods, filing of tariffs, reductions in claims and accidents, reduction of damage to equipment, etc. It may be a plan some section foreman has for reclaiming scrap material or repairing tools, it may be a handy device some shop machinist has put into use, it may be a system some yard clerk has worked out, it may be a method some agent or conductor has for handling passengers or freight in a manner to win praise for the company. The advisory board of the educational bureau will pass on and judge all suggestions offered. Such suggestions as are deemed suitable for adoption, will be properly recommended and presented to the management. If the management accepts a suggestion and puts it into effect, the advisory board will then decide on a fair and proper recompense to be made to the employee.

Rail Conference in Indiana.

At a meeting of the Indiana Railway Commission on April 16, the discussion of rail failures was continued from February 20. J. P. Sayre, New York Public Service Commission, C. E. Elmquist, Minnesota Commission, and Judge Wood, of Indiana, from the committee of the National Association of Railway Commissioners, also attended. Dr. Dudley, of the New York Central, presented a paper outlining recent developments in rail manufactures. He expressed a strong prejudice against a definite amount of discard being specified, but urged shearing the ingot to secure sound metal. He said that the physical properties of rails have been developed so that the rail used today better withstands wheel pressures than formerly, and that strains and deflections of rails have been materially reduced by better maintenance standards. He urged great care in mill practice, saying that it is possible to secure good rails with proper care at the mills. W. C. Cushing, Pennsylvania Lines, urged great care in analyzing the statistics furnished by roads to the commission. The term "rail failure" is very apt to be misleading, as it includes all rails removed from track because of any defect, while but about one-fifth only of rail failures are broken rails. The only dangerous rail failures are broken rails; although the public believes that all rail failures are broken rails. Mr. Cushing also called attention to the fact that railways are not seeking hardness in rails, but toughness and ductility, and that the material in rails must be such as to carry trains at required speeds with perfect safety. President Delano of the Wabash, President Buffington of the Illinois Steel Company and Professor Benjamin of the University of Illinois, also discussed the subject. The commission announced that it would visit the South Chicago and Gary rail mills with railway men and manufacturers on April 23 and 24. The commission is collecting statistics of all rail failures within the state, and will compile these yearly.

Co-operation Campaign on the Southern Pacific.

F. G. Athearn, manager of the bureau of economics of the Southern Pacific, has adopted a plan, since the first of the year, of addressing frequent circular letters to employees of the company, or to particular classes of employees, urging their co-operation with the management in improving the quality and efficiency of the service. The letters are sent out with the pay checks and are written in a breezy style intended to impress upon employees the importance of each individual in the service. They are asked to "come back" with replies making suggestions concerning ways of improvement, and are told that every man who makes a suggestion which will improve the service will receive recognition and credit for his ideas. When a suggestion is sent in, an abstract is made, to put it into brief and clear form. It is then given a number, which is also placed on the letter. The abstract, with no indication of identity is then sent to the head of the department interested, who is asked to make a report on it. Some extracts from the Mr. Athearn's letters are as follows:

"Make a special effort during February to bring your dealings with the public onto a personal basis; that is, try to make every man with whom you do business feel that he is dealing with you personally and not with an impersonal corporation. After all, you are part and parcel of the railway. Have you ever thought of that? Then, whenever you are able to remove a prejudice from the mind of anyone, get his name and address and send it in to me. I want the management to know the men who are boosting for us.

"Then, again, if you can succeed in getting any additional business at your station, especially if it is competitive business, I want you to tell me about it and give me the names and addresses of the new customers you have secured. Many a good man is working hard for the interests of the company and we want to know about him personally.

"I want you to tell me some of the selling stunts you have hit upon, and how they worked. Describe some of the cases where you, personally, were responsible for a shipment going via Southern Pacific, instead of some other route. When we come to get our new promoting plan into operation, I want to know

who of you are alive and awake, who are doing more (maybe only a wee bit more, but more) than you have been ordered to do.

"The Bureau of Economics is not going to do any ordering. It's going to help; to boost, not knock. It's the good things you do that are interesting me. And I am having all the facts you send me put on a little card, one card for each agent. You're going to have a reason now for doing a little thinking. You know someone is watching, ready to give you credit for your ability. See the point?

"So start in right now. If you really want to be advanced, to get out of the rut, advertise yourself. Let me know who you are and what you are doing. Perhaps you have felt, sometimes, that the man who is working right under the nose of the officials has a better chance for promotion than you. If you do, write. Get under the nose yourself. Now's your chance. Will you make the most of it?"

One letter was devoted to explaining the importance of courtesy in dealing with the public, and was illustrated with several incidents. Another dealt with the subject of neatness. Mr. Athearn has received a ready response to the letters, including a large number of suggestions as to various details of the service.

Medals for S. P. Employees.

The Southern Pacific has awarded medals in the annual competition for the best condition of stations, divisions, roadmasters' districts and sections, in accordance with the decision of a committee of engineers after an inspection trip over the lines. The coast division, of which Thomas Ahern is superintendent, carried off the honors for the best division, both the best roadmasters' districts and the best section of track and roadbed being on this division. Gold medals were awarded to the foreman of the best section and to the roadmaster of the best district. Silver medals were awarded to the agents at 27 stations, to 21 pumpers, to three fuel oil plant tenders and to six foremen of power plants. Forty-four silver medals were awarded to the section foremen who had the best sections in each roadmaster's district.

Baltimore & Ohio Strengthens Chicago Organization.

The announcement in the Elections and Appointments department that Frank C. Batchelder has been elected president of the Baltimore & Ohio-Chicago Terminal Railroad, and assistant to the president of the Baltimore & Ohio, with headquarters in Chicago, is indicative of a policy on the part of the Baltimore & Ohio to become more closely identified with the interests of the city of Chicago.

When the Baltimore & Ohio took over the Chicago Terminal Transfer in April, 1910, and reorganized it as the Baltimore & Ohio-Chicago Terminal Railroad, Mr. Batchelder was elected vice-president and placed in immediate charge of its operation. Until it had acquired this property at a cost of over $30,000,000, the Baltimore & Ohio could not be said to be really in the city of Chicago, although it did reach the outer limits of the city with its own rails, and shared with other tenants a joint lease of the terminal property. President Daniel Willard was located in Chicago for six years as vice-president of the Chicago, Burlington & Quincy before going to the Baltimore & Ohio, and while in that position had opportunity to learn the importance of Chicago from the transportation standpoint. Since going to the Baltimore & Ohio he has continued not only to take a very active personal interest in the Chicago terminal itself, but also has urged and carried forward extensive improvements on the main line between Chicago and the East—particularly in the way of additional double track; and it is stated that within the next three months when the improvements now under way are completed, the Baltimore & Ohio will be double-tracked for the entire distance between Philadelphia and Chicago, with the exception of 34 miles, and it is expected that this remaining distance will be double-tracked in the near future.

In recognition of the great possibilities for traffic development to and from Chicago, it has been decided by President Willard that not only should the president of the Baltimore & Ohio-Chicago Terminal Company be actually located in Chicago, which is to be the case in the future, but he has also decided that the interests of the Baltimore & Ohio would be better served by having an assistant to the president located in that city. It is understood that Mr. Batchelder will be authorized to represent the president in all matters likely to come up at the western terminal, and that it will be the policy of the Baltimore & Ohio to co-operate with its shippers and friends located in the West, in every possible way for the mutual benefit of both.

President Willard and Mr. Batchelder have been personal friends and business associates for more than 30 years, and the selection of Mr. Batchelder for the important position to which he has been appointed, may be taken to indicate not only the deep interest which President Willard himself takes in the western terminal of the Baltimore & Ohio system, but also that because of his acquaintance with and knowledge of Mr. Batchelder's ability, he will probably give him greater authority than is usually given to men occupying similar positions.

Reduced Casualties on the North Western.

The Central Safety Committee of the Chicago & North Western reports that for the 15 months ending April 1, 1912, the number of passengers killed on that road, as compared with the preceding period of 15 months (ending December 31, 1910) fell off 57 per cent. The number of employees killed fell off 23 per cent., and of other persons 11 per cent. Injuries (not fatal) also showed marked diminutions. Other decreases for these two periods are as follows:

		Per Cent.
25	fewer trainmen killed	53.2
1,760	" trainmen injured	44.5
5	" switchmen killed	26.3
132	" switchmen injured	16.5
1	" stationmen killed	25.0
120	" stationmen injured	14.7
940	" trackmen injured	42.7
120	" bridgemen injured	29.8
5	" car repairers killed	71.4
13	" car repairers injured	3.5
1	" shop and R. H. men killed	14.3
214	" shop and R. H. men injured	13.2
1	" other employees killed	7.7

There was an increase of 7 trackmen killed, 2 bridgemen killed, and 13 other employees injured.

Unfilled Tonnage of the United States Steel Corporation.

A report of the United States Steel Corporation shows that on March 31 the unfilled tonnage was 5,304,841 tons. This compares with 5,454,200 tons at the end of February, 1912; 5,379,721 at the end of January, 1912, and 3,447,301 tons at the end of March, 1911. The decrease in the unfilled tonnage of March from that of February was 149,359 tons. It had been expected that there would be a decrease of from 150,000 to 200,000 tons. This showing indicates that during March the Steel Corporation received orders for new business at the rate of about 34,000 tons a day, and that shipments were about 40,000 tons a day.

Joint Ownership of City Terminals.

A plan for the joint ownership and operations of railway terminals in large cities with the municipality as the joint partner was outlined by W. L. Ross, vice-president of the Chicago & Alton and Toledo, St. Louis & Western railways, in an address before the Peoria Transportation Club on April 12. In introducing the subject, Mr. Ross referred to the great change in the attitude of the railways to the public and spoke also of the trend of railway regulation, saying that the managers of railway property must be prepared to meet the demand for more and more supervision, and that of a more centralized character, even extending to jurisdiction over the question of whether new roads shall be built; and their issues of securities. In this extension of supervision the Interstate Commerce Commission should be so organized as to represent the various states as well as the federal government, possibly divided into sub-committees having jurisdiction over various phases of the transportation problem. One of the greatest of these problems, in his opinion, involved the economical use of terminals without waste or duplication, to give satisfactory service to the communities dependent upon them. On the subject of terminals he said in part:

With proper terminal facilities everywhere the service offered by the railways would be greatly improved, and that with a marked saving both to the roads and the communities served by them. Under the old system of competition, without supervision, communities and commercial centers always thought that separate terminals and a number of lines entering these centers was an added guarantee that the roads were acting independently, and that they thus had an added guarantee of genuine competition. With the commission's supervision this is unnecessary, because the rates are fixed, and there can be no discrimination.

It would be in the interest of both efficiency and economy if all commercial centers reaching industrial importance, as an

illustration, had one common terminal, around which, at a distance to be determined by local conditions, including the distribution of industrial and manufacturing plants, would be a boundary line, marking a zone, which would be served by one terminal company.

This company would make rates to and from all tracks and facilities located within the zone, serving all railways that were built to a point connecting with the terminal line. And it should do this at a cost not exceeding the interest on bonds, maintenance and operation of the terminal company.

Of course it may be argued that railways having advantages in terminals in a city like Chicago would be the losers in having to give up their terminals. But in roughly sketching this proposed plan it is no part of my intention to have them give up these terminals. The terminal company should issue bonds guaranteed by all the railways using the terminal company's tracks and facilities, to pay for the individual facilities of each line as at present organized and operated. Each line would then be an equal owner with each other line in the city of Chicago in all the terminal facilities within the zone so defined. There would be neither injustice nor confiscation.

I believe that as a further guarantee of fairness to all and a just consideration for the general good that the city itself should be a co-partner with the railways in such terminals. And as such the city should have properly selected representatives on the board of the terminal company. This arrangement would eliminate the question of compensation for the use of streets, and it would take away the consideration of additional track construction from the political standpoint of the city. Nor should the city be a non-participating partner in the arrangement so far as financial consideration and recompense is concerned. The details of such a co-partnership should be worked out on the basis of a percentage of earnings and worked out in a way that would be fair to the city.

To carry this illustration a little further: Suppose such a company organized to operate the tracks of all the railways within the present territory known as the switching district of Chicago and to be known under the new organization as "the switching zone." Under this arrangement there would be no industrial tracks, no tracks of any kind or character for steam railways, to be owned, or constructed, or operated in the city, excepting those belonging to the terminal company, plant facilities excluded. This terminal company to be owned, share and share alike, by all railways reaching a physical connection with the terminal. This would have the effect of giving all shippers located within the zone access to all territories on any and all railways reaching the connection with the terminal, at the established Chicago rate.

The present property would, of course, be appraised, and all lines holding terminals should be well compensated for them. It could not be charged that there was any confiscation of terminals. Neither can it be charged that there would be any element of selfishness in such a plan. In the case of a road having very fine terminals, in consideration of giving them up, it would have access to all terminals and tracks within the city of Chicago, and there could be no discrimination because all shippers would alike have access to all parts of the city.

The earnings of such a terminal company, so organized, should represent the interest on the value represented by bonds, the operating costs and its maintenance, and each line should pay to the terminal on the business handled for each line by the terminal sufficient to simply produce these results. The absorption of switching charges for all these lines would be materially reduced by such a plan.

The operation of the entire terminals by one company would eliminate the duplication of switching tracks and switching service to a great extent; it would also eliminate many hazardous crossings. There would be a further saving in the decreased number of switch engines that would be needed to handle the business. And this in turn would, to some extent at least, decrease the smoke nuisance. The city having an interest in the terminal company, it would simplify the questions relating to the crossing of streets and increased trackage. Having an interest in the earnings, these questions could be reduced to a strictly business basis.

Suppose under this broad commission plan that I have outlined they should authorize the construction of another line between Chicago and some other business center. When such a new railway was constructed to a point giving physical connection with the terminal company's lines, it would be allowed access to all terminals within the city on the same basis as all other roads, by taking an interest in the terminal company on the same basis as the other roads. The plans would expand to meet all the growing demands for transportation. The handling of traffic from one point in the zone to another point within the zone would be on the scale basis, the same as it would be to any other part of the state.

I have thus briefly sketched a plan which I believe would bring relief to the transportation industry at one point where relief is greatly needed. Of course the plan is based upon the fundamental idea that the commission is to actually supervise all of the railways, take them out of the class known as industrials, and bring about a condition of uniformity and prevent discriminations of any kind and character. If this idea were carried out in all commercial centers of importance, industrially and commercially, it would entirely solve the terminal problem. It would eliminate the switching feature, and it would wipe out all discrimination as between different localities in the same city and place all manufacturers and shippers in the city upon an equal basis. Another advantage would be that all terminal charges would be absorbed between all points; and it would not be burdensome to the railways. Such a plan would, in my judgment, be along the lines of efficiency and economy, and should produce service and conditions that would be entirely satisfactory to all concerned.

Damage Suits in Toronto.

A suit for damages for alleged personal injury, which came up before Judge Morgan and a jury in the county court at Toronto, Ontario, March 28, against the Toronto Street Railway, proved to be fictitious, the plaintiff being a detective who, it appears, had been engaged by the company to bring the suit for the purpose of sustaining its charge that the company suffered from fraudulent suits brought in the courts. The plaintiff was Alfred Burnett; and "a prominent physician" testified that Burnett, last October, suffered from a sprained back, was disabled for three weeks, and was still unfit for work. Following this testimony, Burnett went on the stand and swore that he had been in no accident, and that the injuries which he had led the physician to believe real were mythical. Burnett said that he had suffered no injury and that he went out daily during the time that the doctor was visiting him.

How this kind of proceeding is looked upon by the court is suggested in the report of a grand jury presented April 11, which includes a true bill against Robert J. Fleming, general manager of the street railway; James H. Forrest, claims agent; J. Walter Curry, K. C., and Albert Burnett and W. E. Smalling, employees of a private detective agency, charging them with having conspired to fabricate evidence in connection with false cases for damages for injuries brought in the names of Burnett and Smalling; to pervert and obstruct the courts, and with having conspired to commit contempt of court. The fifth count is that the men conspired to commit the crime of bringing one of his Majesty's courts, one of the judges, and the administration of justice into contempt by maliciously, fraudulently and vexatiously procuring . . . . "feigned and fictitious actions, brought to the great scandal, contempt and reproach" of the courts, the judges, the administration of justice and the peace of the King, his crown and dignity.

Investigation of Governmental Regulation.

The National Civic Federation has begun an investigation of the question how far governmental regulation of public utilities may be carried without interfering unduly with the management by the owners. The work will be done under the direction of Dr. John H. Gray, Professor of Economics in the University of Minnesota. Professor Bruce Wyman of the Harvard Law School has been appointed counsel for the investigation. Other experts who have been employed are William D. Kerr, formerly of the Wisconsin Railroad Commission, and Professor I. L. Sharfman. One piece of work already under way is a complete compilation of all the public service laws of the United States (federal and state), Great Britain, the Dominion of Canada and the Canadian provinces. Supplementary to this there will be prepared a summary of all decisions of courts and commissions under the laws so compiled. An expert will be sent to Europe to make a general investigation of public

utilities. The investigation will cover telephone companies, steam and electric railways and water, gas, electric and water power companies.

The work is divided among committees, as follows: Rates, chairman, F. K. Lane; Control of Service, chairman, M. S. Decker; Control of Capitalization, chairman, M. R. Maltbie; Franchises, chairman, B. Lee; Accounts and Reports, chairman, L. S. Rowe; Ways and Means, chairman, F. Q. Brown. The executive committee is composed of well-known members of public service commissions, officers of public service corporations, etc., among whom are the following: August Belmont; Union N. Bethell; William C. Brown (president N. Y. Central); George B. Cortelyou; F. A. Delano (president Wabash); W. W. Finley (president Southern Railway); A. B. Garretson (president Order Railway Conductors); D. O. Ives; J. C. Lincoln; James H. McGraw; William D. Mahon (president Amalgamated Association of Street Railway Employees); T. C. Martin; B. H. Meyer (Interstate Commerce Commission); H. U. Mudge (president Chicago, Rock Island & Pacific); H. B. Perham (president Order of Railroad Telegraphers); W. Z. Ripley; Alfred H. Smith (vice-president N. Y. C.); James Speyer; Charles A. Stone; Warren S. Stone (B. L. E.); George F. Swain; Frank Trumbull (Chesapeake & Ohio), and Daniel Willard (president Baltimore & Ohio).

Proposed Governmental Supervision of Corporations.

The dissolution of the Standard Oil Company and the American Tobacco Company has thrust forward the whole problem of our policy toward industrial corporations. The federal government must have a permanent administrative office through which to supervise interstate corporate business. We want a business machinery of high efficiency, serving the best interests of the citizen and returning ample reward to the ability and industry of those who use that machinery fairly. Two great restraints may be imposed upon business. One is the automatic regulator, competition; the other, direct governmental intervention. It is indeed true that under some conditions even fair competition may result in combination. The further question is then raised, How far is it desirable to *enforce* competition by dissolving such combination? But whatever shall be our ultimate policy, a permanent administrative system is a necessary part of it. That system must have broad powers of investigation, taking continuous cognizance of the operations of large industrial corporations. Such administration by publicity and supervision will preserve competition and provide equal opportunity. By an expert knowledge of current business conditions it will display the working of competition, and the cases, if any, where this fails to be of benefit. It will always have the knowledge and data that may be required properly to enforce competition.

The American Tobacco Co. and the Standard Oil Co. have been disintegrated, and yet the country has no effective means of ascertaining how far the desired reform will really be carried out. No one can forsee the future of these new units in the two great industries. It will be purely an economic and financial process. No judicial machinery is adapted to handle this novel problem. Indeed, the Circuit Court expressly refused the suggestion of the Attorney General that the tobacco case be kept open for three or more years for such purpose of supervision. . . . . The exact form of such an administrative office is a matter for further consideration. The essentials are permanence, expert training, administrative flexibility, effective investigation, and publicity.

The Bureau has published Part III of its Report on Transportation by Water in the United States. Parts I and II having been already published. It has published a summary of Part I of its Report on the Lumber Industry. This dealt with the standing timber of the country, its amount, distribution, and ownership. Part I of the Report on the Steel Industry has been issued. This dealt with the organization, investment, profits, and position of the largest corporation in the country, the United States Steel Corporation.—*From annual report of Herbert Knox Smith, Commissioner of Corporations.*

Entertainment Program for Atlantic City Conventions.

J. W. Taylor, secretary of the Master Mechanics' Association and the Master Car Builders' Association, has sent out to members a circular letter giving details regarding the entertainment features in connection with the conventions of these associations which will be held in Atlantic City, June 12-19, inclusive. The announcement comes from Mr. Taylor this year rather than from the Railway Supply Manufacturers' Association because, as Mr. Taylor's letter shows, the railway associations this year are contributing towards the expense of the entertainment features.

Mr. Taylor in his letter remarks that $1 will be charged for each badge issued to the members of the Master Car Builders' Association, in order to raise money with which to defray that association's portion of the expense, while no similar charge will be made for badges for the Master Mechanics' Association. The reason for this is that the Master Car Builders' Association, being an organization whose members represent the railways themselves, and whose expenses are paid by the railways, has no fund from which to meet this class of expenses, while the membership of the Master Mechanics' Association, being an individual affair of the members, and the money for its support being furnished by them, it can properly take the funds for this purpose from its treasury.

Mr. Taylor's letter is as follows:

At a meeting of the Joint Committee on Arrangements for the conventions in June, it was agreed that the expense connected with entertainments, procurement of badges, and such other details as are necessary in connection with the convention, should be borne by the three associations interested, viz.: Railway Supply Manufacturers' Association, Master Car Builders' Association and the American Railway Master Mechanics' Association, on the following basis:

Music—Daily orchestra concerts on steel pier, Supplymen's Association. Informal dancing, one-third each. Incidental expenses in connection with informal dancing, 70 per cent. by Supplymens' Association, 30 per cent. by other two associations. Musical entertainment, 70 per cent. by Supplymen's Association, 30 per cent. by other two associations. Ball game, one-third each. Badges, cost to each association.

Inasmuch as these expenses are personal in character, being intended for entertainment purposes only, and not such as should be borne by the association, it has been decided, in order to provide a fund to meet them, that there be collected from each member at the time he registers and procures badges for himself, members of his family and guests, the sum of $1 for each badge so procured, the fund thus obtained to be used under the direction of the Joint Committee on Arrangements in paying the above expenses.

The above arrangements for procurement of badges applies only to the Master Car Builders' Association, the Master Mechanics' Association badges being procured as formerly.

ROLLER CHAIRS.

The free use of roller chairs has been dispensed with, but arrangements have been made with the Reed and Shill Chair Companies that coupon books will be provided at the following rates: Ten rides, $2.50 each; 20 rides, $5 each.

When the tickets are used, the book covers will be redeemed when presented to the chair companies, with a refund of 50 cents each on the ten-ride book and $1 each on the twenty-ride book.

ENTERTAINMENT.

The following entertainment features have been provided:

Wednesday, June 12.

10:30 a. m.—Orchestra concert on Million-dollar Pier.
3:30 p. m.—Orchestra concert on Million-dollar Pier.
9:00 p. m.—Social gathering and informal dancing, Marlborough-Blenheim hotel.

Thursday, June 13.

10:30 a. m.—Orchestra concert on Million-dollar Pier.
3:30 p. m.—Orchestra concert on Million-dollar Pier.
9:30 p. m.—Informal dancing on Million-dollar Pier.

Friday, June 14.

10:30 a. m.—Orchestra concert on Million-dollar Pier.
3:30 p. m.—Orchestra concert on Million-dollar Pier.
9:00 p. m.—Musical programme.

Saturday, June 15.

10:30 a. m.—Orchestra concert on Million-dollar Pier.
2:00 p. m.—Baseball; parade from Million-dollar Pier to street cars.
3:00 p. m.—Annual baseball game.
No scheduled entertainment in the evening.

Sunday, June 16.

No scheduled entertainment.

Monday, June 17.

10:30 a. m.—Orchestra concert on Million-dollar Pier.
3:30 p. m.—Orchestra concert on Million-dollar Pier.
9:00 p. m.—Informal dancing, Marlborough-Blenheim hotel.

Tuesday, June 18.

10:30 a. m.—Orchestra concert on Million-dollar Pier.
3:00 p. m.—Orchestra concert on Million-dollar Pier.
9:00 p. m.—Informal dancing on Million-dollar Pier.

Western Railway Club.

At the monthly meeting of the Western Railway Club at the Auditorium hotel, Chicago, on Tuesday, April 16, W. A. Pownall, water engineer of the Chicago, Burlington & Quincy, Aurora, Ill., presented a paper on Water Treatment and Boiler Failures. The committee appointed to suggest what changes are necessary in the Master Car Builders' rules of interchange presented a report recommending a reduction of the number of cardable defects.

Transportation Club of New York.

The Transportation Club of New York will hold a travel and vacation exhibition in the New Grand Central Palace May 23-30. A large and varied collection of historic relics, both originals and models, will be shown. In addition, transportation facilities will be displayed by the leading railway, steamship and express companies of the United States.

American Society of Mechanical Engineers.

At the meeting of the American Society of Mechanical Engineers to be held April 30, Rudolph Diesel, D.E., D. Sc., inventor of the Diesel engine will be made an honorary member of the society. Dr. Diesel will give an illustrated address on the development of the Diesel engine.

Canadian Northern Club.

This is the name of a club which has been organized at Toronto by officers and employees of the Canadian Northern Railway, the purpose being to promote both knowledge of railroading and better personal acquaintance and friendship. Meetings are to be held on the first Tuesday of each month. The president is A. J. Hills; secretary, R. Croasdell.

Society of Railway Financial Officers.

The annual meeting of the Society of Railway Financial Officers will be held at the Marlborough-Blenheim hotel, Atlantic City, N. J., on Wednesday, Thursday and Friday, October 23, 24 and 25.

New York Railroad Club.

At the next regular meeting of the New York Railroad Club, to be held April 19, Frank L. Morse will present a paper on The Chief Clerk.

MEETINGS AND CONVENTIONS.

... meetings, and places of meeting.

... Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.; annual, May 7-10, Richmond, Va.

American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass.; annual, May 10-11, San Francisco, Cal.

American Association of General Passenger and Ticket Agents.—W. C. Hope, New York; next convention, Seattle, Wash.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Detroit, Mich.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York. Convention, October 7-11, Chicago.

American Electrical Railway Manufacturers' Assoc.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

American Railway Association.—W. F. Allen, 75 Church St., New York. Next session, May 15, New York.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago.

American Railway Master Mechanics' Assoc.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

American Railway Tool Foremen's Association.—M. H. Bray, N. Y. N. H. & H., New Haven, Conn. Convention, July 9, Chicago.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

American Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago. Semi-annual, June 11, Atlantic City, N. J.; annual, October 21-25, Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Car Accounting Officers.—G. P. Conrad, 75 Church St., New York. Convention, Oct. 7-11, Chicago.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, 11, rue de Louvain, Brussels, Belgium; convention, 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago. Convention, May 22-25, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

Master Car and Locomotive Painters' Assoc. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass. Convention, September 10-13, Denver, Col.

National Railway Appliances Assoc.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railroad Club.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Business Association.—Frank W. Noxon, 2 Rector St., New York.

Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

Railway Gardening Association.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.

Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio. Convention, May 20-22, Buffalo, N. Y.

Railway Supply Manufacturers' Assoc.—J. D. Conway, 2135 Oliver Bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

Railway Tel. & Tel. Appliance Assoc.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling, Ill. September 10-13, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; August, 1912.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The Merchants' Association of New York is to establish a traffic bureau, and its manager will be J. C. Lincoln, who for six years was traffic commissioner of the St. Louis Merchants' Exchange. He was formerly in the traffic department of the Missouri Pacific.

F. S. Holbrook, general traffic manager of Wells, Fargo & Company, has issued instructions that free transportation be given donations for the flood sufferers in the Mississippi valley when consigned to regularly authorized charitable institutions or municipal authorities.

Judge Mabee, chairman of the Canadian Railway Commission, is moving for the renewal of the negotiations between Canada and the United States, which were broken off a year ago, looking to the establishment of a joint tribunal to regulate railway traffic between these two countries.

A ten-year contract has been entered into between the Grand Trunk Pacific and the Northern Navigation Company, whereby the railway will run special trains in connection with the boats across the upper lakes, affording a through service between Toronto and Edmonton, via Fort William.

The National Baggage Committee, representing the wholesale mercantile interests of the country, and organized for the purpose of obtaining a readjustment and reduction of present baggage rates, particularly those on sample trunks, will hold a meeting at the LaSalle hotel, Chicago, on April 20.

The Chicago, Rock Island & Pacific, Chicago, Rock Island & Gulf, El Paso & Southwestern and National Railways of Mexico, have agreed to allow frabricating-in-transit privileges at El Paso, Tex., on structural material consigned to points on the National lines under through rates from Missouri river points.

The Canadian Pacific is going to try to promote the farming industry in New Brunswick by running a demonstration farm, and for this purpose has bought 400 acres of land at Fredericton Junction. The agricultural instruction train, which is to be run through New Brunswick this spring, will be sent over the Intercolonial as well as over the lines of the Canadian Pacific.

At a meeting of the Central Passenger Association in Chicago on April 10, a majority of the roads decided to make no rates less than two cents a mile for conventions during the coming summer, including the Republican national convention at Chicago and the Democratic national convention at Baltimore. It is possible that a special meeting may be called at the instance of some lines that favor a reduction in rates.

It is announced in Montgomery, Ala., that the Louisville & Nashville will at once advance passenger rates in that state from 2.5 cents a mile to 3 cents. This action follows the final decree of the federal court enjoining the enforcement of the state law limiting fares to 2.5 cents. Those freight rates which had to be reduced because of the state law will also be restored to the bases which were in force prior to January 1, 1907.

Protests are being made by western shippers that they were given insufficient time for consideration of the proposed changes in the Official Classification in advance of the preliminary meeting in Chicago, and there are prospects that a considerable opposition to some of the details will be presented at the meeting of the committee in New York on April 23. It is claimed that only four days elapsed between the receipt of the docket and the day of the preliminary meeting in Chicago.

The Great Northern will put in effect on May 1 a direct freight and passenger service over its lines from Duluth and Superior to Winnipeg. At the same time the rate on coal from the American head of the lakes to Winnipeg will be reduced fifty cents to $2.50 a ton, placing it on a parity with the Port Arthur and Fort William rate. Rates on the first four classes of freight from Duluth and the Twin Cities will be reduced three cents per 100 lbs. and the fifth class rate two cents per hundred.

On April 10 the Chicago & North Western increased the rates for 25-ride commutation tickets on its Chicago suburban lines an average of ten cents. On April 25 there will also be an increase averaging 30 cents in the rates for 60-ride tickets. No advance will be made in the 10-ride rates. The advances are effective throughout the suburban territory from Chicago to Waukegan, Ill., on the Milwaukee division, Barrington on the Wisconsin division and West Chicago on the Galena division.

The Chicago, Milwaukee & St. Paul has announced the arrangements for new transcontinental passenger train service in connection with the Harriman Lines, which is to go into effect on May 15. There will be two new solid through trains out of Chicago which will not have cars of any other line. Regular fares will be charged. A train for Denver and Portland via the Union Pacific and Oregon Short Line will leave Chicago at 10 a. m., arriving at Denver the second day and Portland the third day, consisting of baggage car and coaches, through chair car and standard sleepers, Chicago to Denver; through standard and tourist sleepers, and a through cafe observation car to Portland. The second train will leave Chicago daily at 10:45 a. m., arriving in San Francisco via the Southern Pacific, and Los Angeles via the San Pedro, Los Angeles & Salt Lake, on the third day. This will have baggage car, tourist sleeping cars and observation sleeping car to San Francisco, and standard and tourist sleepers to Los Angeles.

The Illinois Central on April 14 put in effect new schedules on its Western division lengthening the time of several passenger trains because of increased business and additional cars which had made it difficult to maintain the former schedules. Several similar changes will be made on other lines on May 5. A new train was put into operation between Chicago and Omaha, leaving Chicago at 11:45 p. m., and arriving at Omaha at 3:30 p. m. Returning the train leaves Omaha at 10:55 a. m., arriving at Chicago at 7 a. m. Trains between Fort Dodge, Ia., and Omaha, Neb., and between Dubuque, Ia., and Fort Dodge were abandoned. Under the new schedules the Panama Limited leaving Chicago at 7 p. m., will arrive at New Orleans at 9 p. m., instead of 8:45 p. m., adding 15 minutes to its schedule. Train No. 1, now leaving Chicago at 9:40 a. m., will leave at 9:10 a. m., adding 30 minutes to its schedule. A number of other changes affect less important trains. On May 5 the company will extend its suburban service out of Chicago from Flosmoor, Ill., to Matteson.

"Made in Canada" Exhibition Train.

The Canadian press announces that a "made-in-Canada" exhibition train will leave Toronto in May on a tour from the Atlantic to the Pacific. This moving exhibition, arranged by the Canadian Home Market Association, is intended to show the quality and variety of goods manufactured in Canada, with the idea of extending the home market for them. The train will consist of 12 cars, 10 containing exhibits, and 2 the accompanying staff. The route includes a hundred towns and cities in western Canada. The exhibition will include textiles of all kinds, stoves, pianos, automobiles, beds, springs, mattresses, engines, packing-house products, confectionery, rubber goods, salt, kodaks, farm implements, paints and oils, drugs, cement, furniture, jewelry, watches, silver plate, sheet-metal products, etc. By charging a rental for space the exhibit is made self-sustaining. Each car represents in rents about $3,000. Representatives of each exhibiting firm will take orders.—*Consular Reports.*

Lease of the Boston & Maine to the New Haven.

The principal features of a proposed bill in the Massachusetts legislature to permit the merger of the B. & M. with the N. Y. N. H. & H., are as follows:

(1) The dissolution of the Boston Holding Company and the lease of the Boston & Maine to the New York, New Haven & Hartford for 25 years at 4 per cent. on the outstanding stock. After the tunnel shall have been opened to operation and electrified the rate may be increased to 6 per cent., but no higher rate shall be paid except on the condition that an amount equivalent to the rate above 6 per cent., shall be paid into the state treasury. The lease may be extended over another 25 years upon approval by the Public Service Commission, by which board the original lease must be confirmed. Dissenting Boston & Maine stockholders may petition the supreme judicial court for a determination of the value of their stock by three commissioners.

(2) The construction by the city within three years after work has begun, of a tunnel for electric service between the north and south stations in Boston, city bonds running not over 45 years

and bearing not over 4 per cent. interest to be issued to meet the expense, and the tunnel to be operated by the two roads under contract until July 1, 1937, at a rental of 4½ per cent. upon the net cost, the New Haven to construct and own the tunnel in case the city decides not to build it.

(3) The electrification within five years from the making of the lease of the New Haven-Boston & Maine system within the Metropolitan district.

(4) The elimination of all switching charges as between the two terminals and a flat rate within the electric zone.

(5) Any railway reaching Boston or any Junction railway serving Boston to be entitled to the tunnel and have trackage over the New Haven and Boston & Maine within the electric zone, but without the privilege of local service between two points on said trackage unless the New Haven consents.

(6) This act shall not take effect until accepted both by the city council of Boston, subject to veto of the mayor, and by the directors of the New Haven and the Boston & Maine.

A Station Agent in a New Role.

Determined to secure the co-operation of the farmers in its agricultural work, the Pennsylvania Railroad is forming farmers' clubs on its Williamsport division. A. E. Grove, agent at Elizabethville, has been temporarily relieved in order that he may devote his time to this work. One club has been started at Glen Iron, and another in Mifflinburg. The membership is composed of the very best farmers in the community.

Economical Loading.

For many years it has been the custom of dealers to order carloads of cement in round numbers, such as 100, 150, 200, or 250 barrels. None of these figures, however, represents a carload. There used to be a 30,000-lb. car, but this size no longer is available. Even the 40,000 and 50,000-lb. capacity cars are very scarce and rapidly disappearing. The maximum load which can be placed in any car is 10 per cent. in excess of its marked capacity. There is now an actual deficit in this country of several hundred thousand box cars.

The duty, therefore, of extracting from every car its maximum service is apparent to all. To load cars below capacity, this reduces pro rata the efficiency of the available rolling stock. If a car which will hold 280 bbls. of cement is loaded with 150 bbls., there remains 130 bbls. of wasted room in the car, and to waste room in box cars today is little short of criminal. Every car that is loaded to less than capacity imposes upon some other car an undue burden. An accumulation of such burdens means that from 50 to 100 per cent. more cars are required to do a given amount of work than would be necessary if all the cars were loaded to the limit of their carrying capacity. It is a duty to the public at large, to assist in conserving the existing car supply to the greatest extent possible.

"One car not to exceed 170 bbls." This is the way an order should read when a car ranging from minimum to 170 bbls. is what is wanted. In this case we can use a 40,000, 50,000 or 60,000-lb. car, whichever is easiest obtainable, and load it to the maximum. "One car, 170 to 280 bbls." An order reading in this way will enable us to use either a 60,000, 80,000 or 100,000-lb. capacity car."

Co-operation between shipper and consignee will be of marked benefit to both parties as well as to the railways and other shippers and consignees.—*From The Universal Dealer, published by Universal Portland Cement Company.*

INTERSTATE COMMERCE COMMISSION.

The commission has held in conference ruling that post office inspectors may use passes only while on duty.

The commission has held in conference ruling that the directors and officers of a non-operating lessor railway cannot use interstate passes given them by the lessee railway.

The commission has denied the petition of the Kansas railway commission to grant a rehearing on the salt rate case in which the I. C. C. decided against the state railway commission.

The commission will hold a hearing on May 2 to decide whether the proviso of section 2 of the hours-of-service act applies to trainmen, especially on electric roads. This proviso imposes a maximum limit of consecutive hours of service for all operators, train despatchers and other employees whose duties affect train movements.

The Sioux City Commercial Club has filed with the Interstate Commerce Commission an intervening brief in the case of the Duluth Commercial Club, involving rail and lake-and-rail rates from the East. Sioux City argued that if the present rate adjustment accorded the Twin Cities, based on a differential over Duluth, is a reasonable one, Sioux City is entitled to an approximate basis, and that if Sioux City is not entitled to such a relation the Twin Cities are not. Duluth claims that unless its rates are reduced the Twin Cities should take the local rate over Duluth.

Reduced Fare Tickets and Through Transportation.

In re application and use of mileage, excursion and commutation tickets for through transportation in connection with other lawfully established rates. Opinion by Commissioner Clements:

This is in regard to whether through trips may be made on a combination of two or more reduced fare tickets, such as mileage books, excursion and commutation tickets. Carriers may afford many facilities, accommodations and conveniences to shippers and passengers which they may not be compelled to afford, but they are no more at liberty to unjustly discriminate with respect to such service than with respect to those things which under the law they may be compelled to do. The commission decided that through transportation should be given the passenger on a combination of two or more tickets, provided they were presented to the initial carrier, but that it was not lawful to check a passenger's baggage or grant sleeping car accommodations beyond the point to which the tickets were presented at the point of starting. The initial carrier may therefore issue to a passenger a through ticket for the sum of two or more fares applicable to the several connecting roads composing the through route, or may issue additional tickets at lawful tariff fares which, in connection with the ticket or tickets held by the passenger, will cover the entire journey that the passenger desires to take. It is necessary that definite provision be made for such instances in the established tariff schedules filed with the commission and also in the tariff schedules that contain in the excursion, commutation or mileage fares that are to be used. When tariffs contain such provisions, the combination so authorized may be used in lieu of the regular joint or local fares between the points covered by the combination. (23 I. C. C.)

Mohair Rates Reduced.

National Mohair Growers' Association v. Atchison, Topeka & Santa Fe et al. Opinion by Chairman Prouty.

In this case the complainants ask that mohair shall receive the same rates as those recently given to wool. The commission decided that, since mohair was very similar to wool, and that the only reason that could be advanced for imposing higher rates on it was its somewhat higher value, it should be classified under the western classification as second class in less than carloads, and as fourth class in carloads, with a minimum of 24,000 lbs. for standard 36-ft. car and a proportionate increase for large cars; and that rates found reasonable on wool should not be exceeded in the transportation of mohair. Hitherto mohair has been rated first class, any quantity. The question of reparation has not yet been decided. (23, I. C. C.)

Complaint Dismissed.

Liberty Mills v. Louisville & Nashville et al. Opinion by the commission.

In this case the complainant seeks reparation because the net rates applied on grain products moving out of Nashville in 1908 were the balance of through rates in effect on the date of reshipments and not the balance of the through rates in effect when the grain commenced to move from the several points of origin to Nashville. The commission found that if the transit privilege as published by the defendants had been illegal and therefore void, it was not clear that the commission, in the absence of any showing of discrimination, could order a new and different transit privilege for that period, and also that the complainant paid on its shipments precisely the same rates as did its competitors, so an award of reparation in its favor at this time would result in discrimination against them. The complaint was dismissed. (23, I. C. C.)

REVENUES AND EXPENSES OF RAILWAYS.

EIGHT MONTHS OF FISCAL YEAR, 1912. (SEE ALSO ISSUES OF APRIL 5 AND 12.)

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Alabama & Vicksburg	143	$717,857	$342,213	$1,140,650	$167,708	$223,198	$29,989	$392,313	$40,953	$854,161	$286,489	—$3,316	$38,896	$244,277	—$96,648
Alabama Great Southern	309	2,115,072	804,456	3,182,656	352,956	701,852	89,091	978,770	76,713	2,197,412	983,244	— 3,628	119,458	860,158	45,040
Ann Arbor	292	969,633	378,787	1,437,825	155,342	156,134	34,842	513,412	61,682	921,412	516,413	—10,096	111,884	394,433	49,510
Arizona Eastern	366	973,569	263,994	1,313,115	192,808	100,233	18,245	349,426	50,350	711,062	602,053	1,432	78,508	524,977	162,626
Atlanta & West Point	93	457,137	325,966	862,893	98,903	165,944	38,680	261,397	38,277	603,201	259,692	449	41,512	218,628	—12,271
Atlanta, Birmingham & Atlantic	662	1,648,703	464,077	2,232,274	232,230	365,377	134,747	836,401	87,333	1,656,088	576,186	.....	110,700	465,486	61,847
Atlantic City	167	515,026	858,348	1,445,857	207,580	105,995	19,668	702,402	10,269	1,045,914	399,943	— 34,084	56,000	309,859	23,009
Baltimore & Ohio—System	4,433	46,723,870	10,016,702	60,295,120	7,314,058	11,091,961	1,289,317	21,538,719	1,325,550	42,559,605	17,735,515	—423,478	1,964,907	15,347,130	1,231,284
Buffalo & Susquehanna R. R.	265	1,112,683	72,545	1,226,492	234,511	229,897	12,127	465,833	51,008	993,376	233,116	.....	20,800	212,316	30,525
Buffalo & Susquehanna Ry.	91	337,176	75,329	429,134	52,957	213,783	4,089	193,754	20,287	484,870	—55,736	— 365	11,200	—67,301	—19,774
Carolina, Clinchfield & Ohio	238	1,273,842	102,950	1,409,954	90,114	172,666	42,583	281,307	61,281	647,951	762,003	.....	62,000	700,003	252,170
Carolina, Clinchfield & Ohio of S. C.	18	74,393	12,486	89,136	4,561	723	7,722	21,151	3,736	37,893	51,243	.....	4,000	47,243	17,185
Central of Georgia	1,915	6,132,324	2,604,017	9,613,029	1,186,673	1,703,039	270,079	3,218,529	304,175	6,682,495	2,930,534	46,007	400,957	2,575,584	—44,284
Central of New Jersey	672	12,983,662	3,724,831	17,654,365	1,717,032	2,497,193	247,695	5,204,487	324,017	9,990,424	7,663,941	124,119	935,069	6,852,991	891,497
Central Vermont	411	1,747,152	750,235	2,711,780	311,004	438,667	61,535	1,310,835	73,062	2,195,103	516,677	3,599	96,700	423,576	—65,893
Chesapeake & Ohio Lines	2,281	17,709,008	3,707,794	22,383,928	2,655,825	4,392,797	407,767	6,816,916	499,452	14,772,757	7,611,171	14,158	678,067	6,947,262	16,156
Chicago & Alton	1,025	6,523,972	2,836,032	10,109,305	1,375,593	1,975,658	320,936	3,693,735	262,817	7,628,739	2,480,566	—25,962	291,000	2,163,604	— 129,594
Chicago & Erie	270	2,733,844	472,438	3,540,120	469,947	674,405	167,352	1,734,432	85,691	3,131,827	408,293	.....	126,088	282,205	—173,530
Chicago, Burlington & Quincy	9,074	39,323,701	14,638,655	59,251,992	6,607,489	10,122,169	1,024,834	19,150,964	1,505,204	38,410,660	20,804,332	— 81,336	2,123,025	18,635,971	—476,492
Chicago, Indiana & Southern	359	2,345,084	206,094	2,650,055	368,448	596,205	61,352	982,702	67,504	2,076,211	573,844	1,772	101,099	474,517	132,984
Chicago, Indianapolis & Louisville	617	2,846,758	1,104,587	4,351,093	597,621	620,659	141,989	1,588,422	116,076	3,064,767	1,286,326	.....	185,814	1,100,512	22,001
Chicago, Rock Island & Gulf	477	1,430,737	430,069	1,995,572	223,912	190,172	79,715	676,305	66,012	1,236,116	759,456	—1,815	52,195	705,446	48,958
Chicago, Terre Haute & Southeastern	351	1,145,055	139,356	1,313,856	179,864	210,475	22,715	409,417	60,076	882,547	431,309	— 884	69,600	360,825	.....
Cincinnati, New Orleans & Texas Pacific	337	4,860,794	1,217,086	6,399,464	642,880	1,382,613	159,866	1,844,401	148,746	4,178,506	2,220,958	—6,025	174,400	2,040,533	—182,258
Cincinnati Northern	245	706,633	151,512	900,749	166,073	183,410	21,972	367,088	24,593	763,136	137,613	.....	45,691	91,922	—41,509
Cleveland, Cincinnati, Chic. & St. Louis	2,012	13,668,463	5,264,848	20,674,720	2,228,760	3,357,636	608,754	8,310,405	434,791	14,940,346	5,734,374	—22,084	772,512	4,939,778	1,247,114
Colorado & Southern	1,053	4,325,017	968,221	5,678,870	638,110	1,088,667	89,923	1,796,261	183,174	3,796,135	1,882,735	—8,724	211,100	1,662,911	—313,658
Colorado Midland	338	1,005,989	188,059	1,315,999	158,702	238,992	57,236	557,389	43,327	1,055,646	260,353	—1,656	64,000	194,697	41,353
Denver & Rio Grande	2,545	11,802,343	3,417,521	15,911,367	2,090,565	2,847,772	430,165	5,665,158	401,317	11,434,977	4,476,390	—14,753	598,000	3,863,637	—730,820
Detroit, Grand Haven & Milwaukee	191	900,406	434,628	1,537,925	177,580	211,820	54,479	796,868	36,638	1,277,385	260,540	—442	23,039	237,059	32,008
Duluth & Iron Range	200	$4,397,440	$171,388	$4,644,701	$622,126	$419,307	$6,870	$901,331	$93,005	$2,042,639	$2,602,062	$8,297	$224,098	$2,386,261	—$452,881
Duluth, Missabe & Northern	342	4,504,062	296,315	4,867,225	741,205	497,349	14,926	902,389	109,188	2,265,057	2,602,168	35,965	235,817	2,402,316	—2,094,953
Duluth, South Shore & Atlantic	624	1,330,177	643,400	2,083,077	322,945	235,233	76,498	816,136	73,129	1,523,941	559,136	6,447	141,666	423,917	— 83,032
El Paso & Southwestern Co.	902	4,044,098	641,526	4,939,039	629,970	679,718	97,209	1,380,970	183,614	2,971,481	1,967,558	— 15,410	188,885	1,763,263	— 23,298
Elgin, Joliet & Eastern	841	6,211,922	31	6,557,669	609,764	1,211,096	33,542	1,958,494	129,111	3,942,007	2,615,662	.....	160,388	2,455,274	964,602
Erie	1,995	24,645,149	6,067,518	33,219,374	3,733,434	5,674,428	748,932	11,339,386	715,497	22,211,677	11,007,697	— 95,601	1,227,597	9,684,499	—279,614
Florida East Coast	630	1,191,326	1,024,355	2,542,022	437,636	379,715	57,662	962,315	72,561	1,909,889	632,133	—1,380	124,000	506,753	—60,345
Fort Worth & Denver City	454	2,236,177	1,031,844	3,436,676	703,316	527,674	56,088	1,128,833	111,239	2,127,150	1,309,526	—4,866	93,084	1,211,576	— 153,692
Galveston, Harrisburgh & San Antonio	1,338	4,900,846	1,987,241	7,261,868	890,531	1,268,915	253,757	2,766,170	220,086	5,409,459	1,852,409	—38,290	313,109	1,501,110	—440,829
Georgia	347	1,568,490	629,059	2,341,915	197,424	339,652	89,434	992,402	63,208	1,682,120	659,795	.....	21,128	638,667	79,436
Georgia Southern & Florida	395	849,976	577,515	1,651,800	161,877	314,690	57,892	632,870	73,915	1,241,244	410,556	.....	82,619	327,937	1,395
Grand Rapids & Indiana	586	1,944,872	1,212,286	3,420,488	363,396	565,146	90,115	1,454,225	118,160	2,591,042	829,446	—760	184,217	644,469	136,015
Grand Trunk Western	347	2,706,564	1,462,606	4,441,004	428,600	653,234	154,293	1,822,295	109,499	3,167,921	1,273,083	— 8,806	253,080	1,011,197	176,118
Great Northern	7,345	32,390,550	9,256,565	44,746,757	4,761,417	5,097,575	730,431	12,199,242	801,031	23,589,696	21,157,061	93,007	2,224,047	19,026,021	3,918,072
Gulf & Ship Island	307	948,346	283,928	1,339,191	178,479	237,592	19,460	385,187	66,468	887,186	452,005	.....	37,106	414,899	30,635
Gulf, Colorado & Santa Fe	1,597	6,120,937	2,022,758	8,672,378	1,435,062	1,264,704	211,843	3,257,248	259,041	6,427,898	2,244,480	.....	303,719	1,940,761	34,787
Hocking Valley	352	4,125,247	606,949	5,023,472	605,520	791,192	66,662	1,520,235	128,855	3,112,464	1,911,008	.....	301,158	1,609,850	33,242
Houston & Texas Central	789	2,641,101	1,233,040	4,174,444	585,576	693,934	151,748	1,709,162	166,292	3,307,012	867,432	—10,570	180,809	676,053	— 468,355
Houston, East & West Texas	191	600,727	222,113	870,887	159,738	90,854	15,075	289,444	29,421	584,532	286,355	.....	34,639	251,716	—57,138
Illinois Central	4,755	24,976,616	9,169,782	39,143,245	5,362,938	9,386,744	954,102	15,693,480	1,032,510	32,429,774	6,713,471	— 62,443	1,826,258	3,824,770	—5,637,521
Indiana Harbor Belt	105	.....	.....	1,700,016	203,767	187,896	23,289	774,225	60,768	1,249,945	450,071	22,917	33,437	439,551	253,179
Kansas City Southern	827	4,519,497	1,096,610	6,297,222	648,807	898,006	214,509	2,205,287	244,507	4,210,916	2,086,306	.....	268,755	1,817,551	—461,885
Lake Erie & Western	886	2,918,960	629,314	3,761,220	527,711	646,720	102,354	1,484,516	87,898	2,849,199	912,021	.....	157,297	754,724	124,547
Lake Shore & Michigan Southern	1,775	21,553,416	7,942,093	33,429,388	3,536,703	4,484,380	680,704	10,959,382	585,251	20,246,420	13,182,968	— 12,414	1,143,939	12,026,615	4,333,137
Lehigh & Hudson River	97	1,028,506	33,256	1,976,122	121,917	148,279	9,734	366,079	39,539	685,548	390,574	.....	28,000	362,574	29,072
Lehigh Valley	1,449	21,575,591	3,232,495	25,667,256	2,923,009	4,461,674	642,123	8,678,393	543,783	17,248,882	8,418,374	—200,240	932,700	7,285,434	—217,400
Long Island	399	2,167,056	4,674,554	7,145,757	946,803	867,665	106,993	3,256,422	167,096	5,344,979	1,800,778	458,627	434,221	1,825,184	319,427
Louisiana & Arkansas	255	763,223	143,492	944,190	166,336	146,188	18,691	261,209	37,678	630,102	314,088	.....	28,467	285,621	—56,286
Louisiana Western	208	783,093	438,035	1,288,464	158,486	227,251	62,154	429,504	52,998	930,393	358,071	1,304	57,807	301,568	—139,052
Louisville & Nashville	4,705	27,061,483	8,276,314	37,545,728	5,683,327	6,547,624	763,275	11,988,714	713,839	25,696,779	11,848,949	15,141	1,193,267	10,640,541	882,186

— Indicates Deficits, Losses and Decreases.

REVENUES AND EXPENSES OF RAILWAYS.

EIGHT MONTHS OF FISCAL YEAR, 1912—CONTINUED. (SEE ALSO ISSUES OF APRIL 5 AND 12.)

Name of road.	Mileage operated at end of period.	Operating revenues: Freight.	Passenger.	Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Louisville, Henderson & St. Louis	200	532,008	278,594	864,578	186,094	108,114	34,626	288,531	24,073	641,438	223,140	2,669	24,000	201,809	24,551
Maine Central	1,204	4,425,486	2,288,856	7,138,284	1,270,179	912,419	71,655	2,643,481	210,022	5,107,755	2,030,529	21,767	342,477	1,709,819	243,401
Michigan Central	1,817	13,413,243	5,371,049	20,805,409	2,361,155	2,406,668	522,789	8,051,549	353,396	13,695,557	7,109,852	26,626	914,371	6,222,107	2,330,947
Midland Valley	373	644,339	302,737	1,009,444	214,255	159,914	24,240	317,015	50,655	766,079	243,365	743	46,283	197,825	—20,648
Minneapolis & St. Louis	1,585	3,790,294	1,172,918	5,308,003	647,688	788,521	144,680	2,411,086	170,300	4,162,275	1,145,728	—330	229,552	915,846	—492,393
Missouri, Kansas & Texas	1,744	7,688,027	2,989,818	11,356,970	1,412,554	1,619,644	284,050	3,679,834	333,635	7,329,717	4,027,253	—16,931	448,926	3,561,396	— 74,927
Missouri, Kansas & Texas of Texas	1,346	4,895,840	2,586,514	7,957,894	1,700,461	767,656	196,358	4,040,034	243,714	6,948,223	1,009,671	— 5,939	222,637	781,095	—1,146,502
Missouri Pacific	3,915	11,929,193	3,201,406	16,651,143	2,941,453	3,122,074	474,182	7,642,073	564,544	14,744,326	1,906,817	—29,900	681,194	1,195,723	—63,568
Mobile & Ohio	1,114	6,218,925	989,662	7,671,788	882,671	1,413,615	271,341	2,722,031	253,404	5,543,062	2,128,726	—7,708	201,916	1,919,102	—18,772
Monongahela	65	808,088	18,738	838,573	111,889	63,141	2,725	178,248	15,332	371,335	467,238	.....	21,430	445,808	64,132
Morgan's La. & Tex. R. R. & S. S. Co.	404	2,405,534	855,151	3,461,283	430,680	451,124	109,862	1,375,437	99,916	2,467,019	994,264	—15,845	149,538	828,881	—263,171
Nevada Northern	165	832,980	86,830	943,273	100,352	119,697	3,130	202,739	27,649	453,567	489,706	.....	39,613	450,093	—46,285
New Orleans & North Eastern	196	1,895,966	431,752	2,500,129	233,534	470,164	72,644	931,410	92,436	1,800,188	699,941	—7,483	70,170	622,288	—87,109
New Orleans, Great Northern	282	779,752	233,160	1,092,069	168,917	144,285	20,980	352,805	57,703	744,690	347,379	—604	16,050	330,725	—66,090
New Orleans, Mobile & Chicago	404	975,245	242,107	1,292,663	199,122	139,394	22,511	392,452	63,489	816,968	475,695	—390	35,893	440,192	—43,893
New York, Chicago & St. Louis	562	6,285,679	1,087,651	7,663,732	868,750	813,660	374,218	3,194,190	135,176	5,385,994	2,277,738	—13,179	265,125	1,999,434	226,023
New York Central & Hudson River	3,597	41,082,043	21,655,988	70,109,327	9,157,669	11,235,045	1,472,574	26,292,724	1,785,912	49,943,924	20,165,403	272,209	4,062,222	16,375,390	2,902,519
New York, New Haven & Hartford	2,091	20,702,582	18,091,723	42,695,568	4,406,882	5,059,692	257,311	16,554,928	1,284,675	27,563,488	15,132,080	948,741	2,530,000	13,550,821	797,014
New York, Ontario & Western	566	4,726,298	1,192,645	6,153,584	871,494	1,029,561	79,526	2,359,338	136,727	4,476,646	1,676,938	—7,068	143,333	1,526,537	—170,590
New York, Philadelphia & Norfolk	112	1,727,235	308,481	2,197,415	228,804	390,019	32,250	874,951	98,234	1,624,258	573,157	.....	60,800	512,357	—54,906
New York, Susquehanna & Western	152	1,386,026	401,062	2,007,747	194,637	184,028	14,867	774,562	38,976	1,207,070	800,677	—1,571	142,989	656,117	—15,309
Norfolk & Western	2,104	22,085,481	2,947,727	25,973,397	3,061,538	5,042,232	416,280	7,700,430	501,307	16,721,787	9,251,610	—16,291	930,000	8,305,319	537,822
Norfolk Southern	608	1,337,293	572,578	2,078,815	239,711	256,343	44,599	689,120	104,831	1,334,604	744,211	—3,493	60,000	680,718	11,921
Northern Central	473	6,429,434	1,558,003	8,497,298	884,359	1,817,475	118,647	4,286,344	193,831	7,300,656	1,196,642	4,412	314,370	886,684	109,990
Northern Pacific	6,034	29,377,711	10,475,470	42,651,370	5,092,636	4,636,789	768,350	13,965,685	669,561	25,133,021	17,518,349	272,842	2,183,424	15,607,767	—289,207
Northwestern Pacific	404	959,680	1,257,716	2,393,068	391,965	323,405	26,146	859,472	75,811	1,676,799	716,269	.....	97,365	618,904	103,676
Oregon Short Line	1,762	10,036,188	3,157,989	14,049,853	1,536,728	1,370,356	227,266	3,447,696	285,699	6,867,745	7,182,108	—3,213	948,690	6,230,205	96,135
Oregon-Washington R. R. & Nav. Co.	1,920	6,900,450	3,387,691	11,012,867	1,411,277	1,147,725	354,342	3,892,519	346,817	7,152,680	3,910,187	17,703	857,740	3,070,150	.....
Pecos & Northern Texas	479	982,236	257,889	1,302,050	179,060	262,803	20,373	444,872	41,122	948,230	353,820	.....	35,048	318,772	23,286
Pennsylvania Co.	1,760	26,356,028	5,866,290	35,293,783	4,692,776	6,364,589	597,373	12,427,625	696,665	24,779,028	10,514,755	—14,173	1,521,040	8,979,542	—375,761
Pennsylvania *Railroad*	4,018	77,952,112	22,967,453	108,113,859	12,259,303	21,490,433	1,469,931	40,175,255	2,732,702	78,127,624	29,986,235	—1,057,649	4,764,532	24,164,054	—34,252
Peoria & Eastern	352	1,507,093	485,527	2,147,465	279,397	308,688	42,001	889,728	46,128	1,565,942	581,523	.....	77,803	503,720	—51,454
Pere Marquette	2,330	7,542,127	2,825,110	11,299,160	1,404,131	1,815,393	289,365	5,198,768	265,179	8,972,836	2,326,324	—39,156	453,921	1,833,247	103,871
Philadelphia & Reading	1,014	24,027,011	4,696,860	30,060,048	2,626,145	5,526,976	328,650	9,746,319	530,795	18,758,885	11,301,163	195,730	723,277	10,773,616	399,699
Philadelphia, Baltimore & Washington	713	6,113,127	5,270 009	12,696,152	1,751,933	2,187,486	218,998	5,328,785	301,949	9,789,151	2,907,001	.....	402,723	2,504,278	8,138
Pittsburgh & Lake Erie	215	9,498,529	1,037,782	10,862,038	1,164,180	1,719,208	103,882	2,582,313	189,515	5,759,098	5,102,940	—2,248	239,390	4,861,302	—461,836
Pittsburgh, Cincinnati, Chic & St. Louis	1,467	18,510,738	5,385,832	26,890,978	3,608,360	4,990,618	541,515	9,710,668	527,868	19,379,029	7,511,949	—7,351	1,009,691	6,494,907	481,785
Pittsburgh, Shawmut & Northern	278	907,731	69,961	992,915	107,128	202,202	8,799	291,803	32,238	642,170	350,745	.....	12,612	338,133	177,074
Port Reading	21	848,143	.....	858,698	66,069	1,393	248	264,666	914	333,290	525,408	28,727	30,400	523,735	—55,352
Richmond, Fredericksburg & Potomac	83	777,361	612,686	1,591,170	161,143	200,058	22,638	598,756	47,351	1,029,946	561,224	.....	8,753	552,471	38,732
Rutland	468	1,222,081	819,127	2,306,266	275,332	351,383	57,794	918,082	52,391	1,654,982	651,284	.....	89,417	561,867	26,429
St. Joseph & Grand Island	319	693,623	287,862	1,075,996	176,875	171,468	39,914	474,136	44,466	906,859	169,137	162	75,275	94,024	—7,047
St. Louis & San Francisco	4,732	17,557,990	7,673,157	27,231,036	3,271,269	3,537,596	732,682	9,629,640	804,246	17,975,433	9,255,603	.....	1,278,135	7,977,468	57,337
St. Louis, Brownsville & Mexico	510	930,497	477,791	1,523,687	327,152	106,003	23,106	532,272	60,135	1,048,668	475,019	.....	43,934	431,085	211,978
St. Louis, Iron Mountain & Southern	3,314	14,971,515	4,168,963	20,509,139	3,428,780	2,936,997	423,765	6,621,004	565,454	13,976,000	6,533,139	—44,925	683,000	5,805,214	611,244
St. Louis Merchants' Bridge Terminal	9	.....	2,531	1,167,706	193,712	80,145	3,516	633,732	40,628	951,733	215,973	.....	46,532	169,441	—102,998
St. Louis, San Francisco & Texas	244	606,602	224,403	886,482	147,112	124,665	23,530	398,107	37,787	731,201	155,281	.....	8,322	146,959	118,581
St. Louis Southwestern	843	4,006,200	923,265	5,198,848	466,669	841,157	226,870	1,279,154	188,338	3,002,188	2,196,660	—8,009	168,350	2,020,301	— 90,737
St. Louis Southwestern of Texas	703	2,183,095	719,299	3,108,461	424,645	645,083	98,501	1,198,261	140,018	2,506,508	601,953	—1,728	84,607	515,618	419,163
San Antonio & Aransas Pass	727	2,198,041	822,580	3,200,794	520,413	371,206	45,490	1,143,252	79,026	2,159,387	1,041,407	.....	88,000	953,407	125,135
San Pedro, Los Angeles & Salt Lake	1,115	3,471,986	1,960,126	5,815,310	951,389	1,336,980	254,577	2,257,249	136,082	4,936,277	879,033	—31,337	197,640	650,056	—243,761
Seaboard Air Line	3,070	9,979,101	3,413,001	14,931,616	2,180,327	2,113,682	479,462	5,407,809	454,646	10,635,926	4,295,690	—9,705	597,000	3,688,985	—416,153
Southern	7,089	27,441,843	11,575,858	42,366,649	5,077,174	6,728,633	1,101,566	14,582,732	1,254,297	28,743,402	13,623,247	42,239	1,627,947	12,037,539	186,719
Southern in Mississippi	281	492,950	269,505	821,272	181,505	72,105	19,430	309,156	31,368	613,564	207,708	.....	39,411	168,297	— 20,181
Southern Kansas of Texas	125	703,434	125,265	867,764	137,220	188,069	16,822	331,025	32,452	705,588	162,176	.....	20,900	141,276	—95,976
Southern Pacific Co.	6,204	35,997,822	21,048,131	61,237,408	6,955,928	7,471,064	1,390,311	17,661,982	1,561,069	35,040,354	26,196,054	197,202	2,645,611	23,747,645	—868,431
Sunset	59	505,677	128,650	661,194	94,031	22,523	371	237,819	24,762	379,506	281,688	.....	27,118	254,570	124,188
Syracuse, Binghamton & New York	80	402,072	275,943	771,448	89,142	53,685	22,039	285,430	18,672	468,968	302,480	.....	50,960	251,520	— 12,734
Tennessee Central	294	682,969	265,781	1,009,241	180,561	142,194	42,717	382,547	66,645	814,664	194,577	.....	33,666	160,911	—144,480

§ Figures shown here are for the period December 24, 1910, to February 29, 1911.
— Indicates Deficits, Losses and Decreases.

REVENUES AND EXPENSES OF RAILWAYS.

EIGHT MONTHS OF FISCAL YEAR, 1912—CONTINUED. (SEE ALSO ISSUES OF APRIL 5 AND 12.)

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Terminal R. R. Ass'n of St. Louis	35	.....	1,951	1,831,747	276,883	191,800	5,607	673,616	44,721	1,192,727	639,020	69,884	221,010	487,894	—120,255
Texas & New Orleans	458	1,710,638	693,185	2,558,988	432,456	579,136	64,552	1,027,442	82,912	2,186,498	372,490	—2,315	118,077	252,098	—196,786
Texas & Pacific	1,885	8,439,664	2,864,525	12,042,254	1,264,195	1,588,059	236,422	5,027,986	363,296	8,479,958	3,562,296	—28,012	521,890	3,012,394	399,171
Toledo & Ohio Central	441	2,999,425	445,553	3,608,709	553,508	504,889	53,458	1,232,942	66,715	2,411,512	1,197,197	—7,140	164,501	1,025,556	—66,476
Toledo, Peoria & Western	248	522,600	307,198	879,575	134,587	190,718	18,649	332,534	27,146	703,634	175,941	.....	38,600	137,341	—12,822
Toledo, St. Louis & Western	451	2,171,836	304,987	2,643,595	308,150	495,634	65,859	974,263	69,149	1,915,055	730,540	.....	117,000	613,540	—73,954
Trinity & Brazos Valley	463	1,540,679	298,436	1,899,842	301,540	239,347	77,918	855,992	92,702	1,567,499	332,343	.....	35,838	296,505	158,773
Union Pacific	3,537	22,542,417	7,104,063	32,650,299	2,884,878	3,980,924	847,352	9,343,102	853,064	17,909,320	14,740,979	—17,432	1,355,917	13,367,630	—2,803,572
Union R. R. of Baltimore	9	823,092	164,618	1,000,673	81,935	.....	6,224	44,780	19,676	152,615	848,058	.....	46,366	801,692	—50,361
Union R. R. of Pennsylvania	31	.....	.....	2,785,324	239,938	644,306	814	1,024,379	28,614	1,938,051	847,273	29,261	53,322	823,312	301,401
Vandalia Railroad	827	4,477,796	1,646,350	6,886,568	924,388	1,311,562	206,765	2,709,075	151,185	5,302,975	1,583,593	.....	225,342	1,358,251	—114,203
Vicksburg, Shreveport & Pacific	171	573,110	334,830	994,775	177,188	173,013	25,274	309,086	37,021	721,582	273,193	1,459	55,371	216,363	—67,745
Virginian	475	2,892,320	179,659	3,160,176	374,281	566,740	40,443	872,745	63,132	1,917,341	1,242,835	41,599	123,800	1,160,634	291,943
Virginia & Southwestern	240	1,016,099	111,584	1,156,174	137,334	232,718	14,573	340,734	30,731	756,090	400,084	.....	38,923	361,161	98,380
Wabash	2,515	12,969,580	4,861,224	19,373,900	2,245,347	3,353,397	633,538	7,961,636	595,288	14,789,206	4,584,694	—12,274	565,008	4,007,412	—1,055,290
Washington Southern	36	255,588	301,813	741,998	90,141	80,759	9,746	290,528	21,966	493,140	248,858	.....	25,959	222,899	—24,034
Western Pacific	935	2,751,063	727,451	3,588,027	670,875	328,399	222,337	1,478,332	181,863	2,881,806	706,221	—28,028	119,299	558,894	.....
Western Ry. of Alabama	133	543,143	335,269	953,991	150,716	176,342	43,105	262,693	48,801	681,657	272,334	133	36,899	235,568	23,641
Western Maryland	543	3,898,212	641,704	4,740,187	550,659	584,641	81,593	1,726,334	108,843	3,052,070	1,688,117	—393	168,000	1,519,724	—150,716
West Jersey & Seashore	356	1,261,944	2,784,723	4,328,008	666,568	750,568	106,482	1,865,907	86,961	3,476,486	851,522	—28,713	200,644	622,165	—206,274
Wheeling & Lake Erie	457	4,397,017	420,902	5,135,899	586,771	911,097	59,270	1,676,221	111,840	3,345,199	1,790,700	19,102	237,562	1,572,240	353,949
Yazoo & Mississippi Valley	1,372	4,564,468	1,798,347	6,861,184	1,270,841	1,005,410	128,918	2,687,945	211,646	5,304,760	1,556,424	—2,186	302,887	1,251,351	—1,048,565

- Indicates Deficits, Losses and Decreases.

Reparation Awarded.

Clyde Coal Co. vs. Pennsylvania Company et al. Opinion by Commissioner Meyer:

The southern boundary of the Pittsburgh district is changed to include the complainant's mine at Fredericktown, Pa., and complainant is given a rate of 78 cents per net ton on coal from Fredericktown to Ashtabula Harbor, Ohio. The 78-cent rate from other Pittsburgh district points was ordered by the commission in Boileau v. P. & L. E. R. R. Co., 22 I. C. C., 604.

Rates on Wool Reduced.

Railroad Commission of Oregon vs. Oregon Railroad & Navigation Company et al. and National Wool Growers' Association vs. Oregon Short Line Railroad Company et al. Opinion by Chairman Prouty:

This is a general investigation of the rates, regulations and practices of certain carriers in the transportation of wool from points between the Mississippi river and the Pacific coast to the Atlantic seaboard. The questions to be settled arose in several cases, and it was decided that they could only be properly disposed of by some proceeding in which a comprehensive view of the entire situation was taken. The questions considered were: Are the present rates just and reasonable, or should they be revised and reduced? If they are to be revised, should graded rates be established, or should the present blanket system, so far as it exists, be retained? Should rates be the same upon both sacks and bales? Should the rating on wool under the western classification be changed? Should transit privileges be allowed, and if so, at what points? What action should be taken under the fourth section applications?

It was shown that the cost of producing wool in the territory west of the Mississippi river has increased considerably and that the prices on wool had diminished. For this reason wool growers were forced to practice economies. Their present complaint of the unreasonableness of rates is the first, although these rates have remained the same since 1896. It was shown that since 1896 the earnings and traffic of the defendants had increased enormously. It follows, therefore, that rates which were reasonable in 1896 would be extravagant now. In 1896 the minimum loading was 15,000 lbs., and today it is 28,000 lbs. This has tended to reduce the cost of transportation. Instances were shown of other commodities which, while they enjoyed lower rates, were more expensive to transport. It was shown that although wool was carried from the Pacific coast terminals to the Atlantic seaboard, a much greater distance than the haul in question, for less than half the rate of the shorter haul, this did not carry much weight, because the lower rate for the longer haul was forced by water competition. This shows that the carriers considered the traffic as remunerative, and if the $1 rate per 100 lbs. is remunerative from Los Angeles, the rate of $2.075 for a haul shorter by from 300 to 850 miles must be very desirable business. The commission decided that from whatever angle this question was approached it was evident that rates of transportation of wool from western to eastern points were excessive and that they should be revised and reduced.

In the question of grading rates, it was decided that although a blanket rate now existed, the proper way of constructing these tariffs was to fix a reasonable rate to the Mississippi river from some point on the eastern edge of the western wool producing area, and then to gradually advance this rate going west until the reflex action of the water competitive rate from the Pacific coast was met, having in mind always that in long distance transportation like this the rate should not increase mile for mile as rapidly as in the shorter distances. Having established rates up to the Mississippi river, through rates to the Atlantic seaboard could be constructed by adding to the western rate a reasonable charge from the Mississippi river to the point of destination.

In regard to rates on sacks and bales, it was decided that a bale rate should be established which would be lower than the sack rate from these western points to the Mississippi river by approximately 15 per cent. of the sacked wool rate, with a minimum of 32,000 lbs. in standard 36-ft. cars, and a proportionately higher minimum for larger cars. A density of 19 lbs. per cu. ft. is required to secure the baled rate.

In regard to whether the rating on wool under the western classification should be changed, it was decided that wool should be classified under the western classification as second class in

less than carloads, and fourth class in carloads with a minimum of 24,000 lbs. in a standard 36-ft. car, and a correspondingly higher minimum in larger cars. This should apply to both sacks and bales. The present classification in official classification territory, is first class, less than carloads, and second class in carloads, with a minimum of 10,000 lbs.

Regarding transit privileges, it was decided that transit is a practice or regulation over which the commission has jurisdiction, and that in a case like this it could require carriers to accord that privilege. Transit should be allowed at intermediate points on a direct line upon payment of 2½ cents per 100 lbs., and upon condition that it applies only to wool originating west of the Mississippi river, which must be kept separate from wool originating at points east of the river.

With regard to the fourth section applications, it was decided that rates on sacked wool from points on the Pacific coast should be not more than 25 cents higher than rates on baled wool, because the cost of baling was about 25 cents per 100 lbs. Proceeding east from the Pacific coast, rates gradually increase until finally a point is reached where the rate, as it increases from the West, meets the rate increasing from the East. At the present time this line of meeting coincides roughly with the eastern boundary of California, Oregon and Washington. In no case is the rate to any intermediate destination point higher than that to the more distant point at the present time. The question of reparation has not yet been decided.

Rates on Glazed Sash and Window Glass Not Excessive.

Massee & Felton Lumber Co. et al. v. Southern Railway et al. Opinion by Commissioner McChord:

Manufacturers of sash, doors and blinds in southeastern Mississippi valley freight association territory here attack the reasonableness of the rate charged them on window glass in carloads shipped from Pittsburgh, and seek to have applied thereon the rate now applicable on glazed sash from Chicago to the same destination. The complainants contend that as the rate on glass from Pittsburgh to Chicago is 18 cents and the rate on glazed sash from Chicago to Atlanta is 38 cents, the western manufacturer can lay down his product in Atlanta at an aggregate transportation charge of 56 cents, which is the same as complainants must pay to transport their glass from Pittsburgh to Atlanta. In the comparisons made by the complainants only the rates on glass into Chicago and glazed sash out are considered, no allowance being made for the open sash into which the glass is placed. Chicago manufacturers obtain their lumber from the Pacific coast, but the southern manufacturers have to pay only a negligible transportation charge for their lumber, as it lies virtually at their door. It was shown that when this cost of lumber transportation was taken in consideration, it cost the southern manufacturer 3.15 cents less per 100 lbs. to procure his raw material than it did the western manufacturer; and it was also shown that the western manufacturer had to pay 41 cents more per 100 lbs. than the southern manufacturer to place his product on the Atlanta market. The complainants' calculations are faulty, because they assume that 100 lbs. of glass is used in 100 lbs. of glazed sash, and no account is taken of lumber, which approximates 50 per cent. of the weight of the completed article. It is evident, therefore, so far as the aggregate relative transportation costs are concerned, that the southern manufacturer is at no disadvantage compared with his western competitor, and no discrimination as between these sections can be found to result from the present rate adjustment.

It was also contended that window glass was unjustly discriminated against in favor of glazed sash. The rate on glazed sash from Chicago to Atlanta is now 38 cents per 100 lbs. This had been reduced from 58 cents by the carriers in order to obtain traffic which they otherwise would have lost on account of the activity of the southern manufacturers. Glazed sash takes a lower rate, either class or commodity, than window glass, and the difference here existing in favor of glazed sash is not unusual. The southern, official and western classifications all rate window glass in carloads fifth class, which from Pittsburgh to Atlanta is 60 cents. This rate was subsequently reduced to 56 cents, and is now lower than a number of articles which take the fifth class rates. The 18-cent rate on glass from Pittsburgh to Chicago is the fifth class rate between those points. To Atlanta the glass rate is six cents lower than the fifth class rate. It was decided, therefore, that the rate on glass from Pittsburgh to Atlanta is not shown to be either unreasonable or unjustly discriminatory. Complaint will be dismissed. (23, I. C. C.)

STATE COMMISSIONS.

The Indiana railway commission has suspended new rates on drain tile which were to have been put into effect by the railways, and also a rule canceling the former practice of paying grain shippers a refund of $2 when the grain doors were supplied by shippers. Hearings will be held on both orders on May 16.

The railway commissioners of Canada have appointed four locomotive inspectors, one each to be stationed at Montreal, Toronto, Winnipeg and Calgary. The intent of the commission in appointing these officers seems to be to provide supervision somewhat like that which is exercised in the United States by the locomotive boiler inspectors.

COURT NEWS.

The full-crew law of Pennsylvania has been sustained by the highest court of the state. This decision was on a case brought by the state against the Pennsylvania Railroad.

In the federal court at Salt Lake, Utah, the Denver & Rio Grande and the San Pedro, Los Angeles & Salt Lake have been convicted of violation of the safety appliance law.

The Supreme Court of the United States has declared unconstitutional the law of Arkansas making a railway liable for double the value of animals killed on the track if the claim of the owner for loss is not settled within 30 days.

In the federal court at Buffalo, N. Y., April 12, the grand jury returned indictments against the American and the Adams express companies on charges of having collected illegal rates for the transportation of merchandise. Shippers were allowed compensation for delivering goods at the station.

The United States Commerce Court has dismissed without prejudice the case of the Lehigh Valley v. U. S. and I. C. C. et al., on the motion of the petitioner. The case was one in which the court was asked to set aside an order of the I. C. C. reducing rates on anthracite coal from Wyoming coal fields to tidewater.

In the United States district court at Atlanta, Ga., on April 11, Judge Newman directed a verdict against the Southern Railway in the suit of the government to impose a penalty for noncompliance with the air brake law. Judge Newman held that where a train is composed entirely of power-braked cars, all of the cars must have their brakes connected up so as to be operated by the engineman.

The Iowa Supreme Court has ordered a rehearing in the Polk county district court of the suit brought by the Agar Packing Company against the Chicago, Rock Island & Pacific, alleging that it had been driven into bankruptcy through discriminations and rebates in favor of eastern packers on shipments from Valley Junction Ia. The court held that the railway company did not make a proper plea to claim the benefit of the statute of limitations.

Suits to compel the Union Pacific and the Chicago, Rock Island & Pacific to build and maintain adequate freight houses and terminals in Kansas City, Kan., in accordance with an order by the Kansas railway commission, have been filed in the Wyandotte county district court. Orders were issued by the court directing the railways either to begin the work by May 4 or to appear at that time to show cause why they should not be compelled to do so.

Judge Cavender, of the United States district court at Leadville, Colo., has overruled the demurrer of the Colorado & Southern to mandamus proceedings instituted by the Colorado railway commission to enforce an order to compel the railway to resume the running of freight and passenger trains on its line between Como, Colo., and Breckenridge, a distance of 21 miles, on the through route from Denver to Leadville. The order was issued last November on complaint of the Breckenridge Chamber of Commerce that the abandonment of service on this line would deprive mines of an outlet and farmers of a market for hay. The railway disputed the authority of the commission.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Frank C. Batchelder, general superintendent of the Baltimore & Ohio, and vice-president of the Baltimore & Ohio-Chicago Terminal Railroad at Chicago, has been elected president of the Baltimore & Ohio-Chicago Terminal, and also has been appointed assistant to the president of the Baltimore & Ohio, with office at Chicago. Mr. Batchelder was born May 27, 1857, at Fall River, Wis., and began railway work in 1874 with the Chicago, Milwaukee & St. Paul. He remained with that road until 1888, having been consecutively agent, operator and train despatcher. He was then for eleven years with the Minneapolis, St. Paul & Sault Ste. Marie, acting first as train despatcher, then as assistant superintendent, and later superintendent. In July, 1899, he went to the Baltimore & Ohio, with which road he has been ever since. He was superintendent of the Northwestern division of the Chicago district at Garrett, Ind., until December, 1901; was then until April 1, 1905, superintendent of the Newark division at Newark, Ohio; and from the latter date until December, 1906, was superintendent of the Chicago division. He was then made general superintendent of the Main Line district at Baltimore. Since the Baltimore & Ohio took over the Chicago Terminal Transfer in April, 1910, and reorganized it as the Baltimore & Ohio-Chicago Terminal Railroad, Mr. Batchelder has been vice-president of the latter road in immediate charge of its operations, at Chicago.



F. C. Batchelder.

A. W. Thompson, general manager of the Baltimore & Ohio and the Baltimore & Ohio Southwestern, at Baltimore, Md., has been elected third vice-president of the Baltimore & Ohio in charge of operation, he also continues as general manager of the B. & O. system, and in addition has been elected third vice-president in charge of operation of the Cincinnati, Hamilton & Dayton. His office remains at Baltimore. Mr. Thompson was born on May 8, 1875, at Erie, Pa., and was graduated from Allegheny College, Meadville, in 1897 as a civil engineer. The following year he began railway work in the engineering department of the Pittsburgh & Lake Erie, and in 1899 was appointed assistant engineer of surveys on the Pittsburgh division of the Baltimore & Ohio. He was made assistant engineer of the Pittsburgh division in 1900, and the following year was appointed engineer of the Cumberland division. In 1902 he returned to Pittsburgh as division engineer, and the following year went back to the Cumberland division as superintendent. He was transferred to Wheeling, W. Va., in 1904 as superintendent of the Wheeling division, and from 1907 to April, 1910, he was chief engineer maintenance of way. In April, 1910, he was promoted to chief engineer of the Baltimore & Ohio system, including the Baltimore & Ohio Southwestern, and remained in this position until December, 1910, when he was made general manager, with office at Baltimore. Mr. Thompson is a member of the American Society of Civil Engineers, and the American Railway Engineering & Maintenance of Way Association.



A. W. Thompson.

George M. Shriver, vice-president of the Baltimore & Ohio, with office at Baltimore, Md., has been elected also vice-president of the Cincinnati, Hamilton & Dayton.

C. H. Schlacks, vice-president of the Denver & Rio Grande and the Western Pacific, at San Francisco, Cal., has resigned as vice-president of the Denver & Rio Grande.

Operating Officers.

G. T. Mowat has been appointed assistant superintendent of terminals of the Texas & Pacific, in charge of the freight station at New Orleans, La.

C. E. Dafoe, trainmaster of the Northern Pacific at Livingston, Mont., has been appointed superintendent of the Midland Empire Railway, with office at Winnipeg, Man.

M. W. Jones, chief clerk to the general manager of the Guayaquil & Quito, has been appointed acting trainmaster, with headquarters at Huigra, Ecuador, and J. C. Dobbie succeeds Mr. Jones.

M. L. Phelps, assistant superintendent of the Colorado Midland at Colorado City, Colo., has been appointed superintendent, with office at Colorado City, succeeding F. B. Miller, resigned, and J. W. Spahr, trainmaster at Cardiff, Colo., succeeds Mr. Phelps.

Fred D. Pendell, whose appointment as superintendent of the Chicago & North Western, with office at North Fond du Lac, Wis., has been announced in these columns, was born October 27, 1861, at Fond du Lac. He attended public and private schools, and in 1879 began railway work with the Chicago & North Western. He was consecutively messenger boy, car clerk, telegraph operator at numerous stations, train despatcher and superintendent's clerk. From 1898 to 1901 he was station agent at Harvard, Ill., and was then for two years agent at Fond du Lac. In March, 1903, he was appointed trainmaster of the Northern Wisconsin division at North Fond du Lac; in August, 1908, was made assistant superintendent of that division, and on April 1 of the present year was appointed superintendent of the same company.



F. D. Pendell.

O. L. Eaton, trainmaster of the Baltimore & Ohio at Connellsville, Pa., has been appointed assistant superintendent, and T. E. Jamison, assistant trainmaster at Connellsville, has been appointed train despatcher of the new division running from Johnstown to Rockwood, both with offices at Somerset.

W. J. Fripp, general superintendent of the New York Central & Hudson River, at Albany, N. Y., has been appointed assistant general manager, with office at Albany. H. L. Ingersoll, assistant to general manager at New York, has been appointed assistant general manager, and will perform such duties as may be assigned to him, with office at New York.

C. W. Hotchkiss, whose election as president of the Illinois Tunnel Company was announced in these columns last week, has resigned as general manager of the Chicago, Indiana & Southern, to become president of the Chicago Utilities Company, a new company organized to take over the Illinois Tunnel Company and its subsidiaries, operating the Chicago freight subway, automatic telephone, warehouse, terminal and dock properties.

H. Rettinghouse, whose appointment as superintendent of the Chicago & North Western has been announced in these columns, was born in Germany July 30, 1861, and was educated in Germany. Mr. Rettinghouse came to the United States in 1882, and began railway work the following year as a rodman on the construction of the St. Paul extension of the Wisconsin Central. The following year he went with the Milwaukee, Lake Shore & Western, now the Chicago & North Western, where he was consecutively rodman, instrument man and assistant engineer in charge of location, construction and maintenance. He was engaged in the general engineering business at Ashland, Wis., for four years from 1893. In 1897 he went with the Chicago & North Western, and, except for the period from February, 1905, to January, 1907, he has been with that road ever since, having been consecutively assistant engineer in charge of construction and maintenance; superintendent of bridges and buildings on the Ashland division, and from January, 1907, to April, 1912, division engineer at Boone, Iowa, in charge of the East Iowa, the West Iowa and the Iowa & Minnesota divisions. From 1905 to 1907 he was division engineer of the Southern division of the Wisconsin Central. On April 1, 1912, Mr. Rettinghouse was promoted to superintendent of the Iowa & Minnesota division of the Chicago & North Western, with office at Mason City, Iowa.

Henry C. Nutt, fourth vice-president of the Northern Pacific and general manager of the lines west of Paradise, Mont., at Tacoma, Wash., has been appointed general manager of the San Pedro, Los Angeles & Salt Lake, with office at Los Angeles, Cal., succeeding R. E. Wells, resigned, effective May 1. Mr. Nutt was born November 12, 1863, at Council Bluffs, Iowa and graduated in 1883 from the Sheffield Scientific School. In August, 1883, he began railway work with the Burlington & Missouri River, and remained with that road and its successor, the Chicago, Burlington & Quincy, until 1906, having been consecutively rodman, trainmaster, assistant superintendent, superintendent and general superintendent. He was made general superintendent of the Michigan Central at Detroit, Mich., in 1906, and the following year was appointed general manager of the Northern Pacific lines west of Trout Creek, Mont. He was elected fourth vice-president and general manager of the latter road, as above noted, in November, 1909, which office he will resign on May 1, to go with the San Pedro, Los Angeles & Salt Lake.



Henry C. Nutt.

Traffic Officers.

L. P. Moore has been appointed immigration agent of the Northern Pacific, with office at Helena, Mont.

A. W. Reese has been appointed commercial agent of the St. Louis Southwestern, with office at Los Angeles, Cal., a new position.

A. L. Jeffries has been appointed passenger traffic agent of the Illinois Traction System, with office at Springfield, Ill., succeeding Oscar L. Hill, resigned.

C. R. Prince has been appointed contracting freight agent of the Illinois Central, with headquarters at Atlanta, Ga., succeeding F. H. Webber, promoted.

M. H. Dorsett has been appointed commercial agent of the Macon, Dublin & Savannah, with office at Jacksonville, Fla., succeeding W. D. Nelson, resigned.

W. J. Keppler has been appointed soliciting freight agent of the Queen & Crescent Route, with headquarters at Chicago, succeeding Henry Hoving, promoted.

G. C. Maxwell has been appointed traveling freight agent of the Chicago, Burlington & Quincy, with office at Cincinnati, Ohio, succeeding W. B. Kelby, deceased.

C. P. Pruitt, traveling freight and passenger agent of the Chicago, Milwaukee & St. Paul, with headquarters at Salt Lake City, Utah, has resigned to engage in other business.

H. R. Lewis has been appointed division freight agent of the Baltimore & Ohio, with office at Baltimore, Md., succeeding Edward S. King, resigned to go into other business.

P. L. Holtz has been appointed traveling freight agent of the Lake Shore & Michigan Southern and the Lake Erie & Western, with office at St. Louis, Mo., succeeding L. D. Gruber, resigned.

H. N. Breckheimer, commercial freight agent of the Wisconsin & Michigan at Menominee, Mich., has been appointed general freight and passenger agent, with office at Menominee, succeeding J. C. Fitzgerald.

G. R. Hackley has been appointed assistant general freight and passenger agent of the Southern Pacific Railroad of Mexico and the Sonora Railway, with office at Mexico City, Mex., succeeding A. Miranda, resigned to accept service with another company.

J. J. Forster, formerly traveling passenger agent of the Canadian Pacific Atlantic Steamship Lines at Seattle, Wash., has been appointed general agent of those lines, with office at Seattle, and with jurisdiction over the states of Oregon, Washington and British Columbia.

B. W. Frauenthal has been appointed general passenger and ticket agent of the Terminal Railroad Association of St. Louis, the St. Louis Merchants Bridge Terminal Railroad Company and the Wiggins Ferry Company, with office at St. Louis, Mo., succeeding V. W. Fisher, deceased.

The Mexico agency of the Rock Island Lines at Mexico City, Mex., has been closed permanently. Correspondence relating to freight matters heretofore addressed to the general agent at Mexico City should in future be sent to R. R. Seeds, traveling freight agent of the Chicago, Rock Island & Gulf at El Paso, Texas.

C. R. L. Wilder, traveling freight agent of the Chicago & Alton and the Toledo, St. Louis & Western at Detroit, Mich., has been appointed commercial agent, with office at Louisville, Ky., succeeding S. C. Clark, southeastern freight agent at Louisville, deceased, and the position of southeastern freight agent has been abolished. J. O. Kobzina succeeds Mr. Wilder.

J. C. Lincoln, formerly assistant freight traffic manager of the Missouri Pacific at Kansas City, Mo., and later traffic commissioner of the St. Louis Merchants Exchange, and who resigned three months ago as president of the Industrial Traffic League of that city, has been appointed manager of the traffic bureau of the Merchants Association of New York City. Effective May 1.

H. B. McClellan, general eastern agent of the Wabash at New York City, having been appointed special traffic representative in eastern territory, with office in New York City, the office of general eastern agent has been abolished; and A. S. Dunbar, eastern passenger agent, has been appointed general agent of the passenger department, with office at New York. L. C. Bostwick has been appointed general agent in the freight department, with headquarters in New York City.

W. A. Bridgman, traveling freight agent of the Wabash at St. Louis, Mo., has been appointed commercial agent, with office at Keokuk, Iowa, succeeding J. H. Cole, resigned, and F. P. Grace succeeds Mr. Bridgman. Walter Bockstahler, contracting freight agent at Detroit, Mich., has been appointed traveling freight agent, with headquarters at Buffalo, N. Y., succeeding W. N. Price, promoted; and Charles J. Sayles, contracting freight agent at Omaha, Neb., has been appointed commercial agent, with office at Hannibal, Mo., succeeding Earle Lind, promoted.

H. O. Foster, agent of the Pacific Coast Steamship Company at Vancouver, B. C., has been appointed city freight and passenger agent, with office at Vancouver. Frank J. Stapleton, contracting freight agent at San Francisco, Cal., has been appointed traveling freight and passenger agent, with office at Spokane, Wash., succeeding Arthur Heathorn, transferred. George P. Whaley succeeds Mr. Stapleton. R. N. Lambert, ticket agent at San Francisco, has been appointed city passenger and ticket agent, with office at Oakland, succeeding A. C. Jenkins, resigned, and F. S. Holzapfel succeeds Mr. Lambert.

William E. Wolfenden, who has been appointed general passenger agent of the Pere Marquette, with office at Detroit, Mich., as has been announced in these columns, was born March 14, 1862, at Port Hope, Ont., and he was educated at the Whitby (Ont.) Collegiate Institute. He began railway work in 1881 as an operator on the Chicago & West Michigan at Woodville and Kent City, Mich., and he was with that road until November, 1900, where he was consecutively agent first at New Richmond, Mich., and then at Benton Harbor, Mich.; traveling passenger agent and general baggage agent. He was general baggage agent for seven years, from 1893 and held that office on the Detroit, Lansing & Northern, as well as on the C. & W. M.. The Pere Marquette having been formed by the consolidation of the Chicago & West Michigan, the Detroit, Grand Rapids & Western and the Flint and Pere Marquette. Mr. Wolfenden was appointed district passenger agent of that road at Grand Rapids, Mich., on November 1, 1900. He was appointed general western passenger agent, with office at Chicago, in February, 1904, which office he held until his present promotion to general passenger agent.

Engineering and Rolling Stock Officers.

C. Houston has been appointed master mechanic of the Nacozari Railroad, with office at Nacozari, Sonora, Mex.

J. Adams has been appointed supervisor of maintenance of way department of the new division of the Baltimore & Ohio, running from Johnstown, Pa., to Rockwood, with office at Somerset.

J. A. Haley has been appointed master mechanic of the Bellingham Bay & British Columbia, with office at Bellingham, Wash., succeeding M. Dailey, resigned to accept service with another company.

F. W. Taylor, master mechanic of the Illinois Central at Mattoon, Ill., has been appointed master mechanic, with office at Waterloo, Iowa, in place of J. A. Bell, who succeeds Mr. Taylor at Mattoon.

J. A. Gibson, formerly master mechanic of the Cleveland, Cincinnati, Chicago & St. Louis at Urbana, Ill., has been appointed combustion engineer of the Illinois Traction System, with headquarters at Urbana.

Arthur Jung, roadmaster of the Middle division of the Atchison, Topeka & Santa Fe at Newton, Kan., has been appointed roadmaster, with headquarters at Ellinwood, Kan., succeeding Joseph Waterhous, transferred; and W. F. Muff, who was roadmaster of the Middle division until the latter part of 1911, has been appointed to that position again, succeeding Mr. Jung.

Nels Osgard, who has been appointed master mechanic of the Great Northern, with office at Superior, Wis., as has been announced in these columns, was born May 26, 1869, in Norway. He received a common school education and began railway work with the St. Paul, Minneapolis & Manitoba, now the Great Northern, in October, 1887, at Minneapolis, Minn. He first worked in the roundhouse, taking care of ashpans and as an engine wiper, and he was subsequently call boy, boiler washer, boilermaker, machinist, blacksmith and fireman. He became an engineer in November, 1896; in April, 1906, was promoted to traveling engineer, and except for about a year when he was a road engineer again, he was a traveling engineer continuously until his present appointment. He was appointed traveling engineer of the Lake district in March, 1909, over which district he now has jurisdiction as master mechanic.

C. W. Cochran, who has been appointed engineer of maintenance of way of the Cleveland, Cincinnati, Chicago & St. Louis, with office at Wabash, Ind., was born in December, 1876, at Winchester, Va., and was educated at the Shenandoah Institute and the Virginia Polytechnic Institute, graduating in 1893 with the degree of B. S. from the former and in 1898 as civil engineer from the latter. He began railway work in June, 1899, with the Cleveland, Cincinnati, Chicago & St. Louis, and, until 1902, he was consecutively rodman, instrument man and assistant engineer on the Chicago division, near Indianapolis. He was then placed in charge of a locating party on Guilford Hill, near Cincinnati, and was resident engineer on construction from 1903 to June, 1907. Frome June to September, 1907, he was engaged in making a topographical survey of the Wood river valley near Alton, Ill., and in the latter month was made assistant engineer of maintenance of way on the Cleveland-Indianapolis division of the C. C. C. & St. L., with office at Galion, Ohio, from which position he has just been promoted to engineer of maintenance of way of the Michigan division at Wabash, Ind. During the winter of 1909 Mr. Cochran was also supervisor of track on the First district of the Cleveland-Indianapolis division.

OBITUARY.

Edward P. Higgins, assistant auditor of the Cleveland, Cincinnati, Chicago & St. Louis, with office at Cincinnati, Ohio, died April 11 at his home near that city. Mr. Higgins was 60 years of age.

J. P. Coleman, for many years connected with the engineering department of the Illinois Central at Chicago, and for the past four or five years with MacArthur Brothers Company, contractors, died at Chicago, on April 13, at the age of 63.

Charles N. Gilmore, superintendent of the Des Moines Valley division of the Chicago, Rock Island & Pacific from 1887 to 1903, died at his home in Des Moines, Iowa, on April 5. Mr. Gilmore was born October 21, 1835, at Stafford, Conn. He began railway work in 1852 as a locomotive fireman on the Bellefontaine Railroad in Ohio, and was with the Illinois Central, first as locomotive fireman and later as conductor, for 20 years. In 1874 he was made superintendent of the Des Moines & Fort Dodge Railroad, and from 1887, when that road was leased by the Rock Island, until the time of his retirement in 1903 he was superintendent of the Rock Island at Des Moines.

Thomas Whyler Greene, chief engineer of the Minneapolis, St. Paul & Sault Ste Marie, died in Minneapolis, Minn., on March 27, at the age of 47. Mr. Greene was born March 25, 1865, at Green Bay, Wis., and was educated in the public schools of that city and Marinette, Wis. In 1883 he began work as an engineer under S. B. Fisher on the construction of the Milwaukee & Western, now a part of the Chicago, Milwaukee & St. Paul, and continued with that company until 1891, when he entered the service of the Minneapolis, St. Paul & Sault Ste. Marie as instrument man. After various promotions he was made principal assistant engineer, and in 1898 was appointed chief engineer of the Soo Line, which position he held at the time of his death. Mr. Greene has directly supervised all the large construction operations of the company during the past 14 years, and has left the impress of his personality and exceptional engineering skill on many important extensions and structures.

Edward J. Richards, formerly chief assistant general passenger agent of the New York Central & Hudson River at New York, died on April 14, at his home in Brooklyn. Mr. Richards was born on February 8, 1843, at Liverpool, Eng., and began railway work on August 1, 1855, as office boy, and was later clerk in the general ticket office of the Hudson River Railroad. From October, 1865, to March, 1873, he was chief clerk in the same office, and from March, 1873, to March, 1880, was chief clerk in the general passenger agent's office of the New York Central & Hudson River. He was appointed assistant general passenger agent in March, 1880, and from January, 1900, to October 1, 1908, he was chief assistant general passenger agent of the same road, since which time he had been performing such duties as were assigned to him by the general passenger agent. Mr. Richards had been in the service of the New York Central & Hudson River and its predecessors for over 50 years; at the time of his death he was a member of the Montauk Club, Brooklyn, and the Transportation Club, New York.

The Ancud to Castro railway, Chile, was opened to public traffic in March last, and the station, warehouses, and other buildings at Ancud have been finished. This line is 62 miles long and cost about $754,000

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Seaboard Air Line is figuring on 26 locomotives.

The Atlantic Coast Line has ordered one four-wheel switching locomotive from the Baldwin Locomotive Works.

The Union Stock Yards Company, Omaha, Neb., has ordered one six-wheel switching locomotive from the Baldwin Locomotive Works.

The Coal & Coke has ordered one eight-wheel passenger locomotive and two consolidation locomotives from the Baldwin Locomotive Works.

The Harriman Lines are preparing an estimate of their requirements for motive power. It is expected that from 150 to 170 locomotives will be needed. This will include the 60 locomotives mentioned in the *Railway Age Gazette* of April 5 and 12.

The Rutland has ordered six 10-wheel locomotives from the American Locomotive Company. The dimensions of the cylinders will be 22½ in. x 26 in.; the diameter of the driving wheels will be 69 in., and the total weight in working order will be 210,000 lbs. These locomotives will be equipped with superheaters.

The Central Railway of Brazil has ordered eight Pacific type locomotives from the American Locomotive Company. The dimensions of the cylinders will be 21½ in. x 28 in.; the diameter of the driving wheels will be 68 in., and the total weight in working order will be 200,000 lbs. These locomotives will be equipped with superheaters.

The Bahia & Minas, Brazil, has ordered three consolidation locomotives and three 10-wheel locomotives from the American Locomotive Company. The consolidation locomotives will have 15-in. x 20-in. cylinders, 38-in. driving wheels, and in working order will weigh 83,000 lbs. The 10-wheel locomotives will have 16-in. x 20-in. cylinders, 45-in. driving wheels; and in working order will weigh 80,000 lbs.

CAR BUILDING.

The Norfolk & Western is in the market for 50 passenger cars.

The Kanawha & Michigan is in the market for 1,000 all-steel, 50-ton, hopper cars.

The Seaboard Air Line is figuring on 1,200 freight cars, 25 caboose cars and 30 passenger cars.

The Bingham & Garfield has ordered 20 general service cars from the Pressed Steel Car Company.

The Barrett Manufacturing Company, New York, is in the market for from 50 to 75, fifty-ton, tank cars.

The American Zinc Company, Hillsboro, Ill., has ordered 50 tank cars from the German American Car Company.

The Kingan Refrigerator Company, Indianapolis, Ind., has ordered 200 refrigerator cars from the American Car & Foundry Company.

The Lehigh Valley has ordered 750 refrigerator cars from the Pullman Company and is rumored to be considering the purchase of passenger equipment.

The Harriman Lines are said to be in the market for 5,700 fifty-ton box cars, 1,000 refrigerator cars, 700 gondola cars, 700 fifty-ton flat cars and 600 fifty-ton work cars. This company has ordered 6 caboose cars from the Pullman Company.

IRON AND STEEL.

The Chicago & North Western is in the market for 2,600 tons of bridge material.

The Erie has ordered 2,300 tons of structural shapes for a coal storage plant at Hammond, Ind.

The Northern Pacific has ordered 5,000 tons of rails from the Pennsylvania Steel Company.

The Harriman Lines are said to have divided an order for 50,000 tons of rails between the Tennessee Coal, Iron & Railroad Company and the Colorado Fuel & Iron Company.

Supply Trade News.

The Cambria Steel Company, Johnstown, Pa., has moved its Chicago office to 1860 McCormick building.

The O'Malley-Beare Valve Company, Chicago, maker of the Multiplate line of valves, will move its general office on May 1 to 333 Railway Exchange.

Edgar Allen & Company, Limited, Chicago, steel manufacturers, announce the removal of their office to larger quarters at 718-722 West Lake street, on April 1.

George E. Fox, formerly purchasing agent of the Guayaquil & Quito, Ecuador, has entered the sales department of the Curtain Supply Company, Chicago, with office in New York.

The railway sales department of John Lucas & Co., Philadelphia, Pa., manufacturers of paints, will move its Chicago office this month from the Old Colony building to 945 Peoples Gas building.

The American Railway Supply Company, New York, has moved its general office from 24 Park place, to its new factory building at 134-136 Charles street. The company has been located at the former address for 22 years.

The Isthmian Canal Commission, Washington, D. C., will receive bids until May 1 on miscellaneous supplies, including cast iron car wheels (circular No. 703); and until April 22 on chain, steel wire, twist drills, hose couplings, hose packing, etc. (circular No. 702).

R. A. Dugan, formerly assistant general manager of the Southern Railway, has gone to the Scullin-Gallagher Iron & Steel Company, St. Louis, Mo., to take charge of the sales department of its Chicago office. The exact location of this office has not yet been determined.

Gunni Jeppesen, for many years designing engineer for the Strauss Bascule Bridge Company, Chicago, has been appointed managing engineer of the company. J. R. Hall, who has been chief draftsman, has been appointed designing engineer, and is succeeded as chief draftsman by A. O. Walker.

The Wyckoff Pipe & Creosoting Company, New York, has received an order for 20,000 sq. yds. of creosoted wood block required for the floor of the new erecting shop at Eddystone Pa., of the Baldwin Locomotive Works, Philadelphia, Pa. This wood block will be 3½ in. deep and will be made of yellow pine.

The Storrs Mica Company, Owego, N. Y., has taken the general agency for the railway trade of the Indestructible hose clamp, made by the Thompson Manufacturing Company, Newark, Ohio. These clamps are used on air brake, air signal, steam and water hose. Sales of this device will be in charge of Charles P. Storrs, manager of the railway department of the Storrs company.

The American Rolling Mill Company, Middletown, Ohio, has erected six tinning stacks at its plant at Zanesville, Ohio, for the manufacture of terne plate, with American ingot iron as a base metal. This plant, which has just begun operations, will have a capacity of from 600 to 1,000 tons a month. The first order was placed by the Irwin Manufacturing Company, Pittsburgh, Pa., for 1,000 cases.

Robert E. Frame, who has been connected with the American Car & Foundry Company, New York, for several years, has resigned to become connected with the Haskell & Barker Car Company, Michigan City, Ind. Mr. Frame was born in Chicago in 1877, was educated in the Chicago schools, and received a thorough training in the practical details of carbuilding in the shops of the Pullman Company, Chicago, with which company he was connected for seven years. For a time he was estimating engineer for the Western Steel Car & Foundry Company, Chicago, and in 1901 was appointed assistant mechanical engineer of the American Car & Foundry Company, with office at St. Louis, Mo., later being appointed mechanical superintendent at St. Louis. In November, 1909, he was transferred to Chicago in the office of first vice-president and general manager.

J. W. Mack, secretary and treasurer of the Nathan Manufacturing Company, New York, died April 11, following an opera-

tion. Mr. Mack had been secretary and treasurer of the Nathan company ever since its organization in 1883, when it succeeded Nathan & Dreyfus. Mr. Mack was the youngest son of an eminent German physician, Dr. Wolfgang Mack, and was born at Fürth, Germany, 67 years ago. He was educated at the universities at Heidelberg and Stuttgart, and came over to this country in his early twenties. For 12 years Mr. Mack was a school commissioner for the city of New York, and was also for some years vice-president of the Society for the Prevention of Cruelty to Children. He was a member of the New York chamber of commerce, a past president of the Harmonie Club, and as a member of the Armstrong Society took great interest in advancing the education of the negro race.

List of Exhibitors, 1912 June Convention.

Following is a list of the exhibitors who have already secured space for the exhibit of the Railway Supply Manufacturers' Association, to be held at Atlantic City, N. J., in connection with the conventions of the American Railway Master Mechanics' Association and the Master Car Builders' Association in June:

Acme Supply Company, Chicago.
Ajax Manufacturing Company, Cleveland, Ohio.
American Abrasive Metals Company, New York.
American Arch Company, New York.
American Balance Valve Company, Jersey Shore, Pa.
American Brake Company, St. Louis, Mo.
American Brake Shoe & Foundry Company, Mahwah, N. J.
American Brass Company, Ansonia, Conn.
American Car & Foundry Company, Chicago.
American Locomotive Company, New York.
American Nut & Bolt Fastener Company, Pittsburgh, Pa.
American Red Gold Leaf Company, Providence, R. I.
American Steel Foundries, Chicago.
American Tool Works, Cincinnati, Ohio.
American Vanadium Company, Pittsburgh, Pa.
American Mason Safety Tread Company, New York.
Anchor Packing Company, Philadelphia, Pa.
Automatic Ventilator Company, New York.

Barco Brass & Joint Company, Chicago.
Berry Brothers, Ltd., Detroit, Mich.
Best Manufacturing Company, Pittsburgh, Pa.
Best, W. N., New York.
Bethlehem Steel Company, South Bethlehem, Pa.
Bettendorf Axle Company, Bettendorf, Iowa.
Blackall, Robert H., Pittsburgh, Pa.
Boss Nut Company, Chicago.
Bowser & Company, Inc., S. F., Fort Wayne, Ind.
Brunix Manufacturing Company, Philadelphia, Pa.
Buckeye Steel Castings Company, Columbus, Ohio.
Buffalo Brake Beam Company, New York.
Bullard Machine Tool Company, Bridgeport, Conn.
Buyers Index Company, Chicago.
Brown Automatic Connector Company, Chattanooga, Tenn.

Cambria Steel Company, Johnstown, Pa.
Camel Company, Chicago.
Carborundum Company, Niagara Falls, N. Y.
Carey Company, Philip, Cincinnati, Ohio.
Carnegie Steel Company, Pittsburgh, Pa.
Carter Iron Company, Pittsburgh, Pa.
Chase & Company, L. C., Boston, Mass.
Chicago Car Door Company, Chicago.
Chicago Car Heating Company, Chicago.
Chicago Pneumatic Tool Company, Chicago.
Chicago Railway Equipment Company, Chicago.
Chicago Steel Car Company, Chicago.
Chicago Varnish Company, Chicago.
Chisholm & Moore Manufacturing Company, Cleveland, Ohio.
Coe Manufacturing Company, W. H., Providence, R. I.
Collins Metallic Packing Company, Philadelphia, Pa.
Colonial Steel Company, Pittsburgh, Pa.
Commonwealth Steel Company, St. Louis, Mo.
Consolidated Car Heating Company, New York.
Crane Company, Chicago.
Crosby Steam Gage & Valve Company, Boston, Mass.
Crucible Steel Company of America, Pittsburgh, Pa.
Curtain Supply Company, Chicago, Ill.

Dahlstrom Metallic Door Company, Jamestown, N. Y.
Davis-Bournonville Company, New York.
Davis Solid-Truss Brake Beam Company, Wilmington, Del.
Dearborn Drug & Chemical Works, New York.
Detroit Lubricator Company, Detroit, Mich.
Dickinson, Inc., Paul, Chicago.
Dixon Crucible Company, Jos., Jersey City, N. J.
Dressel Railway Lamp Works, New York.
Duff Manufacturing Company, Pittsburgh, Pa.
Durbin Automatic Train Pipe Connector Company, St. Louis, Mo.
Damascus Brake Beam Company, Cleveland, Ohio.
Deforest Sheet & Tin Plate Company, Niles, Ohio.
Duntley Keller Pneumatic Tool Company, Chicago.

Eagle Glass & Manufacturing Company, Wellsburg, W. Va.
Economy Car Heating Company, New York.
Edison Storage Battery Company, Orange, N. J.
Edwards Company, O. M., Syracuse, N. Y.
Electric Controller & Manufacturing Company, New York.
Electric Storage Battery Company, Philadelphia, Pa.
Emery Pneumatic Lubricator Company, St. Louis, Mo.

Fairbanks Company, New York.
Farlow Draft Gear Company, Baltimore, Md.
Flannery Bolt Company, Pittsburgh, Pa.
Forged Steel Wheel Company, Pittsburgh, Pa.
Forsyth Brothers Company, Chicago.
Foster Company, Walter H., New York.
Franklin Manufacturing Company, Franklin, Pa.
Franklin Railway Supply Company, New York.
Frost Railway Supply Company, Detroit, Mich.

Galena Signal Oil Company, Franklin, Pa.
Garlock Packing Company, Palmyra, N. Y.
General Electric Company, Schenectady, N. Y.
General Railway Supply Company, Chicago.
Gold Car Heating & Lighting Company, New York.
Goldschmidt Thermit Company, New York.
Gould Coupler Company, New York.
Greene, Tweed & Company, New York.
Greenlaw Manufacturing Company, Boston, Mass.
Griffin Wheel Company, Chicago.
Grinden Art Metal Company, Brooklyn, N. Y.
Grip Nut Company, Chicago.
Gould & Eberhardt, Newark, N. J.

Halcomb Steel Company, Philadelphia, Pa.
Hale & Kilburn Company, Philadelphia, Pa.
Hammett, H. G., Troy, N. Y.
Harrington, Son & Company, Inc., Edwin, Philadelphia, Pa.
Hewitt, H. H., New York.
Heywood Brothers & Wakefield Company, Wakefield, Mass.
Higley Machine Company, New York.
Hobart-Allfree Company, Chicago.
Home Rubber Company, Trenton, N. J.
Hubbard & Company, Pittsburgh, Pa.
Hunt Company, C. W., West New Brighton, N. Y.
Hunt-Spiller Manufacturing Corporation, Boston, Mass.

Illinois Steel Company, Chicago.
Independent Pneumatic Tool Company, Chicago.
International Oxygen Company, New York.

Jacobs-Shupert U. S. Fire Box Company, New York.
Jenkins Brothers, New York.
Jessop & Sons, Inc., Wm., New York.
Johns-Manville Company, H. W., New York.
Joliet Railway Supply Company, Chicago.
Jones & Laughlin Steel Company, Pittsburgh, Pa.
Joyce-Cridland Company, Dayton, Ohio.

Keystone Drop Forge Works, Chester, Pa.
Keystone Lubricating Company, Philadelphia, Pa.
Keyoke Railway Equipment Company, Chicago.
Knight Pneumatic Sander Company, Huntington, Ind.

Landis Machine Company, Waynesboro, Pa.
Lehon Company, Chicago.
Locomotive Improvement Company, Clinton, Iowa.
Locomotive Superheater Company, New York.
Lucus Machine Tool Company, Cleveland, Ohio.
Lunkenheimer Company, Cincinnati, Ohio.

Main Belting Company, Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., New York.
Manufacturers' Exhibit of Railway Supplies, Chicago.
Massachusetts Mohair Plush Company, Boston, Mass.
Matthews-Davis Tool Company, St. Louis, Mo.
Midvale Steel Company, New York.
Mid-Western Car Supply Company, Chicago.
Milburn Company, Alexander, Baltimore, Md.
Moran Flexible Steam Joint Company, Louisville, Ky.
Mudge & Company, Burton W., Chicago.

McConway & Torley Company, Pittsburgh, Pa.
McCord & Company, Chicago.
McCord Manufacturing Company, Chicago.
McGraw Publishing Company, New York.

Nathan Manufacturing Company, New York.
National Lock Washer Company, Newark, N. J.
National Malleable Castings Company, Cleveland, Ohio.
National Tube Company, Pittsburgh, Pa.
Nazel Engineering & Machine Works, Philadelphia, Pa.
Newhall Engineering Company, Geo. M., Philadelphia, Pa.
Newton Machine Tool Works, Inc., Philadelphia, Pa.
New York Air Brake Company, New York.
Nickel-Chrome Chilled Car Wheel Company, Pittsburgh, Pa.
Niles-Bement-Pond Company, New York.
Norton, Inc., A. O., Boston, Mass.
Norton Company, Worcester, Mass.

Pantasote Company, New York.
Parkesburg Iron Company, Parkesburg, Pa.
Parsons Engineering Company, Wilmington, Del.
Pease Company, C. F., Chicago.
Pennsylvania Flexible Metallic Tubing Company, New York.
Pilliod Company, Swanton, Ohio.
Pittsburgh Equipment Company, Pittsburgh, Pa.
Pneumatic Jack Company, Louisville, Ky.
Pocket List of Railroad Officials, New York.
Pressed Steel Car Company, New York.
Pyle National Electric Headlight Company, Chicago.
Pyrene Manufacturing Company, New York.

Railway Age Gazette, New York.
Railway Appliances Exchange, Chicago.
Railway List Company, Chicago.
Railway Materials Company, Chicago.
Railway Utility Company, Chicago.
Reliance Electric & Engineering Company, Cleveland, Ohio.
Remy Electric Company, Anderson, Ind.
Restein Company, Clement, Philadelphia, Pa.
Robinson Coupler Company, Washington, D. C.
Rochester Germicide Company, Rochester, N. Y.
Rubberset Company, Newark, N. J.

Safety Car Heating & Lighting Company, New York.
Scarritt-Comstock Furniture Company, St. Louis, Mo.
Scullin-Gallagher Iron & Steel Company, St. Louis, Mo.
Sellers & Company, Inc., Wm., Philadelphia, Pa.
Shelby Steel Tube Company, Pittsburgh, Pa.

Simplex Railway Appliance Company, Chicago.
Sprague Electric Works of General Electric Company, New York.
Standard Coupler Company, New York.
Standard Roller Bearing Company, Philadelphia, Pa.
Standard Steel Car Company, Pittsburgh, Pa.
Stowe Mica Company, Owego, N. Y.
Street, Clement F., Schenectady, N. Y.
Swedish Iron & Steel Corporation, New York.
Symington Company, T. H., Baltimore, Md.
Sinclair Company, Angus, New York.

Tabor Manufacturing Company, Philadelphia, Pa.
Templeton, Kenly & Company, Ltd., Chicago.
Topping Brothers, New York.
Tyler Company, W. S., Cleveland, Ohio.

Union Draft Gear Company, Chicago.
Union Spring & Manufacturing Company, Pittsburgh, Pa.
U. S. Light & Heating Company, Niagara Falls, N. Y.
U. S. Metal & Manufacturing Company, New York.
U. S. Metallic Packing Company, Philadelphia, Pa.

Valentine Company, New York.
Van Beuren, Walter B., New York.
Van Dorn & Dutton Company, Cleveland, Ohio.
Virginia Equipment Company, Toledo, Ohio.
Vixen Tool Company, Philadelphia, Pa.

Ward Equipment Company, New York.
Warner & Swasey Company ,Cleveland, Ohio.
Watson-Stillman Company, New York.
Welsbach Company, Gloucester, N. J.
West Disinfecting Company, New York.
Western Railway Equipment Company, St. Louis, Mo.
Westinghouse Air Brake Company, East Pittsburgh, Pa.
Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.
Westinghouse Machine Company, East Pittsburgh, Pa.
Wheel Truing Brake Shoe Company, Detroit, Mich.
Williams Company, Inc., G. H., Cleveland, Ohio.
Wilmarth & Morman Company, Grand Rapids, Mich.
Wilson Remover Company, New York.
Wood, Guilford S., Chicago.

Yale & Towne Manufacturing Company, New York.

Zug Iron & Steel Company, Pittsburgh, Pa.

Track Exhibitors.

McKeen Motor Car Company, Omaha, Neb.

Standard Truck Company, Chicago.

TRADE PUBLICATIONS.

Central Vermont.—This company has just issued an attractive Seashore booklet describing the eastern resorts reached by its line.

Wheel Presses.—The Watson-Stillman Company, New York, has published catalog No. 85 of its hydro-pneumatic wheel presses. The catalog gives illustrations and detailed descriptions.

Door Fixtures.—The Railway Utility Company, Chicago, has issued a new booklet describing the company's line of automatic locks for freight car doors, double roller door hangers, and other fixtures.

Denver & Rio Grande.—This company has just issued a handsome folder in the interest of those who will attend the annual reunion of the Elks at Portland, Ore., July 8-13. The folder is well illustrated with views along the company's lines as well as many scenes in and about Portland, and contains a program of the week's entertainment.

Motors.—The General Electric Company, Schenectady, N. Y., has devoted bulletin No. 4915 to its type CVC, direct current motors of the commutating pole design. These motors embody certain improvements over those described in the company's previous bulletin on this subject. The bulletin amply illustrates and describes these motors and includes rating tables.

Track Motor Cars.—The Chicago Pneumatic Tool Company, Chicago, has issued catalog No. 40, devoted to the description and illustration of several types of Rockford railway motor cars. The catalog contains specifications of the different types of car and a large number of letters from railway men describing the service they have given. This company has also issued circulars describing individual types of motor cars, including the Rockford runabout for inspection and signal service and the Rockford spike-driving car.

Good progress is being made with the deviation of the Great Western line between Emu Plains, New South Wales, and Blaxland. The embankment at Emu Plains, consisting of a fill of 100 cu. yds., is half finished, and the abutments and piers over Knapsack Gulley are well advanced. The embankments and culverts are being constructed for double track throughout.

Railway Construction.

New Incorporations, Surveys, Etc.

Alaska Midland.—An officer writes that this compauy plans to build from Haines, through the western part of Yukon territory to Fairbanks, Alaska, but it is undecided when the work will be carried out. John Rosene, president, Seattle, Wash.

Atlanta & Macon (Electric).—Incorporation will be asked for in Georgia by a company, under this name, with $100,000 capital, to build from Atlanta, Ga., southeast to Macon, about 80 miles. K. Cowan, Chicago; C. G. Young, New York; H. N. Randolph; H. M. Scott, and R. S. Parker, all of Atlanta, are interested.

Baltimore & Ohio.—An officer writes that bids have been received for making improvements on the line between Harper's Ferry, W. Va., and Brunswick, Md. F. L. Stuart, chief engineer, Baltimore, Md.

Canada & Gulf Terminal.—An officer writes that contracts are to be let at once to build extensions. The company now operates a line from Ste. Flavie, Que., northeast following the shore of the St. Lawrence river to Matane, 36 miles. The plans call for extensions as follows: From Matane east to Gaspe Basin, about 160 miles, with a short branch from this line from a point west of Gaspe Basin east to Douglastown, about 20 miles; from Ste. Flavie southwest to St. Eleuthere, 90 miles, and a branch from Ste. Flavie west to Rimouski, 20 miles. The company expects to develop a traffic in lumber, ore and fish. M. J. O'Brien, president, Montreal, and R. Dupont, traffic manager, Matane.

Carolina, Clinchfield & Ohio.—See this company in Railway Financial News.

Central Railroad of New Jersey.—An officer writes that contracts have been let for carrying out improvements on the line between Jersey City, N. J., and Newark. J. O. Osgood, chief engineer, New York.

Clinton & Oklahoma Western.—An officer writes that this company expects to finish work about July 1 on the extension from Butler, Okla., west up the Washita valley to the new town of Strong City, 30 miles. J. W. Maney, president, and G. V. McClure, chief engineer, Oklahoma City. (March 1, p. 408.)

Cumberland Valley & Interstate (Electric).—An officer writes that the proposed route is from Gallatin, Tenn., east and northeast to Hartsville, Lafayette and Red Springs. The prospects of building the line are good, but it has not yet been decided when bids will be asked for the work. There will be two steel bridges, about 200 ft. long. W. G. Schamberger, president, and W. H. Spradlin, chief engineer, Gallatin.

Hudson Bay Railway.—Bids are to be asked for in the near future by the Dominion government to build a second-section of about 100 miles. A contract has already been let to J. D. McArthur, Winnipeg, Man., for the first 185 miles from Le Pas, Keewatin, northeast to Thicket Portage. (Aug. 18, p. 356.)

Long Island.—The report of this company for the year ended December 31, 1911, shows that the work on the Atlantic avenue terminal consisted of finishing a small amount of excavation work in the depressed freight yards, and the Bay Ridge improvements consisted of finishing three bridges, and the new section of work between New Lots and Atlantic avenue. Work on the tunnel between Atlantic avenue and Central avenue will probably be started in 1912. The work in connection with the new terminal at Jamaica and elimination of grade crossings through Richmond Hill and Jamaica has been continued during the year, several bridges were completed, and a large amount of excavation was moved from the Wading river branch and put in permanent position so that yard-tracks could be laid, and the foundation for the station and office building completed. No work has been carried out on the main line improvement between Woodside and Winfield, except to secure property and to clear the right of way. A small amount of second-track was added on the Oyster Bay branch, also a small extension was completed to the second-track on the Wading river branch between Hicksville and Cold Spring, and land has been secured for second-track to be laid between Oakdale and Patchogue. Second-track will be extended to Great Neck, and the line through Port Washington to White-

stone Landing will probably be electrified during 1912. Work on the cutoff of the Wading river branch has been continued between Syosset and Cold Spring and Huntington. This improvement will shorten the line 1,300 ft., abolish grade crossings, reduce grades, eliminate sharp curves between Syosset and Huntington, and in addition will furnish the material necessary for the Jamaica improvements. At Floral Park a double-track connection with the Hempstead branch was put in, and a new bridge was built over Carman's river on the Montauk division. Land has been bought at 12 different points for freight yards, passenger stations, etc. Work has been continued during the year on the elimination of grade crossings at many points, and nine of these are now being removed. Outside of Greater New York, grade crossings will be removed during 1912 at several points, and in Greater New York the crossings have been ordered removed on the Montauk division at Bushwick Junction and on the main line between Hollis and Queens.

Louisiana Purchase.—The North & South Railway Association has been incorporated at Phoenix, Ariz., with $1,000,000 capital, and with principal office at Hermann, Gasconade county, Mo. The company proposes to build from the Gulf of Mexico to the Dominion of Canada, with branches to Omaha, Neb., Duluth, Minn., and other points. The name proposed for the main line is Louisiana Purchase Railroad. J. M. Wilson, president; A. I. Beall, secretary. J. Tonge, F. Berkley, R. E. Francis and E. Klein, are directors.

Meridian & Memphis.—According to press reports, this company is asking for bids to grade about 30 miles from Meridian, Miss., northwest to Union. The company is in the market for 30 miles of 60-lb. relaying rails. S. A. Neville, president, Meridian.

National Railways of Mexico.—An officer writes that a contract has been given to the Cia. Constructura de Ferrocarriles S. A., Mexico City, to build from Tampico, Mex., south to Vera Cruz, about 250 miles. One route has been surveyed for the line north of Tampico to Matamoros, about 250 miles, and another route has been reconnoitered. It has not yet been definitely decided which route will be followed. Surveys are also being made for the connecting line from a point near Tamos south to Honey, or to Beristain, on the Hidalgo & Northeastern division. Three surveys will be made before the route is selected for this connecting line, and no contracts will be let until much of the other work is carried out. J. M. Reid, chief engineer, Mexico City. (March 29, p. 780.)

New York Subways.—Bids have been asked for by the New York Public Service Commission, First district, for building the section of the Lexington avenue subway under the Harlem river. This section begins a little north of 129th street, and the plans call for the construction of a tunnel under the river into the borough of the Bronx as far as 135th street, where the subway will divide into two branches, along Jerome avenue and Woodlawn road, and through 138th street, the Southern Boulevard and Westchester avenue to Pelham Bay Park. The section for which bids are asked is to have four tracks.

Sandy River & Rangeley Lakes.—This company will make improvements, including fills at various places now occupied by trestles, and in addition will build a four-mile branch from a point near East Madrid, Me., to new lumber mills of the Barnjum Timber Land Company in Mount Abram township. T. L. Dunn, chief engineer, Portland, Me.

Southern Pacific of Mexico.—An officer writes that this company has extended its line to Tepic, Mex., which is about 1,000 miles south of the international boundary line, and has also built from Guadalajara north about 62 miles. It is the intention to extend this line north about two miles to facilitate the handling of traffic to and from the Hostotipaquillo mining district. On the completion of this line there will be about 100 miles yet to be built to connect the west coast line with the National Railways of Mexico near Guadalajara, to provide a through all-rail route from Nogales, Ariz., south to the City of Mexico. Epes Randolph, president, Tucson, Ariz.

Three Forks, Helena & Madison Valley.—An officer writes that a contract has been given to the Montana Construction & Irrigation Company, E. A. Tennis, president, Three Forks, Mont., and sub-contracts have been given to A. B. Bennett and to others for grading work on this line. The plans call for building from Helena, Mont., south via Radersburg, Three Forks, and Ennis to Yellowstone Park, about 150 miles. The work calls for the handling of about 20,000 cu. yds. a mile. There will be one 500-ft. trestle. The line is being built to carry ore and farm products. A. D. Atkins, president, and B. L. Allen, chief engineer, Three Forks. (April 5, p. 825.)

RAILWAY STRUCTURES.

Des Moines, Ia.—Preliminary work has been started on a new freight house and office building to be erected by the Chicago, Burlington & Quincy. The building will be two stories high and two blocks long. Together with trackage, it is estimated that the cost will approximate $250,000.

Galesburg, Ill.—The Chicago, Burlington & Quincy has awarded the contract for a new station to replace that destroyed by fire last year, to C. A. Moses of LaGrange, Ill. The estimated cost of the structure is $225,000. The building will be of brick, with Bedford and granite trimmings, reinforced concrete shed, tile floors and tile roof and fireproof construction throughout. The first floor, which will be devoted to station purposes, will be finished in oak or mahogany, and the second floor, which will contain the division offices, will be finished in oak. A contract has also been let to the Marquette Construction Company, Chicago, for building a subway to carry Seminary and South streets under the railway tracks at an estimated cost of $50,000. The company is beginning work on a reinforced concrete addition to its tie-treating plant, including a power plant and a 7-ft. smoke stack 135 ft. high. The work will be done by company forces, except the stack, which will be contracted for.

Kansas City, Mo.—The Kansas City Terminal Railway has awarded a contract to O'Hagan & Lake, Aurora, Ill, covering concrete work in connection with the union station between Broadway and State Line, including several subways, and amounting to about $200,000.

Laurel, Miss..—The New Orleans & Northeastern is planning to begin work at once on the erection of a new passenger station to cost about $100,000.

Pittsfield, Mass.—According to press reports, the Boston & Albany will put up a new station at Pittsfield. The structure is to be built on the site of the present station.

Portland, Me.—The Portland Terminal Company (Maine Central) announces plans for extensive changes. The freight business will be concentrated in a large new yard at Thompson's Point. A new station will be built at Brighton avenue, and more than six miles of new double track laid. The changes will involve crossing several Portland streets. The total cost is estimated at $2,000,000.

Somerset, Pa.—Improvements are being carried out by the Baltimore & Ohio on the line between Johnstown, Pa., and Rockwood. Five heavy steel bridges will be built this spring at the following points: At Holsopple, at Skew, at Pine Creek, at Hog Back tunnel, and at Stony Creek.

Tampa, Fla.—Bids are wanted May 7, by the Board of Commissioners of Public Works, Tampa, for putting up a bridge at Lafayette street over the Hillsboro river at Tampa. The work includes two reinforced concrete arch spans having a clearance of 80 ft., with a Scherzer rolling lift draw in the center, also concrete retaining walls for the approaches. The structure is to carry two tracks for street railways, and with approaches will have a total length of about 1,000 ft.

The last stages of the work in connection with the railway extension from Cooma New South Wales, to Nimityvelle, are almost completed, and the line is expected to be open to traffic very shortly. The Victoria Railway Department, Australia, has adopted a new type of locomotive whistle which, while possessing a full mellow sound, can be heard sufficiently far away to give warning of the approach of the train. All of the locomotives on the surburban lines have been fitted with these whistles, and the other locomotives will soon be similarly equipped.

Railway Financial News.

Canadian Northern.—See Quebec & Lake St. John.

Carolina, Clinchfield & Ohio.—The proposed line from Dante, Va., to Elkhorn, Ky., 40 miles, to a connection with the Louisville & Nashville, the Chesapeake & Ohio and the Baltimore & Ohio, is expected to cost about $5,000,000 and will probably be financed through a sale of 5-year notes issued by the C. C. & O. and secured on the new line. This line, which will have a maximum grade of 1 per cent. and a good alinement, will run almost entirely through the coal properties of the company and will permit of new mine development.

Central of Georgia.—Treasurer Askew has notified holders of second and third income bonds that interest at the rate of 2.179 per cent. on each second income bond, and at the rate of 5 per cent. on each third income bond, has been declared to be payable for the fiscal year ended June 30, 1908, and is being paid at the Guaranty Trust Co., New York, or the Citizens & Southern Bank, Savannah, Ga. This is the remainder of the full 5 per cent. on the second income bonds.

Central New England.—The proposed 999-year lease, mentioned in the *Railway Age Gazette* of April 12, will cover only that portion of the New England Railroad situated in the state of New York, namely, about 29 miles of road extending from a point on the state line near Mill Plain, Conn., to Hopewell Junction, N. Y., on the Central New England.

Chicago, Indianapolis & Louisville.—This company has sold to Potter, Choate & Prentice and White, Weld & Co., both of New York, $1,558,000 refunding mortgage 5 per cent. bonds, series B, due July 1, 1947, which were held in the treasury. This is a closed mortgage and is a first and only lien on the entire 508 miles of line owned, at the rate of less than $30,000 per mile.

Chicago & North Western.—A deed was filed on April 2 in the office of the secretary of state of Wisconsin, transferring the Milwaukee, Sparta & North Western to the Chicago & North Western for a consideration of $1 and the assumption of the outstanding $15,000,000 first mortgage 4 per cent. bonds due March 1, 1947. For a description of the Milwaukee, Sparta & North Western see *Railway Age Gazette* of October 20, 1911, page 782.

Cincinnati, Hamilton & Dayton.—The Public Service Commission of Ohio has authorized the company to issue $1,559,000 5 per cent. bonds to be sold at not less than $80. These bonds are to be pledged to the Baltimore & Ohio, which is to advance 80 per cent. of the face value of the bonds, the entire sum to be used for improvements and new equipment.

Erie.—J. P. Morgan & Co., New York, are offering the $10,000,000 Erie 3-year 5 per cent. collateral notes dated April 1, 1912-1915 at 99¼ and interest, yielding over 5.27 per cent.

Hudson & Manhattan.—Walter G. Oakman and William M. Barnum have been elected directors to succeed A. N. Brady and W. H. Corbin.

Kansas City, Mexico & Orient.—The first mortgage bondholders' protective committee gives notice that the time for the deposit of bonds has been extended to April 30, thereafter subject to penalty. The protective committee of the International and Union Construction companies' stocks has similarly extended the time for deposit until May 4.

Missouri, Kansas & Texas.—This company will soon issue new securities. Directors are as yet undecided whether to dispose of $1,650,000 notes, the unsold balance of the $16,000,000 5 per cent. 2-year notes authorized in the last fiscal year, or to sell a portion of the $125,000,000 5 per cent. consolidated bonds authorized a year ago. The extent of financing will largely depend on the road's needs as determined by the inspection trip of the new executive officials.

The executive committee of this company now consists of James Campbell, W. S. Crandall, C. E. Schaff, Frank Trumbull, F. A. Vanderlip, J. N. Wallace and Hans Winterfeldt, of Speyer & Co., New York.

National Railways of Mexico.—This company, whose earnings are not given in our tables of roads reporting to the Interstate Commerce Commission, earned gross in February, 1912, $4,604,383, as against $5,025,832 in February, 1911. Operating expenses in 1912 were $2,992,531, and in 1911 were $3,308,694, leaving a net in February, 1912, of $1,611,853, as compared with $1,717,138 in 1911. For the eight months ended February 29, 1912, the company earned net $18,921,341, an increase over the same period in 1911 of $1,757,848.

New York & Harlem.—A committee has been formed to look after the rights of minority stockholders who are unwilling to accept the recent offer of the New York Central of $350, or $175 per $50 share for their stock. This committee consists of Henry Evans, president, Continental Insurance Co., chairman; E. F. Beddall, Graham F. Blandy, Albert W. Scholle and Edwin Thorne; John S. Sheppard, Jr., secretary.

Norfolk Southern.—Richard H. Swartwout, of Swartwout & Appenzellar, has been elected a director to succeed Oakleigh Thorne, resigned.

Quebec & Lake St. John.—A special meeting of the tsockholders of this company, which is controlled by the Canadian Northern, will be held at Quebec, April 30, to consider an agreement between the Quebec & Lake St. John, the Railway Share Trust & Agency Company, and the Canadian Northern regarding the exchange of certain issues of securities for certain new securities to be guaranteed by the Canadian Northern, and also to vote on the question of authorizing an issue of 4 per cent. perpetual consolidated debenture stock to be guaranteed by the Canadian Northern. The Quebec & Lake St. John runs from Quebec to Chicoutimi, 227 miles.

Rutland.—Application has been made for authority to issue equipment trust certificates for 1912. The trust agreement provides for the issuance of $500,000 certificates.

St. Louis & San Francisco.—This company has called for payment on June 1 $8,000,000 3-year 5 per cent. notes due March 1, 1913. These notes are secured by $10,000,000 New Orleans, Texas & Mexico division first mortgage 5 per cent. bonds, which have been sold, together with additional bonds amounting to $16,000,000 to William Salomon & Co. and G. H. Walker & Co. The proceeds of this sale will enable the company to pay off its notes, thereby liquidating the only large obligation maturing in the near future.

Milwaukee, Sparta & North Western.—See Chicago & North Western.

Terminal Railroad Association of St. Louis.—At the annual meeting of the stockholders, held at St. Louis on April 8, directors were elected as follows: A. A. Allen, Missouri, Kansas & Texas; F. H. Britton, St. Louis Southwestern; B. F. Bush, Missouri Pacific; George E. Evans, Louisville & Nashville; C. W. Galloway, Baltimore & Ohio Southwestern; Henry Miller, Wabash; Benjamin McKeen, Vandalia; F. W. Morse, Chicago & Alton; W. C. Nixon, St. Louis & San Francisco; E. J. Pearson, St. Louis, Iron Mountain & Southern; T. C. Powell, Southern; W. L. Park, Illinois Central; A. E. Sweet, Chicago, Rock Island & Pacific; C. E. Schaff, Cleveland, Chicago & St. Louis; Frank E. Ward, Chicago, Burlington & Quincy; W. S. McChesney, Jr., Terminal Railroad Association of St. Louis.

Toledo & Ohio Central.—William K. Vanderbilt, Jr., and D. C. Moon have been elected directors, succeeding C. E. Schaff and Horace E. Andrews, resigned.

Wabash.—Winslow S. Pierce, chairman of the Equitable Trust Co.-Kuhn, Loeb & Co. committee, for the protection of holders of the refunding mortgage bonds, says that about $14,000,000 bonds have already been deposited with the committee. Mr. Pierce is also quoted as saying that the committee has pledges of further deposits sufficient to constitute a majority of the total outstanding issue. It is understood that the committee, headed by James N. Wallace, president of the Central Trust Co., New York, has received deposits of $4,000,000 bonds. There are about $40,000,000 of these bonds authorized and about $35,000,000 outstanding.

Wheeling & Lake Erie.—The $4,190,000 receiver's certificates outstanding expire May 1. The court has granted a six months' extension to the present holders on the basis of 5 per cent. interest instead of 6 per cent. as formerly.

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PROMOTERS of full crew laws never sleep; and they are haunting the legislatures this year the same as last. Massachusetts is being carefully attended to, although that conservative old state already has radical legislation in plenty, to burden the railways. But in Massachusetts, as in the state of New Jersey, there are voices that speak out for rational legislation and fair play. For example the *Springfield Republican* in a recent issue says:

> It would seem as if the determination of the number of men to be employed on freight trains could be much more intelligently passed upon by the railway commission than by the Legislature. The average legislator may well hesitate to render off-hand judgment and to lay down hard and fast rules with penalties attached. The Legislature should pay respect to the commission's judgment. In 1908 the commission was asked to investigate "the proper manning of freight trains," and after hearings decided—Walter Perley Hall, George W. Bishop and Clinton White sitting—that there was no necessity for further legislation, and that "a feasible means of securing the safety of the public and employees is to be found, in our opinion, in a strict and rigid enforcement of the existing operating rules of the companies." Is there any reason for believing that the commission has changed its mind in this matter?

And if the Massachusetts legislature cannot trust its commission it might make inquiry in some of those states where full-crew laws are in force. In one of those states a railway commission saw an extra man riding in the cab of a locomotive, and, deeming such a spectacle derogatory to the peace and dignity of the commonwealth—or otherwise improper—sat down and wrote to the railway company, asking an explanation. The general manager replied that the extra man was put there because it was a comfortable place in which to ride; "we have nothing for him to do, and so we thought we would put him where he would be safest from falling off and the least in the way!"

FULL-CREW laws have been put on the statute books of several states under circumstances indicating that the job was done very quietly, final action being taken before the public had much idea of what was going on. This situation will not obtain in Massachusetts, for the railway managers have presented their case to the public in the advertising pages of the newspapers. Their advertisement is not nearly so large as that of the Roosevelt campaigners, but it is very effective. We copy it, minus the big type, in another column of this paper. When political parties (or factions) find "reading notices" insufficient and resort to display type; and when the "Men and Religion" movement takes the same course, the railways may well ask themselves if, in sticking to old methods, they are not behind the times. Massachusetts may also enlighten itself, if enlightenment is needed, by noting what has been done by its next door neighbor, New York, where the governor, John A. Dix, has vetoed the full-crew bill which was passed by the legislature. Governor Dix gives as his main ground for disapproval that the proposed law constitutes an arbitrary rule which it is proposed to make universal in its application without regard to the demands of justice in particular cases. The Public Service Commission has power to require adequate, safe and proper service on the railways, and this includes the power to reduce or increase or change the personnel of a train crew. The proposed law would deprive the commission of this power (to reduce the number of men in a crew). The full-crew law of Pennsylvania has been sustained by a county court (not the Supreme Court), as was almost inevitable under the decision of the Supreme Court of the United States in the Arkansas case; but the last word has not been said, and the fight will no doubt be kept up. It is not likely that the Supreme Court can be induced to alter what it has said in the Arkansas case unless it can be shown that the law amounts to a taking of property without due process of law; but that is just what may be and perhaps can be done in this case. In other words, the full-crew laws are not only wrong in principle, but are outrageously wrong, in principle and in effect. With the Public Utilities Commission of New Jersey and the governor of New York on record as holding rational views on this beclouded subject there is ground for hope. A legislature may do beneficent things in spite of some incidental injustice thereby perpetrated; but when an act is 99 to 100 per cent. injustice it amounts (in a case like this) to actual confiscation, which the Supreme Court when the facts are fully presented, may be expected to forbid.

IN this country railway development has already assumed an intensive rather than an extensive form. The day of bold pioneer construction on a large scale ahead of the development of traffic seems definitely to have passed. Across the international boundary line to the north, however, the history of pioneer railway development may be seen in the making. Elsewhere in this issue is reprinted from the *Yale Review* an ar-

ticle by Avard Longley Bishop, on the plans of the Canadian government for creating a new outlet for the wheat and other products of the prairie provinces by constructing a railway to the shores of Hudson bay. This is one of the most interesting of the various projects for solving the Canadian transportation problem, and in boldness of conception rivals the plans made years ago for the construction of the Pacifics of the United States, and later for that of the Canadian Pacific. To a certain extent the Canadian project has an advantage which our Pacific roads and the Canadian Pacific did not possess in that a vast traffic now seeking an outlet is assured it in advance. On the other hand, the road must pass, as did our early transcontinentals, and also the Canadian Pacific, for the greater part of its length through a territory absolutely without inhabitants and with no immediate prospects of developing any local traffic. However, the Canadians are spared much of the preliminary controversy, such as that which led to the proposal that the Batrachian camel be utilized for transcontinental transportation in this country. They are confronted with few engineering obstacles, and that they are proceeding in a cautious and scientific way to ascertain as definitely as possible the conditions under which the road must be built and operated is indicated by Mr. Bishop's article. There seems room for serious doubt as to the success of a road built for four or five hundred miles through a waste and comparatively unknown region to reach a port that can hardly be open to navigation for over three months in a year. Mr. Bishop shows, however, that the difficulties have been clearly appreciated by the advocates of the road, and that it is notwithstanding this appreciation of them that the government has already appropriated nearly $1,700,000 for the project. As he says, it must be admitted that many now prosperous railways have been projected and built in the face of as serious doubts, and apparently the project is destined to be carried to completion.

LOCOMOTIVE DEVELOPMENT AND THE ENGINEMEN.

NOT very long ago American locomotive design was quite severely criticized in comparison with European designs, because of its crudeness and the lack of highly developed fuel and water saving devices. That this criticism cannot now be so generally applied was indicated by an outline of recent locomotive development in this country, which was presented before a meeting of the Franklin Institute at Philadelphia on April 17 by George R. Henderson, consulting engineer of the Baldwin Locomotive Works. Because of the rapid growth of traffic and the urgent necessity of operating at the highest point of efficiency to offset the higher cost of operation, due to increased labor and material costs, it has proved advisable to increase greatly the capacity of the locomotive.

It was thought that the limit had been practically reached a decade ago, and it was, in a great many cases, as far as the height and width of the locomotive were concerned. One direction was left, however, in which it could expand; this was in the length. While the weight of the locomotive has since increased very considerably, the weight per unit of length has not increased in a like proportion, and it has not been necessary to make as great changes in the roadbed and bridges as would otherwise have been necessary. It is hardly advisable to increase the length of the boiler flues beyond a certain point, and the longer boiler space obtained has, therefore, been utilized by larger fireboxes, the addition of combustion chambers, superheaters, reheaters, feed water heaters, etc. All of these devices have tended to increase the useful work done by each pound of coal.

The average foreman cannot handle more than 5,000 lbs. of coal per hour to the best advantage. Firemen have been known to shovel between 6,000 and 7,000 lbs. per hour, but they worked under such pressure that they could not be expected to secure the most efficient results. Realizing the necessity of securing the greatest possible boiler capacity and at the same time keeping within limitations of the average fireman, the locomotive designers have introduced a number of important features during recent years, which have gradually increased the capacity of the locomotive without making additional demands upon the engineman or the fireman. Some of these developments, which are being used more or less extensively, are the sectional brick arch, combustion chamber, superheater, automatic fire door opener, power bell ringer, coal passers and power reverse gear. On most of the very large locomotives, where the demands are beyond what could reasonably be expected of the firemen, automatic stokers are being introduced, as well as power devices for shaking the grates.

While the tendency was to increase the work of the engine crew while the heavier power was being developed and introduced, the more recent tendency has been to reduce or keep the physical exertion well within the limit, so that both the engineman and fireman can give proper attention to the efficient operation of the locomotive.

DEFECTIVE BOX CARS.

POSSIBLY the most important reason why steel frame box cars have not proved as successful as they should, from the standpoint of loss and damage to freight, has been that in changing from a wood to a steel frame for the superstructure the wooden parts were in most cases replaced by steel ones and no very decided attempt seems to have been made to follow along new lines specially adapted to steel construction. Naturally the results were not entirely satisfactory, as is shown in another part of this issue. Better results would undoubtedly have been obtained if the designers had laid aside all of the details which had been worked out in connection with wooden designs and had started in anew, utilizing only the more general conclusions as to strength, etc., which had been brought out during the development of the larger capacity wooden box cars.

In one notable instance where a steel frame box car had been developed along new and original lines, most of the defects which are responsible for loss and damage to the freight seem to have been overcome. This car will be more fully considered in a later article in the series which is now appearing in this paper.

It is important to note that in the preparation of the third article on defective box cars, all of the photographs, with the exception of those where the side or floor of the car were removed to show the condition of the framing members, were taken on the loading track at the freight house and not in the car repair yard, where the worst conditions are to be found. In no case were the cars marked "bad order"; they were all considered to be in a condition suitable for carrying such freight as it might be necessary to load in them. Is it to be wondered at, therefore, that the railways at large are forced to pay out such large sums annually to settle damages for freight which is intrusted to their care for transportation?

The necessity for using a higher capacity draft gear on modern freight cars has been strongly urged during recent years, and there has been a very considerable improvement in this respect. In many cases, however, the trouble has been not so much with the draft gear as with the method of its application. On steel underframe cars where the gear has been rigidly and securely attached the difficulties seem to have almost entirely disappeared. On one important road having a large number of steel underframe box cars on which all of the draft gear attachments, including the tie plate, have been riveted in place rather than bolted, as is the general practice, no trouble at all is being experienced with the draft gear. The statement was made by one of the officers of this road that when the first large order of cars was equipped in this way a radical change was made in the existing type of draft gear, and that although the cars have been in service for a considerable time there is a question as to whether any of the car repairmen or the foremen know that the cars are not equipped according to the previous standard practice. The change which was made did not increase the capacity of the gear,

but consisted in a rearrangement of the springs which were used in it. Where the draft gear or the draft sills are not securely held to the underframe the end of the car is more or less severely punished by the working back and forth of the gear as it becomes loose. Unfortunately this condition is found to exist on a large proportion of the wooden underframe cars now in service and many steel underframe cars are not in much better condition.

THREE DECADES OF RAILWAY RECEIVERSHIPS.

THE statistical record of railway receiverships goes back for 36 years to 1876. It excludes, therefore, more than two years of the long and disastrous panic and "drag" period that began in the autumn of 1873 and continued for about five years, the actual recovery dating at about the close of 1878, perhaps a little later. As evidence of that panic epoch and its effects in receiverships we have only two years, 1876 and 1877, which together return 80 roads forced into the hands of receivers, with 10,279 miles and $687,294,000 in stocks and bonds. In obtaining any comparison by decades down to and including the last year (1911) we must begin with the year 1882 with results shown in the following tabulation:

FIRST DECADE—1882-91.

Year.	No. of roads.	Miles.	Bonds and stocks.
1882	12	912	$39,074,000
1883	11	1,990	108,470,000
1884	37	11,038	714,755,000
1885	44	8,836	385,460,000
1886	13	1,799	70,346,000
1887	9	1,046	90,318,000
1888	22	3,270	186,814,000
1889	22	3,803	99,664,000
1890	26	2,963	105,007,000
1891	26	2,159	84,479,000
Total	222	37,816	$1,884,387,000

SECOND DECADE—1892-01.

Year.	No. of roads.	Miles.	Bonds and stocks.
1892	36	10,508	$357,692,000
1893	74	29,340	1,781,046,000
1894	38	7,025	395,791,000
1895	31	4,089	369,075,000
1896	34	5,441	275,597,000
1897	18	1,537	92,909,000
1898	18	2,069	138,701,000
1899	10	1,019	52,285,000
1900	16	1,165	78,234,000
1901	4	73	1,627,000
Total	279	62,266	$3,542,957,000

LAST DECADE—1902-11.

Year.	No. of roads.	Miles.	Bonds and stocks.
1902	5	278	$5,835,000
1903	9	229	18,823,000
1904	8	744	36,069,000
1905	10	3,593	176,321,000
1906	6	204	58,042,000
1907	7	317	13,385,000
1908	24	8,009	596,359,000
1909	5	859	78,095,000
1910	7	735	51,427,500
1911	5	2,606	210,606,882
Total	86	17,574	$1,244,963,382

In the last year (1911), of the final decade, the Wabash receivership, which involved 2,515 miles and $207,958,482 in bonds and stocks did not come until last December, and is understood to have been a friendly receivership. If that receivership is omitted the total of the last three years reduces to the comparatively insignificant figures of 16 roads with but 1,685 miles and $132,169,900 of stocks and bonds. It would lower the total for the last decade to 15,059 miles and $1,037,004,900 in bonds and stocks. But taking the tables as they are, and including the Wabash, the returns of the decade become very striking in the comparison. In number of roads the last decade (86 roads) compares with the 222 roads of the first decade and the 279 roads of the second decade. The 17,574 miles of the last decade compares with the 37,816 miles of the first and the 62,266 miles of the second; and the $1,244,963,382 of bonds and stocks of the last decade with the $1,884,387,000 of the first and the $3,542,957,000 of the second. The general correspondence of receiverships with panic periods, notably the high crests of the curve in 1893 and 1908 will be noted, the former year far exceeding any two years of the 30 and slightly exceeding any three. But such transitional high spurts in receiverships do not affect much the general meaning of the contrast of the last decade with the other two which, broadly interpreted, indicates a decided subsidence of receiverships. It must also be remembered that the recession both absolute and relative, has come during a 30 years' increase of railway property and investments. In 1882 there were 114,428 miles of road and $6,960,049,000 bonds and stocks returned for the capitalization of all the railways of the country; in 1892 there were returned 171,805 miles and $10,553,624,000 in bonds and stocks; and in 1910, the latest year returning fairly accurate figures, 239,391 miles and $18,890,850,000 in stocks and bonds. If the decline in receiverships is set against the great increase of railway property and investments, it becomes the more suggestive.

The record of the foreclosure sales, which may be considered as receiverships at their acute and climacteric stage, divided into decades is subjoined:

FIRST DECADE—1882-91.

Year.	No. of roads.	Miles.	Bonds and stocks.
1882	16	867	$65,426,000
1883	18	1,354	47,100,000
1884	15	716	23,504,000
1885	22	3,156	278,394,000
1886	45	7,687	374,109,000
1887	31	5,478	328,181,000
1888	19	1,596	64,555,000
1889	25	2,930	137,815,000
1890	29	3,825	182,495,000
1891	21	3,223	169,069,000
Total	241	30,832	$1,670,648,000

SECOND DECADE—1892-01.

Year.	No. of roads.	Miles.	Bonds and stocks.
1892	28	1,922	$95,898,000
1893	25	1,613	79,924,000
1894	42	5,643	318,999,000
1895	52	12,831	761,791,000
1896	58	13,730	1,150,377,000
1897	42	6,675	517,680,000
1898	47	6,054	252,910,000
1899	32	4,294	267,534,000
1900	24	3,477	190,374,000
1901	17	1,139	85,808,000
Total	367	57,378	$3,721,295,000

LAST DECADE—1902-11.

Year.	No. of roads.	Miles.	Bonds and stocks.
1902	20	693	$39,788,000
1903	13	555	15,885,000
1904	13	524	28,266,000
1905	6	679	20,307,000
1906	8	262	10,400,000
1907	6	114	13,777,000
1908	3	138	2,547,000
1909	12	2,629	250,033,000
1910	17	1,100	93,660,109
1911	13	1,386	40,741,453
Total	111	8,080	$515,404,562

It will be noticed that while foreclosure sales for the first two decades tally pretty closely in the totals with the receiverships, the sales for the final decades show a great disparity in both miles and values—8,080 miles in sales contrasting with 17,574 in receiverships and $515,404,562 in bonds and stocks with $1,244,963,382. It indicates not merely the progressive diminution of receiverships, but also of their seriousness.

In the table annexed the two larger tables are summarized for comparison, the initial letter being used for receiverships and foreclosures:

	First decade.	Second decade.	Last decade.
(R) No. of roads	222	279	86
(F) No. of roads	241	367	111
(R) Miles	37,816	62,266	17,574
(F) Miles	30,832	57,378	8,080
(R) Bonds and stocks	$1,884,387,000	$3,542,957,000	$1,244,963,382
(F) Bonds and stocks	$1,670,648,000	3,721,295,000	515,404,562

The causes of the benign decrease are not hard to find. In the first place weak lines—that is to say *as* weak lines—have been weeded out by time and the fiscal fates. They survive, but under changed conditions and, most of them on a lower financial level. This has been a natural process. But two other continuous forces have been even stronger. One has been the incorporation and merger of the infirm properties into the more powerful railway systems which have been able to sustain them. The other influence has been the supporting power of large railway interests vested in single persons or small groups of per-

sons owning or controlling abundant capital. The salvage of the Erie not so very long ago is a case in point. There is criticism in these days of the undue profits of the big banker in railway directorates, and much of the criticism is undoubtedly just. But the railway foreclosure and receivership records of the last ten years at least hint strongly that in times of corporate stress he has had his high preservative values.

Taking the receiverships of the 36 years, they expand to massive and dramatic figures. The total of $7,632,560,382 in bonds and stocks represents about 38 per cent. of the existing railway securities of the country taken at par. It would be a much larger proportion if computed at earlier periods; and it does not include the receiverships previous to 1876 with the three panic years immediately preceding. Even allowing for "friendly" and "protective," as well as repeated receiverships of the same properties, it is probably safe to say that one-half the railway properties of the country have passed through some form of readjustment; and if the actual losses in securities snuffed out by reorganization could be revealed, they would tell a large tale of fiscal calamity. The other side of the story is the last ten years' record of reduced railway insolvencies and its general attest of increasing railway stability—not the less cheering, because under the strain of hard operating conditions, too familiar to need citation, the receiverships during the last three years have been so few.

NEW BOOKS.

Proceedings of the Nineteenth Annual Convention of the Traveling Engineers' Association, held at Chicago, August 29, 1911. 495 pages, 6 in. x 8½ in. Edited by W. O. Thompson, secretary, Buffalo, N. Y.

This volume contains a list of the subjects discussed at each annual convention, commencing with the first which was held in Chicago in 1893. The principal papers and discussions reported relate to instruction in air brake operation; instruction on fuel economy; lubrication of superheat locomotives; the benefits derived from chemically treated water; the efficient handling of electric locomotives; the Jacobs-Shupert firebox; Mallet compound engines in road service; and the latest developments in automatic stokers. The last includes full descriptions and results obtained from the Crawford, the Hanna and the Street stokers. The discussions of all these papers are fully reported. Some improvements could be made in the manner of printing these proceedings, especially in the index, which is largely personal and not fully subjective. As the work of the association is similar to that of the American Railway Master Mechanics' Association, something could be learned from the manner in which the proceedings of the latter are indexed. The list of members also could be improved by making it similar to that of the Master Mechanics' association, which occupies only one line for each member, while the list of members of the Traveling Engineers' Association occupies the equivalent of three lines for each member, and takes up considerable space.

Judson on Interstate Commerce. By Frederick N. Judson of the St. Louis Bar. T. H. Flood & Co., Chicago. Buckram. 6 in. x 9 in. 805 pages. Price, $6.50.

This is the second edition of Mr. Judson's standard work, the first edition having been published in May, 1905, and a supplement thereto in August, 1906. There has been much legislation and many decisions by the courts and the Interstate Commerce Commission affecting interstate commerce since the first edition was published, and these developments are reflected in the large increase in the size of the second edition over the first edition. Mr. Judson's reputation as a lawyer and as a text book writer is too great to require comment here. Of the value of the volume under review both to lawyers and to students of the general subject of traffic and transportation there can be no question. It is lucid, comprehensive and authoritative. It deals not only with the Interstate Commerce Act, but also with the Anti-Trust Act of 1890, the Expedition Act, the law under which the Department of Commerce and Labor was created, the Safety Appliances Act of 1893 as amended in 1896, 1903 and 1910, the Employers' Liability Act, the Hours of Service Act of 1907, and the 28-hour law. In the appendix are given the Commerce Court Act, the National Trade Union Incorporation Act, the Erdman Arbitration law, the Ashpan Act, the Report of Accidents Act, the rules of practice and forms of procedure before the Interstate Commerce Commission, the rules of practice of the Commerce Court, and the report of the Railroad Securities Commission. Mr. Judson, it will be recalled, was a member of the securities commission.

Early Motive Power of the Baltimore & Ohio. By J. Snowden Bell. Illustrated. Cloth, 156 pages, 6 in. x 9 in. Published by the Angus Sinclair Company, 114 Liberty street, New York. Price, $2.00.

The history of the early locomotives used by the Baltimore & Ohio from 1830 to 1850 is particularly interesting, as it relates to an important chapter in the development of the locomotive in the United States from the very beginning. This work proceeded on original lines, entirely different from those which were followed in England and on other railways in this country at about the same time. The Baltimore & Ohio was the first railway of any considerable length constructed for freight and passenger traffic in the United States, and the first locomotive built in this country, that of Peter Cooper, was successfully operated on it at the early date of August 28, 1830.

The first specification for the construction of locomotives made in the United States was issued from the office of the Baltimore & Ohio on January 4, 1831; it required the engine not to exceed 3½ tons in weight, and to be capable of hauling 15 tons, cars and lading, at a speed of 15 miles per hour on the level. This requirement was met by a locomotive, the York, with vertical boiler and cylinders somewhat similar in general lines to Peter Cooper's engine. It was designed by Phineas Davis, and built by Davis & Gartner at York, Pa., in July, 1831. This was followed by four other heavier engines built by this firm. The second engine of the lot, the Atlantic, was the first "grasshopper" engine used in this country, and was placed on the road September 1, 1832. This engine had vertical cylinders, with piston rods connected to levers located above the boiler and long connecting rods reaching to the gear wheels on the frame. These engines were further developed by Ross Winans, who in 1836 used horizontal cylinders and vertical boilers, and the engines were then called "coal crabs."

Mr. Winans' peculiar traits made him a conspicuous character, and he exhibited unusual inventive genius in his various improvements on the early locomotive, especially in adapting it to freight service and for duty on heavy grades. His work dominated locomotive practice on the Baltimore & Ohio from 1836 to 1856, when he had a controversy with Henry Tyson, then master mechanic, as to the relative merits of the Winans' 8-wheel connected camel engine and Tyson's 10-wheel engines; thereafter no more camel engines were built for the road. The account of Mr. Winans' designs and of the controversy are considered at length.

The book also contains brief accounts of the work of Samuel J. Hayes, who was appointed master mechanic in 1851; Henry Tyson in 1856; Thatcher Perkins, 1859; William H. Harrison, 1885; and A. J. Cromwell, 1887. The author was employed by the Baltimore & Ohio as draftsman during the administrations of Thatcher Perkins and William H. Harrison, and a number of the shaded drawings of the old locomotives which illustrate the volume were made by him. Mr. Bell is well known by railway men on account of the various papers he has written on the advantage of the wide firebox for locomotives and his discussions of various forms of smokebox draft appliances. His early association with the locomotive department of the Baltimore & Ohio and his subsequent study of locomotive boiler design have well fitted him for the preparation of this interesting story of the beginnings of locomotive construction on that road. The volume is illustrated with many rare drawings of old locomotives, and is particularly valuable in furnishing the dates when various locomotive types and details were first used.

Letters to the Editor.

DEFECTIVE BOX CARS AND DAMAGED FREIGHT.

Pittsburgh, Pa., April 14, 1912.

To the Editor of the Railway Age Gazette:

I have just read the first article on the improvement of box car construction with a view of preventing loss and damage to freight. As chairman of our general safety committee, this matter has been brought quite prominently to my attention and the article referred to in your issue of April 12 was certainly written by some one who is thoroughly familiar with the situation.

Our company pays out a large amount annually for loss and damage to freight, and I am free to say that 95 per cent. of the damage might be avoided by better loading of the freight in the car, more careful handling of the cars by the trainmen, and better constructed cars which will not leak at the doors and the roof. Defective cars undoubtedly contribute considerably to this loss, and this is due largely to the fact that railways in purchasing cars, in their endeavors to get them down to the lowest cost, are not willing to pay a price that will warrant good construction of the cars. It is good business to buy at the lowest price, but it is not good business to buy a poor article at any price.

Of course there is no protection against train robbers, except to make it as difficult as possible for them to get inside of the car. There is no reason why car roofs should not be so applied as to be absolutely tight; neither is there any reason why the load should not be placed in the car so as to stand ordinary handling, and trainmen could improve their work and avoid many losses by exercising good horse sense in the performance of their duties.

The series of articles which you propose publishing should do a vast amount of good, for the field is certainly a large one.

L. H. TURNER,
Superintendent Motive Power, Pittsburgh & Lake Erie.

Eastern States, April 17, 1912.

To the Editor of the Railway Age Gazette:

I have read the article on defective box cars and damaged freight in your April 12 issue. We have lately given the question of door fastenings pretty serious attention, and have adopted a malleable door stop and fastening which we think is foolproof and burglar proof. At the same time I am free to say that proper attention has not been paid in the past to the door shoes at the bottom of the doors, commonly called "door guides," simply from the fact that some burglar proof door shoes cost a few cents more than others in the first cost of building a car. This is the reason some railway officers have thought them unnecessary, yet they are willing to pay out thousands of dollars for "lost freight" caused by poor construction.

MASTER CAR BUILDER.

The East, April 23, 1912.

To the Editor of the Railway Age Gazette:

I have read your articles on defective box cars, and think you have hit the nail on the head.

Our principal trouble with box cars leaking grain is due to the tie rods passing from the top plate down through the side sills, the holes having been bored larger than the rod. For instance, where a 5/8-in. rod is used we often find the contract shops bore a 7/8-in. hole. Then the "V" or grain strips are not properly fitted over them and the result is a leaky floor.

I also believe that on all new box cars with good superstructure metal carlines should be used in order to hold the car together.

We are now looking into the advisability of putting in steel ends in all our box cars. I have always contended that the inside lining in box cars—say for a distance of 36 in. or 40 in. above the floor—should be just as solid and as strong as a coal car, for the reason that about the same commodities are hauled in box cars today as are hauled in coal cars, such as pipe, loose wheels, axles, steel rolls, etc. We have reinforced the ends of our box cars with the heaviest wood construction advisable, yet the ends are knocked out just the same, and it is for this reason we favor a steel end; at least, think it advisable to try it out.

There is not a railway in the United States or Canada that has in use a side door which answers the purpose. They are entirely too weak; they should be just as strong as any other part of the car, for when the load shifts or becomes disarranged it will always push out the weak part of the car, which is the side doors, and it is for this reason that we have so many trains side-wiped and so many lost side doors.

DIVISION MASTER CAR BUILDER.

DISHONEST APPLICANTS FOR EMPLOYMENT.

New York, April 15, 1912.

To the Editor of the Railway Age Gazette:

Referring to the article in your issue of April 12, page 834, regarding the supervision and conduct of the employment department: This company has a bureau which supervises the employment of men throughout the system; but I should think the proposition of maintaining a photographic record of applicants would be difficult and expensive to carry out, owing to the large number of applicants; and, on any large railway, the widely different points at which they are hired.

Regarding the question of offering fictitious names, the proportion mentioned, one-third to one-half, must be an exaggeration. Certainly it is much in excess of the actual ratio in our experience. Such cases are encountered, but the percentage is small, and it is the experience on this road that in the majority of instances, the men who falsify their names are "rovers." They do not intend to remain in any one place long enough to be investigated, and so, of course, they escape detection.

J. C. STUART,
Vice-President, Erie Railroad.

New York, April 16, 1912.

To the Editor of the Railway Age Gazette:

The photographing of applicants for employment, as suggested by Charles Burlingame in your issue of April 12, would be a most efficient means of identification. There are at least two electric lines—the New York State Railways (Rochester) and the Los Angeles Railway Corporation—that photograph their applicants, but on a big railway system with its many employing offices such a practice would be rather expensive. To derive full benefit from the plan three pictures would not be enough, as besides those filed one should be sent to each former employer to whom the applicant refers. Mr. Burlingame's high proportion of applicants with aliases—one-third to one-half—probably does not hold good the country over, but his claim that there should be some uniformity among the different roads in handling applications cannot be denied. A good means of identification is cheaply furnished in an applicant's signature written in full without initials, and his description, especially his age, or, better, the date of his birth. These details should accompany the inquiries sent to references and be carefully compared. Some roads make an attempt to carry out this idea, and those sufficiently interested in the subject to have special bureaus in charge of the employing of men meet with corresponding success in securing the most desirable employees.

OCCASIONAL.

A survey of the low lying area at the junction of the Illawarra & Bellmore lines, New South Wales, has been made to the public works department in connection with the proposed construction of a railway from Sydenham Station to Botany. This low lying land is a portion of the Tramvale flats, which a few years ago invariably became flooded during heavy rains. The construction by the government of two storm-water channels has eliminated most of the danger from floods and much of the land has recently been built upon.

THE DEVELOPMENT AND USE OF RAILS.

Abstracts of Two Papers Read at the Indiana Railway Commission's Hearing on the Question, February 20 and April 16.

BY P. H. DUDLEY,
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Strap iron rails and wooden stringers were generally employed for the first railways, but they did not form a smooth and substantial track and by their frailty forced our civil and mechanical engineers to develop the American type of locomotive and equipment. It will be noticed from the table that in 1840 only 2,818 miles of railways had been constructed. Nearly all of the first companies were bankrupt and passed into receivers' hands, owing to the great expense and cost of operating on tracks which had been built as permanent structures to endure for many years, but which were destroyed by the generated wheel effects of three to four tons upon the drivers, and one and one-half to two tons on the wheels of the ordinary rolling stock.

All of the early strap iron rails were imported from England or Wales, as rolling mills had not been built in this country. They were increased to 1½ in. in thickness and 3 in. in width, but between 1840 and 1850 so many accidents occurred from their use that in New York state, in 1844, their further employment was discontinued.

In 1830 Robert Stevens designed a "T" section of iron rail, nearly similar to those of the present type in use, for the Camden & Amboy Railroad. Pear-shaped iron rails were imported from England, and many of these, made out of refined iron, lasted several years under the light wheel loads, but when they increased to 10,000 or 12,000 lbs. upon the drivers the rails failed with great rapidity.

The physical properties of the iron proved inadequate, and when the speeds of trains attained 25 and 30 miles per hour the iron rails broke and laminated with such rapidity that the operations of the railways were conducted with great difficulty and expense. Broken rails were so numerous in the sixties that the railway officials tried the Booth steel-capped rail, which had a surface of about ¼ in. of crucible steel rolled on to a stem of wrought iron, but the surfaces were not welded and did not last long in the track.

Bessemer rails were rolled in England and tried by many of the railways, commencing about 1860, and in 1863 a number of trial orders were placed for similar rails in this country. The cost at the time of $100 to $120 per ton, gold, to which was added the premium of 40 or more per cent. in our currency, forced the railways to use as light a section as possible. Many of the sections of 56 to 58 lbs. per yard, 4 in. in height with a comparatively thick base but thin heads, were imported and tried. The steel rails in places of severe service would outlast 10 to 15 of the best iron rails which could be secured. Bessemer steel works were inaugurated in this country about 1866.

The sections were only 4 to 4¼ in. in height, and the deflections of the rails under the passing wheel loads permitted nearly the entire concentration of the wheel load on each cross-tie. The rail sections were stiff enough to distribute only a small part of the load in the wheel spacing and while the cost of maintenance for track work was high the loss of metal per yard was quite small. The light sections did not permit the development of the wheel loads and enlargement of the locomotives and cars as much as was desired by the railways for the demands of transportation. The loss of metal per yard in service proved to be so small that the consensus of opinion was general that from the excellent wear of the thin-headed sections a residual section might be designed of sufficient strength to carry the traffic and add to the head the amount of metal desired for wear. The base of the rails were made thinner and 50 per cent. or more of metal put into the heads of the rails.

The change in this form of section was made by a committee of engineers in about 1870 and sections they recommended were in service in 1874. The excellent results which they expected to obtain were not secured in subsequent service and the increased demands of transportation for better and smoother rails that would reduce the generated wheel effects of the moving trains were so important and there was such a diversity of opinion in reference to the sections of rails that in 1878 I designed my track indicator and constructed a car in which the measurements of the undulations of the tracks could be made. Passing over the New York Central & Hudson River, the Boston & Albany, Philadelphia & Reading and Baltimore & Ohio, it was found that rails in the track had characteristic permanent sets. These I could classify, and while the companies thought they could make their tracks as smooth as they desired by more ballast and labor, it was shown by repeated inspection of the tracks that while they might temporarily improve the surface it was but a short time before it was more or less out of surface.

This led to the design of the 5-in. 80-lb. rail for the New York Central & Hudson River in 1883, which was rolled and placed in the tracks in 1884. By adding 15 lbs. to the ordinary 65-lb., 4½-in. rails, then used for the heaviest service, and making an 80-lb. section, 5 in. high, the actual stiffness of the section was increased 66 per cent. There was a great difference of opinion as to what would be the value of the increased stiffness for track purposes, the majority of opinions being that the value obtained would not be equal to the increased cost. The section was rolled and placed in the tracks in July, 1884, and demonstrated at once that the increased stiffness in the rail was of decided advantage to the stability and capacity of the track, and raised the standard of maintenance.

Several of the eastern roads adopted either a 5-in. 80-lb. section or one of heavier weight, the Pennsylvania Railroad making a 5-in. 85-lb. section.

It has often been stated that the reason why the former rails seem to last so well was due to the elimination of the poorer quality of rails by the service in the track. This statement is not the complete explanation. The older rails were cold rolled by the light wheel loads until the surface was sufficiently hardened to bear the recent heavier loads without much increased abrasion. New rails of the same section and practically the same physical properties would, when subjected to heavier wheel loads, lose more of the metal by wear, before the surface was rolled as hard as the former sections, and their rate would be much faster.

It is not considered advisable at the present time to make the composition of the rails which are to be subjected to the present heavy wheel loads so hard that at first they will entirely resist the cold rolling effect of the passing wheels. It is better to make the physical properties of the rails such that a slight flow of the metal will take place under the various worn wheel treads which will run over the rails, and in this way the surface will accommodate itself to the average treads passing over the heads, gradually becoming hard, until in a short time the flow is practically arrested. In rails which are too soft the surface may be worn away by the wheel loads before it becomes sufficiently hardened for the long wear, or the drivers slip on the rails, producing a layer so hard as to require their removal from the track.

The table shows some important statistics. The mileage shown for 1830 to 1850 had been constructed mostly with strap iron rails. The mileage built between 1850 and 1870 was mostly with iron rails, though about one-fifth was with steel rails. The mileage for 1880 was more than one-half of it laid with steel rails, while for 1890, 1900 and 1910, the mileage would be mostly

steel. It would have been impossible to have constructed the mileage shown for 1910 without the invention of Bessemer steel. We now have in the United States about 40,000,000 tons of steel in the track, of which 2,500,000 tons are of basic open hearth steel.

Basic Bessemer steel and basic open hearth steels are used abroad in Germany, England, also in Africa, and it is stated that the wear on the rails under their light wheel loads, particularly on the curves, is much more rapid than is desired. The temperatures in those countries do not fall as low as they do in our northern states and Canada. They use higher carbon rails in France as a rule than we do in this country, with excellent effect. Their wheel loads are also much lighter and they maintain their rotundity for a longer period than the wheels here, under our heavier wheel loads and long distance runs.

oration in the product. This was in a partial sense true, for with the larger output, the same Bessemer converters were operated more rapidly, reducing the time for recarburizing and allowing the deoxidation products of the bath of metal to escape in the ladle before teaming the ingots. The latter were poured longer without increasing the size of the moulds and this led to more segregation and greater difficulty in securing sound ingots and rails free from pipes. There were many requirements of good mill practice that in the demand for greater output were unconsciously overlooked without any intention of reducing the quality of the product.

The most serious difficulty was the constant increase in phosphorus content owing to the rapid exhaustion of low phosphorus Bessemer ores, which led to the introduction of the basic open hearth furnaces which are made with a neu-

Development of Railways in the United States.

	1830.	1840.	1850.	1860.	1870.	1880.	1890.	1900.	1910.
Miles of lines operated exclusive of side tracks, yards and terminals	23	2,818	9,021	30,626	52,922	93,296	163,597	192,556	239,652
Miles of all tracks	.....	.....	.....	.....	.....	.....	199,875	258,784	349,159
Tons of freight one mile	.....	.....	.....	.....	.....	.....	76,207,047	141,599,159	255,528,643
Passengers one mile	.....	.....	.....	.....	.....	.....	11,847,785	16,039,007	33,949,936
Locomotive weights without tenders (tons)	.....	.....	.....	.....	.....	.....	1,265,880	2,023,702	4,271,000
Freight cars—total capacity (tons)	.....	.....	.....	.....	.....	.....	19,288,301	37,210,720	74,043,000

It was possible to obtain ores from 1890 to 1898 to make Bessemer rails of 0.06 phosphorus with carbon ranging from 0.60 to 0.65 per cent. for 80 and 100 lb. sections, the metal being tough and ductile, and I made over 500,000 tons of about that composition. The specifications stipulated that 90 per cent. of the butts, one from each heat, should withstand a weight of 2,000 lbs., falling 20 ft., without breaking, and the heats from which these test pieces were taken which gave 4 per cent. elongation per inch before breaking, would be accepted. Such a grade of steel was made for the Boston and Albany, and the New York Central & Hudson River, until the low phosphorus ores were exhausted. The metal was so tenacious that but few breakages occurred in the winter, and practically none in the summer. I made the rails mostly in two or three rail ingots for 30-ft. rails, and for all the three rail ingots marked the top rail "A," the second "B," and the third or last rail of the ingot "C."

The subsequent service of the rails in the tracks furnished the first opportunity for studying the wear from different portions of the ingots. The "A" rails wore the most rapidly under heavy traffic, but the breakages were not much in excess of either the "B" or "C" rails. It was the results of such advice tests that led me to oppose the adoption of a 20 or 25 per cent. discard from the bloom in 1907, and to contend for a provision in the specification to shear the bloom until the metal cuts sound. The number of rails which have proven defective after a short service rolled with 20 to 25 per cent. discard from the ingot, have demonstrated definitely that such a percentage does not insure pipeless or sound rails, as proper mill practice is often neglected for such a percentage of discard.

The stiffer sections require higher physical properties of metal than the early weaker sections to withstand the augmented intensities of the wheel pressures. They do not deflect as much under the wheel loads, consequently the area of contact between the wheels and the rails is less than that obtained on the lighter rail sections and the lesser wheel loads preceding 1890. I knew the intensity of the pressures between the wheel contacts and the rails would be increased, and before beginning the manufacture of the stiffer sections for the New York Central & Hudson River and the Boston & Albany, I advised that it would be necessary to increase the physical properties of the metal to withstand the augmented intensity of the wheel pressures.

The difficulty of securing low phosphorus ores for all of the rails, gradually led to a decided increase of the phosphorus content in the rails. Many fractures developed under the heavier wheel loads and greater speeds during the winter, and led to the opinion that there was decided deteritral lining, permitting lime to be used to absorb the greater percentage of phosphorus in the bath of metal. This enabled ores to be used for rails, which were not available for the acid Bessemer process, and at the same time exchanged for phosphorus the better element of carbon, which, within proper limits, adds toughness and tenacity to the metal. The basic open hearth process requires a larger plant than the Bessemer, and a greater number of furnaces to furnish a given output. The process of making a single basic open hearth melt, occupies eight to twelve hours, while ten to twenty tons of Bessemer metal can be converted in as many minutes.

The wheel loads of a locomotive or car running over the rails at 30 miles per hour, travel 44 ft., or 528 in. per second, at 60 miles, 88 ft., or 1,056 in., and at 90 miles, 132 ft., or 1,584 in. The stremmatograph, an instrument for measuring the strains in rails under moving trains, indicates that while the length of the rail under the wheel contact affected by the positive bending moments will vary, the maximum strains in the base and head are reversed in one-half the length of the span of the wheel spacing as before stated.

A 7-ft. wheel spacing is common for the drivers of the Atlantic type of engines. To run 42 in., the length of the half space at a speed of 30 miles per hour would take 42/528 of a second, for 60 miles per hour 42/1056 of a second, and at 90 miles per hour 42/1584 of a second. The base and head of the rail are under strains of compression and tension which reverse with every passing wheel. These reversals may become so rapid for high speeds, that the metal in the rails capable of distributing the strains with ample factors of safety for speeds of 50 to 60 miles per hour, is more rapidly strained at higher speeds.

The improvements for the present facilities of transportation have not been confined wholly to the rail section in the past three decades, but have included the entire permanent way. The roadbed is better drained and ballasted, the crossties creosoted, with tie plates for the rail seats, and screws are being substituted for hook spikes, while the standards of maintenance throughout are higher. The undulations in the tracks as measured by my track indicator, which averaged 8 ft. per mile in 1881, were reduced to 2 ft. in 1900 on the stiffer and heavier rails for the Boston & Albany and New York Central & Hudson River. Similar reductions have been made by other trunk lines.

The heaviest axle load in 1881 was, for a few locomotives, 31,000 lbs., increased to 40,000 lbs. in 1890, and now 59,000 to 60,000 lbs. for many passenger locomotives, and run at

speeds over 60 miles per hour. The undulations since on 100-lb. rails have only increased to 2½ or 3 ft. per mile under the heavier axle loads and higher speeds.

The correlations between the moving trains and the permanent way are becoming better understood each year, and there does not seem to be any reason why the strains in the rails cannot be lessened in the future for the present loads and speds.

MILL PRACTICE.

The results of extended service tests show that the bath of metal for the present rails must be well purified and the iron must be comparatively free from everything but the percentages of the metalloids and elements of the alloy, to make the steel, and then must be teemed in sound ingots. There are important principles in mill practices which must be observed and carried out in consecutive order and at the proper moment to insure that sound ingots are made. After being stripped, they must be promptly charged into the reheating furnace to equalize the heat in the ingots, and then bloomed as quickly as possible to prevent shrinkage cavities developing in the best of steel before the ingots are rolled.

Ingots which are allowed to cool will develop cavities of 0.05 to 0.10 per cent. of the volume of the ingots. After these cavities are formed and cooled with more or less traces of slag in their interior, they cannot be welded in any subsequent heating or rolling. To make this plain, if an ingot of 8 or 9 cu. ft. of well-deoxidized steel, were allowed to cool, it would develop a shrinkage cavity of 120 to 180 cu. in. near the top of the ingot. If companion ingots were stripped and charged into the reheating furnaces, their heat equalized for 1¾ to 2 hours and then bloomed, the shrinkage cavity would only appear as a mere trace and be removed in the ordinary discard of the bloom crop. The making of sound ingots is now better understood than it was a few years ago, and it is also now a general practice at the mills to charge the ingots into the reheating furnace as soon as they are stripped and bloom them in their own equalized initial heat. This is done in systematic good mill practice and pipeless rails are produced out of ingots 20 x 24 in. on the base, 6 ft. in height and weighing 8,200 lbs.

The important step of the past year has been the increased purification of the bath of metal, which when rolled into rails, gives practically the full percentage of ductility due to the chemical composition. The specifications of the New York Central Lines for basic open hearth rails require three tests per melt, one made from the top crop from the second ingot, one from the middle, and one from the last ingot poured. Each of these tests must show a ductility of 6 per cent. for the maximum inch, or 5 per cent. for two consecutive inches in each of the three butts of the rail tested under the drop for acceptance of the melt.

The ductility of one test butt is completely exhausted by two or more blows of the drop, measured per inch, and recorded. This furnishes the exhausted ductility of the metal per inch which is obtained from the steel to compare with that which is possible from the chemical composition. The ductility per inch is obtained by stamping the butts to be tested on the base or head of the rail by a spacing bar of seven points accurately spaced 1 in. apart for 6 in. in length. This requires but a moment of time, and all the exhausted ductility can be obtained in three or four minutes' work. The fracture of the exhausted ductility test is also a soundness test of the metal similar to the nick tests in other specifications.

One of the large manufacturers, who at first did not think it possible to secure such uniform results as have been obtained, has now become so interested and considers the ductility tests so valuable for his own practice, that he proposes to make all open hearth rails under these tests whether the customers ask for them or not. The exhausted ductility gives a measure or standard of purification of the bath which they never had previous to the specifications of the New York Central Lines, and he proposes to adopt this as a standard practice. This of itself will insure a marked improvement in the metal entering into their open hearth rails.

The Pennsylvania Lines West of Pittsburgh will measure the ductility in their rail steel this year, while the American Railway Engineering Association has introduced a ductility test in its specifications, together with a nick test. Consequently the ductility of the steel for rails will receive more attention this year than ever before, and its importance will be better understood.

It seems probable that the exhausted ductility test for basic open hearth rails will become standard practice at all mills, so the work of each furnace and melter will be matters of record.

The melt of steel is usually rolled into rails in three to four hours after it is tapped and before another is ready from that furnace the ductility of the last melt is known and given to the melter. This measure of ductility has enabled the melters to purify the bath so completely that more uniform results are obtained from each melt than was believed possible by steel makers before this method was installed. It is an aid, and through the co-operation of the makers a more uniform grade of output of rails has been secured for service in the tracks.

It will be of interest to state that the chemical composition for the various weights of rail is calculated to give from three to four times the ductility in the steel for high speed trains, which is stipulated as the minimum for acceptance of the melts. It was possible after the melters had some experience in working under the specifications for the New York Central Lines to secure nearly the theoretical ductility probable for the chemical composition of the steel. To illustrate: 20,422 tons of 5⅛ in. 80-lb. rails were shipped, in which the average calculated ductility for the chemical composition was 21 per cent. per inch. Two hundred and eighty-eight melts were made, and in only two was the ductility as low as 8 per cent., while the average for all of the melts was 19.8 per cent. These 50,000 rails have withstood the service during the past winter with only two fractures and two half-moon brakes in the base, in temperatures of 40 deg. below zero for ten days duration, and in other places of 50 deg. below zero for one or two days duration.

Rails can be made for the requirements of slow heavy traffic of lesser ductility and greater abrasive resistance, than would be permissible for high speed passenger service. I have now the tabulated records for 106,000 tons of basic open hearth rails made at three mills in 1911, under the ductility tests, which passed through the winter under our heavy traffic and high speed trains with so few fractures in the different sections that the results are encouraging in the predominant desire and effort of the officials to fabricate high grade rails for absolute safety in service.

The most important event in the development of the agricultural and mineral resources of Tripoli, North Africa, took place when the government decided to build a railway from Tripoli to Ain-Zara, about 8 miles south toward the rich grazing hills of Gharian and the olive district, which lies 80 miles inland. All of the soil between the mountain range and the sea should give splendid crops of barley and wheat under intelligent cultivation and provide sufficient freight to make the railway a paying investment for the state. The line is nearly completed, and four 39-ton locomotives have been landed. About 150 workmen from Italy, regular employees of the railway department of the state, have been on the spot for over a month; ordinary laborers are receiving $1.40 per day, and section bosses $2.40, while in Italy they receive, respectively, one-half those wages. The ordinary Arab and Negro laborer of Tripoli is earning $0.50 per day, while last year at this time he was glad to receive $0.10 per day when he could find work. The line has 3-ft. gage and 55-lb. steel rails are being used. All of the rolling stocks is of Italian manufacture except the locomotives, which come from Berlin, Germany. No passenger cars have yet arrived.

OPPORTUNITY IN THE RAILWAY BUSINESS.*

BY SAMUEL O. DUNN,
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When I was invited to speak at your dinner it was suggested that I talk on Opportunity in the Railway Business. The first step necessary in the discussion of that subject is to define the word "opportunity." To most of us, I suppose, it means a chance to succeed. But neither does this definition really define; it is without form and void until we say what we mean by success. To many persons success consists in the accumulation of wealth. To others it is the winning of "that bauble, reputation." To others it is the securing and exercise of influence, power. To still others it is the accumulation of wealth, the winning of reputation and the acquirement and exercise of influence in well-balanced proportions. I don't know how it is with you, but the development of a well-rounded mind and character, and the acquirement and use of both the tangible and the intangible good things of life—of material means, of reputation, of intelligence, and of influence for the increase of human welfare—that is my conception of success. I have never for one instant envied any man who had well-filled money bags, a cold heart, an uncultured mind, and a want of public spirit. Likewise, I have never envied Goldsmith with his poetic genius, his spendthrift habits and his humiliating poverty, or Francis Villon, the beggar poet of France, dividing his time between the avocation of writing tuneful verse and the vocation of picking pockets and dodging the police.

MERIT VS. "PULL" ON THE RAILWAYS.

I know of no business which better offers to merit the chance both to accumulate a competency and to acquire and use influence for the public weal than does the railway industry in the United States. If you will read the muckraking magazines, which print everything but the truth, and sometimes even a little of that, you will learn that the only way a man can rise in the railway business is by pull. And when you learn that, you will learn what is not so. Indeed, if you read the muckraking magazines diligently enough, you will learn almost everything about the railway business that is not so. It used to be said that there were three kinds of lies—lies, damned lies and affidavits. The muckraking magazines have not been developed to this refinement of classification, and so they confine themselves to the second class. If the articles of the muckrakers about other large businesses in this country contain the same amount of truth as those they have written about the railway business, an attempt by a modern Munchausen to improve on their lucubrations would be an attempt—

> "To gild refined gold, to paint the lily,
> To throw a perfume on the violet."

However, what I had started to talk about was not muckraking, but pull as a means for advancement in the railway business. Far be it from me to say there is no such thing. There is. There are not a few men occupying important and profitable positions on railways who owe their advancement to one part of merit and nine parts of pull. But I dare say that pull has secured as few promotions and merit has secured as many, in proportion, in the railway business as in any other business in this country; and the higher the railway office the smaller is the number who have attained it by any means but proved efficiency. The man who begins with a dinner pail and ends in the president's office is still a big factor in the railway business.

MANY RISE FROM THE RANKS.

Eleven presidents of large roads have their offices in Chicago. These are Mr. Delano of the Wabash; Mr. Markham of the Illinois Central; Mr. Hetzler of the Chicago & Western Indiana; Mr. Ripley of the Santa Fe; Mr. Earling of the Chicago, Milwaukee & St. Paul; Mr. Winchell of the Frisco Lines; Mr. Felton of the Great Western; Mr. Mudge of the Rock Island Lines; Mr. Gardner of the North Western; Mr. Miller of the Burlington, and Mr. Harrison of the Monon. Of these eleven men no less than eight have been elected to their present offices within the last two and one-half years, although two of them had been presidents of steam roads before. Mr. Ripley, the dean, in point of service, of the railway presidents of Chicago, began railway service as a clerk; Mr. Earling, as a telegraph operator; Mr. Markham, as a section laborer; Mr. Winchell, as a clerk; Mr. Mudge, as a water boy on track work; Mr. Gardner, as a telegraph operator; and Mr. Miller, as a stenographer. Not one of these eight had the advantage of a college or university education. Mr. Delano, who is a graduate of Harvard, began railway work as a machinist's apprentice in the shops of the Burlington and rose, step by step, through the mechanical and operating departments. Mr. Hetzler, a graduate of the University of Michigan, began as an assistant civil engineer. Mr. Harrison, a graduate of Yale, entered railway service as a lawyer. Mr. Felton, a graduate of the Massachusetts Institute of Technology, began railway work as a rodman. If we extended the scope of our inquiry to include the antecedents of all the railway presidents, vice-presidents, general managers and traffic managers in the United States, we should find that they, like the presidents located at Chicago, have risen from the ranks and have risen by dint of hard work, ability and integrity.

My muckraking friends may agree that they have climbed by hard work and ability, but are likely to challenge the statement that they have climbed also by integrity. According to their notion apparently, to say that a man is a railway officer and also that he is honest is a contradiction in terms. Well, I have in my comparatively short life come in contact with all sorts and conditions of men. I have loaded header barges in the Kansas wheat fields. I have worked long days at the printer's case. I have served in country and city newspaper offices as a reporter and editor; and for several years I have been engaged in my present work, which has brought me constantly into contact with a multitude of railway officers in all parts of the United States. Based upon this contact with working men, with farmers, with newspapermen, with business men of all classes, I express the deliberate opinion that the railway officers of this country, not only in point of energy and ability, but also in point of integrity and public spirit, will measure up to the best standards of any other class of American citizens. To a public which has been regaled for years with stories of railway rebating, graft, corruption of politics, corruption of the courts, and so on, that statement may sound strangely. These evils have all existed to some extent, some of them to a very great extent, but the practice of basing sweeping generalizations regarding railway management as a whole on a relatively small number of cases of actual misconduct and corruption has given the general public an entirely wrong impression regarding the honesty and efficiency with which our railways have been operated and of those who have operated them.

SALARIES OF RAILWAY OFFICERS.

We have seen that most of the men occupying high positions in the railway service have come up from the ranks. What of the pecuniary rewards gained by those who rise in the railway business? There is a popular impression that the salaries paid to railway officers are very large. On the other hand, those who come in contact with railway officers often hear complaints from them that their salaries are small. The statistics of the Interstate Commerce Commission show that on June 30, 1910, the railways of the United States had 5,476 general officers who were paid salaries aggregating $17,949,017, an average of $3,277 each. They had, in the same year, 9,392 officers who are designated by the commission as "other officers," and who were paid $19,499,753, or $2,076 each. These figures certainly do not indicate that railway officers are paid excessive salaries, considering the

*An address delivered at the annual dinner of the Cornell University Association of Chicago, at Chicago, April 5, 1912.

hard work they have to do, the heavy responsibilities they have to bear, and the fact that most of them, owing to the very nature of the railway business, have to be away from their homes out on the lines a great deal of their time, supervising operation or seeking and developing traffic. The conclusion we must reach is that on the average railway officers are not highly paid.

You have often heard it said, and often read, that if the railways would reduce some of the "fancy" salaries they pay they could operate more cheaply and make lower rates. Some interesting comparisons, which are a rather effective answer to this statement, may be made between the total amounts annually expended by the railways for wages and salaries, their total operating expenses and the salaries received by their officers. The wages and salaries paid by the railways of the United States in the year ending June 30, 1910, aggregated $1,143,725,305. Of this amount only 1.5 per cent. was paid to the general officers, including presidents, vice-presidents, general managers, traffic managers, etc. The total amount paid to both general officers and other officers was but $37,448,770, or but 3.2 per cent. of the total salaries and wages paid. There are many classes of railway employees who received a great deal more in the aggregate than the officers. For example, enginemen received $91,323,678; conductors, $59,716,891; trainmen, $109,664,112; employees in the shops, about $360,000,000; section foremen and other track employees, about $170,000,000. So, you see, these railway officers with their "fancy" salaries did not get a very large part of the total expenditure for wages and salaries.

If you compare the salaries of officers with total operating expenses the figures become even more significant. The total operating expenses of the railways of the United States in 1910 were $1,822,630,433. Of this amount the total salaries of general officers were but nine-tenths of 1 per cent., and the salaries of all officers only 2 per cent. Of course, however, there are large prizes to be won in the railway business. Those who rise to the top are handsomely paid. Even their salaries are often greatly exaggerated, however.

I have seen the statement made in arguments for government ownership of railways that when the government took the roads over it would effect large savings by reducing or abolishing the inordinate salaries of railway presidents and vice-presidents. Did you ever consider how perfectly trifling an amount could be saved, and, on the other hand, how much might be lost, in that way? As we have seen, if all the official salaries were wiped out total operating expenses would be reduced only 2 per cent.; and fixed charges would be the same as before. The total earnings from operation of the Pennsylvania Railroad, an eastern road, in the fiscal year 1910 were $159,960,806, and its operating expenses were $109,890,246. The total earnings from operation of the Chicago, Burlington & Quincy, a western road, were $87,869,517, and its operating expenses were $63,010,965. Now, I do not know what salaries the presidents of the Pennsylvania and the Burlington receive, but is it not obvious that a corporation doing such an enormous business and having such enormous earnings and such enormous expenses could not afford to have a cheap man as president no matter how cheaply he might be got, while it could afford to hire the best man available, no matter how much he might cost? It might be very easy for these corporations to save a few thousand dollars a year by hiring men who would be willing to work for small salaries, but it would be equally easy for these cheaper men, by inefficient management, to lose the companies $1,000,000 for every thousand that was saved on their salaries. Conditions being what they are, it will probably remain true as long as the railways of the United States continue to be private property that those in the lower official ranks will be paid somewhat smaller salaries than they could get in more purely commercial businesses, but that very large prizes will be held out to stimulate them to labor for promotion to higher offices.

I express the opinion in passing that in proportion to their earnings and expenses the salaries paid by railways are smaller than those paid by any other class of American business concerns.

OPPORTUNITIES FOR PUBLIC SERVICE.

Men of really big minds and great souls do not, however, work for money alone. They want money, of course; as a railway friend of mine says when he "kicks" about his salary, "I have never yet discovered any good substitute for money." But while there are no good substitutes for it, there are some good complements of it. The best of these is the opportunity to render valuable services to the public, and no one has a better chance to do that than the railway officer. The railway business has come to be recognized as a quasi-public business. That makes its officers quasi-public officers. The railway manager is a trustee for the public as well as for his stockholders. It is his duty to his stockholders to try by every honorable means to secure for them a reasonable return upon their investment; that is what they employ him for. It is equally his duty to try to furnish the public good transportation service at reasonable rates. It was said by a wise one of old that no man can serve two masters. The railway man is striving to do this, and it is largely because he is that the results of his work are not always satisfactory to one or the other of his masters. To perform successfully the dual task of the modern railway manager requires a rare combination of qualities. On the one hand, he must be an executive of the highest order. No meaner talent can operate efficiently a great modern railway. On the other hand, he must be a statesman. He must devise and carry out policies that will inure to the good of the public; and he must also convince the public that he is doing so; and to devise, carry out, and, in the forum of public discussion, vindicate beneficial public policies is the very definition of statesmanship.

It is only within comparatively recent years that our present conception of the public nature of the service of railways and of the duties of their officers has developed. It has not been long since the public and railway managers regarded the railway as being as much a private concern as a newspaper or a corner grocery. It is true that this was a wrong conception, both of the economic and the legal character of the railway, but nevertheless it obtained generally both inside and outside of the transportation business, and it required years of legislation, litigation, agitation and discussion to develop and establish our present idea of both the legal and the economic character of transportation companies. This change has made it necessary for the railway manager to change his attitude both toward the railway which employs him and the public which it serves. Some railway managers have found this hard or impossible to do, just as always there are those of such conservatism or stiffness of character that they cannot adapt themselves to changing conditions. But a large majority of the responsible railway officers of today recognize the fact that the change has come, that the railway will be and ought to be in future subject to government regulation, that all the facts about its business with which the public is concerned must be opened up to the light of day, and that the rates charged and the service given must be made and kept such as to deserve and secure the approbation of an intelligent and exacting public sentiment.

The difficulties with which railway managers have to deal are much greater than most people know. This change in the relations of the roads with the public, with all the new regulation that produced and accompanied it—regulation regarding rates, operation, accounting and many other parts of the business, tending to reduce earnings and to increase operating expenses—came during a period of advancing prices and increasing wages, which was followed immediately by a period of financial crisis and industrial depression. These various, conflicting, powerful currents have made the railway ship most difficult to navigate; but railway managers have risen courageously and capably to the demands of the occasion. However, their problem of satisfying at once the owners of the railways and the public is not solved. It never will be finally solved. Railway management, this modern

Sisyphus, is condemned to roll its stone up hill each day only to have it roll back down each night. Changing conditions will ever present new and additional requirements that must be met. So, no matter how well the railway officers of today do their duty, there will be plenty of opportunity for work, for advancement, and for public service for those who come after them.

COLLEGE MEN IN RAILWAY SERVICE.

In an address to an audience like this, and on such a subject as this, something doubtless should be said regarding the opportunities in railway work for college and university men in particular. Most of the railway officers whom I mentioned in the early part of my remarks not only began in the ranks, but began without the aid of higher education. Let us hope that the time will never come in this great industry, devoted alike to the making of money and the rendering of a public service, when any man who enters its employment, whether educated or uneducated, Jew or Gentile, Greek or barbarian, will not have a chance, by the exercise of ability and energy, to rise to the top. It is probable, however, that the number who in future will advance from the ranks of labor to the higher official positions will be relatively smaller than it has been in the past, and that the number of highly educated men, especially those with technical educations, that advance to the top will be relatively larger. This seems probable for two reasons: First, the railway labor brotherhoods insist more strongly and effectively each year on observance of the rule of seniority in the making of promotions in train and engine service. The result is to compel the energetic and ambitious young men to wait for their promotions until the older ones get out of the way. Consequently, it is apt to take longer than formerly for really able workingmen to rise to the positions of yardmaster, train despatcher, road foreman of engines, etc., where they can attract the attention of their superiors and be in line for promotion; and when they do reach such positions they are apt to be too old to be promoted very high. This, however, does not apply to unorganized employees, such as clerks, stenographers, station agents, etc. The second reason why highly educated men are apt to rise to high positions in the future than has been the case heretofore is that in this day of specialization in the railway business, as well as other industries, there is an increasing demand for men with a technical equipment. The college man, therefore, probably has a better opportunity now in railway work than ever before.

One difficulty in the way of the college man's promotion is that, according to the testimony of many railway managers, he often displays a lack of tact and skill in the handling of men; and the "engineering of men," as my friend Major Hine calls it, is very much the most important branch of railway engineering. However, there are plenty of college graduates who have developed skill in the engineering of men and risen to high railway positions. There, for example, are Felton Julius Kruttschnitt, director of maintenance and operation of the Harriman Lines, a graduate of the engineering school of Washington and Lee University; Howard Elliott, president of the Northern Pacific, a civil engineer of Harvard University; F. A. Delano, president of the Wabash, also a Harvard man; Fairfax Harrison, president of the Chicago, Indianapolis & Louisville, a Yale man; S. M. Felton, president of the Great Western, a Massachusetts Institute of Technology man; the late F. C. Melcher, vice-president of the Rock Island Lines, a Tufts College civil engineer; J. W. Kendrick, formerly vice-president of the Atchison, Topeka & Santa Fe, a graduate of Worcester Polytechnic Institute; W. W. Atterbury, vice-president of the Pennsylvania Railroad, a Yale man; Horace G. Burt, formerly president of the Union Pacific, a Michigan man; and E. J. Pearson, vice-president of the Missouri Pacific, and H. I. Miller, formerly president of the Chicago & Eastern Illinois, both Cornell men, and no doubt in the future, as in the past, there will be many college men who will develop into good railway engineers of men.

In the past most of the college men who have entered railway service have been technically educated, and a large majority of these have gone into the mechanical and engineering departments and stayed there. It would seem that there is a great opportunity in railroading for college men, both technical and non-technical, and it also seems a mistake for so large a proportion of the technically educated to seek to become mechanical and engineering specialists. The mechanical and engineering officers are staff officers, while the operating man is a line officer. Now, in the long run there is more chance for advancement in the line than in the staff. The main function of a railway is, not to build and repair cars, not to build and maintain structures, but to get cars and trains loaded with freight and passengers over the road. All other functions are auxiliary to this. No matter how good a mechanical or civil engineer a man may be, he is not likely to become a general manager, a vice-president or a president unless he knows how to move the business, and it is these executive officers who give orders, not only to the men in the transportation department, but also to those in the technical departments. It would seem, therefore, that the college man who went directly from school into the operating department and began work as a station agent, or a yard clerk, or a clerk in the office of some operating officer, or perhaps a telephone operator, might have a better chance to rise than one who entered directly into technical work. There is no department of the railway business where there is more demand for educated and able men and that can offer better opportunity to them than the operating department.

However, whether the college man begins as a draftsman or an assistant engineer or a yard clerk or a telephone operator, in 99 cases out of 100, regardless of his educational equipment, regardless of his natural ability, regardless of his family connections, he will have to begin at the bottom at a very small salary and fight his way up in generous rivalry with thousands of other men who may have less than his amount of knowledge of science and literature, but who may have more than he has of the invaluable sort of knowledge of men and of the world that the able acquire in that largest of all university, the school of hard knocks." And regardless of where he starts, the man with the right kind of stuff in him will advance in the railway business because the railways are looking all the time for men with that kind of stuff in them; and, on the other hand, regardless of where he starts, the man who hasn't the right kind of stuff in him is pretty sure not to rise, because the railways are all the time getting rid of men who are not made of the right kind of stuff.

The Cochabamba to Tarata railway, Bolivia, is expected to reach Tarata in August or September of the present year. The roadbed, bridges, and culverts of the line are being solidly constructed, and the road when completed will be one of the best two republics already in operation.

The total mileage of railways in Victoria, Australia, at the end of 1910 was 3,514 miles, an increase of 75 miles over the previous year. At this time 196 miles of new lines were under construction. Gross earnings for the year 1910 were $22,711,101, and the expenditures were $13,694,873.

In western Australia there were 2,400 miles of railways open to traffic at the close of the year ended June 30, 1910. This was an increase of 258 miles over the previous year. At that time 475 miles were under construction. The gross earnings were $7,957,443; the expenditures, $5,330,973, and the net earnings $2,626,470.

Construction of the proposed railway from Condobolin to Broken Hill is regarded as necessary for the proper development of western New South Wales. It is believed that the opening of the Panama Canal will greatly increase the shipping to Sydney, and that if this line were linked with Perth, thus completing the transcontinental railway from east to west, the mails from England would be landed at Perth and sent by rail direct to Sydney.

DEFECTIVE BOX CARS AND DAMAGED FREIGHT.

Third Article. Poorly Designed and Built Sides and Ends Cause Large Loss by Leakage of Grain and Shifting Loads.

The first article in this series, in addition to considering the great expense to the railways due to damage and loss of freight caused by poorly constructed equipment, also covered pilfering from the cars which is encouraged by inefficient box car door fixtures. The second article in the series, which appeared in last week's issue, showed the effect of poor side door construction, and directed attention to satisfactory side door fixtures and designs. A better arrangement of grain door than is ordinarily used was described, and a scheme which has been successfully used for preventing the entrance of cinders and water around the edges of the ordinary box car side door, when the car is carrying flour or similar lading, was also illustrated.

DEFECTIVE BOX CAR SIDES.

The usual construction on the inside of a box car is to have a lining of material about 13/16 in. thick, which extends as high as the grain line of the car. To prevent any grain which might leak through the lining from remaining between it and the sheathing, the lining extends to within a couple of inches of the floor and a V strip is fitted over the joint between the floor and the

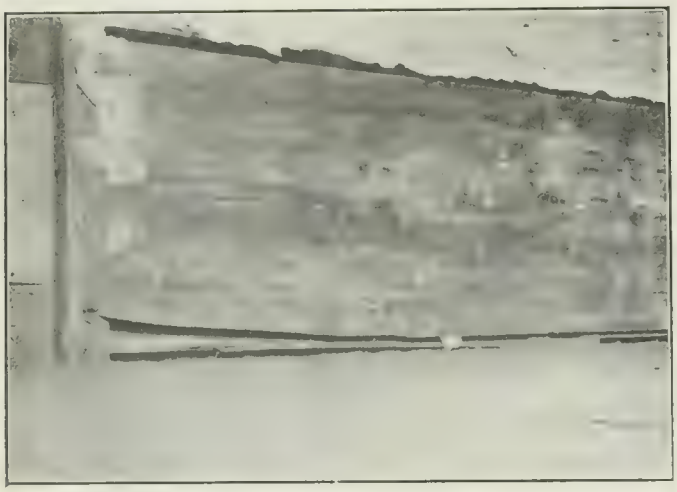


Fig. 27—Grain Strips Loose and Forced Upward.

outside sheathing, thus diverting any of the grain between the lining and the sheathing into the car when it is unloaded. Theoretically this is satisfactory, but practically, as applied under present conditions, it is more or less unsatisfactory and a nuisance.

In the first place the V strips are nailed to the floor and do not remain tight. Examination indicates that they probably become loosened in the following manner: The various members of a car loaded with grain or similar bulk material are under considerable stress while in transit, this stress varying in intensity as the car passes over rough track or crossings, or while the train is being made up, or as the cars are being shifted. As the frame is deflected, due to the varying stresses, the grain strips or the sheathing may be separated or spring away from each other slightly, allowing the smaller particles of grain or dirt to work between them; this prevents them from springing back into place when the stress is removed. As this action is repeated the strip becomes looser and looser and the grain may then drop down and work in between the steel side sill and the sheathing; this latter does not occur so easily where wooden side sills are used.

If a steel upper-frame construction is used and the grain strip is loose the steel braces and frame parts, which are filled with wood, afford numerous opportunities for the grain to leak down and out of the car. Of the 2,478 cars which leaked grain at Galveston, due to other defects than those of the grain doors (*Railway Age Gazette,* April 19, 1912, page 895), undoubtedly a fair proportion were due to the above mentioned cause. A few typical examples of cars defective in this respect, which were be-

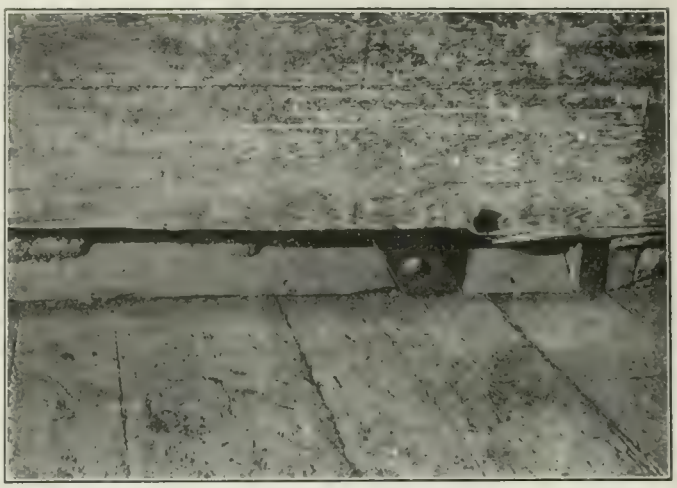


Fig. 28—Lower Part of Inside Lining Torn Away, Showing Grain Strips Near Bolster.

ing loaded with first class merchandise and were in the freight house, and not on the car repair track, are shown in the accompanying illustrations.

For instance, Fig. 27 shows a 40-ton car two or three years old, in which the grain or V strips were in some way forced up a considerable distance from the floor. Fig. 28 shows a 34-ft. car, 60,000 lb. capacity, in which the bottom board of the inside lining was partially torn away, leaving the grain strip and the

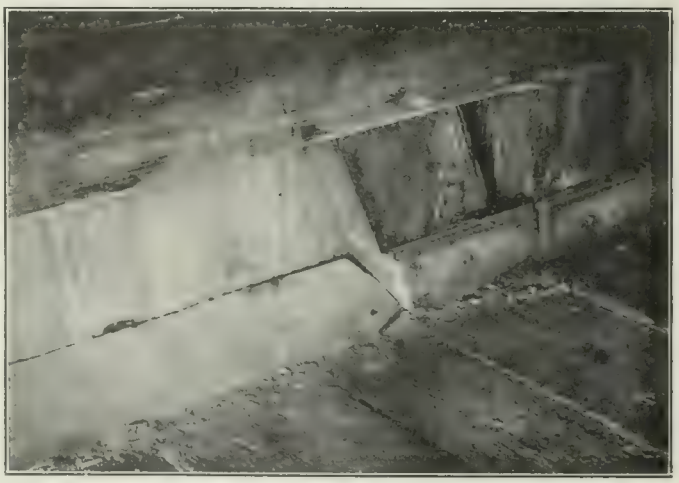


Fig. 29—Grain Strip Loosened; a Common Condition Even in Recently Built Box Cars.

lower part of the steel braces and post at the bolster exposed. The grain strip had been forced from the outside sheathing, allowing the grain to work in between. Looking along the side of the car from the side door the side was seen to be bulged out a considerable amount, and for a distance of three or four feet at the bolster. The other side of the car was in better condition.

A 40-ton box car in which the lower lining board has been removed is shown in Fig. 29. The distance between the top of the V strip and the sheathing measured from 5/8 in. to 3/4 in. Note also that the grain strip does not fit at all neatly between

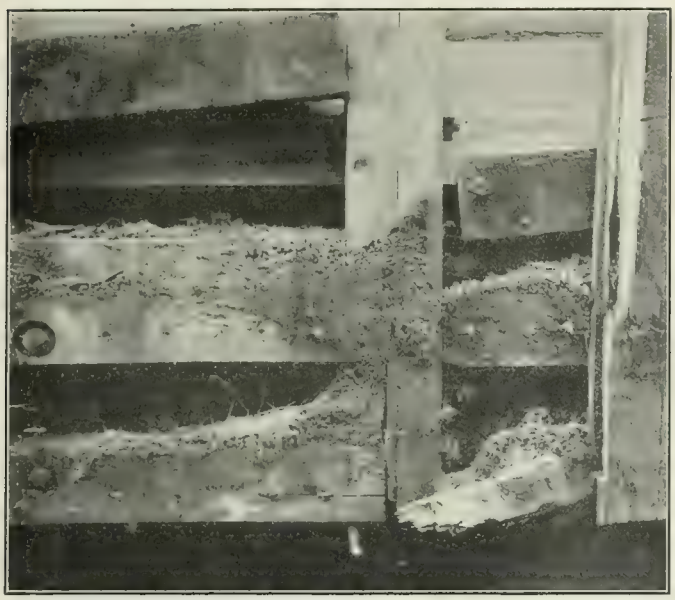


Fig. 30—Outside Lining of Box Car Removed, Showing How Grain Had Worked in and Forced the Sheathing Loose.

the brace and the post. This condition is noticeable even in comparatively new cars, and they must have been turned out from the builder's shops in this way. It does not appear like a serious condition until the sheathing is ripped off. This was

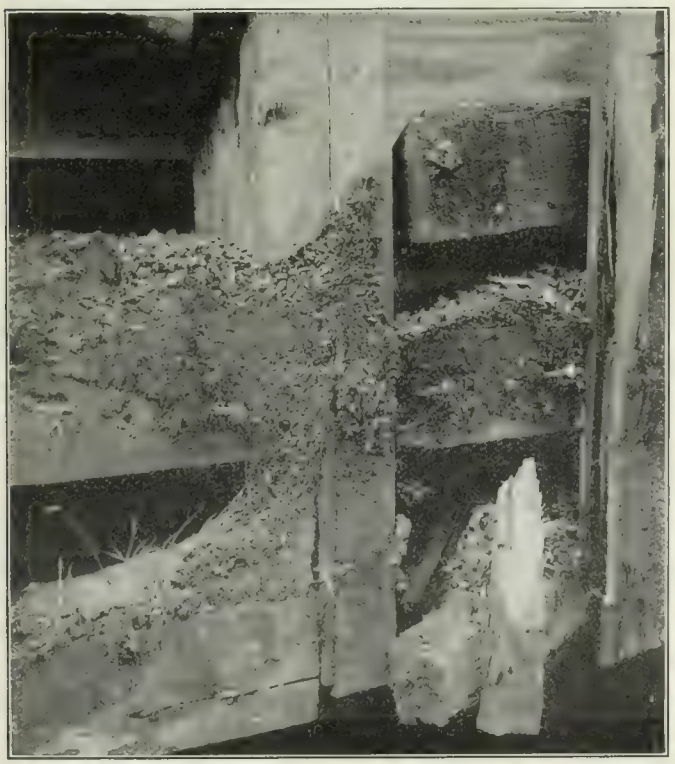


Fig. 31—An Enlarged View of a Portion of the Illustration Shown in Fig. 30.

done in the case of another car of the same series, in which the grain strips had become loose and were forced out of place. The results are shown in Figs. 30 and 31. This car was less than three years old. Surely, even if the leakage of grain was not serious, the unsanitary condition formed by having this collection of decaying matter in the framework of the car is not a pleasant thing to contemplate. The deterioration of the car must be greatly assisted by a condition of this sort.

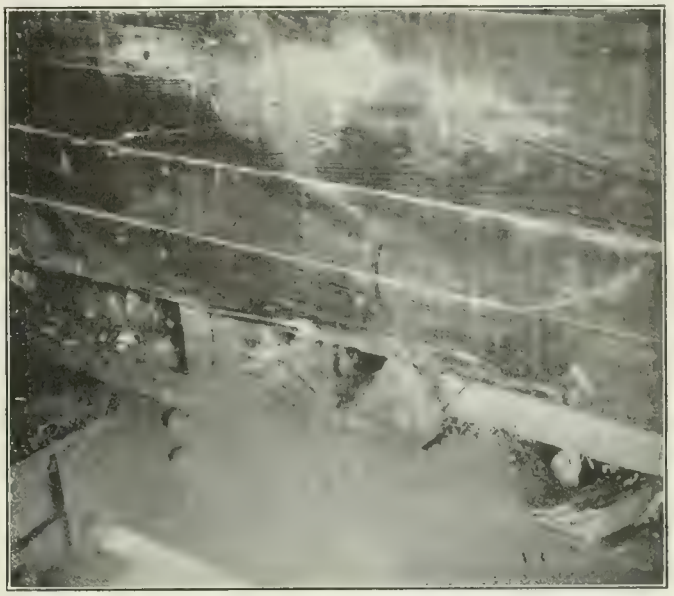


Fig. 32—Floor of Box Car Removed at Bolster Showing Poor Construction from Grain Leakage Standpoint.

In another case the floor of one of these cars was removed at the body bolster, presenting a similar condition of affairs, as shown in Fig. 32. Unfortunately most of the grain and loose material which had worked in between the various members had been cleared away when the picture was taken, but the cracks and crevices between the steel parts of the framework and the wooden filling blocks are clearly shown. Another view



Fig. 33—Another View in the Steel Frame Box Car from Which the Floor Had Been Removed at Bolster.

of the same part of the car is shown in Fig. 33. After these two views were taken the sheathing was ripped away on the outside and the loose grain and refuse was scraped off to show how loosely the wooden parts of the framework are fitted to the steel parts (Fig. 34). If the grain strip between the floor and the side of one of these cars becomes loosened or defective there is nothing to prevent the leakage of the grain, etc. Two

or three suggestions have been made as to how this condition might be remedied. One railway at least, has tried bringing the inside lining down to the floor and using a V strip at the joint, but such strips are usually ripped away within a very short time by the lading in the car. Another road is getting better results by using sixteen-penny nails to hold the strips,

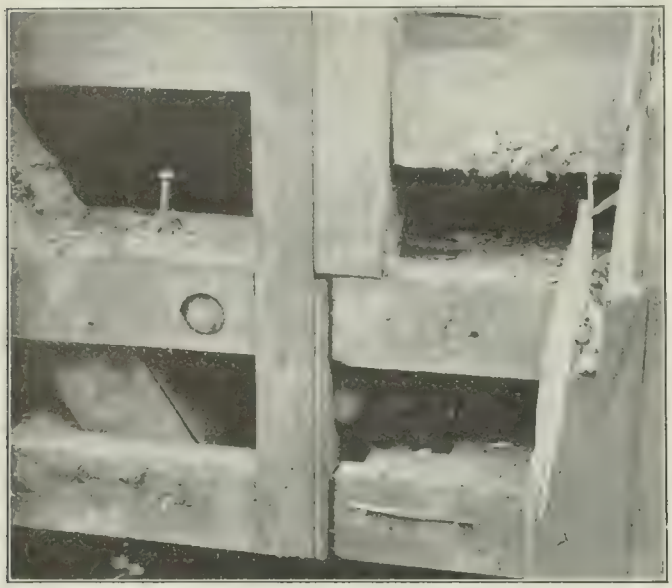


Fig. 34—Showing Poor Construction Where Steel and Wooden Parts of Car Are Fitted Together.

and still another is contemplating bolting the strips in place. This latter method would undoubtedly be a considerable improvement over the conditions as ordinarily found. On the Canadian Pacific steel frame box cars, the framework is on the outside with the sheathing on the inside. The sheathing is 1¾ in. thick, and is joined or fitted to the floor planks as shown in Fig. 35. As both the lining and floor planks are securely bolted to the steel framework, and provision is made for taking up the shrink-

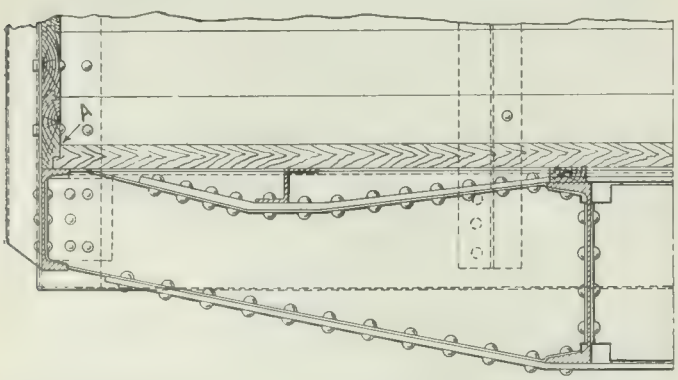


Fig. 35—Joint Between Floor and Sheathing on Canadian Pacific Steel Frame Box Cars.

age of the lining, there is little possibility of the joint between the lining and floor members opening up and allowing the grain to leak out.

WEAK ENDS

The poor end construction on the average box car is responsible not only for considerable loss due to the leakage of grain and similar materials, but also in many cases for damage caused by shifting loads. The end ordinarily has a grain lining on the inside similar to that used on the sides of the car, and consisting of 13/16 in. material. This is not nearly heavy enough, because in the case of lumber and lading of this sort the load very often shifts, due to the shocks from coupling, etc., crushing through the thin lining. The inside lining on the standard 40-ton Santa Fe box cars is made of floor planks 1¾ in. thick. This prevents a large part of the damage due to the shifting of the lading. Ordinary forms of outside end construction are shown in Figs. 36, 37 and 38. Where the inside lining is only 13/16 in. thick, and it does become damaged, the outside lining shown in these illustrations offers very little resistance to pressure from the inside. The condition shown in Figs. 39 and 40 is not at all uncommon on cars constructed in this way.

Much has been said about the relative merits of different types

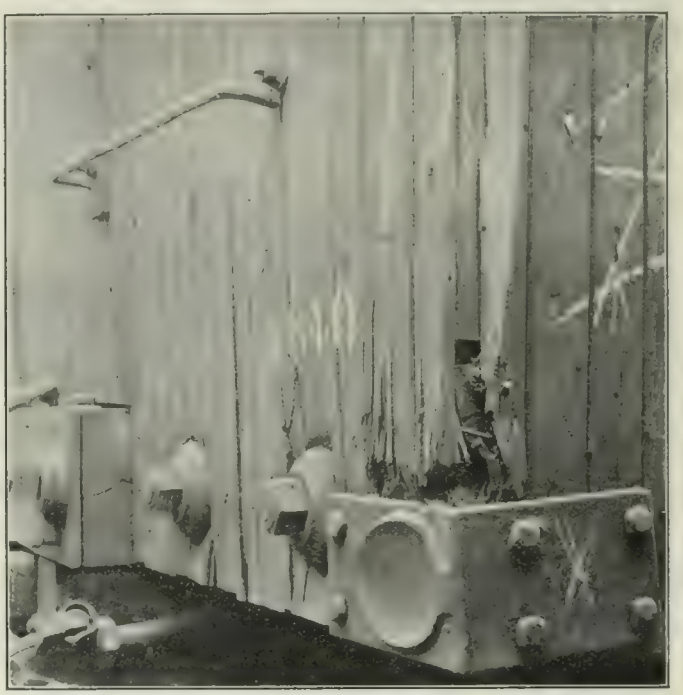


Fig. 36—A Poorly Constructed Box Car End.

of draft gear and the necessity of higher capacity gears. An examination of the draft gears under a number of box cars would seem to indicate that while the draft gear question needs considerable attention, it is not nearly so important at the present stage of the game as providing a better fastening of the gear to the underframe of the car, and this is especially true where



Fig. 37—An Average Type of Box Car End Construction.

wooden draft sills are used. In many cases conditions could be improved by using more and larger bolts for fastening the draft lugs to the underframe. In other cases the construction is such that there is little possibility of the gear remaining rigidly attached to the car after it has been in service for a few weeks.

Examples of the effect of defective draft gear attachments



Fig. 39—Result of Weak Inside End Construction, Allowing Load to Shift.

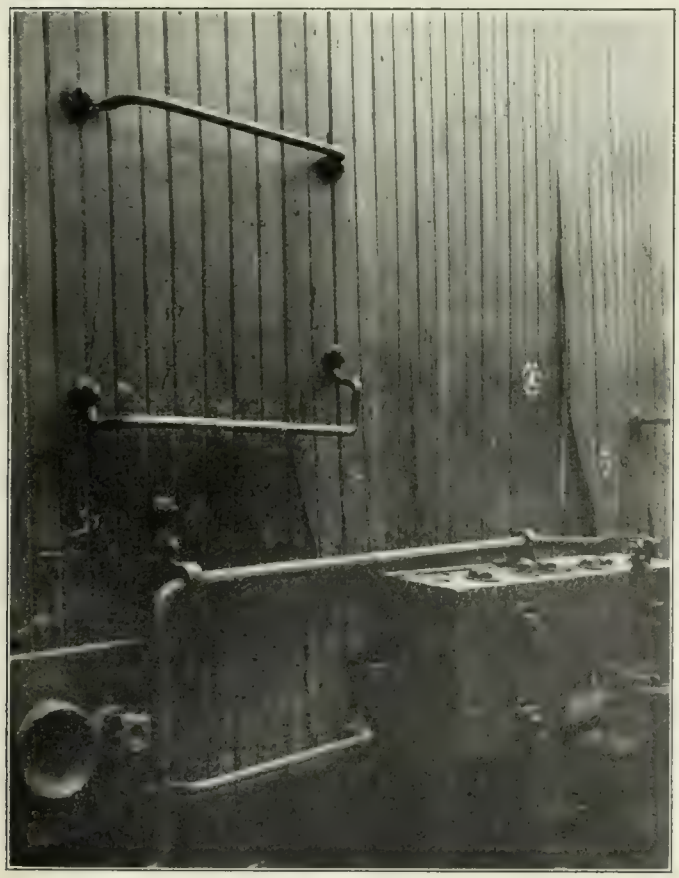


Fig. 40—Another Example Showing Result of Weak Box Car End Construction.



Fig. 38—Not a Strong End Construction.

are shown in Figs. 41 and 42. In the first case the striking block to which the ends of the draft sills were attached had dropped down about 2 in. below its normal position. In the second, the dead block was down 1⅜ in., and there was a space of from ½ in. to ⅝ in. between it and the sheathing. The effect of this



Fig. 41—A Draft Gear Insecurely Attached; Note Where the Loose Dead Wood Has Worn the Sheathing.

on the end of the car may readily be conceived. For instance, an inside view of the end of the car, which is shown in Fig. 42, is reproduced in Fig. 43, showing clearly the large hole through the end of the car which was caused by the repeated movements back and forth of the loose deadwood. This may seem to many to be an exaggerated case, but it must be remem-

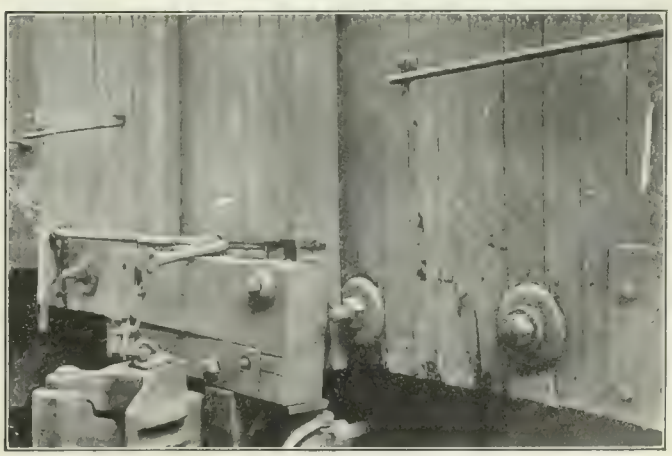


Fig. 42—Many Cars Are in a Condition Similar to This.

bered that very much weather defects, which cannot be shown so clearly by the camera, and of which numerous illustrations may be found in any lot of box cars which are set out for loading at a freight house, will allow the leakage of a very considerable amount of grain or similar material.



Fig. 43—An Inside End View of the Car Shown in Fig. 42.

The end construction shown in Fig. 44 was used on a large number of 40-ton box cars that were designed and built three or four years ago, and which were widely heralded at the time of their construction, because of their light weight and low cost. The draft timbers did not extend beyond the end sill and the

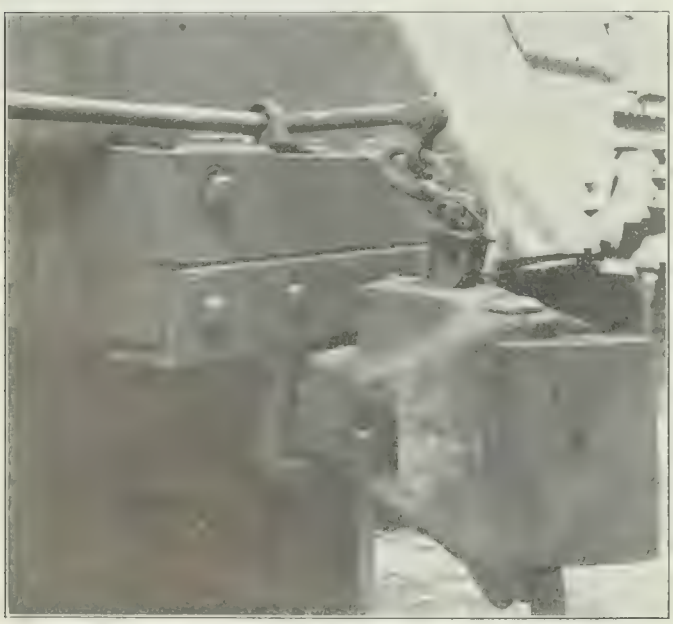


Fig. 44—A Poor Coupler and Dead Wood Attachment.

coupler carry iron was bolted to the dead wood, as shown. There is no way of estimating how much it has cost the company to maintain these ends, but it is known that claims for leakage of grain against the cars, even when they had only been out of the shops a short time, were excessive and this leakage occurred largely at the ends of the cars.

The end construction shown in Fig. 45 is a great improvement over the constructions which have been shown, more par-

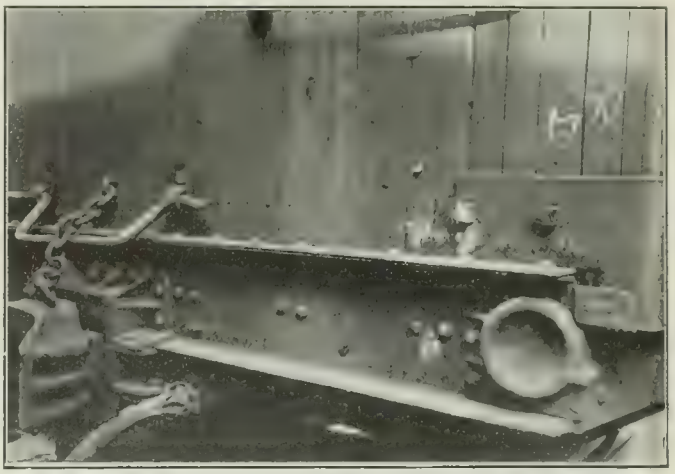


Fig. 45—A Better Form of End Sill and Coupler Attachment.

ticularly because it affords a much more rigid attachment for the draft gear. This car, however, has a thin inside end lining

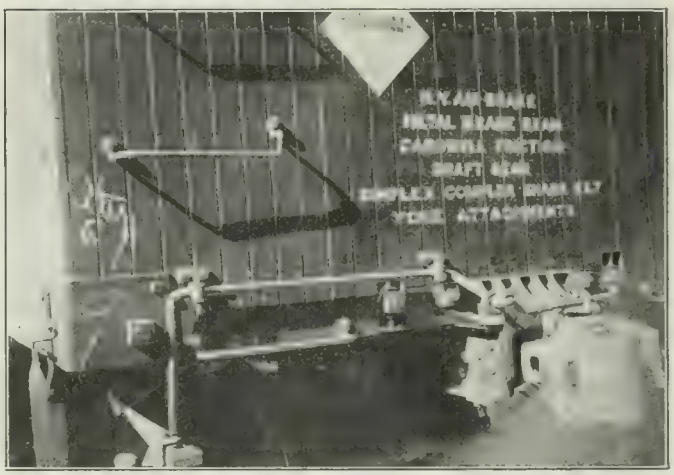


Fig. 46—A Good Coupler Attachment.

and the outside sheathing is fastened in the usual manner. Another illustration of a rigid draft gear attachment is shown



Fig. 47—An Exceptionally Good End Construction Used on Santa Fe Box Cars.

in Fig. 46, and is used on the new refrigerator cars which are being delivered to the Frisco. An especially good end construction, both as regards the attachment of the draft gear at the end of the car and of the construction itself, is shown in Figs. 47 and 48. The draft gear is carried by steel draft sills, which

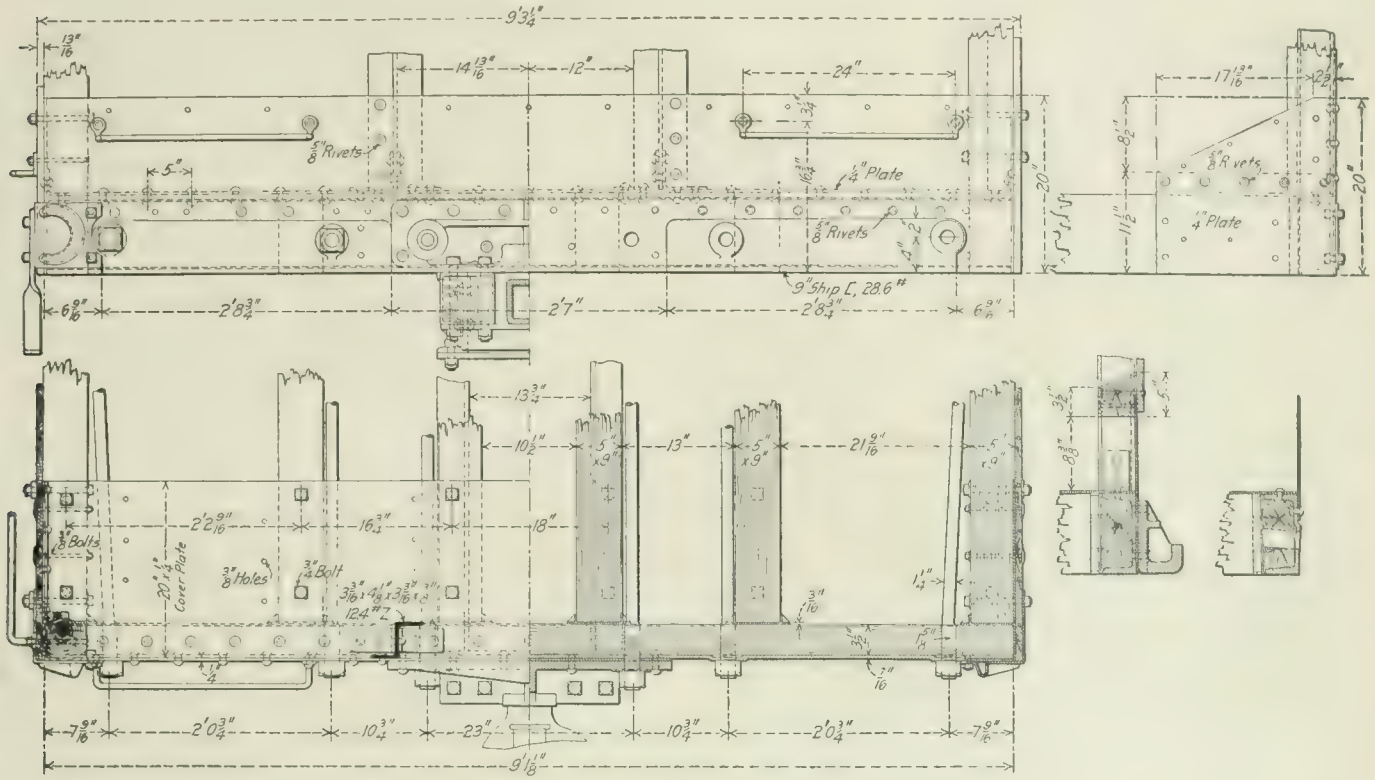


Fig. 48—Details of End Construction of Santa Fe Box Cars.

are securely bolted to the wooden underframe of the car. The dead block is made of cast steel, as shown in Fig. 49. The end sill consists of a heavy channel, 28.6 lb. per foot, which is filled with a wooden block 2½ in. thick. The ¼ in. plate, which is riveted to the web of the channel and extends up underneath the sheathing, is bent at the corners and extends back along the sides for a distance of about 20 in. The ¼ in. cover plate, which extends the full width of the car and is 20 in. wide, is riveted to the top flange of the end sill channel, and is turned up at the sides and riveted to the end plate above mentioned.

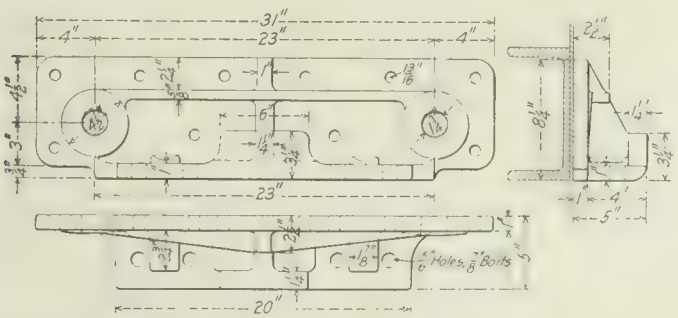


Fig. 49—Cast-Steel Dead Block Used on Santa Fe Box Car.

This not only makes a strong tight end but also provides a good stiff corner construction. The sheathing is held to the frame by bolts and clamps instead of being nailed to it. The small malleable iron clamps extend over the joints, as shown, and keep them grain tight. In addition the inside lining of the car at the ends is 1¾ in. thick. The two wooden end posts are reinforced by 3 3/16 in. x 4⅛ in. x 3 3/16 in. x ⅜ in. Z bars weighing 12.4 lb. per foot. This makes one of the most satisfactory end constructions now in use on box cars in this country. The heavy inside end lining backed by the strong frame prevents the ends from being bulged out or destroyed by shifting loads. The rigid attachment of the draft gear to the sills and the cast steel dead block, in connection with the strong end construction, prevent the damage which frequently results from weak ends and poorly attached draft gears. The arrangement of steel plates and the use of bolts and clamps for holding the wooden sheathing prevent any possibility of grain leakage.

(To be continued.)

The contract for the building of the new Hauhenstein tunnel in the line of the St. Gotthard road, Switzerland, has been awarded to a Berlin firm. The section between Basel and Olten, with the already existing Hauhenstein tunnel, 8,184 ft. long, has such a steep grade that the steadily increasing traffic can no longer be carried on according to the schedule. There is no other way to improve the conditions than to partly move the line, so as to get more favorable grades and curves. According to the plans of the general management of the Swiss national railways this new line will branch off from the old, back of the station at Siffach; run eastward to Gelterkinden, and then take an almost southerly direction and in the rear of the Tecknang station enter the new tunnel which is to be built, and which it will leave shortly before it crosses the river Aare; after which it will reach the station at Olten. The new line is almost exactly 10 miles long and is 364 ft. shorter than the present one. The crest lies 336 ft. lower. The steepest grade is 10.5 per cent., as against 26.6 per cent. of the old line; in the southern leg of the tunnel there is a grade of 7.5 per cent. for a distance of four miles. The shortening of the distance from Basel to Olten amounts to 19 miles, which will permit cutting down the transit time of the fast and ordinary trains from 15 to 20 minutes, and that for freight trains 25 minutes. In the tenders last August there were four bids; two Swiss, one French and one German. The tender of the latter, was $381,000 higher than the estimate of the management of the road, but below those of the other bidding firms by from $309,500 to $1,024,000. In a subsequent tender, the German firm, although it had increased its first bid by $171,400 was the lowest bidder.

THE HUDSON BAY ROUTE: A NEW OUTLET FOR CANADIAN WHEAT.*

BY AVARD LONGLEY BISHOP.

That adequate rail and water transportation facilities represent a basic factor in nation building, is a maxim which is appreciated more than ordinarily by the people of Canada. With them it is a well-recognized fact—one which has possessed itself of the public mind—that their potential forest, agricultural and mineral resources, all of which are known to be abundant, and not be economically utilized until the country is opened up by railways and improved by artificial waterways. The strenuous efforts which they have put forth during the last two or three decades to supply themselves with the necessary transportation systems have been such as to attract attention, if not the admiration, of the rest of the civilized world.

And notwithstanding the fact that already Canada has the greatest railway mileage in proportion to population of any country in the world, with possibly one or two minor exceptions, it would seem as if she were just entering now upon an era of great expansion in railway building. Within recent years the most pressing transportation problems have arisen as a result of the settlement of the West, especially of the prairie provinces—Manitoba, Saskatchewan and Alberta. With the later movement of population westward, the center of wheat production has shifted westward also, until at the present time it is somewhere within the limits of the three prairie provinces. This is shown by the fact that in 1911, Manitoba, Saskatchewan and Alberta together produced 194,083,000 bushels of wheat out of a total of 215,851,000 for the whole of Canada. The realization is just dawning upon the people of the United States and Canada alike that a large, if not the best, part of the wheat belt on the plains of North America lies north of the forty-ninth parallel of latitude.

Just how many million acres of land are available here for the growth of this cereal it is impossible with any degree of accuracy to estimate. There seems to be pretty general agreement, however, that within a decade or two Canada will be exporting several hundred millions of bushels annually. By far the largest proportion of this will undoubtedly be grown in the three prairie provinces. From the valley of the Red river in southeastern Manitoba, a wheat belt 200 miles or more in width stretches away to the northwest for hundreds of miles through Manitoba, Saskatchewan and Alberta. The average yield per acre is considerably above that of the best spring wheat lands in the United States, and already in 1911 the crop had amounted to over 194,000,000 bushels. Yet less than 10,000,000 acres have ever been planted in any one year—a very small fraction of the land known to be available for wheat. Is it little wonder, then, that some of Canada's leading public men are looking to the northwest to produce in the not distant future a billion bushels of this cereal annually.

NEED FOR ADDITIONAL RAILWAYS.

It should be mentioned in passing that wheat is by no means the only source of agricultural wealth in this region. In addition to important crops of potatoes, turnips, peas, flax, etc., there were produced in 1911 over 24,000,000 bushels of barley and 212,000,000 bushels of oats. The crop which already figures most prominently in the export trade, however, and the one which, as has just been shown, promises the most for the future is wheat. Probably a portion of the surplus will seek a market south of the forty-ninth parallel. The greater quantity, however, is pretty sure to cross the Atlantic. Accordingly, sufficient and adequate transportation facilities must always be available to move the surplus to the seaboard, otherwise great loss will incur to the Canadian farmer, and the healthful economic development of the West will be retarded.

In spite of the rapid growth of the railway net in the Canadian wheat belt, the grain traffic continues to suffer from congestion. Such a state of affairs naturally stimulated the demand for more outlets. If the present crop cannot be handled adequately, what will be the situation, it is asked, when a crop equal to several times that of the present is harvested? The building of the Canadian Northern and the Grand Trunk Pacific Railways does not seem to furnish a satisfactory solution to the problem. Some other supplementary route must be provided. Absurd as the scheme may seem at first thought to one unacquainted with climatic conditions in Canada, it is true, nevertheless, that the people of the prairie provinces have been clamoring for several years past for a railway to Hudson bay to supplement the existing transportation routes to the seaboard. Their demands, which have furnished considerable political capital in the provinces of Manitoba, Saskatchewan and Alberta, and which have provoked lengthy discussions in the Dominion parliament, have at last borne fruit. For the government has already appropriated nearly $1,700,000 for the project. Contracts have been signed for the construction of a bridge over the Saskatchewan river at The Pas, and on the sixth of September, 1910, the first sod in connection with the building of the new railway was turned with due ceremony by the minister of railways and canals. Advertisements have been running asking for tenders for the construction of the first 180 miles northward from The Pas. The change of government which resulted from the federal elections of last September will, in all probability, hasten the work of construction, for the Liberal-Conservative party is pledged to build the road. Hence, there seems to be no doubt but that the long-talked-of Hudson Bay Railway will soon be an accomplished fact.

A glance at the railway map of the Dominion issued in 1911 by the Department of the Interior shows that of all the lines in the prairie provinces the Canadian Northern approaches the nearest to Hudson bay. On the Prince Albert branch of this system, at a point nearly 400 miles northwest of Winnipeg, the trains now stop at a place called "Hudson Bay Junction." Upon inquiry it is found that a branch line reaches out northeastwardly for a distance of 86 miles in almost a direct line towards Hudson bay to a point on the south side of the Saskatchewan river known as The Pas. From here to Hudson bay the distance is only 477 miles via the surveyed route to Port Churchill, and but 410 to Port Nelson. The latter follows the course of the former for the first 150 miles or thereabouts from The Pas, so that the work of construction need not be delayed on account of the failure thus far to decide upon the choice of route.

THE PROPOSED ROUTE.

Until recently the country through which the railway will pass was little known, and even at the present time our knowledge of the region is very incomplete. The best available information is contained in the various volumes of the Canadian Geological Survey, and in the two reports of John Armstrong, chief engineer of the Hudson Bay Railway surveys, which were submitted to parliament in 1909. On the whole, the character of the country is such as to permit a comparatively low cost of construction, although in certain places it will necessitate the building of a winding track in order to secure at a moderate cost the easy grades which are provided for in the estimates. There is little reason for believing that the agricultural resources of the country are such as will attract any considerable number of settlers for some time to come—at any rate, not until the more desirable portions of the Canadian West have been filled with immigrants. At present the country is practically unoccupied, for not a single road or farm crossing is to be met with on the projected railway lines throughout the entire distance between The Pas and Hudson bay. Considerable timber is met with on the line to Port Churchill, but probably the Nelson route is the better timbered throughout. It has yet to be shown that the region is rich in minerals. The building of the railway may result in the finding of valuable deposits, as has been the case heretofore in other

*Abstract of an article in the Yale Review for April. Reprinted by permission.

parts of Canada. Hence, although it is always impossible to predict accurately the future of any region, all the available evidence leads to the conclusion that there seems to be no prospect of the railway deriving much income from carrying the products of the immediate country through which it will pass—certainly not for some time to come. The revenue must be obtained largely from the drawing of through trains of grain from the northwest to meet ocean steamers at the terminus on Hudson bay.

One has only to study a map for a few moments to see that the shortest route from the center of the wheat belt to Liverpool is via Hudson bay and strait. There is no need of giving in detail comparative figures of distances, for in this important particular the Hudson bay route has a decided advantage over all others. For all practical purposes the distance by steamship from the railway terminus on Hudson bay to Liverpool will be approximately the same as from Montreal to Liverpool. But the distance by rail to Hudson bay from the wheat fields of the West averages about a thousand miles less than to Montreal, the head of ocean navigation. Hence, the utilization of the Hudson bay route would effect a shortening, on the average, of approximately a thousand miles in the distance from the wheat fields of the West to the seaboard, without increasing the ocean distance to the world's principal markets.

From what has already been said it ought to be evident that there is no question as to the pressing need of opening up this additional outlet for Canadian wheat nor as to the saving in distance that would be effected by its use. The crucial point in the whole project, however, and the one upon which the success or failure of the scheme depends, is the possibility of ocean steamers reaching the railway terminus on Hudson bay for any considerable length of time per year. This is a complex problem, but one upon which a good deal of light has been shed by the investigations of exploring expeditions sent out by the Dominion government, and by the reports of others who have spent considerable time at or in the vicinity of Hudson bay.

Turning now to a consideration of the practicability of navigating Hudson bay and strait for commercial purposes, it should be remembered that their most northern shores are well outside the Arctic circle. Port Churchill is in about the same latitude as the north of Scotland; and Moose Factory, on the southern shore of James bay, is farther south than London. Hudson bay, including the southern projection known as James bay, is a vast area of water which is, roughly speaking, a thousand miles in length from north to south and 600 miles in breadth. Its approximate area is 600,000 sq. miles, or nearly five times that of the British isles, or six times that of the Great Lakes. The only practicable approach to Hudson bay from the Atlantic is through the strait of the same name. This is a deep channel about 500 miles in length, with an average breadth of 100 miles, narrowing down to a minimum with of from 40 to 45 miles. It is remarkably free from rocks and shoals or other obstructions to navigation, while the soundings show the depth of water to vary between 900 and 1,800 ft. It has been stated upon good authority that the bay is always open and as free to navigation as the Atlantic itself. The waters in the harbors, as also those for some distance from the shore line, are frozen for a part of the year; but it is reported that by the use of ice-breakers the harbors may be kept open for the entire winter. Moreover the bay is easy of navigation in that it is unusually free from rocks and shoals, and its depth is remarkably uniform, averaging over 400 ft.

NAVIGATION OF HUDSON BAY.

But fortunate as it is that Hudson bay itself contains no obstacles which would interfere with its use for commercial purposes at any time of the year, it is to be regretted that such a favorable report cannot be made upon Hudson strait; for here we find that nature has imposed a limit to the period of navigation, in the form of ice. Another possible drawback to the easy use of this route is that, no matter whether Port Churchill or Port Nelson be eventually selected as the railway terminus, the harbor will be icebound for a part of the year. There seems to be no serious problem, however, connected with the ice conditions in the harbors, for these remain open in the autumn as long as it is possible for vessels to leave the strait, and are likely to be clear again the following season by the time they are able to enter the bay. Moreover, it is highly probable, as we have already seen, that the harbors can be kept open the whole year. Hence, the question as to how long each season the Hudson bay route could be used for the purposes of commerce is dependent chiefly upon the length of time Hudson strait may be navigated with safety.

As already pointed out, the Dominion government has been untiring in its efforts to arrive at the true answer to this question. In the light of all the evidence collected by experts, it seems fair to conclude that Hudson bay and strait, when properly charted and lighted, will afford a reasonably safe route for commercial vessels for at least three months in the year—from about the middle of July to the latter half of October. This conclusion should be considered as conservative. It is not entirely improbable that the period of safe navigation, so far as it is dependent upon ice conditions, may be lengthened materially when full information regarding the straits is at hand.

VOLUME OF TRAFFIC.

Assuming, then, the practicability of shipping grain from the northwest via Hudson strait, it may be well to inquire what portion of the export crop will probably be handled by this route. It must be admitted frankly at the outset that this question can be answered only in a general way, for there are so many factors which are capable of influencing the choice of route that it is impossible accurately to reckon with them all. So far as distance is concerned, it is evident that there would be a great advantage in shipping by the Hudson bay route. For all practical purposes, The Pas is as near to Port Nelson on Hudson bay as Winnipeg, the great wheat-shipping center in Manitoba, is to Fort William and Port Arthur, the two important grain ports on Lake Superior. But, as it has already been shown, Port Nelson is almost as near to Liverpool as is Montreal; so that the average distance to be saved by shipping via Hudson bay is the distance between Fort William and Montreal—approximately a thousand miles. Let us assume for the moment that it will be as cheap and as easy to provide for the transportation of grain from Port Nelson to Liverpool as it now is to make such shipments over the longer route from Fort William; and that, under any circumstances, grain will be carried as cheaply to Hudson bay as it now is from Winnipeg over the railway lines converging upon Fort William and Port Arthur. Winnipeg and The Pas may then be considered as "radiating points," each of which may be expected to draw upon a considerable area for traffic. Evidently somewhere between these two centers there will be neutral ground from which there would be no choice of route. This whole matter has received attention at the hands of the government officials, and it has been estimated that a line drawn from Dauphin, Manitoba, in a southwesterly direction so as to pass through Weyburn, Saskatchewan, would separate the territories tributary to Winnipeg and The Pas. Such a line of demarcation gives practically the whole of Manitoba and something like 11,000 sq. miles of the southeastern portion of Saskatchewan to Winnipeg, while the rest of Saskatchewan, including by far the greater part of the province, and all of Alberta belong to The Pas. The latter comprises a vast area equal in size to the Dakotas, Minnesota, Wisconsin, Nebraska and Iowa combined, whose fertility is believed to compare favorably with that of the states mentioned. It is the abundant faith in the future of this large region tributary to The Pas which has prompted the government of Canada to hearken to the demands of its western constituents and build the railway to Hudson bay. It is true that the country to the eastward of the line of demarcation is producing the most wheat at present, but already the yield in the area tributary to The Pas

is considerable, and there is no question but that millions of acres more will be sown to wheat within the next two or three decades.

There are, however, as has been intimated, certain indeterminable factors which are likely to upset all calculations and turn the shipment into channels least expected. The Hudson bay route can be used in the autumn for only about two months after the shipment of the year's crop begins; it will be closed for the season a month or more before the last shipments may be made from Fort William. And in the spring the great mass of grain which has been contained in the elevators during the winter cannot be forwarded via Hudson bay for possibly three months after the opening of navigation on the lakes. No one can foretell the ultimate influence of such facts upon the choice of a transportation route. Our assumption that the grain will be landed at Hudson bay as cheaply as at Fort William is a reasonable one, for the distances over which it would move are approximately the same to both points. In spite of the fact that the return traffic from Hudson bay promises to be light, it is expected that the rates on the new road will meet those on the lines which lead eastward. If it be assumed that freight and insurance rates will be equal from Montreal and the Hudson bay terminus of the railway to Liverpool, there will be a saving of from three and one-half to four and one-half cents per bushel in using the Hudson bay route instead of the St. Lawrence. For the cost of carriage from the head of Lake Superior to Montreal in 1910 varied between these two figures.

OPERATION CONSIDERATIONS.

The fact that the railway can be operated to its fullest capacity for only two months, to a somewhat lessened capacity for a third month, and possibly not at all or at any rate only to a small fraction of its capacity for the remaining three-fourths of the year, presents some unusually difficult problems to the engineers. It has been hard to decide upon what basis to provide accommodation for a railway which must be operated with such limitations. According to the plan which had been worked out by the former deputy minister and chief engineer of the Department of Railways and Canals, in the latter part of 1909, it was provided that there should be a single-track road. It was believed that 32 freight trains and one passenger train per day would be its capacity, so that roundhouses and shop accommodation sufficient to handle these numbers would be required.

It was estimated that a road thus equipped, when working to its fullest capacity and allowing for delays and accidents, would carry about 64,000,000 bu. of wheat to Hudson bay per month. There would have to be provided over 100 train crews, 150 telegraph operators, over 50 gangs of section men, shopmen, roundhouse men, superintendents, trainmasters, yardmasters, etc., most of whom would not be required for more than two or three months in the busy season in the autumn. For this reason it may be entirely impracticable for the government itself to operate the road after it has been built. It was stated by the deputy minister that it "would seem to require to be worked by one of the large corporations, so that men and rolling stock could be utilized the whole year." But at the very time that the Hudson Bay Railway would be running to its fullest capacity, both men and rolling stock are most in demand on the lines which operate throughout the year. This is also the time when there is usually a heavy general demand for labor. Then soon after the cessation of wheat shipments northward, the rush season would be over on the regular lines. Undoubtedly, however, some solution of the problem will be found. It is possible that the building of the road will soon be followed by the settlement of the adjacent country, and that a growing local traffic will make it necessary to operate the road the year round. This is a glimmering hope of the many, although it is actually expected only by the more optimistic.

Those who look with little favor upon the whole project find no end of prospective troubles. Yet it is to be remembered that there are few railways which have not been built in the face of what seemed to many at first sight to be insurmountable difficulties. This is true of a number of the Canadian lines. When the Canadian Pacific Railway was projected, it was predicted by a number of the leading men in the Canadian parliament that the road never would earn grease for its car wheels; and yet it is now one of the most prosperous railway companies in the world. There is absolutely no way of foretelling with accuracy the results which will follow a new line, especially when it traverses a new and comparatively unknown region. It is to be hoped that the building of the Hudson Bay Railway will hasten the development of the Canadian northwest; that the country through which it will pass may prove to be, when better known, of far greater economic value than the present available data would warrant us in believing; and that the various difficulties which now present themselves respecting the safe shipment of grain from the Hudson bay terminal may prove in time to have been more imaginary than real.

TRAIN ACCIDENTS IN MARCH[1]

Following is a list of the most notable train accidents that occurred on railways of the United States in the month of March, 1912.

Collisions.

Date.	Road.	Place.	Kind of Accident.	Kind of Train.	Kil'd.	Inj'd.
†*8.	Georgia	Social Circle.	bc.	P. & F.	5	9
8.	Atlantic C. L.	Wilmington.	bc.	P. & F.	4	9
*12.	N. Y. C.	Macedon.	rc.	F. & F.	1	0
12.	C., C., C. & St. L.	Greencastle.	bc.	P. & F.	3	18
13.	N. Y. C.: L. V.	Canastota.	xc.	F. & F.	1	3
13.	A., T. & S. F.	McCarty's.	rc.	F. & F.	3	8
15.	N. Y. C.	Syracuse.	xc.	F. & F.	1	0
†*20.	Ill. Cent.	Charles City, Ia.	rc.	F. & F.	1	0
20.	Lehigh Val.	Manchester.	xc	F. & F.	1	0
21.	Penn.	Barnegat.	bc.	P. & F.	2	10
29.	M., K. & T.	Denison.	bc.	F. & F.	0	8

Derailments.

Date.	Road.	Place.	Cause of Derailm't.	Kind of Train.	Kil'd.	Inj'd.
†1.	Southern	Oxford.	d. eq.	P.	5	5
4.	Denver & R. G.	Salida.	unx.	P.	1	1
4.	Penn.	Bucyrus.	b. wheel.	P.	0	0
6.	Ga., S. & F.	Tifton.	d. track.	P.	0	12
7.	Cleve., C., C. & St. L.	Bellefontaine.	acc. obst.	P.	0	2
7.	L. S. & M. S.	Collinwood.	b. wheel.	P.	1	3
†7.	Wabash	W. Lebanon.	b. rail.	P.	4	81
12.	Chi., M. & St. P.	Oakwood.	d. rail.	P.	0	15
12.	N. Y. C.	Batavia.	b. wheel.	P.	0	5
13.	N. Y. C.	Hyde Park.	b. rail.	P.	0	16
14.	Chicago G. W.	Dunkerton.	b. rail.	P.	0	28
22.	Cin., H. & D.	Miamisburg.	d. track.	P.	0	1
23.	Chi., B. & Q.	Cosby, Mo.	d. track.	P	0	7
31.	St. Louis, I. M. & S.	Wagoner.	.....	P.	1	23

The collision near Social Circle, Ga., on the 8th, occurred at 2:15 a. m., and four of the persons killed were negro passengers riding in the second class car. Eastbound passenger train No. 4 collided with westbound freight No. 13A, wrecking both engines, the first 3 cars on the passenger train and two cars of the freight. The investigation resulted in the conclusion that the engineman of the freight mis-read his watch, believing that when he departed from Rutledge, the first station east of the place of collision, he had sufficient time to go to a station twelve miles distant to meet No. 4. The conductor of this train alleges that his watch was wrong, although it had been compared with the regulator twelve hours previous, with a variation of less than five seconds. The conductor of No. 13B, which train was standing

[1]Abbreviations and marks used in Accident List:
rc, Rear collision——bc, Butting collision——xc, Other collisions——b, Broken——d, Defective——unf, Unforeseen obstruction——unx, Unexplained——derail, Open derailing switch——ms, Misplaced switch ——acc. obst., Accidental obstruction——malice, Malicious obstruction of track, etc. ——boiler, Explosion of locomotive on road——fire, Cars burned while running——P. or Pass., Passenger train——F. or Ft., Freight train (including empty engines, work trains, etc.)——Asterisk, Wreck wholly or partly destroyed by fire——Dagger, One or more passengers killed.

in the siding at Rutledge when Section A left there, immediately inquired over the telephone of the despatcher if 13A had orders giving it the right of road to the next station and informed the despatcher of the departure of Section A. The despatcher promptly notified the next station west, but too late, as No. 4 had left.

The trains in collision at Wilmington, N. C., on the 8th, were a passenger train from Fayetteville and an engine without train which had just started from the station to go to the relief of a disabled passenger train. The persons killed were the foreman of the company's shops, H. B. Goodknight and the engineman and fireman of the passenger train. Seven passengers and two employees were injured. The men in charge of the relief engine had overlooked the schedule of the passenger train.

The collision at Macedon, N. Y., on the 12th, occurred at 2 a. m.; an eastbound freight ran past a fixed signal set against it and into a preceding freight, which had been unexpectedly stopped, wrecking the caboose and one car. The caboose took fire from its stove and the conductor was burned to death.

The trains in collision at Greencastle, Ind., on the 13th, were the eastbound 24-hour train running from St. Louis to New York and a westbound freight which was at a standstill at the station. Of the persons killed one was the engineman of the freight, one was a man stealing a ride on the freight, and the third was the engineman of the passenger train. Thirteen passengers, three employees and two trespassers were injured.

The freight had encroached on the time of the passenger train without right. It appears that the line at this point is double track and the freight had used the eastbound track from Delmar, the first station east of Greencastle. It had right only to Greencastle and should have entered the side track at the east switch, but this was not done. The engineman of the freight was killed. The conductor of the freight is also held responsible, as the train had been at rest about 15 minutes before the collision occurred. The manual block system is in use here also, but it appears that the signalman reported to the despatcher that the freight was clear of the main track when it was not. The signalman appears to have taken the word of a brakeman of the freight.

In the collision at Canastota, N. Y., on the 13th a freight of the New York Central struck an engine of the Lehigh Valley at the crossing of the two roads, the New York Central engine being overturned and ditched. The person killed was a trespasser. The freight had passed distant and home signals set against it.

In the collision at McCarty's, N. M., on the 13th, a westbound freight train rain into a work train. The engine and the caboose of the work train were wrecked. The persons killed and injured were in the caboose of the work train; the track foreman, his wife and an assistant track foreman, killed, and five employees and three children of the track foreman injured. The cause of the collision was failure of work train to properly protect by flag.

The collision at Syracuse, N. Y., on the 15th, was between two engines in the yard, and the person killed was an employee riding on the front end of one of the engines. There was a dense fog at the time.

The rear collision of freight trains on the Illinois Central at Charles City, Iowa, on the 20th, resulted in the wrecking of the caboose of the leading train; and a trespasser riding in a car was burned to death by fire which started from the caboose stove. The following train had entered the yard at uncontrollable speed.

In the collision at Manchester, N. Y., on the 20th, a yard engine struck some freight cars on the main track. The engine was running at about 10 or 12 miles an hour, and an explosion of chemicals occurred in one of the cars, burning this car, as well as several others in the immediate vicinity. A freight conductor, riding on the front of the engine, was fatally injured.

The butting collision at Barnegat Pier, N. J., on the 21st, which occurred at about 6 p. m., was between an eastbound passenger train and a westbound freight standing on a side track. The switch had been left set for the side track, and the passenger train, approaching the station at uncontrollable speed, ran over the switch and into the head of the freight, wrecking both engines, one baggage car and three freight cars. The persons killed were the fireman of the passenger and the fireman of the freight; and six passengers and four trainmen were injured.

The train derailed at Oxford, Ala., on the 1st, was westbound passenger train No. 35, and three of the five persons killed were passengers, two of them being scalded by steam from a freight locomotive standing on an adjacent track, the car in which these passengers were riding having run against the engine in such a way as to cause the rupture of some of its steam pipes. One passenger car and one baggage car were overturned. The cause of the derailment was a part of the brake rigging which had broken and fallen on the track.

The train derailed near Salida, Colo., on the 4th was the westbound Continental Limited No. 3, and the two engines drawing the train were overturned. The person killed was the fireman. One of the enginemen was fatally injured. The derailment was due to an insecure rail; insecure apparently because repairmen had left it insufficiently spiked.

The train derailed at Bucyrus, Ohio, on the 4th, was the westbound 18-hour train, New York to Chicago. The derailment was due to the breaking of a wheel of the tender of the second engine.

The train derailed at Bellefontaine, Ohio, on the 7th, was eastbound express No. 20. It ran into a freight car which had been derailed on a sidetrack and overturned so as to foul the main track a few seconds before the passenger train came along. The passenger engine was overturned and fell down a bank, but the engineman and fireman, in some unaccountable way, escaped with only trifling injuries. No other person was injured, as the engine cleared the main track and allowed the rest of the train to run along some little distance before it came to a stop.

The train derailed at Collinwood, Ohio, on the 7th, was the westbound Twentieth Century Limited, and the cause of the derailment was a broken wheel. The person killed was a watchman in the cabin near the track, which was struck and demolished by the train. Sixteen passengers and three trainmen were injured.

The train derailed at West Lebanon, Ind., on the 7th, was the westbound Continental Limited, and all of the passenger cars were overturned or partly overturned in the ditch. The mail car, which was of steel, fell down a bank and was turned over one complete revolution, but the five clerks in the car escaped with only trifling injuries. Three passengers and one employee were killed and 62 passengers, 11 employees and 8 other persons were injured. (Reported March 15, p. 508.)

The train derailed at Batavia, N. Y., on the 12th, was eastbound passenger train No. 20, and one passenger car was overturned so that it fell against a train standing on an adjacent track. Five passengers were injured, none seriously. The train was automatically stopped by the air brakes, the air pipe having been broken. The derailment occurred at a frog, and was due to the breaking of a wheel of a sleeping car.

The train derailed at Hyde Park, N. Y., on the 13th, was the eastbound Twentieth Century Limited, of which all the cars but one fell to the Hudson river, which, however, was covered with ice. This accident was reported in the *Railway Age Gazette* March 15. It is believed to have been caused by a broken rail. The engine and the leading truck of the first car passed over safely.

The derailment at Dunkerton, Iowa, on the 14th, occurred at 2:30 a. m., and it was due to a broken rail. The train was running at about 40 miles an hour. Three day cars and one sleeping car were ditched and 28 persons were injured, one of them fatally.

The train derailed at Cosby, Mo., on the 23d, was northbound

passenger train No. 113. It was running at low speed near the station and was thrown off the track at a derailing switch which was out of order because of softness of the roadbed due to heavy rains. The baggage car and two passenger cars were overturned and fell down a bank. Seven persons were injured.

The train derailed near Wagoner, Okla., on the 31st, was St. Louis & San Francisco passenger train No. 3. Forty-six passengers and 7 employees were injured, none of them very seriously. The train was being run over the Iron Mountain because of an obstruction on the St. L. & S. F. The tender was the first vehicle to leave the track. The track was soft and a speed limit of 30 miles an hour was in force. This may have been exceeded.

Canada.—Two serious collisions occurred on the Canadian Pacific in March, one at Hull, Ont., on the 8th, and one at Amyot, Ont., on the 23rd. At Hull four passengers and the conductor were killed and 11 persons were injured. In the other case one passenger and two trainmen were killed and three persons were injured. In this case, it is said, that the passenger train, westbound, ran past the station at which it was ordered to meet the eastbound freight. At Hull a telegrapher is held at fault. A coroner's jury found that the passenger train was running with the engine at the rear and that the mortality would have been less if it had been at the head of its train.

Electric Accidents.—Of the eight accidents to electric cars reported in the newspapers as having occurred in the United States in the month of March, three resulted in fatal injuries; a collision at Victor, N. Y., on the 8th, one at Brown's, Ohio, on the 22nd, and one at Fortville, Ind., on the same day, two persons being killed in the last named accident. At Victor, a work train backed into a passenger car, the view of which was obscured by fog. At Brown's a freight car ran around a sharp curve and into a standing passenger car. At Fortville, two passenger cars met in a butting collision, both running at good speed. The vestibules of both were crushed and the motormen were instantly killed. The wreck was set on fire by short-circuits in the wires and by the overturned heaters. The first relief for the 30 persons injured in this wreck came in the shape of a freight train of the Cleveland, Cincinnati, Chicago & St. Louis, the conductor of which took the injured persons into his caboose and carried them to Indianapolis.

NEW NORTHERN CENTRAL STATION AT BALTIMORE.

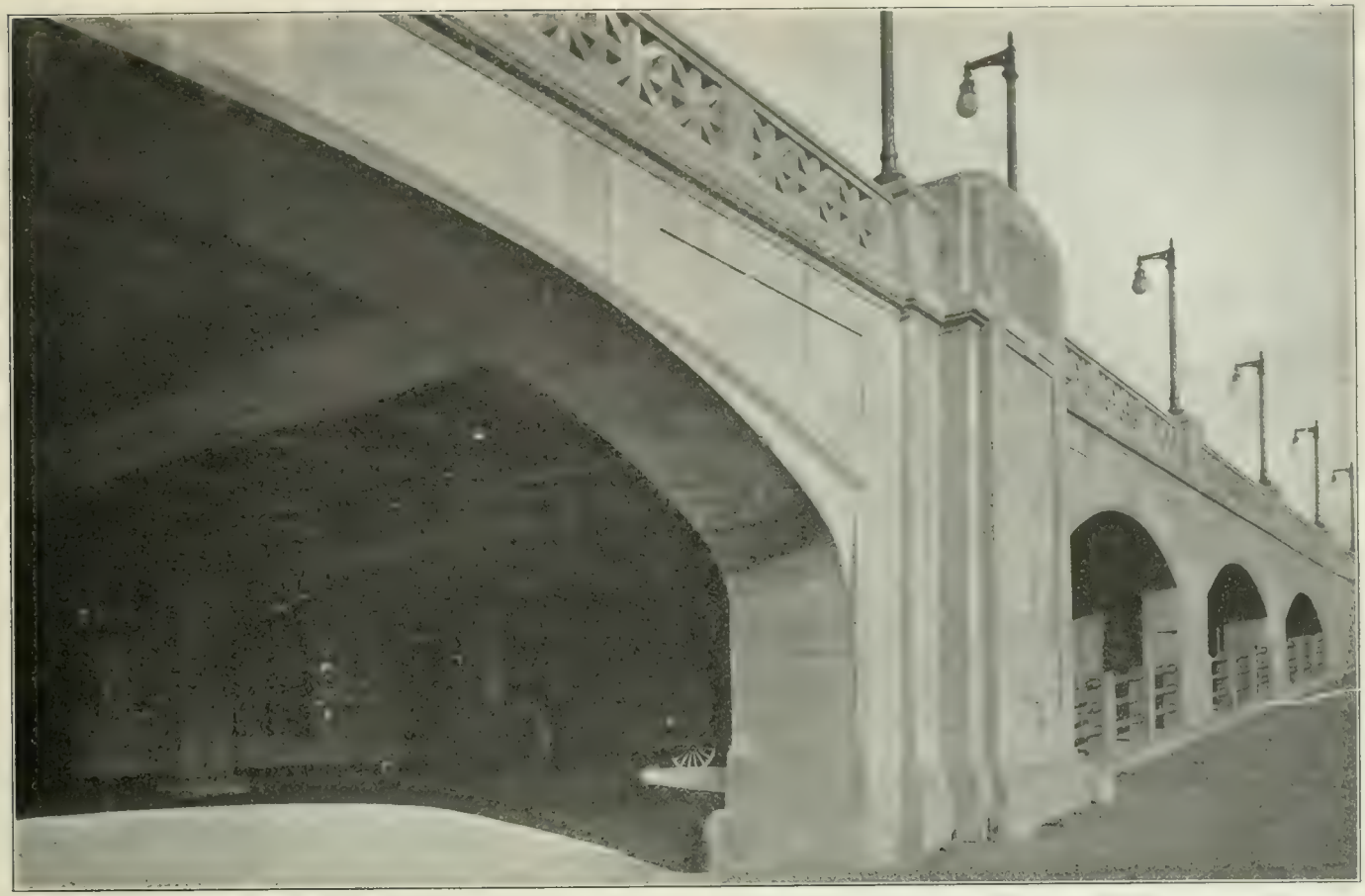
The new Northern Central union station at Baltimore, Md., was put in service last fall, but not fully completed until this winter. Previous descriptions have appeared in the *Railway Age Gazette* of April 8, 1910, and January 13, 1911.

The new building is on the site of the old union passenger station between St. Paul street and Charles street, and just north of Jones falls. The station fronts south, toward the center of the city, the seven passenger tracks being at the back. The building, as shown in the photograph, is reached from Charles street by an approach bridge over the main freight tracks, several spur tracks and over Jones falls. A bridge 50 ft. wide connects Charles street and St. Paul street. There is a street car line on Charles street, but none on St. Paul street.



General View of Baltimore Station, from St. Paul Street.

The concourse is at street level. There is an enclosed concourse parallel to the tracks with a covered passage leading past the cab stand to Charles street. The rest of the concourse is on a bridge over the tracks. Incoming and outgoing passengers are not mechanically separated, but their movements are unrestricted, since incoming passengers diverge through the enclosed concourse toward Charles street, while outbound passengers go from the main waiting room direct to the head of the stairs leading to the platform on which their train stands. The

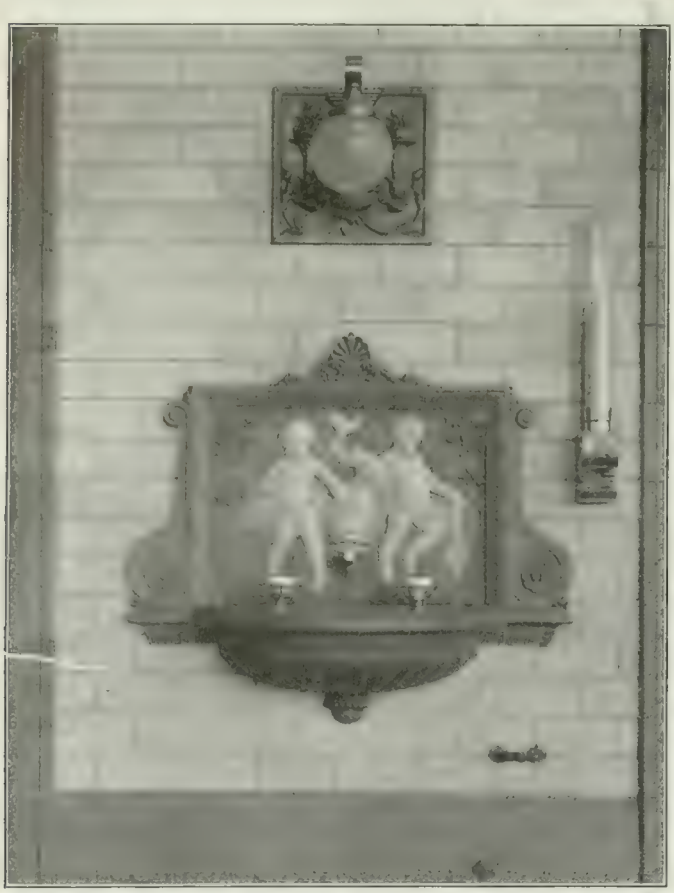


Entrance to Baggage and Express Rooms at Foot of Ramp.



Main Waiting Room.

tracks are protected with Bush train sheds, several installations of which have been described in these columns.



Faience Drinking Fountain in Concourse.

The baggage room at the street level is used only for luggage which the passenger brings to the station with him. The main baggage room is below on the track level. This level is reached by an inclined driveway opening on St. Paul street just south of the bridge connecting the two streets. A baggage chute and an elevator also connect the baggage room on the street level with the large room at track level. There are no subways under the tracks for handling baggage to the platforms; baggage is trucked across the tracks. The other rooms on the track level of the building include express room, immigrants' waiting room, commissary department rooms, trainmasters' office, station master's office.

The two upper floors of the building are for offices. The main waiting room is three stories high, being covered by a skylight. The building is fireproof, steel and concrete construction. The exterior is finished in pink Milford granite. The interior of the waiting room is of Doric architecture and is finished in Pentellic marble, the same stone of which the Parthenon at Athens is made. The concourse on the bridge over the tracks is lined with Faience tiling, and all rooms in the basement are also tiled.

Kenneth M. Murchison, New York, was the architect.

An extension of the Siamese Northern line, Siam, from Dene Chai to Chiengmai, is proposed. This line would run from Dene Chai via Pang Buei across the Meh Yome and the Meh Wang rivers, and thence to the plain of Chiengmai through a tunnel nearly a mile long. From Bangkok to Chiengmai the distance by this route is 453 miles, and from Dene Chai 135 miles.

The first section of the Southern Railway, Federated Malay States, from Perchaburi to Cha Alm, a distance of 23 miles, was opened to traffic on June 1, 1911. This is the first part of the new railway which will eventually link the Siamese and the Federated Malay State railway systems and form a direct connection beyond Singapore and Bangkok. This connection is expected to be completed within two years.



Detail of Waiting Room of Baltimore Station; Entrance to Passenger Bridge Over Station Tracks.

General News Section.

The general offices of the Chicago, Indianapolis & Louisville in Chicago, now located in the Republic building, will be removed about May 1 to the Heisen building, where a lease has been taken of the entire fourteenth floor.

The Grand Trunk has signed an agreement with its locomotive enginemen, to be in force three years, by which wages will be increased about 10 per cent. The increase applies on the whole of the company's lines, both in Canada and the United States.

The railway brotherhoods which have been asking for increased pay on the lines of the southeastern states, are now voting on the question of giving their leaders power to order a strike, and the vote may be announced in a week or ten days.

Two masked robbers secured an entrance to the Golden State Limited train on the Chicago, Rock Island & Pacific near Rock Island, Ill., on April 21, and robbed seven passengers in one of the sleeping cars of their money and valuables. The men entered the train after it had stopped to take water.

The Western Union Telegraph Company announces that it has made a contract with the Marconi Wireless Telegraph Company for the general interchange of messages to and from Europe; and the contract provides for the extension of the wireless telegraph from the Pacific coast to Hawaii, China, Japan and the Philippines.

The twenty-third annual report of the Relief Department of the Chicago, Burlington & Quincy, for the year ending December 31, 1911, shows an expenditure during the year of $621,165.34 in benefit orders to employees of the company. This was more than was received in contributions from members, and the company advanced $38,262.76. Since the establishment of the fund in 1889 there has been paid in benefit orders to employees on account of sickness and accidents a total of $8,240,184.67. The payments by the railway company have amounted to $1,458,211.

The New York State Public Service Commission, Second district, announces that it is unable to take up any further grade crossing elimination applications this year as no funds have been provided for the state's proportion of such work. There are now uncompleted 41 cases in which work has been ordered. The total estimated amount of the state's proportion of the cost in those cases is $1,137,258. The entire balance of appropriations available for every purpose is $1,209,513. There are pending before the commission twenty-seven applications on which no action can be taken at present.

Governor Dix, of New York, has approved the bill which has been passed by the legislature codifying the law, relating to lands and forests. The reforestation of waste land is to be encouraged by relieving the owners from taxation. Inspectors, acting for the state, are to inspect railway locomotives anywhere in the state where large forests are liable to be endangered by engines which throw sparks, and an inspector may order out of service an engine not suitably equipped to guard against fires. The rules in regard to locomotives apply to logging roads as well as lines operated by common carriers.

The Special Committee on the Relations of Railway Operation to Legislation has prepared a brief memorial to F. O. Melcher, the late chairman of the committee, who was killed in the collision at Kinmundy, Ill., January 22, and has sent copies of it to all the railways. This memorial, signed by Chairman Jackson and Messrs. Stuart and Wickersham, recognizes Mr. Melcher's particularly valuable work as chairman of the committee, and closes with the declaration that "we record our conviction that of all the men of his time he has contributed most largely to the ultimate working out of a proper relationship between the railways, the public, the government and railway employees."

A press despatch from Denver says that the Denver & Rio Grande has deeded back to the government coal land in Colorado and Utah worth $2,000,000, which was secured by the use of "dummy" entrymen. The suit of the government to recover has been compromised and 8,288 acres of coal lands revert to the United States. The royalty for which judgment was asked at 8 cents a ton is the equivalent of $15,000,000. The suit has been pending for about four years. It was brought by the government against the Utah and Calumet Coal companies which are controlled by the Denver & Rio Grande. They were charged with making fraudulent land filings in which dummy entrymen were said to have figured.

Vice-president W. L. Park of the Illinois Central has written a letter to Captain Beech, in charge of the Illinois Central's transfer boat "Bertram," plying between Helena, Ark., and Trotter's Point, Miss., commending his heroism during the floods in the Mississippi river. Without special instructions, after he had been cut off from the Mississippi side he took his boat along the levee on the Arkansas side and at great risk to himself and crew saved a great many lives and personal property. Mr. Park said in his letter: "Seed sown in this way must return a hundred fold in bringing about on the part of the public greater confidence in and respect for the railways, which they have in most cases been unjustly deprived of."

A new contract has been entered into by the Illinois Central and the Board of South Park Commissioners of Chicago, by which the railway surrenders to the commission its riparian rights to the shore of Lake Michigan in return for a strip of additional right of way from 50 ft. to 150 ft. wide from Thirty-first to Fifty-first street, and additional property south of Twelfth street; and the railway agrees to depress its tracks 7 ft. between Thirty-first and Fifty-first street. The new contract omits several features included in the previous contract, which the city council refused to approve, and can be carried out without the consent of the city. Several other features of the plan, including the opening of Twelfth street, through the railway property and the location of the proposed new passenger terminal, are left for further negotiations between the city and the railway.

Two hundred and fifty delegates, representing the Brotherhood of Railway Car Men, the Brotherhood of Boilermakers and Helpers, the Brotherhood of Blacksmiths, the International Association of Sheet Metal Workers, and other shopmen's organizations, at a meeting at Kansas City on April 22, organized the "Federation of Federations," to represent the shop workmen employed on 47 lines west of the Mississippi river. The Federation claims 300,000 members. On the second day of their meeting they prepared and sent to President Taft a telegram notifying him that they had decided "to extend or to make preparation to extend" to all the railways in the West the strike on the Harriman Lines and the Illinois Central, which they started last year, "unless a settlement of an honorable character can be secured." They claim that their constituents are determined and that the other railways are assisting the Harriman Lines; and it is declared that boiler explosions are becoming more frequent. The president of the Federation of Federations is W. O. Horton, of St. Louis; vice-president, G. W. Pring, Des Moines; secretary, John Scott, San Francisco. The first of the eleven names signed to the telegram sent to President Taft is James W. Kline.

Governor Wilson, of New Jersey, has sent to the legislature a veto of the law requiring abolition of grade crossings which was passed by the legislature several weeks ago. This bill provided for the abolition of dangerous grade crossings under the supervision of the Public Utility Commission, the commission being empowered to decide details, settle differences and determine the order in which rival applications shall be attended to. If a railway asked to have a crossing abolished, it would have to pay the whole cost, including property damages, except that an electric street railway could be compelled to pay 10 per cent. When a city or town petitioned the commission, it would have to pay 15 per cent. of the expense. The most sweeping provision was that every railway in the state should remove one crossing every year for each 30 miles of its line. Some of those who advocated this bill claim that it is a law, in spite of the governor's action, because he sent his veto to the wrong House. Both houses of the legislature discussed the bill on the last day of the session (April 16), the senate refusing to pass it over the governor's veto, while the house adopted a resolution expressing the belief that the bill was already a law. It is expected that it will be filed with the Secretary of State, and that its validity will have to be settled by the courts.

Massachusetts Railways' Appeal to the Public.

The following argument, which explains itself, has been published in the advertising columns of prominent Massachusetts newspapers, set in display type, filling perhaps four times the space which it occupies here. It is signed by T. E. Byrnes, vice-president of the New York, New Haven & Hartford and the Boston & Maine, and J. H. Hustis, vice-president of the New York Central, lessee of the Boston & Albany. It is headed "TO THE PUBLIC":

The "full crew" bill, so-called, which will require the railroads to employ an unnecessary brakeman on many freight trains, is being pushed through the legislature with all the power of the organized trainmen. This bill will cost the railroads approximately $500,000.00 per annum, and if extended to the entire New England Railroad system, will cost over $1,000,000.00 per annum. The railroad commission, in a report dated September 23, 1908, has decided that this extra brakeman is not needed for the safety or convenience of the public or for the safety of the employees themselves.

At present such a number of brakemen is employed as the railroad officials, with the approval of the railroad commission, deem sufficient. No accident has ever taken place which can be fairly attributed to the absence of an extra brakeman, or which would have been averted by the presence of an extra brakeman. Automatic couplers, automatic brakes and block signals introduced by the railroads, at the cost of many millions of dollars, have changed the duties of freight brakemen materially in the last ten years since this bill was first introduced. If the railroads are compelled, against the judgment of their officials and of the railroad commission, to employ unnecessary men, the public must expect to pay the bill in increased rates. There is no other source of income. The public expects electrification, tunnels, improvements in service and equipment, at a cost of scores of millions of dollars. Is it willing to pay for unnecessary freight brakemen, whose employment organized railroad employees alone demand?

If this bill is passed this year, what will prevent another bill being introduced next year commanding the employment of extra engineers, firemen, station men, conductors, ticket takers, section men or motor men? Where is this to stop?

Does the public, who, in the end, must pay the bill, desire that the railroads employ unnecessary labor and that improvements for the general good be halted? We do not believe so, and we ask you to advise your representatives and senators accordingly.

Steel Directors' Interests.

The Congressional committee that has been investigating the steel industry reports that twenty-three officers and directors of the United States Steel Corporation are also directors of organizations representing $35,124,143,009. The report asserts that a great majority of railway corporations, a system of powerful banks and trust companies, and the great insurance companies are allied with the steel corporation. Commercial organizations of which the directors and officers are also directors and officers, represent $17,755,171,249. Railways of which United States steel men are directors represent $10,365,872,344, or more than half the valuation of all the roads in the country. Banks, trust companies and insurance companies, of which these men are directors, have surpluses and deposits of $3,314,811,178; and industrial corporations, $2,813,509,348. Officers of the corporation are also directors in street railways, express companies, telephone companies and steamship companies, with capital and funded indebtedness of $1,171,778,890. The report contends that the United States Steel Corporation with its ramifications of interlocking directorates, constitutes the real "money trust." Of the two great financial groups, the committee is of the opinion that the Morgan group is more powerful than the Standard Oil group.

Negotiations with Eastern Enginemen.

The managers and enginemen of the eastern roads this week accepted offers of mediation under the Erdman act and are now holding separate conferences with the mediators.

On April 18, the committee of managers, who had been considering the announcement of the enginemen's strike vote, sent their reply, to the effect that they had nothing to offer. Grand Chief Stone answered, saying in part: "We desire to call your attention to the fact that the railway companies in the West, Northwest and Southwest and Southeast are at the present time paying their enginemen approximately the same rates we are contending for here, with better working conditions than we are asking for. You base your refusal to grant the increases 'on the roads' inability to pay more,' and offer nothing beyond the bare statement to substantiate it, regardless of the fact that financial reports show both increased earnings and volume of business. You state 'The public interests are demanding safer and better transportation, double track, interlocking and block signals, better cars, stronger track, elimination of grade crossings and adoption of safety appliances.' We agree the public are entitled to all this, and we are firmly of the opinion our constituency composed of 28,000 trained enginemen on the roads represented are an important factor in the creation of that degree of safety so essential to satisfy public demands. We also desire to call your attention to the fact that in both the western and southern territory, where the volume of both freight and passenger traffic is lighter, and grade lines often heavier, the roads are making all these improvements mentioned, and are still earning money, and paying better wages than we request. We note your reference to the conservatism of the enginemen, and wish to suggest we have not departed from that policy, but when the conference committee seeks to capitalize on the conservatism of the enginemen to the extent of declining our proposal in its entirety, such action forces us to admit the futility of adhering to a policy that is unable to secure results that have heretofore been obtained by other employees with more radical policies."

The managers agreed to meet again on April 22 to consider the matter further. They did so, but after the meeting announced that they saw no way of modifying their previous conclusions. The representatives of the brotherhood then announced their intention of putting a strike into effect as soon as possible, probably within 36 hours. That evening Martin A. Knapp, presiding judge of the United States Commerce Court, and Charles P. Neill, United States commissioner of labor, on their own initative offered their services as mediators. The enginemen accepted within a short time, and the following day, after several meetings, the managers also accepted. The mediators held conferences with the latter on April 24 and 25, and intend to meet with the enginemen as soon as possible.

The Mexican Way of Handling a Strike.

Anticipating a strike of the American conductors and enginemen employed on the National Railways of Mexico, which had been called for 5 o'clock on the afternoon of April 17, on account of an alleged policy of discrimination against American employees in order to eliminate them from the service, the management issued an order discharging them at 3 o'clock on the afternoon of the 16th, just 26 hours in advance of the time set for the strike. According to press reports, the order found many of the men at distant points on the system; and, four days before, an order had been issued cancelling all passes for American employees and members of their families. About 1,000 American enginemen and conductors are said to have been affected. All trains run after the issuance of the order were manned entirely by Mexicans, but for a time it was necessary to abandon a part of the service.

Frisco Asks Governors to Co-operate in Reducing Trespassing.

W. B. Spaulding, chairman of the Central Safety Committee of the St. Louis & San Francisco, has addressed a letter to the governors of the eight states through which the Frisco lines run, Missouri, Kansas, Oklahoma, Arkansas, Texas, Tennessee, Mississippi and Alabama, calling their attention to the proportion of trespassers in the number of persons killed and injured by the railways, and urging their co-operation in improving the situation. With the letter was included a statement showing that 50,025 trespassers were killed and 52,427 injured in the United States during the ten years of 1901-1910 inclusive, while in the same period in Great Britain and Ireland only 4,435 trespassers were killed and 1,319 injured; that of the 103,452 trespassers killed and injured in the last ten years, 13,000 were under the age of 14 years and 20,000 were between the ages of 14 and 21. In other words there have been enough minors killed and injured in the past ten years in the United States to more than make a milepost for every mile traveled in a trip around the world. The letter was as follows:

"The 23,000 employees of the St. Louis & San Francisco, in

an earnest endeavor to safeguard both themselves and the patrons of the company, have established a Safety First, or an accident prevention, organization. This organization, which is represented in all departments, is for the purpose of reducing casualties of every character in the operation of the railway on which they are employed. I have the honor of being its chairman. "I respectfully submit a statement herewith, showing the number of persons, classed under the general head of trespassers, killed and injured on the railways of the United States during the years 1901 to 1910 inclusive, and compared with statistics for Great Britain, and feel confident that you will be impressed with the necessity for measures which will prevent this tremendous decimation in the population, and particularly in the youth of the country.

"The railways of the United States have always realized the importance of this matter and have continuously attempted to prevent this peculiarly unnecessary loss of life. The annual uniformity of the fatalities among the trespasser class discloses the futility of the efforts of the railways in this direction.

"In its essence, this is an economic question for which England and Germany have long since made provision. Governmental aid is necessary to remedy this public evil. Primarily, we need your co-operation and trust you will accord us your valuable energetic assistance.

"I hope you will find it consistent to send us a letter, a copy of which we can send to every mayor and county judge in the state, in order to impress upon them the need of stringent action in dealing with railway trespassers, and at the same time, I request your attention to the laws of your state upon the subject, and would suggest that if you deem proper and these laws appear to you inadequate, that you bring the subject to the attention of your next general assembly.

"If, however, you find the laws adequate, we earnestly solicit your assistance in seeing that they are effectively enforced."

Mr. Spaulding has received replies from Governor Earl Brewer of Mississippi and from Governor Colquitt of Texas, promising their co-operation. Governor Brewer said he would bring the matter to the attention of the next legislature, and Governor Colquitt expresses the opinion that the municipal authorities should pass ordinances prohibiting trespassing.

Cleveland Engineering Society.

At the regular meeting of the Cleveland Engineering Society to be held May 14, Colonel John Millis, U. S. A., will give an illustrated talk on River and Harbor Improvement, from the engineering standpoint, and Charles W. Hopkinson will give an illustrated talk on the same subject from the esthetic standpoint.

Railway Club of Pittsburgh.

The Railway Club of Pittsburgh will give a minstrel vaudeville entertainment at the Nixon theatre, Pittsburgh, Pa., on May 18.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.; annual, May 7-10, Richmond, Va.

American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass.; annual, May 10-11, San Francisco, Cal.

American Association of General Passenger and Ticket Agents.—W. C. Hope, New York; next convention, Seattle, Wash.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Detroit, Mich.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York. Convention, October 7-11, Chicago.

American Electrical Railway Manufacturers' Assoc.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

American Railway Association.—W. F. Allen, 75 Church St., New York. Next session, May 15, New York.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago.

American Railway Master Mechanics' Assoc.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

American Railway Tool Foremen's Association.—M. H. Bray, N. Y. N. H. & H., New Haven, Conn. Convention, July 9, Chicago.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

American Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 21-23, 1912, Los Angeles, Cal.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago. Semi-annual, June 11, Atlantic City, N. J.; annual, October 21-25, Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Car Accounting Officers.—G. P. Conrad, 75 Church St., New York. Convention, Oct. 7-11, Chicago.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, 11, rue de Louvain, Brussels, Belgium; convention, 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago. Convention, May 22-25, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

Master Car and Locomotive Painters' Assoc. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass. Convention, September 10-13, Denver, Col.

National Railway Appliances Assoc.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railroad Club.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Business Association.—Frank W. Noxon, 2 Rector St., New York.

Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

Railway Gardening Association.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.

Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio. Convention, May 20-22, Buffalo, N. Y.

Railway Supply Manufacturers' Assoc.—J. D. Conway, 2135 Oliver Bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

Railway Tel. & Tel. Appliance Assoc.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling, Ill. September 10-13, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; August, 1912.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The first steamboats of the season on Lake Erie started from Buffalo on Monday last.

The Chicago & North Western has established a new parlor car service between Chicago and Williams Bay, Wis.

The Canadian Pacific and the Trans-Siberian Railways have made a joint agreement to sell tickets for trips around the world.

The governor of New York has vetoed a bill which aimed to give to the Public Service Commission authority to suspend passenger tariffs pending investigation as to their reasonableness.

The Ohio State College of Agriculture, using a train furnished free by the New York, Chicago & St. Louis, will give lectures along the line of that road on May 1, 2 and 3, stopping at 17 places.

The legislature of the Island of Jamaica has taken action looking to the subsidizing of a line of steamships to be run by the Canadian Pacific Railway weekly between Jamaica and a port in Canada.

It is announced that about June 1 the Pennsylvania will put in service a new 26-hour train, to be known as the "Broadway Limited," between Chicago and New York over the Panhandle route. This will be a solid, all-steel train of vestibuled cars.

The government has brought four suits in the federal court at New York City against the New York Central to receive penalties for keeping seven loads of hogs in the cars beyond the length of time allowed by law. The alleged offenses took place in January and February, 1911.

Arrangements have been completed by the tours department of the Chicago & North Western and Union Pacific for its twelfth season of summer vacation travel. The programme includes seven 15-day Yellowstone Park tours and tours to California, the Pacific coast, Yosemite National Park, Lake Tahoe, Alaska and other points of interest.

The "Bulletin of Business Openings in Western Canada," which is issued quarterly by the Grand Trunk, has just appeared for the month of April. It gives in much detail the wants of all the principal places on the Grand Trunk Pacific west of Winnipeg. Doctors, druggists and school teachers are wanted everywhere, as well as blacksmiths, barbers, tailors, etc.

Effective April 28 a change in time will be made on several of the through trains of the Chicago, Milwaukee & St. Paul. The "Columbian," now leaving Chicago at 10 a. m. for the Pacific coast, will leave thereafter at 10:30, and No. 5, the day express, will leave at 9:30 a. m. instead of 9:15. The changes are made to insure better connections with trains arriving from the East.

United States Senator Rayner, of Maryland, has introduce a bill which is intended to make it possible to bring a suit against such joint stock associations as the Adams Express Company for violations of the interstate commerce act. The introducing of the bill followed a decision by Judge Hollister, in the United States circuit court, holding that since the Adams Express Company was neither an individual nor a corporation, suits would have to be brought against individual stockholders for violations of the interstate commerce act.

At a meeting of the Transcontinental Passenger Association in Chicago on April 17 consideration was given to a proposition to extend the annual homeseekers' fares which have heretofore been in effect only to points as far west as Arizona, New Mexico, Utah and Idaho, to the Pacific coast, on the basis of $65 for the round trip. It is understood that the Western Pacific advanced the proposition and that several other roads were also in favor of it, but that it was opposed by the Atchison, Topeka & Santa Fe and the Southern Pacific. No decision was reached, and the question was referred to a later meeting.

At a meeting of the executive committee of the American Association of General Passenger and Ticket Agents, of which C. A. Cairns, general passenger agent of the Chicago & North Western, is president, held in Chicago on April 19, arrangements were made for the next annual convention of the association, which will be held at Seattle, Wash., on September 12. The preparation of the docket is in charge of a committee of which A. Hilton, general passenger agent of the St. Louis & San Francisco, is chairman. Among the subjects to be considered will be advertising and the most effective methods of distributing folders, pamphlets, etc., with a view to avoiding a waste of material, uniform methods of ticketing, the development of summer and winter tourist traffic and the simplification of ticket requirements.

The Committee on Foreign Relations of the House of Representatives has filed in Congress a report in favor of meeting the expenses of delegates to a proposed Congress in this country of Chambers of Commerce and Commercial and Industrial Associations from all over the world. The proposed amount of the appropriation is $50,000 to cover, among other things a tour by the foreign delegates to the principal commercial, industrial, agricultural and social centers of the United States to acquaint them with our institutions and enterprises. The Secretary of State is requested to ask the governments of the commercial nations of the world to notify the leading business organizations of their respective countries of this action.

Traffic Club of New York.

The regular meeting of the Traffic Club of New York will be held at the Waldorf-Astoria hotel, April 30. Col. W. B. Dunn, chief of the bureau for the safe transportation of explosives, will deliver an illustrated lecture on the subject of his work and experience.

New York City Rapid Transit.

Governor Dix of New York has signed the Wagner bill giving the Public Service Commission, with the approval of the city Board of Estimate, power to make contracts with companies operating or agreeing to operate existing subway lines, for equipment and operation of municipal lines in connection with their present system.

Following his approval of the Wagner bill Mayor Gaynor of New York last week signed, orders legalizing the following subway routes which the Brooklyn Rapid Transit Company will construct as its portion of the proposed dual subway system:

Eastern Parkway, including Flatbush avenue, with Brighton Beach connection; the Utica avenue connection, the Livonia avenue connection, the Livonia avenue route (separate from the Livonia avenue connection), the Nostrand avenue route, the Fifty-ninth street route and over the Queensboro bridge to Woodside and Astoria and the Roosevelt avenue route. No provision for operating the Fourth avenue (Brooklyn) subway has been made so far, but it will probably be operated in connection with the B. R. T. system.

Frisco Agents to Handle Industrial Matters.

In the *Railway Age Gazette* of February 16, page 278, was published a description of a plan being worked out on the St. Louis & San Francisco of extending the authority of the station agent by giving him power to represent the company in the solicitation of traffic and in the settling of claims within certain limits. In pursuance of this same policy, Frank Anderson, industrial commissioner, has issued a circular letter to the station agents of the Frisco lines, vesting them with the authority to represent the industrial department locally and thus to transact directly a great deal of business relating to the development of the towns and community in general. The letter to the agents is in part as follows:

"Heretofore, the industrial department has been without a local representative in each town and community on our lines, but beginning with this date, you are the industrial agent and the actual representative of this department in your town and community. It is through you that this department will deal with the people of your town and surrounding country. No representative of this company knows the local conditions or the industrial possibilities of your town and country better than you.

"It is the desire of this department that you cooperate with

the business men's commercial associations and the farmers' organizations, in the interest of the upbuilding of your town and surrounding country. You should meet and discuss with them all industrial matters, such as securing new industries for your town, the development of your surrounding country, and all other matters which might in any way assist in the upbuilding of your town and community, the people of which I am sure, will be glad to cooperate with you fully when they know you are the actual industrial representative, and are ready to cooperate with them. I will be glad if you will inform your business men and farmers, in whatever way you choose, that you are ready to cooperate with them in every possible way, and that you are the representative of this department on the ground, with whom they can deal at any and all times."

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association in presenting statistical bulletin No. 117, giving a summary of car shortages and surpluses by groups from December 7, 1910, to April 11, 1912, says:

"The total surplus on April 11, 1912, was 94,943 cars; on March 27, 1912, was 52,682 cars; on April 12, 1911, was 187,219 cars.

"Compared with the preceding period there is an increase of 42,261 cars, of which 2,935 are box and 36,260 are coal cars. The increase in box car surplus is most noticeable in groups 3 (Ohio, Indiana, Michigan and Western Pennsylvania); 6 (Iowa, Illinois, Wisconsin, Minnesota and the Dakotas), and 10 (Oregon, Idaho, California, Arizona and Washington), although there are slight increases in all other groups with the exception of groups 7 (Montana, Wyoming and Nebraska), 8 (Kansas, Colorado, Missouri, Arkansas and Oklahoma) and 9 (Texas, Louisiana and New Mexico), where a decrease is shown. The increase in coal car surplus is general throughout the country except in group 7 (as above), but is most pronounced in groups 2 (New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania) and 3 (as above). This is doubtless attributable to the suspension of coal traffic.

"The total shortage on April 11, 1912, was 15,554 cars; on March 27, 1912, was 33,974 cars; on April 12, 1911, was 1,166 cars.

"Compared with the preceding period there is a decrease of 18,420 cars, of which 9,767 are box, 6,937 coal and 2,149 miscellaneous cars, with an increase of 433 in flat cars. The decrease in box car shortage is general except in groups 7 and 10 (see above), where a slight increase is shown. The decrease in coal car shortage is also general throughout the country. Compared with the same date of 1911 there is a decrease in total surplus of 92,276 cars, of which 29,923 is in box and 45,156 in coal cars. There is an increase in total shortage of 14,388 cars, of which 9,533 is in box and 563 in coal cars."

The accompanying table gives car surplus and shortage figures by groups for the last period covered in the report, and the diagrams show total bi-weekly surpluses and shortages in 1907 to 1911.

Freight Car Balance and Performance.

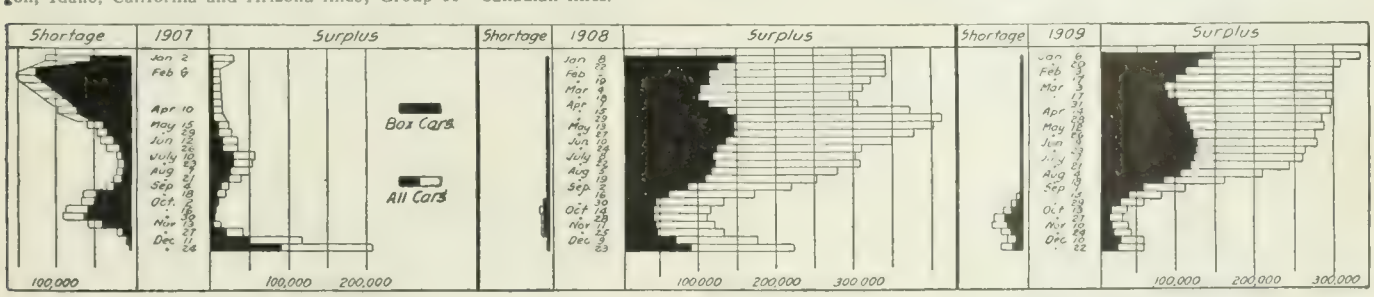
Arthur Hale, chairman of the committee on relations between railways of the American Railway Association in presenting statistical bulletin No. 118, covering car balance and performance for December, 1911, says:

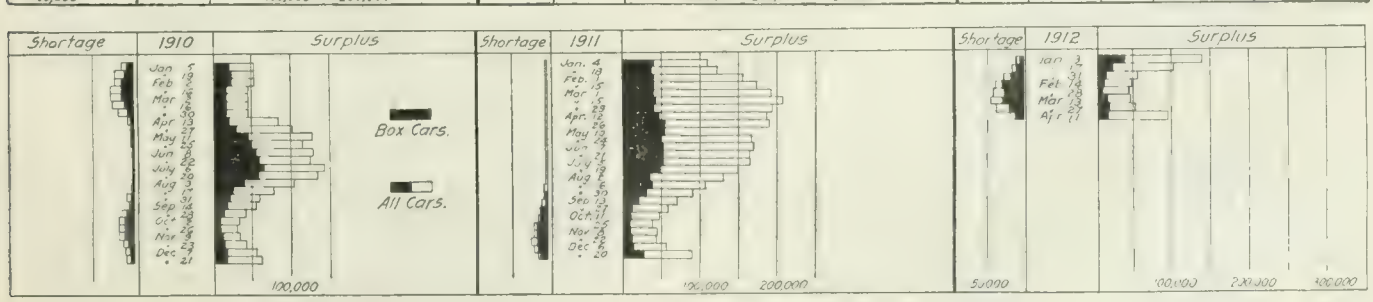
"The per cent. of cars on home line remains the same as in November, viz., 56; this compares with 55 per cent. in December, 1910. There is a decrease in the per cent. of loaded mileage from 70.8 in November to 68.0 in December. The percentage of loaded mileage is 1.7 less than it was a year ago. The average miles per car per day shows a further decrease of 1.0 miles to 23.4 from the November figure, but an increase of 0.7 miles

Car Surpluses and Shortages.

Date.	No. of roads.	Surpluses— Box.	Flat.	Coal gondola and hopper.	Other kinds.	Total.	Shortages— Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1.— April 11, 1912..	7	729	1,278	2,203	283	4,493	169	71	0	0	240
" 2— " 11, 1912..	26	453	117	21,485	471	22,526	767	6	1,029	1	1,803
" 3.— " 11, 1912.	27	475	296	12,941	2,621	16,333	588	305	60	2,003	2,956
" 4— " 11, 1912.	10	282	48	355	1,189	1,874	1,447	425	123	255	2,250
" 5.— " 11, 1912..	19	76	186	933	745	1,940	1,295	90	0	45	1,430
" 6.— " 11, 1912.	24	5,111	269	4,936	4,620	14,936	670	58	0	132	860
" 7— " 11, 1912.	3	0	72	182	82	336	211	0	10	6	227
" 8.— " 11, 1912.	16	2,447	388	2,191	2,062	7,088	23	0	0	204	227
" 9— " 11, 1912.	10	1,481	250	200	1,061	2,992	0	0	0	0	0
" 10.— " 11, 1912..	22	6,562	2,747	3,374	9,426	22,109	71	5	0	0	76
" 11.— " 11, 1912.	5	0	33	0	283	316	4,405	377	0	703	5,485
Total	169	17,616	5,684	48,800	22,843	94,943	9,646	1,337	1,222	3,349	15,554

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



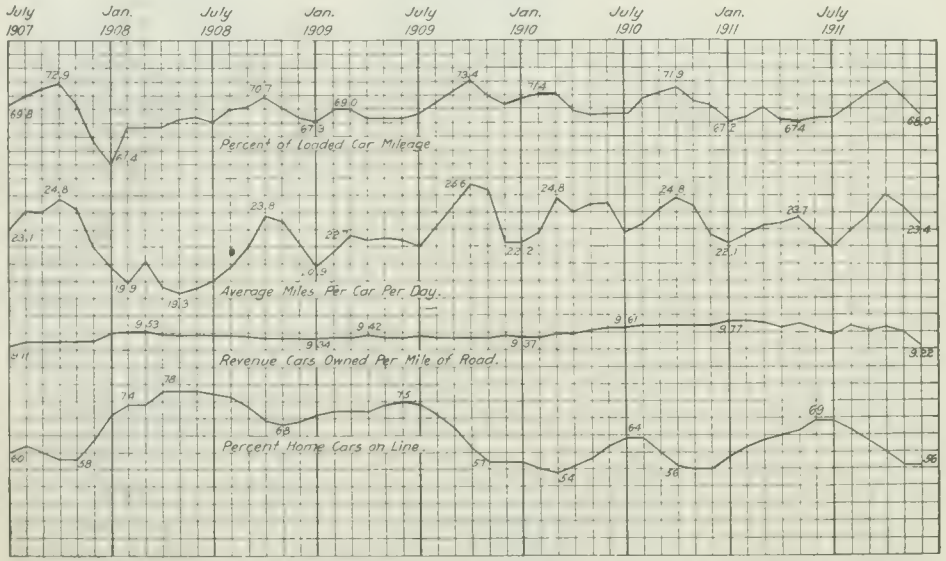


Car Surpluses and Shortages in 1907 to 1912.

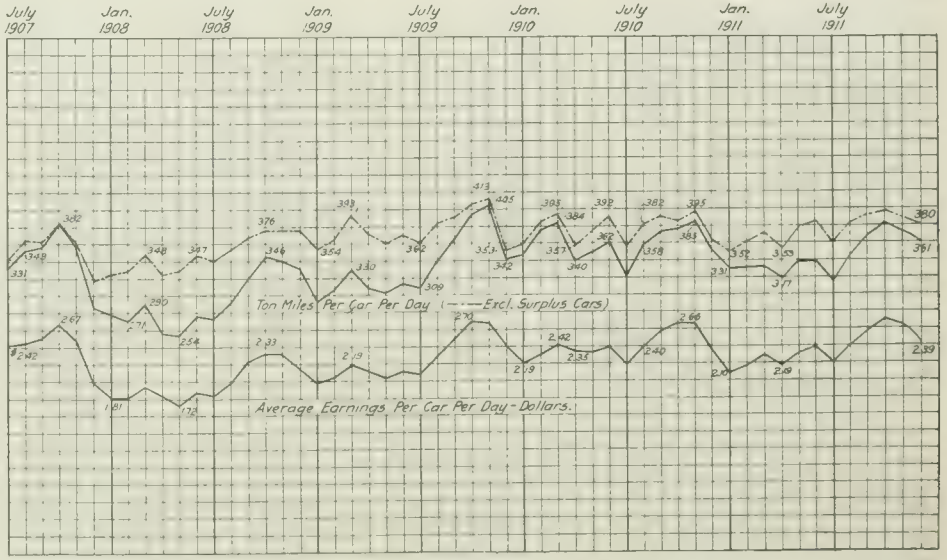
CAR BALANCE AND PERFORMANCE IN 1911.

	New England.	N. Y., N. J., Del., Md., Eastern Pa.	Ohio, Ind., Mich., Western Pa.	Va., W. Va., No. and So. Carolina.	Ky., Tenn., Miss., Ala., Ga., Fla.	Iowa, Ill., Wis., Minn.	Mont., Wyo., Neb., Dakotas.	Kan., Colo., Okla., Mo., Ark.	Texas, La., New Mex.	Ore., Idaho, Nev., Cal., Ariz.	Canadian Lines.	Total.
Roads reporting—												
Number	6	26	19	11	20	17	3	12	14	19	6	153
Mileage operated	6,916	31,616	14,046	19,267	18,974	56,563	4,023	22,287	8,900	26,791	17,298	226,681
Number revenue freight cars owned	83,377	696,221	216,927	184,097	173,402	390,584	18,501	136,119	29,039	144,635	105,384	2,178,276
Per cent. railway cars on line												
Home	56	*62	64	61	60	70	39	64	78	45	71	*63
Foreign	50	*34	40	34	33	29	66	37	72	38	34	*35
Total	106	*96	104	95	93	99	105	101	150	83	105	*98
Excess on line over number owned	4,723	.....	9,305	.....	.....	.....	998	725	14,703	.....	5,331	.....
Per cent. excess on line	6.52	*7.07	8.18	6.66	8.67	6.97	6.34	8.46	5.36	5.54	6.85	*7.21
Average cars on line per freight engine owned	72	*67	79	57	63	63	41	54	61	50	53	*63
Average miles per car per day	17.8	*22.8	20.6	23.6	24.0	22.9	38.7	21.7	23.7	29.3	27.1	*23.3
Per cent. of loaded mileage	7[illegible]4	66.2	68.1	65.5	70.0	71.0	73.4	69.2	67.7	71.7	75.6	68.9
Average ton miles												
Per car	11.1	15.7	15.7	15.3	13.6	13.7	15.6	13.5	12.1	14.6	14.1	14.7
Per loaded car	15.3	23.6	23.0	23.6	19.2	19.7	21.1	19.7	17.4	20.4	18.6	21.4
Per day per car	197	*365	328	360	326	320	628	295	282	427	381	*344
Average daily earnings—												
Per car owned	$2.42	*$2.24	$1.96	$2.11	$2.19	$2.38	$5.19	$2.52	$4.10	$3.63	$2.85	*$2.43
Per railway car on line	$2.29	*$2.35	$1.88	$2.22	$2.35	$2.41	$4.94	$2.51	$2.72	$4.33	$2.69	*$2.47
All cars on line	$2.21	*$2.20	$1.79	$2.18	$2.25	$2.32	$4.54	$2.39	$2.52	$3.94	$2.62	*$2.35

*NOTE—Average of 105,278 Cars owned in Group 2 eliminated in calculations started.



Car Performance in 1907 to 1912.



Car Earnings and Loading in 1907 to 1912.

FREIGHT CAR BALANCE AND PERFORMANCE IN DECEMBER, 1911.

	New England.	N. Y., N. J., Del., Md., Eastern Pa.	Ohio, Ind., Mich., Western Pa.	Va., W. Va., No. and So. Carolina.	Ky., Tenn., Miss., Ala., Ga., Fla.	Iowa, Ill., Wis., Minn.	Mont., Wyo., Neb., Dakotas.	Kan., Colo., Okla., Mo., Ark.	Texas, La., New Mex.	Ore., Idaho, Nev., Cal., Ariz.	Canadian Lines.	Grand Total.
Revenue freight cars owned	87,199	499,342	213,734	185,746	169,288	393,258	18,764	135,297	18,976	143,879	110,892	1,975,765
Average number of system cars on line	45,663	286,545	109,947	102,465	89,600	240,600	6,072	70,105	16,238	60,549	73,793	1,101,557
Railway-owned cars: Average foreign on line	52,051	178,185	95,732	66,839	74,580	134,696	12,385	64,526	25,770	66,224	50,190	821,178
Total Railway-owned cars on line	97,714	464,730	205,659	169,304	164,180	375,296	18,457	134,631	42,008	126,773	123,983	1,922,735
Excess	10,515	.....	.....	.....	.....	.....	193	.....	23,032	.....	13,091	.....
Per cent. of cars on line to total owned:												
Home	52	57	51	55	53	61	33	52	85	42	67	56
Foreign	60	36	45	36	44	34	68	47	136	46	45	41
All railways	112	93	96	91	97	95	101	99	221	88	112	97
Private cars on line	4,485	31,232	12,001	4,269	7,575	15,211	2,116	5,683	2,119	12,214	3,037	99,942
Total, all cars on line	102,199	495,963	217,659	173,573	171,755	390,507	20,573	142,576	44,127	138,987	127,020	2,024,939
Per cent. of cars in shop	6.23	6.83	6.70	6.27	7.95	6.31	5.47	8.75	5.38	4.74	6.30	6.68
No. of freight engines owned	1,418	7,807	3,053	3,149	2,690	6,438	525	2,662	560	2,703	2,161	32,438
Average cars on line per freight engine owned	72	64	71	55	64	61	39	54	79	51	59	62
Total freight-car mileage	[illegible]	338,750,304	146,347,398	130,735,903	116,161,130	272,256,318	22,771,566	100,586,803	29,470,771	121,130,828	107,363,494	1,633,291,865
Average miles per car per day	179	229	217	214.3	211.8	225	35.7	25.4	21.5	28.1	27.3	23.4
Per cent. loaded mileage	70.0	64.6	69.4	65.7	71.1	70.0	75.5	61.4	69.0	70.9	76.6	68.0
Ton-miles of freight, including company freight	[illegible]	8,474,959,453	2,889,844,754	2,072,519,759	1,648,106,099	5,742,348,801	372,616,357	1,291,082,304	382,943,411	1,765,500,924	1,701,060,389	33,353,158,359
Average ton-miles, including company freight:												
Per car-mile	11.1	16.2	16.7	15.9	14.0	15.0	16.8	12.1	11.9	16.0	16.0	15.2
Per loaded car-mile	15.8	25.0	24.4	24.2	19.8	21.7	22.2	19.5	17.6	20.9	20.8	22.5
Per car per day	199	390	363	387	307	345	617	307	266	415	434	361
Gross freight earnings	$6,705,189	$47,576,044	$12,416,889	$12,469,406	$11,470,143	$28,197,783	$2,904,584	$10,488,890	$3,384,499	$16,068,639	$10,568,032	$162,249,894
Average daily earnings: Per car owned	$2.48	$2.27	$1.87	$2.17	$2.19	$2.31	$5.13	$2.50	$5.75	$3.60	$3.07	$2.45
Per railroad car on line	2.21	2.42	1.95	2.38	2.35	2.42	5.08	2.51	2.60	4.09	2.75	2.51
All cars on line	2.12	2.29	1.84	2.32	2.15	2.33	4.55	2.37	2.47	3.73	2.68	2.39

over December, 1910. The increase of 0.6 in the ton miles per loaded car indicates improved loading, but the decrease in average ton miles per day for all cars from 376 in November to 361 in December shows the effect of the decreased percentage of loaded mileage. There is an increase of 12 ton miles per car over the figure for the month of December, 1910.

"The earnings per car per day show a decrease from $2.64 in November to $2.39 in December, 1911. Compared with December, 1910, however, an increase of $0.05 is shown."

The accompanying table on this page gives car balance and performance in the month covered by the report, and the two diagrams on the preceeding page show car earnings and car mileage and certain car performance figures monthly from July, 1907.

The table on the preceeding page gives freight car balance and performance figures by groups for the entire calendar year 1911. The American Railway Association also publishes total figures for six month periods.

Canadian Pacific Colonization Plan.

A new plan of colonization, by which the Canadian Pacific expects to spend several million dollars in making loans of $2,000 each to prospective colonists in western Canada who have demonstrated their ability on a productive farm and who have the machinery and some money, but who lack enough funds to buy and stock a farm and the necessary buildings, was announced last week. This opportunity at first will be opened to 250 men of family now farming rented land. They will be required to make a payment of one-tenth of the purchase price of the farm and to have in reserve enough to maintain their families for a year. They must personally inspect and select the land they buy. The $2,000 loan will be used to pay for buildings, fencing the farm and cultivating at least 50 acres. The amount will be added to the cost price of the land and will be payable during a period of ten years with 6 per cent. interest. Thirty model farms are to be operated by the railway for a period of five years, and the results of the experiments undertaken on these farms will be made public in monthly bulletins.

The National Chamber of Commerce.

The meeting which was held in Washington on Tuesday and Wednesday of this week, in accordance with the call issued by President Taft some weeks since, to establish a national commercial organization, was attended by more than 600 delegates and a permanent organization was decided upon the first day of the meeting, its name to be that shown in the title of this paragraph. Chambers of Commerce, boards of trade, and similar associations from all over the country were represented, and by-laws were adopted providing for a thorough system of getting a reliable expression of commercial opinion at any time. The power and influence of the new body is not to be given to any proposition except by approval of a substantial majority of the commercial associations of the whole country. A permanent office is to be established in Washington. The chairman of the new association is H. A. Wheeler, of Chicago. Congress will be applied to for an act of incorporation.

Optimistic Shippers.

A prominent dry goods man says: "Conditions throughout this country are better than at any time in years. I know of concerns that are doing from 100 per cent. to 150 per cent. more business in dry goods for the fall trade, than at this time last year. Such factors as these have been behind the recent buying of securities by the so-called insiders, and it is this healthy improvement in trade lines that is responsible for the better railway earnings now being published.

"Great Northern rolled up an increase in gross in February of $750,000, or 21 per cent. Pennsylvania gained nearly 18 per cent. Union Pacific shows a gain for February of $570,000, or about 10 per cent. New York Central is doing a rushing business, as you will see by the February statement. In the South, Southern Railway shows a very healthy growth, and even Boston & Maine is pushing its head up with 7 per cent. larger earnings than February a year ago. These results clearly spell widespread prosperity."—*Wall Street Journal.*

INTERSTATE COMMERCE COMMISSION.

The commission has suspended the effective date of the order in the Shreveport case to June 1, 1912.

The Interstate Commerce Commission has suspended until August 17 Leland's tariff I. C. C. No. 908 and its supplement. This tariff and supplement make changes in the class and commodity rates between Texarkana, Ark., and New Orleans, La. The advances on the various articles named in the tariff, range from one to eight cents per 100 lbs.

The commission, in the complaints of discrimination in the distribution of coal cars has awarded reparation against the Pennsylvania Railroad Company, aggregating in five cases $129,722. It finds that the road has been guilty of unlawful discrimination in the distribution of its cars by reason of which five complaining coal companies had been unable fairly to market their products. Never before has the commission awarded damages in cases of this kind; the question has been referred to the courts. The orders require the Pennsylvania to pay to the Hillsdale Coal & Coke Company $27,193, to W. F. Jacoby & Co., $21,094, to Clark Brothers $31,128, to the Bulah Coal Company $31,716, and to James W. Minds $18,592.

Reparation Awarded.

Casey-Hedges Co. v. Alabama Great Southern et al. Opinion by the commission:

Grate bars were given the furnace castings rate when they should have been given the "castings N. O. S. plain as from the sand" rate. (23, I. C. C. 249.)

C. E. Ferguson Saw Mill Co. v. St. Louis, Iron Mountain & Southern et al. Opinion by the commission:

In Ferguson Saw Mill Co. v. St. Louis Iron Mountain & Southern, 18 I. C. C. 396, the commission found rates on cypress lumber to certain points in Oklahoma, Kansas and Missouri unreasonable, and the commission now extends this ruling to a number of other points on other roads besides the St. L. I. M. & S. (23 I. C. C. 229.)

E. Rickards v. Atlantic Coast Line. Opinion by the commission:

A different rate from the same points of origin to destination has been charged on mine prop logs and on saw mill logs. The only justification is that the cost of service on saw lumber is less because it moves in train loads, while the mine props move in carloads. The commission refuses to recognize this as a proper reason for making a difference in the rates. (23 I. C. C., 240.)

Complaint Dismissed.

Chamber of Commerce of Houston, Tex., et al. v. Galveston, Harrisburg & San Antonio et al. Opinion by Commissioner Lane:

In this case the complainants allege that an increase in the differential rate from three cents to five cents over Galveston is discriminatory against Houston. The commission found that this differential was made in an effort to correct a discrimination in the manner best calculated to put the rates from all Texas milling cities in fair relation to each other. The complaint was dismissed. (23 I. C. C., 215.)

New Orleans Board of Trade, Ltd., v. Galveston, Harrisburg & San Antonio et al. Opinion by Commissioner Lane:

In this case the complainants claim that as the rates on clean rice and rough rice from nearly all Texas points to New Orleans are equal, the New Orleans millers are excluded from competing with Texas millers in the purchase of rough rice from Texas producers, because it takes 180 lbs. of rough rice to make 100 lbs. of clean rice, and therefore the New Orleans millers who buy the rough rice from Texas producers, have to pay the same rate per pound on the 80 lbs. of relatively worthless by-product as on the 100 lbs. of valuable product. The commission found that the rates complained of were a part of a rate adjustment which had been arrived at after years of competition between markets, and that whether a differential were established by raising the clean rice rate or lowering the rough rice rate, numerous other rates would thereby be disturbed, and decided that the rough rice rates complained of were not unduly discriminatory. The complaint was dismissed. (23 I. C. C., 210.)

Indianapolis Freight Bureau v. Cleveland, Cincinnati, Chicago & St. Louis et al., on rehearing, and Railroad Commission of Indianapolis v. Wabash Railroad et al. Opinion by Commissioner Clark:

The complainants point out alleged discriminations against Indianapolis in favor of Chicago in the total charges on shipments to and from the Atlantic seaboard. The commission found that these rates were governed by different classifications and that they could not be the same unless a uniform classification existed. It also found that the defendants had established rates somewhat more favorable to Indianapolis than those which had been ordered in the original Indianapolis case and that the former conclusions should be adhered to. Complaint was dismissed. (23 I. C. C. 195.)

Advanced Rate on Candles Refused.

Charles T. Perry & Co. v. Northern Pacific et al. Opinion by the commission:

The rate on candles from Helena, Mont., was raised because of the complaint of competitors at other points, but no evidence was shown that the cost of service had increased. The commission therefore finds that the railways have not justified the advance. (23, I. C. C. 247.)

Discrimination Against Columbia, S. C.

E. M. Du Pre Co. et al v. Buffalo, Rochester & Pittsburgh et al. Opinion by Commisisoner McChord:

The complainants allege that Columbia, S. C., is unjustly discriminated against in favor of Augusta, Ga., in carload rates on apples, potatoes, cabbages and onions from Rochester, N. Y. The commission decided that the conditions were not sufficiently different to justify a higher rate to Columbia, and ordered that Columbia be given the same rates as Augusta. The complainants will be awarded reparation on this basis. The complainants also allege that 24,000 lbs. of grapes, the existing C. L. minimum, cannot be loaded into a car without serious damage to the bottom tier. The commission decided that since it was usually advantageous to the shipper to have a high minimum and a lower rate, and as the question of the rate was not before it, it could not order the defendants to cease applying the existing minimum. The complaint was dismissed. (23 I. C. C., 226.)

Rates on Rice Reduced.

Mutual Rice Trade & Development Association of Houston v. International & Great Northern et al. Opinion by Commissioner Lane:

Complainants in this case attack as discriminatory the rates on clean rice from Texas milling points to central freight association territory, to Illinois, to the Pacific coast and to the southeast in favor of New Orleans. The commission decided that the rates to the central freight association territory, to Illinois and to the Pacific coast were not proven to be discriminatory. It was found, however, that the rates to the southeast instead of being a through rate were a combination of local carload rates, while New Orleans enjoyed an any quantity rate to the southeast. As this any quantity rate was not as low as carload rates should be, and as it was one of the local rates which Texas shippers had to pay to reach the southeast, and as practically no terminal service was performed at New Orleans on through shipments from Texas, the commission decided that the through rate on carloads from Texas should be at least five cents per 100 lbs. less than the lowest combination of local rates. (23 I. C. C., 220.)

Precooling Privilege Granted to Shippers.

In re investigation and suspension of certain regulations and practices with regard to pre-cooling and pre-icing. Opinion by Chairman Prouty:

In this case the complainants urge that the privilege of precooling at a reasonable rate per car be restored. In Arlington Heights Fruit Exchange v. Southern Pacific, 20 I. C. C., 106, the commission reduced the charge of the defendants for precooling from $30 to $7.50 per car. The carriers filed tariffs

establishing the rate of $7.50 per car, but immediately after withdrew the privilege of precooling altogether. The defendants claim that precooling is refrigeration and is part of the transportation service which they are now compelled to provide. The commission decided that shippers have the right to precool in lieu of paying the railways for refrigeration, that $7.50 per car is a reasonable charge for the use of the car for precooling. The tariffs providing for precooling should be restored. (23 I. C. C., 267.)

Ashburn, Ga., Discriminated Against.

Chamber of Commerce of Ashburn, Ga., et al. v. Georgia Southern & Florida et al. Opinion by Commissioner Clark:

This complaint alleges that rates to and from Ashburn are unjustly discriminatory in favor of Cordele, Ga., Tifton, Fitzgerald and Albany. The commission decided that though the defendants could reduce rates to meet competition, they could not maintain rates to nearby points which resulted in discrimination, and that Ashburn should be given the same rates as Tifton. (23 I. C. C., 140.)

STATE COMMISSIONS.

Members of the Indiana and Minnesota commissions, accompanied by fifteen officers of Indiana railways on Tuesday last visited the Bessemer rail mill of the Illinois Steel Company at South Chicago, and the open hearth mill of the Indiana Steel Company at Gary, Ind.

The New York Public Service Commission, Second district (up-state), has fixed May 2 as the date on which to reopen the hearing on the petition of the New York, New Haven & Hartford to be allowed to buy the stock of the Rutland, now held by the New York Central & Hudson River. The New Haven now has half of the majority stock and the New York Central the other half.

The Texas railway commission has issued a notice of a hearing on May 15 to consider a change in General Rule No. 2 governing rate applications in the state. The present rule provides "that the rate between two given points shall not in any case exceed the sum of the rates applying between such given points and a point intermediate." It is proposed to change the rule to read, "the rate between two given points in the state shall not in any case exceed the sum of the rates applying between such given point and a third point in the state."

COURT NEWS.

The full-crew law of Pennsylvania has not yet been before the Supreme Court of the state. The decision sustaining the law, which was recently announced, was by the court of Dauphin county.

Suits were filed in the Superior Court at Chicago on April 22 by the W. C. Craig Company, the Newburger Cotton Company and the Luckett-Sabin Cotton Company, of Mississippi, against the Yazoo & Mississippi Valley, to recover damages aggregating $166,000 for cotton burned in the warehouse of the Gulf Compress Company on June 11, 1911. It is alleged that sparks from a locomotive set fire to the buildings.

The decision of the Supreme Court of the United States, reversing the Supreme Court of the State of Arkansas on the question of liability of railways for live stock killed, which was noticed in the *Railway Age Gazette* of April 19, page 934, is based on the ground that the statute, as construed and applied, is wanting in due process of law, and repugnant to the 14th amendment of the Constitution of the United States. The opinion of Justice Van Devanter is not predicated wholly on the simple point that imposing double liability as a penalty for 30 days' delay is so severe as to be wanting in due process of law; indeed, the court purposely refrains from considering the question in this shape. The salient point is that the complainant whose animals, two horses, were killed, demanded $500 for them, and then after the expiration of 30 days brought suit to recover damages, but claimed only $400. The jury granted this sum and the court doubled it, adding $50 for an attorney's fee. As the owner thus confessed that his first claim was excessive, the court holds that the railway, in resisting payment of this excessive sum, was lawfully exercising an undoubted right. It could never have been the purpose of the legislature to make the railway company pay a penalty for contesting a claim which it did not owe.

St. Louis Terminal an Unlawful Monopoly.

The Supreme Court of the United States in a decision in the case against the Terminal Railroad Association of St. Louis, handed down this week, holds the association and fourteen railways entering that city and owning the terminal company to be a combination operated, in violation of the Sherman anti-trust law, to control transportation across the Mississippi river at St. Louis. The combination is ordered to reorganize.

Justice Lurton, who announced the decision, which was unanimous, said it was not contended that every terminal company in every city was a violation of the Sherman law. It might be a facility instead of a restraint on interstate commerce; but at St. Louis topographical conditions made it impracticable for any road to reach the city without using the terminal company's facilities across the Mississippi. The combination of the three crossings owned by the Terminal Company gives control over competition. Ninety days was allowed the combination in which to reorganize. The conditions for reorganization are laid down as follows:

First—By providing for the admission of any existing or future railways to joint ownership.

Second—By providing for use by other roads without becoming a joint owner.

Third—By removing the provision of the present combination which restricts a company to the use of the terminal facilities.

Fourth—By abolishing the practice of billing to East St. Louis and other junction points and then rebilling traffic destined to St. Louis.

Fifth—By abolishing arbitrary charges (which are in force on certain traffic moving less than 100 miles).

Sixth—By providing that any disagreement between a company applying to become a joint owner or user and the fourteen proprietary companies may be submitted to the district court.

Seventh—By still leaving the companies under the control of the Interstate Commerce Commission as to rates.

The court also provided that if the parties failed to meet the conditions of reorganization, the lower court should, after hearing, make a decree of disjoinder of the Terminal Company, the Wiggins Ferry Company and the Merchants' Bridge Company.

The decision affords an interesting illustration of what is meant by the "rule of reason" which Chief Justice White outlined in his opinion in the Standard Oil case.

The St. Louis case arose out of the fact that the nine railways entering St. Louis have practically monopolized the terminal facilities, and have thereby controlled the entrance to the city to such an extent that for any other road to gain admission to the terminal at all is practically out of the question. One of the regulations has been a requirement that no privileges should be granted to any new company so long as any one of the present partners should object. The decision refers to the Standard Oil and Tobacco decisions at some length, and says that the real question is whether the agreement between the roads violates the rule of reason and thereby introduces an unreasonable degree of restraint upon trade.

The opinion says that there is nothing in the decision to interfere with the operations of the Interstate Commerce Commission, but that on the contrary the commission can go on and regulate rates, terminal charges, and require rates of every kind on the part of the roads and can enforce these decisions by the usual methods. In the event of charges being made by these roads to a new road desirous of gaining access to the city over the existing tracks the charges may be considered by the commission for the purpose of seeing whether they are fair and reasonable, and if not of making them so.

. . . Whether a city railway system is a facility in aid of interstate commerce or an unreasonable restraint forbidden by the act of Congress, as construed and applied in the Standard Oil and Tobacco cases, will depend upon the intent to be inferred from the extent of control thereby secured over instrumentalities which such commerce is under compulsion to use, the method by which such control has been brought about and the manner in which that control has been exerted.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

R. F. Gauld, who has been connected with the financial and accounting departments of the Canadian Pacific for many years, has been appointed auditor of pay rolls, with headquarters at Montreal, Que.

George L. Sands, vice-president of the Missouri & North Arkansas, at Eureka Springs, Ark.; Jesse McDonald and W. S. Holt, have been appointed receivers of the Missouri & North Arkansas, with headquarters at St. Louis, Mo.

J. C. Wallace, auditor of disbursements of the Cleveland, Cincinnati, Chicago & St. Louis at Cincinnati, Ohio, has been appointed assistant auditor, with office at Cincinnati, succeeding E. P. Higgins, deceased. H. L. Berg, assistant auditor of disbursements, succeeds Mr. Wallace.

Edwin Gould, president of the St. Louis Southwestern, with headquarters at New York, has been elected chairman of the board, a newly created office. F. H. Britton, vice-president and general manager, with office at St. Louis, Mo., has been elected president and general manager, and H. E. Farrell, freight traffic manager, with office at St. Louis, has been elected vice-president in charge of freight traffic, effective May 1.

Pending the election of a successor to the late President Hays of the Grand Trunk and the Grand Trunk Pacific, William Wainwright, vice-president of the Grand Trunk, with headquarters at Montreal, Que., has been placed in temporary charge of Grand Trunk affairs, and E. J. Chamberlin, vice-president and general manager of the Grank Trunk Pacific, with headquarters at Winnipeg, Man., has been placed in temporary charge of that company's affairs.

Herbert H. Adams, general manager of the Toronto, Hamilton & Buffalo at Hamilton, Ont., has been elected president of the Kansas City Terminal Railway, with office at Kansas City, Mo., succeeding W. S. Kinner, resigned, effective May 1, as has been announced in these columns. Mr. Adams was born in August, 1876, at Detroit, Mich., and was educated at Johns Hopkins University and the Massachusetts Institute of Technology, receiving the degree of B. S. from the latter in 1899. In July, 1899, he began railway work with the Michigan Central as rodman and draftsman. He was then consecutively assistant engineer, assistant chief engineer and assistant division superintendent, and in February, 1904, was appointed division superintendent, which position he held until he left the Michigan Central in October, 1909. He then went with the Toronto, Hamilton & Buffalo as general superintendent, and a year later was promoted to general manager, which office he will resign on May 1 to go to the Kansas City Terminal.



H. H. Adams.

Roberts Walker, chairman of the executive committee and general counsel of the Chicago, Rock Island & Pacific Railway, with headquarters at New York, has resigned to become a member of the firm of White & Case, which is to act as eastern counsel for the Rock Island system. Mr. Walker retains his place on the railway company's board, but has also resigned as president of the Rock Island Company, and as president of the Chicago, Rock Island & Pacific Railroad, a holding company. W. H. Moore, a director of the Chicago, Rock Island & Pacific, has been elected chairman of the executive committee, with headquarters at New York. F. C. Dillard, interstate commerce attorney for the Harriman Lines at Chicago, has been elected vice-president and general counsel of the Chicago, Rock Island & Pacific Railway, with headquarters at Chicago. Edward S. Moore, vice-president of the Chicago, Rock Island & Pacific Railway, with office at Chicago, has been elected also president of the Chicago, Rock Island & Pacific Railroad, with headquarters at Chicago. J. J. Quinlan, assistant secretary and assistant treasurer of the Chicago, Rock Island & Pacific Railway, and the Chicago Rock Island & Pacific Railroad, and vice-president, secretary and treasurer of the Rock Island Company, with office at New York, has been elected president of the Rock Island Company, with headquarters at New York. These elections complete the changes, making Chicago the operating headquarters of the Rock Island system, with H. U. Mudge, president, and all the operating officers of the railway company located there, and New York the financial headquarters, with W. H. Moore, chairman of the executive committee, and D. G. Reid, chairman of the board of directors of the railway company.

Frank Clifford Dillard, the new vice-president and general counsel of the Chicago, Rock Island & Pacific Railway was born at Auburn, Ala., and graduated from the Alabama Polytechnic Institute. From 1883 to 1907 he was engaged in the practice of law at Sherman, Tex., in the firms of Bryan & Dillard; Head & Dillard; Head, Dillard & Muse, and Head, Dillard & Head. During this time he represented some of the lines now comprising the Harriman system in a legal capacity. In 1907 he removed to Chicago as head of the department of legal work relating to interstate commerce of the Harriman Lines, with the title of interstate commerce attorney, which position he held until his election as general counsel of the Rock Island. He is an ex-president of the Texas Bar Association, and was a delegate to the Universal Congress of Lawyers and Jurists at St. Louis in 1904.



F. C. Dillard.

Frank H. Britton, who has been elected president and general manager of the St. Louis Southwestern, with office at St. Louis, Mo., was born November 29, 1850, at Ovid, N. Y., and began railway work in August, 1868, as a telegraph operator on the Michigan Southern & Northern Indiana. The next year he went to the Chicago & North Western, where he was in the telegraph department for two years; and from November, 1871, to June, 1882, he was with the Louisville & Nashville, having been consecutively assistant train despatcher, chief train despatcher and master of trains. He then became superintendent of transportation of the Chesapeake, Ohio & Southwestern at Louisville, Ky., and from February, 1883, to February, 1892, he was with the Baltimore & Ohio, first as superintendent of transportation and later as superintendent of the Chicago division. He was made superintendent of the Minnesota & Wisconsin in June, 1893, and in September of the following year went with the Great Northern, where he was consecutively superintendent of the Montana division, superintendent of the Fergus Falls division and assistant general superintendent of the Western district at Spokane, Wash. In June, 1899, he left the Great Northern to become general superintendent of the St. Louis Southwestern at Tyler, Tex., and since March 12, 1900, he has been vice-president and general manager of the system as well as president of the St. Louis Southwestern of Texas. In June, 1904, he was also made president of the Southern Illinois & Missouri Bridge Company. As vice-president and general manager of the St. Louis Southwestern,

and president of the St. Louis Southwestern of Texas, Mr. Britton has had his headquarters at St. Louis, while Mr. Gould's headquarters were in New York. Mr. Britton has been chief resident officer of the road, and as such was largely responsible for the improvement in the condition of that property during recent years. He has for a long time been recognized as a most capable operating officer, and has perhaps exerted more complete jurisdiction over the road in his charge than have operating heads of some other Gould properties. He has the initiative to take the responsibility for any necessary action. Emerging from the receivership in 1891 with a reputation for over-capitalization, the earnings of the company have been largely increased during recent years under Mr. Britton's management, and although no dividends have been paid on the common stock, there have been the following payments on the preferred stock during the last three years: 2 per cent. in 1909, 5 per cent. in 1910, and 2 per cent. in 1911, while large sums were devoted to improvements. Mr. Britton, who started as a telegraph operator, had a most thorough training in the operating department of a wide variety of roads in the Middle West, the Northwest, and the Southwest. He is a good organizer, and has a capacity for getting on with subordinates.

Operating Officers.

John H. Rightmeyer has been appointed trainmaster of the Waterloo terminals and the Albert Lea district of the Illinois Central, with office at Waterloo, Iowa.

J. W. James, hitherto train despatcher on the Buffalo, Rochester & Pittsburgh, has been appointed special representative of the general manager of the road, with headquarters at Rochester, N. Y.

J. J. Scully, general superintendent of the Saskatchewan division of the Canadian Pacific, at Moose Jaw, Sask., has been appointed general superintendent of the Lake Superior division, with office at North Bay, Ont., succeeding J. G. Taylor, transferred.

H. M. Eicholtz, assistant superintendent of the Chicago & North Western at Chicago, has been appointed superintendent, with office at Chicago, succeding P. J. O'Brien, resigned on account of ill health, and J. G. Cowan, assistant superintendent at Clinton, Iowa, succeeds Mr. Eicholtz. Michael Murray succeeds Mr. Cowan.

C. W. Galloway, general superintendent of the Baltimore & Ohio Southwestern, with office at Cincinnati, Ohio, has been appointed general manager of the Baltimore & Ohio, with headquarters at Baltimore, Md., succeeding A. W. Thompson as general manager, promoted. W. C. Loree, general manager of the Cincinnati, Hamilton & Dayton, with headquarters at Cincinnati, has had his authority extended over the Baltimore & Ohio Southwestern, with office at Cincinnati.

P. G. Cromar, whose appointment as assistant superintendent of the Canadian Pacific, with office at Schreiber, Ont., has been announced in these columns, was born on November 4, 1878, near Chesley, and was educated in the common schools. He began railway work on November 5, 1889, as an office boy on the Canadian Pacific, and from 1891 to 1908 he was consecutively railway operator, agent and yardmaster. He was then for three years general yardmaster at North Bay, and in 1911 was promoted to assistant superintendent of the same company with headquarters at North Bay, which position he held at the time of his recent appointment as assistant superintendent at Schreiber.

E. C. Blanchard, general superintendent of the Eastern district of the Northern Pacific at St. Paul, Minn., has been appointed general manager of the lines west of Paradise, Mont., with office at Tacoma, Wash., succeeding H. C. Nutt, fourth vice-president and general manager, resigned to go to the San Pedro, Los Angeles & Salt Lake. C. L. Nichols, general superintendent of the Central district at Livingston, Mont., succeeds Mr. Blanchard, and J. M. Rapelje, superintendent of the Idaho division at Spokane, Wash., succeeds Mr. Nichols. A. M. Burt, superintendent at Missoula, Mont., succeeds Mr. Rapelje, and F. L. Birdsall, superintendent of the Dakota division at Jamestown, N. D., succeeds Mr. Burt as superintendent of the Rocky Mountain division. W. H. Strachan, assistant superintendent of the Lake Superior division at Duluth, has been promoted to superintendent of the Dakota division, with office at Jamestown, succeeding Mr. Birdsall.

Merritt L. Phelps, whose appointment as superintendent of the Colorado Midland, with office at Colorado City, Colo., has been announced in these columns, was born September 14, 1861, at Lottsville, Pa., and received a public school education. He began railway work August 10, 1879, as a news agent on the Hannibal & St. Joseph, now a part of the Chicago, Burlington & Quincy, and a year later became a brakeman on the same road. For five years from 1884 he was with the Burlington at Lincoln, Neb., first as brakeman and then as conductor. He then went with the Kansas City, Fort Scott & Memphis, now the St. Louis & San Francisco, as conductor between Thayer, Mo., and Memphis, Tenn., and in 1890, resigned to go to the Colorado Midland as a conductor. On December 15, 1904, he was promoted to assistant superintendent of the latter road, which position he held until his present appointment as superintendent in charge of the entire line.

C. W. Galloway, who has been appointed general manager of the Baltimore & Ohio, with headquarters at Baltimore, Md., was born on December 11, 1868, and entered the service of the Baltimore & Ohio in April, 1883, as a messenger boy in the operating department in Baltimore, and since that time has been in the continuous service of that company. He studied telegraphy and stenography, and from a clerkship was appointed private secretary to the late Thomas Fitzgerald in April, 1891. He remained in that position until September, 1897, when he was made trainmaster of the Baltimore division, becoming assistant superintendent at Cumberland, Md., in April, 1898. He was appointed superintendent of the Cumberland division in July, 1899, and in November, 1901, he was transferred to Baltimore in a similar capacity. Mr. Galloway was appointed superintendent of transportation of the entire Baltimore & Ohio system on December 20, 1906, and was advanced to general superintendent of transportation July 1, 1910, and in September of the same year he was made general superintendent of the Baltimore & Ohio Southwestern, with office at Cincinnati, Ohio, which position he held at the time of his recent appointment as general manager of the Baltimore & Ohio, with office at Baltimore.



C. W. Galloway.

W. J. Fripp, whose appointment as assistant general manager of the New York Central & Hudson River, with office at Albany, N. Y., has been announced in these columns, was born on August 25, 1863, at Albany, and graduated from the high schools of his native town in 1880. In July of the same year he entered the service of the New York Central & Hudson River at West Albany as a yard clerk, and eight years later was transferred as clerk to the office of C. M. Bassett, superintendent of the Mohawk division. In 1892 he was promoted to general despatcher in the freight yard at West Albany, and the following year was made freight trainmaster, becoming passenger trainmaster in 1898 on the Mohawk division, and in 1902 he was made assistant division superintendent. In 1906 he was division superintendent of the West Shore Railroad, at Weehawken, N. J., and was subsequently assistant general superintendent, and then general superintendent of the Boston & Albany, at Boston, Mass. He returned to Albany in 1910 as general superintendent of the Eastern district of the New York Central & Hudson River, which position he held at the time of his recent appointment as assistant general manager of the same company.

James T. Slattery, who has been appointed superintendent of the Denver & Rio Grande, with office at Helper, Utah, as has been announced in these columns, was born July 15, 1868, at Des Moines, Iowa. He was educated in the Nebraska public schools and also for a time attended the Central Business College at Denver, Colo., and he began railway work in 1886 with the Chicago & North Western in the construction department. In 1889 he went with the Denver & Rio Grande, where he was in the freight department for two years, and then went with the Chicago, Burlington & Quincy at Denver in the same department. He returned to the Denver & Rio Grande in October, 1893, and has been with that road ever since, having been consecutively locomotive fireman, traveling fireman, locomotive engineer and general air brake instructor. About six months ago he was promoted to trainmaster at Tucker, Utah, from which position he was recently advanced to superintendent of the Green River division, with office at Helper.



J. T. Slattery.

Traffic Officers.

Ralph W. Cooke has been appointed industrial agent of the Pennsylvania Company, with office in Pittsburgh, Pa.

W. S. Chadwick has been appointed traveling passenger agent of the Great Northern, with headquarters at St. Paul, Minn.

Lawrence L. Lawler has been appointed traveling agent of the Chicago, St. Paul, Minneapolis & Omaha, with office at Winnipeg, Man.

J. M. Maver has been appointed contracting agent of the Northern Pacific, with office at Montreal, Que., succeeding Tracey Howard, promoted.

Charles R. Bradley has been appointed freight agent of the Lehigh Valley, with office at Geneva, N. Y., succeeding Ray Wixon, transferred.

H. F. Blackmore has been appointed dairy agent of the Erie Railroad, with office at Chicago, succeeding F. T. Magan, resigned to accept service with another company.

M. S. Bowman, traveling passenger agent of the Chicago, Milwaukee & St. Paul at Philadelphia, Pa., has been appointed commercial agent, with office at Atlanta, Ga., a new position.

W. E. Duperow, city passenger and ticket agent of the Grand Trunk and the Grand Trunk Pacific, at Vancouver, B. C., has been appointed general agent, passenger department, with office at Vancouver.

F. H. Webber, contracting freight agent of the Illinois Central at Atlanta, Ga., has been appointed traveling freight agent, with office at Atlanta, succeeding A. O. Coke, transferred. As has been announced in these columns, C. R. Prince succeeds Mr. Webber.

Engineering and Rolling Stock Officers.

W. Gillespie has been appointed master car builder of the Central Vermont, with office at St. Albans, Vt.

J. A. Heaman has been appointed division engineer of the Grand Trunk Pacific, with office at Fitzhugh, Alta., succeeding J. Callaghan, resigned to become division engineer of the Pacific Great Eastern, which will build a new line for the Grand Trunk Pacific in Canada.

M. Clark has been appointed roadmaster of the Southern division of the Gulf, Colorado & Santa Fe, with headquarters at Brownwood, Tex. Charles Sullivan has been appointed roadmaster of the Beaumont division, with office at Silsbee, Tex., succeeding R. W. Grooch.

T. McHattie, whose resignation as superintendent of motive power and car department of the Central Vermont, was recently announced in these columns, has been appointed master mechanic of the Eastern division of the Grand Trunk, with office at Montreal, Que., succeeding J. Duguid, assigned to other duties.

The officers of division roadmaster of the Colorado Midland at Colorado City, Colo., and Cardiff, Colo., having been abolished, T. Kennedy, until last July division roadmaster at the former place, has been appointed general roadmaster, with jurisdiction over the entire line. D. Quinn, roadmaster of the First district at Colorado City, has been appointed assistant roadmaster.

V. C. Randolph, whose appointment as master mechanic of the Erie, with office at Avon, N. Y., has been announced in these columns, was born on October 19, 1869, at Randolph, N. Y., and was educated in the common schools at Salamanca. He began railway work in March, 1882, as a machinist apprentice on the New York, Lake Erie & Western, now the Erie, and after completing his apprenticeship he worked as a machinist until July, 1886, when he went to the Allegheny division as locomotive fireman, and was made engineman in April, 1891. He remained in that position until July, 1902, and then became locomotive and air-brake instructor at the International Correspondence Schools, of Scranton, Pa. In November, 1904, he returned to the service of the Erie as general air-brake instructor, and was promoted in January, 1910, to supervisor of locomotive operation of the Allegheny and Bradford divisions, which position he held at the time of his recent appointment as master mechanic of the Rochester division of the same road.



V. C. Randolph.

Louis J. Putnam, whose appointment as division engineer of the Chicago & North Western, with office at Boone, Iowa, has been announced in these columns, was born February 17, 1878, at Manchester, Iowa. He was educated at Cornell College, Mount Vernon, Iowa, receiving the degree of B. S. in civil engineering in 1903, and of C. E. two years later. He began railway work in June, 1898, with the Illinois Central; and in June of the following year went with the Chicago & North Western as an instrument man, and he has been with that road ever since. From February, 1901, to March, 1906, he was assistant engineer on construction, location and maintenance, and was then made acting division engineer of the Ashland division at Kaukauna, Wis. From March, 1907, he was consecutively assistant engineer in charge of second track and terminal improvements at Janesville, Wis.; as-



L. J. Putnam.

sistant engineer in charge of the bascule bridge over the north branch of the Chicago river and of the Wells street yard at Chicgo; resident engineer of the Milwaukee track elevation; resident engineer of the Escanaba ore dock construction; and from July, 1910, to April 1, 1912, he was with the Milwaukee, Sparta & North Western, the new line of the Chicago & North Western across Wisconsin, first as resident engineer on construction, and then as acting resident engineer. On April 1 he was promoted to division engineer at Boone.

OBITUARY.

Peter Charles Stohr, assistant director of traffic of the Southern Pacific, the Union Pacific, and the Oregon-Washington Railroad & Navigation Company, with headquarters at Chicago, was taken sick last week while on the road during a trip to the South, and died on April 24. Mr. Stohr was born on September 27, 1859, at New York, and was educated in the common schools. He began railway work in 1878 as an office boy on the Chicago, Rock Island & Pacific. In 1882 he was made a contracting agent of the Chicago & North Western, and from 1887 to 1889 was general eastern agent of the Minnesota & Northwestern. In 1889 he went to Chicago, where he was general freight agent of the Chicago, St. Paul & Kansas City, and continued in that position with the successor company, the Chicago Great Western. From November, 1898, to January, 1905, he was general traffic manager of the same road. In January, 1905, he was appointed assistant traffic director of the Union Pacific and the Southern Pacific systems, and his title was changed to assistant director of traffic on January 1, 1911.



P. C. Stohr.

John Borland Thayer, second vice-president of the Pennsylvania Railroad, who was at first reported saved from the Titanic when she sunk last week, has now been given up for lost. Mr. Thayer was born on April 21, 1862, at Philadelphia, Pa. After leaving the University of Pennsylvania in 1881, he entered the service of the Pennsylvania Railroad as a clerk in the Empire Line office, remaining in that position for about eighteen months, when he was transferred to the general freight department. After holding various position, he was in 1888, appointed freight solicitor of the United Railroads of New Jersey division. From February, 1889, to May, 1892, he was out of railway work. He returned to the service of the Pennsylvania Railroad in May, 1892, as division freight agent of the Northern Central, with headquarters at Baltimore, Md. On December 1, 1894, he was promoted to assistant general freight agent, with office at Philadelphia, Pa., and in March, 1897, was made general freight agent in charge of through traffic. In May, 1899, he was appointed general freight agent also of the Northern Central, the Philadelphia, Wilmington & Baltimore, and the West Jersey & Seashore. Mr. Thayer was elected fifth vice-president, in charge of traffic of the Pennsylvania Railroad on June 1, 1903. In October, 1905, he became fourth vice-president; in March, 1909, third vice-president; and in March, 1911, second vice-president of the company. Mr. Thayer was a director of the Pennsylvania Railroad and its more important controlled lines east of Pittsburgh, including the Long Island and the New York Connecting; he was director and president of the Erie & Western Transportation Company, and was a director of the Norfolk & Western and the Lehigh & Hudson River. He was a member of a large number of clubs and organizations, including the Philadelphia Club, the Union League and the Union Club of New York, the Metropolitan Club of Washington, D. C., the Railroad Club of New York, and the Chamber of Commerce of the state of New York.



J. B. Thayer.

A minute adopted by the board of directors of the Pennsylvania Railroad says in part: "In recording the terrible fate of a valued officer, and beloved and respected associate, we desire to pay fitting tribute to his memory and bear testimony to his great worth to the company, not only as an officer, but in its highest councils. Mr. Thayer was thoroughly equipped for the high office which he held, by his long service in the traffic department of the company, having discharged the duties of various official positions with the same diligence, intelligence and skill which were manifested and more highly developed in his executive life, until, through the channels of work well done and achievements of lasting importance, his name finds place on the roll of honor of those who have served the company faithfully and well: while to those who labored side by side with him his memory, though darkened by the tragic ending of his life at the high tide of his usefulness, is made more dear by the characteristic manhood and heroism with which he accepted his fate. His true value to the company did not consist alone in his ability as an executive officer and prominent standing as a traffic authority; his alert mind and power of ready expression made for much in argument, debate and negotiation, and never were the interests of the company safer than in his hands. A man in all that endears men to men, of genial nature, with an affable manner and a ready appreciation of humor, he was a charming companion and beloved by all who knew him, while the example of his integrity, honorable dealing and clean life is an inspiration alike to friends, associates and subordinates."

John H. McAdoo, general agent in the freight department of the Chicago & Alton, with office at Pittsburgh, Pa., died at Pittsburgh on April 16.

The Scottish railways have fully participated in the advantages arising from the activity of trade, and at the same time they have dealt with their increased traffic in an economical manner, their profits show great expansion. The directors, have, however been conservative in the matter of dividends in consequence of the loss of earnings from the existing coal strike, and of the expected increase in expenses in the current year from the advances in wages and from a higher price of coal. The conservatism in the matter of dividends is to be commended, especially as it makes for good results in future years. British railways, generally speaking, have in recent years suffered from the consequence of having divided their profits too closely for so many years, and having devoted insufficient sums to reserve, to depreciation and to provision for obsolescence. The Scottish railways in particular have suffered from the lack of conservatism in the matter of dividends in the past. When the waste arising from the use of small coal cars was demonstrated they found themselves with an immense amount of antiquated rolling stock which they were unable to scrap in consequence of the smallness of the funds they had set aside for depreciation and obsolescence. The more conservative dividend policy pursued in recent years has helped them materially to modernize their rolling stock without burdening the capital account, and the considerable amount of profits devoted in the past year to reserves and to other purposes will materially assist them in effecting greater economies of operation in the coming years as an offset to the advance in the rate of wages.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Kansas City Southern is in the market for 25 consolidation locomotives.

The Chicago, Terre Haute & Southeastern is in the market for five consolidation locomotives.

Wade, Clower & Wade have ordered one mogul locomotive from the Baldwin Locomotive Works.

The Pere Marquette is said to be in the market for 40 locomotives. This item has not been confirmed.

The Harriman Lines have ordered 20 Pacific type locomotives from the American Locomotive Company.

The J. A. Bel Lumber Company, Ltd., has ordered one six-coupled locomotive from the Baldwin Locomotive Works.

The Baskett Lumber & Manufacturing Company has ordered one mogul locomotive from the Baldwin Locomotive Works.

The New Orleans, Mobile & Chicago has ordered eight mikado locomotives and four Pacific type locomotives from the Baldwin Locomotive Works.

The Monongahela has ordered six consolidation locomotives from the American Locomotive Company. The dimensions of the cylinders will be 21 in. x 30 in.; the diameter of the driving wheels will be 51 in., and the total weight in working order will be 192,000 lbs.

The Northern Pacific has ordered two 10-wheel locomotives from the American Locomotive Company. The dimensions of the cylinders will be 20 in. x 28 in.; the diameter of the driving wheels will be 63 in., and the total weight in working order will be 169,000 lbs.

The Canadian Pacific has ordered 25 consolidation locomotives from the American Locomotive Company. The dimensions of the cylinders will be 23½ x 32 in.; the diameter of the driving wheels will be 63 in., and the total weight in working order will be 222,000 lbs.

The Vulcan Iron Works, Wilkesbarre, Pa., has received the following orders: Three contractor's locomotives for Richard Evans, Minneapolis, Minn.; four contractor's locomotives for the Purcell Construction Company, Tamaqua, Pa.; two contractor's locomotives for Timothy Burke, Scranton, Pa., and two contractor's locomotives for Dutton & Timson, Secreton, Sask.

CAR BUILDING.

The Wisconsin Fish Commission has ordered one special car from the Pullman Company.

The Lehigh Valley has ordered 250 refrigerator cars from the Standard Steel Car Company.

The Kanawha & Michigan has ordered 1,000 general service cars from the Ralston Steel Car Company.

The Lake Superior & Ishpeming has ordered 50 flat cars from the Western Steel Car & Foundry Company.

The Chicago, Indianapolis & Louisville is said to be in the market for 1,000 box cars. This item has not been confirmed.

The Kansas City Southern is in the market for 1,500 box cars, 1,000 all-steel gondolas, 400 flat cars and 100 automobile cars.

The New England Coal and Coke Company, Boston, Mass., has ordered 500 fifty-ton coke cars from the Cambria Steel Company.

The Intercolonial has ordered 400 box cars from the Nova Scotia Car Company, two dining cars and two sleeping cars from the Canadian Car & Foundry Company, and six first class coaches from the Preston Car Company.

The Harriman Lines have ordered 35 coaches, 15 60-ft. chair cars, ten 60-ft. mail cars, two 69-ft. combination mail and baggage cars, 39 60-ft. baggage cars, 14 dining cars, nine dynamo cafe and baggage cars, and two cafe observation cars from the Pullman Company.

The Atchison, Topeka & Santa Fe has ordered 1,000 box cars from the Standard Steel Car Company, 500 box cars and 25 copper ore cars from the Pullman Company, 1,000 box cars and 250 automobile cars, 500 automobile-furniture cars and 200 tank cars from the American Car & Foundry Company, 500 box cars and 100 flat cars from the Western Steel Car Company, and 50 air-dump cars from the Western Wheeled Scraper Company.

IRON AND STEEL.

The Pere Marquette is soon expected to be in the market for 4,000 tons of 90-lb. rails.

The Mexican Central has ordered 4,000 tons of rails from the Maryland Steel Company.

The Long Island has ordered 6,000 tons of rails from the United States Steel Corporation.

The St. Louis & San Francisco is soon expected to be in the market for 25,000 tons of rails.

The Chicago & North Western has ordered 5,500 tons of bridge material from the King Bridge Company and 1,600 tons from the American Bridge Company.

General Conditions in Steel.—The increase in prices has stimulated specifications on the existing contracts and the mills are forced to operate at almost full capacity to make prompt deliveries. Orders for new business are still small on account of the high prices. It is believed, however, that the manufacturers will still further increase the prices before the end of May. Steel company earnings are not expected to show much improvement in the second quarter over the first quarter, due to the small volume of new business.

Rail Production in 1911.

Statistics prepared by the American Iron and Steel Association show that the total rail production of all kinds in the United States in 1911 was 2,822,790 tons as compared with 3,636,031 tons in 1910, a decrease of 813,241 tons, or over 22 per cent. Of this amount 1,138,633 tons were Bessemer rails, 1,676,923 tons were open-hearth rails, and 7,234 tons were miscellaneous rails. Miscellaneous rails include 234 tons of iron rails, 462 tons of rails rolled from electric steel, and 6,538 tons of re-rolled steel rails which the makers were unable to classify as Besesmer or open-hearth. Of the total production, 2,708,795 tons were rolled from ingots made by the makers, and 113,761 tons were rolled from purchased ingots or blooms, crop ends, seconds, or renewed or re-rolled rails. The following table shows the production of Bessemer and open-hearth rails in this country from 1908 to 1911, inclusive.

	1908.	1909.	1910.	1911.
Bessemer	1,349,153	1,767,171	1,884,442	1,138,633
Open-hearth	571,791	1,256,674	1,751,359	1,676,923

The rail production according to weight for the last ten years is given as follows:

Kind of rails. Gross tons.	Under 45 lbs.	45 lbs. and less than 85.	85 lbs. and over.	Total Gross tons.
Bessemer rails	111,231	606,300	421,102	1,138,633
Open-hearth rails	100,755	461,387	1,114,781	1,676,923
Miscellaneous	6,772	9	453	7,234
Total, 1911	218,758	1,067,696	1,536,336	2,822,790
Total, 1910	260,709	1,275,359	2,099,983	3,636,031
Total, 1909	255,726	1,024,856	1,743,263	3,023,845
Total, 1908	183,869	687,632	1,049,514	1,921,015
Total, 1907	295,838	1,569,985	1,767,831	3,633,654
Total, 1906	284,612	1,749,650	1,943,625	3,977,887
Total, 1905	228,252	1,601,624	1,546,053	3,375,929
Total, 1904	291,883	1,320,677	672,151	2,284,711
Total, 1903	221,262	1,603,088	1,168,127	2,292,477
Total, 1902	261,887	2,040,884	645,162	2,947,933

Supply Trade News.

The Curtain Supply Company, Chicago, announces the appointment of Fred M. Egolf as a new western representative, with office in Chicago.

L. R. Pomeroy, consulting engineer, has moved his office from 30 Church street, New York, to 105 West Fortieth street, New York.

The Isthmian Canal Commission will receive bids until April 29 on miscellaneous supplies, including car couplers. (Circular No. 704.)

The Railway Materials Company, Chicago, will move its general office on May 1 from the Old Colony building to the Railway Exchange.

The Scullin-Gallagher Iron & Steel Company, St. Louis, Mo., has moved its New York office from 1 Wall street to the Grand Central Terminal.

The Helmbacher Forge & Rolling Mills Company, St. Louis, Mo., has filed a petition in court at St. Louis, Mo., asking permission for dissolution.

The Niles-Bement-Pond Company, New York, will on May 1 move its Chicago office from the Commercial National Bank building to the McCormick building.

John P. Congdon, formerly supervising engineer for the Oregon Short Line, has opened offices in the Empire building, Boise, Idaho, as consulting engineer.

Herbert Wolff, mechanical engineer of the American Car & Foundry Company, New York, has been made assistant to Vice-President J. M. Buick, with office in St. Louis, Mo.

Paul M. Warburg, of Kuhn, Loeb & Company, New York, has been elected a director of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., succeeding Charles A. Moore, resigned.

The American Sheet & Tin Plate Company, Pittsburgh, Pa., having completed a series of service tests extending over several years, is now making all roofing terne plates exclusively from copper bearing open hearth steel.

The stockholders of the Bethlehem Steel Company, South Bethlehem, Pa., will vote on the question of authorizing an issue of $50,000,000 5 per cent. general mortgage bonds. Arrangements have been made to sell $15,000,000 of the proposed issue to retire maturing notes and bonds.

W. W. Gaffin, who has resigned after several years' service as division engineer of the Chicago & North Western at Fond du Lac, Wis., has formed a partnership with F. Gehri, of Janesville, Wis., and will conduct a contracting business under the name of Gaffin & Gehri at Fond du Lac.

Benjamin Guggenheim, president and director of the International Steam Pump Company, the Blake & Knowles Steam Pump Works; Henry R. Worthington, the Laidlaw-Dunn-Gordon Company, and the Power & Mining Machinery Company, all of New York, was lost at sea in the wreck of the White Star steamship Titanic, April 15.

John B. Given, general sales manager of the American General Engineering Company, New York, has been made sales manager for the New York and New England territory of the Continental Fibre Company, Newark, Del., and will handle the sales of track insulation to both steam and electric railways. The Continental Fibre Company will soon put on the market a waterproof track fiber.

The Joliet Railway Supply Company, Joliet, Ill., announces that in addition to the Perry anti-friction side bearings it has made arrangements for the exclusive manufacture and sale of the improved Hartman anti-friction center plate. In addition to its works at Joliet, the company is now equipping and will operate a large plant at Fortieth street and Princeton avenue, Chicago, to which point it will remove its general office from Joliet and its Chicago office from the Fisher building, maintaining sales offices only at the Karpen building, Chicago, Mutual building, Richmond, Va., and Syndicate Trust building, St. Louis, Mo.

Arthur M. Kittredge has resigned as president of the Barney & Smith Car Company, Dayton, Ohio. Probably no successor will be elected until the annual meeting in June. Mr. Kittredge entered the service of the Barney & Smith Car Company in 1884 as salesman, and was appointed assistant superintendent in 1886. He was superintendent from 1888 to 1900, when he was elected vice-president. This office he held until November, 1908, when he was chosen president to succeed Col. J. D. Platt. Mr. Kittredge is widely known among railway officials and manufacturers of railway equipment and is considered an authority upon matters of car construction. He remains a member of the board of directors of the Barney & Smith company, being also a director of many industrial and financial institutions. Since the organization of the Railway Business Association Mr. Kittredge has been very actively identified with its work and is now one of the vice-presidents of this association.

A new company is being formed, name not yet decided on. This company will have $15,000,000 capital stock, consisting of $5,000,000 7 per cent. preferred stock and $10,000,000 common stock. This company is a merger of the United States Electric Company, New York, the National Telephone Selector Company, New York, the Sandwich Electric Company, Sandwich, Ill., the Electric Switch & Signal Company, the Charter Electric Company, the Sandwich Pole Changer Company, Sandwich, Ill., and the International Telephone Call Company. The company acquires 150 patents and 1,600 allowed claims in the United States and in 20 foreign countries. The purpose of the company is to make and install, among other things, complete systems of automatic safety equipment. Among the directors of the company are Newman Erb, chairman of the Pere Marquette; Jules S. Bache, of J. S. Bache & Co., New York; James Gayley, formerly vice-president of the United States Steel Corporation; John W. Griggs, formerly attorney general of the United States; C. M. Seeley and C. N. Sigison.

TRADE PUBLICATIONS.

Motor Cars.—Burton W. Mudge & Company, Chicago, have issued a folder giving illustrations and specifications of its Mudge-Adams, Class E, 4 h. p., inspection track car.

Denver & Rio Grande.—This company has published an especially full and attractively illustrated pamphlet on The Fertile Lands of Colorado, written by Clarence A. Lyman of Loma. Colo.

Hydraulic Benders.—The Watson-Stillman Company, New York, has published catalog No. 83 on hydraulic benders. The catalog illustrates and describes the various types of benders and includes price and dimension tables.

Car Ventilation.—The Railway Utility Company, Chicago, has issued a small folder describing the Utility car ventilator, which is operated by a jet action caused by a downward rush of air between the body of the ventilator and an outer ring which siphons air from the interior of the car through an inner ring.

Structural Iron and Steel Work.—The Des Moines Bridge & Iron Company, Pittsburgh, Pa., has published a 50-page well illustrated catalog on its bridges, water towers, steel barges, turn tables, etc. Illustrations of many installations are shown; brief descriptions are given and a list of water towers and stand pipes installed by this company in the United States and other countries is included.

Small Polyphase Motors.—The General Electric Company, Schenectady, N. Y., has issued bulletin No. 4933, describing its small polyphase motors of riveted frame construction. These motors are for two and three-phase circuits and wound for 25, 40 and 60 cycles. They range from ¼ to 15 h. p. This bulletin describes both horizontal and vertical motors, and contains illustrations of various applications of the motors.

Dredging Buckets.—The Hayward Company, New York, has issued an attractive new illustrated catalog No. 39, devoted to a description of its orange peel buckets, clam shell buckets, drag scraper buckets, scraper clam shell buckets, excavators, counterweight drums, derrick fixtures, traveling derricks, coal handling machinery, dredges, etc. The catalog includes excellent photographs of the principal types of buckets in service and of their principal parts, and also contains complete price lists for the different sizes and capacities.

Railway Construction.

New Incorporations, Surveys, Etc.

Boston & Albany.—According to press reports, this company will spend over $1,000,000 for construction work this coming summer. The improvements include the laying of third track near Ashland, Mass., and extending the sidings at various points. The yard facilities at Worcester are to be remodeled, and several branch lines have been planned. New stations are to be put up at West Sprinfield, at Pittsfield, and at Worcester, and the platforms are to be lengthened on the stations between Boston and South Framingham and at West Springfield. A large number of bridges are to be rebuilt or repaired. F. B. Freeman, chief engineer, Boston, Mass.

Burrard Inlet Tunnel & Bridge Company.—An officer writes that this company expects to let contracts in about two months to build a line in connection with the Second Narrows bridge from Eburne in South Vancouver, B. C., northeast to Deepclove. There will be four steel bridges, to be from 2,000 ft. to 3,000 ft. long. D. Cameron, chairman, Winch building, Vancouver, B. C.

Canadian Northern.—An officer of the Canadian Northern Montreal Tunnel & Terminal Company writes that surveyors are now in the field and are preparing plans to drive a double track tunnel through Mount Royal, over three miles long, to provide an entrance for the Canadian Northern from the west into the center of Montreal, Que. A terminal station will be located in the center of the town between Cathcart and Lagauchetiere streets, and between Mansfield and St. Monique streets, and the tracks will be 40 or 50 ft. below the street surface. The track layout will consist of six or seven through tracks and half a dozen stub-end tracks, with platforms about 1,000 ft. long. The double track viaduct will continue down to the St. Lawrence river, where a connection will be made with the Harbor Commissioners' tracks, providing a through eastern connection with the Quebec lines of the Canadian Northern. There will also be an elevated freight yard with storage accommodations in the commercial district downtown. In connection with this project the company is developing a large town site on the Piedmont back of Mount Royal. The actual construction work will probably be started some time in May. The work is to be carried out by Mackenzie, Mann & Company. S. P. Brown, managing engineer, Montreal.

Canadian Northern Montreal Tunnel & Terminal Company.—See Canadian Northern.

Canadian Roads.—Premier Richard McBride of British Columbia is quoted as saying that a line is to be built from Vancouver to Fort George on the Fraser river and thence north and east along the Stuart river and lake. The main line will run east through the Peace river country from Stuart lake. A line will run north along Tremblem lake and the Nars valley to the Yukon. Uultimately this will be the main coast railway to Alaska. The bonds of this new line are guaranteed by the British Columbia government, and construction work has been begun. This new railway is expected to be completed from Vancouver to the MacKenzie valley and to the Yukon in four years. The line is being built by Foley, Welch & Stewart.

Central of Canada.—As soon as the plans of the route for this projected line from Carillon, Que., west to South Indian, Ont., about 50 miles have been approved by the Department of Railways & Canals construction work will be started. L. B. Howland, superintendent of construction, Toronto, Ont.

Central Pacific.—See an item under Railway Financial News.

Chicago, Burlington & Quincy.—All grading has been completed on the line from Thermopolis, Wyo., to Powder River, 103 miles, and track laying will be started this summer as soon as the bridge work is completed.

Chicago & Eastern Illinois.—The plans of this company call for improvements to be carried out during the coming year, at a cost of $2,000,000 as follows: Completion of the double tracking between Chicago and St. Louis, Mo., laying 15,000 tons of 100-lb. rails, putting up a new passenger station at Danville, Ill., and constructing new yards near West Frankfort, Ill., and at Cypress. L. C. Hartley, chief engineer, Chicago.

Chicago, Milwaukee & Puget Sound.—According to press reports work will be begun May 1 on the construction of a three-mile tunnel through the Cascade mountains. The work will cost nearly $5,000,000. The tunnel will shorten the line seven miles and will eliminate the heavy grade at the summit.

Chicago, Milwaukee & St. Paul.—This company has awarded the general contract for about 100 miles of second-track work on the Chicago & Council Bluffs division, between Marion and Coon Rapids, Ia., to McIntosh Brothers of Milwaukee, Wis. A general contract for 74 miles of second-track work on the Hastings & Dakota division between Aberdeen and Summit, S. D., has been let to Morris, Shepard & Dougherty of St. Paul.

Denver & Rio Grande.—An officer writes regarding the proposed double tracking improvements and betterment work on this line, that the company expects to begin work on extensive improvements in Utah at an early date. Contracts for the work have not yet been let. J. G. Gwyn, chief engineer, Denver.

Georgia Roads.—A company is being organized by capitalists of McRae, Ga., to build from Dublin, Ga., south to Douglas, about 75 miles. It is expected that contracts will be let about May 15. The company expects to develop a traffic in cotton, and lumber. M. T. McRae, president, McRae and W. J. Clark, engineer, Helena.

Louisville & Nashville.—According to press reports, the Louisville & Nashville has bought a strip of land in North Montgomery, Ala., 300 ft. x 4,500 ft., to be used for extending the yards. W. H. Courtenay, chief engineer, Louisville, Ky.

Maxton, Alma & Southbound.—An officer writes that this company expects to build a three-mile extension of the freight line now in operation from Alma, N. C., to Bracey, 12½ miles. A. J. McKinnon, president, Maxton, N. C.

Missouri & North Arkansas.—An officer writes regarding the reports that improvements are being carried out on this line, that extensions of the present line are not being considered; the work to be taken care of consists of bank widening, straightening the grades, and replacing the wooden bridges with concrete structures. E. M. Wise, general manager, Eureka Springs, Ark.

New York Subways.—The Board of Estimate and Apportionment, of New York, has approved the route of the Steinway subway extension from Fifth avenue to Eighth avenue, where a connection is to be made with the Seventh and Eighth avenue route. The board also approved the Seventh avenue extension from Twelfth street to Vesey street.

New Orleans, Mobile & Chicago.—An officer writes that the line from Laurel, Miss., north to New Albany, 214 miles, will be reconstructed, and 85-lb. rail is to be laid on this section. W. F. Owen, president and general manager, Mobile, Ala.

Norfolk & Western.—An officer writes that the Williamson & Pond Creek has been organized to bulid a 11-mile line from Williamson, W. Va., up Pond Creek valley, to connections with the coal operations in the Pond Creek district. Rights of way are now being secured. C. S. Churchill, chief engineer, Roanoke, Va.

North Lanark Railway.—See Ottawa & St. Lawrence (Electric).

Ottawa & St. Lawrence (Electric).—An officer writes that contracts are to be let to build from Ottawa, Ont., west via Arnprior to Braeside, thence south via White Lake, Lanark, Perth and Athens to a point on the St. Lawrence river eight miles west of Brockville, thence east to the boundary between the provinces of Ottawa and Quebec; from Ottawa south via Metcalfe, Vernon and Winchester to Morrisburg, connecting with the St. Lawrence river line, also to build a four-mile branch from Kenmore to Russell and a branch from the Arnprior-Lanark line to High Falls on the Matawaska river. The company has been authorized to take over the North Lanark Railway, and the two lines when completed will have a total length of about 274 miles. Work is expected to be started early in May, on the section from Ottawa south to Morrisburg, and soon afterwards work will be started from Ottawa west to

Arnprior. The assets and franchises of both companies have been taken over by J. A. Morden & Company, Toronto. J. E. Askwith, president, Ottawa.

Quebec Central.—An officer writes that the Quebec government has granted subsidies for the line from a point 30 miles from St. George, in Dorchester county, to a point in the parish of St. Sabine, county of Bellechase, about 1½ miles has already been constructed and is in operation. A further extension from St. Sabine to Dionne county, 50 miles, has not yet been definitely located. The general route will be through the counties of Bellechase, Montmagny and L'Islet, and there will be a terminal near St. Pamphile, in L'Islet county. Location surveys will probably be started this coming fall, and the construction work will be carried out next year. J. H. Walsh, general manager, Sherbrooke, Que.

Richmond & Rappahannock River (Electric).—An officer writes that this company was organized to buy a suburban electric line running north from Richmond, Va., and to extend it to the lower Rappahannock river or to Chesapeake bay; with branches and ferries in eastern Virginia, between the James and Potomac rivers. Surveys are now being made. C. L. Ruffin, vice-president, Richmond, Va.

San Antonio & Aransas Pass.—This company is said to have under consideration the question of building an extension from Lockhart, Tex., north to Austin, about 50 miles. L. Andrews, assistant engineer, Yoakum, Tex.

San Antonio, Uvalde & Gulf.—This road is now in operation from Uvalde, Tex., to Fowlerton, 121 miles, and work is under way from Fowlerton to San Antonio, and from San Antonio to the gulf. J. E. Franklin, president; A. R. Ponder, first vice-president and general manager, and M. E. Lemming, second vice-president and purchasing agent, all with office at San Antonio. (March 15, p. 526.)

Sandy River & Rangeley Lakes.—An officer writes that contracts have been let to Joseph Sacco, Portsmouth, N. H., to build a logging line from Sanders, Me., easterly to Mount Abram township, three miles. The work will be light, and involves handling about 5,000 cu. yds. a mile. The maximum grades will be 3 per cent., and maximum curvature 12 deg. T. L. Dunn, chief engineer, Portland, Me.

Southern Pacific.—This company has begun work on the project of changing its Jefferson street line out of Portland, Ore., to Oswego, Newberg and McMinnville, and the west side line to McMinnville from steam to electric power.

Sullivan County Electric.—Incorporated in New York with $200,000 capital, to build from Liberty, N. Y., west and southwest via White Sulphur Springs and Youngsville to Jeffersonville, about 15 miles. L. H. Brown, A. Brown and S. F. Crocker, New York, are the directors.

Tallahassee & Gulf.—An officer writes that this company's line is to connect Norfleet's Siding, Fla., with Jackson's Bluff, Oakgrove and Mekasel. Track has been laid on 12 miles. The plans call for building a 40-mile extension to Carrabelle. J. H. Norfleet, president, Ocklocknee, Fla.

Virginia Roads.—Plans are being made to build a line to connect Suffolk, Va., Chuckatuck and Smithfield, about 20 miles. It is expected that the work will be started in about 60 days. H. H. Prince, Norfolk, may be addressed.

Wabash.—According to press reports, contracts for grading embankments for new second-track have been let as follows: To W. E. Tench & Company, Detroit, Mich., between Oakwood, Mich., and Milan, 29 miles, involving the handling of about 100,000 cu. yds., the work to be finished by July 1; to Costello Brothers, Indianapolis, Ind., between New Haven, Ind., and Fort Wayne, five miles, the work to be finished by June 1, and to the Walsh Construction Company, Davenport, Ia., between Taylorville, Ill., and Litchfield, 33 miles, requiring the handling of about 200,000 cu. yds., the work to be finished by September. A. O. Cunningham, chief engineer, St. Louis, Mo. (April 12, p. 872).

Washington Roads.—Residents of Spokane, Wash., are said to be back of a project to build from Spokane southwest to a point on the Columbia river near Pasco, about 130 miles. C. B. Dennis is the principal promoter.

Williamson & Pond Creek.—See Norfolk & Western.

RAILWAY STRUCTURES.

Aurora, Neb.—The Chicago, Burlington & Quincy has let contracts for the construction of five fireproof brick stations to cost about $20,000 each at Aurora, Sheridan, Wyo., Seward, Neb., and Fairfield and Mt. Pleasant, Ia.

Chatham, Ont.—The Canadian Pacific will build new freight sheds this summer at Chatham, to cost between $30,000 and $40,000.

Danville, Ill.—The Chicago & Eastern Illinois will build a new passenger station.

Fairfield, Ia.—See Aurora, Neb.

Independence, Kan.—The Missouri Pacific will begin work soon on a new brick and tile passenger station, to cost about $34,000.

Montreal, Que.—See Canadian Northern under Railway Construction.

Mt. Pleasant, Ia.—See Aurora, Neb.

Newark, N. J.—Contracts were recently let by the Central Railroad of New Jersey to Henry Steers, New York, for the concrete piers for drawbridges over the Hackensack and the Passaic rivers. The same contractor is at work elevating the line between Jersey City, N. J., and Newark, on about 3½ miles. This includes the handling of about 1,600,000 cu. yds. The American Bridge Company has the contract for the steel work for the bridges. The improvements will cost about $2,000,000.

Oswego, Ore.—The Southern Pacific is preparing plans for large car shops at this point.

Pittsfield, Mass.—See Boston & Albany under Railway Construction.

Seward, Neb.—See Aurora, Neb.

Sheridan, Wyo.—See Aurora, Neb.

Tacoma, Wash.—It is reported that the Chicago, Milwaukee & Puget Sound will make improvements to double the capacity of the Tacoma car shops.

Terre Haute, Ind.—The Vandalia will spend about $100,000 on improvements to its terminals at this point.

Vancouver, B. C.—See Burrard Inlet Tunnel & Bridge Company under Railway Construction.

West Springfield, Mass.—See Boston & Albany under Railway Construction.

Worcester, Mass.—See Boston & Albany under Railway Construction.

A company has been incorporated in Havana, Cuba, with $100,000 capital for the construction of a railway four miles long from Havana to Cojimar. The building of this railway will necessitate constructing a tunnel under the bay to Casa Blanca.

The receipts of the Gibara Railway, Cuba, in 1911 from freight and passenger traffic were $132,431 and the expenditures $121,913, showing a net gain during the year of $10,517. This railway company was organized in 1883 with a capital stock of $400,000, and its assets now amount to $813,675.

The boards of directors of the Buenos Aires Southern and the Buenos Aires Southwestern railways, Argentina, have increased their capital to the extent of $25,000,000 for the purpose of investing the same in the construction of new branches and other railway improvements in the republic.

At the end of 1910 there were 3,806 miles of railways in Queensland, Australia, an increase of 264 miles over the previous year. At this time 431 miles of new line were under construction and 2,009 miles were authorized by the government but not yet begun. The gross earnings for the year were $12,456,705, and the expenditures $6,883,296, leaving net earnings of $5,573,409.

At the end of 1910 there were 375 miles of state-owned lines open to traffic in New South Wales. This compares with 3,623 miles at the close of 1909. The total gross earnings of these railways in 1910 were $28,554,622. Passenger receipts were $11,282,432, and freight receipts were $17,262,190. The cost of operation was $17,186,146, and the net earnings were $11,358,476.

Railway Financial News.

Central Pacific.—This company has acquired the lines and other properties of the following companies: Central California, Niles, Cal., to Redwood City, 16 miles; Fernley & Lassen, projected from Fernley, Nev., to Susanville, Cal., and beyond; Chico & Northern, Chico, Cal., to Stirling City, 32 miles; Modoc Northern, projected from Alturas, Cal., to Klamath Falls, Oregon; Sacramento Southern, Sacramento, Cal., to Walnut Grove, 24 miles, of which nine miles are operated; Goose Lake & Southern, projected from Goose Lake, Cal., to Anderson; Oregon Eastern, Weed, Cal., to Klamath Falls in operation, thence to Natron under construction. The Central Pacific assumes the bonds of these companies, which, together with the stocks, have been held by the Southern Pacific, subject to such disposition as may later be determined on to reimburse the Southern Pacific for advances made for construction. The bonds include $3,000,000 30-year bonds of the Central California; $1,000,000 30-year bonds of the Chico & Northern; $2,500,000 30-year bonds of the Sacramento Southern, and $5,000,000 30-year bonds of the Oregon Eastern. The bonds are all dated November 1, 1911, except the Oregon Eastern, which are dated January 2, 1912.

Chicago, Indianapolis & Louisville.—White, Weld & Company, and Potter, Choate & Prentice, both of New York, are offering at 110½ and interest, yielding over 4.40 per cent., the unsold portion of the $1,558,000 refunding mortgage 5 per cent. bonds, series B, dated July 1, 1897-1947. These bonds were sold by the company to provide for the purchase of additional equipment, and are the remainder of an authorized issue of $15,000,000, comprising $4,700,000 series A 6 per cent. bonds, $5,000,000 series B 5 per cent. bonds, and $5,300,000 series C 4 per cent. bonds.

Chicago, Terre Haute & Southeastern.—F. J. Lisman & Co., Chicago, are offering at 97 and interest a block of first and refunding mortgage 5 per cent. bonds, of December 1, 1910-1960. The amount outstanding is $3,950,000.

Cleveland, Cincinnati, Chicago & St. Louis.—Application has been made to the Ohio Public Service Commission by this company and by its controlled property, the Cincinnati Northern, to issue $1,579,000 and $144,000 bonds, respectively, to pay their floating debts and for improvements.

Denver & Rio Grande.—E. L. Brown, vice-president and general manager of the company, has been elected a director to succeed Howard Gould, resigned.

See item in General News Section.

Georgia & Florida.—The $2,000,000 general mortgage 6 per cent. bonds dated February 1, 1912-1932, which have been underwritten at 52 per cent., as was mentioned in the *Railway Age Gazette* of March 29, are being offered to stockholders to the extent of 22 per cent. of their holdings. The interest accruing on these bonds up to and including February 1, 1922, may be paid either in cash or in script obligations bearing 5 per cent. interest. These script obligations may be converted into 5 per cent. coupons when presented in multiples of $300. The 6 per cent. bonds and the 5 per cent. script obligations are callable at par and interest. An underwriting syndicate has agreed to take up all bonds which are not subscribed for by the stockholders on the same terms on which the bonds are offered to the stockholders for a commission of 1¼ per cent.

Grand Trunk.—The purchase of the River & Rail Coal Company, Belmont county, Ohio, has been effected. It is reported that the purchase was made by a syndicate identified with the Grand Trunk and the Canadian Pacific, and that the property will be operated under the old name but that its output will be mostly used by the Grand Trunk and the Canadian Pacific. An issue of £1,500,000 ($7,500,000) perpetual 4 per cent. consolidated debenture stock is being offered in London. This stock ranks on an equal basis with $17,971,942 stock already listed on the London Stock Exchange. The proceeds will be used for general purposes.

Houston & Brazos Valley.—The Texas Railroad Commission has authorized the registration of $220,000 bonds, secured by a mortgage on the entire line. The road runs from Anchor, Tex., to Velasco, 20 miles.

Kansas City, Mexico & Orient.—A proposal to issue $2,225,000 receiver's certificates was made by the receivers to Federal Judge Pollock at a hearing at Kansas City, Kan., on April 22. Decision was reserved until April 27. It is said that $1,000,000 is needed for the completion of the road from Granada, Kan., to Alpine, Tex., and that a part of the money would be used to pay the floating debt.

Lehigh & Hudson.—Articles have been filed with the secretary of state of New Jersey merging the Mine Hill Railroad, the South Easton & Phillipsburg of New Jersey and the South Easton & Phillipsburg with the Lehigh & Hudson, under the name of the Lehigh & Hudson River Railway. The Lehigh & Hudson under the merger has combined $1,700,000 capital.

Pere Marquette.—United States District Judge Angell on April 23 granted permission to the receivers to issue $605,000 receivers' certificates. It is understood that the money will be used to pay taxes due April 30 and to meet pay rolls.

Rutland.—E. H. Rollins & Sons, Boston, are offering the unsold portion of $500,000 4½ per cent. equipment trust certificates dated May 1, 1912, maturing annually from May 1, 1913 to May 1, 1927. The yield varies from 4.45 per cent. to 4.65 per cent. These certificates were issued to provide 90 per cent. of the cost of new equipment.

The minority stockholders' protective committee, composed of Tompkins C. Delavan, John F. Calder, Ralph L. Shainwald and George N. Towle, with Samuel Untemeyer, counsel, in a circular letter to the minority stockholders, advises them to hold their stock for the same price, namely, about $105 per share, to be paid by the New York, New Haven & Hartford for the majority stock. The committee goes on to say that at the opening of the suit the stock was selling at $28 per share, that $67 per share is now being offered, and that in its judgment it is worth intrinsically over par.

St. Louis Southwestern.—Stockholders on April 17 authorized a mortgage to secure an issue of $100,000,000 first terminal and unifying 5 per cent. bonds of January 1, 1912-1952, of which $7,500,000 have been sold as was previously announced.

Shamokin, Sunbury & Lewisburg.—The $1,000,000 first mortgage 5 per cent. bonds of this company, a subsidiary of the Reading Company, will be paid at maturity, May 1, at the office of Drexel & Co., Phladelphia, Pa. The bankers offer the holders of the bonds the opportunity to extend them at 4 per cent. until July 1, 1925, the extended bonds to be guaranteed principal and interest by the Reading Company. This road runs from Carbon Run Junction, Pa., to West Milton, 31 miles.

Southern Pacific.—See Central Pacific.

At the end of 1910 there were 2,058 miles of railways open to traffic in South Australia, and 303 miles authorized and under construction. Gross earnings were $8,944,339; expenditures $5,196,020, and net earnings $3,748,319.

The mountain observation cars of the Canadian Pacific have been taken as the pattern for the design of some cars which are now being built by the Austrian state railways for use on the summer tourists' lines, and a similar car is to be built for the Austrian minister of railways.

The construction of the railway from Gheringhap, Victoria, to Maroona is proceeding rapidly. Derrinallum and Cressy have already been connected and freight is being transported over 24 miles of the line, but no provision has yet been made for passengers. When the Derrinallum district has been opened up it is anticipated that the grain traffic and general freight business of the railways will develop enormously.

When the Australian Transcontinental Railway is completed there will be a through service between Perth and Adelaide. This line will not be expected to earn its expenses for some time, as there will be stretches of hundreds of miles which will scarcely give rise to any traffic at all. The reason for the construction of this line is largely political, for it will have a great effect in unifying Australia.

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THE Interstate Commerce Commission's report on the collision at Kinmundy, Ill., January 22, which we abstract in another column, throws no new light on the subject. The discrepancies in the testimony of the different men as to the times of the two trains at the two stations are set forth at some length, but the only feature in this testimony that is clear is that the telegrapher at Edgewood, in reporting the two trains 10 minutes apart (12:10 and 12:20) was either dishonest or very careless. His failure to hold the second train until 10 minutes after the first had passed is mentioned as a "contributing cause," but these half dozen words constitute the only hint of censure for this operator. This brevity, amounting to inconclusiveness, characterize the whole report, both in the final summing up and in the separate statements of testimony. The flagman and the conductor of the standing train are saddled with the chief responsibility, and knotty questions are left untouched. Failure to protect standing trains, *where they can be plainly seen for several miles in the rear,* is such a well known occurrence in everybody's experience that it is perhaps not strange that the inspector was at a loss what to say on the subject, especially as there was a semaphore signal about 800 ft. back of this train which served as an additional temptation to its flagman and conductor to neglect their duty; but to most railway men the interesting questions are those concerning the engineman of No. 3. As to these there is no information. He mentioned the steam at the rear of the standing train; but how much exculpation he claims on this account, or whether such a claim is worthy of attention we are not told. He approached at high speed a station where the limit was 10 miles an hour, but his explanation, defense or excuse for this is not given; neither is there anything about his past record. He "supposed" that the train ahead would make as good time as he could make; but the report has nothing to say about the propriety of indulging such a supposition. All we have in the report about the block system is that as the average daily movement of trains over this line (double track) is about 23 each way. The density of traffic "would seem to warrant" its installation. The essential situation, of course, is exactly the same now that it was 12 weeks ago, and there is nothing new to be said.

THE report on the Odessa collision is for the most part subject to the same criticism as the one mentioned above; it is brief where one desires details and is inconclusive except as it declares commonplaces. As regards the steel cars, in particular, there is a considerable amount of descriptive detail, but no conclusion at all, except that if these had been wooden cars the loss of life would have been much greater. The immediate responsibility for the collision is placed on the brakeman, the same as at Kinmundy; the block system seems to be looked upon as a mere adjunct to the time-table and flagging system. The conductor of the standing train, who, at Kinmundy, was held equally responsible with the brakeman, is not mentioned in the final finding at Odessa. But, if the block system is only an after thought, the conductor's duty is most important. In that case, to see that a flagman goes back is a vital feature of train protection, and the question why the conductor at Odessa did not *know* that his man had gone back, and had gone far enough to use torpedoes effectively, is a serious one. However, the whole discussion of the details of Odessa is valuable only as affording a shining illustration of what varied combinations of danger the flagging system is capable of producing, and of how these dangers can be multiplied by introducing the block system and then allowing the men to depend partly on the new and partly on the old system.

IT is estimated by the Interstate Commerce Commission in its opinion in the tap line case abstracted elsewhere in this issue, that the amount of money involved is between fifty and sixty million dollars. Although the commission insists that each one of the so-called tap line cases must be decided entirely on its own merits, the opinion by Commissioner Harlan lays down some general rules defining tap lines which may not legally be permitted to share in the rate with a connecting railway. Although the commission deals only with the lines controlled by lumber companies and used by them to get their product to the mills and to a connection with the railway, the opinion indicates the method which the commission will presumably use in deciding all industrial railway cases. The commission's opinion, in brief, is that if a lumber company chooses to build a railway to get its lumber to an existing railway instead of hauling it out with teams or some other method, a line so built is nothing more nor less than a plant facility and should not be allowed to share in any rate made by the existing railway nor be given

any allowance for the service it performs in bringing the lumber to the existing railway. The test applied is apparently whether or not the line was built to form a part of the lumber industry, or whether it was built to furnish transportation. There are certain exceptions that the commission makes. Where a line is less than three miles and more than 1,000 ft. long, the commission holds that a certain allowance for switching may be made to such a line. Chairman Prouty, in a separate opinion, says that he concurs with the other commissioners, but lays much stress on the possibility of there being a situation where the commission would hold that a line built and controlled by a lumber company or mining company could properly be recognized as a common carrier and allowed to share in the rate. Chairman Prouty expresses strongly his belief that the building of branch line railways should not be discouraged.

PRESIDENT MELLEN has issued a circular to the minority holders of Rutland stock, urging them not to oppose the sale of the remaining half of the majority stock by the New York Central to the New York, New Haven & Hartford. The minority stockholders had been advised to oppose the sale on the ground that the same offer per share should be made to minority holders as is made to the New York Central. In his circular, Mr. Mellen says that the issue before the New York Public Service Commission is not the purchase price of the stock, but the question of whether the Rutland interest will best be served under New Haven control, or under New York Central control. While minority stockholders might be influenced by what, under the circumstances, was expedient, the commission certainly should not be. We doubt if Mr. Mellen himself would urge this view were the same question raised for discussion only, or about properties in which Mr. Mellen were not deeply interested. If a state commission is to discard sound principles of regulation whenever these principles do not conform with what happens to be expedient at some given time, it will soon lose the respect of the public, by whom it is paid, as well the respect of the railways themselves, which the New York Public Service Commission, Second district, now has. The public service commission has the power to prevent, as it did in the Ontario & Western case, a practice which the Hadley's Securities Commission found to be so susceptible of evil consequences that it recommended that a definite law be passed prohibiting such practices. President Mellen says that if the New Haven is compelled to offer to the minority holders the same price per share that it is offering to the New York Central, he would advise against the purchase. If the value of the Rutland to the New Haven is not great enough to warrant such an offer, it is unfortunate for both the minority and majority holders of Rutland stock, because, as has been pointed out in these columns previously and several years ago, the Rutland is not a natural part of the New York Central system, while it would apparently naturally perform a much more valuable service in giving the New Haven a needed entrance into Canada. But, President Mellen's implied argument to the contrary, this is *not* the important question before the Public Service Commission.

VARIOUS commentators on the trend of future railway financing and earnings are perturbed by the fact that the amount of bonded indebtedness of railways is growing from year to year at a much faster rate than the amount of stock outstanding. They usually use the ten-year period from 1900 to 1910 as a basis on which to forecast the conditions from 1910 to 1920. The same *rate* of increase of bonded indebtedness and of stock is assumed for the decade from 1910 to 1920 as took place in the decade from 1900 to 1910. In the first place, why should it be assumed that capital outstanding of railways will increase in geometrical progression rather than in arithmetical progression? Why isn't it fair to assume that the same *amounts* of bonds and of stock will be issued in the next ten years as were issued in the last ten years? If, however, geometrical progression is to be assumed, why is a ten-year period taken? If there is an increase in total indebtedness of a certain per cent. this year over last year, why not take a year instead of 10 years as the period at which to compound the increase, which, of course, will make the total amount issued during the next ten years very much greater? As a matter of fact, however, the history of the relative amounts of stocks and bonds outstanding has been that the ratio shows a pendulum-like record over the history of American railway financing, the issue of first one and then the other class of security being popular. When the amounts of stock issued compared with the amounts of bonds issued got up to certain ratios, there has always been a change in policy, and railways have found it more economical and expedient for a time to sell bonds rather than stock, or vice versa. The selling of bonds rather than stock has been in progress for the last few years, but now there is a fairly distinct turn in the other direction through the issue of convertible bonds. E. H. Harriman was the pioneer in recent years in very successfully selling issues of convertible bonds, and many others have followed his example. The Norfolk & Western's financing by means of convertible bonds is a good illustration of extraordinarily successful financing of this kind. In the 1911 fiscal year $5,388,000 bonds of the Norfolk & Western were converted into stock, reducing the fixed charges by $215,520, and recently the Norfolk & Western has offered and sold another issue of convertible 4 per cent. bonds, convertible prior to 1922 into common stock at par. It will be noted that this method of securing money cheaply now and reducing fixed charges later is dependent on the roads being able to earn a substantial dividend on their common stock.

THE EASTERN ENGINEMEN'S WAGE CONTROVERSY.

THE eastern roads and their enginemen having agreed to arbitrate their differences, the only step preliminary to arbitration that remains to be taken is the selection of the personnel of the board. A review of certain developments in this controversy is now timely. The eastern railways not long ago sought leave from the Interstate Commerce Commission to advance their freight rates. Their chief argument was that their operating expenses had increased and still were increasing, mainly owing to increases made and being made in wages. The commission replied in part that before it could permit rates to be advanced on account of increases in operating expenses, including wages, the roads must establish to its satisfaction that these increases in operating expenses, including wages, were reasonable. Naturally, when the question of another raise in wages was presented to the eastern railway managements, they desired to have the question of its reasonableness determined by the same body which had said that it would determine the reasonableness of changes in their rates largely according to its findings as to the reasonableness of their wages.

But the law does not deal with the wages of interstate railway employees as it does with the rates of interstate railways, out of which those same wages must be paid. It creates a commission and says the roads *must* submit their rates to arbitration by this commission. It does not designate arbitrators to whom employees must submit questions of wages; it does not require them to submit these questions to arbitration at all. And when the eastern railways proposed that the engineers' wage question be arbitrated by the same body that determined the rates railways may charge, the engineers declined the proposition. This could mean only one of two things, viz., that either (1) the employees did not consider the body the government had created to wisely and impartially determine what rates the railways might charge as wise enough and impartial enough to determine fairly what wages the employees ought to receive, or, (2) the employees did not want to submit their case to a body that was wise enough and impartial enough to determine fairly the wages

they ought to be paid. On the former theory, the employees did not think the commission would give them a square deal; and on the latter theory they did not want a square deal. They are welcome to impale themselves on either horn of this dilemma they please. We fancy the truth is that their attitude was like that of the Irishman to whom the judge before whom he was arraigned said: "Don't worry, Pat. I'll see that you get justice." To which Pat replied, "Faith, your honor, that's just what I don't want."

The action of the commission in declining to serve in a voluntary arbitration proceeding, when one of the parties had indicated its services would not be acceptable cannot be criticized. The whole situation demonstrates more clearly than any other that ever has developed the need for the adoption of some scheme of arbitration which will be, in effect, if not in a technical legal sense, compulsory, and which will lead to fair, thorough-going and scientific investigations and determinations of wage controversies between railways and their employees. An agreement has now been reached to submit the controversy to arbitration by a board composed of one representative of the enginemen, one representative of the railways and five other persons to be chosen by these two or by the chief justice of the United States Supreme Court, the chief justice of the Commerce Court and the labor commissioner of the United States, acting together. The railways' indisposition to sumbit the matter to a board organized under the Erdman act and composed of one representative chosen by the employees, one by the roads and one by these two or by the ex-officio mediators under the Erdman act, Messrs. Knapp and Neill, is not surprising. The railways have had experience with arbitrations under the Erdman act, and know they almost invariably result in compromises involving advances in wages and based on no principle whatever. A settlement of the question by such a board as that provided for in the agreement between the railways and the enginemen will be much preferable to a makeshift arbitration under the Erdman act. But there will be other similar controversies, and there ought to be some means for settling them all according to fair and consistent principles. That they may be settled according to consistent principles, there is need for a permanent board of arbitration. That they may be settled justly, there is need that this board shall be created by and represent the public through the national government, and that its findings shall be binding on the Interstate Commerce Commission in rate cases. The workmen's compensation bill prepared by the federal commission on Employers' Liability and Workmen's Compensation, which is now before Congress, provides that payments made by the railways under its requirements shall be accepted by the Interstate Commerce Commission in determining the reasonableness of rates, as reasonable operating expenses. Wage settlements should likewise be made by a federal court of arbitration whose findings should be similarly binding on the Interstate Commerce Commission.

The head of the Brotherhood of Locomotive Engineers announced some time ago that the enginemen intended, if they did not get the increases they demand, "to teach the public a lesson." The implication of this most indiscreet remark was that by tying up the transportation system of the east the enginemen would starve the railways and the public into submission. If the public is not more stupid than we think—that remark of Mr. Stone's and the subsequent developments have already taught it a lesson. That lesson is that the labor leaders, like a certain comic opera character, "want what they want when they want it"; that they are not willing to submit the question whether what they want is what they ought to want to the same body that determines whether the railways are entitled to have what they want; and that, therefore, the time has come for the national government to take steps to insure that they won't get what they are not entitled to have. For the public interest is very directly and deeply concerned. The wages paid by the railways of the United States constitute almost 63 per cent. of their operating expenses. On what wages they pay very largely depends what rates they must receive. And the public pays the rates. Since, in the long run, the public has to pay the piper, it has a right to call the tune. And for its own protection it must, and in due time will, assert and exercise that right.

BOX CAR ROOFS.

SEVERAL shippers of tin plate and cement have inaugurated the practice of testing the roofs of box cars by directing a stream of water on them under considerable pressure and for several minutes. This method has been more or less severely criticized in some quarters on the ground of its being unfair, and possibly it would be if the stream of water were directed in a way which could not possibly be approximated in actual service. Generally speaking, however, the test is a fair one unless the water pressure is too high. As tests of this kind can only be made while the car is standing still, the Jones & Laughlin water test, which is described in the article on Defective Box Cars and Damaged Freight in this issue, and which uses a water pressure of 20 lbs. per sq. in., cannot be considered much more severe than the conditions which prevail when the car is in motion, or is being switched in a severe rain storm.

Under severe service conditions the weaving and distortion of the roof and framing parts is such that weak spots or cracks open up and allow the moisture to enter. Did you ever watch a train of box cars passing by at a speed of 20 or 25 miles an hour? In many instances the springing or weaving of the roof is very noticeable, and without doubt much of the roof trouble on certain classes of cars is largely due to the weakness or lack of stiffness in the frame work upon which the roofing is laid. The temptation to save a few dollars in the cost of a new car is very great when it can be accomplished by increasing the space between the carlines and thus saving one or two per car, or by buying carlines which are too light to provide the requisite strength. One of the car roofing supply companies has found it advisable to include the carlines and running board fixtures in the design of its roof, in order that it may be applied under conditions that will be favorable to it.

The operating department is not controling the abuse to which the cars are subjected in switching, or even in handling them on the road. It is difficult to see how any roof or box car can withstand this unnecessarily severe service unless it is most carefully designed and applied; more than this, it must be closely watched in service and receive repairs regularly, not waiting until the roof is in a bad or leaky condition, but remedying any small defect as soon as it appears. One road, which has a large number of box cars equipped with inside metal roofs, insists that each repair point must renail a certain number of these roofs each month. In this way the roofs are kept in a first class condition and it costs less to maintain them than if the repairs were made at longer intervals.

More reliance should be placed on the advice of the practical car men, and the car department officers should have more responsibility placed on them in the matter of drawing up and enforcing regulations for the upkeep of the rolling stock and in arranging the details for the purchase of new equipment. It is noticeable that where there is a strong car department organization, practically independent of the motive power officers and with full charge of the design and maintenance of the cars, results are much better than are obtained with the ordinary form of organization.

The first cost and the cost of maintenance of a car is very much less than for a locomotive, but there are so many more cars in service that the total cost of maintenance of the cars and locomotives is about the same. Because of the large number of units of rolling stock there should be a much greater opportunity for securing a high efficiency in the car department than in the locomotive department. Unfortunately, however, most of the higher mechanical officers have not had an exten-

sive car department training and they often fail to realize the importance of that department, whose officers are thus severely handicapped. On many roads the car department officers are hardly taken into consideration when a new lot of cars are to be ordered and have very little influence in developing the design and selecting the details. Is it any wonder under these conditions that the freight cars are as defective as they are?

NEW BOOKS.

Walschaert Locomotive Valve Gear. By W. W. Wood, air brake inspector. Published by the Norman W. Henley Publishing Company, 132 Nassau street, New York. 5 in. x 7½ in. 245 pages. 50 illustrations. Bound in cloth. Price, $1.50.

This book is the third edition, revised and enlarged, and is divided into five divisions, the first four dealing with the analysis, design and erection, advantages, and questions and answers relating to the Walschaert gear. The fifth division is given over to the setting of the Walschaert gear and a discussion of other modern radial valve gears, including the Hobart-Allfree, the Baker-Pilliod and the improved Baker-Pilliod. This division also includes questions and answers on breakdowns. The history of the Walschaert valve gear is considered and the development of the gear is carried forward in a very simple manner, so that it may be readily understood by the elementary student, as well as those more familiar with the gear. In the design of the gears both the Reauleaux and Zeuner diagrams are considered. The book will be found valuable by designers laying out valve motions as well as by the mechanics who handle this class of work in locomotive shops.

Accident Prevention and Relief. By Ferd. C. Schwedtman and James A. Emery. 481 pages. 6 in. x 9 in., illustrated. Bound in half leather. Published by the National Association of Manufacturers, 30 Church street, New York.

The authors of this work were sent abroad by the National Association of Manufacturers to study and report on the prevailing systems for the compensation for and prevention of accidents in various foreign countries. They visited England, France, Germany, Austria, Hungary, Belgium, Switzerland and Italy, and at each place were given the fullest opportunity of making their investigation complete. The report deals especially with the systems in use in England and Germany, which were found to be the most advanced, and covers legislation, insurance, safety museums and societies, statistics, employers' liability, etc. Colored plates and charts are used very freely and the whole work of the authors and the associated committee is boiled down into very positive, clear-cut recommendations for action in this country. This book is beyond doubt the most business like and real practical publication available on this subject.

Industrial Democracy or Monopoly. By William W. Cook, General Counsel, Mackay Companies, New York.

This is a reprint in pamphlet form of an article by Mr. Cook published in *McClure's Magazine* for January, 1912, in which the author proposed as an alternative to government ownership of railways, which he deems imminent, that all the railways of the United States be brought under the control of a $25,000,000,000 holding company, capitalized with guaranteed 3 per cent. stock, and managed by twenty-five directors named by Congress. In an appendix are reprinted two criticisms of the proposal, one including two editorials from the *Railway Age Gazette* which Mr. Cook refers to as "from the conservative viewpoint," and a letter from J. W. Woodrough of Omaha, which he refers to as "from the radical viewpoint." In commenting on these, Mr. Cook says that while he is in entire sympathy with the feeling expressed by the *Railway Age Gazette*, that the longer we can continue private ownership and management of railways the better, the question has now passed that point, and that all of the objections raised to his plan apply with tenfold more force to any plan of government ownership.

Letters to the Editor.

DEMURRAGE DIFFICULTIES.

Boston, Mass., April 20, 1912.

To the Editor of the Railway Age Gazette:

I have read with interest correspondence in your issues of March 29 and April 5 on the subject of demurrage.

Those persons, whether they be railway officers, shippers, or public officials, who think that "the facts in any (demurrage) case are readily discoverable and the results fixed absolutely by the rules themselves" simply delude themselves; and those who think that the uniform code (which Mr. Voorhees calls the "I. C. C. rules") is in all respects just, and fits all conditions, are deficient in knowledge that should be possessed by all railway officials. The commission itself in recommending these rules was particularly careful to indicate that they were for trial, and subject to the revision that experience might show to be expedient and necessary. The necessity for the existence of impartial demurrage commissioners arises from many conditions, and thousands of individual instances could be produced illustrative of each.

First and fundamentally, it is axiomatic that one party to a controversy is not fitted to act as a judge. Yet that is exactly what happens when the railway agent in a disputed case is the sole judge of what the facts are or what is the proper interpretation of a rule.

Second: "All shippers of any considerable amount" do *not* "accept the average agreement." One New England road, the Boston & Maine, reports that of the many thousands of shippers on its lines, about 450 have average agreements! Further, these rules should not be framed for the "shipper of considerable amounts only"; they are far better able to take care of themselves than the thousands of small shippers.

Third: The facts in disputed cases are *not* usually "easily discoverable" and "the results" are *not* "fixed absolutely by the rule (s) themselves." We can furnish hundreds of such illustrations. A few typical ones are: (1) Counsel for certain roads say that a notice sent on Sunday shall count as if sent on the following day, and their companies are governed accordingly. Others say the opposite, and act accordingly. (2) Some companies treat the postmark of a notice as evidence of date of sending. Others not. (3) Some companies state that a day during which it is clear part of the time cannot be counted as weather interference. Others do not take this position. We have had opportunities of seeing papers in many such claims showing widely varying interpretations by different roads under substantially similar conditions. When one reflects upon the infinitude of opportunities for disputes as to facts and for variety of construction of the rule, it is immediately apparent that to leave the settlement of such disputes to one of the interested parties is entirely improper.

Fourth: What is "actual placement?" It has been construed by some railway officers as meaning placing at a spot that may be inaccessible or exceedingly inconvenient to consignees, when a convenient and accessible spot might just as well have been chosen. In some cases railways have claimed that their full duty has been performed when car is placed where it can be reached by team. Some roads are far more just and reasonable than others in this interpretation of this rule.

Fifth: Can anyone maintain that a statement by a carrier's agent that he has been unable to deliver cars because of the "crowded condition of the private tracks" or of "other conditions attributable to consignees," is an immutable fact? Suppose, as is frequently the case, the private track owner states that he has plenty of room, or that the crowded condition is caused entirely by failure of carrier to remove loads or empties proffered by the shipper. To apply to the commission to decide each such case is an impossibility; then shall the railway officer,

naturally anxious to justify himself and to make a record, and prejudiced in favor of his own case, be the sole arbitrator? And so we might go on through the list.

Then arises the other question. Are the present rules just in all cases? In New England this winter thousands of cars of coal and grain products show an average time of over 30 days in transit. Hundreds of cars were on the road two, three and even four months. One consignee had not received on April 1 55 cars of feed shipped in December, January and February. His losses on these and other delayed cars were such as to make his season's balance show in red; but on top of that he finally received 20 cars or more in one day, which came via different routes from six different places; so that the bunching rule as it now reads could not be availed of. Another small feed dealer ordered his "spring shipment" of 14 cars of various feeds, etc., in January. On April 14 he had only received three of those cars; he had had to buy in the meantime as many cars as he could in open market at greatly advanced prices, and advises us that his losses have forced him out of the business. I have in my possession about 300 such letters showing proportionately immense losses on the part of small dealers, who have no way of collecting damages from the railway company. After losing a season's profits the cars are delivered in bunches and heavy demurrage bills assessed.

The receipt of over 300 bitter complaints of demurrage unjustly assessed does not lead us to concur in Mr. Voorhees's statements that "complaints are very infrequent." It is true that in New England, where we have a demurrage commissioner, many of these complaints relative to ascertainment of facts and a fair interpretation of the rules have been satisfied; so that great improvement has resulted in that respect; but where the rule itself is unjust even an impartial commissioner cannot give direct help, but he can be, and is, of inestimable help to the public by making recommendations as a result of his experience.

Mr. Voorhees says that a demurrage charge is "for the use of the car held by the consignees for storage," and "of the track occupied by the car." Imagine the righteous indignation of the New England consignees, starving for their freight, to have had nearly every car held by the railway company 20 to 30 days longer than a reasonable time, when they are told that the demurrage charges they are forced to pay on their bunched cars are for "storage!"

The demurrage bill of New England has increased about 20 per cent. in the last year and now amounts to about three-quarters of a million per year. It is too serious a matter to pass off lightly with generalities or to draw sweeping conclusions from narrow experience, or incomplete information. Neither railway officers nor shippers can afford to treat the matter in any but a broad and statesman-like way. Even if we assume it to be true that demurrage troubles in Philadelphia & Reading territory are trivial, and that the rumors of serious difficulties of which we have heard, are unfounded, it is by no means proved that the same happy condition exists elsewhere.

In New England a permanent committee, made up of representative shippers, has been studying this question for three years. They have found it to be a most complicated and vexatious question, and that interpretations of the code and settlements of disputes can only properly be made by an impartial board or person possessed of great discretion and capable of exercising the widest diplomacy and justice. This committee does not inveigh against demurrage rules; it recognizes their value, and it has constantly offered to the Interstate Commerce Commission its co-operation in amending the rules and arriving at a determination of the question fair to both the railways and the public. The time has gone by when wise railway officers expect to exercise a "despotism" however "benevolent"; they recognize the rights of shippers and welcome the co-operation of the commission both in framing just rules and in providing a means for impartial determination of doubtful questions. In the same way, the majority of the shipping public recognize the rights of the railways to make rules that will accomplish the greatest good for the greatest number, and only ask for a "square deal."

D. O. IVES,
Manager of Transportation Department, Boston Chamber of Commerce.

HOME ROUTE CARDS.

PHILADELPHIA, April 20, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In the *Railway Age Gazette* of April 5, page 787, I notice an article by S. J. Jones, superintendent of transportation of the Georgia, Florida & Alabama, giving an outline of an interline home route card system as being the need of the hour, etc. This proposition corresponds so very closely to one outlined by me as far back as 1894, that I have thought that it might be of interest to resurrect my file on the subject; and a copy of the essential part thereof is attached below.

It will be observed that the advantages claimed for this system eighteen years ago still hold good today, and it practically corresponds with the needs of the hour, as set forth by Mr. Jones. "Truth crushed to earth will rise again."

The device to which I refer was a simple covered metal receiver. The entire matter was advanced at that time for the benefit of the service in general and not on behalf of any personal interest; and the same is true now.

J. T. BOUGHER.

[*Enclosure.*]

THE IRON CLAD HOME ROUTING SYSTEM.

April 30, 1894.

This device to be placed in a uniform position on every car, being attached by four screws. The cards are to be inserted by the agent who forwards cars to foreign roads.

At every junction point where the car is delivered to a connecting line, the car inspector of the receiving road is to stamp the card, with a rubber stamp supplied for that purpose. This performance is to be continued until the car reaches home, where the home junction completes the circuit by also stamping the card and forwarding it to the home car record office. The stamping is to be done in consecutive order as to position on the card, and a second or third card inserted (attached to the first) should occasion require.

Should the original card be lost, the first junction discovering the card missing will supply a new one.

Advantages.

1. A complete home route always with the car.
2. A very trifling expense to operate.
3. Annoyance, expense and trouble on the foreign road done away with, yet the latter joins in the benefit.
4. Operation not affected by stormy weather.
5. Can be efficiently operated by the most illiterate, and while the car is being inspected.
6. No chance for error, each junction having its respective stamps.
7. Calls on card record office for routes made unnecessary, relieving the work of that office, and unburdening the wires.
8. Enables an agent and also every isolated shipper to determine without delay the direction in which he may load a given car, thus reducing the average delay to foreign cars.
9. No more diversion through ignorance of route.
10. A large amount of empty mileage saved annually.
11. Will reduce the number of loaded cars reported unknown and without ticket.
12. Affords an accurate check on junction cards, supplies short movements and decides uncertain records.

[The proposed card is 7 in. wide and has spaces for 14 circular stamps (in two rows of 7 each) each stamp, which is 1 in. in diameter showing a delivery and a date; as, for example, "Grand Trunk Ry., Toledo; received from Wabash R. R. May 7, 1894."]

GRADE SEPARATION AT GRAND CROSSING.

Construction Work Involved in Track Elevation and Subway Building at One of the Busiest Localities in the World.

One of the most complicated problems in grade separation which the railways entering Chicago have had to solve in connection with their track elevation work was found at Grand Crossing near Seventy-fifth street and South Chicago avenue, where the six-track north and south line of the Illinois Central crossed the double-track line of the Lake Shore & Michigan Southern and the three-tracks of the Pittsburgh, Fort Wayne & Chicago, and the New York, Chicago & St. Louis crossed the Pennsylvania and connected with the Lake Shore.

PRELIMINARY TRACK ELEVATION.

The first ordinance covering the track elevation in this district was passed by the city council of Chicago, September 29, 1902, and included the district between Sixty-seventh and Seventy-ninth streets on the Illinois Central and Seventy-third street and Stony Island avenue on the east and west roads. This ordinance provided for the completion of the work by December 31, 1907, but owing to the desire of the roads to eliminate the grade crossings between their tracks and the difficulty in reaching an agreement as to a division of the cost of such work, the time for the completion of the work was later extended one year.

In March, 1907, the Illinois Central began elevating its tracks between Sixty-seventh and Seventy-third streets, involving the construction of four subways over Seventieth, Seventy-first, Seventy-second and Seventy-third streets. The tracks were raised on sand fill with temporary pile trestles over the streets, work being carried on continuously from one outside track to the other by shifting traffic from track to track. The permanent subways which were later built at the four streets in this section are of reinforced concrete, the floor slabs being built in a yard at some distance from the work. In connection with the design of these slabs elaborate tests were made of the strength of full size specimens as described in the *Railway Age Gazette* of July 31, 1908. During the same season the tracks were elevated over Seventy-ninth street, which involved the raising of the west three tracks of the company's Fordham yard on the run-off south of Eighty-second street, where a connection with the yard is maintained. These tracks were lifted by a derrick car, using clamps hanging from the end of the boom which were attached to the rails. The track was raised about 18 in. at each lift and held in position by the derrick, while sand was tamped under the ties. The car then backed up a short distance and raised another section. This work was practically completed within the time set by the original ordinance, as was also the section of the Pennsylvania and Lake Shore between Stony Island and Adams avenues. The rest of the work was too near the crossing to be undertaken until a definite agreement could be reached as to the separation of the railway grades.

DEVELOPMENT OF GRADE SEPARATION PLANS.

It was very important that the grade of the north and south tracks be separated from those of the east and west line at this point, as each of the companies handles a very heavy traffic. In addition to the roads mentioned, the tracks of the Illinois Central are used by the Michigan Central and the Cleveland, Cincinnati, Chicago & St. Louis, and those of the Pennsylvania by the Pere Marquette. The record of traffic kept at the crossing between November 29 and December 20, 1908, showed the following total number of trains, engines and cars passing over the tracks of the four proprietary roads between those dates.

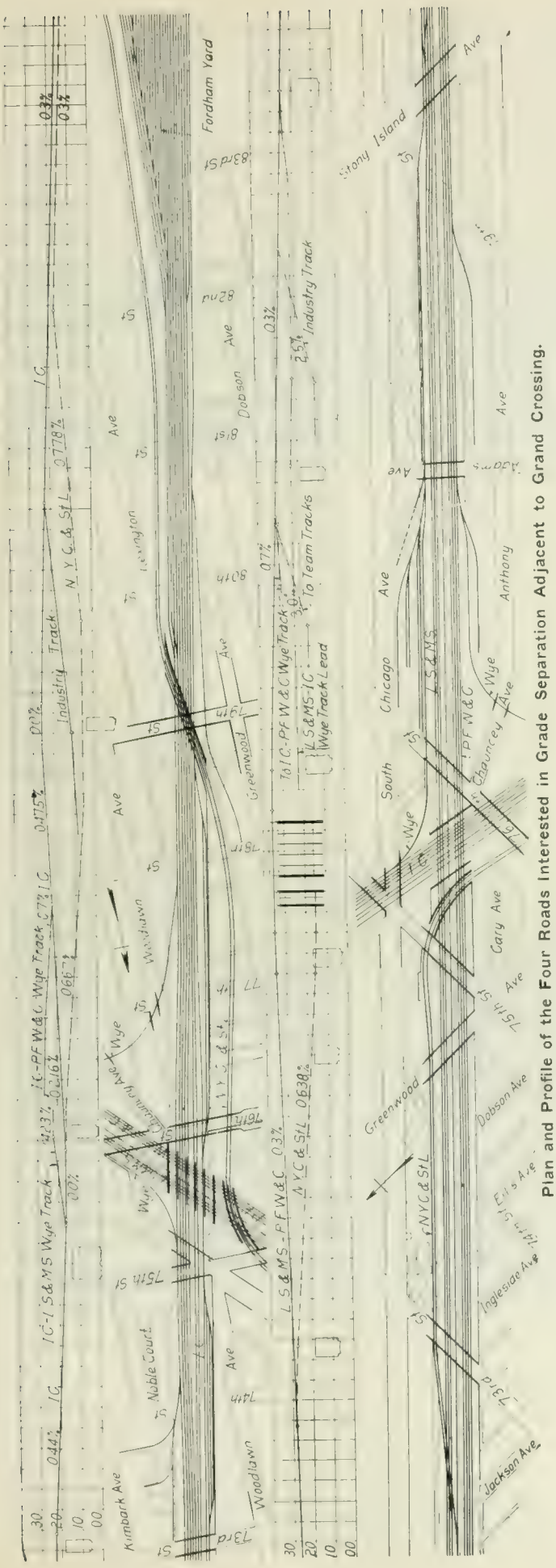


Arrangement of Tracks at Grand Crossing Before the Work of Grade Separation was Begun.

	Passenger.			Freight			Total Cars and Engines.	R. R.'s Prop'n. Per Cent.
	Trains.	Engs.	Cars.	Trains.	Engs.	Cars.		
Ill. Cent.	3,414	3,429	18,052	2,295	2,417	43,073	66,971	43.0
L. S. & M. S.	1,383	1,394	8,178	1,368	1,450	32,910	43,932	28.1
Penna. Lines	1,273	1,303	7,089	1,368	1,401	22,548	32,341	20.7
N. Y. C. & St. L.	546	546	2,960	382	395	8,866	12,767	08.2
Total	6,616	6,672	36,279	5,413	5,663	107,397	156,011	100.00

These figures show an average daily movement of 301 passenger trains, 246 freight trains, and 7,091 engines and cars over the crossings.

The number of tracks involved, the large volume of traffic and the complicated arrangement of tracks necessary to handle satisfactorily the business of all the roads on the new elevations made the decision as to construction details and the division of costs very difficult. The cost of raising all tracks to ordinance grade within the limits affected was estimated at $4,000,000, and the added cost of raising the Pennsylvania and Lake Shore tracks over the Illinois Central and Nickel Plate at $1,500,000. The four roads finally agreed to submit these questions to a board



Plan and Profile of the Four Roads Interested in Grade Separation Adjacent to Grand Crossing.

of arbitration, consisting of four executive officers of disinterested railways and one consulting engineer, each of the roads selecting one member, and these four selecting the fifth. Such a board was formed in 1909. The city council passed an amending ordinance on June 28, 1908, entirely replacing the original one and providing for a comprehensive scheme of grade separation. This ordinance called for the completion of the work by December 31, 1910, but before the expiration of that time an amendment was passed extending the time one year.

The plan of grade separation adopted provided for eight tracks on the Illinois Central, four each on the Lake Shore and Pennsylvania, and two on the Nickel Plate in the present construction, and 15 on the Illinois Central, seven each on the Lake Shore and Pennsylvania, and four on the Nickel Plate, in the ultimate development. The grade of the Illinois Central at the crossing was lowered 4 ft. below that provided in the original ordinance lowering the street elevation at Seventy-fifth and Seventy-sixtth streets 5 ft., and the elevations of the Lake Shore and Pennsylvania were raised to give a clearance of 17 ft. under the structure which will carry their tracks over the Illinois Central. The Nickel Plate alinement had to be altered considerably, as under the old arrangement this company's tracks were east of and parallel to the Illinois Central south of the crossing, swinging away from the Illinois Central just south of Seventy-sixth street, intersecting the Pennsylvania at a sharp angle and joining the Lake Shore just east of the Illinois Central crossing. In order to carry the Nickel Plate from the lower elevation to the upper it was necessary to increase the length of this connection by crossing under the Illinois Central near Seventy-ninth street, running in a northerly direction approximately parallel to that line and crossing under the Pennsylvania and the Lake Shore on a 10 deg. curve, bringing the line parallel to the Lake Shore. From the crossing of the Illinois Central the Nickel Plate line will rise on a 0.667 per cent. grade to a point near the Pennsylvania crossing. The grade is level on the curve under the Pennsylvania and the Lake Shore and west of that curve it again rises on a 0.638 per cent. grade to the junction with the Lake Shore between Seventy-third street and Cottage Grove avenue. The trains on the Nickel Plate were operated over the Rock Island through Englewood and Burnside during construction.

The ordinance also provides two interchange tracks. One leaves the Illinois Central at the crossing of South Chicago avenue, rises on a 1.423 per cent. grade to a track paralleling the Lake Shore, which is several feet lower than the main tracks at Seventy-sixth street, and rises to the main line grade near Stony Island avenue. The other interchange track leaves the Illinois Central about opposite Seventy-eighth street, rises on a 0.7 per cent. grade to the crossing of Woodlawn avenue, on a 0.216 per cent. grade from that point to Chauncey avenue, and a 0.7 per cent. grade to the Pennsylvania connection. The roads agreed to prosecute all work on their own rights of way and the wye tracks were arbitrarily divided into sections to be handled by the interested roads.

ELEVATION OF TRACKS AT THE CROSSING.

Active work was begun by the Illinois Central on the section between Seventy-third and Seventy-ninth streets, and by the Lake Shore and Pennsylvania on the section between Seventy-third street and Adams avenue, in December, 1909. The Illinois Central had driven piles at Seventy-fifth and Seventy-sixth streets on the four westerly tracks in 1907, and as the season was late the bents under the other tracks were not driven until the following spring. These four tracks were carried over the streets as the grade was raised, the fill being completed under all tracks between street crossings. The Illinois Central grade at the crossing is at elevation 16 above Chicago datum, and as the nearest streets on the Lake Shore and Pennsylvania were far enough away to allow these roads to raise their tracks to elevation 15 without interfering with street traffic, work was carried on jointly up to this elevation. The crossings were

raised under traffic about 6 in. at a lift, sand being used for the fill. The Illinois Central raised its tracks to elevation 16 as close to the crossing as possible and for a distance of 900 ft. in both directions. This made the approaches to the elevated line at Seventy-third street on the north and at Seventy-ninth street on the south very steep, but during the season of 1910 these grades were reduced to 0.6 per cent. on the north and 0.5 per cent. on the south by filling in the sags. After the traffic on the east and west roads had been carried over head the Illinois Central grade at the crossing was raised to the final elevation.



Panoramic View of Grand Crossing Territory, Taken December 21, 1910, Showing Progress of Construction Work up to

The Lake Shore and Pennsylvania had to drive continuous trestles from Greenwood avenue to Seventy-sixth street. The Pennsylvania tracks were near enough to the south right of way line to allow the trestle to be driven near the Lake Shore property line and the fill carried up for some distance before it interfered with traffic on the low level tracks. A great deal of work was involved in the driving of these trestles, and as many as eight pile drivers were used simultaneously at some stages of the work. Sand was used for filling by both the east and west roads, the Pennsylvania getting its supply from Gary and the Lake Shore from Dune Park, about 25 miles away. Outside the limits of this trestle the tracks of both companies were raised on sand fill under traffic.

Considerable work was required in the depression of streets for the building of some of the subways. The Illinois Central began excavation for subways at Seventy-fifth street and South Chicago avenue, and at Seventy-sixth street in March, 1910. South Chicago avenue intersects Seventy-fifth street at an angle of about 45 deg. near the west right of way line, and as these streets were originally 100 ft. and 80 ft. wide respectively, and the subways required by the ordinance were 65 ft. wide, the subway in Seventy-fifth street was built along the north property line and in South Chicago avenue along the south property line in order to throw the intersection of the central abutments as far west as possible. The excavation for these two subways amounted to 39,000 yds., most of which was handled by shoveling into small cars running on narrow gage tracks laid in the street and pulled by mules. These loaded cars were hauled to two derricks which picked up the car bodies and dumped the material into standard gondola cars for use in bank widening between Seventy-sixth and Eighty-fifth streets. The material excavated at Seventy-sixth street was hauled by teams on to the adjoining right of way. Most of the excavation handled by the other roads was also team work. One street, Chauncey avenue, was diverted and one was closed. The Illinois Central subways under Seventy-fifth street and South Chicago avenue were too low to drain into existing sewers and the company was forced to build 3,100 ft. of 24-in. sewer extending south to Seventy-ninth street. Two double-track street car lines, one in Seventy-fifth street and one in South Chicago avenue, had to be taken up and re-



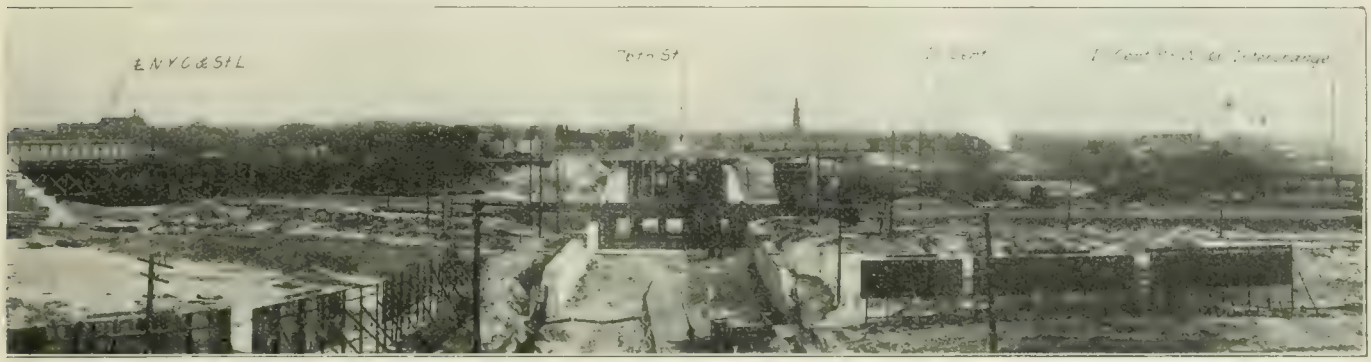
Progress View of Construction Work, Looking North, Showing Completed Abutments for Street Subways and Steel Partly Erected.

laid, and the disposition of overhead and underground connections of public service companies was a serious problem.

ILLINOIS CENTRAL SUBWAYS.

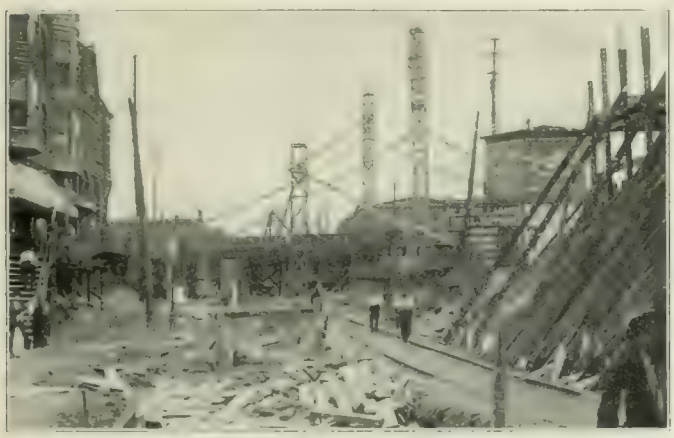
The subways built by the Illinois Central over Seventy-fifth street, South Chicago avenue and Seventy-sixth street are steel structures encased in concrete, the general appearance being made to harmonize with the reinforced concrete structures built in

1908 on the four streets north of the crossing. The concrete slab construction developed for those four subways could not be used near the crossing because the clearance was insufficient to allow the depth of 4 ft. of floor slab which is required. The columns on curb lines and street center line are supported on cylindrical concrete footings varying from 7 ft. to 10 ft. in diameter, carried down to hard pan. The abutments



that Date. Grades are Separated, the East and West Roads Being Carried Over the Illinois Central on Temporary Trestle.

are mass concrete with surface reinforcement only. The columns are spaced from 14 ft. to 17 ft. apart and support transverse deck girders, on which are carried longitudinal I-beams encased in concrete to form a solid deck floor. The columns and girders are covered with concrete to a minimum thickness of 1½ in. reinforced by a layer of expanded metal. The forms for coating the steel were built up in movable sections to allow their repeated use. The forms were arranged to provide fillets in all corners between columns and girders, and between girders and deck in order to give the structure a finished appearance. Ornamental parapets are also provided along the faces of the subway over the street. A 2-in. layer of felt, burlap and pitch waterproofing is laid over the floor. On the section of the joint subway at Seventy-fifth street and South Chicago avenue west of the intersection of the central abutments, through plate girders and transverse I-beams had to be used on account of the length



Looking East in Seventy-sixth Street During Work of Street Depression, Showing Distributing Towers for Placing Concrete Subway Abutments.

of span between outside abutments. The sidewalks along the streets approaching the subways at Seventy-fifth street and South Chicago avenue are in some places considerably higher than the street surface, and in all cases where the difference in elevation is greater than 18 in., the edge of the walk is protected by an ornamental iron railing.

LAKE SHORE STRUCTURE.

The clearance of the Lake Shore and Pennsylvania over streets near the crossing is unusually great, which eliminated the necessity for a shallow deck in the design of subways for those streets. The Lake Shore used a heavy steel deck girder structure with I-beam floor, designed for Cooper's E 60 loading. Each track is supported by a unit practically independent of the remainder of the structure. Two-column steel bents are located at the street center line under each track and no curb piers are used. Two deck girders 84¼ in. back to back of angles support each track. The floor beams are 12-in., 31½-lb. I's, spaced 18⅜ in. center to center, riveted up in pairs with separators of 18-in., 55-lb. I-beams 9 in. long. These floor beams are 12 ft. 5¾ in. long, which leaves a clear space of 6¼ in. between the ends of floor beams under adjacent tracks. Vertical facia girders 2 ft. 10 in. high are placed on the ends of the floor beams and are braced on every third beam by 3½-in. by 2½-in. by ⅜-in. angles. The only connections between the units supporting adjacent tracks are struts of two 9-in., 15-lb. channels connecting the tops of adjacent bents, and one 8-in. 11¼-lb. channel inverted over the upward projecting plates of the facia girders. These channels are held in place by ⅝-in. bolts spaced 3 ft. center to center. A concrete slab with a minimum thickness of 5 in. is carried on the floor beams and is reinforced by ½-in. bars in both directions. The facia girders are protected with concrete up to the top angles, this concrete being laid continuous with the floor slab. The surface of the floor is sloped 1/16 in. per foot longitudinally for drainage and is protected by a 1½-in. waterproofing layer



Work of Street Depression in South Chicago Avenue, Showing Number of Pipes and Cables Encountered.

A concrete walk is provided along one side of each subway by supporting a second facia girder 3 ft. outside the first one and building a concrete slab over the top flanges of these two girders. The outside girder is carried on two 7-in. channels bolted to every third floor beam, and is braced by 3½-in. by 3½-in. by ⅜-in. angles, as shown in the accompanying detail. The sidewalk slab has a minimum thickness of 3½ in., and is reinforced by ½-in. bars in both directions. The outer girder is encased in concrete 3 in. thick both inside and out, the outer face being paneled. A parapet is provided along the opposite faces of the subways, the trough so formed being 2 ft. 5½ in. deep. The concrete in this parapet is carried 3 in. outside the end of the floor beams

and flush with the lower flange of these beams at the outer end.

The general design of the subway had to be modified considerably for the structures over Adams avenue and Seventy-sixth street which carried the Illinois Central-Lake Shore interchange track, and which was low enough to make the deck structure objectionable on account of clearance. The steel bents are similar to the other structures, except that curb piers are provided at Seventy-sixth street to reduce the span. The track is carried by through girders, the floor beams being hung from the girder web plates by plate and angle connections. The concrete floor and waterproofing layer are the same as in the other bridges and a walk is carried along both sides on a concrete slab supported by angles braced from the bottom flange of the girders, as shown in the detail drawings herewith.



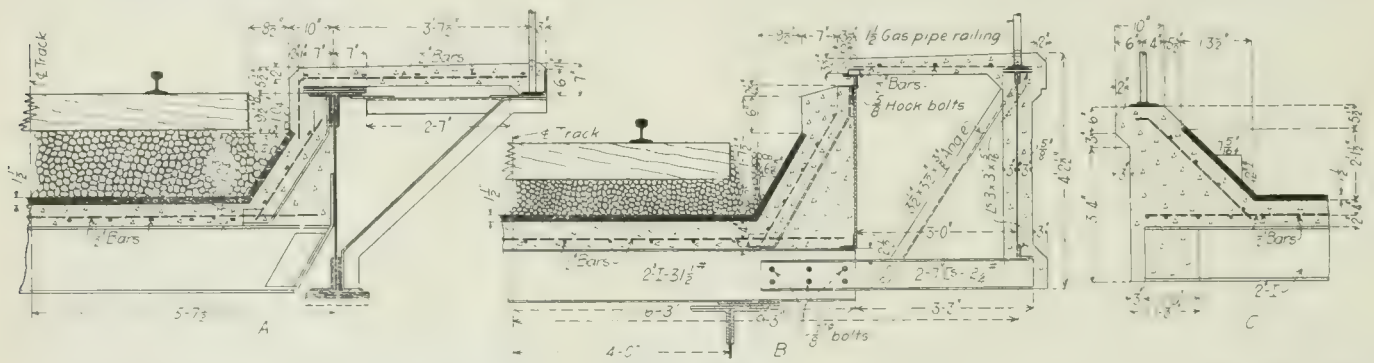
Steel Encased Subway over Seventy-sixth Street for Illinois Central.



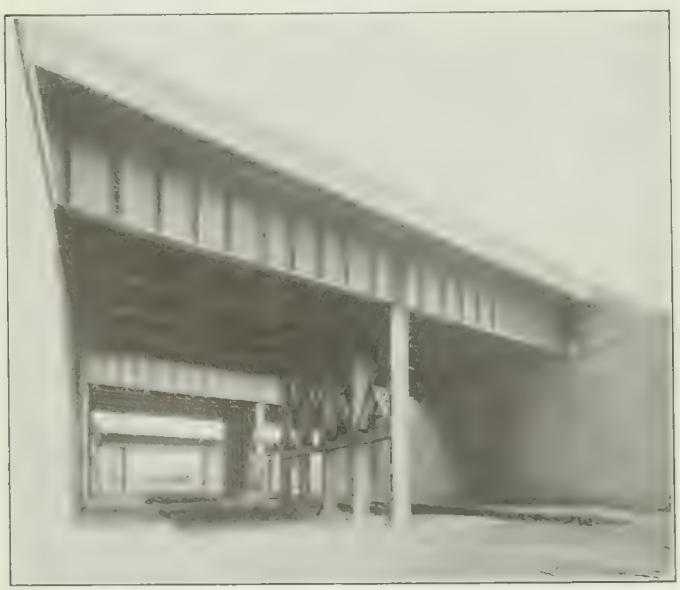
Low Level Subway for Lake Shore-Illinois Central Interchange Track.

SUBWAYS ON THE PENNSYLVANIA.

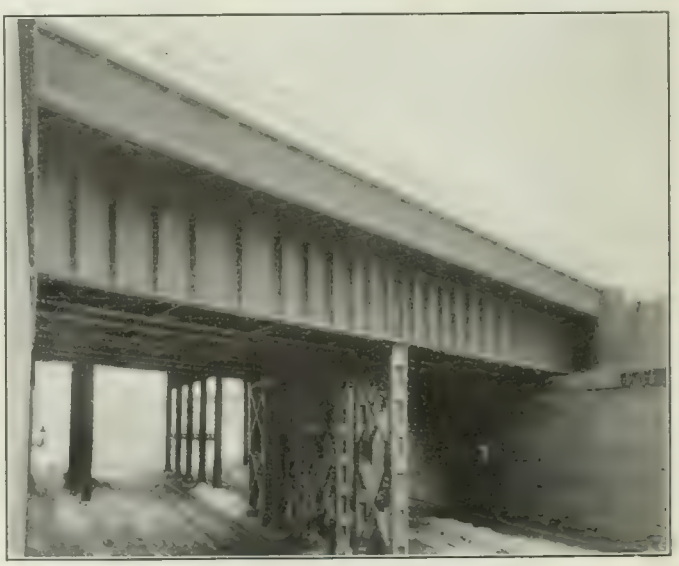
The Pennsylvania subways are of the trough floor type. The structures built at Seventy-third street, Greenwood avenue and Seventy-fifth street, have longitudinal floor troughs carried on transverse girders over the steel bents at curb lines and street center line. The Seventy-third street bridge had been built before it was decided to separate grades at the Illinois Central crossing and shop work on the Greenwood avenue and Seventy-fifth street bridges had been started. The columns of the Seventy-third street bridge has to be spliced to raise the elevation about 5½ ft. It was possible to change the order for columns for the Seventy-fifth street and Greenwood avenue structures, but the deck was used as designed for the lower clearance. Work had not been started on the Seventy-sixth street subway before the separation of the grades was determined upon, so the design for that street was altered to use transverse floor troughs on longitudinal deck girders spanning from the abutments to street center line. The piers are five-column bents, the columns being rigidly braced together in each bent. The troughs are continuous under the four tracks, making one solid four-track deck structure. The troughs for the Seventy-sixth street



Cross Sections of Floors of Lake Shore & Michigan Southern Subways. A—Low Level Interchange Track with Sidewalk. B—High Level Subway with Sidewalk. C—Parapet Without Sidewalk.



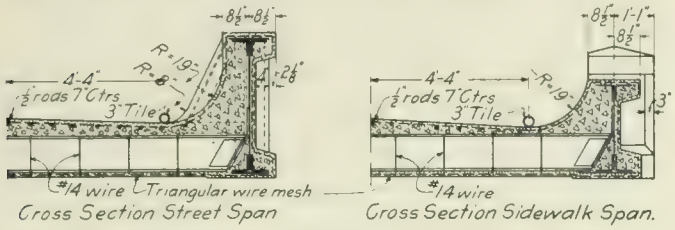
Pennsylvania Subway with Transverse Floor Troughs.



Lake Shore High Level Subway.

bridge are 15 in. deep back to back of angles. All parts inaccessible after erection were given two coats of red lead in the shop, all parts in contact were given one heavy coat during erection. The concrete floor over the trough was sloped in both directions from the center for drainage. The surface was waterproofed with a five ply layer of felt and asphalt compound protected by 2 in. of concrete. The faces of the surveys over the streets were covered with concrete molded to form a parapet, which gives the structure a neat appearance.

All concrete abutments and retaining walls on the Pennsylvania work were of mass design. In some cases retaining walls were made unnecessary by paving the slopes of the fill. In this way the fill, which naturally stands at 1½ : I could be made to assume a 1:1¼ slope. The company has used rubble, concrete blocks and concrete spread in place for this purpose, securing good results with all three methods. Rubble is usually the



Details of Steel-Encased Subway for the Nickel Plate over Seventy-sixth Street.

cheapest, but is hard to secure of proper size in the Grand Crossing locality.

NICKEL PLATE STRUCTURES.

The Nickel Plate subways are through steel girder structures encased in concrete. Two-column steel bents are provided under each track at curb lines and street center line. The transverse I-beams supporting the floor are connected to the girder webs by plate and angle connections. All steel work is covered to a minimum depth of 1½ in. with concrete. The encasing layer of concrete is reinforced with triangular reinforcement and the floor slab also has ½-in. rods placed longitudinally on 7-in. centers just under the triangular mesh. The triangular reinforcement below the floor beams is supported by wires looped over these beams. The outside girder faces are paneled, the abutments



Pennsylvania Subway with Longitudinal Floor Troughs.

are finished by ornamental columns at the corners, and all corners of the concrete covering the piers are turned to a convenient radius, giving the structure a pleasing appearance. Drainage over the subways is provided by laying 3-in. tiles in the gutters at each side. In placing the bridges adjacent to the Lake Shore, one of that company's tracks was turned over for construction purpose.

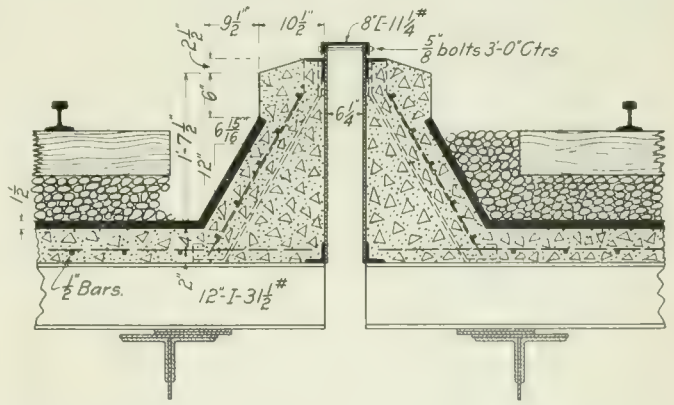
The crossing of the Lake Shore and Pennsylvania over the Illinois Central will be a five-span structure, with a total span of 250 ft. The Illinois Central will handle the work of placing piers for columns and the two overhead roads will place the superstructure under their own tracks. Contracts have just been let for the sub-structure work on this bridge. The undercrossing of the Nickel Plate with the Lake Shore and Pennsyl-



Low Level Subway Over Chauncey Avenue for Pennsylvania-Illinois Central Interchange Track.

vania was built by the overhead roads within the limits of their rights of way.

The work in the Grand Crossing territory has been handled under the supervision of A. S. Baldwin, chief engineer, and D. J. Brumley, engineer of construction of the Illinois Central; Samuel Rockwell, chief engineer of the Lake Shore & Michigan Southern; Thos. Rodd, chief engineer, and R. Trimble, chief engineer maintenance of way of the Northwest System, Pennsylvania Lines West, and E. E. Hart, chief engineer of the New York, Chicago & St. Louis. The representatives in direct charge of the work



Cross Section of Floor of Lake Shore Subway, Showing Connection Between Structures Under Adjacent Tracks.

were Maro Johnson for the Illinois Central, D. M. Craig and J. G. Keenan for the Pennsylvania, and A. C. Harvey for the New York, Chicago & St. Louis, and J. W. Crissey for the Lake Shore & Michigan Southern.

There is very little new railway construction in Tasmania, probably not averaging over 2 miles a year, and there is scarcely any attempt to use improved appliances to save labor. American firms which may desire to introduce new appliances, machines, or equipment into Tasmania might send their catalogs and address letters to John McCormick, engineer in chief for public work department, Hobart, Tasmania. At the agency general of Tasmania in London, 5 Victoria street, London, S. W., a consulting engineer, William Harvey, is employed to give advice concerning purchase in England of equipment for railways and other public works. In the case of American manufacturers who may be represented in England, but not in Australia, it might be well to get in touch with Mr. Harvey concerning the purchase of supplies for Tasmania. The new commissioner of the government railway headquarters, Hobart, is George W. Smith.

DECISION IN TAP LINE CASES.

Commission Indicates Rules for Determining What Lumber Roads Should Be Considered as Being Plant Facilities.

The Interstate Commerce Commission handed down this week its decision in the so-called tap line cases. The opinion written by Commissioner Harlan and a concurring opinion by Chairman Prouty are abstracted herewith.

Opinion by Commissioner Harlan:

The commission has for some time been investigating the cases of industrial railways, some of which are now incorporated as common carriers and a number of which are allowed a division of the rate by the connecting railways. The aggregate amount so paid by the regular lines to the industrial lines throughout the country is not known. It has been estimated at not less than $100,000,000. On the basis of such investigations as we have been able to make, it seems entirely conservative to say that they amount, for the whole country, to not less than $50,000,000 or $60,000,000 a year.

The investigation was closed for the purpose of compilation on June 30, 1909, on a record embracing 2,208 cases where tracks and locomotives were owned and controlled and used by industries in active operation. Of the total on the record, 611 were incorporated as railway companies. Out of the whole number incorporated and unincorporated, only 450 were receiving divisions or allowances from the public carriers; some 363 derived some revenue from local rates; while 1,395 derived no revenue at all from operation. Out of the whole number but 135 were receiving, according to their own claims, as much as 20 per cent. of their traffic from the general public; and there is reason to think that a careful analysis of the figures would materially modify the extent of this outside traffic. Of the whole number only 441 had filed tariffs or concurrences with the commission and but 345 had filed annual and monthly reports.

We propose here to examine only industrial lines affiliated with lumber companies, limiting our observations to lumbering operations in the Southwest, and more particularly to those in the states of Arkansas, Missouri, Louisiana and Texas. The tap line question, therefore, is simply a phase of the larger question which we have endeavored to outline.

Of the 2,208 industrial lines of all classes that were examined, 1,251 were tap lines owned by or closely affiliated with companies engaged in the manufacture of lumber. Of these only 243 were found to be receiving allowances from public carriers. These 243 tap lines operated 5,787 miles of track, while the 1,008 tap lines receiving no allowances operated 12,358 miles of track. Limiting our comments to the conditions west of the Mississippi river in Arkansas, Texas and Louisiana, allowances were made to 112 tap lines, while 143 tap lines were receiving no allowances.

Within the last four or five years "tap line" has come to mean the rails leading from the mill to or through the timber, and usually to a logging camp or company town. The spurs radiating into the forest from points along the main line are usually referred to as logging roads.

Witnesses who were asked why some tap lines were incorporated and others not, admitted that the incorporation was for the purpose of obtaining and legalizing the allowance or division of the freight rate with the main line railway. As to the traffic handled for the public other than the lumber company which controls the tap line, there is scarcely a tap line on record that would not necessarily cease its operations if the lumber mill of the proprietary lumber company were moved or ceased to run. Instances are shown of record where the tap line stopped running while the mill was temporarily shut down.

The notion seems to prevail in the yellow-pine district west of the Mississippi river that a common carrier must be an incorporated company; on the other hand, it is also claimed that a company incorporated as a common carrier is a common carrier in law for all purposes, regardless of all other considerations. This, however, is not a sound view of the matter. In some of the states the local law permits only incorporated companies to act as common carriers by rail; and, as a matter of fact and practice, common carriers by rail are usually incorporated companies. At the moment we recall no exception. Nevertheless, the act to regulate commerce specifically applies "to any corporation or any person or persons" engaged in the transportation of passengers or property by rail from a point in one state to a point in another state. It follows, therefore, so far as interstate transportation is concerned, that incorporation is not a condition precedent to the right to be a common carrier by rail. That relation to the public may lawfully be sustained, with respect to interstate traffic, by individuals or partnerships or other associations. The inquiry with this commission, therefore, is not whether a railway company has been incorporated, but whether the company or the person claiming to be a common carrier by rail is a common carrier in fact. If there is a holding out as a common carrier for hire, and if there is an ostensible and actual movement of traffic for the public for hire, generally speaking, the status of a common carrier may be said to exist, whether the holding out is by a company or by an individual. But such a holding out and the existence of an actual traffic is not conclusive in all cases. Where the holding out is in furtherance of a plan to secure unlawful advantages and the alleged carrier is able to pick up some traffic that is incidental to that purpose, it must be regarded simply as a cloak or device to effect unlawful results. This commission, in the enforcement of the law, is necessarily bound to ascertain the real purpose and object of the holding out; and in the prevention of preferences and other unlawful consequences it is entitled to and must ascertain the real situation. In other words, whether a company or a person claiming to be a common carrier is a common carrier at all and for all purposes is a question of fact, and whether the service performed for a particular person is a service of transportation or an industrial service is also a question of fact.

It follows from that view of the matter that the common ownership of an industry and of a railway that is held out as a common carrier and has some actual traffic for the public for hire is not in itself sufficient to divest the railway of its status as a common carrier. On the other hand, the fact that the rails, locomotives and cars of an industry have been turned over to an incorporated railway company, owned and operated by the industry or in its interest, does not divest those appliances of their character as a plant facility if such in fact is the case. If the rails were laid and the equipment acquired for the use of the industry as a facility in the process of manufacture and production, and are so used, the fact that some outside traffic may be carried over the same rails does not modify the character of what is done over them for the industry. We must look at the thing done and scrutinize the manner in which it is done. We must ascertain what is its real relation to the industry. If in such a case the tracks and equipment are a facility of the plant and are so used in the process of manufacture, what is thus done for the controlling industry cannot be regarded as a service of transportation. It is clear that a division allowed by a public carrier out of the rate under such circumstances is a rebate to the industry. But again, it must be added that the real relation of the tracks and locomotives to the industry is a question of fact that is not controlled by considerations of mere ownership, but by a correct understanding of the service thus performed for the controlling industry.

It is clear, therefore, that the time has come when the commission must draw a line at some point between what is trans-

portation and what is industry, and must distinguish between what is a facility of transportation and what is a plant facility or a tool of the industry. In the present state of the law it is not less clear, however, that the question is not susceptible of solution on general grounds; that no general rule or principle may be laid down that will do exact justice in all cases; and that the only safe course is to ascertain and determine on the facts disclosed in each case what is the real relation between the tap line and the industry by which or in the interest of which it was constructed and is now operated. With that view of the matter in mind we have carefully analyzed the testimony offered by each of the tap lines appearing of record and shall presently state each case in a summary outlining the features shown of record that we regard as of importance.

Before doing that, however, it may be well to look for a moment into the practice of the trunk lines in this territory in connection with their lumber traffic:

It is our understanding that in some cases the trunk lines have connected their rails with the mills by constructing spur tracks at their own expense; in other cases they have furnished the rails and the ties and the lumber companies have borne the expense of the grading and construction, and in a number of cases the lumber companies have built the connection entirely at their own cost, either directly or through their tap lines. In some instances the original spur or switch track built by the trunk line to the mill still remains and could be used; as a matter of fact, however, the tap line connection subsequently built is actually used. In some cases, where the tap line has connected the mill with the trunk line, the spur track of the trunk line to the mill has been torn up. In some instances the trunk line is still closely connected with the mill by an available switch track, but in order to give the appearance of a real service the tracks of the tap line have been laid parallel to the trunk line to a more distant switch connection.

In all cases it is apparently the practice of the trunk lines, where no allowance is made, to set the empty car at the mill and to receive the loaded car at the same point. Indeed, they do this in many cases even when allowance is made to the tap line. But whenever this service is performed by the trunk line, it is included in the lumber rate and is done without additional charge. In some instances the switch or spur track. connecting the mill with the trunk line is as much as three miles long. In other words, by their common practice the public carriers interpret the lumber rate as applying from mills in this territory apparently as far as three miles from their own lines. So far as the manufactured lumber is concerned, it may therefore be said that where a mill has a physical connection with a trunk line and is not more than three miles distant the transportation offered by the trunk line commences at the mill. If, therefore, a lumber company, having a mill within that distance of a trunk line, undertakes, by arrangement with the trunk line, to use its own power to set the empty car at the mill and to deliver it when loaded to the trunk line it is doing for itself what the trunk line, under its tariffs, offers to do under the rate. In such a case the lumber company may therefore fairly be said to furnish a facility of transportation for which it may reasonably be compensated under Section 15 whether its tap line is incorporated or unincorporated. In other words, the lumber company thus does for itself what the trunk line does with its own power at other mills without additional charge, and what it must therefore do for the particular lumber company without additional charge. Under such circumstances we think the lumber company, under Section 15, may have reasonable compensation when it relieves the trunk line of the duty. But an allowance under such circumstances is lawful only when the trunk line prefers, for reasons of its own and without discrimination, to have the lumber company perform the service. It is not lawful when the lumber company refuses to permit the trunk line to do the work. No allowance, however, ought to be made by a trunk line to a lumber company where the mill is within, say, 1,000 ft. of the trunk line. We should regard an allowance under such circumstances as a mere device to effect an unlawful payment to the lumber company. We should take the same view of an allowance where a short switch track to the mill has been torn out or is still available but not used in order to give the appearance of a longer haul to the mill over a spur or switch track constructed by the lumber company or by its tap line.

Where a mill is distant more than three miles from a trunk line and is connected with the latter by a tap line not recognized by this commission as a common carrier, no allowance or division may lawfully be made by a trunk line either to the lumber company or to its tap line. Such a lumber company, although using rails, stands in no better position under the law with respect to its lumber than does a lumber company that uses other means of delivering its lumber to a public carrier. But where a mill is more than three miles distant from a trunk line and is connected with it by a tap line organized as a common carrier and so recognized by this commission, the mill is to be regarded as a shipping point equally with all other mill points in the extensive rate group which the trunk-line carriers have defined in this territory; and the lumber rate is to be regarded as in effect from the mill, the tap line being entitled to a division thereof according to the extent of its participation in the through service under the through rate.

This view of the matter, it must be clearly understood, is based upon the particular conditions that we find existing in this lumber territory and the rate adjustment which there obtains. We shall not endeavor at this time to fix the allowances that may be made under Section 15 to a lumber company furnishing a facility for the transportation of its lumber from its mill in the manner and under the conditions described, or to fix the divisions on the lumber haul that may be paid by the trunk lines to tap lines herein recognized by the commission as common carriers. The basis of such allowances and divisions may be proposed by trunk lines for our approval after conference with the parties in interest. It must also be understood that a tap line herein recognized by us as a common carrier can not expect to continue to be so recognized if it does not itself recognize its obligations as a common carrier under the act to regulate commerce by conforming its accounting methods to the requirements of the commission, by filing annual reports and lawful tariffs, by obeying the hours of service law and the safety-appliance acts, so far as they are applicable, and otherwise fulfilling the obligations and duties imposed by the act on carriers engaged in interstate commerce. We have no authority to overlook the failure of any company claiming to be a common carrier to fulfill all the requirements of the act and to comply with the rules and regulations of the commission; and we shall regard any omission of its duty in this respect by a tap line as tending to show that its claim to be a common carrier is a mere device or attempt to justify allowances and divisions.

Each case must stand upon its own facts. But two conditions are clearly essential in all cases: No tap line that is, in fact, a common carrier engaged in interstate commerce may haul the logs to the mill of the proprietary company free of charge, as is the case in many of the instances before us. A free service is inherently unlawful. Nor may a trunk line set up a milling-in-transit privilege with a common carrier tap line by which the lumber rate is extended back through the mill point to the tree in the forest unless it pursues the same course with respect to forests on its own line. That would be an unlawful preference.

With scarcely an exception the officers of the tap line are officers of the lumber company in the interest of which it is owned and operated. Throughout the record it was frankly admitted that they make use of the privilege of free transportation extended to them by the trunk lines even when traveling on the business of the lumber company and in the capacity of an officer of the lumber company. In one case "car and party" passes are shown to have been used. This is another of the advantages to industries that own short lines serving their plants, and which they have caused to be incorporated as common carriers. The use of such free transportation we regard as al-

together improper and unlawful, even though the holder may be an officer of a tap line that we have found to be a common carrier. The affairs of the proprietary lumber company are so interwoven with the affairs of the tap line as to make it impossible to admit the right under the law of an officer of a tap line to use free transportation.

Our finding is that in none of the cases that follow (descriptions of individual cases omitted in this abstract) does the tap line perform a service of transportation as a common carrier either in the movement of the lumber of the proprietary company from its mill to the trunk line or in the movement of its logs from the forest to its mill.

Chairman Prouty, concurring:

While I do not dissent from the conclusions finally announced in the majority opinion, I do dissent from the implication that the building of branch-line railways, whether denominated tap lines, industrial lines or what not, by those persons who own an industry to be served by these railways, should be discouraged by this commission. While the industrial line and the tap line have been the medium through which the grossest discriminations have been perpetrated in the past my belief is that these unlawful practices can be stopped without the sligthest difficulty and that the thing itself should be encouraged rather than discouraged. This view, which I have entertained from the first, is confirmed by observation and reflection, and I desire to keep it clearly before the public.

My meaning can be best illustrated by the accompanying rough diagram:

Let us assume that AB is a 100-mile section of a trunk-line and that CD is a branch extending from C to D. The section traversed by this railway produces lumber, coal, stone, perhaps various commodities. The principle is the same in all cases, although the application might somewhat differ.

X, Y, and Z are localities distant from the main line by about the same number of miles as C, but in these localities the industry has not been developed.

The railway AB applies to all points on its main line and to its branch line CD the same rate to markets of consumption. X, Y, and Z cannot be developed until railways are built, connecting these localities with the main line. Manifestly it is for the public interest that connecting lines shall be constructed, since otherwise a monopoly in the production of the commodity at points tributary to AB is possible. By whom shall these branch railways be built?

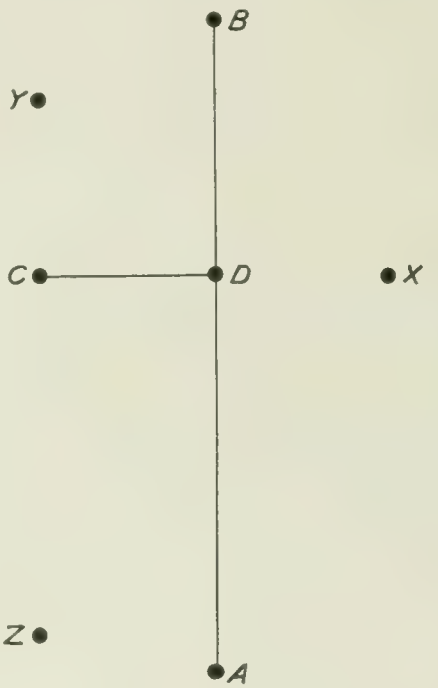
Manifestly the owners of property at X may construct a road from X to AB and may transport the commodity manufactured from X to AB and there ship it to destination. The cost of rendering this service may be, if lumber, 3 cents per 100 lbs.; if coal, 10 cents per ton. Whatever the cost, it is plain that the operator at X is at a disadvantage as compared with the operator at C by the exact amount of this charge, and it frequently and perhaps usually happens that the advantage thereby obtained by the industry at C is sufficient to entirely prevent, certainly for a long time, the development at X, Y, or Z.

The inevitable conclusion is that the railway AB absolutely dictates the development of this region. If it elects to construct its branch line to C, that locality becomes valuable, whereas if it goes to X or to Y those are the favored locations. It must be admitted that it is most unfortunate to put the development of a country into the hands of a main-line railway as this of necessity does. My own belief is that those persons interested in the localities other than C should be permitted, where circumstances justify, to construct a railway from X to the main line; that the main line AB should be required to establish in connection with the branch line from X the same rate which it applies from its branch line at C, and should be required to accord to the branch line in the way of a division a sum which is fairly equivalent to the expense which it incurs in originating this traffic at C and handling it from C to D. This is certainly in the public interest; what valid objection can be urged against it?

Consider this, first, from the standpoint of the main-line railway. That road transports the traffic from C to D at a certain cost and from D to destination at a certain other cost. If from the through rate there be deducted the cost of transporting the business from C to D, there remains the service from the main-line point D to destination. If, now, it allows the other branch line from X the same amount, it becomes a matter of indifference, so far as its profit as a railway is concerned, whether traffic originates upon its own branch line at C or upon the independent branch line at X.

This might be urged, possibly, that if the mine or the forest at X is developed the mine or the forest at C may produce less, and the main line may therefore have less business for its own branch; but this is a matter of small consequence, which ought not to weigh in the general conclusion. Its profit is not made upon the branch line but upon the main line.

If this railway AB itself owns lands at C which it desires to develop, then manifestly it is for its advantage that the branch line from X should not be constructed; or, if those persons interested in the main line and potential in the direction of its policy own lands at C, it is manifestly for their interest that no other similar industry should be developed; but the function of a railway in these modern days has come to be, not the exploitation of its private property used in other than its transportation purposes nor in the enriching of those who sit in its directorate, but rather in serving the entire public impartially and for a reasonable consideration.



From the standpoint of the main line railway, considered purely as a railway, there is no reason why the branch line from X should not be permitted to connect and should not be allowed a suitable division. It should be carefully noted that this only applies in its entirety to instances where the main line establishes a blanket rate upon its main line, as is usually done with producing points in case of lumber, coal, etc., and where it extends that rate to its own branch lines. If a fair mileage scale were applied, both to main line and to branch line, these difficulties would largely disappear. My proposition only goes to this: That the main-line road should be required to put the industry at the end of the independent branch line upon substantially the same basis that it puts the industry at the end of its own branch line or at a corresponding point upon its main line.

Consider this matter now, from the standpoint of the mine

or the mill. Compare the operator at C with his competitor at X.

The distance from the main line to C is the same as from the main line to X. There is no reason why the rate from X ought not to be the same as the rate from C. Suppose the same rate is applied and is paid by both these competing operators. Looking to the mill and to the company which owns and operates the mill, manifestly there is no discrimination.

But it is said that the same individuals who own the industry at X also own the capital stock of the railway which leads from X to the main line, and that therefore they have finally the benefit of whatever division is allowed to this independent branch line.

This branch line is performing a legitimate common-carrier service, exactly the same service from X which is performed from C. The agency which performs that service from X is entitled to a fair compensation to exactly the same extent as is the agency which performs that service from C.

If, now, the expense of constructing and operating the railway from X to D is such as to leave no net return out of the divisions allowed by the main line, then the individuals who own the mine at X have received nothing beyond that received by those who own the mine at C, although they have invested and devoted to the public service an additional amount of capital. If the net is sufficient to pay a fair return upon the fair value of the property, they have received exactly that to which they are entitled under the constitution of the United States.

The mining company is not discriminated in favor of, for it pays the same rate as does the competitor at C. The individuals who own the railway from X to the main line are not discriminated in favor of as against the individuals who own the mine at C, for they have only received a legitimate return upon the property which they have devoted to this public service, if it be a legitimate public service. It is true that if the division allowed to the independent branch line is excessive, that does work out a final discrimination, not in favor of the mine at X, but in favor of the individuals who own the railway and who also own that mine. The discrimination would be exactly the same if the divisions were, with respect to traffic, not produced at the mine, but handled from the mine of a competitor upon the branch, or with respect to an entirely different species of traffic.

It is urged that this gives to the owner of property at X an advantage over the owner of similar property at Y, and this is true, for neither X nor Y can be developed without a railway. But that sort of discrimination arises out of the fact that the operator at X has the money or the means of securing the money with which to build the railway from X to the main line, while the owner at Y does not possess this means. Some day the importance of this aspect of the case may become such that the government itself will build and operate all these branches, but until then the most that can be done is to secure to all persons equality of opportunity, to give to the individual at Y, if he can find the money, the same chance which the individual at X possesses.

In my opinion, this right to build branch lines and obtain recognition from the main line is becoming daily of more and more consequence. Our trunk lines have been built; many, perhaps most, of the branch lines remain to be built. Upon what inducement is this future development to take place?

In the past branch lines have been often constructed to develop properties which the railway itself owned; still more frequently to develop properties owned by those who could influence the policy of the main-line railway.

Branch lines have often been constructed as stockjobbing propositions with a view to selling them at an extravagant price to the main line. These motives will not to any great extent operate in the future, and if there is to be a free development of our resources, if that development is not to be put entirely under the control of our railways and the influences which dominate them, then the recognition of branch lines by the main line must be enforced.

It is significant that the three states in which the tap lines under consideration are most developed—Texas, Louisiana and Arkansas—in every instance approve and insist upon the legal status of these railways, the reason being, as stated by their accredited representatives before this commission, that the recognition of the tap line promotes the development of the country by fostering the building of railways which will otherwise not be constructed and which the country absolutely needs.

It is desirable that common carriers by rail should be strictly confined to their public functions and not permitted to engage in private commercial pursuits. While this may not be as imperative in case of branch lines as with trunk lines, since the former can be subjected to a closer scrutiny and a higher degree of control, still the ideal condition would be one in which the carrier's service was performed either by the government or by some private corporation with no interest whatever in the property transported. We should not, however, sacrifice the essential to the pursuit of the ideal, nor should we repress legitimate undertaking simply because some phases of the means employed may result in abuse. Congress might prohibit all connection between railway and private industry. As to what has actually been done it may be observed:

First. When Congress came to declare its will in this respect by the enactment of the commodities clause, lumber was expressly excepted from the operation of that provision, thereby giving an implied sanction to unity of ownership between the lumber-carrying railway and the commodity which is carried.

Second. The commodities clause itself is interpreted by the Supreme Court and as accepted by Congress since that interpretation does not prohibit a common ownership of industry and railway, provided the two are kept entirely separate and distinct in their operation. Inasmuch as the statute has not been changed since that interpretation was put upon it, it must be assumed that as so interpreted it represents the legislative will.

If this commission prohibits the payment of any division in all cases where the railway is not a bona fide common carrier, and confines those divisions when properly allowable within proper limits, I am unable to see how harmful discrimination can result.

One fact has been developed which does lead to slight discrimination and which we cannot apparently correct, and that is the issuing of passes to the officers of these common-carrier tap lines who are also owners and frequently officers engaged in the management of the industries. The use of these passes when traveling upon the business of the industry undoubtedly gives to that industry an advantage over its competitor.

This is wrong and should be corrected—if not by the voluntary action of the carriers who issue and honor these exchange passes, then by Congress. But let it be noted that this vice is not confined to the insignificant tap line. Directors of main-line railways are almost invariably engaged in private business, in the course of which free transportation is used.

Discrimination of this kind ought not to exist, but it will continue to exist until common carriers by rail are prohibited from issuing these exchange passes. When the issuing of free transportation by railway is restricted to railway employees who spend substantially their entire time in railway service, with such general exceptions as may be made upon sentimental grounds and which involve no element of commerce, discrimination from this source will cease, and not until then.

I do not wish at this time to enter upon any general discussion of this tap-line question; that I have done in previous reports; but only to restate my conviction that to prohibit or discourage legitimate enterprises of this character is to deal a serious blow to the future development of this country.

I may add that I do not fully concur in the suggestion that main-line carriers may make to the owners of private railways not common carriers allowances for the movement of lumber

from the mill to the main line. I doubt whether this is a transportation service within the meaning of the fifteenth section; but even if the allowance might be under some circumstances lawful, we ought not to invite it.

There is no essential difference between a private railway operated by steam and a tramway or a dray. When once the door is opened there is no stopping place. I believe that all these services should be performed by the railway itself and that the shipper, instead of receiving an allowance for these accessorial services, should be compelled to pay a reasonable charge for every service rendered outside the ordinary transportation.

THE INTEREST OF EMPLOYEES IN EFFICIENCY OF OPERATION.*

BY W. W. FINLEY,
President, Southern Railway.

In the common language of the day, we who work for railways are classed as officers and employees. There is, however, no hard and fast line separating these two classes. The way to the top is open in the railway service of the United States. The capable and loyal employee of today is the officer of tomorrow, and we are all, in the broad meaning of the term, railway employees engaged, in our respective capacities, in carrying on the great work of transportation.

When I call attention to the tendency of the present era in the direction of decreasing the revenue units while, at the same time, increasing the expense units of our operations, every one here will, at once, appreciate the stupendous task that is imposed upon us railway employees so to increase the output of our work, through greater efficiency of individual effort, as to insure the unit of net results being maintained and even materially increased.

As railway employees, we are interested in greater efficiency of operation because of its effect upon the earnings of the companies by which we are employed. Our interests are identical with those of the owners of the properties, for our salaries and wages, funds for fuel, materials and supplies, and every expense incident to the operation of the railway, for taxes, interest, and dividends all come from the same source—the gross earnings. On superficial consideration, it might be thought that the railway employee is interested only in gross earnings being sufficient to run the road and to provide employment for him and funds with which to pay him, and that he is not concerned with net income in any way. This is far from the truth, for if we, as railway employees, are to reap the full reward of faithful and efficient service, we must see to it that, not only is the wage-paying power maintained, but that the net results achieved through our services are such as are defined in the recent report of the Railroad Securities Commission to President Taft and by him submitted to Congress as, "under honest accounting and responsible management, will attract the amount of investors' money needed for the development of our railway facilities."

In a growing country, such as the United States, there is a constant demand for increased transportation service, calling for additional facilities on existing railways and the construction of new lines. It is transportation which has, more than any other one agency, made the United States the wonderfully progressive and prosperous country it is. Transportation companies have, in the face of steadily lowered rates, increased the extent and raised the quality of their service, and, at the same time, steadily increased their expenditures and work for the development of the country. Without transportation facilities its development would have been retarded and its progress slow.

A growing railway has constant need of money. The provision of additional facilities will call for the investment of large amounts of new capital in railway enterprises. Investors naturally seek those fields in which the prospects for returns are fair and reasonably assured. They will put their money into railway enterprises, therefore, only if the returns from investments in railway properties are approximately equal to the returns secured from capital invested in other kinds of business. Whether or not this shall be true and railway development, with its advantages for railway men, affording an ever widening field for employment and promotion, is to continue, will depend, in large measure, upon the efficiency with which the properties are operated.

This is particularly true in the present era of railway regulation by state and federal authority. I should not be construed as criticising the policy of governmental regulation within its proper field. I am speaking of it on this occasion merely for the purpose of directing attention to its bearing on the subject I am discussing. If the demand for the product of a farm or a manufacturing establishment is such as to make an advance in price possible, the margin between the cost of production and the selling price can be increased by the simple method of advancing the latter. But the railways of the United States are not free to advance the price of their product. Whatever may be the demand for transportation, the price can not be increased without first securing governmental approval, which will always be a difficult thing to do. As a result of this condition, substantially the only way in which a railway can increase the margin between the cost of producing transportation—the expense unit—and its selling price—the earning unit—is by greater efficiency of operation—by more efficient solicitation, whereby a larger volume of traffic may be secured, and by greater efficiency, whereby the traffic may be handled at a reduced cost.

I think it is clear, therefore, that all railway employees, whatever may be their duties, are interested in efficiency and in the companies which they serve obtaining the best possible net results. The practical question for us to consider is that of how greater efficiency can best be brought about and how each one of us, in his particular sphere of duty, can best aid in securing better results. We should, I think, be careful to differentiate between efficiency that is merely theoretical and that which is practical. There seems to be a tendency to carry the development of theoretical efficiency plans to an extent which sacrifices real practical efficiency for the system. We should not be led astray by beautifully worked-out schemes with elaborate machinery for their administration, but should test every plan by its results in actual practice. If it results in saving a dollar at an expense of less than a dollar it is good. If it costs a dollar or more to save a dollar it is worse than useless.

The formulation of plans for obtaining greater efficiency of operation is the duty of those of us who are charged with railway management, but each of us can contribute to the success of such plans by making his individual service efficient. All that is necessary is that the individual employee shall know his duty and do it to the best of his ability. He should not only endeavor to perform his specific duties as effectively as possible, but he should seek at all times to co-operate intelligently and helpfully with all other employees in his own department and in other departments. I do not mean by this that he should seek to thrust his aid on others. If he does he will probably make a nuisance of himself, and if he spends his time attending to the business of others he is in danger of neglecting his own duties. There are, however, many opportunities for helpful co-operation and effective team-work. To enumerate all of the opportunities of this kind that may arise would make a long list, but the man who has the best interests of the service as a whole constantly in mind will be quick to recognize them as they occur.

The highest efficiency of management consists in securing safety and efficiency of service by so conducting operations that expenditures will bear a fair and reasonable relation to the revenues of the company. Therefore, in the maintenance of the property and in conducting its operations otherwise, the factor of consistent economy should be ever in mind. The in-

*Address before the Richmond Railroad Club, April 4, 1912.

telligent ordering and use of materials in roadway maintenance; the effective use of materials in shop and other operations; careful watch on storehouse supplies; close attention to fuel consumption; close check on and the proper use of stationery and other station supplies—these are only some of the things tending to greater efficiency.

A phase of the general problem of greater efficiency with which the employees of the operating department are chiefly concerned and falling within the category of personal injuries—which places so heavy a burden on the railways of today—is the prevention of accidents. Some railway accidents are unavoidable by any human means. Others are due to the carelessness or recklessness of passengers, trespassers, or others not in the employ of the companies, and their prevention is often beyond the power of the employees. Still others are clearly preventable.

A recent writer on this subject has said that "every preventable accident is due to some failure or insufficiency of material, method, or man." Materials and methods are largely in the control of the management, but shortcomings of the human element can be corrected only by the men themselves, and back of failures which, on their surface, may seem to be attributable to materials or methods, there may be faults of men. This is manifestly the case where an accident results from a defect in material which it was the duty of some one to detect and report, and we all know that the effectiveness of methods is largely dependent upon the attitude toward them of the men by whom they must be carried out.

The absolute elimination of preventable accidents should be an end for which railway managers and employees should strive for two reasons: first, because it is our primary duty to the public to safeguard the lives and property entrusted to us for carriage; and, second, because of the large hole which payments on account of personal injuries and loss and damage make in the fund in which, as we have seen, owners and employees are alike interested.

Preventable accidents are not limited to those which are the result of faults in train operation. We think first of these because, when they happen, there is danger of appalling loss of life and great damage to property. We should not lose sight of accidents which attract less general notice, but which, in the aggregate, are of scarcely less importance. Injuries to employees received by falling from engines, cars, etc., although there were no defects in the equipment or negligence of others; or from crawling under or over cars; injuries resulting from striking cars in or about which there are men or teams loading or unloading; obstructions on station platforms, resulting in injuries to passengers or employees; an engineer, "spotting" his engine at a water plug and moving the train while passengers are getting on and off—these are relatively minor causes, but just such causes result in a substantial number of accidents on the railways of the United States every year. A great majority of them could be eliminated if all employees did their duty all the time. It is the man who is constantly watchful of these things who acquires what has been termed the "safety habit" and who is not apt to neglect the big things.

Just here, while speaking on the subject of preventable accidents, let me call attention to the great loss of life on American railways by trespassers on railway property. I will make no mention of the thousands of cases of personal injuries sustained annually by persons trespassing on railway property, in connection with which the railways are called upon to pay out annually large sums, or of the great damage done to railway property caused by acts of trespassers. I will simply refer to the loss of life. The statistics of the Interstate Commerce Commission show that no less than 51,083 people were killed while trespassing on the property of the railways of this country during the ten years, 1902-1911, and that out of the total number of people, 10,396, killed for the year ended June 30, 1911, 5,284, or more than 50 per cent., were trespassers. The railways, at an expense of millions of dollars for the installation of block signals, have carried the prevention of collisions so far that the total number of passengers and employees killed in such accidents annually is about 400. While we should aim, through greater efficiency of operation, to eliminate these accidents entirely, is it not worth while for the governments to take some action to stop the evil of trespassing which costs an average of over 5,000 lives annually? If for no other reason than for the protection of those who participate in it, trespassing should be abolished in some way. I mention this in the hope that not only those interested in the welfare and prosperity of our railways, but in the welfare of the nation, will do everything that is within their power to aid in bringing about the enactment of such reasonable and helpful legislation as will result in a great saving of life, and, at the same time, relieve the railways of the country of considerable trouble and expense.

Still another phase of efficiency of operation which concerns us all is involved in our relations with the public. A railway company, controlling a public highway and exercising a monopoly of transportation over it, owes various duties to the public. It is our duty to handle the traffic entrusted to us as promptly and efficiently as possible and to endeavor, to the best of our ability, to make our service satisfactory to our patrons. In this way we can all help our traffic organizations, for satisfactory service is the most effective solicitation. The railway man should never miss an opportunity to make a friend for himself and for his company, bearing in mind that the infrequent traveler or the small shipper of today may be the constant traveler or the big shipper of tomorrow and that public opinion which controls governmental policies relative to our business is made up of the aggregate of individual opinions.

This rather plain talk that I have given you this evening should not be construed as indicating an opinion on my part that railway employees, as a class, are inefficient. My opinion is just the contrary. My entire business life has been devoted to the railway service in different capacities and in different parts of the country. I know the men in all departments of the service. I know the conditions under which they work and the exacting nature of their duties. With this knowledge, I am proud to be able to say that the great army of railway men of the United States need not fear comparison, as to character, ability, and general efficiency, with any other body of men in our own or any other country. Taking into consideration the circumstances under which it was constructed, the conditions under which it is operated, and the relatively low compensation it receives for its services, the American railway system is the most efficient transportation agency in the world. It has been made so by the American railway man. But, in common with all mankind, we have our faults and our shortcomings, and it is by frankly recognizing them and earnestly striving to correct them that we can advance to constantly greater efficiency in railway operation.

Until quite recently the Tasmanian government made it an invariable policy to permit none other than British or Australian manufacturers to compete in tenders for supplies, and to purchase nothing in any other country that could be obtained in Great Britain or Australia. However, in October, 1911, the Tasmanian railways were placed by the state parliament under the control of a commissioner, who is to hold office for four years, and have full authority to operate the railway system on business principles, and independent of any political considerations. Shortly after assuming office some steel rails were purchased in England through the agent general in London, and with regard to the tenders having as usual been restricted to British manufacturers, an American firm wrote to the new commissioner to the effect that it could have landed the rails in Tasmania at about $3.60 per ton cheaper than the price at which they were supplied from England. The commissioner wrote in reply that the next time any steel rails were required, American as well as English firms would be given the opportunity to submit bids.

DEFECTIVE BOX CARS AND DAMAGED FREIGHT.

Fourth Article. Better End Doors Are Needed. Less Than 15 Per Cent. of the Roofs in Service Are Waterproof.

The earlier articles in this series considered the heavy damages to freight caused by the use of poorly constructed cars. Side doors, grain doors, box car sides and ends have been discussed, attention being directed to the poor construction; suggestions have also been made as to satisfactory designs for these parts. The recommendation has been made that the American Railway Association establish a bureau to see that all cars are designed and constructed with a view to transporting freight safely and without damage.

END DOORS.

The end doors on the average box car are in most cases neither grain proof nor water proof. Where they are located below the grain line, provision should be made so that they may be boarded over to prevent the loss of grain by leakage. To accomplish this successfully any bolts which pass through the car near the door opening must be applied so that the heads or ends will come flush with the inside lining of the car. One important railway system which ordered thousands of box cars a few years ago with the end door below the grain line clearly specified that this was to be done, but the inspectors at the car builders' plant carelessly overlooked the importance of this provision and the bolts were made from ⅛ to ¼ in. too long, and have since been the cause of much loss, due to the leakage of grain, because the agent or shipper in applying the grain boards covering the door will not take the time to cut them out to clear the bolts.

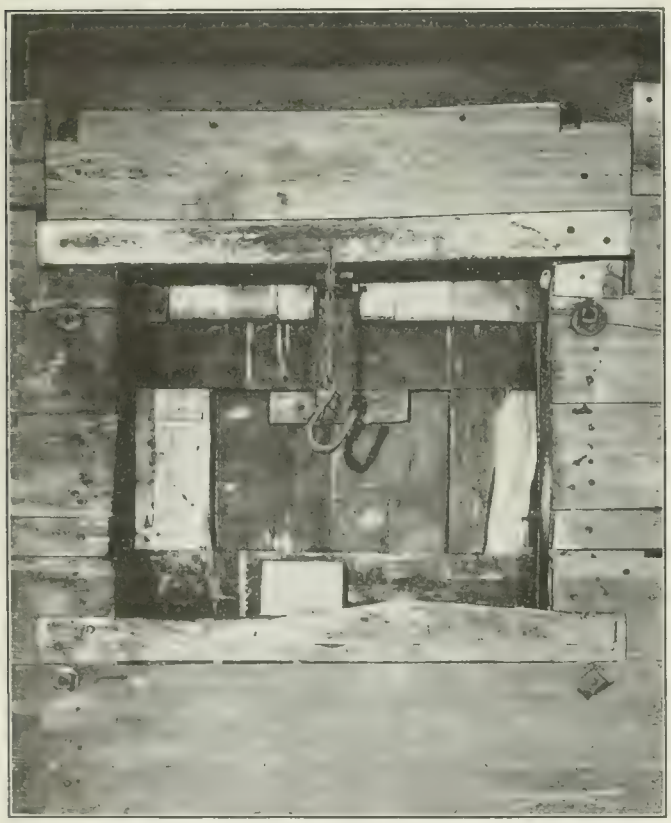


Fig. 50—Inside View of a Defective Box Car End Door.

The box car end door shown in Fig. 50 was found on a car which was being loaded with high grade merchandise at a freight house. The hasp hook had been torn off and the door was nailed on the end of the car and could easily be removed. The door opening was large enough to allow a man to climb through and remove fairly large packages of freight. The cracks between the boards which formed the door, and the openings where the door fitted against the end of the car, were such as to allow cinders and water to enter easily. While the condition of this door was particularly bad, a close examination of a considerable number of cars showed that the end doors generally were in bad shape, and such as to cause a considerable loss, due both to damaged freight, because of the entrance of moisture, cinders and dust, and to the opportunities that were offered for pilfering from the car.

A satisfactory end door construction, which is used on the Santa Fe standard 40-ton box cars, is shown in Figs. 51 and 52. The door is well above the grain line and is made of ⅛ in. pressed steel. The door opening is 8 in. high and 2 ft. long. The Z bar guides in which the door slides, and the galvanized iron flashing over the upper Z bar, together with a large overlap at the ends of the door, prevent any possibility of moisture entering the car at this point. The door is large enough for the loading or unloading of long material, but not large enough for a man to climb through; it has given good satisfaction. Some idea of its location on the end of the car may be gained from the end view of one of these cars shown in Fig. 53.

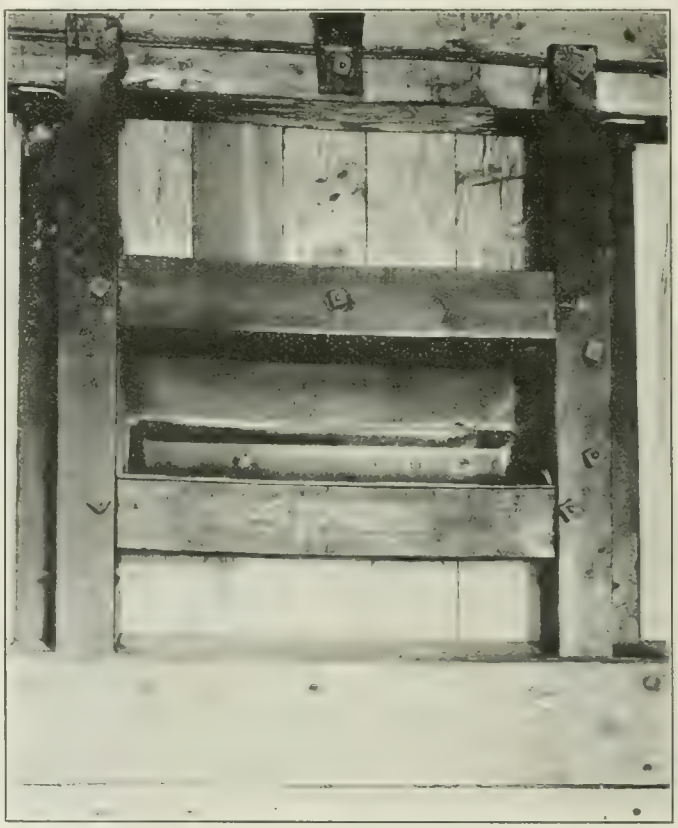


Fig. 51—Inside View of Santa Fe Box Car End Door.

LEAKY ROOFS.

It requires only a casual examination of the insides of the roofs of box cars to show that comparatively few of them are water proof. Evidences of the leakage will be shown by the stains on the carlines. During a heavy rain at Springfield, Mo., on August 23, 1911, one of the general traveling agents of the Frisco, accompanied by the assistant superintendent of motive

power, made an inspection of 52 cars at the mechandise platform, which does not have a shed protection. Thirty-eight of the 52 box cars were found to be leaking through the roof and seven through the sides. There was a total of 152 roof leaks in the 38 cars, or an average of four to the car. Cars from a number of the important roads throughout the country were found leaking, indicating that this condition is quite general.

Shippers of tin plate in the Pittsburgh district find it necessary to give the roofs of the cars a hose test to locate those which are moisture proof and suitable for carrying their product. When a box car is placed for loading in the Jones & Laughlin plant, two men take a hose to the roof of the car and spray it with a water pressure of about 20 lbs. Not over 15 per cent. of the cars will stand this test without leaking.

In some districts the cement shippers follow the same practice. Probably not much more than 10 per cent. of the cars in this country can pass this test without requiring repairs or special work of some kind. It is just as necessary to have strictly moisture proof cars for carrying flour, grain and similar products. The additional cost of a good roof can easily be offset by damage to freight within a comparatively short time where an inferior roof is used. The trouble apparently is that those who design and specify the kind of equipment to use have no proper appreciation of the great amount of damage which is caused by leaky roofs. Added to this is the inconvenience to the shipper and the resulting dissatisfaction and spirit of criticism which is engendered.

E. D. Levy, assistant general manager of the Frisco Lines, who reported the above mentioned conditions at the Springfield, Mo., freight house to the General Managers' Association of the Southeast, severely criticized the metal roofs and stated that "the best roof I know of is a double board roof with a rubberoid plastic roof, or some other plastic roof between the two boards." This could perhaps be improved upon by placing the plastic material between a board roof, and an outside tin roof, which would be more expensive but would be durable and satisfactory.

A recent stroll over the tops of a large number of box cars indicated a rather startling condition, and the cars examined bore the names of some of the most important roads in the country. Outside metal roofs were found loose and open at the joints, exposing the wood underneath and offering the most favorable condition for leakage during rainy weather. Inside metal roofs covered with boards at the top were found with the boards loose and nails projecting upward. Metal roofs which appeared to be perfectly secure showed signs of leakage on the carlines and along the ridge pole of the car, because of the through bolts being loosened, allowing moisture to work in under the head of the bolt and drip down into the car. The observations checked up in a most practical way the experience at the Springfield freight house of the Frisco.

It is not an easy matter to detect leaky roofs when the cars

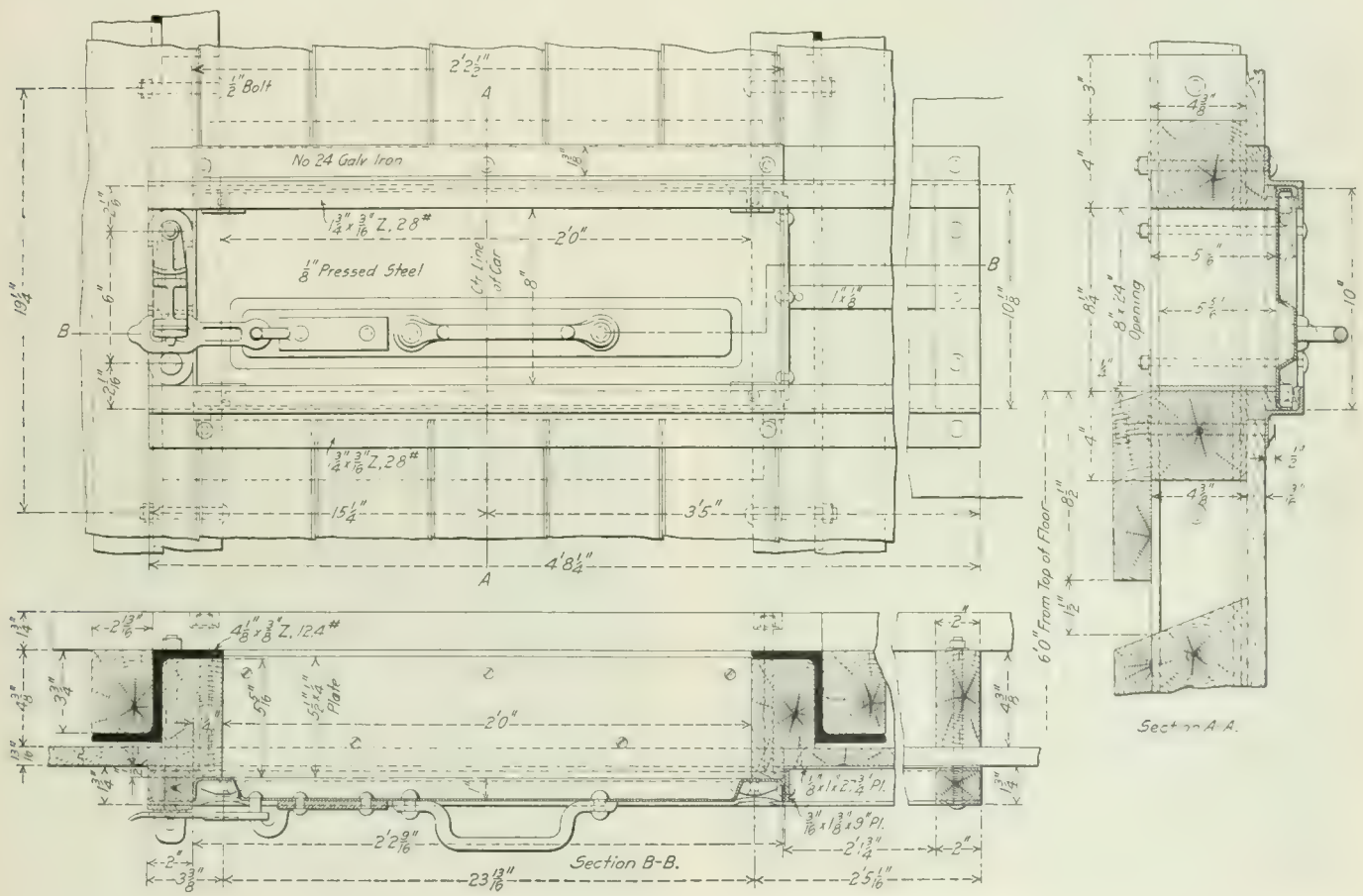


Fig. 52—Details of End Door on Santa Fe Standard Box Car.

are standing still and in dry weather, but by riding in the car when it is in motion the stresses open up the cracks in the roofs so that daylight can often be seen through them; the weak spots also become apparent during a heavy and prolonged rain storm. While the problem of making a water tight roof is a severe one, yet it is not impossible of solution. Mr. Levy's suggestion as to the double board roof with the plastic material between, is undoubtedly a good one.

The roofs of the 40-ton Santa Fe box cars have given good satisfaction. In this case a metal roof is placed over the wooden roofing, but it is held rigidly along the center of the car and is arranged at the edges so that when the roof of the car becomes distorted, due to the stresses which occur when it is in service, or when it is being jacked up on one end or at the corners, the sheets can slip on each other at the sides and adjust themselves to the condition of the roof. This appears to be a logical solu-

tion of the problem. Another type of metal roof is arranged with the outside edge of the sheets held fast to the side plate, but with the sides and ends at the center of the car free to move. This type of roof is also said to be giving good satisfaction. It is simply impossible, without going to excessive weights, to make the framing and roof construction of a box or house car sufficiently strong and rigid so that there will be no distortion or weaving when it is in service, and particularly when it is subjected to rough handling. If the metal roof is held tight at both the center and the edges something must give way with a resulting leaky condition.

Two roads had a number of cars equipped with the same type of metal roof and with equally strong side frames and roof construction. The roofs on one road gave good satisfaction. The other road claims to have very poor results and is figuring on

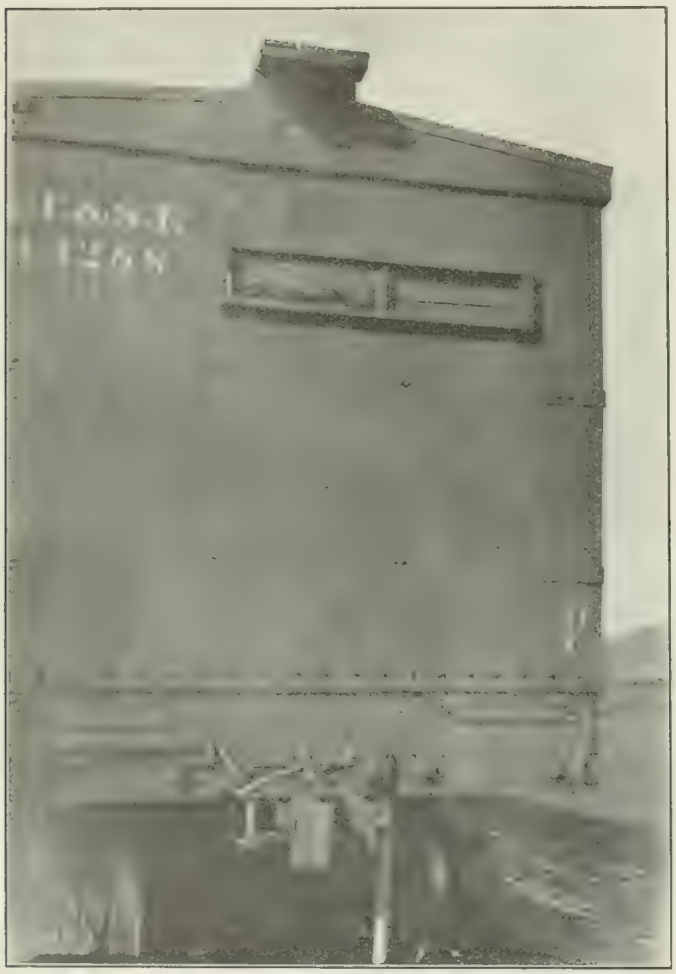


Fig. 53—End of Santa Fe Box Car, Showing End Door Closed.

replacing the roofs with another type. The first road, which by the way, has the reputation of maintaining its cars at a considerably lower cost than most of its neighbors, has certain regulations in force in the car department which require the roofs to be kept in first class repair all the time, and fluctuations in business are not allowed to interfere with the appropriation for this work. The second road, which is having such poor results has no systematic method of following up roof repairs, and a car does not receive such repairs until it is in such bad shape as to make them absolutely necessary. With the extremely rough treatment to which cars are subjected in these days it is essential that more careful attention be given to their upkeep.

Another feature of the Santa Fe box car which is deserving of attention is the carlines. These are so constructed that they add considerably to the strength and rigidity of the roof structure. They consist of 4 in. I-beams, 9½ lbs. per foot, split and spread at the ends, as shown in Figs. 54 and 55. To prevent the beams from splitting further 5-16 in. holes are drilled through the web, as shown. This design has been criticized, and in fact did give some trouble, but it was due to the radius of the bend being made too short and the material not being in the proper condition when the bend was made. The feet or

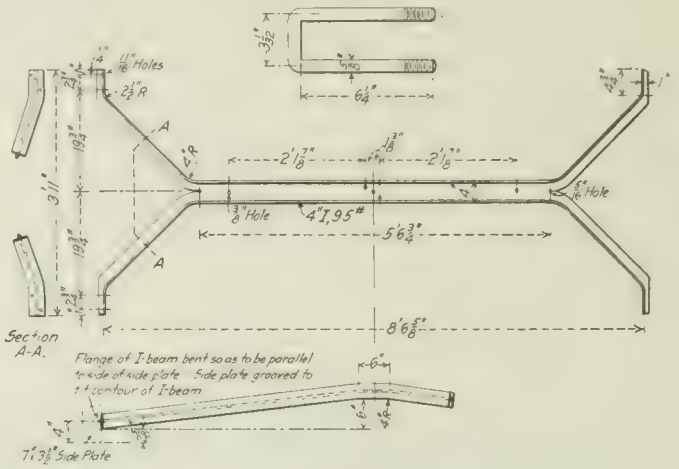


Fig. 54—Detail of Carline Used on Santa Fe Box Car.

ends of the carlines are not bolted to the side plates in a haphazard manner, but are securely held by the ⅝ in. U bolts which fit through the two holes in each foot and pass through castings on the outside of the car against which the nuts bear. Undoubtedly this strong roof construction will do much to reduce leakage, even if the roof covering itself is not of the best.



Fig. 55—Application of Carline Used on Santa Fe Box Car.

Leakage could often be prevented if more care were used in the construction of the cars. For instance, holes for vertical bolts through the ridge pole are often bored much too large to facilitate the rapid fitting together of the parts. Horizontal bolt holes through the fascia and side plate are bored with the drill pointing downward when they could just as easily be made slanting slightly upward, thus avoiding any possibility of leak-

age. The railways should insist on more care being exercised in these respects, both in their own shops and at the car builders.

Possibly the greatest detriment to getting a proper roof is the tendency on the part of the railways to try to cut down the first cost of the equipment to a minimum. For example, a car may be carefully designed with a certain number of metal carlines. Someone, possibly in the mechanical department, possibly in the purchasing department, will conceive the idea that by cutting out one carline on each car several thousand dollars can be saved on an order of 1,000 cars. The change is made hurriedly and possibly without consulting the designer, and an apparently big saving is made—but what about the final result? Manufacturers of metal car roofing recommend certain weights of metal sheet, but often they are requested by the railway officers to provide a lighter weight material. The car roof manufacturer can make just as much profit on the lighter weight roof, and if he will not furnish it his competitors probably will. The ridiculous part of this proposition is that the railway officers often ask the same guarantee of life for the light weight as for the heavy weight material.

To sum up, a good durable water proof roof can undoubtedly be provided if the railways will pay a proper price for it and provide a proper framing to support it. The higher first cost will be more than made up by the longer life of the roof and the better protection afforded to the lading. The roof should be flexible and metal roofs must not be too rigidly fastened to the roof frame.

(To be continued.)

AUTOMATIC SIGNALS ON THE TORONTO, HAMILTON & BUFFALO.

The above named company has recently installed automatic block signals on its line between Grand Trunk Crossing, Hamilton, Ont., and Vinemount, about ten miles. From Kinnear to Vinemount, 7 miles, this line is single track and the signals are so arranged and controlled that as against opposing trains this is one block section, while for following movements several trains may follow one another through short block sections. The arrangement of these signals is shown in the illustration. Vinemount is a regular passing point. Kinnear is a day and night telegraph office.

Six regular passenger trains run in each direction over this section daily, and a similar number of regular freight trains. In addition there are from one to five extra freight trains daily. There is a heavy descending grade westbound, signal 27.1 being 301 ft. higher than signal 33.2. This amounts to nearly a 1 per cent. grade. The signaling between Hamilton and Kinnear, about three miles, has no special features. Power semi-automatic home signals have been provided in connection with the mechanical interlocking plant at Grand Trunk Crossing. The entrance to the receiving yard is at Kinnear.

On account of the heavy up grade from Kinnear to Vinemount three eastbound intermediate signals have been provided to permit close headway between eastbound trains, whereas only one westbound intermediate signal is required on account of the higher speed of westbound trains. Signal 34.1 governs movements to the westbound main of the double track section and clears as soon as the switches are set for this movement, provided the block is unoccupied. Signals 27.1 westbound and 34.2 eastbound govern movements into the single track block between Kinnear and Vinemount. Signal 35.2, which repeats signal 34.2, is provided in order to hold eastbound trains back of the crossover at the end of the double track, when a westbound train is approaching. Signal 35.2 is always regarded as an absolute signal, except under orders from the operator at Kinnear, and such orders are given only for switching movements into the yard. In case it is desired to make a switching movement from the eastbound track into the yard ahead of a westbound train which has not yet reached Vinemount, the operator opens a switch which prevents signal 34.2 from clearing; and this in turn leaves signal 27.1 free to clear for a westbound train.

Signal 27.1 clears when a westbound train enters the preliminary section at point marked "A," provided no opposing train has cleared or passed signal 34.2 and there is no preceding westbound train nearer than signal 31.1. As soon as a westbound train has cleared the block between 27.1 and 31.1, a following train will get a 45 deg. indication. Signal 27.1 will give a 90 deg. indication if the preceding train has passed signal 34.1.

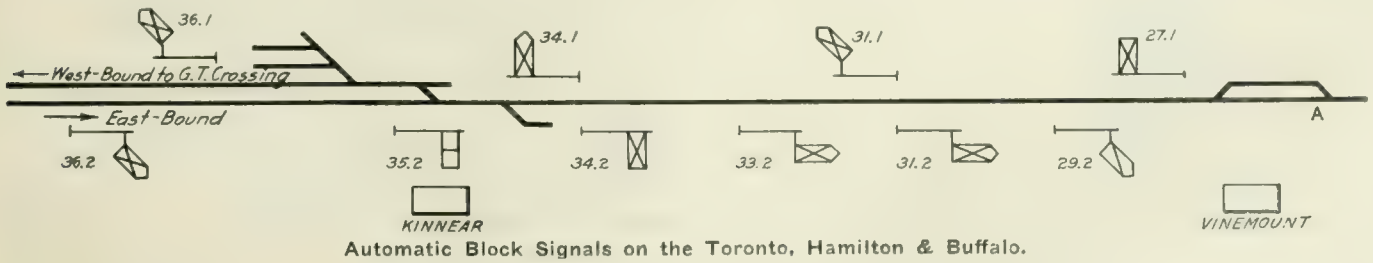
The signal operation for eastbound trains is similar to that westbound, following trains getting the 45 deg. indication when running one block apart and the 90 deg. indication when running two blocks apart. In other words the same facility is afforded for following trains as in the case of double track signaling.

It will be noted that all intermediate signals are permissive. They are not required for protection against opposing trains, but only to facilitate following movements. It should be mentioned, however, that when 27.1 clears for a westbound train, signals 29.2, 31.2 and 33.2 are set in the stop position; and signals 34.2 and 35.2 are, of course, prevented from clearing. Likewise when 34.2 clears for an eastbound train signal 31.1 is set in the stop position as well as 27.1 being prevented from clearing.

This arrangement is that of the "A P B" block system, as devised by the General Railway Signal Company, of Rochester, N. Y., and that company installed the signals.

There are three private lines open for general traffic in Tasmania, all situated in the western part of the island: The Emu Bay Railway, about 104 miles long, with headquarters at Burmie; the Mount Lyell Mining & Railway Company, about 52 miles long, with headquarters at Queenstown, and the Magnet Silver Mining & Railway Company's line, about 10 miles long, with headquarters at Mount Magnet, Tasmania.

The Tasmanian government railways now comprise 470 miles, a gain of only about eight miles within the last five years. The total cost of construction and equipment of the lines open on June 30, 1911, was $19,827,178, representing a cost of $42,160 per mile. No information is given in government reports as to the precise cost of various supplies and equipment purchased, and when bids are accepted information concerning prices is not disclosed. Individuals or firms desiring to sell material there cannot expect to find out what prices the Tasmanian government might be willing to pay, but must state the prices at which they may be willing to sell. In the case of steel rails the average price paid is said to be about $50 per ton landed in Tasmania.



Automatic Block Signals on the Toronto, Hamilton & Buffalo.

LARGEST NON-ARTICULATED LOCOMOTIVE.

A Maximum Theoretical Tractive Effort of 71,500 Lbs. Is Obtained with one Group of Drivers and Two Simple Cylinders.

Five pairs of driving wheels have been considered as the largest practical number to be included in one group with a rigid frame, and when there is an average weight of over 60,000 lbs. for each pair, and cylinders are applied of such a size as to bring the factor of adhesion down to 4.22, it would seem as if the limit was practically reached for the non-articulated locomotive. Five engines fulfilling these conditions have recently been delivered to the Chicago, Burlington & Quincy by the Baldwin Locomotive Works. They are fitted with single leading and trailing trucks which together carry 76,900 lbs., making the total weight of the locomotive 378,700 lbs., of which nearly 80 per cent. is on drivers.

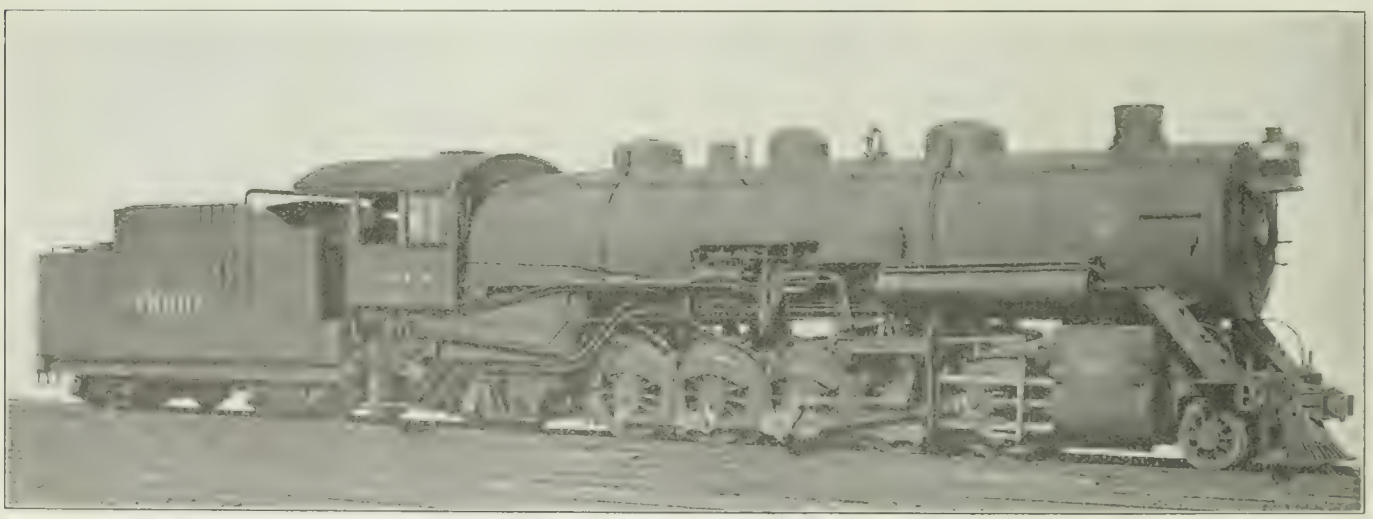
These locomotives were ordered after considerable experience with articulated locomotives of the 2-6-6-2 type of practically the same power, as well as with Mikado and consolidation locomotives ranking with the largest of their type. It thus appears that for this service a simple locomotive of the non-articulated type fitted with a high degree superheater was considered preferable to the articulated compound designs already in use on that road. These include engines fitted with superheaters, reheaters and feed water heaters, as well as an earlier design, which includs none of these appliances.

There is shown in the accompanying table two locomotives of the lighter 2-6-6-2 type and several of the latest examples of the 2-8-2 type in comparison with this 2-10-2 type. It will be seen that while the Mallets have a somewhat larger percentage of weight on drivers, the new locomotives do not compare very badly in this respect and are of course a considerable improvement over the Mikados. The average weight per driving axle depends on the strength of the track and bridges, and in this respect the Mikado on the Chesapeake & Ohio is the largest of any locomotive shown in the table, although by no means the largest weight per driving axle now in service in this country. Figuring arbitrarily that the maximum indicated horsepower will be delivered with a piston speed of 700 ft. per minute, which in the case of the locomotives shown in the table varies from 22¼ miles per hour for the 57 in. driver to 25 miles per hour for the 64 in. wheel, it will be seen that the new Burlington engine is slightly less than the Mallet on the same road, but that it exceeds all other engines on the list. Even this large power is obtained with a very reasonable average evaporation per square foot of heating surface.

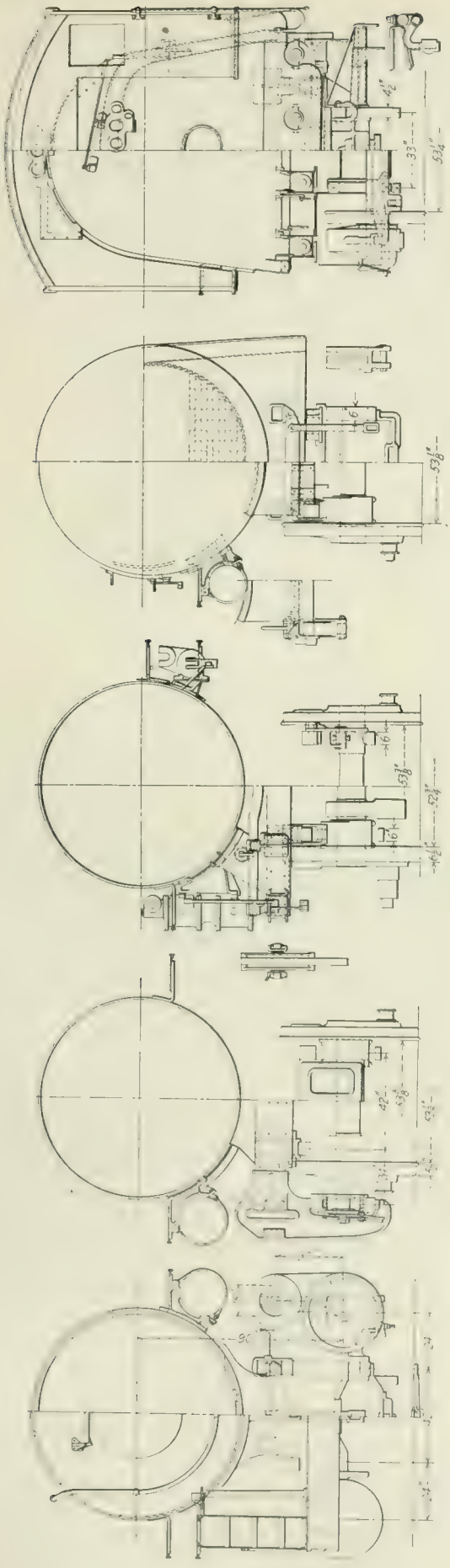
Road	C. B. & Q.	C. B. & Q.	N. Y. C.	Erie.	G. N.	C. & O.
Type	2-10-2	2-6-6-2	2-6-6-2	2-8-2	2-8-2	2-8-2
Total weight, lbs.	378,700	361,650	354,000	320,600	287,000	315,000
Weight on drivers, lbs.	301,800	304,500	301,500	237,150	220,000	243,000
Percentage on drivers	79.7	84	85.2	74	76.5	77.1
Average weight per driving axle, lbs	60,300	50,750	50,250	59,288	55,000	60,750
Tractive effort, lbs.	71,500	70,500	67,500	57,460	57,460	60,800
Maximum I. H. P.*	2,750	2,900	2,475	2,330	2,330	2,500
Heating surface total, sq. ft.	5,161	5,090‡	4,393	4,155	4,720	4,051
Superheater surface, sq. ft.	970	464	966.3	843	871	845
Equivalent heating surface, sq. ft.	6,616	5,786	5,842.5	5,419.5	6,026.5	5,318.7
Evaporation per sq. ft. of evaporating heating surface, lbs.†	11.2	12	11.85	11.75	10.4	12.95
Cylinders, diameter and stroke, in.	30 x 32	23 & 35 x 32	21½ & 34 x 32	28 x 32	28 x 32	29 x 28
Diameter of drivers, in.	60	64	57	63	63	56

* Taken at 700 ft. per minute piston speed, tractive effort assumed to be .62 of the maximum.
† Steam consumption assumed to be 21 lbs. water per horsepower hour.
‡ Includes the feed water heater.

Boiler.—The boiler measures 88½ in. in diameter, and is of the straight top type, although the third sheet increases to a diameter of 96½ in. at its connection to the firebox. The slope is all placed at the bottom of the barrel to give a larger water space around the bottom of combustion chamber. As a further improvement to the circulation at this point the front water leg is sloped upward on an easy curve and has a width of 6 in. The clearance around the bottom of the combustion chamber is approximately 7 in. The tubes and flues are 22 ft. 7½ in. in length, there being 285 of the former 2¼ in. in diameter and 30 superheater flues 6 in. in diameter. The combustion chamber is about 27 in. long and it, with the firebox, has a total heating surface of 320 sq. ft., giving the boiler a total evaporative heating surface of 5,161 sq. ft. Assuming a steam consumption of 21 lbs. per indicated horsepower and the maximum horsepower



Most Powerful Non-Articulated Locomotive; Chicago, Burlington & Quincy.



A Non-Articulated Locomotive Having a Tractive Effort of 71,500 lbs.; Chicago, Burlington & Quincy.

given, it will be seen that the average evaporation per square foot of evaporative heating surface required will be about 11.2 lbs. of water per hour, a figure below any of the others shown in the table with the exception of one. This clearly indicates that the boiler is of ample capacity.

There are no features of particular interest in the construction of the boiler. The crown of the combustion chamber is supported at the top by two T-bars hung on expansion links and the remainder of the boiler is radially stayed. There are 501 flexible staybolts placed in the sides, throat and back head.

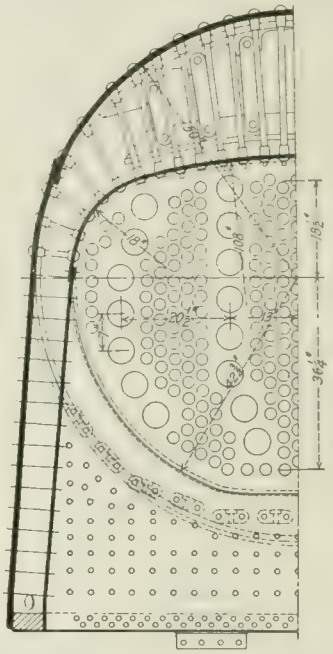
Emerson superheaters, having a surface of 970 sq. ft. on the steam side of the elements and headers, have been applied to these locomotives. They comprise 30 double looped elements, 15 on each header. The superheater tubes are 1¾ in. diameter outside and are placed inside of 6 in. flues. These superheaters are of the latest design of this type, wherein the saturated and superheated steam headers are in separate castings bolted together in such a way as to allow a slight movement, permitting unequal contraction and expansion.

Assume that an efficiency of combustion is obtained on these locomotives which will give an evaporation of 8 lbs. of water per lb. of coal; to develop the maximum horse power of the engine with a steam consumption of 21 lbs. per horse power hour will require over 7,200 lbs. of coal per hour. On the district where these locomotives are to be used, *viz.*, Beardstown division in Illinois, conditions are such that the maximum capacity will be required practically all of the time, and while there are some firemen capable of handling this amount of fuel, the average fireman cannot do so. It therefore seemed necessary if the capacity of the locomotive is to be utilized, to either provide a stoker or to equip for burning oil. The former method was preferable and the Barnum stoker which has been developed on this road has been fitted to the five locomotives.

Stoker.—This stoker is of the underfeed type employing screw conveyors of a constantly decreasing diameter toward the front end of the firebox, which are set in troughs just below the level of the grates. Above the conveyors in each trough are a series of inclined plates, adjustable for height and inclination. The clearance between the conveyor and the bottom of the trough can also be adjusted to secure the most satisfactory results. The conveyors are operated by a transverse worm shaft under the cab deck which is rotated by two small steam engines secured on the outside of the frames. There are four troughs and conveyors set 28 in. apart, and between them are the grate bars. Each of the three sections of the grate are arranged to shake in two groups, and each grate bar is set in a rectangular frame which can be tilted through a wide angle for dumping the fire. Below each of the three sections of the grate is an independent ash pan having two hoppers. All of these hoppers are of the self-clearing type and are fitted with cast iron swinging doors.

A coal crusher driven by a 6 in. x 6 in. steam engine is located on the tender and delivers coal to a belt conveyor which transfers it to a transverse trough from which it is discharged into the longitudinal feed troughs. A Ryan-Johnson coal pusher is fitted in the coal space of the tender.

There is no arch in the firebox, but a brick wall 9 in. thick is built in the combustion chamber and is extended up to a point

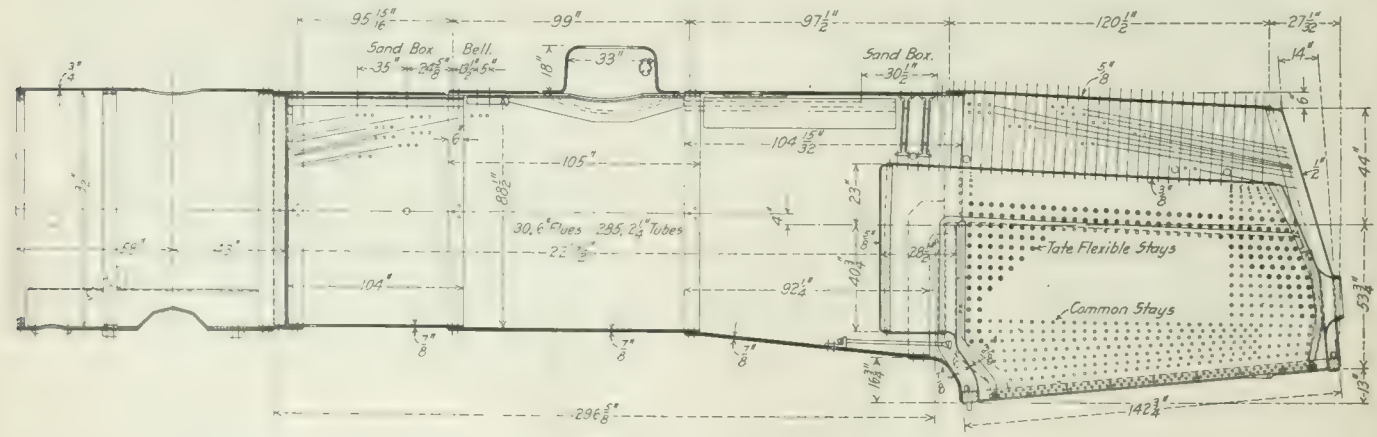


Section of Firebox Showing Arrangement of Flues.

38 in. below the crown sheet. The inside of this wall is 16½ in. back of the tube sheet.

Because of the arrangement of the stoker it was not possible to use the usual plate support at the back end of the firebox and two vertical expansion links are employed. These are located 56 in. apart transversely, placing them outside of the frames, and the cast steel deck plate is extended out and fitted with heavy ribs to form a suitable support.

Cylinders.—Cast iron cylinders, each including half the saddle in the customary manner, have been employed. Since the superheater has two separate headers, an equalizer pipe connecting the steam passages in the cylinders has been provided. The cylinder barrel walls are made unusually thick—2 in.—because of their large diameter. Cast steel piston heads of the dished type fitted with cast iron bearing rings 6 in. in width, except at the bottom where they are widened to 8 in., are used. The 15 in. piston valves are of the double ported design similar to those employed by the same builders on the Nashville, Chattanooga

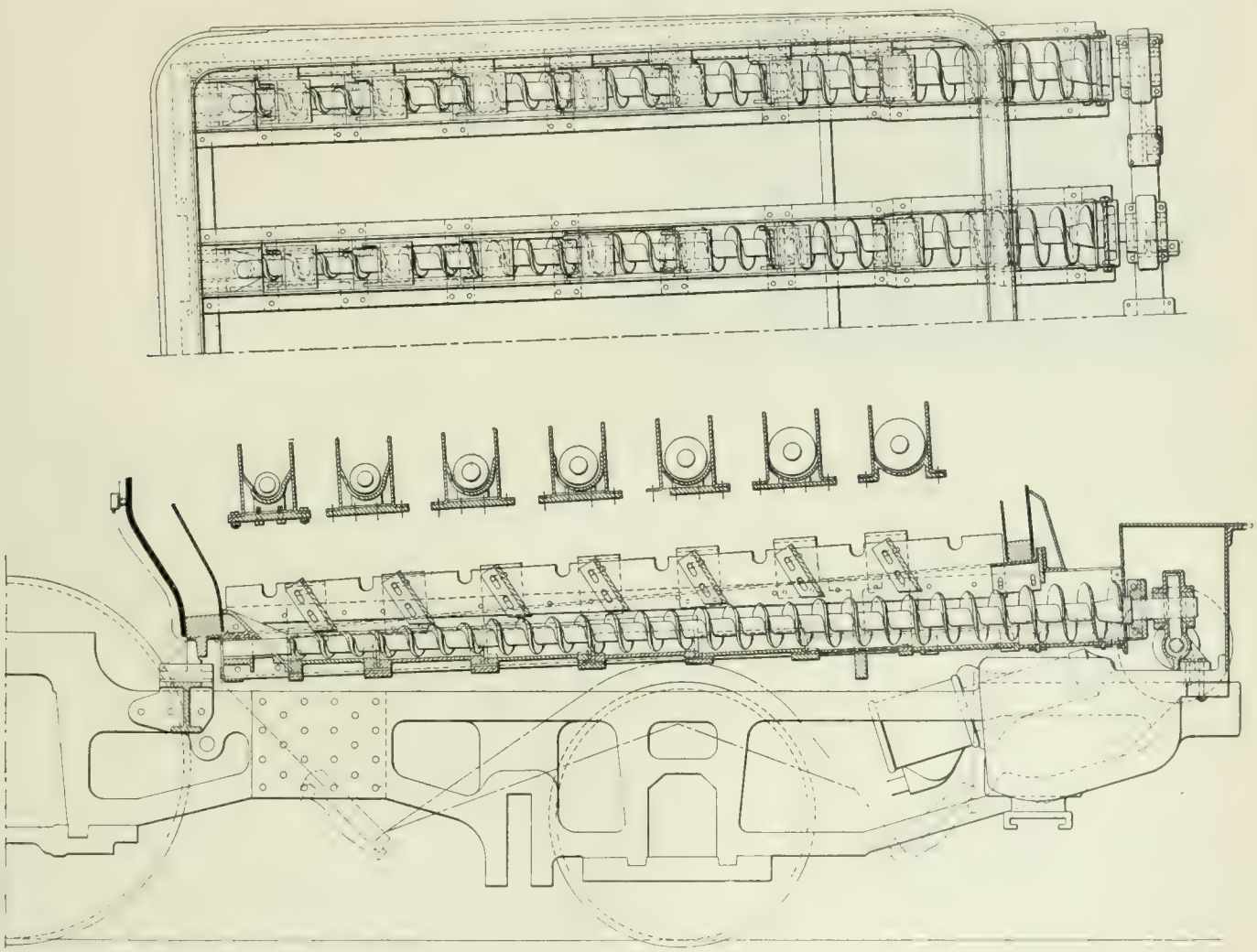


Straight Top Boiler With Combustion Chamber; Burlington 2-10-2 Type Locomotive.

& St. Louis Pacific type locomotives. Circulating or drifting valves of the Sheedy type are provided and relief valves are tapped into the live steam passages. The guides for the valve stem crosshead are cast in one piece with the back steam-chest head. A Ragonet power reverse gear is employed.

Frames.—The frames are steel castings 6 in. wide with separate rear sections 4½ in. wide. Included in the castings at the proper points are thin webs for suitably attaching the frame braces. By this method the frame itself is not weakened by the numerous transverse bolt holes, and at the same time the braces have a better bearing and are more securely fastened. The construction and arrangement at the front pedestal and around the cylinders is particularly interesting. Separate front rails

Tranverse frame braces are liberally employed and include a horizontal steel casting just back of the cylinders, which is bolted to the cylinder castings as well as the frames. Between the first and second pair of driving wheels the guide yoke acts as a frame brace and the valve gear bearer answers this purpose between the second and third pair. Just at the rear of the second pedestal is also a heavy cast steel ribbed brace in a vertical position secured to the 1½ in. webs forming part of the main frame castings. A similar brace is found in front of the fifth pedestal. Between the third and fourth and the fourth and fifth drivers are heavy horizontal frame braces which also act as supports for the boiler braces. Shoes and wedges are of bronze and the pedestal binders are of cast steel lugged and



Barnum Underfeed Stoker Applied to Burlington 2-10-2 Type Locomotive.

at the top and bottom are employed, but the bottom rail of the main frame is also carried forward underneath the cylinders for a distance of about 39 in. This extends below the lower front rail, which is of cast steel and arranged to accurately fit into the main frame back as far as the pedestal leg. The front rail includes a lip 2¼ in. thick extending down on the inside of the main frame for its full length, and also up the inside of the front pedestal leg nearly to the top. This inner lip has a stiffening web in the corner and also extends downward on the inside below the main frame, ending in a jaw which carries the bearing for the main brake shaft. Both of the front rails end just in front of the cylinders where they are bolted and keyed to a cast steel deck plate. There are 9 horizontal and 9 vertical bolts, and a large key securing the lower front rail and the main frame. Part of these bolts also connect to the cylinder castings. At the top the rail is carried back well over the pedestal.

bolted to the frames in the usual manner. Castle nuts are employed on these bolts.

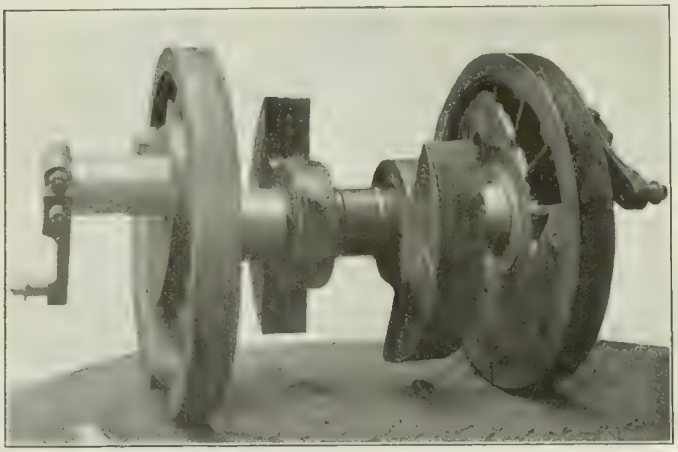
Rods and Driving Wheels.—The main rods are of I section, but the side rods are rectangular in section. The knuckle pins on the stub ends are surrounded by spherical bushings of case hardened steel, fitting in braces having a wedge adjustment. This arrangement was employed since the locomotives are designed to traverse 21 deg. curves and the front and rear pairs of driving wheels are permitted considerable side motion. Blind tires are employed on the main drivers; the second and fourth drivers have their tires set in to give a clearance of ⅝ in., and the front and back tires have a clearance of ⅞ in. This in connection with the side play allowed in the boxes necessitated the employment of some method to permit the side rods to adjust themselves without binding.

Vanadium steel is used in the main driving axle and the main

crank pins. It was found impossible to provide the necessary amount of counter-balance in connection with the main wheel centers, and therefore large cast steel counter-weights have been placed on the main axle inside the frames. These are pressed on and keyed in place.

The equalization system is divided between the third and fourth pairs of drivers. All driving springs are mounted over the driving boxes and cast steel equalizers are used throughout with the exception of those extending under the rear trucks, which are of forged iron.

Twelve inch steel channels are used in the framing of the



Main Driving Axle With Counterbalance Weights.

10,000-gal tender, which has a front bumper beam of oak, and a back bumper beam built up of steel plates.

General dimensions, weights and ratios are shown in the following table:

General Data.

Gage	4 ft. 8½ in.
Service	Freight
Fuel	Bit. coal
Tractive effort	71,500 lbs.
Weight in working order	378,700 lbs.
Weight on drivers	301,800 lbs.
Weight on leading truck	26,600 lbs.
Weight on trailing truck	50,300 lbs.
Weight of engine and tender in working order	562,000 lbs.
Wheel base, driving	20 ft. 9 in.
Wheel base, total	39 ft. 8 in.
Wheel base, engine and tender	74 ft. 4¼ in.

Ratios.

Weight on drivers ÷ tractive effort	4.22
Total weight ÷ tractive effort	5.30
Tractive effort × diam. drivers ÷ equivalent heating surface*	647.00
Tractive effort × diam. drivers ÷ total heating surface	830.00
Total heating surface* ÷ grate area	58.70
Firebox heating surface ÷ equiv. heating surface*, per cent	6.22
Weight on drivers ÷ equiv. heating surface*	58.60
Total weight ÷ equiv. heating surface*	73.40
Volume both cylinders, cu. ft	26.18
Equivalent heating surface ÷ vol. cylinders	253.00
Grate area ÷ vol. cylinders	3.36

Cylinders.

Kind	Simple
Diameter and stroke	30 x 32 in.

Valves.

Kind	Piston
Diameter	15 in.
Lead	¼ in.

Boiler.

Style	Straight
Working pressure	175 lbs.
Outside diameter of first ring	88½ in.
Firebox, length and width	132 x 96 in.
Firebox plates, thickness	⅜ & ⅝ in.
Firebox, water space	F—6 in.; S—4 to 6 in.; B—4 in.
Tubes, number and outside diameter	285, 2¼ in.
Tubes, thickness	No. 11 B. W. G.
Flues, number and outside diameter	30, 6 in.
Flues, thickness	No. 8 B. W. G.
Tubes, length	22 ft. 7½ in.
Heating surface, tubes and flues	4,841 sq. ft.
Heating surface, firebox	320 sq. ft.
Heating surface, total	5,161 sq. ft.
Superheater heating surface (steam side)	970 sq. ft.
Heating surface, equivalent	6,616 sq. ft
Grate area	88 sq. ft.

Wheels.

Driving, diameter over tires	60 in.
Driving, thickness of tires	4 in.
Driving journals, main, diameter and length	12 x 12 in.
Driving journals, others, diameter and length	11 x 12 in.
Engine truck wheels, diameter	33 in.
Engine truck, journals	6 x 10 in.
Trailing truck wheels, diameter	42½ in.
Trailing truck, journals	8 x 14 in.

Tender.

Tank	Water bottom
Frame	Steel
Wheels, diameter	33 in.
Journals, diameter and length	6 x 11 in.
Water capacity	10,000 gals.
Coal capacity	15 tons

* Total heating surface plus 1.5 times the superheating surface.

GOVERNMENT REPORTS ON KINMUNDY AND ODESSA COLLISIONS.

The report of Inspector Belknap on the rear collision which occurred on the Illinois Central at Kinmundy, Ill., January 22, which is dated February 16, and which was made public by the Interstate Commerce Commission April 3, was briefly noticed in our issue of April 5, page 809. As there stated, the inspector puts the primary responsibility on the flagman of the standing train, and treats the negligence of the engineman of the following train as a "contributing cause." The principal facts of this collision were reported in the *Railway Age Gazette* of January 26, February 2, and March 1. We note such parts of the inspector's report as throw additional light on the causes of the collision.

In his opening statement the inspector says that the second train traveled from Edgewood to Kinmundy, 14.31 miles, in ten minutes; but this must be a misprint. The train-sheet says that No. 25 left Edgewood at 12:10 and reached Kinmundy at 12:25. The engineman gives these times as 12:12 and 12:29; the conductor, as 12:12 and 12:31, and the flagman says that they left Edgewood at 12:13. The engineman of a northbound freight, who was at Kinmundy, thinks that No. 25 reached there about 12:26. The train sheet shows that No. 3 passed Edgewood at 12:20, and reached Kinmundy at 12:31; the engineman of this train says that he passed Edgewood at 12:18 or 12:19 and that the collision occurred at 12:33. Mr. Belknap's conclusion is that No. 25 passed Edgewood at 12:12, and No. 3, at 12:19; and that the collision occurred at 12:32 or 12:33. The leading train made schedule time between these two stations, and the conclusion seems to be that the following train traversed the distance in about 13 or 14 minutes.

No cars in either train were derailed, except the officers' car which was wrecked. The line is straight and level for the whole distance from Edgewood to Kinmundy. No. 25 had been obliged to flag No. 3 at a station 30 miles back. The flagman of No. 25 was in next to the last car of his train, and got off before it stopped at Kinmundy. He ran back as fast as he could and swung his lantern. The engineman of No. 3 answered this hand signal; but this engineman testifies that he saw the left-hand tail light of the train before he saw the hand signal. Steam was escaping from the heating pipe at the rear of the standing train, and the engineman's claim seems to be that this had obscured his view of the tail lights. This engineman said that he had not seen the bulletin requiring all southbound trains to take water at Kinmundy, but he admitted knowledge of the order requiring all trains to reduce speed at that station to ten miles an hour. The fireman of the other train had seen the order requiring all trains to take water at Kinmundy.

The conductor of No. 25 said that it had been necessary to use fusees at various points on the road on nearly every trip lately because No. 3 followed so closely behind No. 25. He had told the flagman at Effingham that a stop would be made at Kinmundy and to look out for No. 3; and this, says the conductor, should have been sufficient warning to the flagman to use fusees approaching Kinmundy.

The inspector refers, incidentally, to the fact that the distant

signal at Kinmundy, about 800 ft. short of the station, was against No. 3, but does not connect this with the cause of the collision, except to say that the engineman of No. 3 knew that there was at Kinmundy an interlocking plant, the signals of which might be against him. Only seven telegraph offices are open at night on this division. The report does not give the distances between these offices, but it seems that there is none between Edgewood and Kinmundy, 14.31 miles.

ODESSA.

The commission's report on the Odessa collision on the Chicago, Milwaukee & St. Paul, December 18, is dated March 13. It was issued about a month later, and noticed in the *Railway Age Gazette* of April 19, page 923. It gives the findings of Inspector Belknap. Some interesting details are given, but as to the main facts there is little to be added to the reports printed in our issue of January 26. When the first section of No. 18 arrived at Odessa at 3:52 a. m., finding the signal at stop, the conductor sent a flagman to get the telegrapher from his home. While waiting for the operator the engineman joined the conductor at the station, and the fireman was left in charge of the engine. When the second section was heard approaching, the fireman, being warned, was able to move the train ahead about 75 ft. The report says that the second section used about ten minutes in traveling the 5.3 miles from Junction Switch to Odessa; but it was also said that a short time before reaching Odessa the speed was 50 miles an hour. There was a curve of 1 deg., so that the standing train was hidden by freight cars until the second section was within 700 ft. of it.

When permissive block signals are given, a special order to that effect must be secured from the despatcher for each movement and a permissive card issued.

While at Odessa the conductor of the first section told the flagman to go back and set the switch (so that the following section would enter the passing track) and then to go back farther so as to stop the approaching train. The flagman went out of sight around the curve, but before he had set the switch or had gone far beyond it the telegrapher reached the office and at once set the block signal at proceed. The flagman seeing this returned to his train. He had just about reached the rear car when the second section was heard approaching and, by order of the conductor, he ran back again, but was too late to stop the train.

After moving the signal lever back and forth several times (and leaving it in the proceed position), the operator asked the despatcher if he wished to change an order, which was held by the first section, fixing a meeting point with westbound train No. 17. The despatcher having already authorized the departure of the second section from Junction Switch at once asked if the train standing at Odessa was protected by a flag. Being told that it was, he then went on to send an order, but without saying anything about the second section. On hearing of the despatcher's question, however, the conductor sent another brakeman back to see if the flagman had done as he was told.

The flagman says that the conductor ordered him to flag the second section *if* he heard it coming. He said that it was the practice, while standing at stations, to depend on the block signal to stop a following train (the signal being opposite the office). He did not deem it necessary to go farther than the switch, as he could see an electric headlight five miles away. The inspector thinks that perhaps he might have seen the rays of the headlight in spite of the obstruction of the freight cars on the curve if the light of the second section had been burning brightly; it was dim, or not burning at all.

The evidence as to whether the telegrapher at Junction Switch was told by the telegrapher at Appleton that the first section was approaching his station is conflicting. (It will be recalled that the Minnesota State Commission found that the weight of evidence sustained the operator at Junction Switch and discredited the Appleton operator's denial.)

The engineman of second No. 18 said that he saw the outside marker of the standing train and applied the air brakes before he saw the flagman's light.

The operator at Odessa said that he left his signal in the clear position when he went off duty at 1:30 a. m., and that the lever must have slipped out of its socket. He claimed that an operator who had formerly worked at that station had had a similar experience with that lever.

The despatcher justifies himself in having allowed the second section to follow the first, before the first had arrived at Appleton, because second No. 18 had an order to meet No. 17 at Correll, and he felt absolutely sure that the road was clear as far as Correll. The order which he sent to Odessa, as the operator came into the office, was one changing the meeting point of the first section of No. 18 from Appleton to Correll.

The operator at Junction Switch, being questioned why he gave a permissive card when he knew the block section was not clear, said that the same thing had been done before, and, especially, he had known of its being done at Milbank. Asked why he thus disobeyed a proper rule, he said: "We have to take the chance; if the despatcher tells us to clear trains and if you do not do so, you are liable to get discharged." He had no copy of the clearance which he gave to the second section, although the rules require copies to be kept on file. He said that no officer of the road had ever inquired as to whether copies were properly filed.

The signal foreman, who has charge of signals on 983 miles of road, testified as to the signal lever at Odessa, which was equipped with a spring lock. It appears that this lock was faulty to the extent that the signal could be moved by a person outside the building.

All the employees involved were experienced except the operator at Appleton, who had worked for the road three months, and the flagman, who had worked 18 months. The operator, however, had had several years' experience elsewhere.

As has been already reported, the inspector places the blame for the collision primarily on the failure of the flagman to protect his train, and the faults of the others are called contributing causes. Attention is called to the special danger of reporting a block clear because a train is nearly out of it; that train might break down at any point, or even may have left a part of its train at some point back out of sight. At an investigation on another division of this road a few weeks before, the commission found facts confirming those found here, sustaining the opinion that the rules of the company are not properly understood nor properly enforced. "Steps should be taken at once to see that the employees have a working knowledge of the rules and that they obey them."

The report devotes two pages to a description of the steel cars, and this description is supplemented by five photographic illustrations.

The tunnel up the Jungfrau mountain, Switzerland, has been holed through to the Jungfraujoch. The Jungfraujoch station lies in a depression filled up by glaciers between the Jungfrau and Monch mountains, 11,410 ft. above the sea and 4,620 ft. above the Little Scheidegg, the starting point of the railway. It is expected that the railway will be completed as far as the Jungfraujoch station this summer.

The railway from Adana, Arabia, to Bagdad is now under construction. Rails are being laid from Aleppo in both directions toward Adana and toward Halif. It is expected that by the autumn, from 60 to 90 miles will be open to traffic. The section from Halif to Bagdad is about 300 miles long, and is divided into six sub-sections, on which six groups of engineers are now at work preparing plans. These plans are not expected to be completed for three or four months, but as soon as they are completed work will be begun simultaneously at Halif and Bagdad. It is not expected that the entire line will be completed for at least four years.

STUDY OF A BROKEN RAIL ON THE NEW HAVEN.

On February 11, the Federal express, eastbound, on the New York, New Haven & Hartford while running at high speed was derailed by a broken rail, 1,875 ft. east of Leet's Island station, Conn., on a tangent. The train was made up of an engine, baggage car, one day coach and four Pullmans. The last two cars left the track and the train ran about 1,325 ft before stopping. The train did not break apart and no one was injured. The cars worked over towards the westbound track until the north rail of the eastbound track acted as a guard rail and held them. The condition of the track at the point of the break was good, the ground being frozen solid and the track in good surface and alinement. The rail was solid on the ties and the ties were sound.

An examination of the rail has been made under the direction

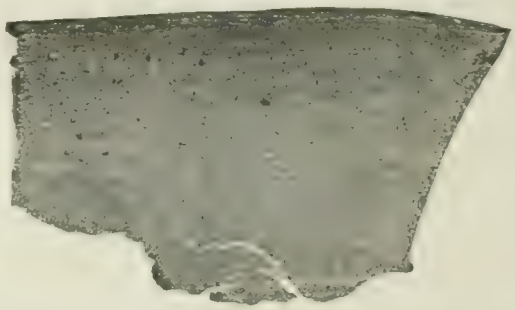


Surface of the "Original" Fracture.

of Vice-President McHenry, to whom we are indebted for the information on which the following description was based:

The first break in the rail occurred 9 ft. 8 in. from the receiving end, and the next 11 ft. was broken into 55 pieces, the longest one being at the farther end, which was 9 ft. long. The rail weighed 100 lbs. to the yard; it was rolled by the Lackawanna Iron & Steel Company at its southwest mill at Scranton, Pa., in October, 1898, and was laid in the summer of 1899, having thus been in use for 12 years. At the first point of fracture of the rail, the "original" break, there was a smooth black spot on the crack across the rail; and in this case it had a polished surface, indicating that it had been worn smooth by the movement of the two faces over each other prior to the complete breakage. The surfaces thus presented had all of the indications of a fracture by detail, and they were in such condition that the point of starting could be very definitely located—almost in the center of the head, vertically over the edge of the web on the gage side of the rail. Before the final rupture occurred, however, this crack had worked out toward both sides and toward the top until there was but about 1/16 in. of unbroken metal on the crown, about 1/32 in. at the gage side, and ⅛ in. on the outside of the rail. There was not the slightest indication of piping or flaw in the metal, and the finished surface of a piece cut off was smooth and apparently homogeneous. (Subsequent etching brought out features which will be mentioned later.)

The ends of two other pieces showed identically the same

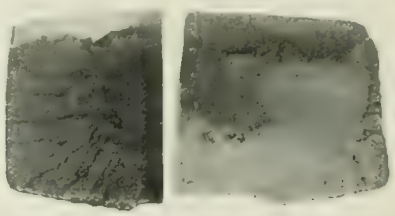


Longitudinal Section of Rail at the "Fresh" Break.

Cracks at bottom formed as rail broke, not present usly.

character of fracture except that the surfaces were not black. They were not worn smooth, and they showed no indication of a fracture by detail, but every evidence of having been freshly broken throughout and were as clean and glittering as any such break would be. Evidently there was the same condition of metal as that existing at the point of first fracture where a prior crack had existed, but the metal had not separated.

It was found that the whole interior of the rail was of a different structure, or at least was possessed of characteristics different from the shell in which it was enclosed. A polished section of the rail, given a rather vigorous etching treatment, showed that this interior was far more soluble and liable to attack than the outside; that this structure occupied a goodly portion of the head, almost all of the web, and the upper part of the flange; and that the greatest susceptibility to attack was to be found at that point in the head where the detail fracture which caused the wreck, started. After etching, this metal appeared porous, while the outer parts were fine and close grained with a rather distinct line of demarkation between the two; this peculiar construction appears in white in the engraving herewith.



"Fresh" Break.

The left-hand portion is darker, owing to the action of the acid in etching this piece, a side view of which is shown in another photograph.



Fragments of Broken Rail.

[illegible] direction in which train was moving. Shape of "fresh" break. Position of ties indicated below rail.

A longitudinal section of the head of the rail brought out

the variation in the structure between the crown and body of the head even more effectively. Here was found a third structure. It was evidently the cold rolling to which the fracture of the Lehigh Valley rail was attributed by James E. Howard. The metal in the body of the head was readily attacked by acid and appeared quite similar to that shown in the cross section, while the shell or top surface was rolled out and had all the appearance of fibrousness found in Swedish iron. The line of separation between the two structures was startlingly distinct. There was almost no tapering off and gradual merging into the granular structure beneath, but quite an abrupt termination at a depth of about ⅛ in. As to the adhesion existing between these two parts, no determinations were made. The distance to which this structure persisted was not determined, though it is known to extend back for at least 2 in. from the point of fracture. Some of the fractures seemed to show, though not positively, that it does not extend throughout the whole length of the rail. It is local, but not minutely so.

The above may be called the variations in the structure of the rail. As to physical properties, it is unfortunate that the lines of demarkation of the structure were not more carefully re-



Etched Section of Rail Near Original Break.

garded in drilling test pieces. As it is, while they show remarkable variations, it is difficult to reach any conclusion from the results. Six pieces were cut from the rail. The yield point was quite uniform in all, but the ultimate strength varied from 86,330 to 134,630 lbs. per sq. in. As only two of the pieces were cut from homogeneous structure, the results are confusing and indecisive.

The chemical analyses are almost as useless. The only point is, that if we take the three points, 1, 7 and 8, which were taken from the fine-grained shell, and compare them with 4 and 5, which are the only ones that are definitely known to have been taken from the interior body, we have, for the phosphorous content:

1	.063 per cent.	4	.028 per cent.
7	.061 per cent.	5	.035 per cent.
8	.063 per cent.		
Average..	.0623 per cent.	Average..	.0315 per cent.

The analysis of the rail at the original break was:

Carbon	.57 per cent.	Manganese	.71 per cent.
Phosphorus..	.067 per cent.	Silicon	.14 per cent.
Sulphur	.113 per cent.		

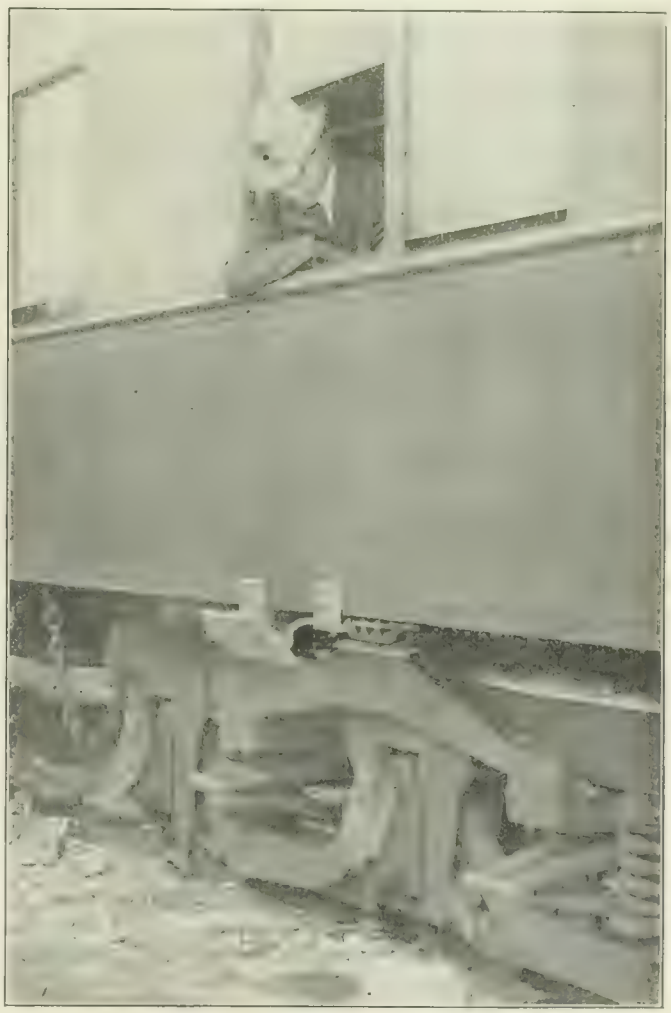
Phosphorous adds to the strength of low carbon steel and diminishes its ductility. And here we have the break originating in the low phosphorous portion of the section while the high phosphorous held, and it is difficult to see how its absence or presence can account for all the vagaries shown by the rail.

Summed up, the facts are: The structure of the interior of the rail was in places quite different from the outside. This structure seems to have some sort of a relationship with the peculiar fracture of this particular rail, but this is not definitely proven. The longitudinal extent of this structure is unknown, but it appears to be scattered through the rail. And, finally, a fracture closely resembling the initial one may occur in the solid metal as the result of a blow.

No one would claim that this interior structure could be caused by cold rolling, because its area is too great. For certainly cold rolling on the crown of the head could hardly produce such a change in the web and flange. It is, therefore, driven home that it must have existed in the rail at the time of its delivery from the mill. As for the exact character of the structure of the metal, data is not at hand because the photomicrographs available are not definitely located, nor are they sufficiently numerous to show the progressive development of the structure from one portion to another.

INSPECTING SIDE BEARING MOTION.

There is considerable uncertainty in regard to the action of several important details when a car truck is in motion, and careful observations of this action would be of material assistance to those who are endeavoring to improve these details. The movement of side bearings is a subject which is constantly



Mirror for Inspecting Side Bearing Motion.

under discussion, but on account of the difficulty of inspecting them when the car is traveling in regular service, very little is known as to their actual performance. The illustration shows a mirror arrangement which was devised by Edwin S. Wood & Company, Chicago, for observing the action of side bearings from the car window. The mirror is secured to the lower edge of the car opposite the side bearing, and the angle is such that the image is reflected vertically and the motion of the truck with respect to the car body can be clearly seen. Various modifications of the same principle can be used for the purpose of observing the motion of the journal boxes, springs and equalizers, etc.

It is claimed by many that the friction of the center plate and side bearing is sufficient to hold the truck out of square after it has left a curve and entered a tangent. By a simple arrangement of the mirror this action could be readily inspected and some useful information could be derived from such a study. Here is a field for investigation which has not been properly cultivated, and with the assistance of the mirror it ought to be possible to obtain a number of valuable facts relating to truck motion and the action of truck details when moving rapidly, which should lead to important improvements.

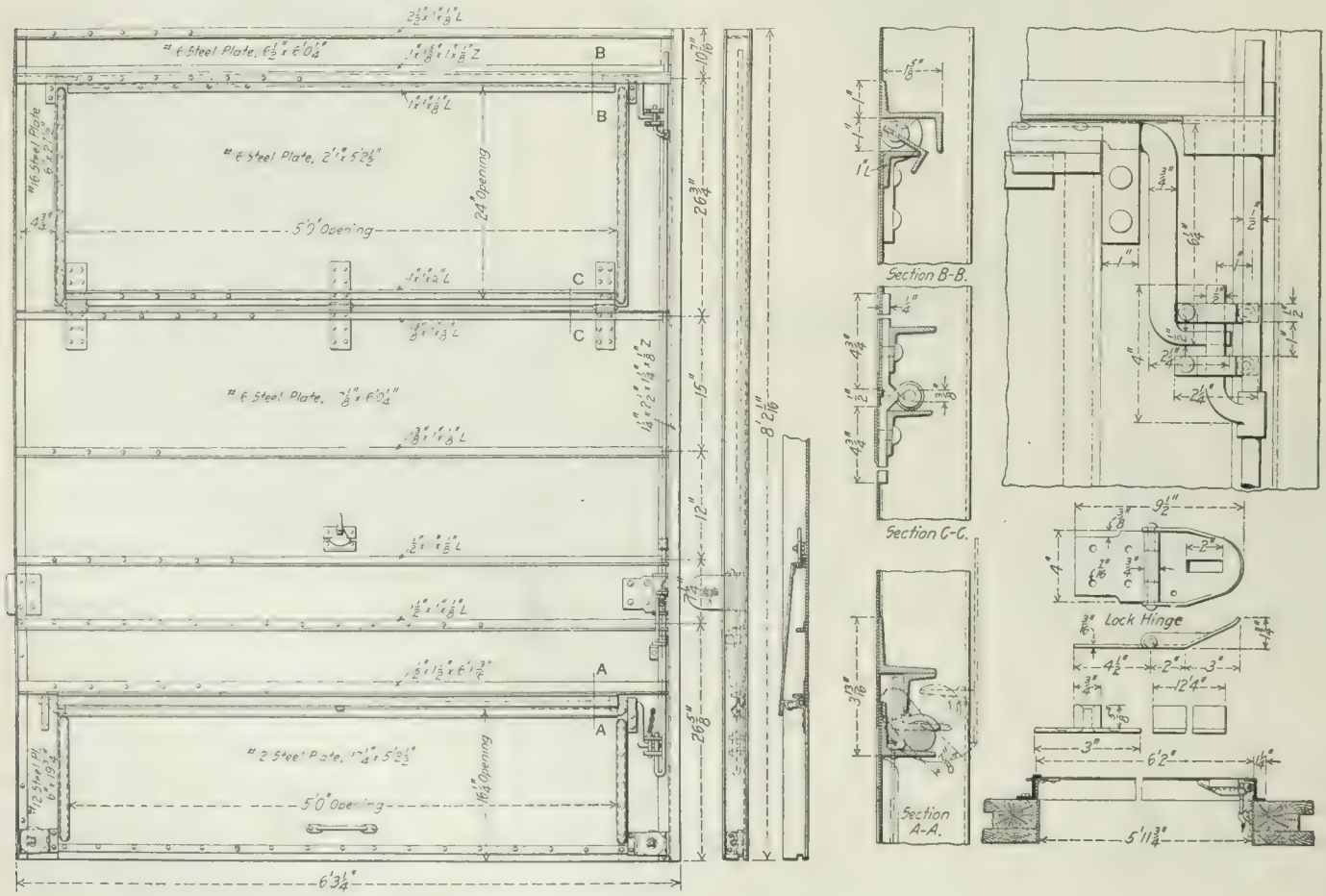
CHRISTY STEEL BOX CAR DOOR.

The Christy box car door, illustrated herewith, is a combined side door and grain door, is made entirely of steel and is fixed permanently to the car. The fixed grain doors which were formerly used were so expensive to maintain that they were gradually abandoned and temporary doors substituted. Temporary doors are stolen and destroyed in such large numbers that the expense for them has also become a large item in the freight car repair account. The ordinary side door, when made of wood and with ordinary fixtures, has many defects; it frequently gets out of order and also causes a large expense for maintenance.

For these reasons, the permanent improved steel door here illustrated will be regarded with unusual interest. It has been used in regular service on the Rock Island for nearly two years. Sample doors have also been used experimentally on the Chicago & North Western and the Lake Shore & Michigan Southern, and fifty cars now building at Pullman for the Michigan Central will be equipped with it.

The door slides on the inside of the car and thus avoids the danger to passenger trains which sometimes occurs when the outside doors hang loose. It is well protected and is not liable to be injured by outside forces. The fixtures are so substantial and well arranged that they do not permit of pilfering, and the door is so tight that there is no loss from leakage of grain or damage from driving rain. It also has advantages in loading and unloading. A full car of grain can be completely unloaded and swept out in 28 minutes from the time the car is delivered at the elevator, while it often takes this long to open the doors and get the shovels ready for unloading a car with the usual type of side door and temporary grain doors.

The main door is made of No. 16 steel plate reinforced by angle irons of different sections and weights, as indicated on the drawing. In order to render the door satisfactory for the shipping of grain, coal or similar freight, it has two separate doors or ports, 60 in. wide, provided with simple and secure fastenings, permitting their easy and rapid operation. The upper door is 24 in. high and is hinged at its lower margin 5 in. above the grain line, and is large enough to admit the spouts used in loading grain and coal. The lower door, 16¼ in. wide, is hinged at its upper border and when opened permits the free discharge through it of all such freight as grain, coal, etc., without opening the main door. This lower door is likewise planned with special reference to the use of such power scoops or scrapers as are in general use at elevators and elsewhere for unloading grain, coal



Details of Christy Steel Box Car Door.



Outside View of Christy Door Closed.

and similar substances from cars. When the smaller doors or ports are closed and fastened the main door, of course, acts as a rigid whole.

For freight which has to be passed through the main doorway, guards are provided to prevent packages from getting behind the door and thus preventing it from being opened. When the door is closed it completes the side wall of the car, making that part as strong as the other side walls, and all kinds of freight may be loaded against it, thus making available the entire cubic space of the car. The box car side doors now in use will not sustain very much pressure from within; therefore, no freight of any kind can be loaded against them.



Interior View of Car Showing Christy Door Closed.

The photographic illustrations show the construction of the doors clearly. The upper one operates on plain strap hinges which extend out sufficiently to make the door clear the adjacent angle irons. The sides are made tight by lapping over the half round molding which stiffens the side of the main door, and the top is made tight by the use of hinged angle irons, which are shown in section at *B-B*.

The lower door is hinged on a long ⅞ in. round bar, which is offset so as to work like an eccentric and throw the door out and make it clear the adjacent angle irons. The section at *A-A* shows the angle iron on the top of the lower door underlapping an adjacent angle, which is secured to the stiffener of the main door. In this way the top of the main door is made proof against the weather. The whole door rolls on a floor track made of ¾ in. square iron, and passes into the car where it is held in a pocket protected by six angle irons.

One of the illustrations shows the interior of the car with the door closed. When the door is closed both top and bottom auxiliary doors are fastened and sealed by a vertical rod which extends between the two doors and passes into sockets at the top and bottom of the door frame. A detail of this fixture is shown on the drawing. The other attachments which are connected with the sealing of the car are now being developed and can be better understood by an examination of the door with its fixtures in operation. This improved steel door, which combines the side door with the grain door in permanent form, was invented by H. A. Christy, 1447 Marquette building, Chicago.

The report on a scheme for building an electric railway from Hobart, Tasmania, to Franklin, about 35 miles, recommends the construction of the line from Hobart to Franklin via Kingston, Sandfly and Huonville. It is also recommended that the line be electrically operated on the single phase system by means of an overhead trolley wire. The cost of the construction would be $1,135,000, exclusive of the cost of land. It is estimated that the gross earnings for the first year of operation would be $106,800, that the operating expenses would be $58,715, and that the net earnings would be $48,085.

Application has been made by the Railway Branches Association to the Russian minister of finance for permission to build 12 branch lines to connect with the state railways. These branches are as follows: The Kryloff line, from Novogeorgievski to Burta, on the Southwestern line, about 16 miles; the Taraschtchanska, from Traschtcha to the Rokoton branch of the Southwestern railway, with an additional branch to the town of Stavaischtche, on the same line, about 39 miles; the Rzhischtchevska, from Rzhischtchef, on the Dniepre river, to Mironovka, on the Southwestern railway, about 27 miles long; the Voguslavska, from Voguslava to the Karapuyscha branch of the Southwestern railway, about 22 miles long; the Tchigirinsky, from Tchigirina to Phundukleevka, on the Southwestern railway, about 22 miles long; the Starobielska, from Starobielska to Rubezhnoe, on the Ekaterininsk railway, about 33 miles long; the Tchembarska, from Tchembara to Baschmakoff, on the Sys-Nyaz railway, about 28 miles; the Bolchovsky, from Bolchoff to Pesotchnaya, on the Moscow-Kieff-Voronezh railway, about 28 miles; the Achtyrka-Gadyatch, from Achtyrka, on the Southern line, to Gadyatch, about 45 miles long; the Nizhnelomovska, from Nizhnelomovska to Vuiglyadovka, and the Cyzrano-Vyazemsky railway, about 18 miles long; the Kurachovska, from Kurachovska to Gravovka, on the Ekaterininsk railway, about 28 miles; the Slobodskaya, from Slobodskaya to the Zagorye siding of the Perm-Kotlass railway, about 25 miles. The total cost of building these special lines is estimated at $13,000,000.

General News Section.

The University of Illinois announces that contracts will be let shortly for the new transportation building and the new locomotive testing laboratory.

The telegraph operators employed in the Cleveland, Cincinnati, Chicago & St Louis have presented a demand for an increase of wages amounting to approximately 14 per cent., in addition to certain changes in the working rules.

The St. Louis & San Francisco has installed a gasolene motor car service on its Salem branch between Cuba, Mo., and Salem. Similar service is to be established soon on the Chadwick branch between Springfield, Mo., and Chadwick, and also between Enid, Okla., and Clinton.

Francis S. Foote, Jr., an instructor in the school of railway engineering and administration at the University of Illinois, has been appointed associate professor of railway engineering in the department of civil engineering of the University of California, the appointment to take effect July 1 next.

Theodore N. Vail, president of the Western Union Telegraph Company, is quoted as saying that the night letters, in their first month, brought in $11,000; in the second month, a great deal more, and in the first year over $1,000,000. The reporter adds that more than half of these telegraphic letters are sent by men away from home who have promised to write home every day, but in the rush of business have neglected to do so.

Tuesday, April 30, was California Raisin Day, and the committee in charge of the campaign to advertise the California raisin feels that it has met with marked success. Nearly every railway in the country served raisins in its dining cars, and hotels throughout the United States offered on that day some dish of which raisins were an ingredient. California Raisin Day had its inception in the spring of 1909, when the railways of the West inaugurated a campaign to make California raisins famous the world over.

Philip T. Dodge, president of the American Museum of Safty, 29 West 39th street, New York City, has resigned that office, on account of ill health, and has been succeeded by Arthur Williams, chairman of the Committee on Plan and Scope. The museum has received a gift of $5,000 from the United States Steel Corporation to aid in collecting the best devices for saving life at sea and to make a permanent exhibit of such devices. Another gift of $5,000 has been received for research in connection with industrial poisons.

The Baltimore & Ohio will construct a modern timber-treating plant on its line at Green Spring for the preservation of ties and other lumber used in railway construction. The plant, which, including the storage yards for seasoning timber, will cover 60 acres, will be close to large areas of timber land along the South Branch valley of the Potomac river. The timber-treating plant will include two treating cylinders with a maximum capacity of 1,000,000 ties a year. The B. & O. requires approximately 2,500,000 ties a year for renewals.

Elaborate plans are being made for the special trains to carry members of the National Electric Light Association to the thirty-fifth annual convention at Seattle, Wash., June 10-14. Two trains, to be called the Orange and Green specials, will leave Chicago by the Santa Fe and the Soo Line. Each will be decorated with thousands of colored electric lights; and the color scheme will be carried out on tickets and in other ways. There will also be a Blue special from New York and a Purple special from St. Louis. Many unusual electrical appliances will be part of the train equipment.

The agreement which the Grand Trunk has made with its enginemen concerning wages provides for the following rates: Eastern states: Passenger, $3.90 per 100 miles; freight, $4.35; heavy freight, $4.60; local freight, $4.65. In Canada: Passenger, $3.85; freight, $4.20; heavy freight, $4.45; local freight, $4.50. West of St. Clair: Passenger, $4.05; freight, $4.45; heavy freight, $4.60; local freight, $4.70. Switching, throughout the entire system, 40c. an hour; branch line enginemen will receive a monthly salary of $125 to $145, according to class of service. The company and the enginemen had agreed that if satisfactory schedules could not be settled upon, the question was to have been submitted to arbitration; and also that the situation on the Grand Trunk should not be affected by any possible strike of enginemen on the railways in the United States.

The Chicago Association of Commerce Committee on Smoke Abatement and Eiectrification of Railway Terminals has 20 observers at work recording observations of 1,000 smoke stacks typical of the various plants consuming coal in Chicago. Observations at intervals of one minute for periods of a complete day will be taken by the observers who will record the classification of smoke as to density according to the Ringelmann chart and the exact percentage of density will be determined for each stack. Later a similar investigation is to be made of the locomotive smoke on each railway line of the city.

The Steel Corporation's First Quarter.

The report of the United States Steel Corporation for the quarter ended March 31 shows that the total net earnings were $17,826,973, after deducting all expenses incident to operation, including those for ordinary repairs and maintenance of plants, and interest on bonds and fixed charges of subsidiary companies. This was a surprise, as it had been estimated that the net earnings would be at least $19,500,000. These earnings compare with $23,519,203 for the corresponding quarter of 1911; $37,616,876 in 1910, and $22,921,268 in 1909. The corporation charged off $4,148,444 for depreciation and sinking funds on bonds of subsidiary companies, compared with $3,517,386 for the corresponding quarter of 1911. This increase was necessitated by the large increase in production in the first quarter of 1912. The balance after dividends on the preferred stock was $61,647. To meet the dividends on the common stock, $6,292,134 had to be taken from the surplus. During the quarter only 0.012 per cent. on the common stock was earned. These small earnings were made on a production of steel never before equaled in any quarter. Deliveries of finished steel aggregated about 2,800,000 tons, which would indicate that the average profit per ton was not much above $6.30, comparing with a ten-year average of about $14. The net earnings in January, 1912, were $5,243,406; in February, $5,427,320; and in March, $7,156,247.

Wages and Earnings on the Pennsylvania.

While the strike vote was being taken by the eastern enginemen, the Pennsylvania distributed among employees in train service on its Lines East a statement as to wages and earnings from which the following is extracted:

In 1890 for every dollar earned, the Pennsylvania Railroad paid to its employees 44.8 cents; in 1911, 51.7 cents. In 1890 the average annual earnings were $570.37; in 1911, $800.29. The employees, therefore, today are receiving 39 per cent. more than in 1890, and 15.4 per cent. more on every dollar earned than in 1890. In 1911 the enginemen received 16 per cent. more on every dollar of gross earnings than they did in 1890. The average annual earnings of all P. R. R. enginemen in 1890 were $1,114.71; in 1911, $1,546.34, an increase of 39 per cent. In addition to this, many of these enginemen earned wages as firemen. In 1890 the same enginemen on full time basis earned $1,130.54, while on the same basis in 1911 the average was $1,741.42, an increase of 54 per cent. Excluding the Pennsylvania Railroad, the increase asked for by the enginemen amounts to 20.2 per cent. for all lines interested, whereas its effect on the P. R. R. alone would be 11.8 per cent. increase, evidencing the fact that its own enginemen are now receiving nearly 8.5 per cent. more than the average wage paid enginemen on the other roads interested.

The Pennsylvania Railroad stockholder in 1890 received a dividend of 5.5 per cent. on the face value of his stock; in 1911 he received 6 per cent.; therefore, the stockholder who bought his stock in 1890 at the average market price of $51.50 per share and continued to own his stock and allotments in addition to cash dividends would have received on his investment an average yearly return for the period 1890 to 1911 of 5.4 per cent., or practically no increase. It is apparent, therefore, that the stockholders have not profited with employees in the growth of the company. In the 1908 depression they sustained a reduction of over 14 per cent. in their dividends, while the wages of employees, then at the highest figure, remained unchanged, and in 1910 were further increased. Out of every dollar received by the

company in 1890, 68.5 cents had to be spent for operation; in 1911, 78 cents. This increase in the cost of operation was due to advance in wages, increased taxation, increased cost of material and necessary items in operation and to meet legislative and public demands. Based on the 1911 operations of the company, if the 11.8 per cent. increase asked for by the P. R. R. enginemen were granted to all employees, it would entirely wipe out the surplus, necessitating the curtailing of improvements and reducing the dividends paid stockholders, and leaving the company no margin of surplus to protect its financial credit.

Enginemen's Pay in England and America.

In view of Grand Chief Stone's claim that an engineman's pay is not commensurate with the responsibility he has to bear, the conference committee of managers last week called attention to a report made by Special Agent Ames of the Interstate Commerce Commission on the average wages paid railway employees in England.

	England. Per hour of twelve hours.	United States. Per hour of ten hours.
Enginemen	$1.88	$4.80
Firemen	.76	1.85
Conductors	1.21	4.11
Brakemen	.75	2.81
Switchmen	.94	2.80
Trackmen	.94	1.32

On the railways of Belgium, which are owned by the government, firemen receive $15.20 to $22.80 per month, the higher wage only after 15 years' service. Enginemen begin at $22.50 per month, and at the end of 24 years' service work up to $38 a month. Conductors earn from $17.97 per month up to a maximum of $34.70. Brakemen begin as switchmen at 45 cents per day. When promoted they receive $17.10 per month and work up to $22 per month. The average railway worker in Belgium receives 43 cents a day.

Arbitration of Eastern Enginemen's Demands.

The eastern railway managers and the enginemen have agreed to submit to arbitration all the demands made by the enginemen last January. The board will consist of one representative of the railways, one representative of the enginemen and five to be selected by these two. In case they fail to agree on all or any of such other members within 15 days after their first meeting, such other members, or so many of them as have not been agreed on, shall be appointed by the chief justice of the United States Supreme Court, the presiding judge of the Commerce Court and the United States commissioner of labor, acting together. The award of a majority of the members of the board is to be binding for one year from its effective date, and thereafter subject to the usual 30 days' notice. The board is to fix the date when its award becomes effective, and may make it retroactive.

P. H. Morrissey, president of the American Railroad Employees' and Investors' Association, and formerly head of the Brotherhood of Railroad Trainmen, has been chosen by the enginemen as their representative on the board. The railways have not yet made known their choice.

The agreement to arbitrate under the above conditions was reached after a week of mediation on the part of Judge Knapp and Commissioner of Labor Neill. On April 29, the day before the arbitration agreement was reached, the railways made public the fact that they had proposed that the Interstate Commerce Commission act as a board of arbitration, but that both the enginemen and the commission had refused to accept the proposition. The managers then suggested the plan of arbitration finally agreed on. In making their public statement, the managers said, in part: "The suspension of railway operation in this large territory involves such disastrous consequences that the power to bring about such a state of affairs should not be exercised by any corporation or organization, nor should the possession of such power be used to bring about a calamity of this character. . . .

"Under the law, the Interstate Commerce Commission is made the arbitrator between the shippers and the railways in all cases where differences arise. The commission thus controls the railways' revenues through the rate making power and largely controls their expenditures through the administration of the safety appliance acts and other railway legislation. Under these conditions, the destinies of the railways are absolutely in the hands of the commission, while the responsibility for safe and efficient results still rests with the managements of the roads, and it is certainly not unreasonable that this tribunal should settle a controversy which involves the question of whether or not the public in this great territory shall for a time be deprived altogether of railway facilities.

"The committee of managers, therefore, recommended to the mediators that the Interstate Commerce Commission be requested to act as arbitrator of the engineers' demands, and to consider all facts as regards the ability or otherwise of the railways to pay more wages to their employees, and also to provide facilities and safety appliances alleged to be necessary to meet the demands of the public."

New York Subways.

The New York State Public Service Commission has directed the Bradley Contracting Company to discontinue work on the new subway in Lexington avenue, Manhattan, between Twenty-seventh and Forty-first streets, on which section over $100,000 has already been spent. One of the commissioners voted against the issuance of this order. The action of the commission is understood to mean that the proposed new contracts, by which some of the subways in Manhattan will be operated by the Interborough Rapid Transit Company and others by the Brooklyn Rapid Transit Company, will soon be let, and that possibly the section in Lexington avenue south of Forty-first street will not be used.

Safety First on the Union Pacific.

The Educational Bureau of the Union Pacific has issued a new instruction pamphlet, entitled "Safety First," containing several pages of "dont's" for employees of the operating department, the observance of which would greatly reduce the number of accidents. Preceding the list of "dont's" are several paragraphs devoted to observation of rules; the company expects employees to live up to the rules absolutely, and in all cases of doubt or uncertainty the safe course must be taken and no risks run. Some of the paragraphs are as follows:

"It is a common saying among railway men that if one lived up to the book of rules to the letter, he would never get over the road. This is true only in a degree, because the man who seems slow often accomplishes more, and as a rule works longer without causing accidents or injuries and does less damage to property than the man who is always in a hurry and never does things exactly right.

"The company *does* want its rules lived up to. If there are rules that are found impracticable they can be changed and modified by a bulletin or special order, thus safeguarding all and hindering no one.

"The man who takes chances may be praised by a thoughtless official as long as he doesn't get into trouble, but the man who praised him while he kept out of trouble is the same man who will quickest discharge him when he takes the one chance too many or takes it too often."

Employees are asked to make suggestions for additional "dont's" or for photographs or moving pictures that could be taken to illustrate the right and wrong way of doing things, or to show more clearly what things not to do to avoid accidents.

Mattie Smithers, Agt.

A "station agent in a new role" was noticed in these columns recently. Still another variation in the monotony of the country station is now reported, this time from northwestern Missouri, not far from where the obscure agent, Thomas J. Potter, some 40 years ago, made himself general manager by settling some live stock claims (at a great saving) without waiting for authority from headquarters. The present story is from *The Maize*, the Chicago Great Western employees' magazine. We quote:

"New Market is a quiet little village in Platte county on the Chicago Great Western. Miss Mattie Smithers is nominally known as station agent at New Market, but to her mind the activities of a little community of 200 people are not sufficient to keep an aggressive station agent fully occupied. The country surrounding New Market is a tobacco-growing section, and there is yearly considerable rivalry in connection with the disposition of the crop. The market headquarters have from time immemorial been located at a neighboring town on another road. With womanly instinct for getting the better of a rival, and with the business forethought of doing a good turn for the company she represents, the young lady asked for a few days'

leave of absence and quietly slipped away to Mayville, Ky., whence annually come the tobacco buyers to the Missouri district, and by her winning ways and pleasant smiles induced the buyers to make New Market the trading center, and while the rival townsmen were making usual arrangements for the influx of buyers and the railway people were looking after the car supply, Miss Smithers was busily notifying the planters that New Market was still on the map and would henceforth be the "new market" for the Platte county planters. The result was that in all the history of New Market there never was such a lively time as during tobacco week, with Mattie Smithers the chief hostess and the Great Western the principal beneficiary in the way of increased freight earnings.

"She literally smashed the rival town to 'Smither(s)eens.'"

Reduction in Accidents on the Illinois Central.

A reduction of 29 per cent. in the number of accidents during 1911 as compared with the year 1910 is reported by the Illinois Central. In 1911 there were 269 accidents on the road as compared with 380 in 1910; 179 persons were injured as compared with 256 in 1910; the number of killed was 16 as compared with 22 in 1910, and the value of property damaged was $237,150, as compared with $366,052 in 1910. This showing is made in the face of an increase of 337,858 in the number of passengers carried, which was 31,042,301 in 1911, as compared with 30,704,443 in 1910. During the month of February, 1912, 359 surprise tests were made on the system in which the signal test warnings were obeyed in 344 cases, or 96 per cent.

Effects of the Mississippi River Floods.

As an illustration of the effects of the recent floods of the Mississippi river on railway operation in the South, there were on Monday, April 29, 3,000 square miles of submerged territory in Mississippi in the districts traversed by the Yazoo & Mississippi Valley, which made it necessary to suspend service on 351 miles of branch lines. The sections affected were principally on the three lines running north from Vicksburg to Rosedale, Cleveland and Sunflower, Miss., where the water was from 20 in. to 7 ft. in depth. There was no interference with traffic on the line between Jackson, Miss., and Memphis, Tenn., via Greenwood on the Yazoo & Mississippi Valley; nor at any point on the Illinois Central. The tracks were flooded by the break in the levee at Hughes, Miss., about 25 miles north of Greenville, Miss., on the night of April 17. The interruption to traffic on the Illinois Central, caused by the break in the levee, at Cairo, Ill., during the first days of the flood, when two miles of double track line between Cairo Junction and Mounds, Ill., were covered with water, has been completely removed, and service was restored on April 13.

Duplex and Quadruplex Telegraphy.

A certain railway abandoned its quadruplex system of telegraphy because too much trouble was experienced in maintaining the equipment and wires in full quadruplex condition. The common side of a quadruplex is what you make and maintain it; that is, if the line wire is within the limits of good quadruplexing distance, then the question is one of upkeep, and the returns in added service surely justify first-class maintenance and attendance. If the line wire is so long as to make "fair weather" service only, then "you cannot get something for nothing." A quadruplex properly installed and working on a wire well within the limits does not require a great amount of attention, but what attention it does need and receive must be from a skilled attendant. In general it is more satisfactory to relay business for local points on any division at the main telegraph office on that division than to attempt a general direct service between all stations. The through wires are decreased in resistance by the cutting out of office equipment at way offices, which are rarely able to get the circuit long enough to raise an office.—*J. A. Kick*, in the *Telephone Engineer*.

American Society of Mechanical Engineers.

The spring meeting of the American Society of Mechanical Engineers will be held May 28-31 at Cleveland, Ohio. A tentative program of the papers, subject to change, includes papers on: A New Analysis of Cylinder Performance of Reciprocating Engines, by J. Paul Clayton; Sound Waves: How to Photograph Them and What They Mean, by Dr. Dayton C. Miller, of the Case School of Applied Science (this lecture will be illustrated with apparatus and experiments, and especially with the phonodeik, a new instrument for projecting sound waves directly upon the screen); New Processes for Chilling Cast Iron, by Thomas D. West; Strength of Steel Tubes, Pipes and Cylinders Under Internal Fluid Pressure," by Reid T. Stewart; On the Control of Surges in Water Conduits, by W. F. Durand; Speed Regulation in Hydroelectric Plants, by W. F. Uhl (to be read by title only; discussion is invited); The Present State of Development of Large Steam Turbines, by A. G. Christie; A Discussion of Certain Thermal Properties of Steam, by G. A. Goodenough; The Reduction in Temperature of Condensing Water Reservoirs Due to Cooling Effect of Air and Evaporation, by W. B. Ruggles; Results of Tests on the Discharge Capacity of Safety Valves, by E. F. Miller and A. B. Carhart (to be read by title only; discussion is invited).

American Railway Association.

The spring session of The American Railway Association will be held at the United Engineering Society building, New York, on May 15. Reports will be presented by the following committees: Executive committee; committee on transportation; committee on maintenance; committee on relations between railways; committee on the safe transportation of explosives and other dangerous articles; committee on electrical working, and committee on nominations. The election of a president and a first vice-president will take place at this meeting. Two members of the executive committee, three members of the committee on transportation, three members of the committee on maintenance, three members of the committee on relations between railways, and three members of the committee on nominations are also to be elected.

M. M. & M. C. B. Convention.

There are several vacancies on the M. M. & M. C. B. convention enrollment committee. The work done by this committee is most important to both railway men and supply men, and the chairman of it should have the full support of those who can help him do the work successfully. Names suggested for places on this committee should be sent to the chairman, O. F. Ostby, 80 Broadway, New York City, as soon as possible.

Central Railway Club.

At the next regular meeting of the Central Railway Club, to be held at the Statler hotel, Buffalo, N. Y., May 10, Frank Wyatt Prentice, of Toronto, Ont., will present an illustrated paper on Wireless Train Control.

Traveling Engineers' Association.

The annual meeting of the Traveling Engineers' Association will be held at the Sherman hotel, Chicago, August 27-30.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of regular meetings and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.; annual, May 7-9, Richmond, Va.

American Association of Demurrage Officers.—A. G. Thomaston, Boston, Mass., annual, May 10-11, San Francisco, Cal.

American Association of General Passenger and Ticket Agents.—W. C. Hope, New York; next convention, September 12, Seattle, Wash.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Detroit, Mich.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York. Convention, October 7-11, Chicago.

American Electrical Railway Manufacturers Assoc.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

American Railway Association.—W. F. Allen, 75 Church St., New York. Next session, May 15, New York.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago.

American Railway Master Mechanics' Assoc.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

American Railway Tool Foremen's Association.—M. H. Bray, N. Y. N. H. & H., New Haven, Conn. Convention, July 9, Chicago.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Calvin W. Rice, 29 W. 39th St., New York; spring meeting, May 28-31, Cleveland, Ohio.
AMERICAN WOOD PRESERVERS' ASSOCIATION. F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.
ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.
ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 21-23, 1912, Los Angeles, Cal.
ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago. Semi-annual, June 11, Atlantic City, N. J.; annual, October 21-25, Chicago.
ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.
ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conrad, 75 Church St., New York. Convention, Oct. 7-11, Chicago.
CANADIAN RAILWAY CLUB. James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.
CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.
CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.
CENTRAL RAILWAY CLUB. H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.
CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.
ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.
ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.
FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.
GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.
INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.
INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago. Convention, May 22-25, Chicago.
INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.
INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.
MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.
MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.
MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOC. OF U. S. AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Convention, September 10-13, Denver, Col.
NATIONAL RAILWAY APPLIANCES ASSOC.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.
NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.
NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.
NORTHERN RAILROAD CLUB.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.
OMAHA RAILWAY CLUB.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.
PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.
RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.
RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 2 Rector St., New York.
RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.
RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOC.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.
RAILWAY GARDENING ASSOCIATION.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13 16, Roanoke, Va.
RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L., S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.
RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa.
RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio. Convention, May 20-22, Buffalo, N. Y.
RAILWAY SUPPLY MANUFACTURERS' ASSOC.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.
RAILWAY TEL. & TEL. APPLIANCE ASSOC.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.
RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.
ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill. September 10-13, Buffalo, N. Y.
ST. LOUIS RAILWAY CLUB.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.
SIGNAL APPLIANCE ASSOCIATION. F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.
SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Niquist, La Salle St. Station, Chicago.
SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.
SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.
TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.
TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.
TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.
TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.
TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.
TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.
TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.
TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; annual, Aug. 27-30, Chicago.
WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.
WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.
WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The United States House Committee on Appropriations has failed to report any appropriation for the Commerce Court.

The "Agricultural Special" of the Ohio State College of Agriculture will next week make a trip of five days over the Toledo & Ohio Central and the Kanawha & Michigan, using a train furnished free by those roads, and accompanied by railway officers. Stops will be made at about 40 places.

The growers of cantaloupes in the Imperial Valley, California, estimate this season's production at 50,000,000 melons, or 2,600 carloads. Approximately 5,500 acres have been planted this spring. It is estimated that at least 30,000 tons of ice will be required for the shipping of this fruit.

E. S. Conway, vice-president of the W. W. Kimball Company, addressed the Chicago Transportation Association at its monthly luncheon on April 25 on the subject of "Industrial Commercialism." The association will move about June 1 into new quarters in the former Hamilton Club building, which will be known as the Chicago Transportation Association building.

The principal railways in South Carolina, complying with a law which has recently gone into effect and which forbids the carriers to require mileage ticket coupons to be presented at a ticket office for exchange, will issue 1,000-mile books, to be good only in that state and on the lines of the issuing company. These books will be sold at $20. The sale of interchangeable books will be discontinued.

The Pennsylvania Railroad has advanced the fares to be charged for the use of its horse cabs in Philadelphia, that branch of the company's service having come short of paying its expenses last year by about $10,000. Under the new tariffs the rate for two persons in a hansom cab for 1½ miles will be 35 cents, instead of 25; and the rate for a four-wheel carriage will be advanced from 40 cents to 55. The minimum rate for a taxicab will at the same time be increased from 30 cents to 50.

The National Baggage Committee, composed of representatives of business houses and commercial organizations, is compiling a series of tables showing the baggage rates and regulations that have been in force in different parts of the country for the last six years, to be used as a basis for an agreement which it is desired to secure with the railways on a fixed uniform scale of charges. The committee will also attempt to reach a compromise with the railways on the proposal to charge an excess baggage rate for large and odd-sized trunks on the basis of a free limit of 45 in. in length and a charge equal to that for 5 lbs. of excess baggage for each additional inch.

The Traffic Club of Chicago gave a complimentary luncheon on April 26 to its honorary members, William Borner, who retired on April 1 as assistant to the freight traffic manager of the Pennsylvania Lines West, after 55 years in the service of the Pennsylvania company, during which he was for 29 years general western freight agent; and William J. Young, who retired some time ago as foreign freight agent of the Illinois Central after 48 years in the service of that company at Chicago. Mr. Young said he believed he was the first freight solicitor in Chicago, as in the early days it was not necessary to solicit freight; and Mr. Borner made the first way-bill for a through shipment from Chicago to New York over the Pennsylvania.

The Denver & Rio Grande, Western Pacific and Missouri Pacific, have served individual notices through the Transcontinental Passenger Association that they will make effective at an early date a round trip homeseeker's fare of $55 from the Missouri river to all points on the Western Pacific from Deeth, Nev., to Stockton, Cal. This will be the first extension of the homeseekers' rates through to the Pacific coast. The individual announcement of the Gould Lines was made after the other roads had failed to agree on the plan. The tickets will be sold from the same territory as homeseeker's tickets previously sold to Oregon, Idaho and Washington, and will be on sale the first and third Tuesdays of each month, with a final return limit of 25 days from date of sale. On Monday the Rock Island, Burlington and Union Pacific announced they would meet the competition of the Gould lines and place homeseekers' tickets to the

coast on sale from Chicago and intermediate points at a rate of $65 for the round trip from Chicago and $62.50 from St. Louis.

Lewis E. Pierson, president of the Irving National Exchange Bank, New York City, who has been chairman of a bankers' committee and active in the promotion of bill-of-lading reforms, in an address at New Orleans last week before the Louisiana Bankers' Association, declared that continued laxity on the part of the railways in the handling of bills of lading was likely to precipitate a serious financial situation at almost any time. Mr. Pierson says that the railways continue their old loose practices in allowing bills of lading to be signed without the rigid restrictions which are necessary, and also that they are blocking the proposed changes in laws concerning bills of lading which are under discussion in Congress. Mr. Pierson says that bankers should seek to secure the prompt passage, in all the states, of the bills of lading act which was proposed by the commissioners on uniform state laws, and the enactment by Congress of laws to hold carriers unconditionally liable for bills of lading issued; should petition the Interstate Commerce Commission to order—not recommend or request—all railways to issue order bills of lading; these to be on a uniform blank, to be filled out in ink, to be signed in ink, and to be stamped at the issuing office. This petition should also call for central offices to check bills of lading as is done at New York now with cotton bills, and also should call for a strict regulation requiring bills of lading to be taken up and cancelled when the goods are delivered.

Anti-Scalping Campaign at Kansas City.

The Railway Ticket Protective Bureau has issued a circular letter relating to the ticket scalping situation at Kansas City, where, about two years ago, after evidence had been secured by a raid instigated by the bureau, six of the most persistent scalpers were indicted and held for trial. Local conditions and political influences were inimical to a successful issue of the efforts of the bureau, the letter says, and after many delays "the accommodating holder of the scales of justice" proceeded to hear the cases, and on February 10 of this year discharged the defendants, holding the evidence insufficient. Notwithstanding the decision of the trial court the bureau's attorneys were finally able to reinstate the indictments in the criminal court, and recently one of the defendants, Bert Roehm, has been sentenced to two years in the penitentiary. In the cases of the other defendants it has been necessary for the bureau to obtain continuances on account of the absence of witnesses. The letter says in part:

"When it is considered that for each of these continuances, numbering fifteen in all, the officers of the bureau were obliged to assemble its witnesses, one residing in San Francisco, and the others, with the exception of the one who treacherously withdrew from the jurisdiction of the state, residing from one to three hundred miles distant from Kansas City, the patience, perseverance, unalterable and unrelenting determination to cleanse this plague spot, despite the frequent and continued interjection of the obstacles recounted, which, like the brook, were seemingly to run on forever, will be apparent.

"Conditions in other localities in which railway scalping has heretofore flourished have been kept under constant and careful supervision, and we are pleased to report that the aspect as to complete and final extermination of the evil is even more satisfactory."

Abolish Grain Door Allowances.

The railways in Central Freight Association territory have filed tariffs with the Interstate Commerce Commission, effective May 1, canceling the allowances heretofore paid to grain elevators for providing grain doors for cars loaded with grain at the elevators. The allowances have been at the rate of 50 cents a door, or a maximum of $2 a car. An investigation conducted by the Chicago General Managers' Association and the General Superintendents' Association showed that the shippers were invariably charging $2 a car, whether they furnished a complete complement of four doors or not; and that in many instances doors had been removed from inbound cars and placed on outbound cars, and charged for. There are 65 grain door points in the city of Chicago, and the allowances paid have amounted to about $300,000 a year on 150,000 cars. At the request of shippers the Indiana railway commission suspended the tariff, but after a hearing the suspension order was vacated on April 29. The railways have made an arrangement to provide the grain doors themselves through an agent, T. A. McNulty, who will collect the grain doors from inbound cars and return them to the owners at a charge of 5 cents a door. He will also furnish new doors and attend to the re-coopering of the cars at a rate of 50 cents a door, which rate, it is expected, will soon be reduced.

INTERSTATE COMMERCE COMMISSION.

The commission has further suspended until November 14 the proposed advanced rates on potatoes and other commodities from Princeton, Minn., to Cincinnati, Ohio, and other points.

The commission has further suspended until November 24 the advanced class and commodity rates from Cincinnati, Ohio, and other points to points on the Carolina, Clinchfield & Ohio.

Special Examiner George P. Boyle held a hearing in Chicago on April 26 upon the subject of an advance in rates on hay from Wisconsin points to Chicago which had been suspended for 120 days.

The commission has suspended tariffs advancing the rate on petroleum from Wellsville and Olean, N. Y., and Bradford, Warren, Oil City, etc., Pa., to points in Indiana, Ohio, Kentucky and West Virginia, ranging from a half cent to one and a half cents.

The Sloss-Sheffield Steel & Iron Company and others have filed a complaint with the Interstate Commerce Commission against the rates on pig iron from Birmingham, Ala., Chattanooga, Tenn., and other points in the iron producing districts of Alabama and Tennessee to the Ohio and Mississippi river crossings and points beyond.

At a hearing before Special Examiner Boyle at Chicago on April 29 a complaint of the Chicago Board of Trade, involving rates on wheat and flour, between Chicago and Minneapolis, as against the rates from the Missouri river was dismissed by the complainant, in order that the petition may be amended to include the rates east of Chicago.

The Interstate Commerce Commission has announced that a hearing will be held in Washington on May 8 on the question of ordering into effect the rates to Salt Lake City, Utah, and Spokane, Wash., which were found reasonable in its decisions of June, 1910, which were suspended and were followed by another decision under the new conditions imposed by the fourth section of the amended commerce law. The latter decisions were enjoined by the Commerce Court and the cases are now pending before the Supreme Court, which recently ordered a reargument during the October term. Officers of the transcontinental railways have held several conferences with the shippers at Spokane and at Salt Lake City in an effort to effect a compromise. At conferences held last week between traffic officers of the Hill and Harriman railways and the shippers of Spokane, the roads proposed to submit to the commission temporary tariffs based on the rates found reasonable by the commission in the Spokane and Salt Lake decisions. Separate conferences were held with representatives of the shippers in different lines of business, and an agreement was practically reached with the jobbers to adjust the rates to Spokane on the basis of the rates that the commission had found reasonable to Salt Lake City. The shippers were indisposed to accept any settlement that might prejudice their claims for reparation, and negotiations are still pending.

Reparation Awarded.

A. V. Neilson Co., Ltd., v. Louisiana Railway & Navigation Co. et al. Opinion by the commission

The commission decided that the rate of 80 cents per 100 lbs. charged the complainant on a shipment of cartridges from Bridgeport, Conn., to Alexandria, La., was unreasonable, and ordered that a future rate of 65 cents per 100 lbs. on such shipments be established. (23 I. C. C., 254.)

Complaint Dismissed.

Cyrus C. Mattison v. Pennsylvania Company. Opinion by the commission:

In this case the complainant requests the commission to order

defendants to re-establish the station at Park Manor, a suburb of Chicago. The commission found that the evidence was not conclusive and the complaint was dismissed. (23 I. C. C., 233.)

Edward Byrnes, trustee for H. Woods Co., bankrupt v. Atlantic Coast Line et al. Opinion by the commission:

In Florida Fruit & Vegetable Shippers' Protective Association v. Atlantic Coast Line et al., 17 I. C. C., 552, rates from Florida points to the central freight association territory were reduced, but no provision for reparation was made. The complainant now seeks reparation on shipments of oranges, grape fruit and pineapples from Florida to the central freight association territory made within two years previous to August 28, 1911. The commission decided that since rates were frequently reduced without awarding reparation, the claim for reparation should be denied, and the complaint was dismissed. (23 I. C. C., 251.)

Smith-Booth-Usher Co. v. Lake Shore & Michigan Southern et al. Opinion by the commission.

On a shipment of high pressure boilers the complainant was charged the rate on boilers for use in connection with the operation of machinery. Complaint is made that the lower rate on boilers used in connection with heating apparatus should have been charged because the boilers shipped, though high pressure, were to be used in connection with the heating plants of large buildings. Reparation was asked. The commission found that high pressure boilers were not in the same class as boilers used for heating apparatus, and that the fact that they were sometimes used in connection with large heating plants was merely an example of an additional use to which they could be put. (23 I. C. C., 242.)

Former Decision Holds Good.

Sunderland Brothers Co. v. St. Louis & San Francisco et al. Opinion by the commission:

In the previous decision on this case, 18 I. C. C., 545, the commission reduced the minimum weight assessed on the complainant's shipment of lime from Ash Grove, Mo., to Pine Bluffs, Wyo., and Laramie, from 30,000 lbs. to 24,000 lbs. Reparation was awarded. In the rehearing of this case the commission adhered to its original decision. (23 I. C. C., 259.)

Rates on Sheep Where Double-Deck Cars Cannot Be Furnished.

Carstens Packing Co. v. Southern Pacific et al. Opinion by the commission:

When the complainant orders double-deck cars for the shipment of sheep, and the defendants, not being able to supply such cars, furnishes in their place single-deck cars, the complainant is charged at the rate of the cars used. The complainant seeks reparation. The commission decided that since the defendants have provisions in their tariffs for the use of double-deck cars, they should charge double-deck car rates where double-deck cars are ordered and single-deck cars are furnished. No reparation was granted. The complainant also claimed that the rates on sheep in single-deck cars were unreasonable. The evidence, however, was not supported, and that part of the complaint was dismissed. (23 I. C. C., 236.)

Northern Pacific Allowed Preference on South Tacoma Traffic.

Public Service Commission of Washington v. Northern Pacific et al. Opinion by Commissioner Harlan:

The Northern Pacific has the only line from Tacoma to South Tacoma. Heretofore a switching charge has been made on traffic received from or to other lines (and absorbed by those lines) to or from South Tacoma, but in January, 1910, the Northern Pacific excluded South Tacoma from its switching limits and made a local rate from Tacoma to South Tacoma of from $6 to $10 a car. The Washington state commission ordered the Northern Pacific to give South Tacoma the same rate as Tacoma to all points within the state on its own line (on traffic routed wholly over its own line) and to all points on other railway lines not reached by the Northern Pacific, but permitted the Northern Pacific to continue to charge $6 to $10 a car on traffic from or to South Tacoma to or from points reached by the Northern Pacific, but routed for part of the distance over a competitor of the Northern Pacific. In other words, the Northern Pacific is given the benefit of its investment in its South Tacoma line insofar as protection against competition is concerned, but South Tacoma shippers are preserved in their former right of having the same rates as Tacoma. The Washington commission asks that the I. C. C. make the same ruling on interstate traffic, and the petition apparently indicates that the railways will accept such a ruling. The I. C. C. approves the plan and will make a formal ruling if necessary. (23 I. C. C., 256.)

Increases of Flaxseed Rate Permitted.

In re investigation and suspension of advances in rates by carriers for the transportation of flaxseed in carloads from Fort William, Port Arthur and Westport, Ont., to New York, Philadelphia and other points. Opinion by Chairman Prouty:

The recent advances in the rates on flaxseed were suspended on the protest of Spencer Kellogg & Sons, because that firm had not been able to ship its supply of flaxseed, which had been purchased previous to the announcement of the increase in rates, before the rates took effect. The commission decided that since that firm had now shipped all the flaxseed bought by it previous to the announcement of the increase in rates, and that since the increase was not unreasonable, the order for suspension should be vacated and the suspended tariff should be allowed to take effect. (23 I. C. C., 272.)

Closing of One Route Allowed.

In re advances in rates from Chicopee, Mass., to New York via Chatham, N. Y., and Rensselaer. Opinion by Commissioner Harlan:

There are now three through routes and joint rates from Chicopee to New York. Chicopee is on the Boston & Maine, and the Boston & Maine quotes a joint rate with the Boston & Albany, which moves traffic through Chatham and Rensselaer, with the New York, New Haven & Hartford, which moves it through Springfield, and also has joint rates with the New York Central & Hudson River, which moves traffic through Troy, N. Y. The B. & M. gets only a few miles haul on traffic routed via Rensselaer or via Springfield, but gets a 120-mile haul on traffic moving through Troy. The Troy route is about 55 miles longer than the Chatham route. Although there are certain objections to the Troy route, the commission believes that the B. & M. should be given an opportunity to demonstrate the practicability and efficiency of the Troy route and be allowed to cancel the joint rates with the Boston and Albany. (23 I. C. C., 263.)

Conference Rulings.

Where the charges on a shipment of freight have been paid for in advance and the shipment is stopped at some point short of its billed destination or is not moved out under a transit privilege, or where a passenger on a through ticket stops short of his destination, a refund may properly be made for the difference between the local rate from point of origin to point of stopping and the prepaid or through ticket rate.

When a railway purchases appliances, materials or supplies, in the use of which instruction and supervision of employees by experts is essential to successful results, the road may in the contract of purchase agree to give free transportation over its own lines to such expert, provided that he shall not sell goods or solicit orders. Such experts may be given free transportation over one road to reach another road to which they have been assigned for duty.

Where through shipper's error steel was shipped and no note was made on the bill of lading showing where it was to be fabricated in transit, no refund will be allowed on the higher charges than the fabricated in transit charges.

The commission holds that although there may be a remedy at common law which could compel a shipper to pay the ice company's bill in case where a refrigerator car was set for loading, fully iced, but was not loaded because of weather conditions, it is not clear that the ice charges are collectable on a complaint to the Interstate Commerce Commission.

A rate once lawfully cancelled may not be reinstated as a reissued rate.

Railways may give free transportation to Canadian customs and immigration inspectors on duty.

A tariff that shows an erroneous number of a lawful concurrence is not invalidated by such minor error, and is binding on the participating carriers.

The sale of documents of a railway as waste paper is a lawful destruction of such records under the regulation regarding destruction of records.

Damages for Unjust Distribution of Coal Cars.

The decision of the commission awarding reparation for damages resulting from discrimination in the distribution of coal cars by the Pennsylvania Railroad was noticed briefly in our last issue. The present opinion, which is No. 1,833, is supplementary to one issued in 1910 in the same cases* the supplementary proceedings having been taken in consequence of a decision of the circuit court of the United States, for the eastern district of Pennsylvania, to the effect that the question of damages in a case of this kind should be decided by the commission. In all previous cases the commission had held that such a question should go to the courts. The circuit court case referred to was that of the Morrisdale Coal Company v. Pennsylvania Railroad. The suit was dismissed. The present cases, if not settled by the commission, would probably go to that same court. If the present decision shall be appealed to that court, the commission will then have opportunity to secure a final judicial ruling as to what it ought to do in future cases.

In the first of the five cases now decided, that of the Hillsdale Coal & Coke Company, the original claim was for $127,855.65. On re-argument this was reduced, twice, but still the commission could not see its way to award the sum claimed, nor did it find any proof of the claim that damages were sustained by reason of the excess cost of mining the coal actually shipped because of the inefficient working of the mine on account of the lack of cars.

The mines were closed for several months, and the commission deals with claims covering two periods, October 1, 1903, to March 31, 1906, and August 1, 1906, to May 1, 1907; and the following facts are found:

(*a*) That the complainant's mines, known as Hillsdale Nos. 2 and 3, during each of the two periods could have produced and disposed of an average of 500 tons of coal per working day; and that 22 working days would have been an average working month.

(*b*) That if the complainant had received its proper proportion of the cars available for distribution by the defendant it could have shipped and disposed of 143,880 tons during the first period and 67,795.20 during the second period; that it actually shipped during the two periods 45,059.84 tons and 35,719.25 tons, respectively, making a shortage in its output of 98,820.16 tons during the first period and 32,075.95 during the latter period; that of this tonnage 87,831,36 tons would have moved to points without the state of Pennsylvania during the earlier period and 15,662.68 during the latter period. In other words, we find that the quantity of coal which the complainant was prevented from selling and shipping to interstate destinations as the result of the discrimination against it in the matter of car supply was 87,831.36 tons and 15,662.68 tons for the periods named.

(*c*) That the average selling price for the coal at the mine for interstate markets would have been $1.0711 per ton during the first period and $1.1320 during the second period; that the cost of production during the same periods with its proper proportion of cars would have been 81 cents and 86 cents per ton, respectively; and that the profit lost on the shipments and sales which the complainant was prevented by the discriminatory acts in question from making during the first period was 26.11 cents per ton and during the second period 27.2 cents.

The Hillsdale Company has recovered $17,500 in the state courts for losses connected with intrastate traffic.

After discussing the claims of the other parties in the same way, the commission says:

In cases of this kind there is a natural tendency on one side to enlarge and on the other to minimize the claim made. This is characteristic of the record before us. Damages are claimed by the petitioners to an extent not supported by the evidence adduced; on the other hand, the defendant has not sought so much to help the commission to arrive at a correct award as to show the fallacious character of the factors adopted by the complainants in arriving at their estimates of their damages. The result is a record that is not so helpful as it might be. The responsibility for this, however, rests with the parties; in such a case we can accept only the responsibility that follows upon a careful study of the record and an earnest effort to weigh all the evidence before us and to reach such conclusions as it fairly justifies.

Many theories as to the elements that should be considered in estimating damages in a case of this kind were advanced by each side. It is said by the complainants that their damages should be estimated on the basis of a supply of coal cars according to the physical capacity of their mines, or at least on the basis of their rated capacity. We have dealt with the claims only on the basis of the fair proportion of the available equipment that each claimant was entitled to receive in view of what we here find would have been a proper rating for each operation. According to the argument and brief on behalf of the defendant there is no sound theory upon which the damages of the complainants may be calculated. The defendant contends in all these cases that the coal which the complainants were unable to mine because of their failure to obtain their fair share of cars still remained in the ground, and that the extent of the damage really suffered cannot therefore be ascertained without proof, showing that the coal when subsequently mined was sold at a less profit than might have been realized during the period of the action. We are not prepared to enter upon a discussion of that question. Such claims are clearly justiciable, and we know of no better guide or basis for our action than the rule followed by the courts in similar cases. In the action by the Hillsdale Coal & Coke Company in the state courts, to which reference has heretofore been made, the Supreme Court of Pennsylvania, in 229 Pa., 261; 78 Atl., 28, said:

As we look at it, the only known method to get at data from which to estimate what a man is damaged by reason of discrimination, in not furnishing cars or other facilities of transportation, is to give the shipper discriminated against what would have been a reasonably fair profit on whatever is shown to be the fairly probable output of the mine discriminated against, less what was actually shipped from that mine. . . . Counsel for appellant argued that because, as a result of the defendant's discrimination, the coal of the plaintiff was left in the ground, and might be available for future shipment, and as there was no evidence that prices which prevailed throughout the period of the action were abnormal, or in excess of those reasonably ruling, there was no room for the inference that the plaintiff would realize for his coal when it might be shipped in the future less than it would have realized if shipped during the period of the action. But the burden was upon the defendant to show anything of this kind, by way of mitigation of damages, if it could do so, and it offered no evidence for any such purpose.

We do not undertake to say whether this is a correct rule, but simply refer to the case in explanation of our findings.

*Reported in [illegible] August 26, 1910, page 360, with a dissenting opinion by Commissioner Prouty. Mr. Prouty held that the Commission should have assessed damages then.

STATE COMMISSIONS.

The Railway Commission of Canada has ordered the Canadian Pacific, the Grand Trunk, the Canadian Northern and the Great Northern to furnish, before June 5, information showing the number of cars and engines in actual service, the number out of commission, number of each ordered and being built, and when to be delivered; this with a view, if deemed necessary, of issuing orders requiring the purchase of additional equipment to meet the numerous complaints now before the board, of inadequate equipment.

The New York State Public Service Commission, Second district, has denied the application of the Frontier & Western Railroad for a certificate of public convenience and a necessity. The commission has heretofore authorized the construction of the Buffalo Frontier Terminal Railroad (which, however, has not yet been built) and the present application was for an extension of about five miles to that proposed line. The line applied for runs directly through a thickly populated district of Black Rock, and the residents have made vigorous objections.

The Board of Public Utility Commissioners of New Jersey has held that the charter rights as construed by the attorney general of the state, of the Delaware & Raritan Canal Company,

now leased by the Pennsylvania Railroad, are such that neither the state legislature nor the public utility commission can regulate the tolls charged on the canal so long as these tolls do not exceed the maximum tolls named in the canal company's charter. The commissioners say that there can be little doubt that, if the canal's charter did not so provide, the present canal tolls, or many of them, would have to be set aside as exorbitant or discriminatory, despite the deficit now resulting from the canal's operation. The commission holds that the canal may properly be closed for repairs at certain times of the year.

COURT NEWS.

The Great Northern and Northern Pacific have filed pleas in the United States Circuit court at Tacoma, asking a permanent injunction against the enforcement of recent orders of the Washington public service commission reducing distributive freight rates out of Tacoma, Seattle and Spokane.

The Supreme Court of the United States on Monday of this week sustained the courts of the District of Columbia in ordering the Interstate Commerce Commission to take cognizance of rate questions in Alaska. The commission had held that it had no authority there, but the decision of the courts is that Alaska is an organized territory.

The Appellate Court in Indiana, in a suit against the Baltimore & Ohio Southwestern, holds that that road must answer in damages for a street car destroyed by one of its trains at Aurora, in 1908. The street car was struck while standing on a crossing, its power having failed. The train which struck it was running at 20 miles an hour. This was 12 miles faster than the limit which had been established by the city of Aurora, and the steam road is held liable because it was doing an illegal act when the damage was done.

The Supreme Court of the United States, in a case appealed from the Supreme Court of the State of Washington this week held that, under certain circumstances, the Commerce Court, in considering a case appealed from a state court, may receive new evidence. The case is the so-called ten towns case, in which ten towns in the State of Washington appealed to the State Railway Commission for certain facilities that the roads were not giving them. Ultimately the case came to the Supreme Court and is now sent back for further evidence and action in the lower court.

Judge A. B. Anderson, of the United States Court at Indianapolis has confirmed the report of the special master in chancery in the suit brought by the Baltimore & Ohio to prevent the enforcement of an order of the state railway commission requiring locomotives to be equipped with headlights of not less than 1,500 candle power. The report of the master declared that the order was invalid on account of indefiniteness; but he also said that the commission had the power under the statute to issue a proper order regulating headlights. The commission is considering the preparation of a new order.

It is announced that the senior reporting councillor of the Prussian ministry of public works, Dr. Alfred von der Leyen, has resigned his position. In accepting his resignation the emperor gave him a promotion and the title of "His Excellency," which is something like promoting a brigadier-general to be major-general in our army, on his retiring. Dr. von der Leyen has been a student of the political and administrative side of railways, and especially of the railways of this country, concerning which he published two volumes many years ago. He edited two of the railway periodicals published by his ministry, and has contributed a great number of articles to other periodicals, hand-books, encyclopaedias, etc., all regarding transportation questions. He first became familiar with such questions in what we may call an admiralty court; and then as agent of the Bremen chamber of commerce. Thence he was taken into the service of the empire and of Prussia by the famous Minister Maybach, under whom the state railway system was mainly formed, in which von der Leyen has been promoted to the highest rank. It is understood that Dr. von der Leyen will continue to edit the *Archiv für Eisenbahnwesen*, and the journal devoted to light railways, published by the Prussian ministry of public works.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Frank Hunt has been appointed assistant auditor of disbursements of the Cleveland, Cincinnati, Chicago & St. Louis, with office at Cincinnati, Ohio, succeeding H. L. Berg, promoted.

Harry L. Frank has been appointed auditor of the Silverton Railway and of the Silverton Northern, with office at Silverton, Colo., succeeding H. C. Brown, resigned on account of ill health.

R. N. Begien, assistant to general manager of the Baltimore & Ohio and the Baltimore & Ohio Southwestern, with office at Baltimore, Md., has been appointed assistant to third vice-president of the Baltimore & Ohio, with office at Baltimore.

W. A. Jones, vice-president and general manager of the Mineral Point & Northern at Mineral Point, Wis., has been elected president, with office at Mineral Point, succeeding C. W. McIlhon, deceased. E. M. Harter has been elected vice-president and general manager, in charge of all departments, succeeding Mr. Jones.

Operating Officers.

James H. Burke, superintendent of the Northern Railway (Costa Rica), has been appointed general superintendent, with office at San Jose, Costa Rica.

William Tansley, chief despatcher of the Canadian Pacific at Toronto, Ont., has been appointed assistant superintendent of the Havelock division, and James Walsbrough succeeds Mr. Tansley.

H. S. Smith, chief despatcher of the Baltimore & Ohio at Seymour, Ind., has been appointed assistant superintendent, with office at Seymour, succeeding J. F. Cook, resigned. G. V. Copeland succeeds Mr. Smith.

E. F. Holbrook has been appointed general agent of the Cincinnati, Hamilton & Dayton, with office at Toledo, Ohio, in charge of the coal and ore docks of the company at that place, and reporting to the superintendent at Dayton, Ohio.

Arthur J. Grymes, superintendent of the marine department of the Erie, at New York, has been appointed manager of marine, lighterage and foreign freight departments, with office at New York; C. R. Stewart, assistant superintendent of the marine department at Jersey City, succeeds Mr. Grymes, with office at Jersey City.

J. G. Taylor, general superintendent of the Lake Superior division of the Canadian Pacific, with office at North Bay, Ont., has been appointed general superintendent of the Saskatchewan division, with office at Moose Jaw, Sask., succeeding J. J. Scully, who succeeds Mr. Taylor, as has already been announced in these columns.

L. F. Newton, trainmaster of the Lake Superior division of the Northern Pacific at Duluth, Minn., having been made assistant superintendent of the division, with office at Duluth, succeeding W. H. Strachan, promoted; T. B. Quinn, trainmaster of the Third district of the division at Duluth, succeeds Mr. Newton, in charge of the entire division.

Michael Nolan, trainmaster of the Erie at Port Jervis, N. Y., has been appointed passenger trainmaster, with office at Jersey City, N. J., succeeding J. M. Hoffman, deceased. Thomas O'Donnell, trainmaster at Jersey City, succeeds Mr. Nolan; Harold R. Cole, chief despatcher at Jersey City, succeeds Mr. O'Donnell; Albert M. Kelly, night chief despatcher at Jersey City, succeeds Mr. Cole, and Horace Fitzgerald, despatcher at Jersey City, succeeds Mr. Kelly.

H. B. Voorhees, general superintendent of transportation of the Baltimore & Ohio and the Baltimore & Ohio Southwestern, with office at Baltimore, Md., has been appointed general superintendent of the Baltimore & Ohio Southwestern and the Cincinnati, Hamilton & Dayton, with office at Cincinnati, Ohio; C. C. Riley, assistant to general manager of the Baltimore & Ohio and the Baltimore & Ohio Southwestern, with office at Baltimore, succeeds Mr. Voorhees, and J. C. McCahan has been appointed superintendent of mails of the Baltimore & Ohio.

F. B. Mitchell, whose appointment as superintendent of the Baltimore & Ohio Southwestern, with office at Flora, Ill., has been announced in these columns, was born August 18, 1879, at Cuba, Ohio. He graduated from the Wilmington, Ohio, high school in 1899, and in October of that year began railway work with the Baltimore & Ohio Southwestern as a telegraph operator. In May, 1901, he was made secretary to the superintendent of that road at Washington, Ind., and for six months from April 1, 1902, he had charge of car distribution on the Chicago Great Western at St. Paul, Minn. He then returned to the Baltimore & Ohio Southwestern, and has been with that road ever since. He was consecutively secretary to the superintendent at Chicago, and then to the general superintendent at Cincinnati, Ohio; car service clerk at Cincinnati, and assitsant trainmaster at Chillicothe, Ohio. He was made trainmaster at Seymour, Ind., in January, 1911, was promoted to assistant superintendent at Cincinnati on March 1, 1912, and a month later was made superintendent at Flora, Ill., as noted above.

Traffic Officers.

James Eblan has been appointed soliciting freight agent of the Atlanta, Birmingham & Atlantic, with office at Atlanta, Ga., succeeding J. H. McBrien, resigned.

D. W. Hayes, freight agent of the Grand Trunk at Guelph, Ont., has been appointed freight agent, with office at London, succeeding L. H. Harold promoted.

James M. Breen has been appointed industrial agent of the New York Central & Hudson River, the West Shore, the New York & Ottawa, and the Ottawa & New York, with office at New York.

F. T. Brooks has been appointed district freight and passenger agent of the Union Pacific, the Southern Pacific and the Oregon-Washington Railroad & Navigation Company, with office at Buffalo, N. Y.

W. G. Rogers has been appointed traveling freight and passenger agent of the Illinois Central, with headquarters at San Francisco, Cal., succeeding A. J. Dahlin, resigned to engage in other business.

H. W. Howell has been appointed traveling freight and passenger agent of the Chicago, Milwaukee & St. Paul, with headquarters at Salt Lake City, Utah, succeeding C. P. Pruitt, resigned to engage in other business.

Sheldon Volkman, contracting freight agent of the Great Northern at Spokane, Wash., has been appointed district freight and passenger agent, with office at Portland, Ore., and Henry Heleniak succeeds Mr. Volkman.

The agency of the Erie Despatch at Providence, R. I., has been abolished, and the territory heretofore covered by that agency will in future be under the jurisdiction of J. Karcher, Jr., general agent, with office at Boston, Mass.

M. L. Hartley, traveling freight agent of the Rock Island lines at Little Rock, Ark., has been appointed division freight agent, with office at Alexandria, La., succeeding R. O. Roy, resigned to go to another company, and R. E. Eshleman succeeds Mr. Hartley. O. C. Turlington, commercial agent at New Orleans, La., will handle the import and export matters formerly taken care of by the Steel-Hardin-Dillon Company.

F. G. Lantz, division freight agent of the Chicago district of the Erie, at Chicago, has been appointed assistant general freight agent of the lines west of Buffalo, N. Y., and Salamanca, with office at Chicago, and C. D. Turner succeeds Mr. Lantz. C. P. Morse, general agent of the Erie Despatch and the Erie Railroad at Cincinnati, Ohio, has been appointed general southern agent, with office at Cincinnati, and C. M. Owen has been appointed general agent of the Erie Railroad and agent of the Erie Despatch, with office at Memphis, Tenn., succeeding H. H. Cage, deceased. Effective May 1.

Robert R. Ritchie, general agent of the Chicago & North Western at San Francisco, Cal., has been appointed general western agent, with office at San Francisco, and he will have general charge of all agencies on the Pacific coast. R. V. Holder, general agent at Portland, Ore., has been transferred to San Francisco, succeeding Mr. Ritchie, and E. C. Griffin, general agent in the freight department at Omaha, Neb., succeeds Mr. Holder. George F. West, general agent in the passenger department at Omaha, having resigned to engage in other business; John Mellen, traveling agent at Omaha, has been appointed general agent, and R. D. Miller has been appointed assistant general agent, both with office at Omaha.

Engineering and Rolling Stock Officers.

F. L. Shea has been appointed an assistant supervisor of the Philadelphia Terminal division of the Pennsylvania Railroad, with office at Philadelphia, Pa., succeeding E. C. Smith, transferred.

H. C. Estep has been appointed engineer of construction of lines in Massachusetts and Rhode Island of the Southern New England Railroad Corporation, a subsidiary of the Grand Trunk, with office at Providence, R. I.

H. Honaker, master mechanic of the St. Louis & San Francisco at Birmingham, Ala., having been transferred to Fort Scott, Kan., B. A. Beland, master mechanic at Fort Scott, succeeds Mr. Honaker at Birmingham.

W. J. Hoskin, who recently resigned as master mechanic of the Chicago & Alton at Bloomington, Ill., has been appointed assistant master mechanic of the Paducah shops of the Illinois Central, with headquarters at Paducah, Ky. A. O. Garber, general foreman of the Illinois Central at Paducah, has been appointed master mechanic, with office at East St. Louis, Ill., succeeding W. H. Donley, given a leave of absence on account of illness.

Richard C. St. John, whose appointment as engineer maintenance of way of the western lines of the Canadian Pacific, with office at Winnipeg, Man., has been announced in these columns, was born December 5, 1864, at St. Catharines, Ont. He was educated at St. Catharines Collegiate Institute, and the College of Engineering of Cornell University, graduating from the latter in 1887; and began railway work the following year with the Pennsylvania Railroad. He held minor positions with various railway companies and in private engineering practice, and subsequently filled the following official positions: assistant chief engineer of the Michigan Central; assistant superintendent of the Great Northern, principal assistant engineer of the Missouri Pacific-Iron Mountain system, and assistant subway engineer of the city of Chicago. He received the Fuertes gold medal from the College of Civil Engineering of Cornell University for his report on the Chicago subways. At the time of his appointment to the position as above noted, Mr. St. John was assistant engineer of the Canadian Pacific at Winnipeg.



R. C. St. John.

OBITUARY.

Thomas W. Parker, assistant to freight traffic manager of the St. Louis & San Francisco, with office at St. Louis, Mo., died on April 29, at Chicago.

H. O. Byer, master carpenter of the Baltimore & Ohio, with office at Flora, Ill., while out on an inspection trip, was killed by a passener train on April 26.

James Oborne, general superintendent of the British Columbia division of the Canadian Pacific, with office at Vancouver, B. C., died at that place this week. Mr. Oborne was born at Montreal, Que. He was for many years at the head of the car service department, being promoted from that place to the position of superintendent. For about ten years he was general superintendent of the Ontario division, with headquarters at Toronto.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

THE BINGHAM & GARFIELD is in the market for one Mallet locomotive.

THE DELAWARE & HUDSON is in the market for five consolidation locomotives.

THE GRAND RAPIDS & INDIANA is in the market for three switching locomotives.

THE MEXICAN UNION has ordered one mogul locomotive from the Baldwin Locomotive Works.

THE LANCASTER & CHESTER has ordered one ten-wheel locomotive from the Baldwin Locomotive Works.

THE PACIFIC & IDAHO NORTHERN has ordered one mikado locomotive from the Baldwin Locomotive Works.

THE CHATTAHOOCHEE VALLEY has ordered one ten-wheel locomotive from the Baldwin Locomotive Works.

THE GRANDIN LUMBER COMPANY has ordered one consolidation locomotive from the Baldwin Locomotive Works.

THE NORFOLK & PORTSMOUTH BELT LINE has ordered one six-wheel switching locomotive from the Baldwin Locomotive Works.

THE WALSH-KAHL CONSTRUCTION COMPANY has ordered one six-wheel switching locomotive from the Baldwin Locomotive Works.

THE CANADIAN PACIFIC has ordered 25 consolidation locomotives from the American Locomotive Company, in addition to the similar order placed a short time ago.

THE HARRIMAN LINES have ordered 55 mikado locomotives, 15 Mallet locomotives, 15 Pacific type locomotives, 20 six-wheel switching locomotives and 10 ten-wheel locomotives from the Baldwin Locomotive Works, and 10 mikado locomotives from the American Locomotive Company.

THE CHICAGO, TERRE HAUTE & SOUTHEASTERN has ordered five consolidation locomotives from the American Locomotive Company. The dimensions of the cylinders will be 25 in. x 32 in.; the diameter of the driving wheels will be 61 in., and the total weight in working order will be 238,000 lbs.

THE CHICAGO, INDIANAPOLIS & LOUISVILLE has ordered 16 mikado locomotives and three Pacific type locomotives from the American Locomotive Company. The mikado locomotives will have 28-in. x 30-in. cylinders, 63-in. driving wheels, and in working order will weigh 285,000 lbs. The Pacific type locomotives will have 23-in. x 28-in. cylinders, 73-in. driving wheels, and in working order will weigh 220,000 lbs. All these locomotives will be equipped with superheaters.

CAR BUILDING.

THE BUFFALO CREEK & GAULEY is in the market for 300 hopper cars.

THE CHICAGO & EASTERN ILLINOIS is in the market for 15 caboose cars.

THE ST. LOUIS & SAN FRANCISCO has ordered 6,000 coal cars from the American Car & Foundry Company.

THE NEW ORLEANS, MOBILE & CHICAGO has ordered 400 box cars from the American Car & Foundry Company.

THE CHICAGO, INDIANAPOLIS & LOUISVILLE has ordered 1,000 box cars from the Haskell & Barker Car Company.

THE ATCHISON, TOPEKA & SANTA FE has ordered 1,000 refrigerator cars from the American Car & Foundry Company.

THE NATIONAL RAILWAYS OF MEXICO is said to be in the market for 30 passenger cars. This item has not been confirmed.

THE WESTERN CHEMICAL COMPANY, Denver, Col., has ordered four 7,200-gallon, 50-ton tank cars from the German-American Car Company.

THE BOSTON & MAINE is said to have ordered 22 passenger cars from the Standard Steel Car Company. This item has not been confirmed.

THE CANADIAN PACIFIC has ordered 2,000 box cars from the Western Steel Car & Foundry Company, and 2,000 box cars from the Standard Steel Car Company. This company, it is said, will also build 2,000 freight cars at its shops.

THE SEABOARD AIR LINE, mentioned in the *Railway Age Gazette* of April 19 as being in the market for 1,200 freight cars, 25 caboose cars and 30 passenger cars, is now in the market for 1,000 box cars, 500 hopper cars, 25 caboose cars and 30 passenger cars. This company has ordered three all-steel postal cars from the Pullman Company.

THE HARRIMAN LINES, which have been reported in the market for 9,100 cars, are understood to be concluding negotiations for 9,076 cars, as follows: Pullman Company, 5,710 box cars; American Car & Foundry Company, 1,000 refrigerator cars; Bettendorf Axle Company, 700 flat cars, 620 work and 300 gondola cars; Standard Steel Car Company, 700 stock cars and 46 caboose cars.

IRON AND STEEL.

THE CANADIAN PACIFIC has ordered 15,000 tons of rails.

THE GRAND TRUNK PACIFIC has ordered 40,000 tons of rails.

THE NEW ORLEANS, MOBILE & CHICAGO has ordered 5,000 tons of rails from the Tennessee Coal, Iron & Railroad Company.

GENERAL CONDITIONS IN STEEL.—The Steel Corporation is now operating at 94 per cent. of its capacity and is producing finished products at the rate of 17,680,000 tons annually. Prices have been advanced during the past week with the result that consumers have made heavy specifications on existing contracts which expire July 1. This will insure operations at almost full capacity during the present month. Orders for new business have been small, particularly on the part of the railways. The export business is unusually good.

A Swedish railway has been experimenting with powdered peat as locomotive fuel. Peat is usually burned in little brick-like sods, dried in the sun, making a fair fire, but a great deal of ash. Hitherto it has been attempted to improve it by pressing it. A Lieutenant Ekelund contrived to reduce it to powder, and a railway engineer has invented an apparatus for feeding this powder into a locomotive firebox. This feeds faster as the steam pressure falls and slower as it rises. Swedish papers say that it works well, but that when the lowest price for peat is $2.65 per ton it is not economical. Sweden has great peat bogs, but it does not have any coal.

The Canton-Macao railway, China, has already been surveyed, and it is probable that construction work will be commenced in the near future. Starting at Fati, across the Sikiang river from Canton, the line will run almost due south through the districts of Shuntak and Heungshan to the boundary of the Portuguese colony of Macao. This line will be about 70 miles long and will penetrate one of the richest districts of South China. The country through which it passes is low and is intersected by innumerable creeks, and given over to rice, fruit and vegetable culture. A 30-mile branch line will be built to connect the main line at Chentsun with the Sunning Railway at Kongmoon via Kaukong. There are no very large cities on the railway, but there are many villages and several towns of from ten to fifty thousand inhabitants, among which are Chentsun, Shuntak, Heungshan, Chingshan, Kanchuk and Kaukong. The southern terminus of the line will be within five miles of the new commercial port of Heungschow. While rice is the principal product of this region, the population is so dense that large quantities of rice have to be imported to help out the local crops. Sugar cane is grown on a large scale for local consumption and export. Among the manufactured articles exported from the districts touched by the railway are palm leaf fans, mats and matting bags, groundnut, cassia, bean oil, coarse china wear, paper and firecrackers. The principal imports are kerosene, cotton goods, matches, timber, metals, coal and clothing.

Supply Trade News.

The Linde Air Products Company, Buffalo, N. Y., has moved its New York office from 30 Church street to 79 Wall street.

The Pyle-National Electric Headlight Company, Chicago, has moved its offices from the McCormick building to 1000 Karpen building, 900 South Michigan avenue.

Hildreth & Company, New York, consulting and inspecting engineers, have moved their main office from the Whitehall building, New York, to the Mills building, 15 Broad street.

The stockholders of the Flannery Bolt Company, Pittsburgh, Pa., will vote on June 1 on the question of authorizing an increase in the capital stock of the company from $300,000 to $750,000.

The Kennicott Company, Chicago Heights, Ill., is erecting as an addition to its car shops a brick building 70 ft. x 323 ft., and is installing two new electric traveling cranes, orders for which were recently placed.

The Chicago Grain Door Company, Chicago, has received an order for 500 of its new Chicago outside doors for 500 automobile cars to be built at the Chicago, Milwaukee & St. Paul shops at Milwaukee, Wis., for the Chicago, Milwaukee & Puget Sound.

The W. K. Kenly Company, Chicago, announces a change in the name of the company to the Universal Railway Supply Company, with offices as formerly in the Peoples Gas building. The company was organized in 1905 to sell light rail, and in 1908 began to increase its line in the general railway supply business. The supply part of the business has been gradually growing, until it now constitutes the major portion, and therefore it has been considered necessary to change the name of the company to a title more descriptive of the present character of its business. The company is still prepared to sell light rail and its accessories, but is specializing in high grade railway specialties, handling its own signal lines and representing in the West the Kalamazoo Railway Supply Company, Kalamazoo, Mich. The officers and stockholders remain unchanged.

Hinsdill Parsons, vice-president and general counsel of the General Electric Company, Schenectady, N. Y., was killed in an automobile accident on April 28 near Albany, N. Y. He was born at Hoosick Falls, N. Y., February 10, 1864. After graduating from Trinity College he entered the Albany law school, from which he graduated in 1885. Four years later he was made patent attorney for the Walter A. Wood Harvester Company, Hoosick Falls. In 1894 he went to the General Electric Company, and in 1900 he was made general counsel of that company. He was elected vice-president in April, 1901. Mr. Parsons, in 1907, took an active part in the reorganization of the Knickerbocker Trust Company, New York, and was later made a director, a position which he subsequently resigned. He was interested in the Schenectady Railway Company, and at the time of his death was president of the Schenectady Illuminating Company and the Mohawk Gas Company. He was also a director of the Electric Bond & Share Company, New York; the Washington Water Power Company, Spokane, Wash., and the Schenectady Power Company. Mr. Parsons was a member of the University Club, the Metropolitan Club, the St. Andrews Golf Club, the St. Nicholas Club and the Down Town Association, all of New York City.



Hinsdill Parsons.

Charles J. Symington, general sales agent of the T. H. Symington Company, Baltimore, Md., with office at Chicago, has been made vice-president in charge of sales, with office in New York, and Thomas C. de Rosset, sales agent of the Symington company, has been made manager of eastern sales of that company, with headquarters in Baltimore, succeeding John F. Symington, resigned to go to Hambleton & Company, Baltimore, a banking firm.

TRADE PUBLICATIONS.

Protective Liquid.—The Watson-Stillman Company, New York, has published bulletin J on Jackohol, a protective filling liquid for use in the cylinders of hydraulic tools. Prices are included.

Test Meters.—The General Electric Company, Schenectady, N. Y., has published bulletin 4942 on Thomson direct current test meters, type C B-4. This bulletin is illustrated, gives detailed descriptions and supersedes the company's previous bulletin on this subject.

Doors.—The Variety Manufacturing Company, Chicago, has issued a new illustrated catalog describing its cross horizontal folding doors, freight elevator doors, tin-clad fire doors and shutters, iron fire doors and shutters, joist hangers and miscellaneous light iron work.

Hydraulic Jacks.—Richard Dudgeon, New York, manufacturer of hydraulic jacks, has published a small illustrated booklet entitled The History of the Hydraulic Jack. This booklet gives a brief history of the development of hydraulic jacks, a detailed description of their construction, and a number of points on their care and upkeep.

Graphite.—The Joseph Dixon Crucible Company, Jersey City, N. J., has issued a 40-page booklet entitled Graphite Products for the Railroad, giving illustrations and descriptions of methods of using Dixon graphite products in maintenance of equipment work. This is the second edition of the book brought up to date to correspond with certain changes that have been made in standard practice and several new products that have been added to the line.

Tools and Supplies.—The Scully Steel & Iron Company, Chicago, has issued its 1912 Blue Book, a complete catalog and stock list of the company's iron, steel, machinery, heavy hardware, tools and supplies, for the year. The issuance of the book marks a change in the company's practice, as the monthly stock list has been discontinued and the Blue Book will hereafter show the various lines and the amount of stock carried. The amount shown in the stock columns represent the quantity always kept on hand. The book is indexed and contains about 75 pages of special tables and information of interest to boiler makers and other steel users, including a large amount of new data about riveted joints, butt joints and bursting pressure of boiler shells, issued by the courtesy of the Hartford Steam Boiler Inspection & Insurance Company.

A new line is being built between Rome, Italy, and Naples, which will shorten the present distance of 155 miles by about 24 miles. This road will run underground from the outskirts of Naples to the center of that city, and a number of underground passenger stations will be built.

Construction work is progressing on the Trans-Uruguayan Railway from Colonia, opposite Buenos Aires, almost due north to San Luis, on the northern frontier, where it will be linked with the Brazilian railway system. This line, together with its branches, will be 425 miles long.

The Mafeking-Zeerust Railway, South Africa, a short section to connect the line from Johannesburg to Zeerust with the main line from the Cape of Good Hope to Rhodesia, is nearing completion and may eventually divert to the port of Durban much of the freight for Rhodesia and the north, now coming through other ports of South Africa. A part of the new line, a few miles long, from Mafeking to Buhrman's Drift, has been in operation for several months, and on February 1 another section of 13 miles from Buhrman's Drift to Otto's Hoop was opened to traffic. The remaining 18-mile section from Otto's Hoop to Zeerust is expected to be completed within a few months.

Railway Construction.

New Incorporations, Surveys, Etc.

ATCHISON, TOPEKA & SANTA FE.—An officer writes that the Dodge City & Cimarron Valley is building a line from Dodge City in Ford county, Kansas, through portions of Ford, Gray and Haskell counties, for a distance of 60 miles. This is being built as a light development line, with 1 per cent. grade, but is located for a .4 per cent. grade line with the idea of raising sags and lowering cuts on the present line to make this a .4 per cent. grade line eventually, should the line be extended as originally projected through to Colmor, New Mexico, which is on the Santa Fe, south of the Raton mountains. Such a line would cut out the heavy grades over the Raton mountains for traffic originating east of Dodge City, Kansas. Grading is well under way on this line and the company expect to begin track laying about May 15. C. H. Morse, chief engineer, Topeka, Kan. (January 26, p. 176.)

President Ripley says that almost the entire sum of $5,000,000 appropriated for improvements on the lines tributary to Los Angeles, Cal., is to be spent for building double-track, preparatory to the increased volume of traffic expected during and after the year of the exposition. About $2,000,000 of this will be spent for improvements in southern California, and $3,000,000 will be spent for improvements in Arizona. Second-track will be laid between San Bernardino, Cal., and Keenbrook, about 15 miles.

CANADIAN NORTHERN.—According to press reports, this company will start work on the Duluth, Winnipeg & Pacific, over which, when completed, the Canadian Northern will enter Duluth, Minn. T. Turnbull, assistant chief engineer, Winnipeg, Man.

Contracts have been let for grading various branch lines and extensions, as follows: To the Northern Construction Company, Winnipeg, Man., from Benton, Alb., to Munson, 110 miles; to the Western Construction Company, Winnipeg, for the completion of the line, from Winnipeg, northerly to a point on Lake Winnipeg, and to W. J. Cowan, Winnipeg,, for a section of the Calgary-Macleod branch, south of Macleod, Alb., and on the Prince Albert-Battleford branch, for 34 miles west of Blaine lake, Sask.

CANADIAN PACIFIC.—An officer writes that surveys are being made for carrying out improvements to include regrading and double-tracking work between Vancouver, B. C., and Calgary, Alta. J. G. Sullivan, chief engineer, western lines, Winnipeg, Man.

An officer of the Southampton Railway writes that contracts have been given to William McDonald & Sons and to McDonald Brothers, to build from a point on the Canadian Pacific one mile below Millville, N. B., south and southwest via Temperance, Vale and lower Southampton, to Hawkshaw bridge, 13 miles. Track has been laid on 6½ miles. There will be two steel bridges. The maximum grades will be 1½ per cent., and maximum curvature 9 deg. H. H. McNally, president, and D. Brown, chief engineer.

CANADIAN ROADS (Electric).—A company is being organized to build an electric line from London, Ont., southeast to Port Burwell, about 40 miles, to be financed by the municipalities through which it is proposed to be built. J. G. Henderson, London; J. C. Dance, Kingsmill; S. McDermand, Lakeview; J. Poustie, Port Burwell, and R. Black, Springfield, are interested.

CHATTANOOGA, ROME & ATLANTA INTERURBAN.—According to press reports, this company is ready to begin grading work as soon as a charter can be secured in Georgia. A charter has been granted to the company in Tennessee. The projected route is from Chattanooga, Tenn., southeast to Atlanta, about 85 miles. The first section to be built will be from Chattanooga to Hillsdale, Ga., 27 miles, and from that point it will be built via Rome and Cartersville to Marietta. Trackage rights will probably be secured from Marietta to Atlanta. C. Reif, president; J. O'Grady, vice-president; J. A. Hill, vice-president and general manager; S. A. Hunt, treasurer, and S. Devine, secretary, Chattanooga.

DODGE CITY & CIMARRON VALLEY.—See Atchison, Topeka & Santa Fe.

DOMINION ATLANTIC.—The Railway Commission of Canada has approved the plans and profiles of the North Mountain branch, which is to be built from the Cornwallis valley branch at Centreville, N. S., west to Weston, about 15 miles. The maximum grades will be 1.5 per cent., and maximum curvature 4 deg. New stations will be opened at Billtown, at Lakeville, at Woodville, at Grafton, at Somerset and at Weston. M. A. Fullington, Kentville, N. S., resident engineer.

DULUTH, WINNIPEG & PACIFIC.—See Canadian Northern.

ERIE.—An officer writes that contracts for second-track and grade reduction work between Concord, Pa., and Meadville, 35 miles, have been let to the following contractors: To the Ferguson & Edmondson Company, Brookville, Pa.; Robert Grace Contracting Company, Cleveland, Ohio, and T. A. Gillespie, New York. W. J. Harahan, vice-president, New York. (Mar. 15, p. 525).

FRONTIER TERMINAL.—See Frontier & Western.

FRONTIER & WESTERN.—The New York Public Service Commission, Second district, has refused the application of this company for a certificate of public conveniences and necessity, to build from the terminal of the Frontier Terminal to the International bridge, about five miles. The Frontier Terminal has been authorized to build a freight belt line around Buffalo, N. Y. C. W. Goodyear, president, and R. F. Schelling, secretary, Buffalo.

GRAND TRUNK.—Contracts have been let for building the Southern New England from Palmer, Mass., to Providence, R. I., as follows: To the O'Brien Construction Company, New York, for the Rhode Island section, about 27 miles, and to the John Marsh Construction Company, Milwaukee, Wis., from Palmer, Mass., to Blackstone. The American Bridge Company has the contract for the steel bridge superstructures, and the Strobel Steel Construction Company, Chicago, for erecting the bridges.

JOLIETTE & LAKE MANUAN COLONIZATION.—This company was organized to build from Montreal, Que., north and northwest via Joliette, Ste. Emelie de l'Energie and St. Michel des Saints, to Lake Manuan. The line will connect with the National Transcontinental Railway (Grand Trunk Pacific) at Weymontachene. The Enterprise Construction Company, of New York and Ottawa, are now at work on a section of 60 miles. J. N. Patton, chief engineer, St. Felix de Valois, Que. (Nov. 17, p. 1036.)

KETTLE VALLEY.—Contracts have been let, it is said, for grading 25 miles west of Carmi, B. C., as follows: To C. H. Williams & Company, six miles; Millighan, Dussault & Company, nine miles, and Porter & Connelly, 10 miles. A. McCulloch, chief engineer, Penticton.

LAKE ERIE & EASTERN.—An officer writes that a contract has been given to the Culbertson Construction Company, Cleveland, Ohio, for grading and masonry work through Youngstown, Ohio. J. A. Atwood, chief engineer.

MAINE CENTRAL.—This company has petitioned the Maine railroad commissioners for permission to change the location, on a total of about 1½ miles, at three places between Danville Junction, Maine, and Cumberland Junction. The changes are to carry out the reduction of curves and grades preparatory to double-tracking. T. L. Dunn, chief engineer, Portland.

OKLAHOMA ROADS (Electric).—Residents of St. Louis, Mo., associated with capitalists of Woodward, Okla., are back of a project to build an electric line from Woodward, south via a point near Mutual, Cestos and Lenora, thence crossing the Canada river at Taloga, via Putnam and Anthon to Clinton, where a connection is to be made with the line being built by J. L. Hamon, from Ardmore to Lawton, and which it is said is to be extended northwest to Clinton.

SOUTHERN NEW ENGLAND.—See Grand Trunk.

SOUTHAMPTON RAILWAY.—See Canadian Pacific.

RAILWAY STRUCTURES.

GREEN SPRING, W. VA.—See an item in General News regarding new tie-treating plant for the Baltimore & Ohio.

BALTIMORE, MD.—An electric sub-station, to be 50 ft. x 87 ft., of brick and concrete construction, with concrete roof, is to be built by the Baltimore & Ohio at Mount Clare.

Detroit, Mich.—Work is to be started at once by the Wabash on an extension of its freight shed to a length of 1,500 ft., at an estimated cost of $93,000.

Helena, Mont.—The Great Northern has announced it will build a new station this year on the site of the present building.

Hickory, N. C.—The Southern Railway is receiving bids for the construction of a new passenger station at Hickory, and work will be started as soon as the contract has been let. The station will be of brick with tile roof, 30 ft. 2 in. x 132 ft. There will be a white waiting room, 28 ft. x 36 ft., and a colored waiting room, 23 ft. x 28 ft.; a baggage room 16 ft. x 28 ft. The ticket office will be located in the center of the building.

Norfolk, Va.—According to press reports, the Norfolk & Western has given a contract to Henry Steers, Inc., New York, for constructing a breakwater, carrying out dredging work and constructing a bulkhead and the superstructure for the new 1,200-ft. steel coal pier at Lambert's Point. (March 29, p. 781.)

Portland, Ore.—The Southern Pacific has asked bids for a new freight house to be built on the east side of the city at an estimated cost of $120,000. The building will be 40 ft. x 200 ft., and will be constructed of reinforced concrete and steel. Offices will be located on the second floor.

San Antonio, Tex.—The International & Great Northern has announced that work will be started at once on the construction of a cold storage plant for fruits and vegetables. The building will be 148 ft. x 80 ft., and will have five stories, with a storage capacity of 500,000 cu. ft.

Scranton, Pa.—An officer of the Central of New Jersey writes that the company expects to build a new passenger station at Scranton, in the near future. The plans have not yet been completed. (April 5, p. 825.)

Washington, Ind.—The Baltimore & Ohio Southwestern has let contracts for the construction of two additions to its machine shops and the improvement of its roundhouse.

Wilkesbarre, Pa.—An officer of the Wilkesbarre Railway Company writes that bids have been received for enlarging the Market street bridge, and double-tracking that structure. This improvement is now held in abeyance by the county commissioners, who are investigating the question of removing the present structure to another site, and building a new concrete arch structure, about 90 ft. wide and 750 ft. long. Nothing definite has yet been decided.

A line is proposed from Corinilla, on the Atlantic coast of Uruguay, to Santa Rosa, on the Uruguay river.

The Russian council of ministers have approved the estimate of the minister of ways of communication regarding the freight engines for the state railways. During the next five years 1,071 new locomotives will be needed. Of this number, 214 locomotives will be ordered during the present year.

The construction of a railway from Shekwan, China, across the East river from Shek Lung, on the Canton-Kowloon railway, to Amoy has been under consideration for a number of years, and in 1906 a survey of the route was made. The line is to be built by a Chinese syndicate representing the people of the provinces of Kwangtung and Fukien through which the road will pass. It is expected that construction work will not be begun for some time. The line will have 275 miles in Kwangtung, and about 100 miles in Fukien. It will penetrate thickly populated country in a high state of cultivation, and will bring rail communication to several important cities now served by inferior waterways. The western terminus, Shekwan, is a busy town, with about 10,000 inhabitants. It shares with Shek Lung in the distributing trade of the East river delta and of a large area along both sides of the river to the east. The country surrounding it is fertile and is devoted largely to the cultivation of rice and sugar, and to cattle raising. At Chaochowfu the line crosses the Swatow-Chaochowfu railway, thereby obtaining rail connection with the sea at that point. Chaochowfu is an important collecting and distributing center for the Han valley and considerable areas on both sides of it. Its principal port is now Swatow, but with the completion of the line from Canton, it will be able to draw easily upon Amoy as well as upon Hongkong and Canton.

Railway Financial News.

Bartlett & Western.—The Bankers Trust Company, of Houston, Tex., proposes to finance an extension of this company from Bartlett, Tex., to Cameron, a distance of 32 miles, to form a connection with the Atchison, Topeka & Santa Fe and the San Antonio & Aransas Pass. Capital for this extension will be furnished when satisfactory right-of-way and bonuses have been secured. The Bartlett & Western runs from Bartlett to Florence, 23 miles.

Chicago, Memphis & Gulf.—Suit to force the sale of this company and its property to the Illinois Central was instituted in the United States district court at Memphis, Tenn., on April 15. It is alleged by the Illinois Central that the defendant has broken its contracts by making certain conections with other roads. The Bankers Trust Company of New York is named as a co-defendant in the suit.

Florida East Coast.—The New York Stock Exchange has listed $1,000,000 additional first mortgage 4½ per cent. bonds of June 1, 1909-1959, which were issued for improvements and extensions. The amount authorized is $12,000,000, and the amount outstanding and listed is $11,000,000.

Grand Trunk.—This company has sold to Blair & Co., New York, $3,940,000 4½ per cent. car trust notes dated May 1, 1912, and maturing in twenty semi-annual instalments of $197,000 each, beginning November 1, 1912, and extending to May 1, 1922. These notes are redeemable at 102½. The proceeds will be used to buy new equipment.

Missouri & North Arkansas.—Bids will be received at the company's office, St. Louis, Mo., until May 10 for $1,250,000 5 per cent. 3-year receivers' certificates dated May 1, 1912, and callable at 101. The amount authorized is $2,500,000. This road is 337 miles long.

New York Central & Hudson River.—The directors of the Rome, Watertown & Ogdensburg, the Utica & Black River and the Oswego & Rome have resigned and their places have been taken by the directors of the New York Central.

New York, New Haven & Hartford.—The New York Public Service Commission, Second district (up-state), has granted permission to the New Haven to acquire all the capital stock of the Westchester Street Railway. That corporation will be reorganized and made a subsidiary of the New York, Westchester & Boston, a subsidiary of the New Haven. The street railway line extends from Mamaroneck, N. Y., to neighboring points, with a total length of 21 miles.

Norfolk Southern.—Stockholders will vote on May 10 on the question of authorizing the purchase of the property and franchises of the Raleigh, Charlotte & Southern, and the execution and delivery of $5,456,000 first and refunding mortgage bonds and the reservation of $851,000 of these bonds to provide for the purchase of the R. C. & S., and additional cash for the connection, improvement and extension of that road. The R. C. & S. is 237 miles long.

Oswego & Rome.—See New York Central & Hudson River.

Raleigh, Charlotte & Southern.—See Norfolk Southern.

Rome, Watertown & Ogdensburg.—See New York Central & Hudson River.

Texas & Pacific.—This company has sold to Blair & Co., New York, $500,000 5 per cent. car trust notes maturing in 10 equal annual instalments.

Utica & Black River.—See New York Central & Hudson River.

Virginian.—Stockholders will vote on May 4 on the question of authorizing a new issue of not exceeding $75,000,000 first mortgage bonds. These bonds may be issued to the amount of $25,000,000, secured by a mortgage on the main and branch lines and other property, for the purpose of retiring the outstanding $25,000,000 first mortgage bonds pledged as collateral for Tidewater Company notes, called for payment on June 1. The remainder will be used for future construction or acquisition of additional property and facilities. As mentioned in the *Railway Age Gazette* of March 29, arrangements have already been made for the sale of $25,000,000 of these bonds.

Wabash.—The United States court at St. Louis, Mo., on April 26 gave permission to the receivers to issue $1,500,000 5 per cent. receivers' certificates to provide for the May 1 requirements.

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GENERAL NEWS SECTION 1059

THE widespread expressions of appreciation and approval which the series of articles on Defective Box Cars and Damaged Freight has evoked from railway officers, emphasizes the importance of immediate action being taken to improve the condition of the equipment. The railways cannot delay very much longer in placing orders for large numbers of freight cars, and now is the time to decide on the designs and details which must be used in order that this equipment may not prove a burden, because of its inefficiency in protecting the freight which it must transport and because of the high maintenance costs which follow the tendency to cut down the weight and price of the cars below a reasonable limit. The practical men, in both the operating and the car departments, who come into close contact with the cars and who have exceptional opportunities of seeing their weak points, should be consulted in deciding on the details. In order that all of the roads may co-operate and work together in this improvement for better equipment, the American Railway Association should take forcible measures to insure prompt and general action being taken, as recommended in the conclusions of the last article in the defective box car series, which appears elsewhere in this issue. A bureau to pass upon the new equipment and the improvement of the old equipment to make it satisfactory from a transportation standpoint is just as necessary, and possibly more so, than the Bureau of Explosives, or the Committee on the Relations Between Railroads.

THE aim of the car designer and of the men who direct the purchase of freight cars has been along the lines of securing cars of light weight, to make the ratio of the dead weight of the car to the capacity as low as possible and also to reduce the first cost to a minimum. The condition of the box cars on many lines would seem to indicate that this tendency had been carried much too far and that the possibility of heavy maintenance costs and of damage to freight due to defective design and construction had been almost entirely overlooked. In the study which we have made of defective cars and the resulting loss and damage to freight we have found that one wooden box car was so much better than the average that it has strongly attracted the attention of the operating and mechanical department officers who are engaged in the problem of developing a model box car from the standpoint of reducing the amount of loss and damage to freight. This is the 40-ton box car on the Atchison, Topeka & Santa Fe. The car was designed under the direction of E. Posson, engineer of car construction, and is probably more nearly water proof, grain tight and burglar proof than any other type of all-wood box car in general use in this country at the present time. Some of the methods Mr. Posson follows in developing a design are worthy of thoughtful consideration by men engaged in this work on other roads. The Santa Fe is a large system, but every morning he has on his desk and studies over a report of all of the bad order cars on the system for the previous day. In this way he is able to follow up the cars in service and get some idea of their reliability. In designing the box cars special attention is given to making them burglar, water and cinder proof and grain tight. After the cars are designed, and the contracts are let, the builders are first required to build a sample car. This is not only closely inspected during the process of building by inspectors from Mr. Posson's office, but he himself spends a couple of days in making a critical and accurate examination of every portion of the car. When the sample car is finally passed upon, all the cars in the order must conform strictly to it.

GOVERNOR FOSS, of Massachusetts, has vetoed the full-crew bill passed by the legislature of that state, holding it to be inequitable, because it does not provide for adjusting the number of men in a crew to different kinds or classes of trains. The bill had received only two negative votes in the House, and only one in the Senate. The appeal which the railways made in the newspapers calling upon citizens to oppose this bill, appears to have fallen on very deaf ears, especially in the legislature. However, it is to be said for the upper House that on a motion to pass the bill over the governor's veto fourteen senators voted against it; and the motion failed, the law calling for a two-thirds majority. This would have required 24 votes instead of the 20 which it received. The governor has done a good thing; but his motives seem to be largely political. In his veto the governor says that the state ought to have a public service commission; meaning, presumably, that he thinks the present railway commission has insufficient power to deal with questions of this kind. In

demanding a "public service" commission the governor seems to be dazzled by the mere name, which has become so popular in other states. The principal projects which he has in mind appear to be all connected with transportation, the scheme for consolidating the New Haven and the Boston & Maine with a tunnel across Boston and electrification *ad libitum* being the largest one. But, for transportation matters, the state already has a radical law, passed only last July. The act then adopted (Chapter 755) gives the railway commissioners power not only to change rates, with as much freedom as was ever enjoyed in Georgia, Oklahoma, or any other radical community, but also to correct improper or inadequate practices, equipment, appliances and service; all these powers to be subject to no restraint except that of the courts; which restraint exists, of course, in all the states. Apparently the reason that Massachusetts has not entered upon a course of radical railway regulation is that a majority of her commission is composed of conservative men. It is true, however, that Governor Foss has not shown himself to be quite so conservative.

THE means being adopted for increased inspection of rails during the processes of manufacture, which are described elsewhere in this issue, will be very advantageous in several ways, both directly and indirectly. In the first place, under this new arrangement the inspector who finally accepts a rail will have a knowledge of the history of its manufacture when he inspects it, and if what is recognized and provided for as good practice in the particular mill has been departed from in any stage he will be prepared to subject the rail to a severer scrutiny. In this way he should be able to detect many such rails as now go into the track defective because of bad mill practice and which later fail in service. An important indirect benefit will be the moral influence of having the inspectors in the mills at all times. Although the inspector has no authority over the workmen, the latter will be less disposed to deviate from the established rules, or good practice, or from the specifications when they know that this deviation will be made a matter of permanent record and that their personal identity will be connected with any defective rails produced, and the foremen in charge will also have the same personal reason for exercising care. Under the existing practice of paying the men on the basis of the tonnage turned out, the inclination is great to rush the work, especially immediately after any delay. Suppose that either the blooming or the rail mill is forced to suspend operations for a short time. The steel converters or furnaces continue turning out steel and the soaking pits become congested. When the repaired mill starts again the tendency is to hurry the ingots through the soaking pits and the blooming mill in order to catch up with the steel plant. The time the steel should stay in the soaking pits may thereby be reduced, giving rise to cracks in the metal which will not weld in rolling and which pass into the finished rail. With an inspector looking on, and knowing that such action will be reported, the foreman will be less likely to permit the material to be rushed in this way, and the men less inclined to attempt it; and even if the work is unduly hurried the final inspector will be warned to watch the rails from this heat closely. In this way a stricter adherence to good mill practice should be secured and the quality of the rails should be improved, benefiting not only the railway, but also the maker, by reducing the percentage of second quality as well as of defective rails. Another important advantage will be the securing of a greater knowledge of the rails put into track. From the records of each heat furnished to the railways their engineers will be able to study the relations of mill practice to service results. Heretofore the railways have been at a great disadvantage in studying rail failures because of their inability to go back of the finished rail—to look "behind the returns." It is very probable that a study of service records in the light of the records of manufacture of the very steel whose results are studied will show where improvements can be made to insure a sounder rail. Another thing to be considered in reference to this increased inspection is the attitude of the state and federal commissions. When the manufacturers and railways co-operate properly in adopting all practicable measures to insure the making of sound rails there can be no good ground, or even plausible pretext, for interference by the public authorities, and the traveling public will feel much greater confidence in the safety of transportation.

A BANKING house has been extensively advertising in the newspapers that two men prominently identified with the railway business whose names are given—one the vice-president and general manager of an important railway, the other a "railway capitalist," and so advertised—are directors in a railway supply company which has been organized to take over several smaller concerns, and that "The organization includes executives and engineers of recognized prominence among railway officials throughout the United States." It is further stated that "the constituent companies manufacture and install complete systems of special electrical equipment now in use on practically all the railways in the United States, including"—here follows a list of twenty-two of the largest trunk lines in the country. Further along the statement is made in blackface type: "The scope of the company's business, the established reputation of its products, the character of its customers, and the personnel of its management, indicate the importance of this corporation in the railway field." In conclusion, the public is invited to buy stock in the company. It is hard to believe that any man connected with the railway business can have read this advertisement without feeling that while it might be the sort of publicity which would induce people to buy the stock offered for sale, it was bound to injure the reputation of the two railway men mentioned as directors, and those of railway men in general. The statement that the organization "includes executives and engineers of recognized prominence and acknowledged reputation among the railway officials throughout the United States" is certain to convey the impression, whether intentionally or not, that prominent railway men throughout the country are identified with this supply company; and even merely advertising that two railway men were directors would be enough to cause many persons to jump to the conclusion that numerous other railway men are similarly identified with this and other like concerns. Furthermore, what interpretation will naturally be put on the statement that *"the character of its customers"* and *"the personnel of its management" "indicate the importance of this corporation in the railway field"?* (The italics are ours.) If the advertisement had been deliberately so worded as to furnish ammunition to those who make it their business to attack railway management it could not have been more cunningly adapted to that purpose. We understand that one of the railway men who are directors was elected to serve only temporarily; but the harm caused by the use of his name in this connection is now done. Does not the fact, that the giving of publicity to the connection of railway officers with railway supply concerns causes comment and develops a public opinion that injures railway men and the roads, in itself furnish pretty strong evidence that such connections are most undesirable from the standpoint both of the railway men and the roads, and is it not true that conditions that thus invite criticism are conditions which, as a matter of railway policy, not to mention any stronger reason, ought not to exist? Railway officers complain loudly about the attacks of the muck-rakers, about a hostile public opinion and about restrictive and harmful public regulation; but it is unfortunately true that hardly a day passes when things are not done by railway men themselves which furnish ammunition to the muck-rakers, incense public opinion and furnish the pretext for the very kind of regulation of which they complain. Fortunately, on the other hand, the number of railway officers of whom this must be said is growing smaller.

RAILS BROKEN BY FLAT WHEELS.

IN the various articles relating to the rail situation recently published in the *Railway Age Gazette,* rail breakage due to inherent defects of the steel have been discussed. The relation of the rail section and wheel loads has been considered, but the effect of flat wheels running at high velocity has hardly been touched on. During January and February, when the weather was most severe, several lines reported derailments due to broken steel tired wheels and numerous broken rails were caused by the blows from flat spots on steel tires on passenger car wheels, tender wheels and locomotive drivers. Prominent among these were wheels on the very fast limited trains on the eastern lines, and on some of these the wheels were not only slid flat but broken, and the condition became so serious that investigations were made to ascertain the cause. It was naturally attributed to the brakes and brake shoes, and, while these are held blameless under normal conditions, it is a fact that the heavy brake pressure required for the safe running of very fast trains heats the wheels and applies loads which sometimes set up stresses beyond the limits of their resistance. With proper manipulation of the brakes and favorable rail conditions these brake pressures exceeding the weight on the wheels may be used successfully; but with a slippery rail and irregular brake action the wheels may be slid flat, and if not promptly removed will break the rails when running at high speed.

As we have previously contended in these columns, some factor of safety must be allowed in the strength and section of the rail for high stresses set up in this way, but there is a limit to the size of the flat spot and to the speed, beyond which it becomes dangerous to the best of rails. The speeds of freight trains are so slow that a length of flat spot on cast iron wheels of 2½ in. has become a well established standard and few broken rails have ever been traced to that combination. The effect of speed on the damage to rails by slid flat wheels is properly recognized by limiting the length of flat spots on steel tired wheels in passenger service to one inch. The difficulty is that the spot may increase in size considerably above one inch on a single run, and the damage to rails is accomplished before there is opportunity to remove the wheel. In 1909 the question of reducing the limit for freight wheels to less than 2½ in. was considered by committees of the Master Car Builders' Association and the American Railway Engineering Association, but it was not then considered advisable to make any change in the rule.

In the *Railway Age Gazette* of March 16, 1910, we reported 200 85-lb. rails broken in 14 miles by a flat spot which had grown to a length of 6 in. and maximum depth of ⅜ in. The following are representative of conditions on many lines during the severe cold weather of January and February, 1912. During January of this year a case was reported on a line in Minnesota where a small flat spot on a rolled steel wheel in passenger service enlarged to 4 in. long and broke nine 80-lb. rails in a distance of 3 miles. On January 7, a flat spot 5½ in. long on a steel tired wheel on a passenger train broke 150 rails near Savanna, Ill. On January 14, on a line in South Dakota, two steel wheels with flat spots on different trucks of a dining car broke 500 rails. On January 24, on a line in New York state, a flat wheel on an observation car broke 15 rails. On January 20, on a line in New York state, a flat wheel on a fast train broke nearly 100 rails. In February, a fast train on a line in Ohio having a shelled out steel tired wheel broke 960 rails in 200 miles; at the end of the run the flat spot was found to be 9 in. long. In February, on a line in Indiana, a flat spot on a steel tired wheel under a baggage car broke 50 rails in 70 miles.

A considerable amount of rail breakage was caused on some lines by shelled out and slid flat spots on steel tender wheels when these spots reached a length of 3 to 6 in., and as a rule they were on fast passenger trains. The intensity of the blow from a flat wheel is materially increased by the rigidity of the track when the ballast and substructure is frozen into a solid mass, and for this reason most damage to rails occurs in very cold weather.

Flat spots on driving wheels are liable to damage and break rails even at moderate speeds, because the weight below the springs is so much greater than that of car or tender wheels, and broken rails on several lines have been traced to this cause. There is also direct evidence that driving wheels which are not truly circular have broken rails in large numbers, and this condition becomes so serious in winter that some lines in the northern districts have found it necessary to order a monthly inspection of driving tires over 63 in. in diameter and to make a limit of 1/16 in. difference in diameter, beyond which the tire must be turned. Uneven worn spots 2 ft. long or more on tires 70 in. or greater must also be removed by turning. During the past winter a defective driving tire on a line in Illinois broke over 100 rails on one trip and an equal number on the next trip, and the cause was then definitely located.

The intensity of the blow delivered by a slid or worn flat wheel has been investigated theoretically, and information on the subject will be found in a paper on Flat Spots on Car Wheels, by Prof. C. H. Benjamin, in the Proceedings of the Western Railway Club, November, 1908. His revised conclusions on this subject are: That the wheel is in the nature of a projectile and as soon as the beginning of the flat spot reaches the rail it falls toward the rail impelled by gravity and accompanied by its share of the load. That if this were all, the flat spot would not be a serious menace because at higher speeds there would not be time for the wheel to fall and practically no blow would be struck. That the spring effect changes this, because the spring being interposed between the car and the wheel has only to overcome the inertia of the parts below it and will cause the wheel to fall more rapidly than by gravity. That the swaying of the car may add to this latter effect considerably. That these conditions are such as to make a mathematical solution more or less approximate.

A discussion of Professor Benjamin's paper by H. H. Vaughan, and his elaborate treatment of the subject, will be found in the *American Engineer* for December, 1908, page 475. On account of the uncertainties connected with such calculations, it was proposed to construct a testing machine for the purpose of measuring the effect of the blow from flat spots on car wheels, and Professor Benjamin is now building a machine for this purpose at the Purdue mechanical laboratory.

Neither calculations nor testing machines are necessary to demonstrate the fact that rails can be broken by flat wheels and oblong driving tires, for the experience of the past winter, as shown by the cases above described and many others on record, is the most conclusive and direct proof. This is a test on a large scale, and it is sometimes selective in breaking brittle rails and not those which are more ductile. They may also be broken in this way on the most rigid portions of the track and not on that which is most yielding.

To guard against possible misunderstanding of the foregoing by those not familiar with railway engineering matters, it should be stated that rail breakages are of two distinct classes, those of rails which are sound when put in track and those of rails which have inherent defects. Either a sound or an unsound rail may, of course, be broken by a blow from a flat wheel; but from the standpoint of safety the breakage of an inherently sound rail is unimportant as compared with that of an inherently defective rail. In the case of a sound rail the break is pretty sure to be a clean one, and the rail will ordinarily be held securely in place by the track fastenings until found and removed by the track forces. On the other hand, a defective rail will ordinarily shatter into several pieces, thus destroying the continuity of the track, and giving rise to serious danger of accident. It is for this reason that most serious derailments are due to inherently defective rails. For the

breakages of defective rails—and these are the only breakages that have been considered by the *Railway Age Gazette* in previous recent discussions of the rail situation—the rail makers must be held chiefly responsible; and the remedy is better methods of manufacture. For the breakages of sound rails caused by flat wheels or other defects of equipment—which, as the statistics given herewith show, are not uncommon in severe weather—the railways must, and, in fact, do, accept full responsibility; and the remedy is constant vigilance to remove defective equipment from service and to properly regulate the speed of trains, especially in cold weather.

THE RAILWAY LABOR SITUATION. VI.

IT is true that the rich are growing richer. It is not true in the United States that the poor are growing poorer. But, while the poor are not growing poorer, important, and even ominous, changes have been occurring in the control of property. The number of farms in this country increased from 4,564,641 in 1890 to 5,737,372 in 1900, and to 6,361,502 in 1910. The average number of acres to a farm was in 1890 136.5; in 1900, 146.2, and in 1910, 138.1. These figures indicate a steady increase of persons who own and cultivate land. The social and political history of a nation is largely determined by the number of its citizens who own property. Considered by themselves, these figures seem to give ground for optimism.

But the population figures for the same years do not tell so encouraging a story. In 1890 36.1 per cent. of our population lived in places of 2,500 inhabitants or more; in 1900, 40.5 per cent., and in 1910, 46.3 per cent. These changes are mainly due to the growth of cities. Under modern conditions as the percentage of the urban to the total population increases, the proportion of citizens who own property tends to diminish. The city dweller ordinarily does not own his home. He usually works for wages or salary, and banks his savings or buys life insurance. The banks invest his money in stocks, bonds or commercial paper. The life insurance companies invest their reserves in securities. The depositor or policy holder has a very real interest in the quality of the paper in which his money is invested. But his interest is one of the nature and degree of which he is only partially conscious.

He has no voice in the management of the concerns in which his money is invested, and none of the feeling of pride or responsibility that accompanies conscious proprietorship. He regards the "financial magnates" who control the management of large corporations as their owners, and he reads or talks of the concentration of wealth in the hands of the few, when the concentration is much less that of wealth than of the management of wealth. People used to say that Mr. Harriman "owned" railways capitalized for more than a billion dollars. When he died he owned, perhaps, 10 or 15 per cent. of a billion dollars. Regarding these large accumulations by a few of power over wealth as the accumulation of wealth itself, and having no feeling of proprietorship in the soil, the factories and the railways of his country, the average wage and salary worker grows disposed to adopt, in co-operation with others, whatever measures seem to him calculated to redress the balance of prosperity. Hence, largely, unreasonable demands and conduct by labor unions; hence, so-called "progressivism," socializing reform movements and the trend toward socialism.

The railways of the United States are the most conspicuous victims of this situation as to the control of corporate wealth and the tendencies, political and social, it produces. Frequently there is published a short list of the names of the men who are said to "own" the railways. In fact, directly and indirectly, the ownership of the railways is widely diffused. But the wage or salary worker whose deposits in banks and premiums in life insurance policies have been invested in railway securities, including thousands of the employees of railways, don't know that they are among the owners of the railways, and are wanting in any feeling of proprietorship in them. Perhaps nothing could more change the attitude of railway employees and the public toward the roads than a wide diffusion, especially among the employees, of the direct ownership of railway bonds and stocks. Suggestions for attempts to get employees to invest in railway securities often have been advanced. Some have been made. But they have met with little success, and under present conditions many railway managers think that while, theoretically, a widespread diffusion of securities among railway employees would be desirable, practically, it could not be obtained.

Some large industrial concerns are not so easily discouraged. The measure adopted by the United States Steel Corporation to get its employees to invest in its securities are familiar. Two large railway supply concerns have recently adopted plans for the sale of stock to their employees. Six of the largest stockholders of the Baldwin Locomotive Works contributed shares to a fund, and offered to employees selected by them one share of 7 per cent. cumulative preferred stock and two shares of common stock for $200 for the three shares. Payment in cash might be made at the time of subscription, thus rendering the ownership absolute; or the employee could give his note for ten years with interest at 4 per cent. for so much of the purchase money as should be unpaid. The purchaser is credited with all dividends declared, out of which are paid the interest on his note; and any residue of dividends is credited on the principal. Shares not fully paid when the subscription is accepted will be held as collateral until full payment. Ample provision is made for the protection of the purchaser and his heirs, in case of his discharge or death, or the dissolution of the company.

The Union Switch & Signal Company last year offered stock to its employees, excepting its directors and general executive officers. Each had the right to subscribe for an amount governed by his total compensation during the year prior to the adoption of the plan. The stock was issued at $75 per share. Payment may be made in instalments covering a maximum of 50 months, and cash dividends accruing in the meantime will be credited to the purchaser's account, except that no dividends will be credited until 24 per cent. of the total purchase price has been paid in minimum monthly instalments of 2 per cent. The privilege is also offered to those who continue in the company's service, after completing payment for stock purchased under this plan, to receive non-transferrable "participation" certificates, on which they will secure "substantial profits in addition to dividends paid to other stockholders through the repayment of one-third of the purchase price of $75 per share by means of 'special participation dividends' at the rate of $5 per share per annum for a period of five years, thereby eventually reducing the actual cost of stock purchased by employees to $50 per share." Employee stockholders may, after the date of final settlement, surrender "participation" certificates and receive for them regular stock certificates. But the acceptance of regular certificates, which can, of course, be sold and transferred, will involve the surrender of any rights under the plan additional to those enjoyed by ordinary stockholders. If an employee stockholder shall cancel his subscription before his stock shall have been fully paid there will be returned to him the exact amount of his payments (otherwise than by dividends credited) with interest at 5 per cent. If the monthly payments required shall be discontinued for three months without the written consent of the company it may close the account. Stockholders whose employment is suspended by temporary closing of the works will not be deprived of their rights, and if the period of suspension exceeds three months in the aggregate it will not be counted as part of the period of 50 months in which full payment of the subscriptions must be made.

The foregoing summarizes very briefly, and perhaps inadequately, the plans adopted by these two great railway supply concerns to give employees a proprietary interest in their business. Doubtless they were largely moved to this step by the belief that to obtain the most efficient and loyal service from employees they must make them co-proprietors. The interest shown by the employees of the Union Switch & Signal Company

is indicated by the fact that, while they were offered only 1,000 shares, 637 of them subscribed for 2,724 shares, all of which were finally allotted.

It is impossible to see why a railway cannot do what can be done by the Steel Corporation, the Baldwin Locomotive Works, or the Union Switch & Signal Company. Those who discuss the relations of railways and their employees sometimes talk as if all employees are arrayed in an attitude of antagonism to the roads and their managers. While, when questions of wages or conditions of employment are pending, members of the brotherhoods act as a unit, there are many thousands, both organized and unorganized, whose relations with the managements are most amicable and who have a sense of pride in and loyalty to the roads with which they are connected. Even the most loyal would not accept the opportunity to subscribe for stock or to buy bonds in lieu of changes in their wages or conditions of employment to which they thought themselves entitled. But if a real opportunity to buy securities were given, and the facts indicating their value were lucidly presented, it is hard to believe that there would not be a large number who would take advantage of it and that this number would not steadily grow.

There are other ways in which the railways and their employees can financially co-operate. The Rock Island and the Illinois Central have recently placed their law departments at the disposal of such of their employees as may have fallen into the toils of loan sharks. The Baltimore & Ohio long has conducted a building and loan association through which employees have been able to borrow money to build or acquire homes at a low rate of interest. Whatever makes the employee a better citizen will make him a better employee. And certainly no means of helping him to become a better citizen can be more effective than that of giving him a chance to acquire a real, financial stake, either in the form of an interest in the business with which he is connected or in the home in which he lives. It is true many co-operative plans have been partially or wholly unsuccessful. But a good many have been successful. Even if every past one had been a failure, that would be no conclusive argument against trying new experiments. The strongest bulwark against socialism in this and every other country is the farmers who own their own land; and a large increase in the number of salary and wage workers who were property-owners would provide another strong and much needed bulwark against it.

DENVER, NORTHWESTERN & PACIFIC.

THE history of the Denver, Northwestern & Pacific, for which receivers were appointed last week, forms an interesting comparison with the story of the Kansas City, Mexico & Orient. Each road was conceived of, promoted, and built, by one man in opposition to existing railway interests.

The Denver, Northwestern & Pacific was projected from Denver, Col., through the Rocky mountains, to Salt Lake City. While the road was to open up a rich section of Colorado heretofore without railway facilities, its most interesting object was to form a part of a new transcontinental transportation route independent of the Gould, the Harriman or the Hill lines. The road was projected by David H. Moffat, president of the First National Bank of Denver, and a financier of considerable local prominence. It was his ambition to build a line which should be a competitor of E. H. Harriman's Union Pacific, and Mr. Moffat was quoted on many occasions as ascribing many of the difficulties of the project to the fact that it was bitterly opposed by E. H. Harriman. On the face of it, it would not seem unnatural that Harriman should oppose the building of such a line.

The remarkable thing about the building of the road was the cheapness of the cost of construction. It is estimated that it cost about $60,000 per mile, which for a line through the Rocky mountains is very cheap indeed.

At the end of 1909 there was outstanding $10,940,000 4 per cent. 50-year bonds due 1952, and there was authorized $10,000,000 5 per cent. non-cumulative preferred and $10,000,000 common stock. In May, 1909, the Colorado-Utah Construction Company which was building the road, sold to Hallgarten & Company, New York, and George H. Burr & Company, Chicago, $4,000,000 6 per cent. notes of 1909-1911, guaranteed principal and interest by D. H. Moffat and secured by the deposit of $8,000,000 first mortgage 4 per cent. bonds of the D. N. W. & P. Presumably the $10,940,000 bonds mentioned as outstanding at the end of 1909 included the $8,000,000 deposited as collateral for the construction company notes. The road, after various difficulties, both of an engineering nature and of a financial nature, was built as far as Steamboat Springs, 214 miles west of Denver.

Shortly before May 1, 1911, when the construction company notes fell due, D. H. Moffat died, and on May 1 the interest on the notes was paid, but the principal, which was also due, was not paid. A company, the Denver Securities Company, was formed to take over the Moffat estate interest in the road. The Securities company had an authorized capital stock of $10,000,000, and took over $8,232,000, half common and half preferred, stock owned by the Moffat estate and offered $5,000,000 of its own stock for sale for $750,000 cash. (This sale would have made an interesting study for the Hadley Securities Commission had they had an opportunity to question those making the sale.) Of this cash, $500,000 was paid to holders of the $4,000,000 6 per cent. notes of the Construction company, giving the holder of each $1,000 note $125 in cash and $875 in purchase money collateral trust 6 per cent. notes of the Denver Railway Securities Company. An attempt was then made to reorganize the Denver, Northwestern & Pacific, and to sell it to some other railway interests or to persuade some eastern banking interests to take up the financing. It was rumored early this year in Denver that Kidder, Peabody & Company, of Boston, were about to become interested, but nothing more has been heard of this rumor.

The earnings of the road are not reported to the Interstate Commerce Commission, but since receivers both for the Securities company and for the railway have been appointed, presumably the road, extending only as far as Steamboat Springs, as it does, has not been able to earn its fixed charges. The difficulties of operation of the road in winter have been very great, and there is some doubt as to whether or not it will ever be possible to operate the road on a profitable basis unless a four-mile tunnel is driven through the continental divide. A bill has passed the Colorado legislature providing for the financing of this tunnel by the state, but nothing further has been done and no steps have been taken to issue bonds or in any way raise the money. With this tunnel built and an extension to Salt Lake made there will still be the question of finding traffic relations at the two ends which would provide through business. The road between Denver and Steamboat Springs runs through some coal fields, of which the full value is not known. It might not be impossible to establish traffic relations at the eastern end of the road, if it is completed, with a road terminating at Denver, like the Chicago, Rock Island & Pacific, or with a road like the Burlington, which possibly could advantageously ship San Francisco traffic over such a route. At Salt Lake, however, it would have nothing but direct competitors with which to exchange traffic.

How much of Mr. Moffat's personal fortune went into the building of the road it is impossible to say accurately, but estimates have placed it at over $7,000,000. Mr. Moffat was accused of building the road simply to force one of its competitors to buy it. On the other hand, there are many indications that it was built partly through personal ambition, partly in an attempt to prove to those who refused to enter into the project that it could be done and done profitably, and partly to develop a rich part of Colorado, in which Mr. Moffat presumably had interest, and to develop the city of Denver, in which Mr. Moffat had a very large interest. Insofar as it was built by independent parties, its projection was in a way analo-

gous to that of the plans of the Kansas City, Mexico & Orient; but certainly, from a study of the map alone, the economic need and necessity for such a line is by no means so clearly shown in the D. N. W. & P. case as in the case of the Stilwell road. It will be interesting to follow the reorganization of these two properties—the D. N. W. & P., and the K. C. M. & O.—the one with an originally strong local financial backing but without an apparent economic necessity for its construction; the other with very little but brains and selling ability as capital to start on but with a real possibility of developing new traffic and new country.

NEW BOOKS.

Railway Statistics of the United States for the Year Ending June 30, 1911. Prepared by Slason Thompson, Bureau of Railway News and Statistics, Chicago. 126 pages. Bound in paper.

This is the eighth issue of Mr. Thompson's annual pamphlets, in which he compares statistics which he has gathered with the statistics of the Interstate Commerce Commission and recent statistics of foreign railways. The statistics gathered by Mr. Thompson himself and herein presented for the railways of the United States are those of railways operating 232,117 miles of line, and are based on the situation as of June 30, 1911. "While the mileage reported to the bureau," says Mr. Thompson, "covers slightly over 95 per cent. of the total of the United States, by reason of its location and nature, it carries more than 97 per cent. of the traffic." The statistics of the commission with which Mr. Thompson's own statistics are compared are those for the year ending June 30, 1910, and the statistics of foreign railways given are for years varying from 1908 to 1911, although some statistics for earlier years than these are given for the railways both of the United States and several foreign countries.

Proceedings of the Forty-Fourth Annual Convention of the American Railway Master Mechanics' Association, held at Atlantic City, N. J., June, 1911. 516 pages. Cloth. Published by the association, J. W. Taylor, secretary, 390 Old Colony building, Chicago. Price, $2.50.

Reports and papers on the following subjects presented at the last convention are given in full in this volume: Mechanical stokers; smoker consuming devices for terminals; construction of locomotive frames; main and side rods; formulae for designing piston rods and crossheads; equipment for engine houses; best method of treating feed water when water treating plants are not practicable; lubrication of locomotive cylinders; locomotive performances under different degrees of superheated steam; safety appliances; design, construction and inspection of locomotive boilers; contour of tires; flange lubrication and standards. Full specifications and drawings of the standards of the association are included; also the list of members and their addresses, the committees and subjects for the next meeting, and the constitution and by-laws of the association.

Proceedings of Thirteenth Annual Convention American Railway Engineering Association. Published under the direction of the Committee on Publications. 7 in. x 10 in. 1,300 pages (including inserts). Price, paper cover, $5; cloth binding, $5.50; half morroco, $6.

Although the convention of the American Railway Engineering Association closed less than six weeks ago, the bound proceedings are now ready for distribution in paper covers, and it is expected the cloth and half morocco bindings will be ready by May 15. This promptness of publication will be very much appreciated by members accustomed to wait several months after the convention to receive the official proceedings.

Several radical changes in the publication of the book have been made this year. The volume of the reports submitted by committees during the past few years has grown to such an extent that in 1910 the proceedings were separated into two volumes, and it was necessary to use three volumes in 1911, containing an aggregate of over 1,800 pages. All committee reports for the present year were kept down to the shortest possible length, enabling the entire proceedings to be included in 1,300 pages, including inserts. The paper stock on which the book is printed was imported from Europe and is light enough in weight to make the total thickness of the 1,300 pages only about 20 per cent. greater than that of a single volume of last year's proceedings, although the quality of the paper is fully up to standard. This decreased size of the year's publications effect a large saving in binding and will also economize in shelf room needed for the books.

A very great economy in the cost of publication was effected by holding the pages set up for the advance notices to be used in the proceedings. This made it necessary to publish the discussion of all committee reports together following the reports themselves, and also to publish a short list of amendments which were made to committee reports during the discussion at the convention. While there may be some slight inconvenience due to this arrangement, the complete table of contents and index and cross references which accompany both the discussion and the report make it perfectly easy to use the volume. A new feature of the book is the publication of the list of speakers taking part in discussions at the head of the section devoted to the discussion of each committee report. As it is very frequently desired to refer to information which is known to have been given by a member in discussion, this means of locating his remarks will be found very useful. The book also contains the three monographs which have been published by the association during the past year.

The Full Recognition of Japan. By Robert P. Porter. 778 pages, seven colored maps, 6 in. x 9 in. Bound in cloth. Published by Henry Frowde, London. Price, $4.

In view of the universal interest now being taken in the affairs and progress of the Japanese empire, this book, a detailed account of the economic and political progress of this remarkable nation drawn from extended observation and the latest printed documents and reports, should command attention. Readers of the *Railway Age Gazette* will be especially interested in the chapters on trade, commerce and shipping and on railways, in both of which the author has given a careful analysis of present conditions and tendencies. In the chapter devoted to the railways Mr. Porter states that while he has never been convinced that railways are more efficiently managed when in the hands of the state than when under private control, he is willing to admit that Japan has carried out a policy of railway nationalization on a plan of unexampled economy and efficiency. This he attributes to the fact that a noteworthy public spirit has been manifested by the officials, from the highest to the lowest, and that their idea has been that the railways should not only be made self-supporting, but that all extensions and improvements should be paid for out of earnings and not from loans. The state operates 4,879 miles of railway, with capital obligations amounting to £62,547,000, or about $300,000,000, while there are 506 miles representing a capital investment of £4,676,944, or about $22,000,000 remaining in the hands of private companies. Japan is now confronted with the necessity of converting much of the original narrow gage railways to standard gage. The chapter includes a brief history of railway development in the country, outlines the present railway situation, and discusses at considerable length the principal features of the government's plans for financing the extension and improvement of the system which have been decided on as a necessary public policy.

Mr. Porter has had the best of opportunities for studying contemporary Japanese affairs, conditions and developments, as, in the course of his extensive travels in and observation of the situation in various countries, he made a long visit to Japan fifteen years ago, and another a short time ago, on which he had access, not only to all the official public documents that would be useful to him, but also to many special reports that were prepared expressly for his information. Being a trained observer and an experienced and able writer, he was able both to see and learn the things that the people of other countries want to know about Japan and to tell them in a style that is always lucid and interesting.

Letters to the Editor.

DEFECTIVE BOX CARS AND DAMAGED FREIGHT.

Savannah, Ga., April 24, 1912.

To the Editor of the Railway Age Gazette:

I have been very much interested in reading the articles on defective cars and damaged freight, and cannot help but believe that by calling the attention of the railway public to this matter the necessary reforms will be brought about.

A cause of loss and damage, which is touched upon but not amplified as it should be, is the rough usage cars receive at terminals, hump yards, etc. A very large percentage of loss is due to rough handling, as is evidenced by the tearing out of the ends and shifting of the loads. This cannot help but result in considerable loss, and to a certain extent could be remedied by very much better end construction in box cars than is commonly used. The accompanying drawing shows the end construction of some box cars which we built a year ago at our Macon shops, in which I carried out this plan of reinforcement, and after quite considerable service from these cars I believe it will prove a very substantial economy in the maintenance of the cars and keep down the damage to freight.

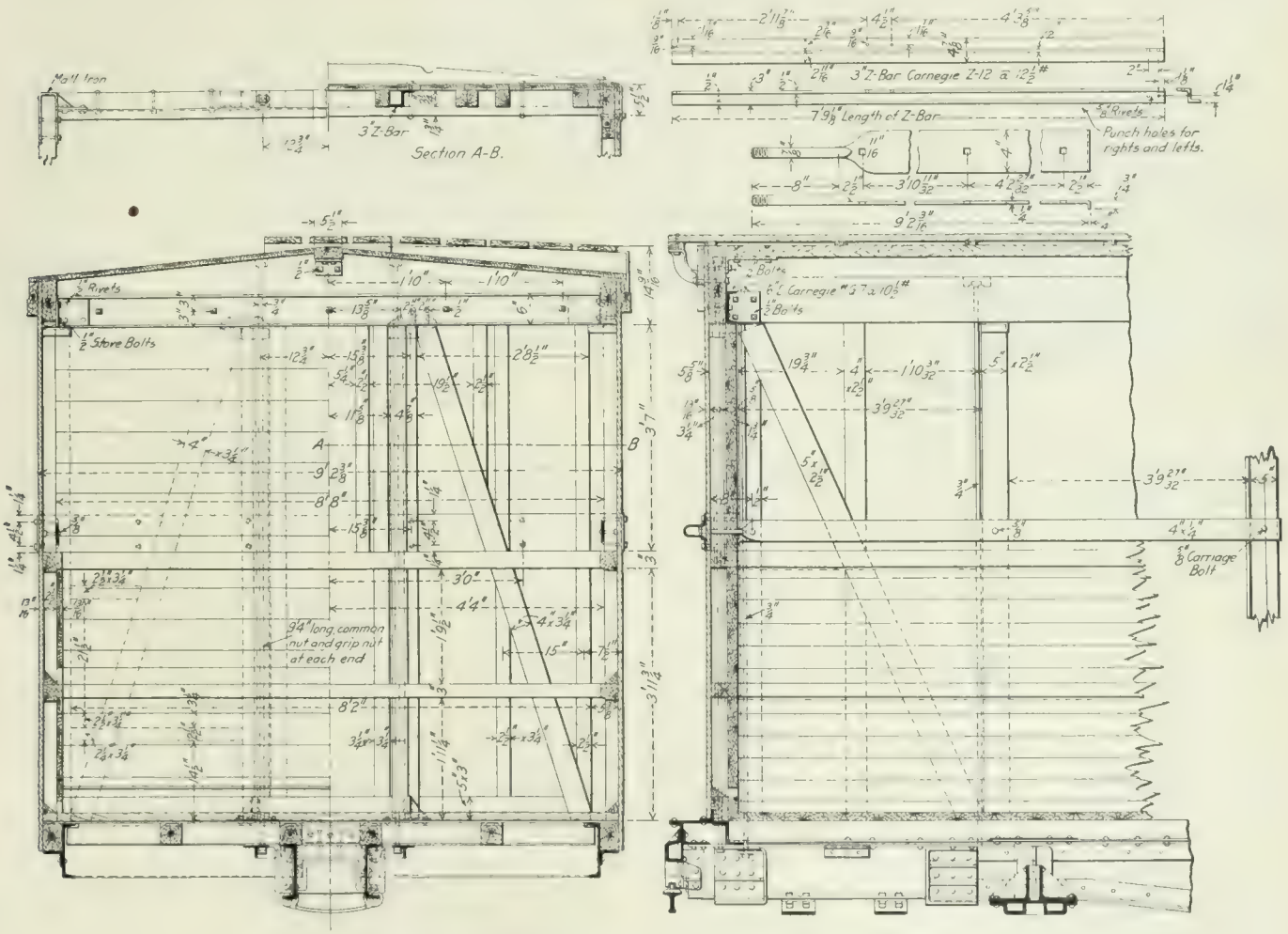
Wooden draft timbers and light draft gear are also fruitful sources of damage to lading by tearing out end sills and sheathing. Nails used for cleating lading, nailing car doors, etc., are another source of damage to lading, especially when the packages are made up of sacks. We have had a campaign on this matter for the past year, and have provided all agencies and car inspectors with a special type of pulling bar for removing the nails.

Another item that causes considerable damage is leaky roofs. An inspection at any terminal on a rainy day will reveal a very high percentage of leaking roofs.

While many of the railways are aware of all of these defects that lead up to loss and damage to freight, and are striving to overcome them in new equipment and in repairs to old equipment, I must confess that a majority of them are not doing so, if the average conditions that are found in any large yard are to be taken as evidence.

F. F. GAINES,
Superintendent Motive Power, Central of Georgia.

An interesting experiment in the use of oil fuel for locomotives is being made by the Caledonian railway, Scotland. At the locomotive works in Glasgow an engine has been fitted up with oil-burning apparatus. The oil is stored in a cylindrical tank placed on the tender in a part of the space usually occupied by coal.



Strong End Construction for Box Car; Central of Georgia.

The oil flows from the tank to the engine injectors, which force it into the firebox at two points about 18 in. apart, where a current of steam from the boiler causes it to assume the form of fine spray spreading itself through the firebox. By means of a thin layer of wood or coal fire covering the firebars this spray is ignited, and so generates steam for the motive power as well as for the injecting and spraying. The extent of the flame is regulated by a valve on each of the injectors. The firebox, in addition to the customary firebrick arch, is equipped with a firebrick wall to protect the copper front plate from the effects of the great heat produced by the oil fuel. The special fittings are such as to permit of the engine using oil or coal. On a trial non-stop run from Glasgow to Stirling and return the engine consumed 1½ gal. of crude oil per mile; drawing a full train it is estimated that the fuel consumption will be 3 gal. per mile.

THE FLORIDA EAST COAST EXTENSION.

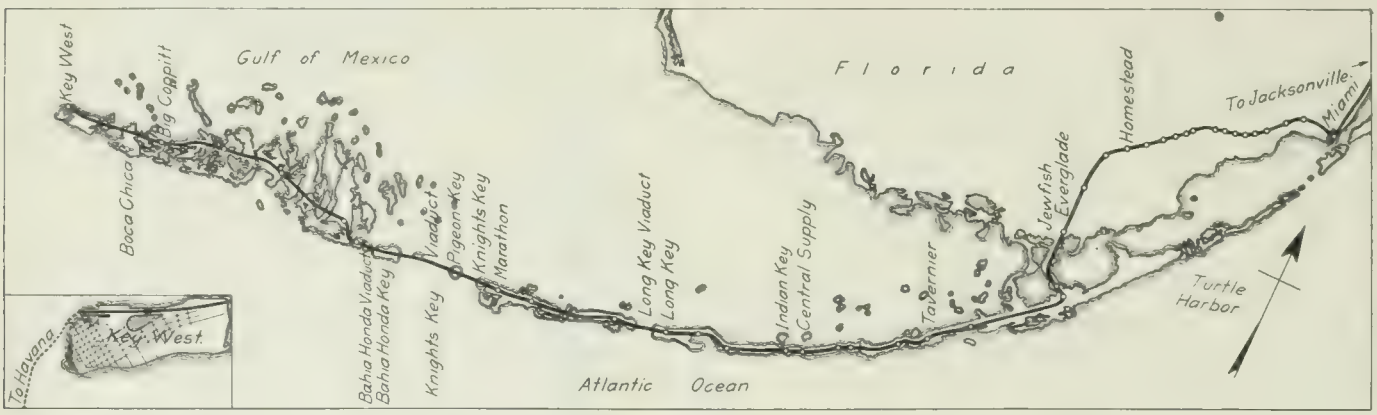
History of the Key West Project; Details of the Novel and Difficult Construction; Operating Prospects.

BY FRANK M. PATTERSON.

With the inauguration of traffic over the entire Florida East Coast Railway's Key West extension, on January 22 of the present year, came the realization of plans long nurtured by H. M. Flagler. Beginning his railway acquisitions in a modest way Mr. Flagler purchased in 1885 a small decrepit road extending from Jacksonville, Fla., to St. Augustine to improve the service to the latter place whither he had gone in 1883 for rest and recreation. He found St. Augustine a sleepy southern town with a delightful winter climate and became interested in its possibilities as a winter resort, as well as in the possibilities of the entire east coast, both as a winter play-ground, and as a fruit and vegetable growing section. To properly develop the country he purchased two additional railways south of St. Augustine giving him access to Palatka on the St. John's river and to Daytona on the coast, consolidated them with his original purchase and pushed them southward until in 1896 the Florida East Coast Railway entered Miami, situated on Biscayne bay, 366 miles south of Jacksonville. Biscayne bay has practically all of the attributes of a first class harbor except water, the natural depth being only about 12 to 14 ft. Here construction stopped; steamer lines were established to Nassau, Key West and Havana, Cuba, and it seemed that Miami would remain the southern terminus.

However, the growing importance of our trade with Cuba, after the Spanish war and the certainty of the construction of the Panama canal led to the determination to extend the railway to some point where satisfactory harbor facilities could be obtained. The railway had been extended to Homestead, 28 miles south of Miami, in 1904, and from the latter point surveys were made to Cape Sable, the most southerly point on the mainland, about 100 miles from Homestead. The route lay wholly in the Everglades and was rejected after a thorough investigation. The next survey was made to Turtle Harbor, but this plan was abandoned also, and it was decided in 1904 to build to Key West, a distance of 128 miles of which about 22 miles was on the mainland and the remainder across the string of keys or small islands that fringe the coast and extend beyond the mainland to deep water at Key West. Construction was started in 1905.

As far as Knight's Key the islands are admirably situated for the location of the railway, affording good alinement and necessitating comparatively little bridging, the longest stretch of water being at the lower end of Long Key where a concrete viaduct two miles in length was built. Immediately below Knight's Key is a stretch of water seven miles wide ranging in depth from 18 to 22 ft. A few miles further on Bahia Honda is encountered,



Key West Extension of the Florida East Coast Railway.

where a bridge 5,100 ft. long is required, in water whose greatest depth is 30 ft. The three structures just referred to, together with a concrete arch bridge, 2,573 ft. long at Boca Chica, a few miles north of Key West, were the principal bridges as originally planned, although later it was found necessary to provide additional arch structures to which reference will be made later.

Owing to the comparatively favorable conditions above Knight's Key and the large amount of bridging below that point it was determined to establish a temporary dock at Knight's Key. Traffic was opened to this point in February, 1908, and steamer connections made to Key West and Havana, displacing the service previously maintained between Miami and the latter points.

The construction on the extension resolved itself into three



Quarter Boat for Housing Men.



Temporary Dock and Approach at Knight's Key.

methods: grading across the Everglades and other submerged sections, grading across the keys and bridge work. On account of the conditions under which the construction had to be done and the desirability of having all labor under the undivided authority of the railway none of the work was let by contract, the company assembling equipment and perfecting an organization under the direct supervision of the constructing engineer.

From the nature of the work practically all of the outfit used on the original construction was floating equipment and this included a number of Mississippi river steamboats of the stern-wheel type, which proved most efficient for the transportation of material and supplies in the shallower waters, owing to their light draft. All material and supplies, including water for domestic and boiler use, had to be brought from the mainland.



Temporary Trestle Alongside Permanent Line.

Material for concrete was shipped by steamer from northern points, trap rock being brought from the Hudson river, sand from Baltimore and American Portland cement from New York. German Portland cement was used in all concrete below high tide, being delivered by tramp steamers at the nearest available harbor.

From Homestead to Jewfish Creek, where the line leaves the mainland and crosses to Key Largo, the location lies entirely in the Everglades and the grading was done by means of floating excavators using a boom and orange peel bucket to excavate material from the sides and deposit it in the embankment. When open water was reached the dredges were towed to other places where their services might be needed.

On the keys proper most of the grading was done by hand labor. The material is coraline rock with little or no overburden of dirt. This rock is light and easily worked and the quantities per mile averaged small. Where the embankments were too high to be built economically by hand labor the excavators were taken from their scows and placed on the embankment, moving forward on rollers as they completed the work ahead of them.

BRIDGE CONSTRUCTION.

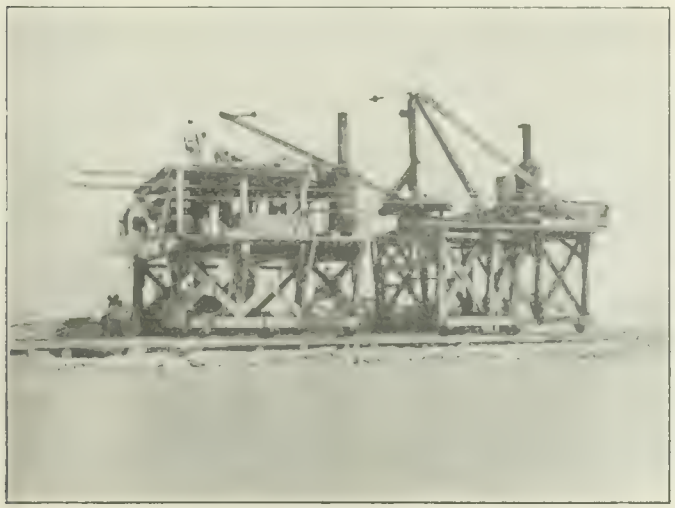
Five permanent bridges were put in between the mainland and Knight's Key: a drawbridge at Jewfish Creek, single steel spans at Tavernier Creek, Snake Creek and Wilson's Key and the concrete arch bridge at Long Key. The drawbridge is deck girder swing span, 99 ft., 6 in. long and is operated by hand. The center used is somewhat unusual, being rimbearing with drum between flanges of main girders. In addition to these structures, several pile trestles were put in where the water was comparatively shallow, to be replaced later by concrete arches.



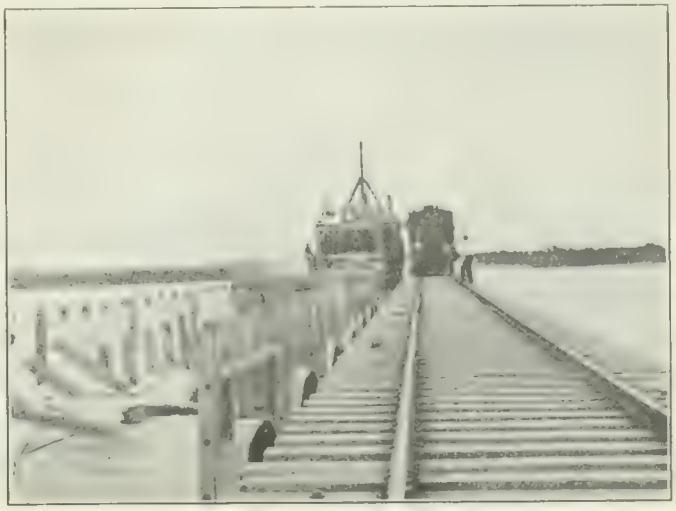
Boca Chica Arch Viaduct.

The Long Key viaduct is the longest structure of the arch type on the line and is a notable piece of work, consisting of 180 semi-circular arches of 50 ft. span, the track being at an elevation of 30 ft. above high tide. The method of construction used here has been followed on all similar work and a description of it will serve for all.

The location of piers having been established the sand was removed from the rock bottom by dredging and a cofferdam floated into place and sunk. Piles were then driven into the rock to refusal, the average penetration being 12 to 14 ft. The purpose of the piling was three fold: first, to afford foundation should any erosion of the rock occur; second, to act as an anchor against any tendency to overturning or lateral displacement; and third, to act as an exploratory probe. It happened several times that cavities in the rock were encountered that had been missed by the sounding outfits. After the piles were driven a footing course of concrete from 3 to 5 ft. in depth was deposited by



Side View of Traveling Concrete Mixer Outfit.



Building Concrete Arches with a Traveling Mixer.

tremie and allowed to set, forming a seal. The cofferdam was then unwatered, the piling cut off to a point well below low tide and forms erected for the piers. After the piers were completed to the springing line false work for the arch forms was driven and the forms put in place. To avoid expansion cracks the arches were put in alternately, the concreting being done by mixers and derricks on scows. A plan of these arches is shown in the occompanying figure from which it will be noted that the arch is so designed that little dependence is placed on the reinforcement. This is true of all concrete structures on the entire line, as it was not thought wise to take any chances of corrosion of the reinforcement from the salt water, and weight was desired to withstand the action of the waves.



Barge Loaded with Steel Girders for Moser Channel Bridge.



Erection of Bahia Honda Bridge.

Below Knight's Key the rock changes from coraline to a highly fossiliferous sedimentary limestone, and it was found possible to use it for concrete, thereby effecting a saving in the cost of concrete of from $3 to $5 per cu. yd. The rock is blasted in shallow water and loaded by orange peel dredges. When blasted it breaks up into small sized pieces with enough fine stuff so that it can ordinarily be used as it comes from the dredge without the addition of sand, or any sorting other than the removal of occasional large chunks.



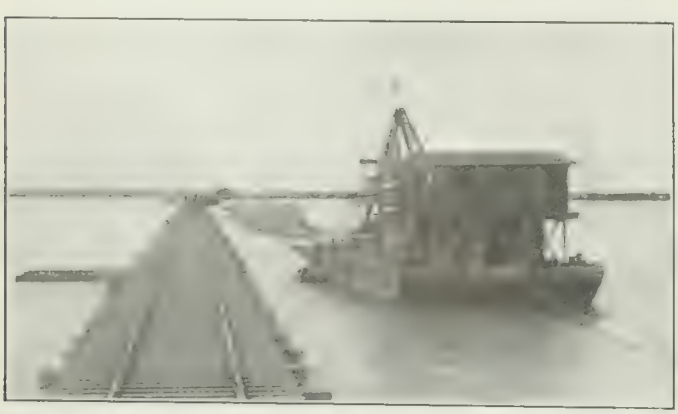
Driving Piles with Floating Driver.



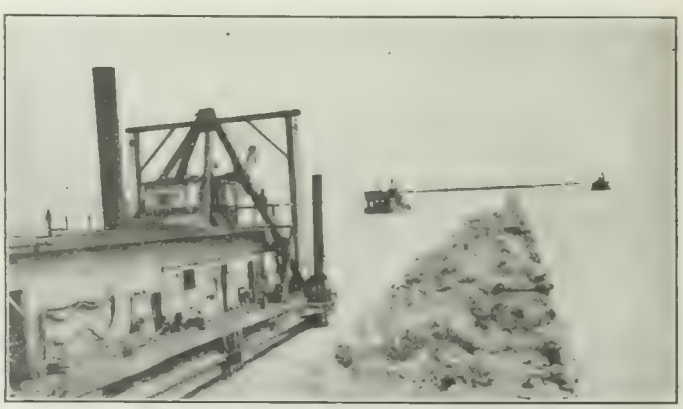
Completed Piers, Bahia Honda Bridge.

In driving piles through this limestone it was found that the top for a distance of from 3 to 5 ft. was harder than the underlying material and that it was necessary to punch holes through this crust before the piles could be driven. For this purpose a steel rod or bar was used, fitted with a driving head and cushion and was hung alongside the leads where it could be swung into place readily. This served admirably as a punch, but difficulty was found in withdrawing it on account of the side friction, which was obviated by fastening a collar 2 in. thick by 6 in. long around the lower end of the bar. This arrangement worked well with the floating drivers, but with the track drivers a further modification was necessary, as the force needed to withdraw the punch was enough to threaten overturning of the driver on any but a direct pull in line with the center of the track. A way out of the difficulty was found by using 2 in. x 2 in. bar iron bent to the form of a ring with a diameter slightly larger than the punch. This ring was then slipped over the lower end of the punch and fastened only enough so that it would not drop off until the punch was driven. The use of the punch and loose ring has shown a saving of about 50 per cent. over the cost of pile shoes besides being more efficient.

On account of the depth of water at Knight's Key the use of deck girders was decided on, and for the same reason through truss spans were used at Bahia Honda, the depths of water being as previously noted 18 to 22 ft. and 20 to 30 ft. respectively. The methods of pier construction were as previously described,



Gasolene Excavator Removing Washed Out Embankment, Preparatory to Building Concrete Arches.



Clamshell Dredge Loading Marl on a Trestle; Florida East Coast Extension.



Connection of Girder and Arch Structures, Knight's Key—Moser Channel Viaduct.

except that Friestedt and United States steel interlocking sheet piling was used for cofferdams at the Bahia Honda bridge. The sheet piles were driven several feet into the rock and the sealing course deposited over the entire area of the cofferdam. Little difficulty was met in pulling the piles, one or two blows of a pile driver being enough to loosen them from the concrete.

Knight's Key bridge consists of 316 80-ft. and 19 59-ft. 9 in. deck girders with 210 arches of 35 ft. span at the southerly end where shallower water is found, and a 253 ft. 6 in. through truss draw span over Moser channel operated by a gasolene engine.

The erection of the girders at Knight's Key was begun by contract, but was taken over by the railway after a comparatively small part had been erected, and the remainder was completed by the construction department. The erection was begun by derrick car, but after the company's forces assumed charge the work was done by means of floating derricks and much faster progress was made, at one time six spans being set in place in four hours, and at another one span being erected in 20 minutes.

Bahia Honda bridge consists of 13 spans of 128 ft. 6 in., 13 spans of 186 ft., 1 span of 247 ft. 6 in., and 9 plate girders of 80 ft. span. The steel work was erected by the company's forces, using false work and overhead traveler, and it is interesting to note that not a life was lost in the erection of either the Knight's Key or the Bahia Honda bridge. The decks of the steel bridges are of the ordinary type fastened with hook bolts.

The protection of the steel spans from rust is one of the hardest problems facing the railway. In the warm, moist, salty air corrosion begins in an almost incredibly short time and no paint has been obtained that can be considered wholly satisfactory. Near the constructing engineer's office at Marathon a test rack is located in which are placed test plates coated with different paints, and so far none has been found that will afford protection for two years. The railway company's standard paint has proved about as efficient as any and on account of its bright yellow color corrosion is quickly detected. The ordinary galvanized telegraph wire rusts through in two years or less, and it even has been necessary to paint the track rails with a coating prepared by the Cunningham formula, consisting of one part kerosene, four parts Portland cement and 16 parts refined coal tar, the cement and kerosene being first mixed and then stirred into the heated tar. The concrete arch bridge at Boca Chica, four miles north of Key West, is the last important bridge on the extension, having 83 arches of 25 ft. span.

At Key West all of the land needed for terminals was made by pumping material by hydraulic dredge, as no land was available on the island. The plans for the terminals are not fully decided upon, but work has been begun on a concrete pier 1,700 ft. long by 134 ft. wide, with a 24 ft. depth of water alongside. One of the accompanying drawings shows the traveller and concrete plant at work on this pier, and a part of the wooden pier now in use. It is also the intention to put in car ferry slips and to transport freight cars to and from Havana, 105 miles distant, to avoid breaking bulk on shipments between points in Cuba and points in this country. A small draw span was put in at Key West to afford access to the basin for small craft. The plans of this bridge reproduced herewith show the design which is somewhat unusual, being adopted to allow the use of some material on hand.

The effect of sea water on the concrete has been closely watched, both in the actual structures and on test cubes exposed for observation, and so far there is no reason to believe that any serious deterioration will take place. Shortly after being exposed to the water it is found that a scaling off occurs to a depth of about 1/16 in. on the part of the concrete between the limits of high and low tide which amounts only to about 18 in. After the scaling off has taken place a marine growth forms on the parts exposed to the water and seems to protect the concrete from further damage.



Bahia Honda Bridge, Only Truss Bridge on Extension.

EFFECT OF HURRICANES.

After surveys had been completed and plans made for the construction of the extension it was thought that the bridges already referred to would be all that would be necessary and



Knight's Key—Moser Channel Viaduct.

that solid embankments could be made from key to key in other places. It will be seen from the map that the keys are small and more numerous below Knight's Key than above that point, and it was found that the water between them below Bahia Honda was quite shallow, in some cases being only a few inches in depth. However, there was one factor that had not been considered and one that perhaps never had been encountered before in work of this kind. This is the impounding of the waters of the gulf by hurricanes in that pocket between the railway and the mainland known as the Bay of Florida. The hurricane of 1906, while very severe, came upon the work before those waterways had been closed, and it was not until the storms of 1909 and 1910 that their effects could be noted and studied in this connection. Under the stress of these storms continuing for several days from the south and west it was discovered that the water was banked up in the bay until it overtopped the embankments, and swept them away. It was also noted that the embankments across the water, even in the shallowest places, were the first to go, and that when they were gone the water rapidly subsided. This has led to the decision to build arches, varying from 16 to 25 ft. spans, across these stretches, the length required amounting to a total of between five and six miles. In the meantime pile trestles have been put in on a temporary location alongside the permanent line to carry traffic and also to act as construction track. In one of the accompanying photographs will be seen one of these temporary trestles with a gasoline dredge removing



Moser Channel Drawbridge During Erection.

the remains of the old embankment; and another shows the construction of the arches. Especial attention is called to the traveling concrete outfit which is used on all the smaller arches and which has proved a highly efficient method. The embankments were made of rock and the material is loaded on cars and used for ballast or for concrete as required. It is interesting to note that while little trouble is experienced with the toredo, except at Key West where the waters are somewhat infected, the life of a timber trestle is only about three years, owing to rot.

In addition to providing more waterway it has been found necessary to protect the embankments from wave action in exposed places with some other material than riprap. Riprap from 3 to 5 ft. thick was originally used, but the suction of the receding waves carried it away and then attacked the embankments themselves. Deposits of calcareous marl are found at various places in the waters between the keys, and this is being unloaded along the banks where protection is needed. The marl is of such consistency that it takes a natural slope of about 5:1, corresponding very nearly to a beach slope and is dressed off to a smooth surface. After exposure to the air the marl hardens and affords complete protection from the waves. In one of the cuts is seen a clam shell dredge loading Goodwin cars on a trestle, while in the distance are two gasoline dredges throwing in marl to increase the deposit for the loading dredge. One of these trestles is in use at Central Supply where marl is being loaded for use above Knight's Key, and the one shown in the illustration is at Big Coppitt about 10 miles northerly from Key West. Two other trestles for the same purpose are almost completed between Big Coppitt and Bahia Honda. North of Knight's Key the total requirements were about 3,000,000 cu. yds., of which approximately one-half has been placed. South of Knight's Key the requirements will be considerably larger.

The railway is liable to face a charge of nature-faking while doing this work and if left to a jury of turkey buzzards the



South End of Long Key Viaduct.

charge would be sustained. There is a strong odor of sulphuretted hydrogen when the marl is freshly unloaded and wherever the work is in progress the banks are lined with the buzzards searching for the morsels that their sense of smell tells them should be there.

Reference having been made to the hurricanes, it may be of interest to review their connection with the work. These storms, arising in the West Indies and resembling the East Indian typhoons, may be looked for in August, September and October, but are most apt to occur in the latter month. The greatest loss of life and damage to equipment from this cause occurred in 1906, although that storm was not so severe as those of 1909 and 1910. A hurricane was predicted in 1905, the year the work was started, and strict orders were given by the constructing engineer to prepare for it. It is perhaps unfortunate that the predictions that year did not materialize into a moderately severe blow, for there were fewer men on the work then and a wholesome fear

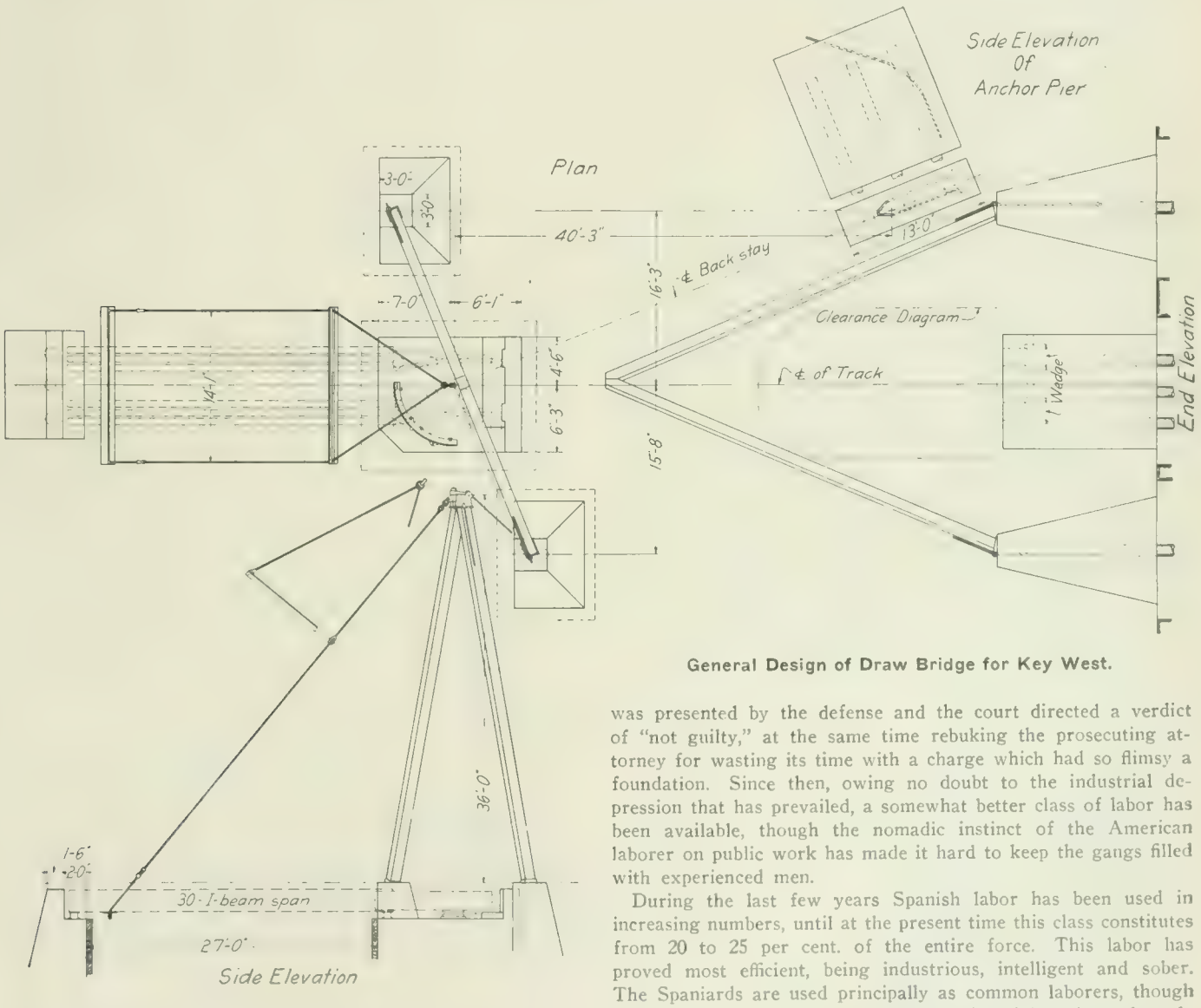


Traveler and Cement Mixer; Building the Concrete Pier at Key West; Florida East Coast.

would have been instilled in all. In 1906 when warnings were again issued they were not given much attention except where the constructing engineer and his principal assistant could see personally that they were observed. As a consequence when the storm broke it found the greater part of the men and equipment helpless, or worse than helpless, for most of the laborers were housed in quarterboats and had taken refuge in them. These boats were soon blown out to sea, over 70 men were lost and

many others were picked up by passing steamers after days of suffering. Since 1906 every precaution has been taken to protect lives and property when information of an impending hurricane is received. Each engineer's camp is provided with a barometer and the weather bureau at Washington has given valuable aid and sends warnings promptly whenever it gets reports of an approaching storm. At such times the land equipment is put in shape to stand the storm as best it may, the floating equipment is taken to sheltered places and sunk in shallow water and the men are assembled at such places as will afford the best protection. It is worthy of note that the storms of 1909 and 1910, the most severe known on the coast of Florida, caused little loss of life and equipment.

In 1909 the wind reached a velocity of 125 miles per hour and



General Design of Draw Bridge for Key West.

the lowest barometric reading known in the United States was observed. While much embankment was washed away absolutely no damage was done to any of the concrete work in place. Five girders of the Knight's Key bridge were blown off the piers but this was due to the carelessness of the contractors who had failed to put in the anchor bolts as erection proceeded. Each girder is anchored to the pier with 16 bolts, four to each pedestal, and the contractors had put in only two to each girder at the time of the storm.

THE LABOR QUESTION.

The question of labor has been a serious one and was particularly troublesome in the early stages of the work. The use of negroes recruited from Florida and neighboring states was considered, but the supply was found to be insufficient and inefficient on this class of work. Italian and Greek labor was tried and found wanting, and arrangements were made for securing common labor in New York through labor agencies established by the railway. In spite of the care taken to select only men fitted for the work, much trouble was experienced at first with incompetents and with those who recruited with no idea other than to secure a trip to Florida at the expense of the company. Out of this grew the peonage charges which resulted in federal indictment of the engineers in charge and their New York agent. These charges received highly sensational treatment in the press, but when, after hard fighting, the railway was able to bring the cases to trial, the result was a verdict of acquittal. No evidence was presented by the defense and the court directed a verdict of "not guilty," at the same time rebuking the prosecuting attorney for wasting its time with a charge which had so flimsy a foundation. Since then, owing no doubt to the industrial depression that has prevailed, a somewhat better class of labor has been available, though the nomadic instinct of the American laborer on public work has made it hard to keep the gangs filled with experienced men.

During the last few years Spanish labor has been used in increasing numbers, until at the present time this class constitutes from 20 to 25 per cent. of the entire force. This labor has proved most efficient, being industrious, intelligent and sober. The Spaniards are used principally as common laborers, though many have shown themselves capable of a higher class of work, and have been used as firemen, calkers and stationary engineers.

With the skilled labor little trouble has been experienced, the greatest difficulty having been to secure all around machinists capable of performing the diversified duties necessary on work using such a varied assortment of equipment and situated so remote from industrial centers. The machine shops are located at Boot Key Harbor but a short distance from Marathon where all the repairs to plant and equipment are made.

The men are furnished board and lodging by the railway and care is taken to see that they are comfortably housed and well fed. Sanitation is carefully looked after and hospitals are maintained at Miami and Key West for cases that cannot be cared

for in camp. That the care taken produces results is evidenced from the fact that the sick rate, including accidents, averages from 1 to 1½ per cent. of the force. One thing that contributes largely to the health of the men is the lack of local water supply with its likelihood of pollution.

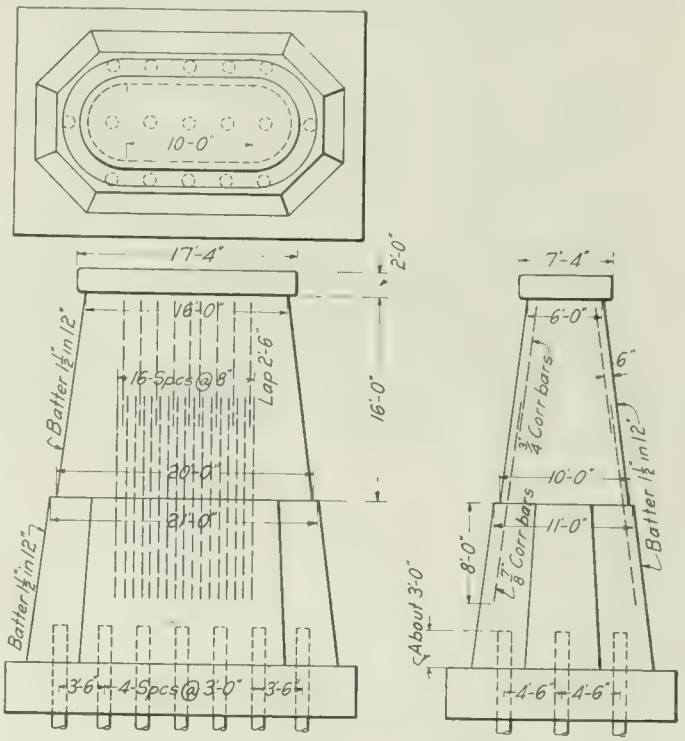
Owing to the situation of the work comparatively little trouble has been experienced with drunkenness except in the camps easily accessible to Key West. "Bum boats" occasionally come among the keys with their contraband cargoes, but have to operate so stealthily that little trouble is caused.

EQUIPMENT.

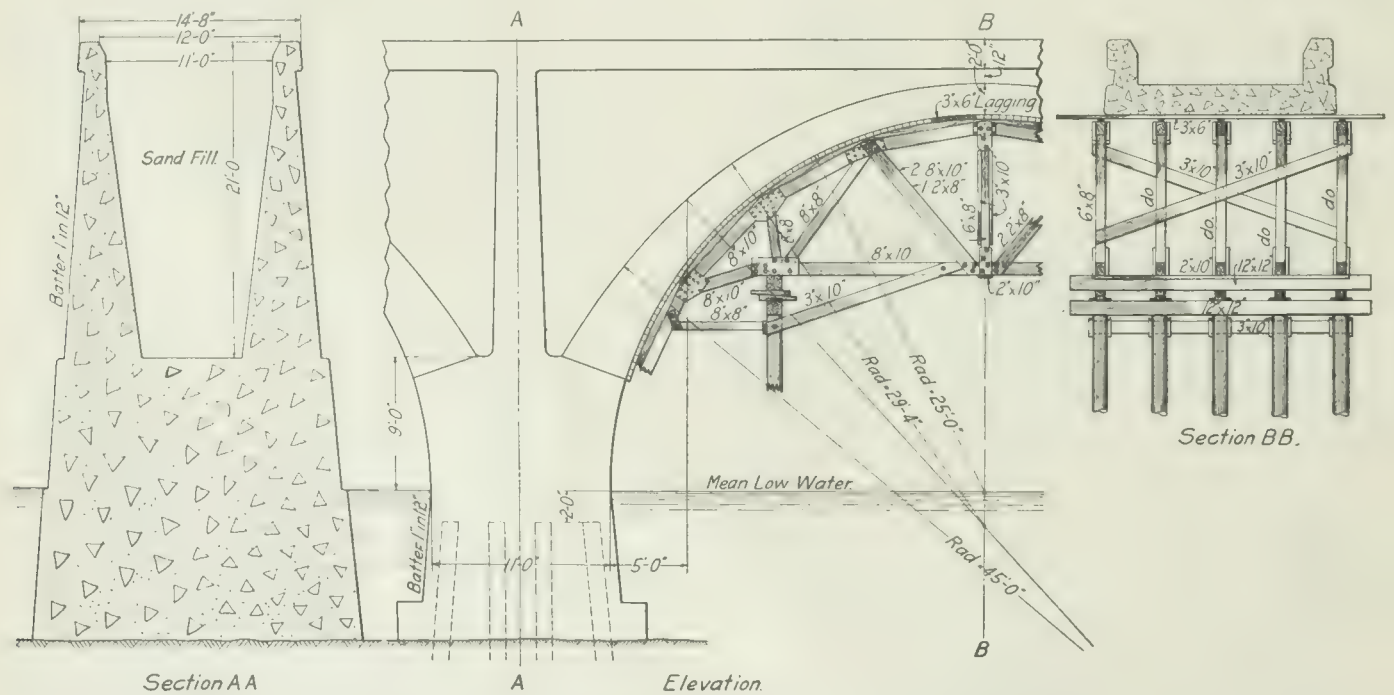
The equipment has been ample and well adapted for the work and comprises all that one would expect to find on construction of this character. One of the most efficient machines has been the gasoline excavator to which passing reference has been made. This device was evolved for this work and consists of a 30 h. p. Otto gasoline engine operating a boom and Hayward orange peel bucket of ¾ to 1¼ cu. yd. capacity. This has proved most economical, both in upkeep and in the saving effected in coal and water, both of which items are expensive owing to the cost of hauling and handling. Before the railway was completed to Key West the cost of water to the company at the latter place was ½ cent per gallon. The excavators are used either on land or water, being mounted on scows in such manner that they may be readily removed. Another efficient device is a steam drilling scow for putting in blast holes, the drills being driven in leads similar to a steam hammer pile driver. For driving piles from the track locomotive cranes, fitted with removable leads and Arnott steam hammers, have been used extensively, and for many classes of work are preferred to the regular track drivers.

From an operating standpoint the extension is in surprisingly good physical condition when one stops to consider that in February, 1911, orders were given to have the line ready for traffic into Key West in January, 1912, instead of a year later, as had been the intention. The track is laid with 70 lb. rail, well tied, with tie plates on all curves. The grade is practically level at a minimum elevation of about 10 ft. above sea level except at Long Key, Knight's Key and Bahia Honda bridges where it is at a 30 ft. elevation. At present the approach grades at these places are one per cent., but this will be reduced to 0.3 per cent. On the bridges referred to speed is restricted to 15 miles per hour, to minimize the danger of derailment. In addition to this the despatcher's office is kept fully informed as to storm warnings and no train is allowed to proceed to exposed places when a hurricane is impending. Fortunately, severe storms are unusual except during the hurricane season.

Train service as scheduled provides two passenger trains and three freight trains each way daily except Sunday. One of the passenger trains is the "Oversea Limited," a solid Pullman train running between New York and Key West during the tourist season, and the other is a local from Jacksonville. The freight trains consist of one through freight, one way freight and one water train, the water for the entire extension being hauled from Everglade on the main land where a pumping plant and storage tanks are maintained. The water is hauled in cypress tanks of 3,000 gal. capacity erected on flat cars, each car holding



Piers of Knight's Key Viaduct.



50-Ft. Concrete Arch, with Centers, on Long Key Viaduct; Florida East Coast.

two tanks. These cars are set out at water stations and construction camps as needed. The water is the surface water of the Everglades and is remarkably pure and soft, having but a small amount of lime.

"WILL IT PAY?"

The question has been asked, "Will it pay?" and the reply, whatever it may be is sure to start a discussion. Mr. Flagler thinks it will, backing his judgment with plenty of money, and his judgment in business matters in the past has shown itself to be sound. If there is any advantage in having a railway terminus insuring the shortest haul by vessel the Florida East Coast has that advantage, for business with the West Indies, Central America, the Panama canal and South America, and especially with Cuba, in the possibilities of through car shipments. Local traffic on the extension is small at present, but there are possibilities of increase, as the upper keys are well adapted for growing citrus fruits and afford excellent facilities during the winter months for yachting and fishing.

If in the foregoing Mr. Flagler and the railway company have been used synonymously it has not been through inadvertence nor for sentimental reasons. The railway has an authorized capital of $5,000,000 of which Mr. Flagler is the sole owner of the $3,000,000 outstanding stock and has agreed to purchase the remaining $2,000,000 for the purpose of completing the road to Key West. There have been issued $10,000,000 of 4½ per cent. first mortgage bonds, out of an authorized total of $12,000,000, and $20,000,000 of general mortgage income bonds, out of an authorized total of $25,000,000. The latter bonds are entitled to interest up to 5 per cent. from earnings after operating expenses, taxes and interest on the first mortgage bonds have been deducted. In the year 1910 the interest paid on this issue was 3½ per cent.

Comparative statements of earnings and expenses for the fiscal years ending June 30, 1903, 1905 and 1910 follow, together with analysis of the statement for 1910:

COMPARATIVE STATEMENTS, FISCAL YEARS ENDING JUNE 30, 1903, 1905 AND 1910.

Year.	Capital Stock.	Bonded Debt.	Value of Road and Property.	Road Operated. Miles.	Gross Earnings.	Net Earnings.	Net Income.	Interest Charges.	Total Deductions.	Balance. +Surplus. —Deficit.
1903	$1,000,000	$13,259,000	$13,656,737	484.95	$2,018,207	$666,614	$666,614	$593,777	$594,899	+$71,715
1905	1,000,000	13,259,000	14,552,134	500.84	2,328,864	720,334	722,674	669,200	743,605	—20,931
1910	3,000,000	30,000,000	31,176,122	583.47	3,687,434	1,481,621	1,490,213	1,150,000	1,376,288	+113,925

ANALYSIS OF EARNINGS AND EXPENSES, FISCAL YEAR ENDING JUNE 30, 1910.

Gross Earnings.

Passenger	$1,276,051
Freight	1,910,295
Mail	101,351
Express	260,107
Miscellaneous	139,630
	$3,687,434

Operating Expenses.

Maintenance of way and structures	$447,731
Maintenance of equipment	484,239
Transportation expenses	1,108,771
Traffic expenses	64,995
General expenses	100,077
	$2,205,813

With the opening of the Key West Extension the railway has 628 miles of main track in operation, as follows:

Jacksonville to Key West	522
Jacksonville to Mayport	26
East Palatka to Palatka	3
San Mateo Jct. to San Mateo	3
New Smyrna to Orange City	27
Titusville to Sanford	47
	628

In addition to the foregoing 160 miles is under construction from Maytown to Lake Okeechobee.

The work was begun under charge of J. C. Meredith as constructing engineer and W. J. Krome as principal assistant. In April, 1909, Mr. Meredith died from illness contracted on the work and was succeeded by Mr. Krome who has been in charge ever since. R. W. Carter is bridge engineer, and the division engineers are P. L. Wilson, C. S. Coe and Ernest Cotton. Edward Sheeran is general foreman in charge of equipment and the employment of labor. The writer is indebted to the railway company, and especially to Mr. Krome and Mr. Cotton, for information and for courtesies extended in making examinations of the work.

BLOCK SIGNAL MILEAGE, JANUARY 1.

The Interstate Commerce Commission has issued its bulletin showing the mileage of railways in the United States worked by the block system on January 1, 1912. The principal table in this bulletin, table 1, is reproduced herewith; also table 2, showing the kinds of automatic block signals in use.

The total length of road operated under the block system on January 1, 1912, was 76,409.7 miles; 20,334.9 miles automatic and 56,074.8 miles manual. There was an increase of 2,623.4 miles automatic and 2,517.2 miles manual, a total increase in miles operated under the block system during the year of 5,140.6 miles.

The present bulletin includes the following roads which have not heretofore reported the use of the block system: Arizona & New Mexico; Carolina & Northwestern; Chicago, Terre Haute & Southeastern; Copper Range; Denver & Rio Grande; Lake Erie & Pittsburg (N. Y. C. freight railway); New York, Chicago & St. Louis, and New York, Philadelphia & Norfolk.

Five instances are noted where two companies operate their two single track lines jointly as a double track, and in the table these pieces of road are credited as double track to both companies.

From table 3, showing methods and apparatus used with the manual block system, it appears that the Seaboard Air Line, on 206 miles, now uses the telegraph in block signaling where, according to last year's report, the telephone was used. A number of roads have increased the use of the telephone for blocking, notably the Cleveland, Cincinnati, Chicago & St. Louis, which now reports 922 miles of road on which the blocking is done by telephone. The telegraph has been entirely abandoned for block signaling on that company's lines. The total length of road in the United States on which the telephone is used for blocking is now reported as 16,544 miles, as compared with 12,199 miles one year previous.

From information heretofore given in the *Railway Age Gazette*, it appears that in the case of two roads, the Chicago Great Western and the Northwestern Pacific, the apparent decrease shown below is explained by the fact that figures published one year ago were erroneous. The block system was never used on the sections of line referred to. The Grand Trunk now reappears in the tables. This road reported the manual block system as in use several years ago, but the report was sent in under a misapprehension of the meaning of the term block system. It appears that now the space interval is actually used, but only for passenger trains. The Louisville & Nashville has discontinued the use of the block system on certain sections.

The use of alternating currents in track circuits for automatic signals is now reported by a dozen roads, the aggregate length of track being 898 miles. Most of the track thus reported is on lines where electric motors are used.

Upper quadrant semaphores are now in use on over 2,000 miles of road, the most prominent roads reporting these being the Baltimore & Ohio, Chicago, Milwaukee & St. Paul, New York Central, Norfolk & Western and Northern Pacific. This list contains 25 companies altogether.

The bulletin includes the usual table, showing the length of

TABLE 1. RAILWAYS WORKED BY THE BLOCK SYSTEM, JANUARY 1, 1912. (SEE NOTES ON NEXT PAGE.)

Names of railroads.	Automatic block signals.						Nonautomatic block signals.						Total automatic and nonautomatic.		Total passenger lines operated.		Percentage block signaled, miles of track.
	Single track.	Double track.	Three track.	Four track.	Total. Miles of road.	Total. Miles of track.	Single track.	Double track.	Three track.	Four track.	Total. Miles of road.	Total. Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	
Ann Arbor							1.0				1.0	1.0	1.0	1.0	292.0	292.0	0.3
Arizona and New Mexico	1.0				1.0	1.0							1.0	1.0	109.0	109.0	.9
Atchison, Topeka & Santa Fe:																	
Eastern lines	7.7	111.9			119.6	231.5	444.2	508.2			952.4	1,460.6	1,072.0	1,692.1	2,455.4	3,052.9	53.9
Western lines	3.8	2.5			6.3	8.8	541.7	23.8			565.5	589.3	571.8	598.1	2,856.2	2,882.4	20.7
Coast lines	9.0	22.2			31.2	53.4	4.3				4.3	4.3	35.5	57.7	1,878.5	1,985.2	2.9
Gulf, Colorado & Santa Fe	2.9				2.9	2.9	2.2				2.2	2.2	5.1	5.1	1,621.4	1,621.4	.3
Atlanta & West Point								6.0			6.0	12.0	6.0	12.0	86.0	92.0	13.0
Atlantic Coast Line	2.4	14.1			16.5	30.6	359.7	81.5			441.2	522.7	457.7	553.3	3,820.8	3,958.3	14.0
Auburn & Northern	6.5				6.5	6.5							6.5	6.5	6.5	6.5	100.0
Baltimore & Ohio	1.9	253.1		12.7	267.7	558.9	2,044.0	702.5	117.9	9.5	2,873.9	3,840.7	3,141.6	4,399.6	3,139.0	4,289.6	100.0
Baltimore & Ohio Chicago Terminal	1.2	11.2			12.4	23.0							12.4	23.0	45.8	73.0	31.5
Baltimore & Ohio Southwestern		24.8			24.8	49.6	910.6	44.7			955.3	1,000.0	980.1	1,049.6	980.1	1,049.6	100.0
Baltimore & Sparrow Point							1.7	3.0			4.7	7.7	4.7	7.7	4.7	7.7	100.0
Bessemer & Lake Erie							63.8	130.6			194.4	325.0	194.4	325.0	191.0	321.5	97.2
Boston & Maine	348.9	591.2		2.1	942.2	1,539.7							942.2	1,539.7	2,238.6	2,801.6	54.9
Boston, Revere Beach & Lynn		13.8			13.8	27.6							13.8	27.6	13.8	27.6	100.0
Buffalo, Rochester & Pittsburgh		35.1			35.1	70.2	295.1	96.5			391.6	488.0	426.7	558.2	426.7	558.2	100.0
Butte, Anaconda & Pacific	7.9				7.9	7.9							7.9	7.9	25.3	25.3	31.2
Carolina & Northwestern							6.1				6.1	6.1	6.1	6.1	133.5	133.5	4.5
Central New England	12.9	15.7			28.6	44.3	6.7				6.7	6.7	35.3	51.0	276.8	302.2	16.9
Central of Georgia							52.3	7.4			59.7	59.7	59.7	59.7	1,915.9	1,915.9	3.1
Central of New Jersey	13.0	165.5	2.4	31.5	212.4	477.2							212.4	477.2	464.1	742.9	64.2
Chesapeake & Ohio		409.0			409.0	818.0	1,086.2	59.5			1,145.7	1,205.2	1,554.7	2,023.2	1,602.8	2,070.7	97.7
Chesapeake & Ohio Ry. of Indiana							262.2				262.2	262.2	262.2	262.2	262.2	262.2	100.0
Chicago & Alton	420.7	184.6			605.3	789.9	141.2				141.2	141.2	746.5	931.1	1,025.2	1,209.8	72.8
Chicago & Eastern Illinois		98.4			98.4	196.8	277.0	55.2			332.2	387.4	430.6	584.2	972.7	1,131.2	51.6
Chicago & North Western		722.1	12.8	8.4	743.3	1,516.6	2,413.3	115.3			2,528.6	2,643.9	3,271.9	4,160.5	6,979.8	7,897.3	52.8
Milwaukee, Sparta & North Western							139.9	6.3			146.2	152.5	146.2	152.5	154.3	168.7	90.4
Chicago & Western Indiana		19.5			19.5	39.0		4.6	3.2		7.8	18.8	27.3	57.8	27.3	57.8	100.0
Chicago, Burlington & Quincy	44.6	43.6	1.6	5.4	95.2	158.2	7,922.6	642.5	17.1		8,582.2	9,258.9	8,677.4	9,417.1	8,422.2	9,171.1	100.0
Chicago Great Western	197.0	86.2			283.2	369.4	88.6				88.6	88.6	371.8	458.0	1,470.7	1,566.7	29.2
Chicago, Indianapolis & Louisville	26.2				26.2	26.2	498.7				498.7	498.7	524.9	524.9	578.0	578.0	90.9
Chicago, Milwaukee & St. Paul	5.9	103.7			109.6	213.3	3,300.5	478.4			3,778.9	4,257.3	3,888.5	4,470.6	6,048.1	6,628.1	67.5
Chicago, Milwaukee & Puget Sound	248.2				248.2	248.2	1,640.0				1,640.0	1,640.0	1,888.2	1,888.2	1,943.1	1,943.1	97.2
Tacoma & Eastern							129.0				129.0	129.0	129.0	129.0	129.0	129.0	100.0
Chicago, Peoria & St. Louis Ry. of Ill	1.3				1.3	1.3							1.3	1.3	237.0	237.0	.5
Chicago, Rock Island & Pacific	653.3	283.1			936.4	1,219.5	997.7				997.7	997.7	1,934.1	2,217.2	6,682.7	6,974.4	31.8
Chicago, Rock Island & Gulf	32.6				32.6	32.6							32.6	32.6	408.9	408.9	8.0
Chicago, St. Paul, Minneapolis & Omaha		6.2			6.2	12.4	549.6	104.5			654.1	758.5	660.3	770.9	1,627.1	1,645.5	46.9
Chicago, Terre Haute & Southeastern	1.5				1.5	1.5							1.5	1.5	351.1	367.6	.4
Cincinnati, Hamilton & Dayton	19.2	17.1			36.3	53.4	16.0	17.9			33.9	51.8	70.2	105.2	527.9	579.5	18.6
Cincinnati, Indianapolis & Western							99.0				99.0	99.0	99.0	99.0	360.9	360.9	27.4
Colorado Midland							2.0				2.0	2.0	2.0	2.0	261.1	261.1	.8
Copper Range							74.6				74.6	74.6	74.6	74.6	81.6	81.6	91.4
Cornwall & Lebanon							8.3	13.7			22.0	35.7	22.0	35.7	22.0	35.7	100.0
Cumberland & Pennsylvania							4.3		3.0		7.3	13.3	7.3	13.3	31.3	34.8	38.2
Cumberland Valley	4.9	38.5			43.4	81.9	11.1				11.1	11.1	54.5	93.0	162.2	206.9	44.9
Delaware & Hudson	164.7	225.9	4.3	17.5	412.4	699.5							412.4	699.5	743.9	1,042.4	55.4
Delaware, Lackawanna & Western	164.3	458.1	44.6	7.9	674.9	1,245.7	9.7				9.7	9.7	684.6	1,255.4	985.3	1,573.7	79.8
Denver and Rio Grande							7.7				7.7	7.7	7.7	7.7	2,247.3	2,406.7	.3
Duluth & Iron Range		16.1			16.1	17.9							16.1	17.9	200.5	270.6	6.6
Durham & Southern							56.0				56.0	56.0	56.0	56.0	56.0	56.0	100.0
Elgin, Joliet & Eastern	2.0	3.0			5.0	8.0	11.3				11.3	11.3	16.3	19.3	218.7	278.5	7.0
Erie		213.3		14.8	228.1	485.8	521.6	551.7			1,072.7	1,624.4	1,300.8	2,110.2	1,704.4	2,513.8	84.3
Chicago & Erie							240.4	8.4			248.8	257.2	248.8	257.2	248.8	257.2	100.0
Columbus & Erie							12.6	9.8			22.4	32.2	22.4	32.2	22.4	32.2	100.0
Erie & Jersey		42.3			42.3	84.6							42.3	84.6	Freight line		
Genesee River							32.6				32.6	32.6	32.6	32.6	32.6	32.6	100.0
New Jersey & New York		10.5			10.5	21.0	26.1				26.1	26.1	36.6	47.1	51.8	61.3	76.8
New York, Susquehanna & Western							16.0	13.7			29.7	43.4	29.7	43.4	203.4	217.1	20.0
Evansville & Terra Haute							105.8				105.8	105.8	105.8	105.8	143.3	143.3	73.8
Grand Trunk	1.1	1.6			2.7	4.3	807.6	323.5			1,131.1	1,454.6	1,133.8	1,458.9	1,133.8	1,458.9	100.0
Great Northern	9.9	162.0			171.9	333.9	77.8				77.8	77.8	249.7	411.7	7,088.8	7,290.0	5.6
Hocking Valley							138.4				138.4	138.4	138.4	138.4	338.0	338.0	36.2
Hudson & Manhattan	3.0	7.9			10.9	18.8							10.9	18.8	10.9	18.8	100.0
Illinois Central	65.1	235.1		12.0	312.2	621.0	7.0	5.0			12.0	17.0	324.2	638.0	4,462.7	5,027.2	12.7
Yazoo & Mississippi Valley	6.6				6.6	6.6		6.3			6.3	12.6	12.9	19.2	1,193.0	1,200.7	1.6
Illinois Traction	76.0				76.0	76.0							76.0	76.0	418.8	419.8	18.1
Iowa Central							11.0				11.0	11.0	11.0	11.0	503.0	503.0	2.2
Kanawha & Michigan	1.8				1.8	1.8	2.3				2.3	2.3	4.1	4.1	163.9	163.9	.3
Kentucky & Indiana Bridge & R. R. Co.							4.8	5.8	0.5		11.1	17.9	11.1	17.9	11.1	17.9	100.0
Kentwood & Eastern							3.3				3.3	3.3	3.3	3.3	30.0	30.0	11.0
Lackawanna & Wyoming Valley							1.0	2.4			3.4	5.8	3.4	5.8	22.6	43.4	13.3
Lehigh & New England	.7				.7	.7							.7	.7	67.2	67.2	
Lehigh Valley	14.1	447.5	34.9	24.1	520.6	1,110.0	645.7	51.9			697.6	749.5	1,218.2	1,859.5	1,178.0	1,779.3	100.0
Long Island	4.0	106.1	3.3	8.8	122.2	261.3		22.7			22.7	45.4	144.9	306.7	391.9	549.5	55.8
Louisville & Nashville	21.1	18.0			39.1	57.1	170.8	65.5			236.3	301.8	275.4	358.9	4,232.2	4,402.9	8.2
Maine Central	419.9	57.6			477.5	535.1							477.5	535.1	1,100.1	1,187.7	45.1
Portland Terminal	3.1	11.5			14.6	26.1							14.6	26.1	22.1	32.7	79.8
Minneapolis, St. Paul & Sault Ste. Marie							2,444.8	4.4			2,449.2	2,453.6	2,449.2	2,453.6	3,429.2	3,433.6	71.5
Missouri, Kansas & Texas	8.4	.8			9.2	10.0	9.5				9.5	9.5	18.7	19.5	2,885.9	2,886.7	.7
Missouri Pacific	54.5	33.3			87.8	120.1	465.7	5.4			471.1	476.5	558.9	596.6	3,736.8	3,790.5	13.1
St. Louis, Iron Mountain & Southern	113.8	9.4			123.2	131.8	315.2	52.8			368.0	420.8	491.2	552.6	3,100.1	3,259.2	17.0
Mobile & Ohio		4.7			4.7	9.4	51.9				51.9	51.9	56.6	61.3	827.0	827.0	6.9
Monongahela	.5				.5	.5							.5	.5	66.7	66.7	.7
Munising, Marquette & Southeastern							3.7				3.7	3.7	3.7	3.7	145.5	145.5	2.5
Nashville, Chattanooga & St. Louis							92.8	11.8			104.6	116.4	104.6	116.4	1,230.1	1,241.9	9.3
Newburgh & South Shore							.1	5.2			5.3	10.5	5.3	10.5	Freight line		
New York & Long Branch		38.0			38.0	76.0							38.0	76.0	38.0	76.0	100.0
New York Central lines:																	
Boston & Albany		132.9	50.1	23.6	206.6	510.5		1.9			1.9	3.8	208.5	514.3	356.7	607.6	84.6
Chicago, Indiana & Southern		5.0			5.0	10.0	144.1	59.1			203.2	262.3	208.2	272.3	421.3	540.5	50.3
Cleveland, Cincinnati, Chicago & St. Louis	2.3				2.3	2.3	542.6	379.0			921.6	1,300.6	923.9	1,302.9	1,865.4	2,283.2	58.0
Lake Erie & Western							862.8	9.2			872.0	881.2	872.0	881.2	832.5	841.5	100.0
Lake Shore & Michigan Southern	8.5	181.1	113.4	234.4	537.4	1,646.6	961.8	85.9			1,047.7	1,132.8	1,585.1	2,779.4	1,452.9	2,587.7	100.0
Dunkirk, Allegheny Valley & Pittsburgh							90.5				90.5	90.5	90.5	90.5	90.5	90.5	100.0
Lake Erie & Pittsburgh							27.8				27.8	27.8	27.8	27.8	Freight line		
Lake Erie, Alliance & Wheeling							87.7				87.7	87.7	87.7	87.7	87.7	87.7	100.0
Michigan Central		271.9			271.9	543.8	901.0	19.3			920.3	939.6	1,192.2	1,483.4	1,192.2	1,483.4	100.0
New York Central & Hudson River	1.9	505.8		66.8	574.3	1,279.9	1,597.9	867.4	15.5		2,480.8	3,379.1	3,055.1	4,659.0	3,085.8	4,722.9	98.7
Peoria & Eastern							84.0	1.7			85.7	87.4	85.7	87.4	337.9	340.3	25.7
Pittsburgh & Lake Erie		102.4		49.3	151.7	402.0	2.7				2.7	2.7	154.4	404.7	106.2	418.1	96.8
New York, Chicago & St. Louis	15.4				15.4	15.4							15.4	15.4	523.0	523.0	2.9
New York, New Haven & Hartford	17.5	264.3		9.2	291.0	601.3	154.3	205.7		75.8	435.8	868.9	726.8	1,470.2	1,958.1	3,120.2	47.1

TABLE 1—CONTINUED.—RAILWAYS WORKED BY THE BLOCK SYSTEM.

Names of railroads.	Automatic block signals.						Nonautomatic block signals.						Total automatic and nonautomatic.		Total passenger lines operated.		Percentage block signaled, miles of track.
	Single track.	Double track.	Three track	Four track	Total. Miles of road.	Total. Miles of track.	Single track.	Double track.	Three track.	Four track.	Total. Miles of road.	Total. Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	
New York, Ontario & Western	36.0	132.5	....	....	168.5	301.0	....	....	....	....	....	....	168.5	301.0	492.8	626.2	48.1
New York, Philadelphia & Norfolk	....	8.8	....	....	8.8	17.6	43.6	40.0	....	....	83.6	123.6	92.4	141.2	112.0	160.7	87.8
Norfolk & Western	70.7	376.2	....	....	446.9	823.1	1,217.6	7.1	....	....	1,224.7	1,231.8	1,671.6	2,054.9	1,695.0	2,081.5	98.6
Northern Pacific	101.5	338.6	....	....	440.1	778.7	781.6	137.0	....	....	918.6	1,055.6	1,358.7	1,834.3	5,307.9	5,868.9	31.3
Northwestern Pacific	13.4	12.4	....	....	25.8	38.2	....	....	....	....	....	....	25.8	38.2	383.2	395.9	9.8
Pennsylvania	....	60.0	3.1	304.3	267.4	949.9	1,884.9	673.2	25.8	191.9	2,775.8	4,113.1	3,043.2	5,063.0	3,217.2	5,237.5	95.0
Cleveland, Akron & Cincinnati	....	....	....	....	....	....	137.7	17.5	....	....	155.2	172.7	155.2	172.7	325.8	343.3	50.3
Grand Rapids & Indiana	....	....	....	....	....	....	55.8	2.2	....	....	58.0	60.2	58.0	60.2	532.5	543.1	11.1
Northern Central	....	....	....	....	....	....	286.7	121.9	....	18.8	427.4	605.7	427.4	605.7	435.0	616.9	98.2
Pennsylvania Co.	....	442.7	21.2	52.7	516.6	1,159.8	398.6	173.1	4.0	1.6	577.3	763.2	1,093.9	1,923.0	1,314.8	2,164.0	89.0
Philadelphia, Baltimore & Washington	....	15.5	....	21.0	36.5	115.1	426.4	146.7	14.6	18.7	606.5	838.4	643.0	953.5	646.0	956.8	99.6
Pittsburgh, Cincinnati, Chicago & St. Louis	....	10.2	....	3.5	13.7	34.4	489.9	515.3	59.2	34.9	1,099.3	1,837.7	1,113.0	1,872.1	1,415.6	2,174.5	86.0
West Jersey & Sea Shore	....	87.1	6.0	....	93.1	192.2	48.9	31.8	....	....	80.7	112.5	173.8	304.7	318.2	455.6	66.9
Vandalia	....	....	....	....	....	....	300.9	60.9	....	....	361.8	422.7	361.8	422.7	797.1	868.2	48.7
Peoria & Pekin Union	....	....	....	....	....	....	....	6.5	....	....	6.5	13.0	6.5	13.0	15.2	24.2	53.7
Pere Marquette	15.2	....	....	....	15.2	15.2	39.0	....	....	....	39.0	39.0	54.2	54.2	1,534.2	1,589.6	3.4
Philadelphia & Reading	14.5	326.7	38.9	22.6	402.7	875.0	143.2	96.2	....	....	239.4	335.6	642.1	1,210.6	870.0	1,461.9	81.2
Atlantic City	....	86.8	....	....	86.8	173.6	35.9	....	....	....	35.9	35.9	122.7	209.5	164.0	251.9	83.2
Gettysburg & Harrisburg	....	....	....	....	....	....	24.2	....	....	....	24.2	24.2	24.2	24.2	31.0	31.0	78.1
Northeast Pennsylvania	2.8	2.0	....	....	4.8	6.8	1.6	....	....	....	1.6	1.6	6.4	8.4	25.6	27.6	30.4
Perkiomen	....	....	....	....	....	....	38.2	....	....	....	38.2	38.2	38.2	38.2	38.2	38.2	100.0
Philadelphia, Newton & New York	3.8	1.7	1.6	....	7.1	12.0	....	....	....	....	....	....	7.1	12.0	21.7	26.6	45.1
Reading & Columbia	....	....	....	....	....	....	34.9	....	....	....	34.9	34.9	34.9	34.9	53.3	53.3	65.5
Quincy, Omaha & Kansas City, and Iowa & St. Louis	....	....	....	....	....	....	307.7	....	....	....	307.7	307.7	307.7	307.7	307.7	307.7	100.0
Queen & Crescent Route:																	
Alabama Great Southern	108.1	.4	....	....	108.5	108.9	....	....	....	....	....	....	108.5	108.9	290.5	297.6	37.5
Cincinnati, New Orleans & Texas Pacific	263.3	70.8	....	....	334.1	404.9	.7	....	....	....	.7	.7	334.8	405.6	335.4	406.2	99.8
New Orleans & Northeastern	77.9	15.5	....	....	93.4	108.9	....	....	....	....	....	....	93.4	108.9	195.6	211.1	51.6
Richmond, Fredericksburg & Potomac	....	....	....	....	....	....	9.0	78.7	....	....	87.7	166.4	87.7	166.4	87.7	166.4	100.0
St. Joseph & Grand Island	....	....	....	....	....	....	.3	....	....	....	.3	.3	.3	.3	251.6	251.6	....
St. Louis & San Francisco	695.9	37.8	....	....	733.7	771.5	108.3	....	....	....	108.3	108.3	842.0	879.8	4731.9	4806.5	18.3
Beaumont, Sour Lake & Western	....	....	....	....	....	....	84.3	....	....	....	84.3	84.3	84.3	84.3	118.3	118.3	71.3
New Orleans, Texas & Mexico	....	....	....	....	....	....	158.7	....	....	....	158.7	158.7	158.7	158.7	264.3	264.3	60.1
Orange & Northwestern	....	....	....	....	....	....	61.6	....	....	....	61.6	61.6	61.6	61.6	61.6	61.6	100.0
St. Louis, Merchants Bridge Terminal	....	5.9	....	....	5.9	11.8	....	1.1	....	....	1.1	2.2	7.0	14.0	10.0	19.8	70.7
St. Louis Southwestern	.4	....	....	....	.4	.4	....	....	....	....	....	....	.4	.4	649.2	649.2	.1
San Francisco, Oakland & San Jose Consolidated	....	3.8	....	....	3.8	7.6	....	....	....	....	....	....	3.8	7.6	18.0	35.4	21.1
San Pedro, Los Angeles & Salt Lake	3.7	....	....	....	3.7	3.7	....	....	....	....	....	....	3.7	3.7	963.7	963.7	.4
Seaboard Air Line	....	....	....	....	....	....	213.5	....	....	....	213.5	213.5	213.5	213.5	2,820.5	2,820.5	7.5
Southern	....	3.0	....	....	3.0	6.0	1,562.3	273.1	....	....	1,835.4	2,108.5	1,838.4	2,114.5	6,616.7	6,952.2	30.4
Southern Illinois & Missouri Bridge	....	4.6	....	....	4.6	9.2	....	....	....	....	....	....	4.6	9.2	4.6	9.2	100.0
Southern Pacific Atlantic System:																	
Galveston, Harrisburg & San Antonio	279.1	....	....	....	279.1	279.1	....	....	....	....	....	....	279.1	279.1	1,270.3	1,274.7	21.9
Louisiana Western	103.6	....	....	....	103.6	103.6	....	....	....	....	....	....	103.6	103.6	140.5	140.5	73.8
Morgan's Louisiana & Texas	95.3	....	....	....	95.3	95.3	....	....	....	....	....	....	95.3	95.3	292.6	332.8	28.6
Texas & New Orleans	109.8	....	....	....	109.8	109.8	....	....	....	....	....	....	109.8	109.8	438.4	438.4	24.9
Southern Pacific, Pacific System	2,266.3	172.8	....	2.5	2,441.6	2,621.9	87.0	11.0	....	....	98.0	109.0	2,539.6	2,730.9	6,497.9	6,731.9	42.0
Spokane, Portland & Seattle	.5	6.8	....	....	7.3	14.1	....	....	....	....	....	....	7.3	14.1	505.6	515.6	2.7
Staten Island Rapid Transit	....	10.1	....	.6	10.7	21.3	....	....	....	....	....	....	10.7	21.3	10.7	21.3	92.5
Staten Island	....	1.8	....	....	1.8	3.6	2.5	8.4	....	....	10.9	19.3	12.7	22.9	12.7	22.9	100.0
Syracuse, Lake Shore & Northern	....	6.5	....	....	6.5	13.0	....	....	....	....	....	....	6.5	13.0	33.0	44.5	27.6
Terminal R. R. Assn., of St. Louis	....	6.0	....	....	6.0	12.0	....	1.1	....	....	1.1	2.2	7.1	14.2	12.7	25.4	55.9
Tidewater Power Co.	....	....	....	....	....	....	6.2	....	....	....	6.2	6.2	6.2	6.2	11.3	15.7	39.5
Toledo, Peoria & Western	....	....	....	....	....	....	.3	....	....	....	.3	.3	.3	.3	220.0	220.0	.1
Toledo, St. Louis & Western	....	....	....	....	....	....	172.0	....	....	....	172.0	172.0	172.0	172.0	450.0	450.0	38.2
Ulster & Delaware	24.4	....	....	....	24.4	24.4	....	....	....	....	....	....	24.4	24.4	126.3	126.3	19.8
Union	....	0.6	....	....	0.6	1.2	1.4	....	....	....	1.4	1.4	2.0	2.6	7.4	14.8	24.3
Union Pacific	766.8	684.1	....	1.7	1,452.6	2,139.8	11.4	....	....	....	11.4	11.4	1,464.0	2,151.2	3,506.5	4,210.9	51.1
Oregon-Washington R. R. & Navigation Co.	424.9	13.6	....	....	438.5	452.1	1.3	....	....	....	1.3	1.3	439.8	453.4	1,427.3	1,445.6	31.3
Oregon Short Line	541.2	36.0	....	....	577.2	613.2	....	....	....	....	....	....	577.2	613.2	1,457.6	1,497.6	41.0
Virginia & Kentucky	....	....	....	....	....	....	.6	....	....	....	.6	.6	.6	.6	4.8	4.8	12.5
Virginian	....	....	....	....	....	....	17.3	....	....	....	17.3	17.3	17.3	17.3	460.0	460.0	3.8
Wabash	....	13.2	....	....	13.2	26.4	1,726.7	88.0	....	....	1,814.7	1,902.7	1,827.9	1,929.1	1,954.9	2,056.1	93.8
Wabash-Pittsburg Terminal	....	4.1	....	....	4.1	8.2	....	....	....	....	....	....	4.1	8.2	59.8	63.9	12.8
Washington Southern	....	4.1	....	1.5	5.6	14.2	....	26.6	....	....	26.6	53.2	32.2	67.4	32.2	67.4	100.0
Washington Terminal	....	1.1	....	1.0	2.1	20.4	....	....	....	....	....	....	2.1	20.4	2.1	20.4	100.0
Washington Water Power Co.	29.0	....	....	....	29.0	29.0	....	....	....	....	....	....	29.0	29.0	29.0	29.0	100.0
Western Pacific	11.2	....	....	....	11.2	11.2	....	....	....	....	....	....	11.2	11.2	11.2	11.2	100.0
Total	9,314.0	9,843.0	338.2	839.7	20,334.9	33,425.4	47,067.8	8,395.0	260.8	351.2	56,074.8	66,072.2	76,409.7	99,497.6	176,844.7	201,686.3	....

The figures for the Baltimore & Lake Erie include nine miles of road on which no passenger trains are run. On the Central New England there is a length of four miles, single track, equipped with automatic signals but also worked by the controlled manual system for the protection of opposing trains. The figures in the columns headed "four-track" include short sections having more than four tracks on the Chicago & North Western, Illinois Central, New York, New Haven & Hartford and Washington Terminal. On 480 miles of the lines of the Chicago, Burlington & Quincy only one engine is in regular service, but the block system is put in effect whenever more than one engine is used. On the Duluth & Iron Range there is a length of 14 miles, double track, which has automatic signals for one track but not for the other. The Hudson & Manhattan does not appear in Table 2 for the reason that all of its signals are "light signals." The figures shown for the Philadelphia & Reading include 16 miles of road, partly double track, used exclusively for freight service.

railway on which the telephone is used for the transmission of train orders. The total length of road thus reported is 58,584 miles, as compared with 41,717 miles one year ago. On a few lines both telegraph and telephone are in use, so that this increase of 6,867 miles in telephone mileage is offset by a decrease in telegraph mileage of only 5,811 miles.

The last preceding bulletin of the Interstate Commerce Commission, showing block signal mileage, was noticed in the *Railway Age Gazette*, April 21, 1911.

Comparing the present report with the report for January 1, 1911, the notable changes given in the small table herewith appear, the figures in each case representing miles of road.

Name of road.	Increase. Automatic.	Increase. Nonautomatic.	Decrease. Nonautomatic.
	Miles.	*Miles.*	*Miles.*
Atchison, Topeka & Santa Fe	44.8	58.8	....
Atlantic Coast Line	....	....	33.6
Baltimore & Ohio	49.6	1,827.2	....
Boston & Maine	45.1	....	4.8
Buffalo, Rochester & Pittsburgh	35.1	....	38.3
Central New England	3.4	....	0.3
Chesapeake & Ohio	226.0	....	254.4
Chicago & Alton	44.3	....	....

TABLE 2 KINDS OF AUTOMATIC BLOCK SIGNALS IN USE

Names of railroads.	Exposed disk.		Inclosed disk.		Semaphores.						Normal clear.	Normal danger.	Total automatic signals.		
					Electropneumatic.		Electric motor.		Electrogas.						
	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of track.	Miles of track.	Miles of road.	Miles of track.	Number of block sections.
Arizona & New Mexico							1.0	1.0			1.0		1.0	1.0	1
Atchison, Topeka & Santa Fe.															
Eastern lines							119.6	231.5			231.5		119.6	231.5	168
Western lines							6.3	8.8			8.8		6.3	8.8	10
Coast lines			3.0	3.0			28.2	50.4			53.4		31.2	53.4	49
Gulf, Colorado & Santa Fe			2.9	2.9							2.9		2.9	2.9	5
Atlantic Coast Line							16.5	30.6			30.6		16.5	30.6	35
Auburn & Northern							6.5	6.5			6.5		6.5	6.5	3
Baltimore & Ohio					12.2	39.0	161.9	333.8	93.6	186.1		558.9	267.7	558.9	677
Baltimore & Ohio Chicago Terminal			1.0	2.0			11.4	21.0			23.0		12.4	23.0	35
Baltimore & Ohio Southwestern							24.8	49.6				49.6	24.8	49.6	72
Boston & Maine[1]			.8	1.6			927.7	1,510.7	8.9	17.8	1,510.7	19.4	937.4	1,530.1	1,956
Boston, Revere Beach & Lynn							13.8	27.6			27.6		13.8	27.6	59
Buffalo, Rochester & Pittsburgh							35.1	70.2			70.2		35.1	70.2	66
Butte, Anaconda & Pacific			7.9	7.9							7.9		7.9	7.9	7
Central New England							28.6	44.3			44.3		28.6	44.3	49
Central of New Jersey					29.7	116.0	163.3	323.2	19.4	38.0	439.2	38.0	212.4	477.2	736
Chesapeake & Ohio							409.0	818.0			818.0		409.0	818.0	570
Chicago & Alton							605.3	789.9			367.6	422.3	605.3	789.9	418
Chicago & Eastern Illinois[2]			8.7	13.8			98.4	196.8			210.6		107.1	210.6	165
Chicago & North Western			736.8	1,500.0			6.5	16.6			1,212.8	303.8	743.3	1,516.6	1,196
Chicago & Western Indiana					1.7	3.4	17.8	35.6			39.0		19.5	39.0	63
Chicago, Burlington & Quincy			23.0	46.0			72.2	112.2			112.2	46.0	95.2	158.2	57
Chicago Great Western							283.2	369.4			369.4		283.2	369.4	273
Chicago, Indianapolis & Louisville							26.2	26.2			26.2		26.2	26.2	15
Chicago, Milwaukee & St. Paul			2.4	2.4			103.7	207.4	3.5	3.5	197.4	15.9	109.6	213.3	254
Chicago, Milwaukee & Puget Sound							248.2	248.2			248.2		248.2	248.2	189
Chicago, Peoria & St. Louis Ry. of Ill							1.3	1.3			1.3		1.3	1.3	1
Chicago, Rock Island & Pacific			3.3	6.6			933.1	1,212.9			1,212.5	7.0	936.4	1,219.5	1,294
Chicago, Rock Island & Gulf							32.6	32.6			32.6		32.6	32.6	50
Chicago, St. Paul, Minneapolis & Omaha							6.2	12.4			12.4		6.2	12.4	6
Chicago, Terre Haute & Southeastern							1.5	1.5			1.5		1.5	1.5	1
Cincinnati, Hamilton & Dayton							36.3	53.4			53.4		36.3	53.4	59
Cumberland Valley							43.4	81.9			81.9		43.4	81.9	91
Delaware & Hudson			31.2	62.4			21.8	43.6	359.4	593.5		699.5	412.4	699.5	1,028
Delaware, Lackawanna & Western			27.5	55.0	2.0	8.0	645.4	1,182.7			1,245.7		674.9	1,245.7	1,698
Duluth & Iron Range							16.1	17.9			17.9		16.1	17.9	8
Elgin, Joliet & Eastern							5.0	8.0			8.0		5.0	8.0	5
Erie							228.1	485.8			292.2	193.6	228.1	485.8	559
Erie & Jersey							42.3	84.6			84.6		42.3	84.6	88
New Jersey & New York							10.5	21.0			21.0		10.5	21.0	22
Grand Trunk					2.7	4.3					4.3		2.7	4.3	3
Great Northern							171.9	333.9			331.7	2.2	171.9	333.9	291
Illinois Central			29.5	104.2			118.8	187.0	163.9	329.8	252.1	368.9	312.2	621.0	536
Yazoo & Mississippi Valley							6.6	6.6			6.6		6.6	6.6	8
Illinois Traction							76.0	76.0			76.0		76.0	76.0	50
Kanawha & Michigan			1.0	1.0			.8	.8			1.8		1.8	1.8	2
Lehigh & New England							.7	.7			.7		.7	.7	1
Lehigh Valley			207.9	474.3			297.2	604.7	15.5	31.0		1,110.0	520.6	1,110.0	1,091
Long Island							122.2	261.3			257.3	4.0	122.2	261.3	410
Louisville & Nashville[3]							39.1	57.1			57.1		39.1	57.1	86
Maine Central							477.5	535.1			535.1		477.5	535.1	563
Portland Terminal							14.6	26.1			26.1		14.6	26.1	36
Missouri, Kansas & Texas			.5	.5			8.7	9.5			10.0		9.2	10.0	14
Missouri Pacific							87.8	120.5			120.5		87.8	120.5	104
St. Louis, Iron Mountain & Southern							123.2	131.8			121.8		123.2	131.8	123
Mobile & Ohio							4.7	9.4			9.4		4.7	9.4	6
Monongahela							.5	.5			.5		.5	.5	1
New York & Long Branch							38.0	76.0			76.0		38.0	76.0	118
New York Central lines:															
Boston & Albany[4]	15.9	32.4					180.5	456.0	6.6	13.2	154.2	347.4	203.0	501.6	639
Chicago, Indiana & Southern							5.0	10.0			10.0		5.0	10.0	14
Cleveland, Cincinnati, Chicago & St. Louis							2.3	2.3			2.3		2.3	2.3	3
Lake Shore & Michigan Southern			5.3	5.3			355.1	972.4	177.0	668.9	977.7	668.9	537.4	1,646.6	1,672
Michigan Central[5]			57.4	114.8			197.2	394.4			509.2		254.6	509.2	335
New York Central & Hudson River[6]			8.8	17.6			555.6	1,238.7	8.0	16.0	345.1	927.2	572.4	1,272.3	1,636
Pittsburgh & Lake Erie							151.7	402.0			402.0		151.7	402.0	550
New York, Chicago & St. Louis							15.4	15.4			15.4		15.4	15.4	17
New York, New Haven & Hartford	177.1	338.3	64.7	129.4			49.2	133.6			601.3		291.0	601.3	632
New York, Ontario & Western			75.8	131.3			92.7	169.7			301.0		168.5	301.0	170
New York, Philadelphia & Norfolk							8.8	17.6			17.6		8.8	17.6	9
Norfolk & Western					.7	.7	446.2	822.4			822.4	.7	446.9	823.1	804
Northern Pacific			1.5	1.5			438.1	776.2	.5	1.0	778.7		440.1	778.7	662
Northwestern Pacific							25.8	38.2			38.2		25.8	38.2	70
Pennsylvania[7]			4.6	9.2	245.9	901.2	11.8	23.2			933.6		262.3	933.6	1,561
Pennsylvania Co.							516.6	1,159.8			1,159.8		516.6	1,159.8	1,487
Philadelphia, Baltimore & Washington					36.5	115.1					115.1		36.5	115.1	169
Pittsburgh, Cincinnati, Chicago & St. Louis							13.7	34.4			34.4		13.7	34.4	84
West Jersey & Sea Shore					74.7	155.4	18.4	36.8			192.2		93.1	192.2	249
Pere Marquette			10.0	10.0			5.2	5.2			15.2		15.2	15.2	11
Philadelphia & Reading			386.0	846.8	1.5	4.4	1.9	4.1	13.3	19.7	1.6	873.4	402.7	875.0	1,004
Atlantic City			86.8	173.6								173.6	86.8	173.6	95
Northeast Pennsylvania			4.8	6.8								6.8	4.8	6.8	8
Philadelphia, Newtown & New York			7.1	12.0								12.0	7.1	12.0	17
Queen & Crescent Route:															
Alabama Great Southern	29.0	29.0	9.0	9.0			70.5	70.9			108.9		108.5	108.9	76
Cincinnati, New Orleans & Texas Pacific	21.5	21.5	44.8	44.8			202.3	329.6	5.5	9.0	367.7	37.2	334.1	404.9	339
New Orleans & Northeastern							93.4	108.9			108.9		93.4	108.9	89
St. Louis & San Francisco							733.7	771.5			771.5		733.7	771.5	218
St. Louis Merchants' Bridge Terminal							5.9	11.8			11.8		5.9	11.8	30
St. Louis Southwestern							.4	.4			.4		.4	.4	1
San Francisco, Oakland & San Jose Consolidated							3.8	7.6			7.6		3.8	7.6	75
San Pedro, Los Angeles & Salt Lake							3.7	3.7			3.7		3.7	3.7	3
Southern							3.0	6.0			6.0		3.0	6.0	9
Southern Illinois & Missouri Bridge							4.6	9.2			9.2		4.6	9.2	18
Southern Pacific—Atlantic System:															
Galveston, Harrisburg & San Antonio							279.1	279.1			279.1		279.1	279.1	201
Louisiana Western							103.6	103.6			103.6		103.6	103.6	73
Morgan's Louisiana & Texas							95.3	95.3			95.3		95.3	95.3	72
Texas & New Orleans							109.8	109.8			109.8		109.8	109.8	77
Southern Pacific—Pacific System					5.0	12.0	2,436.6	2,609.9			2,621.9		2,441.6	2,621.9	2,274
Spokane, Portland & Seattle							7.3	14.1			14.1		7.3	14.1	11
Staten Island Rapid Transit			10.7	21.3							21.3		10.7	21.3	55
Staten Island			1.8	3.6							3.6		1.8	3.6	6
Syracuse, Lake Shore & Northern							6.5	13.0			13.0		6.5	13.0	26
Terminal Railroad Association of St. Louis							6.0	12.0			12.0		6.0	12.0	16
Ulster & Delaware							24.4	24.4			24.4		24.4	24.4	20

TABLE 2—CONTINUED.

Names of railroads.	Exposed disk.		Inclosed disk.		Semaphores.						Normal clear.	Normal danger.	Total automatic signals.		
					Electropneumatic.		Electric motor.		Electrogas.						
	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of track.	Miles of track.	Miles of road.	Miles of track.	Number of block sections.
Union			.6	1.2							1.2		.6	1.2	1
Union Pacific			8.8	15.1			1,412.9	2,062.9	30.9	61.8	2,139.8		1,452.6	2,139.8	1,710
Oregon-Washington R. R. & Navigation Co.							438.5	452.1			452.1		438.5	452.1	345
Oregon Short Line			1.7	1.7			575.5	611.5			613.2		577.2	613.2	482
Wabash							13.2	26.4			26.4		13.2	26.4	37
Wabash Pittsburgh Terminal					4.1	8.2					8.2		4.1	8.2	11
Washington Southern					5.6	14.2					14.2		5.6	14.2	12
Washington Terminal					2.1	20.4						20.4	2.1	20.4	13
Washington Water Power Co.							29.0	29.0			29.0		29.0	29.0	23
Western Pacific							11.2	11.2			11.2		11.2	11.2	8
Total	243.5	421.2	1,877.6	3,838.6	424.4	1,402.3	16,848.5	25,692.4	906.0	1,989.3	26,437.1	6,906.7	20,300.0	33,343.8	33,715

[1] (Boston & Maine.) 4.8 miles double track light signals in the Hoosac tunnel not shown in this table. Provision is made for the operation of the road through this tunnel as single track, at which time the staff system is used.
[2] (Chicago & Eastern Illinois.) The figures in this table include 8.7 miles of inclosed disk signals used in manual block territory which are not shown in Table 1.
[3] (Louisville & Nashville.) Automatic signals are installed on 22.3 miles single track in manual block territory.
[4] (Boston & Albany.) 3.6 miles of road, 8.9 miles of track, on which slotted signals are used, not shown in this table.
[5] (Michigan Central.) 17.3 miles double track slotted and semiautomatic signals not shown in this table.
[6] (New York Central & Hudson River.) 1.9 miles four-track light signals not shown in this table.
[7] (Pennsylvania.) 5.1 miles road, 16.3 miles track, light signals, not shown in this table.

Name of road.	—Increase— Automatic.	Nonautomatic.	Decrease. Nonautomatic.
	Miles.	*Miles.*	*Miles.*
Chicago & Eastern Illinois	.....	100.8	.....
Chicago, Burlington & Quincy	52.8	.....	109.8
Chicago Great Western	177.3	.....	1,242.3
Chicago, Indianapolis & Louisville	26.2	.....	26.3
Chicago, Milwaukee & Puget Sound	248.2	275.3	.....
Cumberland Valley	36.7	.....	8.5
Delaware, Lackawanna & Western	90.2	.....	.....
Grand Trunk	.....	1,131.1	.....
Great Northern	41.1	.....	180.7
Illinois Traction	76.0	.....	24.0
Louisville & Nashville	.....	.....	259.6
Missouri Pacific	6.9	452.5	.....
St. Louis, Iron Mountain & So.	.....	355.3	.....
New York Central & Hudson River	192.8	.....	.....
Norfolk & Western	106.1	.....	86.7
Northern Pacific	201.9	.....	74.9
Northwestern Pacific	11.9	.....	250.5
Pennsylvania	4.5	414.3	.....
Pennsylvania Co.	172.3	.....	171.8
Philadelphia, Baltimore & W.	.....	272.6	.....
Queen & Crescent—New Orleans & N. E.	77.9	.....	.....
St. Louis & San Francisco	133.6	.....	49.0
Southern Pacific—Pacific System	86.5	.....	.....
Union Pacific	38.9	.....	.....

It will be noticed that the increase in block signal mileage during the year 1911, as shown in the present report, is considerably larger than that shown in the *Railway Age Gazette* of December 29, 1911, a number of roads from which statements were then unobtainable having made large increases during the year.

The Belgian government has made an arrangement with the Societe Generale de Belgique, Brussels, for the construction of a new railway in the Belgian Congo, which will connect the Casait and Katanga districts. For the construction of this railway a company will be formed with $7,500,000 capital.

The concession for building the Amazon-Pacific, or Ucayali railway, Peru, as modified by the Peruvian congress, was signed by President Leguia on March 8. The modifications of the original contract of April 11, 1907, are as follows: The gage is reduced, at the option of the concessionaires, from 4 ft. 6 in. to 3 ft. 3 in., but the tunnels and cuts are to be made as for a normal gage. The concessionaires may prefer to build a broad-gage road. A grade up to 5 per cent. is authorized for the section of the road between Goyllarisquisca and the exit of the pass of Tusi. The Ucayali railway should be completed at least by the time the Panama canal is officially opened, and will enable direct shipment of United States products to be made to the Amazon regions via the Panama canal, the Pacific ocean, and the port of Callao, thus materially increasing the commercial importance of this port, which will then be the Pacific terminus of this transcontinental route.

GOVERNMENT RAILWAY OPERATION IN FRANCE-*

BY PAUL LEROY-BEAULIEU.

The French government has owned and operated a system of railways, its own property, for about 35 years. This system had a limited extent at first, but gradually it was carried to 2,992 kilometers (about 1,860 miles). The management of it was very ordinary; it certainly had no pretention to being a "model system," or an experimental system, as was promised. It went on indifferently, with accidents relatively frequent—there being several sensational ones. It was almost unproductive, leaving only net earnings of 12,000,000, or a maximum of 15,000,000 francs, which were out of all proportion to the purchase price or the value of the property.

It was argued, as excuse, that this system was badly placed between systems vaster and better situated. The government wished to do something grander. In 1908 it obtained from parliament—by several majority votes in the senate, and against the opinion of all the financiers of that assembly, notably those of several ex-ministers of finance—authority for the purchase of the neighboring and much larger system, the Western Railway. To force the vote of the senatorial assembly, which opposed this action, M. Clemenceau found it necessary to declare that if they did not pass it (in order to realize this great "reform") he would resign. What a pity they did not let him resign, more especially as several months later an unexpected vote of the Chamber of Deputies, upon an incident of the assembly, forced him to resign.

M. Clemenceau, chief of the cabinet; M. Caillaux, then minister of finance; M. Barthou, then minister of public works, followed each other in the speaker's chair, in order to affirm that the purchase was very simple and could not in any case be onerous to the state. The most positive, the most solemn, the most precise declarations were made on this subject by the three ministers. As to the service of the system, it would be considerably improved; the people of the western provinces would experience benefits from the state management.

The government, by this threat of resignation—which, however, would have been an event, or, rather, an incident, of very little significance—carried the day. The purchase was voted. The system of the Western Company, comprising today 5,960 kilometers (about 3,700 miles) passed into the hands of the state, making a total of 8,952 kilometers (about 5,600 miles)

*A translation of an article in *The Economiste* of Paris, December 2, 1911. M. Leroy-Beaulieu has long been one of the leading economists of France.

of railways belonging to the French government, about 600 kilometers less than the system of the Paris-Lyons-Mediterranean Company, and more than any of the systems of the four other great companies.

Three years have passed since then. The last year of operation by the company was the year 1908. Every one knows the deplorable effects of the government operation. It has been complete disorder for three years, which grows instead of lessening—the most frequent irregularities in the arrival and departure of trains; the most constant errors and phenomenal delays in the transportation and delivery of freight. The people, given poor service by the government in cases where they had no recourse to water transportation as a substitute or subsidiary, are perforce obliged to revive the old modes of transportation by wagon. In brief, at the end of three years the operation by the government appears as a public calamity and a financial disaster. Besides, sensational accidents succeed each other, not only on the Western State system, but upon the old state system, the latter of which has been operated for nearly 35 years.

Let us state first the financial disaster. It ought to cost the state nothing more, Messieurs Clemenceau, Caillaux and Barthou assured us in their speeches to the senate, after the purchase, than before. But we have prepared a comparative statement of the receipts and expenses of the system of the Western State before and after the purchase. It is edifying. We give it below:

Years.	Gross receipts in francs.	Expenditures in francs.	Net receipts in francs.
1908 (last year of the operation by the company)	218,378,000	146,801,000	71,577,000
1909 (operated by state)	219,341,000	152,782,000	66,561,000
1910 (operated by state)	229,621,000	174,441,000	55,180,000
1911 (estimated)	233,014,000	203,545,300	29,468,700

Thus, though the gross receipts have advanced nearly 15 millions in that period, the expenses have increased nearly 57 millions, and the net receipts have fallen more than 42 millions. The Western system realized 71,500,000 francs net receipts during the last year of private operation. The first year of operation by the state, this figure was almost maintained, there being a loss of only 5 millions; the state had not had yet time to complicate and disorganize the service. The second year of state operation, the disorganization of service being accentuated, there was a new loss of almost eleven and a half millions in the net reecipts; and at last, in the third year of operation by the state, which year is approaching its end, the decline of net receipts, as we can foresee, will be much more considerable; it approaches 25 millions. Since the purchase the net receipts of this vast system of 5,960 kilometers have been diminished more than 42 millions, or about 60 per cent. The net receipts tend to vanish completely. It will not be astonishing if there remains nothing in two or three years from now. What has become of the promises of Messieurs Clemenceau, Caillaux and Barthou in the discussion upon the purchase? Whence come these frightful miscalculations? From the usual faults of federal administration in democratic countries—unstable personnel in high places; confirmed habits of prodigality, of favoritism; want of unanimity and want of discipline.

In order to quote only a few facts, they have increased enormously the office staff; doubled, indeed trebled, the number of employees; have created 3,000 places to reinforce the personnel of the stations, 900 for the train service, 380 for the track service, or an increase of effective force of 5,280 units; when the increase of traffic did not warrant more than a quarter, or a third at the most, of that increase. It has come to that point when the administration of the state railways does not know—parliamentary reports as witness—the importance of the actual working force of its staff. They have raised the larger part of the salaries, but there is still only a dissatisfied personnel. Unparalleled errors have been made in materials and work.

The financial results of the operation by the state of the system of the old company of the West, already so deplorable, according to the statement above, appear yet to be bound to increase. The budget of 1911 foresaw really for that operation a deficit of 41,847,000 francs. A demand of supplementary credits, recently disposed of and which will not perhaps be the last for that cause, added to it 32,286,000 francs. The total charge of the system for the state mounts up thus to 74,133,000 francs. But the old company of the West only demanded of the treasury as guarantee of interests those sums which, according to the annual report have varied in the recent period, between a minimum of 6,000,000 a year and a maximum of 27,000,000; this last figure attained only in the last year of operation, on account of divers charges of liquidation which without the purchase would have been divided among several accounts. In taking, nevertheless, as a term of comparison, this maximum figure of 27,000,000 of the guarantee of interest, which at the outside would not have been prolonged beyond the year 1934, one sees that the additional burden on the people, that is to say, the taxpayers, due to the purchase, attained 47,000,000 francs in 1911.

These are the financial results of the purchase of a property, which, according to the assertions of the three ministers, MM. Clemenceau, Caillaux and Barthou, would be self-supporting. "A clean transaction," they said complacently. If the people enjoyed a convenient service—we do not say improved, but not deteriorated—we would not complain. But one knows the frightful disorganization to which the service of this unhappy system is the victim. In the sessions of November 23 and 24 in the senate, the most formal and most certain declarations came from MM. Jenouvrier, d'Estournelles de Constant, Richard Waddington and Milliard painting "the deplorable condition of the Western State system." These are the very terms of the order of the day voted by the senate in the session of November 24.

The operation of the railways by the state, outside all its monstrous irregularities, its frequent accidents, has gone back 50 years as compared with the operation of the company. After the first period, when the state increased the number of trains and had quicker service on several of them, it resolved, on the contrary, to reduce the number and the speed. M. Waddington, for example, demonstrated that the duration of the journey from Rouen to Paris, which in the last year of operation by the company (1908) was 143 kilometers, for 2 hours and 11 minutes, is now 2 hours and 39 minutes, or 28 minutes more; which represents an increase of more than 20 per cent. in the time of the journey. It is even seven minutes longer in 1911 than in 1865; and then we were at the beginning of the operation of railways.

Yet the reduction in the number of trains and their decrease in speed are the least evil. We refer the reader who wishes to have precise details to the extraordinary revelations made by the different orators in the senate, MM. Jenouvrier, d'Estournelles de Constant, Waddington and Milliard. They fill entirely a series of columns in the official journal of November 24 and 25 last. We content ourselves by reproducing here a resolution of the chamber of commerce of Evreux, from which M. Milliard had read:

"The chamber of commerce of Evreux, noting that the management of the railway of the Western State is more than ever unable to assure the transport of freight to its destination on its lines; noting that this incapacity throws into the greatest disturbance the commercial relations of our region and threatens to cause the ruin of its industries; noting that this situation is the cause of numerous legal processes, and necessitates the payment of large indemnities by the Western State Railway which are met largely by the taxpayers; noting, lastly, that because of the extension of the evil and the dissatisfaction which results from a general discontent, there is cause to dread an agitation of a violent character, such as has been produced by other causes in years past, therefore, calls the most serious

attention of the competent ministers to the facts above noted and asks the promise that the condition will be remedied."

M. Milliard is senator from the Eure, and this is why he quotes the deliberation of the chamber of commerce of Evreux. His colleagues, representing the other departments of the system, could quote similar resolutions from the reports of the chamber of commerce of that region.

It is in vain that the government seeks to excuse its deplorable administration, by throwing the responsibility on the old company. The latter has not been in possession for three years, and under its management the operation of the Western system—if it was not particularly remarkable—was very decent; the trains were more numerous and faster than at present. There was not then the lamentable disorder of which the people complain at the present time. There was besides (the company has proved it) no grave accident upon its system. These accidents are multiplied today in a most distressing fashion; as much upon the Western State system as upon the old state system.

On that old system which the state has operated for nearly 35 years was that horrible accident of Montreuil-Bellay, by the failure of the bridge and the precipitation of a train into the Thouet river. Hardly four years ago there was, on that same old state system, a frightful accident of the same nature, within 60 kilometers of the same place on August 4, 1907, at the Ponts-de-Cé, causing the death of 30 passengers. Let us recall another accident, recent also, which happened suddenly, causing the death of 40 passengers; also, of course, on the old state system at Saujon, near Bordeaux, in August, 1910. Add to these on the Western State system the accident of Villepreux, June 18, 1910, where there were 18 deaths; then that of Bernay, September 10, 1910, with ten victims; and, still on the Western State, the accident of Courville, February 14, 1911, where there were ten deaths.

The six greatest accidents which have taken place in France during four years, those of Ponts-de-Cé, Villepreux, Saujon, Bernay, Courville and Montreuil-Bellay, have all happened on the state railways—three on the Western State and three on the old state system, which the state operated for nearly 35 years, and which is only 2,992 kilometers long, or about one-fifteen of the length of the systems under private management.

The French government owns different monopolies, those of tobacco, matches and powder. It has possessed itself of another monopoly for several years more or less, that of homicidal railway accidents. Six fatal accidents to passenger trains in four years, equally divided between the Western State and the old state system! And this deadly management imposes on the French tax-payers 50 million francs annual charges! Here is the great "reform!" Here the masterpiece! The senate closed its discussion on November 24 by an order of the day which it is well to reproduce:

"The senate sends the testimony of its profound sympathy to the families of the victims of the catastrophe of Montreuil-Bellay and its congratulations to the rescuers; taking account of the declarations of the minister of public works, of the efforts made to lighten the deplorable condition of the system of the Western State Railway System, and trusting to the government to put a stop to the insecurity as well as the irregularity of its administration."

Thus "the deplorable condition of the system, the insecurity and irregularity of the management" are solemnly stated by the senate. The system operated by the state represents among the French railways the drunken slave among the Greeks. How can one stop this plague? According to our opinion, there is only one remedy, and we hope that it will soon come: it is other management than that of the state system. Certain persons wish that this horribly costly experiment be prolonged. It is an abyss. The democratic government, inclined to demagogy, having a varying personnel, practicing favoritism, favoring want of discipline, and habituated to prodigality and want of unanimity, is incapable of conducting with method, surety and economy a complicated industrial work. We are having it fully demonstrated. No matter how well-advised and wise, the rules of the state administration cannot have the suppleness of those of private management. The same men in the service of the state cannot be as valuable as in the service of independent companies, because they are subjected to many more hindrances, much more suspicion, much more red tape and are especially restrained in their initiative.

Let the government rid itself of its purely industrial tasks. Let it concentrate its attention and its efforts on its own distinctive tasks—the general administration of the nation, the defense of the country, the army and navy, its foreign representation. When it will confine itself to these essential tasks, which no one else can do, perhaps it will accomplish them with less want of unanimity and inefficiency than it has done for a certain number of years.

The French government will have a survey made for the proposed railway from Tangier, Morocco, to Fez. It is probable that instead of a direct route, a route via Mekinez will be chosen, owing to its smaller cost, for, though it would be a good deal longer, this route would avoid the mountainous region and would partly coincide with the proposed line from Fez to Rabat.

The program of new works proposed by existing railway companies in the United Kingdom in bills and provisional orders in the present session of parliament contemplates a total expenditure of $20,011,242, exclusive of $867,502, for Edgware & Hampstead railway works authorized by previous acts and intended to be replaced by deviations and alterations at any extra cost of $642,052. Existing companies propose to construct a new railway 45 miles single and 20 miles double track. Double line widenings aggregate 29 miles, most important being the Great Central outside Sheffield and at various points between Mexboro and Barnetby, total 22 miles, estimated cost $2,400,381. Of 28 miles of single-line widening, 26 miles will be constructed at different points on the Great Eastern, estimated cost $661,557; and double-line deviations, alterations of levels, etc., 4 miles. By individual companies the largest expenditures will be made on electric railways in the London district. The London Electric contemplates spending $3,664,474, and the London & North Western $2,877,425. A new line to Watford and widenings between Finchley road and Wembley park will cost the Metropolitan $1,825,638. The Metropolitan District Company contemplates $1,190,175 expenditure on widenings between East Putney and Wimbledon, and the Great Western and Midland propose outlays of $1,942,488 and $1,697,941, respectively, in South Wales and other parts of their system. Existing companies propose to spend the following amounts: On 113 bridges over public roads, railways, rivers, or canals, $826,878; on accommodation works, $1,281,524; on viaducts, $64,934; on tunnels, $3,771,381; on retaining walls, $582,929; on covered way, $162,478; on electrical equipment, $42,275; and on stations, $1,109,635. On widening, lengthening or reconstruction of bridges, $326,639 is proposed to be spent by the Great Western, $53,531 by the Great Eastern, $4,818 by the Great Central, and $3,163 by the Caledonian. The Great Eastern proposed also to spend $73,172 on river walls and $13,845 on pier works; and new subways will cost the London Electric $205,366. Two railway proposals by new companies seeking incorporation are the Canvey Island Deepwater Wharf & Railway, with a proposed expenditure of $2,458,653, and the Lothian railways with $1,456,855. The Canvey Island expenditure includes $1,672,713 on the construction of a new wharf, and the remainder on constructing 4 miles of single line, involving $136,262 for a public road and railway bridge, $10,920 for culverts and drains, and $14,137 for stations. The 14 miles of single line of the Lothian railways is estimated to involve expenditures of $239,870 for 33 public road and railway bridges, $58,130 for accommodation works, $194,660 for viaducts, and $37,082 for culverts and drains.

DEFECTIVE BOX CARS AND DAMAGED FREIGHT.

Fifth Article. Examples of Best Wood and Steel Frame Equipment. Possibilities of All-Metal Construction. Conclusions.

The first four articles in this series directed attention to the great expense to which the railways are put because of damage to freight due to defective equipment. The various defects which are responsible for such damage have been considered in detail, and in all cases recommendations have been made, or devices have been described, which will largely overcome the difficulties. To make the series of articles doubly constructive it is proposed in this fifth article to describe certain box cars which, more than any others of their particular type of construction, seem to have given the best results from the standpoint of loss and damage to freight. These cars were not selected because of any theory or imagination on the part of the editor, but were recommended by practical men in the operating, motive power and car departments, because of the good results which they have given in service. One of them, a Santa Fe 40-ton car, has a wooden underframe and superstructure. Another, the Canadian Pacific car, has a steel underframe and a steel frame for the superstructure. In addition to these two cars another type—the all-steel box car—which at the present is almost entirely experimental, but which promises to give a good account of itself in the future, is considered.

WOODEN BOX CAR.

An all-wood box car which seems to have received more favorable attention generally from the car department and operating officers who are interested in reducing the amount of damage and loss to freight, than any of the other cars of that type, is the standard 40-ton box car of the Atchison, Topeka & Santa Fe, the general construction of which is shown in Fig. 56. Various details of this car have been touched upon in the earlier articles of this series and several of them have been illustrated.

The side door was described in the issue of April 19, page 892. A master car builder of no mean experience, in commenting on box car side doors, made the following statement: "There is not a railway in the United States or Canada that has in use a side door which answers the purpose. They are entirely too weak. They should be just as strong as any other part of the car, for when the load shifts or becomes disarranged it will always push out the weak part of the car, which is the side doors, and it is for this reason that we have so many trains side-wiped and so many lost doors." To secure a door of the strength indicated it may be necessary to make it entirely of steel—and such designs are now being developed. The door on the Santa Fe car is, of course, not nearly as strong as the side of the car, but if properly applied there should be very little danger of cinders or moisture entering the car at either the top, bottom or ends of the door. It is also burglar proof; that is, it cannot be forced open without leaving evidence of its having been broken into, thus saving the expense of a fruitless search in attempting to trace the goods under the impression that they have been mis-sent, and also making it possible to locate the approximate point at which the robbery occurred. The door is thus far in advance of the average side door now found on box cars. The door post is also reinforced, as shown on page 894 of the issue of April 19, thus making a more substantial construction and reducing the cost of maintenance of both the door post and the door.

Both the sides and the ends of the car are of substantial construction. It is true that the grain or V strip is nailed in place, as in the ordinary box car, but the loosening of this strip is not such a serious matter where wooden side sills are used as is the case with a steel underframe. However, the car could be improved in this respect by fastening these strips more securely.

The end construction is particularly good and was fully described in the issue of April 26, page 959. The end door, of steel construction, is also far more substantial and effective than is to be found on most box cars; it was illustrated on page 1003 of the May 3 issue. The roof is substantially supported on strong metal carlines, which are rigidly tied to the side plates. An outside metal roof is used, which is said to have given good results. The strong construction of the roof frame has undoubtedly favored the roof.

The Canadian Pacific has found it advisable to place a stronger end on its standard wooden box cars and the method of doing this is shown in Fig. 57. The end and corner posts are constructed of Z-bars, weighing 6.7 lbs. per foot; lining of 1¾ in. x 5 in. planks is placed inside of the end posts and is fitted into Z-bar corner posts, as shown on the drawing. A 3.5-lb. Z-bar is fitted between the bottom of the end plate and the top of the sheathing. The tops of the end posts are riveted to this Z-bar, while the bottoms are fastened to the 4 in. x 3 in. x ¼ in angle plate, which connects the end sill and the sheathing. The end sill is backed up and reinforced on the inside for a considerable part of its length by a 11.25 lb. channel. The end is, therefore, far more substantial and tight than the ordinary type of construction.

A method of reinforcing the ends of box cars on the Central of Georgia is illustrated in connection with a communication from F. F. Gaines, superintendent of motive power, in another part of this issue.

STEEL FRAME BOX CARS.

In designing steel frame box cars very little attempt seems to have been made to strike out along original lines and to adapt the design to secure the best results from the use of the steel. In most cases the wooden parts seem to have been simply replaced by steel ones, and the sheathing, floor, etc., are attached as nearly according to the practice followed with wooden construction as possible. Naturally this method does not give the best results and many defects have developed, as indicated in the third article of this series in our issue of April 26.

The steel frame box cars of the Canadian Pacific, of which there are now 4,500 in service and 4,500 building, are a notable exception to this method of construction, and the cars are undoubtedly more satisfactory, both from the standpoint of the loss and damage to the freight and from that of the cost of maintenance, than any of the other steel frame cars which have been introduced thus far. The general construction of these cars is shown in Figs. 58 to 61 inclusive. The steel framework is on the outside of the car, and the sheathing on the inside consists of 5½ in. x 1½ in. planks. The bolt holes through the frame members are slotted so that in case the sheathing should shrink, the bolts can be loosened and it can be wedged down from the top and tightened up. In the first cars that were built provision was made for drawing the sheathing down by tightening the nuts on long rods extending from the side plate to the side sill. It was found, however, that if the lumber was properly dried and the cars were erected according to instructions that there was no tendency for the wood to shrink, and some of these cars which have been in service for two years are still as tight as when they were first built.

Kiln dried lumber was not used on some of the first cars of this type, but the lumber apparently shrunk as much in the first two or three months as it will ever shrink, and one tightening down of the side planks is probably all that will ever be required. The planks are tongued and grooved, and the joints are painted when the cars are erected.

The strongest criticism which can be directed against the car is that the car builders in this country do not have sufficient

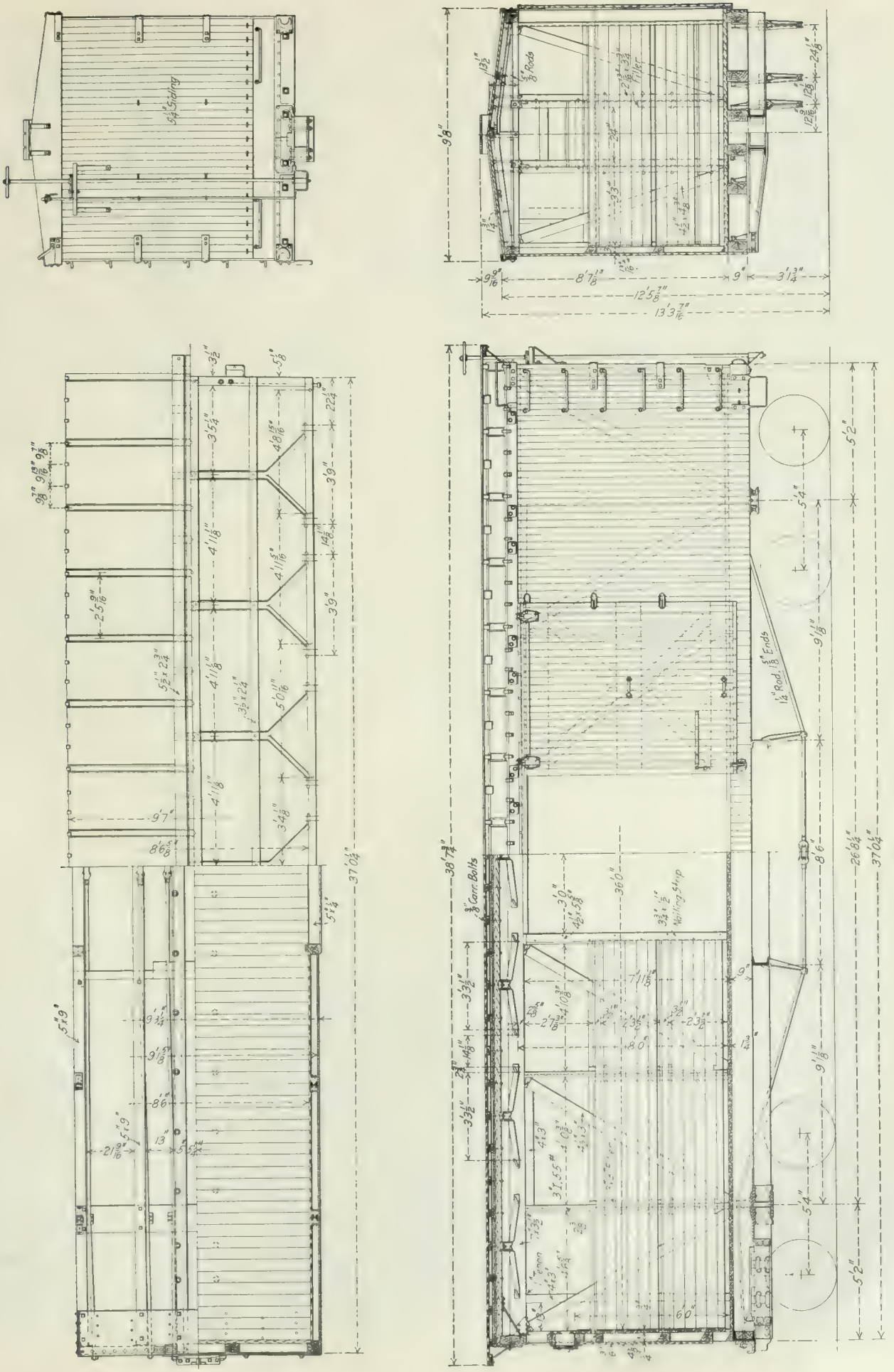


Fig. 56—Santa Fe Standard 40-Ton Wooden Box Car.

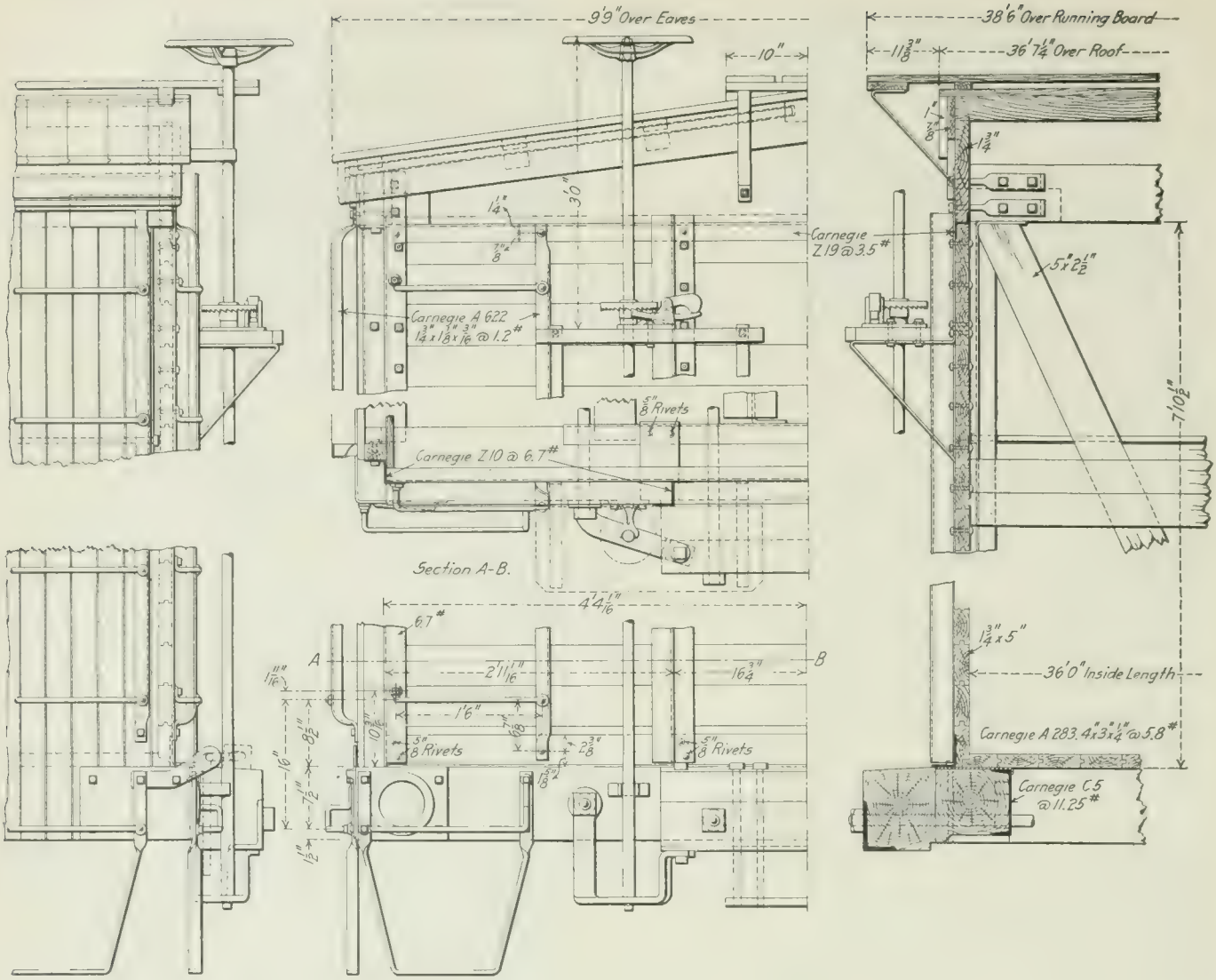


Fig. 57—Reinforced End Construction on Canadian Pacific Wooden Box Car.

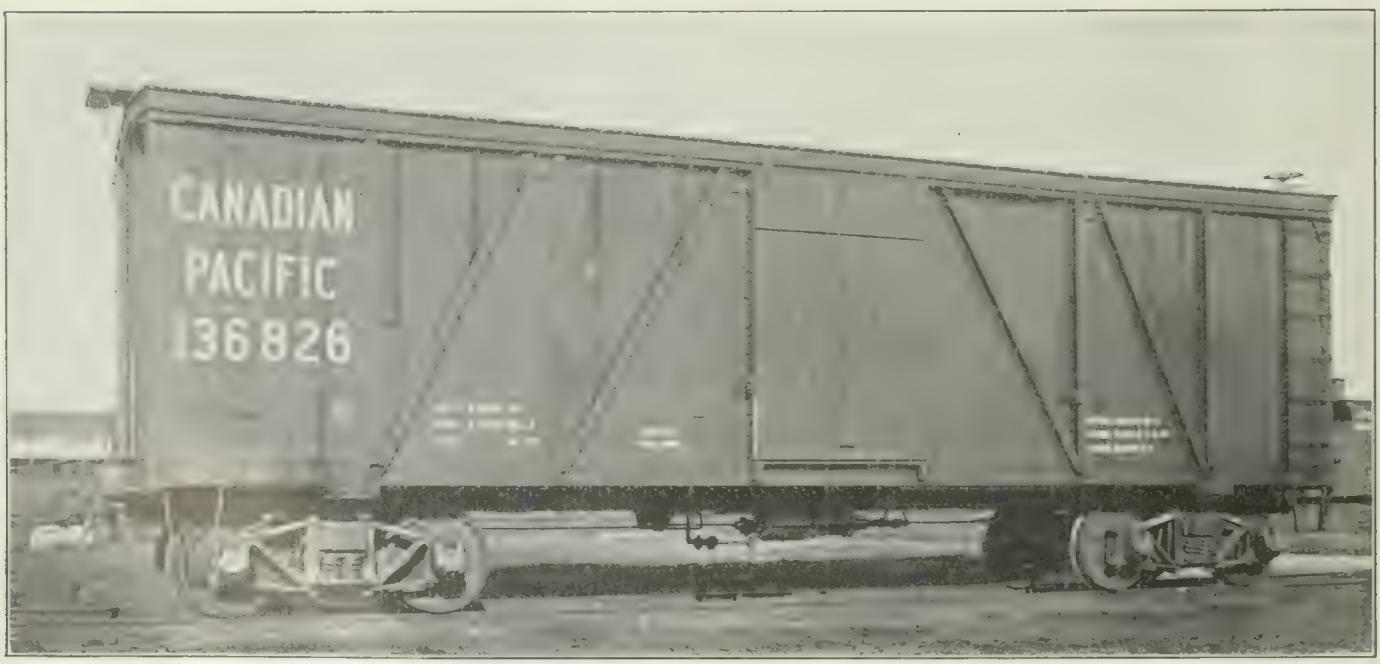


Fig. 58—Canadian Pacific Steel Frame Box Car.

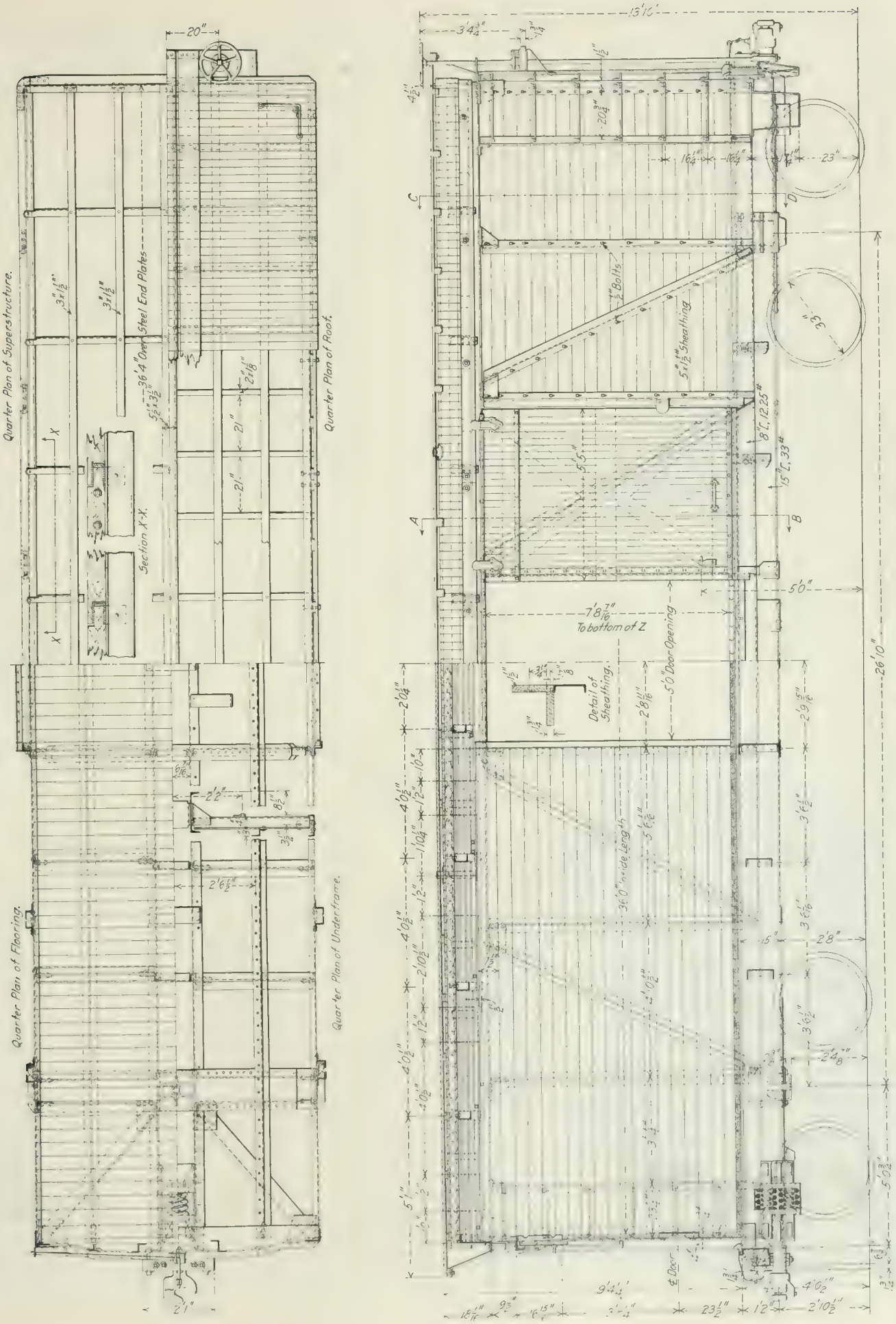


Fig. 59—Canadian Pacific Standard 40-Ton Steel Frame Box Car.

facilities for drying the lumber properly, but no doubt they will be glad to provide them if this type or a similar type of car should be adopted more or less generally.

The first cars which were built had four end posts in addition to the corner posts, but the later cars have only two end posts, the intermediate posts being removed. These ends have given excellent service; the joint between the floor and the lining is the same as between the sides and the floor (Fig. 35, April 26, 1912, page 956) and prevents any possibility of the leakage of grain or similar lading.

In most cases where these cars have been side raked it has only been necessary to remove the lining, straighten up the posts and replace the lining. On cars which have been cornered in accidents which would have destroyed an ordinary type of car, the corner section has been removed and replaced without disturbing the rest of the car framing.

These cars were fully described in the *Railway Age Gazette* of March 10, 1911, page 55. An inside metal roof is used and the construction of the roof frame is such as to require an extremely small width over the eaves, as may be seen by referring to the end view of the car.

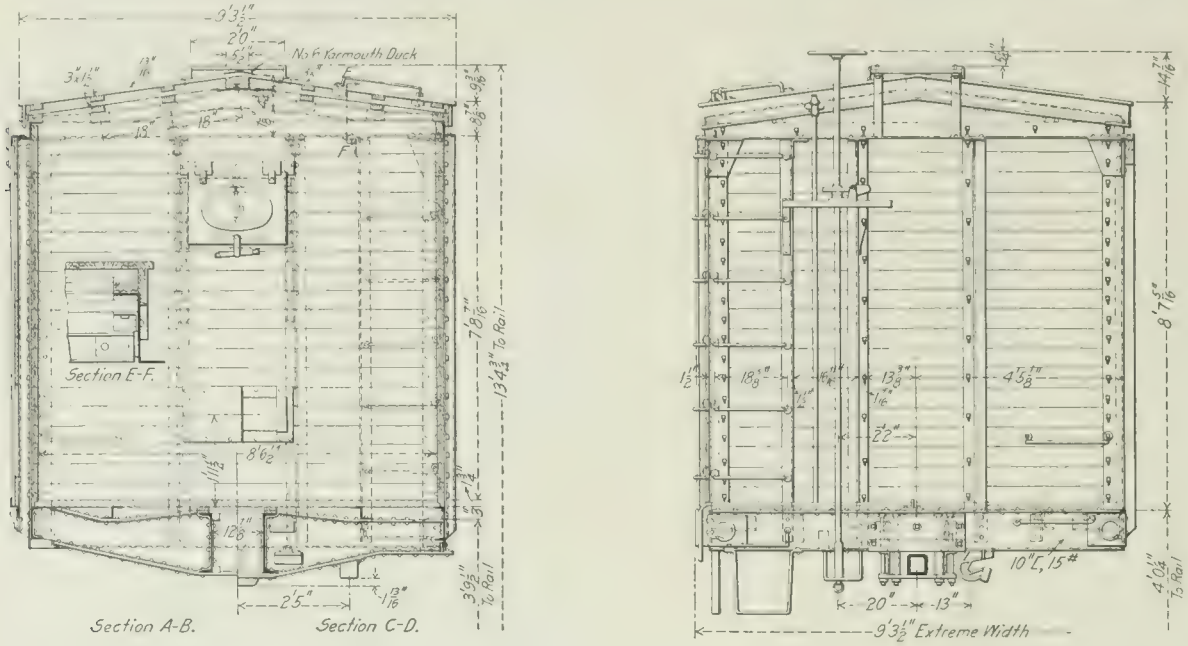


Fig. 60—End View and Sections Through Canadian Pacific Steel Frame Box Car.



Fig. 61—End View of Canadian Pacific Steel Frame Box Car.

The details of the side door, but as applied to a wooden frame car, are shown in Figs. 62 and 63. A Security door is used with a 1¼ in. x 1¼ in. x ¼ in. angle to stiffen it horizontally near the top. The door guides are held by ½ in. bolts, with the ends riveted over the guide instead of being secured by nuts. The door guides, therefore, cannot be removed without cutting off the rivet head. The staple for the door hasp is secured by nuts with large washers on the inside of the door. The ends of the staple are riveted over after the nuts are screwed on, and it cannot be pried loose without tearing the door badly. In place of the two washers shown on the drawing the former practice was to use a single washer 2 in. x 10 in. x 1/16 in. The lower edge of the door is reinforced by a Z-bar; the rear end of the lower leg of this bar is bent outward so that the door is wedged tight against the car when this part of the bar comes in contact with the guide as the door is closed. The door post is not reinforced, but is larger than that ordinarily used, being 2 in. x 3 in. in section. Better results would probably be obtained by reinforcing this post.

The end doors are of steel construction and fit tightly in place. The details are not illustrated as additional improvements are now being made in the design of these doors.

ALL-STEEL BOX CAR.

Recent years have shown a wonderful increase in the amount of steel used in box car construction. With the increasing price of lumber and the difficulty in securing the proper quality for car construction, steel has been found to be as cheap as and, when maintenance is considered, even cheaper than wood. Steel box cars have been considered for a long time, and two designs of this type of car have been experimented with in service. Such defects as have developed thus far can be remedied, and now that better box car construction is imperative and the probabilities are that there will not be much difference in the first cost of a wood and an all-steel car—with a possibility of greatly

reduced maintenance costs in the case of the steel car—the latter must be given careful consideration.

The Union Pacific was the first to introduce a modern all-steel box car, and now has 27 of them in service. A description of one of these cars will be found in the *Railway Age Gazette*

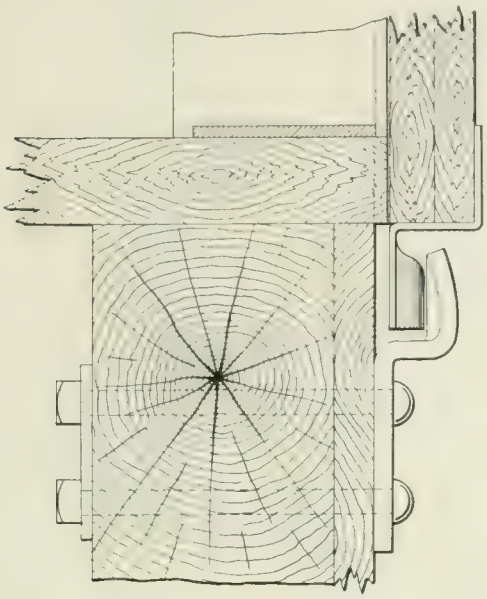


Fig. 62—Door Guide Bracket Riveted to Side Sill.

of February 11, 1910. It is understood that they have given good results in service and we hope to present more complete data concerning them in the near future.

An all-steel box car of the Summers type has been in service for about two years, and is said to have given perfect satisfaction in the hauling of cement which is loaded in bulk. No difficulty has been caused by sweating on the inside of the car, as was predicted by some of those who were familiar with the iron box cars which were used on the Baltimore & Ohio in the early history of that road. In order to carry tin plate a car must be moisture proof, and that the steel box car is satisfactory for this service is indicated by the fact that last spring this car carried a load of tin plate from Pittsburgh to the Pacific

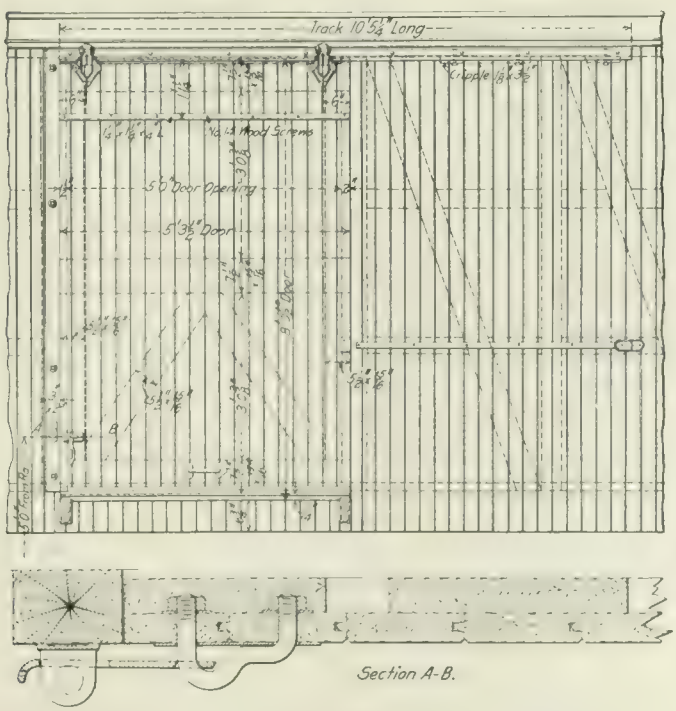


Fig. 63—Side Door on Canadian Pacific Steel Frame Box Car.

coast and delivered it in good condition. Based upon two years' service of the car the Bessemer & Lake Erie has ordered 100 more of these cars to be used in the cement trade. The con-

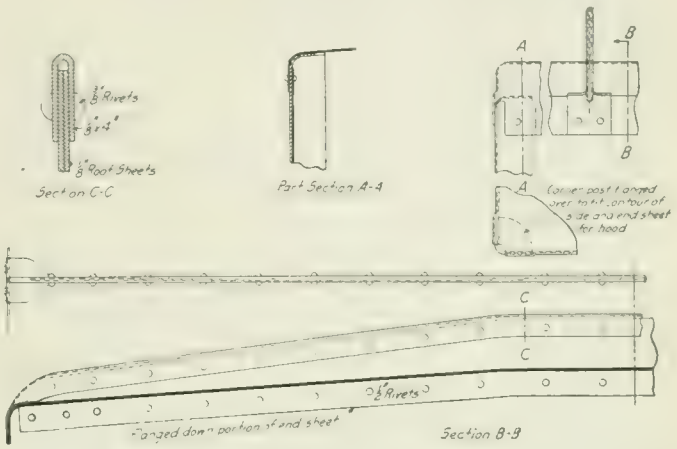


Fig. 64—Details of Roof Construction on Summers' All-Steel Box Car.

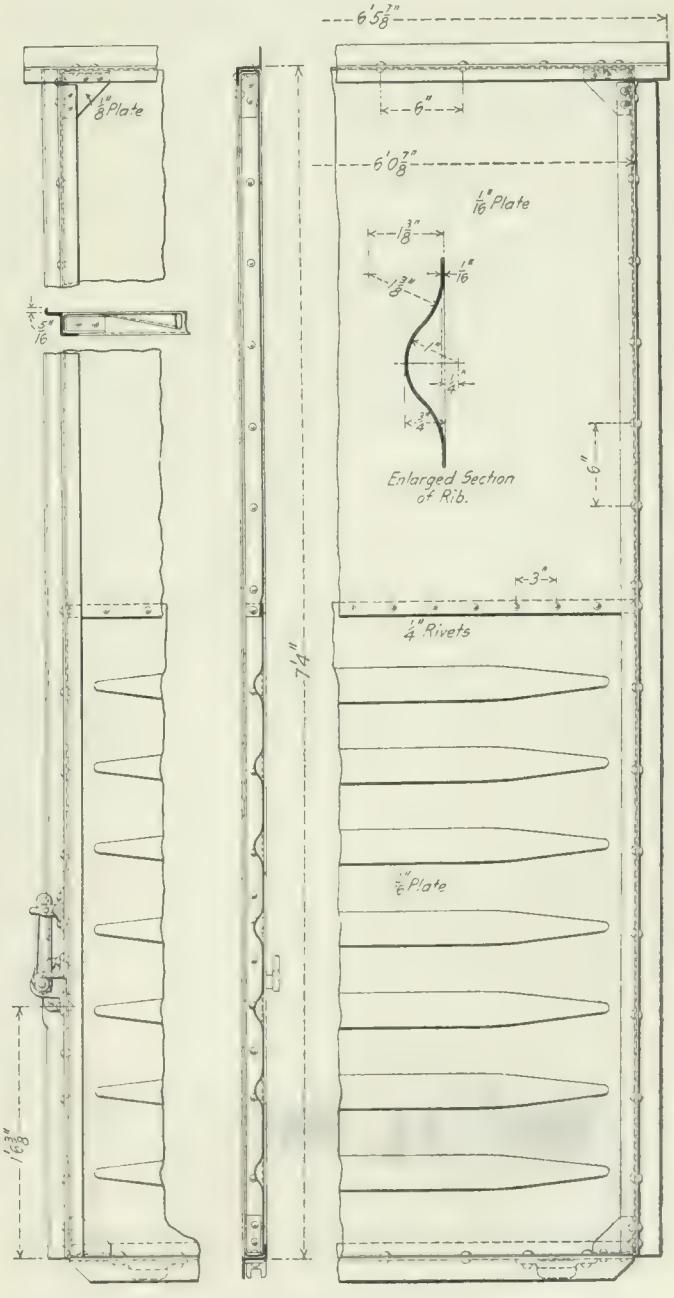


Fig. 65—Steel Side Door on Summers' All-Steel Box Car.

struction was described in more or less detail in the *Railway Age Gazette* of March 22, page 677.

The roofing and the door details were not clearly shown, however, and in-as-much as these parts have an extremely important bearing on the loss and damage to freight, as indicated in previous articles of this series, it is proposed to describe them somewhat more in detail. The details of the roof construction are shown in Fig. 64. The ⅛ in. roof sheets extend across the top of the car and are about 36 in. wide. They are flanged upward at the edges and the flanges of the adjacent sheets are capped by the ⅛ in. x 4 in. sheet, which is formed to a *U* shape to fit over the flanges and is riveted to them, as is shown in the section *CC*, Fig. 64. This construction leaves a smooth surface on the inside of the roof and the arrangement of the cap over the edges of the roof sheets is such that there can be no possibility of leakage. The sheets at the end of the car are flanged down and riveted to the end sheet, as indicated on the drawing. The running board is bolted to angles, which are riveted to the projecting ribs of the roof. This forms a strong and moisture proof roof construction.

The details of the side door which will be used on the 100 Bessemer & Lake Erie cars are shown in Figs. 65, 66 and 67. The lower part of the door is constructed of 1/16 in. plate, which is corrugated to stiffen it. The upper half of the door, which will not be subjected to the stresses caused by lading being piled or shifted against it, is made 1/16-in. plate without the corrugations. The sides, top and bottom of the door

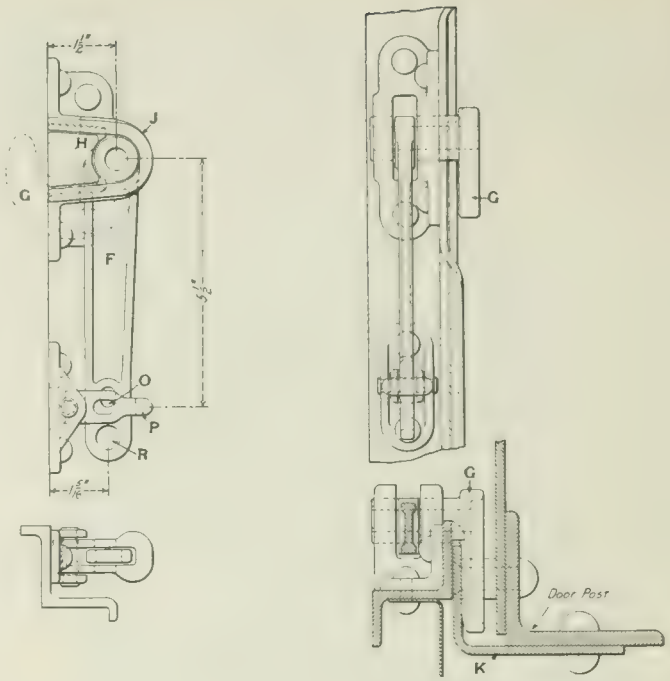


Fig. 67—Door Latch on Summers' All-Steel Box Car.

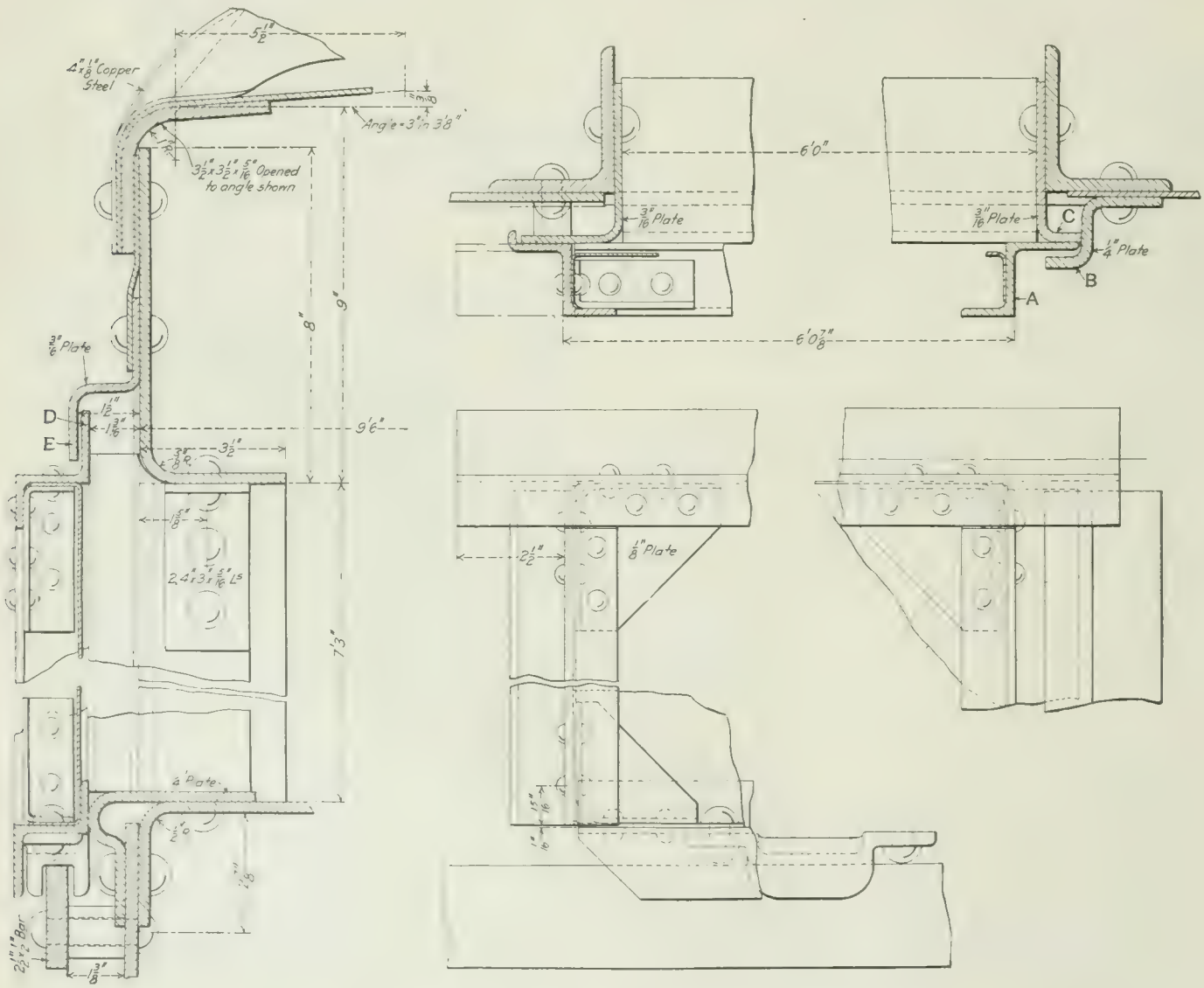


Fig. 66—Details of Steel Side Door on Summers' All-Steel Box Car.

are reinforced by Carnegie 1¼ in. x 1¾ in. x 1¾ in. x 3/16 in. Z-bars. The door is fitted at the bottom with two cast iron shoes, which slide on a ½ in. x 2½ in. bar. The details shown in Fig. 66 give some idea as to the ability of this door to protect the car against the entrance of moisture and cinders. The fixture for locking the door is placed at the rear, and the Z-bar *A* at the front end of the door slides between the parts *B* and *C* with only a comparatively small amount of clearance between them. The upward projecting edge of the Z-bar *D* at the top of the door slides behind the 3/16 in. plate *E* with a large overlap, so that there is very little possibility of moisture entering at this point.

The latch which is used on the door is shown in Fig. 67. The latch, or hook lever *F*, has a hook *G* which is cast integral with it. The pin or journal about which the lever swings has an inner half bearing *H* which fits in a pocket in the outer half bearing *J*, the latter being riveted to the car by four rivets. When the latch is closed the hook *G* engages with the plate *K*, locking the door securely in position. The Z-bar at the rear end of the door is turned over to engage the end of *K*, except for a short distance where the hook *G* engages plate *K*. When the latch is locked the end of the latch lever *F* is engaged by the U member *P*, which swings over it. The seal can then be placed through the hole *O*, or if necessary a padlock may be locked through the hole *R*. It is possible to make a door of this kind just as moisture, cinder and burglar proof as the wooden door; at the same time it is stronger and will undoubtedly cost less to maintain.

CONCLUSIONS.

A much better box car than the great majority of those now in service is absolutely necessary, not only to reduce the claims for loss and damage to freight, which are now excessive, but also to reduce the cost of maintenance of the cars.

The defects responsible for this loss and damage can be remedied very largely if those in charge of design, purchase and maintenance of the cars will awake to a realization of the seriousness of the situation.

In this series of articles, of which this is the last, the more important defects responsible for loss and damage to freight have been clearly pointed out and practical remedies have been suggested.

Moreover, we have illustrated box cars which, more than any others of their particular types, have given satisfactory results in these respects in actual service.

While the articles have thus proved doubly constructive, another recommendation has been made, which, if adopted, should make it possible within a reasonable time to get the entire box car equipment of this country into first class condition. That is, that the American Railway Association establish a bureau in charge of capable and experienced men whose function it shall be to pass on all new designs of box cars and see that the cars are free from defects which may cause loss or damage to the lading. In addition to this the bureau should maintain inspectors at the car building plants to see that the cars are constructed so as to be free from such defects. That the condition of the present box car equipment, which is now in bad shape generally, as pointed out in the earlier articles in this series, shall be improved, it is recommended that the proposed bureau shall not only indicate such changes as should be made in the present equipment as it goes through the shops for heavy repairs, but shall have inspectors to follow up the recommendation and see that they are put into effect. The formation of such a bureau is necessary, because, while the cars are owned by the individual roads, they are used generally by all the roads, and unless all combine and co-operate to provide better equipment the best results cannot be secured.

The Bauchi Railway, Nigeria, has been opened to traffic between Zaria and Rahamma.

INCREASED INSPECTION AT RAIL MILLS.

A very important step in advance of general practice in the inspection of rails is being made for a number of the larger railway systems. Until recently the inspection of rails has been confined to inspection and physical tests of the finished product, combined with chemical analyses furnished by the mills. Recent investigation and discussion regarding defective rails led several railway executives and rail experts to the conclusion that a large part of these poor rails could be eliminated by a more thorough inspection on behalf of the railways of the milling processes; and Robert W. Hunt & Company, who have for many years represented a large number of the railways as inspectors at the mills, have devised and put into operation within the last two months a system of increased and stricter inspection, by means of which the rail is followed through the entire process of manufacture.

The plan adopted is to place a man day and night in the converting works, either Bessemer or open hearth, another man day and night in the blooming mill, another in the rail mill, and another at the testing machine. This requires eight men in addition to the four or five inspectors now employed at each mill, the new inspection being in addition to that previously done as provided for in the different specifications under which the rails are rolled.

The inspectors in the converting works and in the blooming and rail mills closely observe whatever happens in connection with every heat, and if anything occurs contrary to the specifications under which the rails are being rolled or to the accepted good practice of that particular mill, the inspectors at once note and report that fact through the inspection office and also notify the foreman in charge of that particular turn and department of the mill, so that he can at once remedy the trouble. The nature of the deviation from the standard practice, together with the heat number, are also reported to the inspectors who pass finally on the rails before acceptance, so that, if the offense is great enough to justify it, the rails can be rejected by the railway concerned, or at least the rails from this heat can be examined more critically and watched more closely during the testing. It is expected that the foremen and workmen will be more careful when they know that their work is made a matter of permanent record.

The inspectors in the mills are given no authority to interfere with the operation of the plant by rejecting material during the process of manufacture into rails further than to report any deviation from good practice to the foreman, but by reporting the conditions under which the particular rails are made to the final inspectors, the rails in question are subjected to stricter scrutiny.

As the reports giving the records of all heats are furnished to the roads concerned, the engineering department of the road has a complete history of each heat of steel, and, in fact, of each rail. Therefore, the action of the rails in service can be watched with reference to their manufacture, a thing heretofore impossible, and important relations may be discovered between processes of manufacture and service which will tend to increase the knowledge of the art of rail manufacture and thereby increase the service and reliability of the rails, an object desired by both the manufacturers and railways.

This plan of increased inspection was first worked out for the Harriman lines, and has since been expanded, so that 15 systems, with a total mileage of over 90,000 miles, have already contracted to have their rails inspected in this manner, while a number of other leading roads are considering doing so. Among the roads for which this increased inspection has already been arranged are the following:

Harriman Lines.
Chicago & North Western.
Chicago, St. Paul, Minneapolis & Omaha.
Erie.

Chesapeake & Ohio.
Hocking Valley.
Missouri Pacific.
Illinois Central.
Central of Georgia.
Chicago, Indianapolis & Louisville.
Baltimore & Ohio.
St. Louis & San Francisco.
Atchison, Topeka & Santa Fe.
Chicago, Milwaukee & St. Paul.
Canadian Pacific.
Canadian Northern.
Grand Trunk.
Grand Trunk Pacific.
Louisville & Nashville.

Complete staffs of inspectors already have been located at the South Chicago and Gary mills of the Illinois Steel Company, the Ensley mill of the Tennessee Coal & Iron Company, the Pueblo mill of the Colorado Fuel & Iron Company and the Algoma Steel Company and Dominion Steel Company's mills. Inspectors will be located at the remaining six mills in this country as soon as the organization can be completed.

The complete development of this plan will require 96 additional men, to provide inspection for the twelve mills, and involve an increase in payroll of $135,000 to $150,000. A very gratifying feature of this development and an indication of the more satisfying relations being developed between the steel makers and the railways is the manner in which the manufacturers have co-operated with the railways and with the inspectors at those mills where the inspectors have already been placed.

The lines of the Manila railway, Philippine Islands, now under construction, include the 40-mile line from Luta to Lucena, of which about 25 miles are completed, the 27-mile line from Calamba to Santa Cruz, of which about 15 miles are completed, the 30-mile line from Noveleta to Naic, of which about 10 miles are completed, and the 28-mile line from Paniqui to Tayug, of which about 12 miles have been completed. These lines are being built under the company's contract with the government made in 1906. Governor-general Forbes is quoted as saying that the opening of the lines of the Manila railway in 1911 has had a remarkable effect in stimulating industry and fostering production, and that territory in which crops have not been harvested for years is now being cultivated, and that particularly in the provinces of Batangas, LaLaguna and Tayabas the advent of the railway seems to have made the difference between a backward and a progressive situation.

The Philippine government has contracted for an immediate advancement of the work on the Arinjay-Naguilian railway, which is to complete the connection between Manila and Baguio.

C. R. GRAY TO BE PRESIDENT OF THE GREAT NORTHERN.

James J. Hill has announced that Carl R. Gray, president of the Spokane, Portland & Seattle, who, it had been announced previously, was to resign, is to be made president of the Great Northern, succeeding Louis W. Hill. Mr. Hill, in making the announcement, said: "I am not yet ready to state the details of the changes in the Great Northern, but both myself and my son will remain on deck subject to call. We will both be members of the executive committee."

Mr. Gray worked up to an executive position on the St. Louis & San Francisco, and it was in the service of the Frisco Lines that railway men came to know and sincerely respect him. He was born September 28, 1867. He was educated at the Arkansas Industrial University, and began railway work in 1882 as a telegraph operator for the St. Louis & San Francisco. Four years later he was transferred to the traffic department as a clerk, and in April, 1887, was appointed commercial agent. For seven years from July, 1890, he was division freight agent, and he was then transferred to the operating department as division superintendent. He was promoted to superintendent of transportation in October, 1900, and early in 1904 was appointed general manager. In November of the same year he was appointed second vice-president and general manager, and was elected vice-president in 1906. In April, 1911, he was elected president of the Spokane, Portland & Seattle, the Oregon Trunk Railway, the Astoria & Columbia River, the Oregon Electric Railway, the Pacific & Eastern and the United Railways company.



Carl R. Gray.

There are three qualities which distinguish Mr. Gray and which have contributed materially to his success. One's first and lasting impression of the man is of his alertness. It was this quality which probably first attracted attention to him on the Frisco and led to his being picked out from the other traffic department clerks and made a commercial agent. Mr. Gray, since he has held executive positions, has shown a rather remarkable diplomatic ability, especially in his dealings with the Interstate Commerce Commission and with the government. In this respect he was somewhat like Mr. Melcher, of the Rock Island. The third quality is a habit of mind and of action which is absolutely straightforward. Those under him, as well as his associates, were never for an instant left in doubt as to his squarely facing any situation that might arise. His diplomacy never gave rise to even the faintest suggestion that he would or could do anything but the square thing.

It is proposed to start preliminary construction work on the Black Sea Railway, Russia, next year. The line will be about 190 miles long, and it is proposed to use motor cars.

General News Section.

The Hudson & Manhattan has adopted Brown's discipline, about 1,000 employees being affected.

The Chicago & Alton has abolished the use of signal flags as rear end markers, the lamps serving both by day and by night.

All railways in Illinois have discontinued the sale of intoxicating liquors with or without meals on passenger trains within the state.

Eleven suits against the Erie charging violations of the federal hours-of-service law have been filed in the federal court at Cincinnati.

The annual "family meeting" of officers of the Erie was held in Chicago on May 3 and included a reception and dinner at the Congress hotel.

The fifth annual meeting of the Association of Surgeons of the Illinois Central and the Yazoo & Mississippi Valley was held at Chicago on May 5.

The Missouri railway commission has issued an order that drinking water tanks must be installed at all stations. Agents may keep on hand sanitary drinking cups to be sold at low prices.

The St. Louis, Brownsville & Mexico has erected an intermittent vacuum pre-cooling plant at San Benito, Tex., the first one to be built east of California, for preparing vegetables for shipment.

The Chicago, Burlington & Quincy was fined $300 in the federal court at Kansas City on May 3 for violation of the safety appliance law in running a train in its yards with less than 75 per cent. of the air brakes coupled.

The Illinois Central was indicted by the federal grand jury at Chicago on May 3 for violation of the federal laws regulating the interstate shipment of cattle, in transporting a carload of cattle from the State of Mississippi without inspection during a period of quarantine.

The United States district attorney at Cincinnati filed suit in the federal court on May 3 against the Chesapeake & Ohio charging 29 violations of the hours-of-service laws during October, November and December, 1911, and asking penalties of $14,500. A similar suit was filed against the Wabash asking $1,500 in penalties for three violations of the act.

Committees representing conductors, brakemen and firemen have called upon the general manager of the Pennsylvania asking for conferences relative to numerous grievances, none of which, however, deal with wages or hours of labor. It is said that these committees have been conferring together in Philadelphia for several weeks past. The firemen of the Grand Trunk are asking for a 20 per cent. increase in pay. The enginemen of that road were recently given a 10 per cent. increase.

Hearings in the suit of the government against the United States Steel Corporation were begun in New York City this week, Henry P. Brown, an examiner appointed by the circuit court, conducting the investigation. The first two days were devoted to preparatory operations and to questions concerning the doings of the makers of wire and of horse shoes in fixing prices. Jacob M. Dickinson, formerly secretary of war, is acting as special counsel for the government, and the chief counsel for the defendant is Richard V. Lindabury.

The United States House of Representatives has passed a bill legalizing the sale by the Union Pacific of certain parcels of land along its right of way. The original right of way granted the Union Pacific through Kansas, Nebraska and Colorado was 400 ft. wide, of which only 100 ft. were used for railway purposes and a good part of the rest sold. The Senate is considering a similar bill. The Union Pacific has been attempting to recover the lands and numerous suits have resulted. The Supreme Court recently decided that the railway was not entitled to any of the right of way which it did not use.

The Interstate Commerce Commission has issued Accident Bulletin No. 42. It shows that 242 persons were killed and 4,706 injured in train accidents during the three months ending with December, 1911. Adding other accidents, but excluding industrial accidents, the total of casualties for the quarter is 22,682 (2,726 killed and 19,956 injured). In industrial accidents (in which the movement of locomotives or cars was not involved) 78 employees were killed and 21,634 injured. Of the 2,726 killed 1,419 were trespassers. The Bulletin includes a synopsis of the reports on fifteen accidents which have been investigated by the chief inspector of safety appliances.

President Williard, of the Baltimore & Ohio, has been selected by the eastern railways to act as their representative on the board to be appointed to arbitrate the demands of the enginemen in eastern territory, P. H. Morrissey, as noted last week, being the representative of the enginemen. B. A. Worthington, receiver of the Wheeling & Lake Erie, and a member of the conference committee of managers, will prepare and present the case for the railways when the board of arbitration begins its hearings. A. W. Sullivan, who has been serving as secretary of the conference committee, has resigned, the preliminary work having been completed, in order to devote all his time to his duties as chairman of the committee on railway mail pay. Martin Quick succeeds him as secretary of the conference committee.

The terminal commission, acting in behalf of the city of Buffalo, which has for a long time been considering the problem of a new Union station for that city, has finally agreed upon a plan which would make use of the large rectangular space bounded by Washington, Exchange, Michigan and Scott streets, with a plaza extending westward to Main street. The present station of the New York Central fronts on Exchange street, and the proposed plan would extend the track yard back from the station (southward) to Scott street, taking in the Hamburg canal territory. The commission proposes that the new station shall be used by the New York Central and the other lines now occupying the present station, and also by the Lehigh Valley, the Erie and Wabash. A part of the land embraced in the plan is owned by the Lehigh Valley. The proposed site is wide enough for 37 tracks.

The employees' compensation bill passed the Senate at Washington this week by a vote of 64 to 15, but not until it had been vehemently opposed by a few senators. This bill, noticed in the *Railway Age Gazette* of March 15, page 472, was prepared with much care by a special commission and was recommended to Congress by President Taft. It provides that accidental disability or death of employees shall be subject to compensation, to be paid by the employer, and applies to all persons engaged in interstate commerce by railway. Numerous changes were proposed by senators and the opposition was so strong that three hours were occupied on Monday in taking roll calls, but only a few amendments were accepted, and these were of such character that Senator Sutherland, in charge of the bill, accepted them. One of the changes modifies the period during which children shall receive compensation; the age of 16, the ordinary limit, is to be extended, in the case of a daughter, to the age of 20, unless she marries before that age. The opposition to the bill seems to be based mainly on the claim that injustice will be done to railway employees who suffer serious injuries by fault of the employer and who, under present laws, may sue for heavy damages—much heavier than would be allowed under the proposed law. One of the objecting senators said that the officers of the labor unions, in endorsing the bill have not fairly represented their constituents; but, on the other hand, some of the observers at Washington say that the opposition has come mainly from senators who, under the present law, make a good deal of money out of their work in prosecuting suits against the railways.

Employees' Compensation—First Decision.

The California Industrial Accident Board, in its first decision, holds that Harry Christ, an employee of the Pacific Telephone and Telegraph Company, who lost an eye while at work, is entitled to receive $100 for medical and surgical expenses, full wages for time in hospital, 65 per cent. of his wages for the following eight weeks, and 65 per cent. of his estimated loss in earning capacity thereafter for a maximum period of 15 years.

The board finds that although the loss of an eye does not necessarily impair a man's earning capacity, it increases the difficulty of finding work.

Tap Line Decision Causes Conflict.

A peculiar situation has grown out of the decision of the Interstate Commerce Commission in the tap line cases, reported in our issue of last week. It was stated in the decision that the cancellations of tap line allowances filed by the trunk lines over a year ago, which had been suspended, would become effective May 1; and that in the near future in a supplementary report the commission would state the facts relating to the other tap lines in addition to those as to the 36 whose cases were passed on in the opinion, and would point out which of them are regarded by it as common carriers in the service they render to their respective proprietary companies.

No formal order having been made which the tap lines could appeal to the Commerce Court, before the cancellation should become effective, the attorneys for the tap lines decided to secure injunctions in the state courts, forbidding the cancellation of the joint tariffs, on the ground that irreparable damage would be done if the trunk lines were permitted to withdraw them. Restraining orders were issued by the state circuit court at St. Louis on April 30 on the petition of seven St. Louis lumber firms against twelve railways, returnable May 11; and on application of the Warren, Johnsville & Saline River Railway versus the Chicago, Rock Island & Pacific returnable May 13. The tap lines involved were not included in the 36 cases passed on by the commission. Similar injunctions were secured in Arkansas.

The trunk lines advised the Interstate Commerce Commission of the injunction proceedings, and received a telegram from Secretary J. H. Marble, stating that the cancellations had taken effect at midnight on April 30, and that "rates as filed must be observed by carriers and shippers if criminal violation of the Interstate Commerce act and the Elkins act is to be avoided." The railways, therefore, ignored the injunctions. It is understood that conferences will be held looking to an understanding between the shippers, carriers and commission pending the issuance of the supplemental report.

Freight Handlers' Strike at Chicago.

A large number of the members of the Brotherhood of Railroad Freight Handlers at Chicago, including freight clerks and checkers, claimed to be 6,000, went out on strike May 4, after the railways had refused to grant their demands for higher pay and shorter hours. The demands presented on April 1 were for an increase of $5 a month for the men employed on a monthly basis and of one cent an hour for those paid by the hour; a half holiday on Saturdays with pay; a nine-hour instead of a ten-hour day for the freight handlers; an eight-hour instead of a nine-hour day for the clerks; time and a half for overtime, and double time on Sundays. A second proposition was met by the managers with an offer of one-half cent an hour and $2.50 a month increases, but with no reduction in hours. The managers were then served with an ultimatum that the strike would be called unless one of the two propositions was accepted and made no reply.

As we go to press, the railways say that perishable freight is and has been moving with little trouble, and no serious delay. Mr. Garrett, chairman of the General Managers' Association, says that only 1,000 men are out, and that the strikers will be defeated.

Monument to Charles Minot.

The bronze tablet, which has been set up at Harriman, N. Y., commemorating the first telegraphic train order, which was sent from Turner (now Harriman) in 1851, was dedicated with appropriate ceremonies on Thursday, May 2, in the presence of several hundred railway men, telegraphers, and citizens of the locality, including a large company of school children, who sang "America." The station and other buildings were decorated profusely with flags. Turner is 48 miles west of New York, on the Erie Railroad. Its present name, Harriman, was adopted in honor of the late Edward H. Harriman, whose summer residence was near this place. The granite monument on which the bronze tablet is fixed was quarried on the Harriman estate, and its cost, including the cutting and setting, was paid by Mrs. Harriman, who was present at the unveiling.

E. P. Griffith, superintendent of telegraph of the Erie Railroad and chairman of the committee which originated the project and which collected the funds with which to pay for the tablet, presided at the ceremonies, and his young daughter, Gertrude, unveiled the tablet. The principal address was given by H. D. Estabrook, a lawyer of New York City and a member of the firm of Noble, Estabrook & McHarg. Mr. Estabrook was formerly one of the counsel of the Western Union Telegraph Company, and gave an eloquent and appropriate talk, evincing a practical and sympathetic acquaintance with telegraphic and railway affairs.

The monument stands on the site of the old station, a short distance west of the present building. The speech presenting it to the Erie Railroad Company was made by D. H. Bates, of New York, a well-known "old timer" of the telegraph, who was in the telegraph service of the government at Washington during the civil war, and who is now secretary of the Society of the United States Military Telegraph Corps. Mr. Bates, in his address, joined in the glorification of the train despatcher by telling of the movement of 23,000 troops with their horses and baggage from the region of Washington to Chattanooga in September, 1863, when the Union cause was in a desperate situation following the battle of Chickamauga. This movement was over the Baltimore & Ohio to Wheeling and thence by way of Columbus, Indianapolis, Louisville, Nashville and Stevenson, nearly the whole of the route, 1,233 miles, being at that time single track. The whole movement was accomplished in 11 days.

The monument was accepted on the part of the Erie Railroad by George N. Orcutt, general attorney of the company. President F. D. Underwood and numerous other officers of the Erie were present. Colonel R. C. Clowry, late president of the Western Union, and Thomas A. Edison were also there.

The tablet, which is about 6 ft. high, was designed by Charles Keck, of New York, a pupil of the late Mr. St. Gaudens. It contains at the top a medallion portrait of Mr. Minot and below copies of the famous orders. (The duplicate order system had not then been thought of.) The circumstances of this historic event, as narrated in numerous publications, will be readily recalled. Minot, superintendent of the road, being a passenger on a westbound train, was held at Turner because an eastbound train, having the right to the road, was behind time. Learning from the operator at Goshen that the eastbound had not arrived there, he ordered the agent there to hold it, if it should arrive; and then ordered the westbound train to proceed. The engineman refused to do so reckless a thing, even on a written order from the superintendent, and so Minot had to take charge of the engine himself. Arriving at Goshen, he found that he could go still farther, on the time of the eastbound train, and repeated the telegraphic process with Middletown, and then with Port Jervis. Mr. Minot was born in Haverhill, Mass., and before going to the Erie had been superintendent of the Boston & Maine.

Locomotive Firemen's Demands in Eastern Territory.

President W. S. Carter, of the Brotherhood of Locomotive Firemen and Enginemen, last week submitted to the conference committee of managers representing the 50 roads in eastern territory a proposed schedule of rates of pay and conditions of service for firemen. The committee has not yet met to consider the demands, but will presumably do so on May 15, the date of their next meeting.

The proposed scale seems to call for an increase of at least $25,000,000 a year in pay, of which about $16,000,000 would be required for the "assistant firemen" which are asked for on all coal-burning locomotives.

The demands are as follows:

PASSENGER SERVICE.

Article 1.—On engines weighing 100 tons or over, exclusive of tender $2.70
On engines weighing 70 tons or over, and less than 100 tons, exclusive of tender 2.60
On engines weighing less than 70 tons, exclusive of tender 2.50

THROUGH FREIGHT SERVICE.

Article 2.—On engines weighing 120 tons or over, exclusive of tender (including Mallet and mikado type engines) $4.00
On engines weighing 90 tons or over, and less than 120 tons, exclusive of tender 3.25

On engines weighing 60 tons or over, and less than 90 tons, exclusive of tender 3.00
On engines weighing less than 60 tons, exclusive of tender..... 2.85

LOCAL, WAY FREIGHT, PICK UP AND SET OUT RUNS.

Article 3.—On local, way freight, pick up and set out runs the rate shall be twenty-five (25) cents per day of 100 miles, or 10 hours, in excess of through freight rates, as per class of engine used.

ELECTRIC LOCOMOTIVES.

Article 4.—The rates of pay fixed herein for firing steam locomotives shall apply to helpers on electric locomotives in the same class of service.

MALLET TYPE ENGINES.

Article 5.—On Mallet type engines, when used in pusher or helper service, firemen shall be paid $3 per day of sixty (60) miles or less, six hours or less. On grades or divisions of more than ten (10) miles in length, relief firemen will be furnished, and no fireman will be required to fire for more than six hours or sixty miles in any twenty-four hour period. Should a smaller class of engine be substituted for a Mallet engine after making one trip, or vice versa, the miles, hours and rates of pay as applied to the Mallet engine shall prevail.

SWITCHING SERVICE.

Article 6.—Switching, per day of ten hours or less.....$2.60

HOSTLERS.

Article 7.—Road hostlers, per day of ten hours or less.....$3.75
Road hostlers firemen, per day of ten hours or less..... 2.50
Hostlers employed in handling engines in and about the engine house and shop, per day of ten hours or less..... 2.50

Article 8.—In all classes of service, not herein specified, firemen shall be paid freight rates, according to class of engine.

A DAY'S WORK.

Article 9.—Ten hours or less, 100 miles or less, shall constitute a day's work in all classes of service, except as otherwise specified. The time of firemen will be computed from time required to register at engine house or report for duty, and end when engine is delivered at point designated by the company.

OVERTIME.

Article 10.—All mileage in excess of 100 miles made within a ten-hour period shall be paid for at mileage rates. All mileage or time made, after the expiration of ten hours on duty (this to include yard service), shall be paid for on a basis of time and one-half, it being understood that the miles run and hours worked shall not be counted together, but where miles exceed hours, miles will be allowed, and where hours exceed miles, time will be allowed on a basis of one mile for each four minutes. Less than four minutes will not be counted.

HELD AWAY FROM HOME.

Article 11.—Firemen held at other than home terminal will be paid continuous time for all time so held after the expiration of fifteen hours from time registered off duty.

WORK NOT REQUIRED OF FIREMEN.

Article 12.—Firemen shall be relieved from all cleaning of engines, tanks, fires and flues, scouring of brass, painting of stacks, smoke arches and front ends.

LIMITATION OF SCHEDULE.

Article 13.—Rates that are higher and conditions that are better in existing schedules shall be maintained.

ASSISTANT FIREMEN.

Article 14.—On coal-burning locomotives in freight service a fireman and an assistant fireman shall be employed.

Article 15.—The assistant fireman shall assist the fireman in the prescribed duties incident to the firing of a locomotive.

Article 16.—The standing and rates of pay for assistant firemen to be as may be agreed upon at a conference with the general managers.

Article 17.—On all coal-burning locomotives in passenger service, coal shall be kept within reach of the firemen from the deck of the engine.

Article 18.—It being understood that the provisions of paragraphs (14) and (15) shall not interfere with any agreement now in effect, or that may hereafter be made in connection with the employment of two firemen on one locomotive, except by mutual agreement.

To Permit the Merger of the B. & M. and the New Haven.

The legislative committee on railways of Massachusetts has voted to report the bill for consolidation of Boston & Maine and New York, New Haven & Hartford. The bill will provide for a lease of the B. & M. to New Haven on terms to be approved by the railway commissioners and accepted by the New Haven, within six months after the passage of the act. The New Haven shall acquire two-thirds of the stock of the Boston & Maine.

Boston & Maine minority stockholders opposing the lease may have the value of their shares adjudicated by the railway commission. The bill provides for the expenditure of $80,000,000 by the New Haven, at the rate of $16,000,000 a year.

The bill provides for the electrification of all railways within the metropolitan district, electrification to be completed within five years. The New Haven is to acquire the stock of the Boston & Maine now held by the Boston Railroad Holding Company, which latter company is automatically dissolved. A tunnel to East Boston is not provided for, except should great emergency so demand, and in that event only when agreed on by the railway commissioners and the directors of the port of Boston.

The bill reserves to the commonwealth the right to take over the railways within the electrified zone at any time and thereby terminate the lease. The tracks of the existing railways may be used by any other railway corporations, the charges to be fixed and approved by the railway commission. The railway commission is given authority to fix rates and determine facilities, the rates and facilities at all times to be subject to revision by the Supreme Court.

The Boston & Albany is required to spend $20,000,000 in electrification, bringing the total expenditure involved in the project up to $100,000,000.

The bill provides that there shall be no switching charges to any of the terminals, or anywhere within the electrified zone. It is provided that the New Haven shall build a tunnel between the North and South stations, and this tunnel, with the approval of the railway commissioners and the tranist commissioners sitting jointly, may be extended under the Charles river to a point either in Charlestown or Cambridge, and in that event it will do away with all except one of the bridges over the Charles river. This provision is made in order to meet the requirements of the Navy department. No special reference is contained in the bill to the Grand Trunk, but it is so drawn as to permit any outside railway to enter Boston over the tracks of existing roads. No provision for the establishment of a public utilities commission recommended by Governor Foss is made.

Disastrous Derailment at Hattiesburg, Miss.

In the derailment of a passenger train on the New Orleans & Northeastern near Hattiesburg, Miss., on Monday last, four passengers and three trainmen were killed and 50 or more passengers were injured. The train was heavily loaded with Confederate veterans going to a reunion at Macon, Ga., but it is said that none of the veterans were killed. The engine and first five cars were derailed, the engine and baggage car being overturned. The train was running on a straight line at about 30 miles an hour, and it is said that the baggage car was the first vehicle to jump the track.

The Chicago Electrification Investigation.

The Chicago Association of Commerce Committee on Investigation of Smoke Abatement and Electrification of Railway Terminals recently approved a tentative outline report of the investigation, giving the progress made up to date and a sketch of the entire plan of the work

The general scope of the investigation has been set forth by the committee as follows: (1) A determination as to the necessity of changing the motive power of steam roads to electricity or other power. (2) The mechanical or technical feasibility of such change. (3) Its financial practicability.

Much of the work during the past year has been done under the first heading. A great deal of preliminary work has also been done under the second heading. The determination of the third question necessarily depends on the results of the study of the first two.

In the study of the safety of electric operation, the consulting engineers of the committee have sent letters to 25 electric lines abroad and to the most important electric lines in this country, asking information as to the character of the line and the traffic and the number and character of injuries before and after electrification, and on similar steam lines during a corresponding period. Such replies as have been received indicate that exact comparisons may not be feasible, but it is expected that reliable conclusions may be reached regarding the general question of comparative safety.

An effort has been made to check up estimates of the effect of smoke on property that have been made for various cities, but all this information is of the most general character, and affords no original suggestions for the establishment of a method for the determination of loss.

Accounts have been prepared of existing as well as of past conditions in smoke abatement in 25 or more cities in the United States, and a large collection has been made of the available published information on the subject of smoke abatement in foreign cities, some of which has required the assistance of translators.

For the classification of all existing smoke producers into six classes, a force of 20 inspectors is now taking observations of 1,000 representative smokestacks for each minute of a complete day. The reports are made on blank forms, containing squares for each minute and for the six classifications of smoke density as shown by the Ringelmann chart. Later a similar investigation will be made of locomotive smoke. Negotiations

are being made for a series of tests of fuel at the Altoona testing plant of the Pennsylvania Railroad to study visible smoke and gases, and the results of burning bituminous coal in locomotives. Information has been obtained from the railways in Chicago as to the amounts and origin of the various kinds of coal supplied to their locomotives, and they have been asked to furnish 16 cars of representative coal for test purposes. Tests have been conducted on the Atchison, Topeka & Santa Fe with a switching locomotive, as described in the *Railway Age Gazette* of February 23, page 343, and additional tests are contemplated to determine the amount of smoke and cinders, fuel dust and soot for other kinds of service.

The Ringelmann chart has been used generally for comparisons by color of the density of visible smoke, and a graphic smoke recorder which has been ordered will also be used. To obtain representative samples of visible smoke from industrial stacks, it was necessary to prepare special apparatus and make several experiments. A sampling tube is inserted into a smokestack with the intake at the point of the mean velocity of the stack contents. A filter contained in the tube is so constructed that it arrests all of the cinders, fuel dust and soot in the sample, which are classified by coarse and fine sieves, the soot being separated into four divisions.

The subject of selection of fuel, the efficiency of firing and improvements in boiler design, smoke abating appliances, etc., has received due consideration by the engineering staff and will be considered further. The question of partial elimination of locomotive operation in the city by moving the main switch yards and locomotive terminals outside of the central zones, is receiving attention, and reports are being made by the railways as to the movement and number of cars.

The committee has made a thorough study of the physical characteristics of the Chicago railway terminals. There are 40 operating companies within the central zones, of which 17 own the tracks they use; seven lease the tracks, and 16 own part and lease the rest of the tracks they use. The lines operated are classified as 25 trunk lines, 6 belt lines and 9 industrial lines. Reports have been received from all the railways showing the movement of all classes of service for one week during the months of January, March, May, July, September, October and December, and observations and tests will be made in representative yards during several periods throughout the year to determine the average tonnage moved in yard service and the relation between idle and working time of yard locomotives.

Careful study and research has been made for the purpose of obtaining an accurate estimate of the probable conditions and characteristics of the Chicago railway terminals at the end of 1917. This includes studies of census reports and other data affecting the growth of population and the additions by annexation. For purposes of comparison similar statistics are being gathered for communities within 50 miles of Chicago and for 50 of the largest cities in the United States.

Texas Welfare Commission Hears from Railways.

The Texas Welfare Commission, which has been holding a series of hearings for the purpose of discussing legislation to improve the condition of the state, has received some advice from railway men who were asked to express opinions regarding needed railway legislation. H. G. Askew, statistician of the Texas railways, submitted a series of compilations showing comparative conditions for the ten years since 1901, during which time the gross operating revenues had increased 71 per cent., the operating expenses 93 per cent., and the mileage operated 49 per cent.

Frank Trumbull, chairman of the executive committee of the Missouri, Kansas & Texas, appeared on April 30 and urged the necessity of a slight advance in rates to bring the finances of the Texas roads up to a level with those in other states. He also declared that the roads should be permitted to issue bonds for improvements without reference to previous issues, to refund bonds now maturing which had been issued before the passage of the present stock and bond laws, and to issue bonds in advance of construction; also that the consolidation of connecting and lateral roads should not only be permitted but encouraged. F. G. Pettibone, vice-president of the Gulf, Colorado & Santa Fe, declared that to permit of needed improvements and extension of the Texas lines an advance of approximately 27 per cent. in rates would be required.

F. A. Vanderlip, president of the National City Bank of New York, addressed a long letter to the commission discussing the effect of present Texas laws on the railways and urging legislation providing for a revaluation of all railway property in the state to the end that a more equitable basis be adopted for the issuance of bonds and other indebtedness. He also declared that in some way the railway commission and the tax commission should co-operate in fixing valuations so that constantly changing values may have a corresponding appraisal. Mr. Vanderlip's letter was concluded with the following: "Texas roads, as a whole, are not profitable today. Such being the case, it is obvious that railway extension will not be carried on very rapidly unless some more means are taken to make them profitable. Texas, a magnificent, fertile state, with its pent-up resources and energy crying for outlets, should be fully cognizant of the tremendous importance of railway development. Intrastate business is rapidly increasing, but not to the extent that natural laws would seem to warrant. The laws of men must foster, not hamper, railway business; must permit logical and scientific financing and must make development attractive and protection ample."

It is announced that R. S. Lovett, chairman of the executive committee of the Harriman lines, will appear before the commission on May 15 at Dallas.

Compromise on Spokane Freight Rates.

A compromise agreement proposed by the traffic officers of the northern transcontinental railways providing for a temporary scale of rates to Spokane, Wash., on a basis slightly higher than that suggested by the Interstate Commerce Commission in its decision of June, 1910, was accepted by the trustees of the Chamber of Commerce and the directors of the Merchants' Association of Spokane on April 29, following a series of conferences between a committee of the railway men and representatives of the different classes of shippers in the city, as reported in last week's issue.

The agreement provided that the Spokane complainants at the hearing set by the Interstate Commerce Commission for May 8 in Washington should indicate their willingness to accept the proposed temporary tariff pending the decision on the fourth section cases by the Supreme Court, and that the railways should immediately proceed with its publication. This action is to be independent of the issues involved in the fourth section cases, and as the carriers deny the existence of any basis for reparation claims the acceptance of the proposal is without reference to any such claims.

The compromise was proposed by the railways on account of the situation created by the action of the Supreme Court in postponing its decision in the fourth section cases till next fall, whereupon the commission assigned the original Spokane and Salt Lake City cases for hearing on May 8, and suggested that the carriers and shippers in the meantime submit complete schedules of rates, mutually satisfactory, pending the final decision by the Supreme Court. The compromise basis was described by J. G. Woodworth, traffic manager of the Northern Pacific, acting as chairman of the railway committee, in the proposals submitted to the shippers, as follows:

"In the Salt Lake City case the commission prescribed certain rates as just and reasonable. While the defendant railways consider these rates to be unreasonably low, and while their petition for an injunction is yet pending in the courts they represent the only basis for reasonable rates which has been established by the commission in the intermountain territory, and for the purpose of constructing rates to Spokane which will comply with request of the commission and meet its requirements as to reasonableness the Spokane roads are willing to use these rates as a basis, and if acceptable to shippers and approved by the commission would publish a tariff from eastern defined territories to Spokane and common points on the following basis:

"As the distance, St. Paul to Spokane, approximately 1,500 miles, is 150 per cent. of the distance Omaha to Salt Lake, approximately 1,000 miles, a reasonable rate from St. Paul to Spokane would not be less than 130 per cent. of the rate from Missouri river to Salt Lake, and in the proposed tariffs rates from St. Paul to Spokane would be made accordingly.

"From Mississippi common points as defined by current tariffs, the rates would be 112½ per cent. of the St. Paul rates.

"From Chicago and common points, the rates would be 116⅔ per cent. of St. Paul rates.

"From Detroit and common points, 125 per cent. of the St. Paul rates.

"From Buffalo, Pittsburgh and common points, 130 per cent. of St. Paul rates.

"From New York, Boston and common points, 130 per cent. of St. Paul rates.

"From Colorado common points, 90 per cent. of St. Paul rates."

Class rates have already been established from eastern defined territories to Spokane and common points on the basis ordered or suggested by the Interstate Commerce Commission, and represent a reduction of first class rates ranging from 50 to 75 per cent. No further change in class rates is proposed.

The commisison established carload commodity rates on 204 items, but in the Spokane tariff it is proposed to increase the number of these items, using the basis employed in fixing the Salt Lake rates.

On April 30 the city council and the county commissioners of Spokane, which bodies had at first declined to approve the compromise, voted to accept it, thereby removing Spokane as a complainant in the case before the commission. Bankers and business men made addresses favoring the compromise, and Mayor Hindley stated that he was opposed to the city's spending another dollar in the rate contest. It was estimated that the temporary tariff would save the shippers of Spokane between $500,000 and $600,000 a year.

Charges Against Judge Archbald.

Judge Robert W. Archbald, of the Commerce Court, has been accused of improper conduct, and the judiciary committee of the House has decided to make an investigation. The committee has information on the subject which was gathered by agents of the Department of Justice and sent to the committee by President Taft. The charges have to do with alleged negotiations, conducted apparently some time ago, for the sale of culm at mines in Scranton. The allegation, so far as can be made out from the newspaper accounts, is that the property was bought from the Erie Railroad at a price unduly low, for the purpose or with the intention of selling it at a high price. The chairman of the committee, Senator Clayton, says that the following witnesses will be examined:

E. J. Williams, of Scranton, Pa., who is alleged to have negotiated for the purchase of the Erie coal piles for $3,000; B. H. Meyer, Interstate Commerce Commissioner, who first reported the charges against Judge Archbald to the President; G. F. Brownell, general attorney and vice-president of the Erie Railroad; W. P. Boland, president of the Marion Coal Company of Scranton, who first reported the alleged negotiations of Archbald and Williams; Capt. W. A. May, manager for the Erie Railroad of its coal properties, who is said to have been the Erie's principal in the alleged negotiations; Vice-President Charles C. Conn, of the Lackawanna & Wyoming Railroad, who charges that Judge Archbald and Williams offered to sell for $35,000 the coal properties which they are said to have bought from the Erie for $3,000. Special agents of the Department of Justice who investigated the charges will also be witnesses.

Members of Congress who have been dissatisfied with the decisions of the Commerce Court, reversing decisions of the Interstate Commerce Commission, have been agitating the question of abolishing the court, and the publication of charges against Judge Archbald looks as though it might be a part of this agitation. Mr. Archbald was appointed a judge of the federal court by President McKinley, in 1901, and was transferred to his present position on the establishment of the Commerce Court in December, 1910.

International Railway Fuel Association.

The fourth annual convention of the International Railway Fuel Association will be held May 22-25, at the Hotel Sherman, Chicago. On May 22 there will be addresses by President T. Duff Smith; by Robert Quayle (C. & N. W.); and by Walter S. Bogle, president of the Crescent Coal & Mining Company. On that day papers will be presented on Standard Locomotive Fuel Performance Sheet, by R. Collett (St. L. & S. F.), and on Fuel as a Factor in Locomotive Capacity, by Prof. W. F. M. Goss, University of Illinois. On May 23 papers will be presented on The Use of Anthracite Coal for Locomotive Fuel, by T. S. Lloyd (D. L. & W. and C. R. I & P.), and on Proper Method of Firing Locomotives, illustrated, by D. C. Buell (U. P.). On May 24 a paper on Locomotive Drafting and Its Relation to Fuel Consumption will be presented by H. B. MacFarland (A. T. & S. F.). On May 25 a paper will be presented on Inspection of Fuel from the Standpoint of the Producer and Consumer, by J. E. Hitt, Burnwell Coal Company, and Glenn Warner (C. H. & D.). On that day the reports of the committees will be received, which will be followed by the election of officers.

Railway Storekeepers' Association.

The ninth annual convention of the Railway Storekeepers' Association will be held May 20-22 at the Hotel Statler, Buffalo, N. Y. The regular subjects will include: Line Inspection, by J. H. Callaghan; How Can the Efficiency of the Store Department be Increased, by H. C. Pearce; Oil and Waste, by F. R. Brown; and Method of Handling and Accounting for Railroad Company Material Furnished for Repairs of Railroad Equipment at Contract Shops, by H. S. Burr. A number of papers on topical subjects will also be presented by members selected by the president. Reports will be received from the committee on recommended practices, the committee on piece work, the committee on scrap classification, the committee on accounting, the committee on the uniform grading of lumber, the committee on standard grain door, the committee on membership, the committee on stationery, and the committee on standardization of tin ware.

Air Brake Association.

The nineteenth annual convention of the Air Brake Association was held at the Jefferson Hotel, Richmond, Va., May 7-10, with an attendance of about 300 members. The convention was opened with prayer by Rev. George W. McDaniel, D.D., and addresses of welcome were made by Governor William Hodges Mann, for the commonwealth, and W. H. Adams, of the board of Aldermen, for the city. President T. M. Carrington, of the Chamber of Commerce extended the welcome of Richmond's business men. Responses for the delegates were made by M. J. Caples, fourth vice-president of the Chesapeake & Ohio, and by President W. P. Huntley, of the Air Brake Association.

New York Railroad Club.

At the next regular meeting of the New York Railroad Club, to be held May 17, a paper will be presented by W. H. Sauvage on Automatic Brake Slack Adjusters for Steam and Electric Cars, dealing with the question—What Relation Does a Slack Adjuster Bear to the Economy and Safety of Railways?

American Society of Mechanical Engineers.

At the meeting of the American Society of Mechanical Engineers to be held May 14, A. J. McFaul, of the Allen Advertising Company, New York, will introduce the subject of Commercial Dictating Machines. A general discussion will follow. The meeting will be followed by an informal dinner, provided a sufficient number subscribe.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meetings.

AIR BRAKE ASSOCIATION.—J. M. Nellis, 53 State St., Boston, Mass.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomaston, Boston, Mass., annual, May 10-11, San Francisco, Cal.

AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York; next convention, September 12, Seattle, Wash.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Detroit, Mich.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York. Convention, October 7-11, Chicago.

AMERICAN ELECTRICAL RAILWAY MANUFACTURERS' ASSOC.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next session, May 15, New York.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, Monadnock Block, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOC.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—M. H. Bray, N. Y. N. H. & H., New Haven, Conn. Convention, July 9, Chicago.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York; spring meeting, May 28-31, Cleveland, Ohio.
American Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.
Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.
Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 21-23, 1912, Los Angeles, Cal.
Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago. Semi-annual, June 11, Atlantic City, N. J.; annual, October 21-25, Chicago.
Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.
Association of Transportation and Car Accounting Officers.—G. P. Conrad, 75 Church St., New York. Convention, Oct. 7-11, Chicago.
Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.
Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.
Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.
Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.
Civil Engineers' Society of St. Paul.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.
Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.
Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.
Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.
General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.
International Railway Congress.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.
International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago. Convention, May 22-25, Chicago.
International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.
International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.
Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.
Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.
Master Car and Locomotive Painters' Assoc. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass. Convention, September 10-13, Denver, Col.
National Railway Appliances Assoc.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.
New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.
New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.
Northern Railroad Club.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.
Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.
Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.
Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.
Railway Business Association.—Frank W. Noxon, 2 Rector St., New York.
Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.
Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.
Railway Gardening Association.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.
Railway Industrial Association.—G. L. Stewart, St. L., S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.
Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.
Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio. Convention, May 20-22, Buffalo, N. Y.
Railway Supply Manufacturers' Assoc.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.
Railway Tel. & Tel. Appliance Assoc.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.
Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.
Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling, Ill. September 10-13, Buffalo, N. Y.
St. Louis Railway Club.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.
Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.
Society of Railway Financial Officers.—C. Niquist, La Salle St. Station, Chicago.
Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.
Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.
Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.
Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.
Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.
Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.
Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.
Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.
Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.
Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; annual, Aug. 27-30, Chicago.
Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.
Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.
Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The Erie Canal is to be opened for traffic May 15.

The Baltimore & Ohio is to establish a demonstration farm of 527 acres at Brown, Vinton County, Ohio.

Effective May 15 passenger fares from points east of the Missouri river to and through the state of Minnesota will be advanced on account of the advance in the Minnesota state fares from two to three cents a mile. The joint rate sheets containing these fares will be re-issued or supplemented.

In the United States district court at New York City last week H. R. Wakem, a shipping broker, and W. L. Divine, general import freight agent of the Chesapeake & Ohio, were indicted by the grand jury on a charge of illegal rebating. Wakem, acting for importers, shipped liquors and olive oil from New York to Chicago. The net amount collected for the transportation was less than the regular rate. It is charged that at first the railway company paid Wakem a salary of $150 a month, in lieu of rebates, and that thereafter he received a percentage, the total amount received in one year being $760.85.

Shippers Favored by Stenciled Tare Weights.

A. S. Dodge, superintendent of the Western Railway Weighing Association and Inspection Bureau, has submitted to the Interstate Commerce Commission, in connection with its investigation of railway weighing practices, a statement of the clean empty cars belonging to lines members of the association and weighed by association weighmasters during the year 1911 for the purpose of showing variations between the stenciled and actual tare weights. The statement is a substitute for one presented by Mr. Dodge at the recent hearing in Chicago covering the months of January, February, September, November and December, which showed that on 59 per cent. of the cars the stenciled tare was greater than the actual light weight and that the discrepancy operated to the shipper's advantage, whereas on 41 per cent. the stenciled tare was less than the actual weight, in which cases the discrepancy operated to the carrier's advantage.

The complete statement for the year shows that the advantage to the shippers from variations in car weights is even more pronounced when the entire year is taken into consideration. On 25,018 cars, or 73 per cent., the stenciled tare exceeded the actual tare by 25,213,624 lbs., an average of 1,008 lbs. per car. On 9,103 cars, or 26.7 per cent., the stenciled tare was less than the actual tare by 8,402,656 lbs., an average of 923 lbs. per car. Mr. Dodge's complete statement, giving the figures by months, as is follows:

Month.	Number of cars.	Stenciled tare greater than actual.	Average per car.	Number of cars.	Stenciled tare less than actual.	Average per car.
January	1,260	1,259,945	1,000	794	716,420	902
February	977	979,865	1,003	732	632,260	864
March	2,057	2,083,490	1,013	1,272	1,141,830	898
April	2,896	2,837,145	979	1,017	862,765	848
May	3,280	3,350,150	1,021	694	633,390	913
June	3,571	3,724,910	1,043	670	679,780	1,015
July	3,857	3,870,906	1,004	674	693,360	1,028
August	3,134	3,116,740	995	589	506,475	860
September	1,577	1,623,253	1,030	433	352,916	814
October	940	928,640	987	539	491,570	912
November	869	853,295	982	767	726,495	948
December	600	585,285	975	922	965,395	1,041
Total	25,018	25,213,624	1,008	9,103	8,402,656	923

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association in presenting statistical bulletin No. 117-A, giving a summary of car surpluses and shortages by groups from December 21, 1910, to April 25, 1912, says:

"The total surplus on April 25, 1912, was 151,186 cars; on April 11, 1912, was 94,943 cars; on April 26, 1911, was 189,524 cars. Compared with the preceding period there is an increase of 52,243 cars, of which 1,967 are box, 1,173 flat, 45,892 coal, and 7,211 miscellaneous cars. The increase in box car surplus is general, except in group 10 (Oregon, Idaho, California, Arizona and Washington), where a decrease of 1,099 cars is shown, and

in groups 7 (Montana, Wyoming and Nebraska) and 11 (Canadian Lines), where no surplus is shown. The increase in coal car surplus is general throughout the country except in groups 9 (Texas Louisiana and New Mexico), where there is a slight decrease, and 11 (as above), where no surplus is shown. This increase is more noticeable, however, in groups 2 (New York, New Jersey, Delaware, Maryland and eastern Pennsylvania), 3 (Ohio, Indiana, Michigan and western Pennsylvania) and 5 (Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida), where the suspension of coal traffic has been a contributing factor.

"The total shortage on April 25, 1912, was 12,305 cars; on April 11, 1912, was 15,554 cars; on April 26, 1911, was 2,518 cars. Compared with the preceding period there is a decrease of 3,494 box and 953 miscellaneous cars, but an increase of 276 flat and 922 coal cars, making a net decrease of 3,249 cars. The decrease in

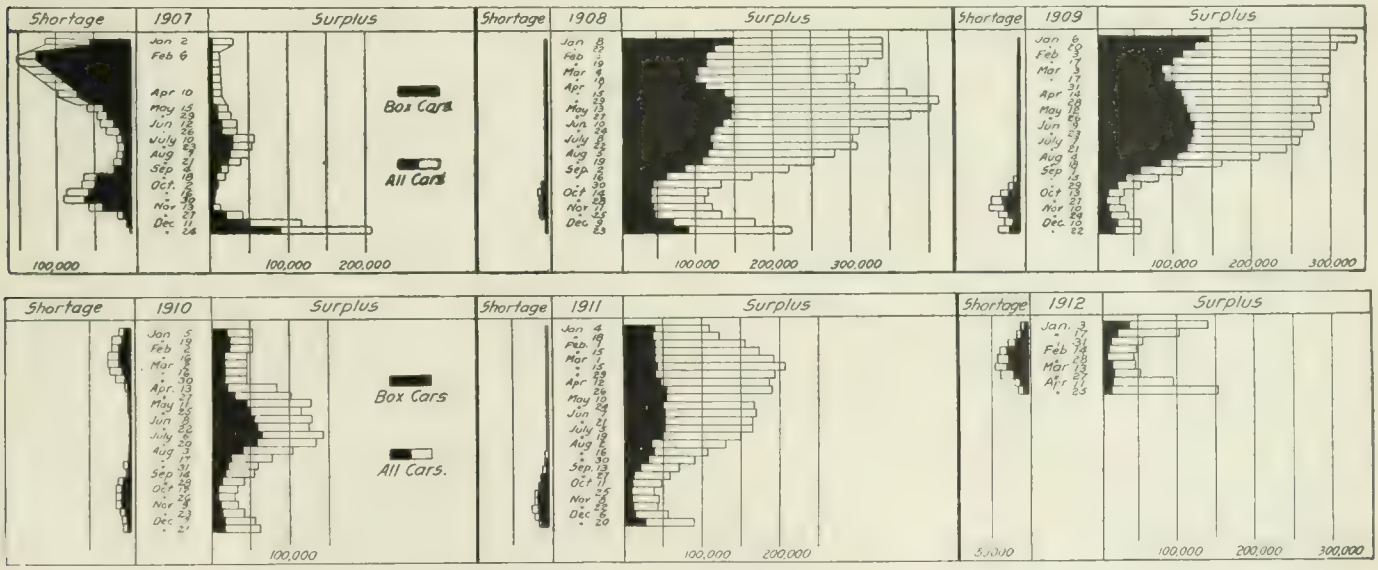
vested was about 25,744,000 acres, or 3,418,000 acres (11.7 per cent.) less than the area harvested in 1911, and 6,469,000 acres (20.1 per cent.) less than the area sown last fall (32,213,000 acres).

The average condition of winter wheat on May 1 was 79.7, compared with 80.6 on April 1, 86.1 on May 1, 1911, and 85.2, the average for the past ten years on May 1. A condition of 79.7 per cent. on May 1 is indicative of a yield per acre of approximately 14.4 bu., assuming average variations to prevail thereafter. On the estimated area to be harvested, 14.4 bu. per acre would produce 370,714,000 bu., or 13.9 per cent. less than in 1911, 14.6 per cent. less than in 1910, and 11.3 per cent. less than in 1909. The out-turn of the crop will probably be above or below the figures given above, according as the change in conditions from May 1 to harvest is above or below the average change.

CAR SURPLUSES AND SHORTAGES.

Date.	No. of roads.	Surpluses—Box.	Flat.	Coal gondola and hopper.	Other kinds.	Total.	Shortages—Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1.—April 25, 1912	7	957	1,041	2,419	211	4,628	54	165	305	3	527
" 2.— " 25, 1912	26	686	98	47,034	1,883	49,701	593	4	1,082	4	1,683
" 3.— " 25, 1912	23	1,199	1,957	23,215	7,392	33,763	130	200	20	1,707	2,057
" 4.— " 25, 1912	10	560	48	704	1,542	2,854	926	435	623	5	1,989
" 5.— " 25, 1912	20	1,251	85	6,192	1,371	8,899	729	230	100	0	1,059
" 6.— " 25, 1912	25	5,165	362	6,874	4,474	16,875	947	88	4	36	1,075
" 7.— " 25, 1912	3	0	65	443	611	1,119	74	0	10	2	86
" 8.— " 25, 1912	17	2,770	389	4,387	2,057	9,603	30	0	0	200	230
" 9.— " 25, 1912	10	1,530	245	172	1,008	2,955	0	0	0	25	25
" 10.— " 25, 1912	23	5,463	2,504	3,252	9,051	20,270	56	0	0	0	56
" 11.— " 25, 1912	5	2	63	0	454	519	2,613	491	0	414	3,518
Total	169	19,583	6,857	94,692	30,054	151,186	6,152	1,613	2,144	2,396	12,305

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages in 1907 to 1912.

box car shortage is principally in groups 4 (the Virginias and Carolinas), 5 and 11 (see above), and there is a slight increase in group 6 (Iowa, Illinois, Wisconsin, Minnesota and the Dakotas). The decrease in coal car shortage is principally in groups 1 (New England Lines), 4 and 5 (as above). Compared with the same date of 1911 there is a decrease of 35,469 box, 2,716 flat and 9,494 miscellaneous cars, with an increase of 9,341 coal cars, making a net total decrease of 38,338 cars. There is an increase in total shortage of 9,787 cars, of which 6,061 is in box and 141 in coal cars."

The accompanying table gives car surplus and shortage figures by groups for the last period covered in the report, and the diagrams show total bi-weekly surpluses and shortages in 1907 to 1912.

Crop Conditions.

The crop reporting board of the department of agriculture estimates that on May 1 the area of winter wheat to be har-

The average condition of rye on May 1 was 87.5, compared with 87.9 on April 1, 90.0 on May 1, 1911, and 89.2, the average for the past ten years on May 1. Details for winter wheat and rye states follow:

States.	Per cent. abandoned.	Acres remaining to be harvested.	Condition May 1, 1912.	1911.	10-yr. av.	Rye. Condition May 1, 1912.	1911.	10-yr. av.
Kansas	18.0	5,361,000	80	76	80	88	77	86
Nebraska	10.5	2,856,000	85	88	87	92	87	90
Illinois	53.5	1,183,000	52	86	86	77	93	92
Missouri	23.2	1,930,000	72	92	87	83	94	90
Indiana	46.5	1,206,000	52	90	83	77	92	89
Ohio	45.2	1,192,000	53	88	82	75	89	86
Oklahoma	10.5	1,522,000	87	67	8	90	74	83
Pennsylvania	4.6	1,240,000	89	89	89	88	90	90
Washington	4.5	988,000	95	96	91	95	97	95
Michigan	26.0	705,000	64	91	83	79	92	88
Kentucky	13.0	686,000	76	92	87	79	93	88
Virginia	2.8	741,000	92	89	88	97	90	88
Texas	1.5	704,000	93	83	77	94	91	76

States.	Winter Wheat. Per cent. abandoned.	Winter Wheat. Acres remaining to be harvested.	Winter Wheat. Condition May 1, 1912.	Winter Wheat. Condition May 1, 1911.	Winter Wheat. Condition May 1, 10-yr. av.	Rye. Condition May 1, 1912.	Rye. Condition May 1, 1911.	Rye. Condition May 1, 10-yr. av.
Tennessee	5.6	667,000	85	88	86	86	88	87
Oregon	1.6	630,000	100	94	95	98	96	95
N. Carolina....	3.3	598,000	91	90	86	90	89	89
Maryland	3.0	598,000	93	85	86	92	86	90
California	8.0	385,000	77	83	85	90	90	88
New York	5.1	335,000	83	89	87	88	85	89
Idaho	3.8	340,000	96	96	95	98	93	97
Iowa	18.3	279,000	84	93	90	91	95	94
Montana	3.7	291,000	95	98	..	96	95	96
West Virginia ..	3.3	233,000	90	88	86	92	91	89
Colorado	7.8	193,000	88	85	..	90	82	91
Utah	7.1	156,000	95	92	..	95	97	97
Georgia	5.0	135,000	85	91	86	87	90	88
Delaware	3.9	111,000	91	87	89	90	90	89
Arkansas	7.0	94,000	81	88	86	86	89	87
Wisconsin	7.2	87,000	89	88	88	91	91	91
New Jersey.....	5.7	79,000	88	90	88	91	91	92
S. Carolina.....	4.3	79,000	84	85	84	85	88	87
New Mexico....	10.9	37,000	83	89	..	..	81	..
Alabama	7.0	30,000	83	96	88	85	86	86
Wyoming	8.7	28,000	92	92	..	96	95	96
Arizona	15.0	21,000	96	..	..	..	..	..
Nevada	5.0	16,000	94	100	..	..	98	..
Mississippi	17.0	8,000	83	85	86	..	..	..
Minnesota	....	.....	..	..	..	94	89	89
North Dakota..	....	.....	..	..	..	88	87	86
South Dakota...	....	.....	..	..	..	94	90	92
Connecticut	....	.....	..	..	..	92	89	94
Massachusetts...	....	.....	..	..	..	94	84	91
Vermont	....	.....	..	..	..	90	86	92
United States.	20.1	25,744,000	79.7	86.1	85.2	87.5	90.0	89.2

The average condition of meadow (hay) lands on May 1 was 85.7, compared with 84.7 on May 1, 1911, and a ten-year average on May 1 of 88.6.

Stocks of hay on farms May 1 are estimated as 3,888,000 tons (8.2 per cent. of crop), against 7,546,000 tons (12.4 per cent.) on May 1, 1911.

INTERSTATE COMMERCE COMMISSION.

The Southwestern Missouri Millers' Club has complained to the Interstate Commerce Commission against the present rules of the railways which provide that when shippers make repairs to car doors to permit shipment of grain they shall be allowed 80 cents per car, and when they put on new doors they shall be allowed $1.20 per car. The St. Louis & San Francisco, Atchison, Topeka & Santa Fe, Missouri & Pacific, and St. Louis, Iron Mountain & Southern are named as defendants.

In line with the views expressed by the commission in the so-called commutation rate case, decided on June 21, 1911, a new schedule of 60-trip monthly fares has now been submitted by the Erie, which the commission has accepted as conforming to the findings in that case. On what it considers good grounds the commission concludes that the 50-trip fares of that line need not now be revised, and also permits both the 60-trip and 50-trip fares of the West Shore to remain undisturbed for the present.

Reparation Awarded.

Standard Oil Co. v. Illinois Terminal Railway Co. et al. Opinion by the commission:

The complainant alleges that the switching rate at St. Louis of two cents per 100 lbs. on an arbitrary weight of 7.4 lbs. per gallon on oil was excessive and that a rate of one cent per 100 lbs., based on an estimated weight aggregating 7,867,837 lbs., should have been charged. The charges were based on an estimated weight of 7.4 lbs. per gallon, provided in the western classification, which, however, did not govern the movements. The commission decided that the rate charged by the defendants was excessive, in that it exceeded a rate of two cents per 100 lbs. on a total weight of 7,867,837 lbs. (23 I. C. C., 369.)

Switching Charge Found Reasonable.

Curtis Brothers & Co. v. Southern Pacific et al. Opinion by the commission.

Previous to October 5, 1910, the Southern Pacific had performed free of switching charge the service of handling cars in and out of the complainants' plant, using a portion of the McCloud River railway to get to the plant. On October 5 the McCloud River Company filed a tariff providing for a charge of $3 per car for this service and refused to permit the Southern Pacific to continue to perform the service. Although this has the effect of increasing the rate to the complainant, the commission does not find that it comes under the class of increases in rates where the burden of proof is placed on the railway to justify the increase. The switching charge itself is not found to be unreasonable, and the Southern Pacific's rate is not unreasonable. The complaint is therefore dismissed. (32 I. C. C., 372.)

Water Competition Controls.

Michael Cohen & Co. v. Mallory Steamship Co. et al. Opinion by the commission:

A shipment of rough marble was made from New York to San Francisco via Galveston, Tex. The bill of lading prepared by the complainant described the shipment as rough stone, on which a rate of 55 cents applied. At destination the rate on rough marble was applied, and the complaint is that rates on rough marble are unreasonable and should be no higher than rates on rough stone. The 55 cent rate on rough stone is made only so as to meet competition by the all-water route around Cape Horn, which competition does not apply on marble because of the greater value of the marble, and consequent greater risk of carriage by way of Cape Horn. The commission recognizes the force of this argument and holds that a rate of 95 cents per 100 lbs. on marble from New York to San Francisco is reasonable. (23 I. C. C., 374.)

Rate on Malt Reduced.

Electric Malting Co. v. Atchison, Topeka & Santa Fe et al. Opinion by the commission:

There is at present a rate higher by 10 cents per 100 lbs. on malt than on barley from Minneapolis, Minn., to California terminals. The complainants claim that they have to compete with manufacturers of malt in Californian cities under a great disadvantage, because they have to pay 10 cents more per 100 lbs. on their malt than the competitors have to pay on their barley from which malt is made. Malt is worth on the average 50 per cent. more than barley, and 100 lbs. of barley makes 80 lbs. of malt. The commission recognizes the fact that a higher rate may be charged for a manufactured product than the raw material, and finds that 7 cents instead of 10 cents is the proper difference between the barley rate and the malt rate. No reparation is awarded. (23 I. C. C., 378.)

Boat Line a Private Facility of Salt Company.

Colonial Salt Co. et al. v. Michigan, Indiana & Illinois Line et al. Opinion by Commissioner Harlan:

In 1900 large salt interests in Michigan organized the Michigan, Indiana & Illinois Line under the laws of Illinois. Immediately the railways established joint through rates with this boat line to its various destinations. The boat line was claimed to be a common carrier, but the complainants allege that it was a private facility of the salt company, formed to evade the law and secure rebates on salt. It was claimed that the establishment of this line had destroyed the parity of the salt rates in that district and had enabled the salt company, which owned the boat line, to place its product on the market at much lower rates than was possible to the competing salt companies. It was shown that the boat line received divisions of from 30 to 35 per cent. of the through rates, so that where the salt company had been previously paying seven or eight cents a barrel to land its salt across Lake Michigan, the boat line now was receiving from 16 to 18 cents a barrel out of the joint through rates. The boat line, having no terminals at Chicago, rented the facilities of the parent salt company and agreed to furnish labor necessary to perform the terminal service at that point; therefore, the salt company was relieved of the expenses, incident to services received other than transportation, which it had previously been obliged to meet. It was also shown that the boat line only published tariffs for salt in cargo lots and that out of its own earnings enormous returns were paid to the salt company. The commission decided that the boat line was not a common carrier but was a private facility of the Morton Salt Company. The same was found regarding the Ludington Transportation Company, owned by the Ludington Salt Company. The commission decided that these relations were unlawful and should be discontinued. No order was made. (23 I. C. C., 358.)

STATE COMMISSIONS.

INDIANA.—See block signal order, under the head of signaling.

The Indiana railway commission has postponed from May 1 to June 15 the effective date of its order reducing express rates within the state by about 15 per cent. This was suggested by Judge Anderson of the federal court at Indianapolis during the hearing on a motion by the six express companies for a temporary injunction to set aside the order of the commission, on the ground that by June 15 the Interstate Commerce Commission may issue an order affecting express rates throughout the country.

The Galveston, Houston & Henderson, which runs from Houston to Galveston and is used jointly by the Missouri, Kansas & Texas and the International & Great Northern, has asked the Texas railway commission to make a revaluation of its property. In 1885 the company issued $1,000,000 stock and $2,000,000 bonds, the bonds maturing in 1912. The Texas railway commission's valuation of the property for the purpose of bond issue made in 1895 placed the amount of bonds issuable at $1,527,023.

A. S. Goodeve, of Rossland, British Columbia, has been appointed to fill the long-existing vacancy on the Railway Commission of Canada caused by the death of Hon. Thomas Greenway. Mr. Goodeve is member of Parliament for Kootenay, and assistant chief conservative whip. He will represent the West on the commission. He has been a careful student of transportation problems. He was born at Guelph, Ont., in 1860, but went West in early life, locating at Rossland. He was Mayor of that town in 1889 and 1890 and was Provincial Secretary in 1902.

The New York Public Service Commission, Second district, has ordered a hearing on May 20 upon the complaint of the Postal Telegraph-Cable Company, made against the New York Telephone Company, alleging that the telephone company is, by illegal discrimination, diverting to the Western Union Telegraph Company telegrams which are intended for the Postal Telegraph-Cable Company. It appears that the telephone company connects callers with the Western Union Telegraph Company, when either "Western Union," its telephone number or merely "telegram" is asked for, and that it is only when "Postal" or its telephone number is asked for that callers are connected with the Postal Telegraph-Cable Company.

The Washington public service commission has rendered a decision in the case of the Central Mill Company against the Northern Pacific in which it is held that the present practice of the railway in charging lower rates on shipments of ten cars or more of logs than on single carloads, is an unjust discrimination against the smaller manufacturer. The railway is ordered to establish rates on shipments of less than ten cars which shall not exceed the rate for shipments of ten or more cars by more than ten cents per 1,000 ft. In addition, the commission ordered that the minimum in either case shall be between 6,000 and 7,000 ft. The complaint alleged that the rate on logs from Buckley to Tacoma in shipments of ten cars or more was $1 per 1,000 ft., with a minimum of 5,500 ft., while on shipments of less than ten cars the rate was $1.45 per 1,000 ft., with a minimum of 7,000 ft.

COURT NEWS.

Supreme Court Justice Erlanger has granted an order to show cause why the New York Central should not be restrained from transferring or assigning any capital stock of the Rutland to the New York, New Haven & Hartford. The order, which is also directed against the New Haven and Rutland, was granted on behalf of Tomkins C. Delavan, John F. Calder, Ralph L. Shainwald and George N. Towle, minority stockholders in the Rutland.

In the United States district court in Chicago, May 7, the railways recently indicted for giving rebates in the guise of payments for advertising pleaded guilty, and Judge Carpenter imposed fines as follows: Cleveland, Cincinnati, Chicago & St. Louis (two indictments), $20,000; Lake Shore & Michigan Southern, $10,000; Michigan Central, $10,000. Indictments against railway traffic officers were non-suited, by agreement of counsel. The cases against theatrical agents are still pending. The indictments on which these fines were imposed charged conspiracy to violate section 6 of the interstate commerce law.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF FEBRUARY, 1912. (SEE ALSO ISSUES OF APRIL 5, 12, AND 19.)

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses					Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or deficit).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance Way and structures.	Maintenance Of equipment.	Traffic.	Transportation.	General	Total.				
Belt Ry. Co. of Chicago	1			$204,080	$12,881	$23,448	$509	$97,543	$4,246	$138,627	$65,453	$6,200	$59,253	$9,150
Butte, Anaconda & Pacific	46	$84,970	$6,993	96,100	7,725	19,037	750	44,953	2,349	74,814	1,772	1,000	19,172	10,370
Chicago Great Western	1,496	739,095	180,082	1,001,400	96,586	169,735	49,145	409,004	37,033	561,104	140,355	3,500	115,363	36,006
International & Great Northern	1,139	637,627	157,327	831,494	115,817	116,817	16,413	363,394	34,017	666,453	165,431	380	143,051	.....
Kanawha & Michigan	127	107,683	19,471	135,875	19,416	30,076	1,385	68,052	5,292	134,671	61,154	10	33,058	—5,749
Kansas City, Mexico & Orient	168	90,481	18,959	123,554	23,833	25,554	5,591	65,102	13,274	163,854	30,595	.....	2,750	28,184
Louisiana Ry. & Navigation	351	104,793	471	137,355	30,893	16,051	6,360	61,925	6,119	120,897	16,458	5,000	11,458	4,137
Minneapolis, St. Paul & S. Ste. Marie	1,770	1,387,455	99,483	1,701,500	167,371	227,636	44,911	720,176	45,580	1,205,601	510,899	2,415	494,662	161,356
Nashville, Chattanooga & St. Louis	1,196	780,598	117,811	989,046	135,139	177,698	41,373	376,231	36,774	747,655	241,391	444	227,794	13,113
New Orleans, Texas & Mexico	275	134,335	14,780	164,780	33,960	19,442	5,230	65,532	8,347	131,760	33,020	.....	30,020	36,114
Spokane, Portland & Seattle	551	206,839	35,576	287,960	32,960	41,313	7,667	90,051	1,299	193,990	93,970	137	93,833	13,183
Ulster & Delaware	119	84,170	11,764	118,264	8,506	13,694	958	26,849	1,499	51,506	66,758	6	66,752	2,497
Total (26 roads)														
Belt Ry. Co. of Chicago	1			$1,297,134	$110,441	$198,069	$4,763	$679,674	$44,877	$1,037,824	$259,310	$57,200	$202,110	$59,520
Butte, Anaconda & Pacific	46	$840,681	$70,134	1,045,841	73,888	140,011	5,577	336,678	23,110	583,303	462,538	12,000	450,538	11,961
Chicago Great Western	1,496	7,900,870	1,906,026	10,634,650	972,083	1,386,780	376,867	3,646,556	270,676	6,565,565	4,069,085	8,800	4,060,285	198,509
International & Great Northern	1,139	6,351,116	1,085,811	8,139,300	840,502	1,061,584	128,552	3,043,285	123,835	5,498,758	2,640,542	1,875	2,638,667	.....
Kanawha & Michigan	127	1,061,144	155,001	1,315,940	150,115	301,230	17,915	647,458	52,450	1,329,163	813,223	1,500	811,723	41,069
Kansas City, Mexico & Orient	168	660,519	47,207	1,111,301	153,745	160,414	63,274	560,417	26,037	1,161,887	50,586	2,500	48,086	47,907
Louisiana Ry. & Navigation	351	990,958	1,102,010	1,297,134	118,806	198,111	48,684	495,911	34,365	907,957	389,176	38,000	351,176	113,511
Minneapolis, St. Paul & S. Ste. Marie	1,770	8,581,179	2,450,814	12,115,444	1,071,867	1,705,165	357,905	5,650,121	360,860	11,350,996	6,955,948	1,900,700	5,055,248	1,215,854
Nashville, Chattanooga & St. Louis	1,196	5,481,797	1,086,238	8,038,048	1,106,858	1,489,401	301,677	1,956,251	183,389	6,130,146	1,907,902	194,500	1,713,402	179,705
New Orleans, Texas & Mexico	275	1,347,206	147,127	1,644,435	90,360	118,771	34,583	441,151	27,009	800,625	843,810	1,500	842,310	21,500
Spokane, Portland & Seattle	551	1,587,701	1,159,161	3,764,455	253,584	300,388	57,000	833,333	89,850	1,615,063	2,149,392	45,000	2,104,392	91,413
Ulster & Delaware	119	473,575	271,745	750,759	100,883	89,657	11,122	300,904	40,055	542,621	208,138	6,000	202,138	11,470

Operated in the preceding period 1176. 5740. 3764. 41. 85. 364. 488. Indicates Deficit, Losses and Decreases.
Figures shown here are for the period September 1st to February 29.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF MARCH, 1912.

Name of road	Mileage operated at end of period.	Operating revenues: Freight.	Passenger.	Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Trans portation.	General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Alabama & Vicksburg	143	888,676	$83,268	$131,264	$19,437	$25,953	$3,766	$50,682	$5,263	$105,101	$26,163	-$2,811	$4,200	$19,652	—$12,799
Alabama Great Southern	309	80,371	81,151	401,436	49,840	81,144	11,462	136,299	9,672	288,426	13,010	492	13,935	98,583	62,826
Atchison, Topeka & Santa Fe	8,201	4,773,241	2,894,303	7,843,656	954,159	1,183,362	185,869	2,401,680	159,942	4,885,012	2,658,624	. . .	312,652	2,345,972	338,192
Atlanta & West Point	93	68,750	35,407	113,420	11,024	20,414	4,571	55,937	4,116	76,057	37,369	935	5,189	32,415	482
Atlantic & St. Lawrence	267	13,750	35,615	154,230	10,107	22,968	4,699	47,271	4,130	139,175	15,055	. . . . .	6,658	8,397	—646
Atlantic Coast Line	4,527	2,171,519	855,646	3,259,802	401,135	453,154	49,988	1,104,011	74,403	2,082,691	1,177,111	.....	115,000	1,062,111	284,929
Baltimore & Ohio—System	6,438	9,663,788	1,072,420	8,142,297	848,187	1,493,078	161,545	2,940,900	167,535	5,610,245	2,532,052	55,643	236,572	2,237,837	224,825
Bangor & Aroostook	607	274,796	47,596	336,499	38,491	35,356	4,530	101,349	10,968	190,694	145,805	. . . . .	10,375	135,430	8,61
Boston & Maine	841	3,335,566	1,106,930	3,7 7,351	404,861	645,608	88,042	2,000,150	96,248	3,244,909	482,442	9,110	174,301	317,251	116,348
Buffalo & Susquehanna, R. R.	268	153,29	7,412	164,99	25,780	34,541	1,506	63,930	6,274	132,031	32,961	. . . .	2,600	30,361	—7,641
Buffalo & Susquehanna, R.	92	44,56	6,990	63,908	18,466	29,239	444	24,951	2,346	75,446	—11,538	6	1,400	22,947	—6,754
Buffalo, Rochester & Pittsburg	527	727,872	71,488	819,541	87,723	164,69	10,763	281,817	16,767	561,762	257,779	511	17,000	240,268	60,639
Canadian Pacific Lines in Me.	433	126,881	49,720	185,204	17,839	21,969	4,941	112,051	3,614	160,414	24,790	. . . .	7,000	17,790	—36,285
Carolina, Clinchfield & Ohio	288	69,718	10,138	183,306	16,179	18,186	6,882	35,613	7,160	84,020	99,286	1,138	8,000	92,424	26,751
Carolina, Clinchfield & Ohio of S. C.	18	11,984	1,385	13,537	1,668	100	961	2,534	422	5,685	7,852	. . . .	500	7,35	1,438
Central of Georgia	1,915	894,450	275,575	1,279,033	158,244	212,667	35,321	448,665	38,195	893,092	385,941	5,286	54,100	337,127	—28,151
Central of New Jersey	672	1,998,900	884,197	3,519,582	168,744	326,661	56,003	743,355	41,123	1,305,886	1,213,696	18,418	94,445	1,100,833	259,978
Central New England	277	299,325	28,998	337,880	16,565	24,516	1,229	94,263	2,085	138,658	199,222	139	9,000	190,083	94,718
Charleston & Western Carolina	241	144,110	24,189	176,192	30,536	26,457	2,709	67,746	4,534	131,982	44,210	. . . .	5,000	39,210	—25,609
Chicago & Alton	1,025	896,237	293,348	1,281,365	105,561	162,146	39,402	508,880	33,961	949,950	331,415	3,856	43,500	284,059	—76,009
Chicago & Eastern Illinois	1,376	1,077,433	220,828	1,406,379	107,546	277,815	32,386	565,846	39,411	1,023,004	383,375	- 1,816	37,500	344,059	14,923
Chicago & Northwestern	7,951	3,854,170	1,384,703	5,848,116	532,494	768,808	100,632	2,702,657	123,351	4,228,027	1,617,089	—14,597	305,000	1,297,492	—329,166
Chicago, Burlington & Quincy	9,074	5,166,621	1,411,473	7,211,044	715,817	1,294,580	131,312	2,789,140	191,554	5,122,603	2,088,441	—10,866	265,015	1,812,560	—309,322
Chicago, Indiana & Southern	359	393,532	20,112	424,989	45,177	105,670	7,382	149,972	8,866	317,067	107,922	106	13,000	95,028	59,311
Chicago, Milwaukee & Puget Sound	2,050	1,108,870	171,980	1,317,504	89,719	146,338	43,010	458,111	20,081	757,259	560,245	—43,794	75,787	440,664	—184,907
Chicago, Milwaukee & St. Paul	7,511	3,806,550	988,72	5,300,658	387,212	854,746	101,560	2,425,760	94,351	3,863,629	1,437,029	340.6	229,685	1,241,370	308,928
Chicago, Peoria & St. Louis	286	117,814	3,703	148,341	17,978	25,798	6,898	74,388	5,789	130,851	17,490	. . . . .	4,300	13,190	—1,354
Chicago, Rock Island & Gulf	477	184,011	40,921	211,928	29,643	24,971	10,004	96,966	7,727	169,311	42,617	307	8,122	34,188	—27,239
Chicago, Rock Island & Pacific	7,565	3,228,096	1,174,348	4,777,605	491,829	617,771	161,759	2,346,004	134,884	3,752,247	1,025,358	17,598	225,572	782,188	—348,680
Chicago, St. Paul, Minneapolis & Omaha	1,744	825,966	342,122	1,226,497	87,667	163,795	23,249	601,935	30,564	907,210	319,287	2,142	62,232	254,913	—167,597
Cincinnati, Hamilton & Dayton	1,015	585,571	105,795	764,909	85,104	148,764	20,717	345,376	17,291	617,252	147,657	. . . . .	24,689	122,968	7,521
Cincinnati Northern	245	96,841	14,582	116,035	17,867	30,385	2,544	64,613	3,378	118,787	—2,752	. . . . .	5,300	—8,052	—16,227
Cleveland, Cincinnati, Chic. & St. Louis	2,012	1,953,246	545,408	2,720,370	262,588	459,702	66,631	1,141,419	53,119	1,982,459	737,911	3,692	95,000	639,219	130,350
Colorado Midland	338	90,310	14,531	115,887	15,861	27,366	6,626	64,690	5,198	119,741	—3,854	1,078	8,000	- 12,932	4,500
Colorado & Southern	1,075	501,584	79,884	626,240	70,044	136,495	15,110	236,859	22,724	481,232	145,008	—1,701	29,200	114,107	—58,330
Cumberland Valley	162	201,901	47,244	259,978	40,570	33,996	3,808	86,017	8,185	172,576	87,402	161	5,612	81,951	64,822
Delaware & Hudson Co.—R. R. Dept.	854	1,529,419	187,970	1,772,363	164,564	277,702	20,88	684,837	52,579	1,200,564	571,799	20,807	48,739	543,867	—93,354
Delaware, Lackawanna & Western	988	2,237,948	515,675	2,932,445	250,705	567,766	63,377	970,520	59,660	1,912,028	1,020,417	59,647	168,940	911,124	—44,174
Denver & Rio Grande	2,545	1,338,713	306,798	1,717,731	234,335	382,857	50,083	645,909	52,705	1,365,919	351,812	- 2,681	78,000	271,131	—82,803
Denver, Northwestern & Pacific	215	62,507	8,707	75,492	17,145	15,127	1,918	34,273	3,740	72,203	3,289	. . . . .	3,500	—211	153
Detroit & Mackinac	358	78,602	23,359	107,954	8,151	17,759	2,314	36,782	3,080	68,086	39,868	140	8,250	31,478	6,817
Detroit, Grand Haven & Milwaukee	191	100,000	41,500	164,300	15,820	23,787	5,148	106,933	4,254	155,948	8,352	—14	2,880	5,458	—5,054
Detroit, Toledo & Ironton	441	140,877	10,531	161,074	25,795	16,091	3,710	83,387	5,447	133,430	27,644	11	5,000	22,633	13,715
Duluth & Iron Range	200	83,185	23,173	114,401	28,968	45,010	785	64,697	8,716	148,176	33,775	3,374	4,559	41,708	—19,593
Duluth, Missabe & Northern	342	169,681	34,279	209,260	43,274	58,749	1,667	80,779	11,119	195,538	13,722	2,384	8,402	2,936	—131,205
El Paso & Southwestern Co.	902	532,018	79,828	641,662	85,571	93,174	12,667	185,339	23,241	399,992	241,670	1,592	22,238	217,840	10,675
Elgin, Joliet & Eastern	841	931,313	5	986,215	71,917	141,949	4,161	310,313	14,315	542,655	443,560	. . . .	23,555	420,005	162,936
Erie	1,995	3,201,149	655,222	4,168,157	332,263	774,051	95,620	1,557,123	90,779	2,849,836	1,318,321	61,177	163,026	1,094,118	177,377
Florida East Coast	630	222,934	295,830	586,934	57,482	45,505	10,299	197,278	16,574	327,138	259,796	700	15,500	243,596	—151,940
Fort Worth & Denver City	454	240,899	88,823	350,305	50,184	74,895	6,541	140,849	14,542	287,011	63,294	513	10,292	52,489	— 31,187
Galveston, Harrisburg & San Antonio	1,338	594,980	143,846	890,249	102,204	186,701	36,623	409,697	30,014	765,239	125,010	—7,391	35,404	82,215	121,705
Georgia	307	210,877	70,916	302,066	28,999	49,962	11,766	139,445	8,596	238,768	63,298	. . . . .	2,920	60,378	—24,381
Georgia Southern & Florida	395	128,854	65,100	223,604	26,447	43,587	7,458	88,444	9,713	175,649	47,955	. . . . .	9,819	38,136	—3,129
Grand Rapids & Indiana	586	320,941	115,717	467,545	51,441	77,553	11,304	212,339	14,340	366,987	100,558	—787	23,365	76,406	—2,187
Grand Trunk Western	347	369,000	138,000	540,710	58,806	78,141	17,406	265,361	14,157	433,871	106,839	1,842	31,635	73,362	—16,184
Great Northern	7,345	3,507,919	956,241	4,847,167	488,750	708,385	84,654	1,535,834	92,573	2,910,196	1,936,971	4,993	274,330	1,657,648	340,877
Gulf & Ship Island	307	120,227	29,356	160,547	19,016	31,095	2,169	53,225	8,902	114,407	46,140	. . . . .	5,220	40,920	—15,753
Gulf, Colorado & Santa Fe	1,597	627,322	197,099	888,977	132,458	169,236	18,792	422,117	37,154	789,757	99,220	. . . . .	42,929	56,291	30,701
Illinois Central	4,755	3,487,481	995,516	5,145,961	453,219	1,172,479	11,650	2,176,053	121,361	4,044,762	1,101,199	11,273	210,279	879,647	—251,922
Indiana Harbor Belt	105	. . . . .	. . . . .	266,381	22,268	31,008	915	117,588	6,790	180,569	85,812	442	5,000	81,254	37,080
Kansas City Southern	827	530,068	118,076	734,481	93,012	103,847	26,519	303,213	33,797	560,388	174,093	. . . . .	30,160	143,933	132,649
Lake Erie & Western	886	404,354	63,899	490,905	62,797	93,347	10,110	199,406	10,961	376,621	114,284	. . . . .	19,000	95,284	36,284
Lake Shore & Michigan Southern	1,775	3,302,270	805,033	4,609,513	421,930	690,057	80,120	1,608,997	100,477	2,901,581	1,707,932	—5,865	140,000	1,562,067	617,361
Lehigh & Hudson River	97	161,283	3,451	176,468	11,335	22,825	1,415	59,237	4,583	99,395	67,073	. . . . .	3,500	63,573	27,629
Lehigh Valley	1,450	1,958,479	299,174	3,364,546	300,803	608,381	84,905	1,175,714	71,763	2,241,566	1,122,980	28,353	131,000	968,627	—55,969
Long Island	399	303,53	422,161	757,849	109,906	109,290	9,987	414,139	24,101	667,393	90,456	24,010	56,450	58,016	28,310

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF MARCH, 191[illegible] (CONTINUED).

Name of road	Mileage operated at end of period.	Operating revenues			Maintenance		Operating expenses				Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Louisiana & Arkansas	.58	117,018	14,829	137,009	15,688	19,938	2,609	36,652	3,703	78,590	58,419	.....	4,233	54,186	3,309
Louisiana Western	108	115,483	51,406	176,568	16,179	31,923	7,577	62,772	6,031	124,482	52,086	705	6,534	46,257	22,319
Louisville & Nashville	4,7[illegible]	3,689,348	963,411	4,939,330	739,586	892,479	118,979	1,695,045	100,979	3,547,068	1,392,262	—10,687	150,617	1,230,958	216,725
Louisville, Henderson & St. Louis	00	75,184	28,578	110,031	[illegible],250	15,459	4,201	39,897	2,812	84,619	25,412	61	3,000	22,473	8,923
Maine Central	1,204	638,440	227,057	913,168	89,4[illegible]6	135,573	8,412	376,954	21,812	632,177	280,988	—5,249	42,897	232,842	36,785
Michigan Central	1,817[illegible]	1,909,567	545,831	2,719,337	232,347	383,820	60,946	1,146,432	49,083	1,872,628	846,709	—435	116,000	730,274	363,654
Midland Valley	373[illegible]	71,961	35,579	114,870	22,361	15,64[illegible]	2,770	36,742	6,856	84,371	30,499	185	5,785	24,529	—10,308
Missouri, Kansas & Texas	1,744[illegible]	851,618	297,389	1,233,125	129,629	214,179	35,761	487,368	39,834	906,771	326,354	2,915	52,000	271,439	- 99,427
Missouri Pacific	3,915[illegible]	1,292,178	304,799	1,751,095	245,245	232,896	59,295	971,720	78,062	1,587,218	163,877	2,182	103,000	58,695	-138,703
Mobile & Ohio	1,114	813,260	107,823	978,164	108,418	190,176	35,443	364,079	33,201	731,317	246,847	—856	27,483	218,508	71,782
Monongahela	65	130,829	2,194	134,738	14,601	18,321	307	25,738	2,047	61,014	73,724	.....	2,000	71,234	11,098
Morgan's La. & Tex. R. R. & S. S. Co.	404	260,531	94,217	383,018	56,559	50,878	13,278	172,958	11,358	305,031	77,987	1,506	17,763	58,718	6,755
Nashville, Chattanooga & St. Louis	1,230[illegible]	751,003	219,208	1,041,417	143,047	187,919	44,833	404,624	28,743	809,166	232,251	—527	27,794	203,930	36,487
Nevada Northern	165	120,949	11,678	135,769	14,956	14,572	371	29,023	3,429	62,351	73,418	.....	5,724	67,694	16,813
New Orleans & North Eastern	196	252,129	47,873	325,090	31,382	59,855	9,465	133,318	12,978	246,998	78,092	—315	8,250	69,527	- 21,993
New Orleans Great Northern	282	94,793	25,077	129,419	18,712	17,413	2,392	40,761	8,439	87,717	41,702	- 40	124	41,538	-9,867
New York Central & Hudson River	3,597[illegible]	5,639,031	2,251,911	8,852,174	964,350	1,703,409	203,906	3,037,085	222,967	6,731,717	2,120,457	7,146	462,210	1,665,393	169,764
New York, Chicago & St. Louis	562	901,200	84,519	1,026,987	90,071	106,089	43,320	475,303	16,895	731,678	295,309	2,695	32,000	260,614	62,081
New York, New Haven & Hartford	2,09[illegible]	3,066,763	1,956,982	5,476,408	431,590	677,511	29,782	289,410	160,873	3,569,166	1,907,242	102,988	340,000	1,670,230	376,263
New York, Ontario & Western	566[illegible]	643,245	88,003	755,777	91,430	135,038	8,607	332,750	17,564	583,389	170,388	3,130	17,917	149,341	4,999
New York, Philadelphia & Norfolk	112	208,701	29,894	256,662	22,703	47,132	4,042	107,385	12,470	193,732	62,930	.....	7,900	55,030	7,410
Norfolk & Western	2,014[illegible]	2,845,648	315,724	3,270,707	364,182	687,358	57,413	1,030,898	63,360	2,203,211	1,067,496	—2,159	120,000	945,337	- 20,269
Norfolk Southern	608	213,557	55,939	286,663	33,500	33,629	5,127	91,622	13,524	177,402	109,261	—182	7,500	101,579	—8,267
Northern Central	473[illegible]	904,623	169,011	1,134,764	148,467	245,099	14,453	538,022	28,482	974,523	160,241	237	36,175	124,303	-8,868
Northern Pacific	6,032[illegible]	3,558,470	1,040,253	4,928,944	369,556	668,972	102,056	1,759,780	74,386	2,974,750	1,954,194	—2,965	295,737	1,655,492	26,103
Oregon Short Line	1,762[illegible]	1,129,512	294,744	1,527,687	169,147	167,254	26,879	422,984	34,594	820,858	706,829	—2,407	57,000	647,422	81,289
Oregon-Washington R. R. & Nav. Co.	1,920[illegible]	800,558	338,201	1,233,838	184,037	154,153	42,576	493,488	51,703	925,957	307,881	—6,817	70,580	230,484	40,687
Pecos & Northern Texas	479[illegible]	149,818	34,742	195,535	23,561	41,444	3,024	79,277	8,475	155,781	39,754	.....	6,307	33,447	21,644
Pennsylvania Co.	1,760[illegible]	3,546,516	700,445	4,627,655	660,807	903,256	78,993	1,801,535	93,287	3,537,878	1,089,777	—4,359	215,641	869,777	55,527
Pennsylvania *Railroad*	4,018[illegible]	11,055,992	2,591,628	14,527,248	1,560,082	3,024,404	185,383	5,506,578	377,229	10,653,676	3,873,572	—106,430	564,472	3,202,670	5,326
Peoria & Eastern	35[illegible]	217,634	51,807	288,122	32,551	39,694	4,740	121,233	5,371	203,589	84,533	.....	9,800	74,733	38,852
Pere Marquette	2,330[illegible]	921,995	270,813	1,299,316	148,013	273,358	29,782	709,926	34,922	1,196,001	103,315	13,515	56,521	33,279	118,200
Philadelphia, Baltimore & Washington	713	806,680	594,016	1,558,428	220,766	268,213	29,087	701,087	49,794	1,268,947	289,481	.....	49,268	240,213	- 15,511
Pittsburgh & Lake Erie	215[illegible]	1,252,194	114,201	1,410,727	145,486	220,284	11,521	351,994	23,784	753,159	657,568	—289	31,000	626,279	38,364
Pittsburgh, Cincinnati, Chic. & St. Louis	1,467	2,696,567	621,709	3,656,826	371,575	694,898	69,432	1,375,930	68,020	2,579,855	1,076,971	—467	125,156	951,348	222,071
Rutland	468	165,665	74,850	270,071	29,150	58,454	7,331	118,856	6,947	220,738	49,333	.....	11,731	37,602	6,896
St. Louis, Brownsville & Mexico	510[illegible]	132,116	59,731	202,695	42,206	18,083	7,535	81,783	6,607	156,214	46,481	.....	5,150	41,331	3,888
St. Louis, Iron Mountain & Southern	3,315[illegible]	1,856,031	487,231	2,538,065	210,099	267,582	60,036	932,162	81,499	1,541,378	996,687	— 3,342	118,315	875,030	36,126
St. Louis Merchants' Bridge Terminal	9	.....	298	183,663	19,102	1,971	458	103,862	5,525	130,918	52,745	.....	5,600	47,145	25,308
St. Louis, San Francisco & Texas	244	82,674	[illegible],636	111,306	18,447	14,734	4,371	54,709	6,096	93,357	12,949	.....	1,217	11,732	35,674
St. Louis Southwestern	843[illegible]	587,310	91,999	659,043	59,584	117,025	29,592	175,704	32,383	414,288	244,755	502	22,562	221,691	27,699
St. Louis Southwestern of Texas	703	288,772	62,493	313,688	74,667	93,020	11,833	165,677	17,779	362,976	49,288	- 588	10,945	—60,821	6,800
San Antonio & Aransas Pass	727	226,018	80,712	325,734	59,942	53,687	5,430	147,593	10,737	277,389	48,345	.....	11,000	37,345	63,808
Southern	7,090[illegible]	3,871,534	1,254,622	5,556,583	658,450	873,078	149,578	1,987,308	160,716	3,829,130	1,727,453	7,619	205,656	1,529,416	5,822
Southern Kansas of Texas	125	90,601	17,359	120,728	11,314	25,155	1,839	47,678	4,305	90,291	30,437	.....	2,572	27,865	10,339
Southern Pacific Co.	6,222[illegible]	4,149,403	2,440,418	7,090,018	745,440	950,552	192,132	2,159,498	200,727	4,248,349	2,841,669	5,119	385,664	2,461,124	23,300
Syracuse, Binghamton & New York	81	59,447	28,15[illegible]	98,456	13,319	9,620	2,983	39,305	2,151	67,378	31,268	.....	6,820	24,448	6,549
Tennessee Central	294	90,0[illegible]4	28,074	125,206	25,692	18,087	5,313	46,158	6,993	102,243	22,963	.....	4,212	18,751	- 22,001
Terminal R. R. Ass'n of St. Louis	35[illegible]	.....	264	264,080	33,110	24,859	706	105,933	4,896	169,504	94,576	10,374	26,000	78,950	42,278
Texas & New Orleans	458	231,650	80,027	333,15[illegible]	46,212	75,937	9,545	145,308	11,412	288,414	44,738	—927	13,683	30,128	23,793
Toledo & Ohio Central	441[illegible]	408,401	41,805	464,538	58,573	92,122	6,332	177,637	8,012	342,676	121,862	485	20,385	100,992	55,656
Toledo, Peoria & Western	248	67,433	32,667	105,273	15,006	26,118	2,240	42,015	3,537	88,916	16,357	.....	5,000	11,358	5,178
Toledo, St. Louis & Western	451	274,685	23,760	318,197	24,398	48,170	8,601	120,505	7,794	209,468	108,729	.....	15,750	92,979	15,922
Union Pacific	3,537[illegible]	2,226,436	627,695	3,220,068	341,369	558,718	94,789	1,171,444	105,146	2,271,465	948,603	- 5,517	159,950	783,136	520,487
Union R. R. of Baltimore	9	108,038	18,781	128,506	6,932	.....	1,000	5,832	2,842	16,606	111,900	.....	5,414	106,486	5,838
Union R. R. of Pennsylvania	31	.....	.....	282,645	38,171	80,073	100	132,129	4,455	254,928	27,717	2,585	4,750	25,552	7,671
Vandalia	827	611,982	182,205	878,018	104,186	188,363	21,669	369,134	17,493	700,845	177,173	.....	28,687	148,486	—29,413
Vicksburg, Shreveport & Pacific	171	74,649	33,630	120,367	19,604	23,160	3,492	41,619	5,008	92,883	27,484	— 50	6,300	21,134	2,183
Virginia & Southwestern	240[illegible]	135,853	12,173	151,130	18,516	32,085	1,887	40,770	3,243	96,501	54,629	.....	5,331	49,298	25,349
Virginian	475[illegible]	382,591	16,945	409,911	59,356	77,779	4,955	118,972	7,982	269,044	140,867	5,288	17,600	128,555	32,744
Washington Southern	36	33,999	46,070	105,875	12,669	11,269	1,354	40,925	2,649	68,866	37,009	.....	3,245	33,764	3,908
West Jersey & Seashore	356[illegible]	173,417	231,194	428,377	72,312	80,517	11,910	218,899	13,771	397,409	30,968	5,533	29,902	4,467	28,020
Western Maryland	543	571,720	59,447	655,538	64,303	91,213	9,703	248,559	15,152	428,930	226,608	.....	21,000	205,608	- 14,466
Western Ry. of Alabama	133	80,675	39,839	129,593	22,510	22,866	5,214	42,178	5,579	98,347	31,686	7	4,612	27,067	6,667
Wheeling & Lake Erie	457	606,830	42,033	680,543	80,808	136,538	7,269	226,430	14,479	465,524	215,019	1,447	33,615	182,851	88,313
Yazoo & Mississippi Valley	1,372	699,985	170,087	850,985	128,851	123,411	16,573	377,800	26,579	673,214	177,771	1,111	37,000	141,882	83,548

REVENUES AND EXPENSES OF RAILWAYS.

NINE MONTHS OF FISCAL YEAR, 1912.

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss)	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.					
Alabama & Vicksburg	143	$880,833	$375,481	$1,271,913	$187,145	$249,151	$33,753	$442,996	$46,218	$959,762	$312,151	$5,626	$43,096	$263,669	$109,446
Alabama Great Southern	309	2,401,443	885,707	3,584,000	402,805	784,096	100,553	1,115,069	86,386	2,487,836	1,096,253	—4,119	133,393	958,741	67,566
Atchison, Topeka & Santa Fe	8,209[1]	43,691,[illegible]	17,295,623	66,536,608	10,385,163	10,354,903	1,491,169	20,030,972	1,431,880	43,694,086	22,842,522	....	2,699,793	20,151,729	360,887
Atlanta & West Point	93	588,407	761,373	976,319	109,97[illegible]	186,357	43,251	297,329	42,393	679,357	297,062	683	46,700	251,045	11,756
Atlantic & St. Lawrence	167	66,097	36,645	1,149,199	200,347	194,341	40,095	586,170	31,882	1,112,835	36,364	.....	59,928	23,564	26,765
Atlantic Coast Line	4[illegible]7	16,613,768	6,427,901	24,837,926	3,339,929	3,631,343	417,056	8,565,878	649,010	16,498,716	8,339,710	.....	971,000	7,368,710	348,[illegible]
Baltimore & Ohio System	4,[illegible]3[illegible]	83,387,[illegible]3	11,089,12[illegible]	68,437,417	8,16[illegible]245	13,584,040	1,450,862	24,479,618	1,493,085	48,169,840	20,[illegible]67,567	479,121	[illegible],703,479	17,584,967	[illegible],486,[illegible]
Bangor & Aroostook	667	1,974,[illegible]	488,334	2,591,978	407,499	891,996	36,398	802,457	102,[illegible]34	1,640,884	951,394	.....	86,658	864,760	53,84[illegible]
Boston & Maine	2[illegible]40	19,962,659	11,913,770	34,403,739	4,567,767	4,838,940	344,481	16,161,391	773,156	26,685,135	7,718,604	145,240	1,569,811	6,294,033	388,113
Buffalo & Susquehanna R. R.	965	1,765,975	79,958	1,391,484	260,992	264,439	13,632	529,76[illegible]	87,[illegible]87	1,[illegible]38,407	66,077	....	23,400	242,677	22,884
Buffalo & Susquehanna R.	291	388,138	82,370	483,041	71,422	243,033	4,533	218,704	[illegible],[illegible]34	860,316	77,[illegible]74	874	12,600	40,[illegible]48	26,899
Buffalo, Rochester & Pittsburgh	527	6,193,791	799,105	7,193,084	871,814	1,379,706	88,483	2,378,098	153,336	4,871,437	2,321,647	947	183,000	2,169,594	208,367
Canadian Pacific Lines in Maine	33	684,040	47,074	905,747	180,407	155,500	18,786	486,158	38,484	918,375	77,367	.	63,000	14,367	5,305
Carolina, Clinchfield & Ohio	387	1,443,560	113,088	1,593,261	106,293	190,85[illegible]	49,466	316,919	68,442	731,927	861,[illegible]89	2,276	70,000	793,565	180,058
Carolina, Clinchfield & Ohio of S. C.	18	80,377	13,871	102,673	6,[illegible]29	[illegible]83	8,683	23,685	4,158	43,578	59,095	.....	4,500	54,595	18,603
Central of Georgia	1,[illegible]9[illegible]	7,[illegible]06,775	879,592	10,893,061	1,344,916	1,915,706	305,399	3,667,195	342,371	7,575,587	3,316,474	51,293	455,056	2,912,711	77,434
Central of New Jersey	67[illegible]	14,987,561	4,108,958	20,173,948	1,885,775	2,[illegible]83,855	273,698	5,947,842	365,143	11,296,311	8,877,637	105,70[illegible]	1,079,514	7,[illegible]53,[illegible]23	1,151,475
Central New England	377	5,[illegible]47,395	54,030	5,623,365	866,126	200,229	11,467	709,236	[illegible]4,774	1,811,833	1,811,533	—4,676	81,000	1,[illegible]25,857	388,367
Charleston & Western Carolina	341	1,133,671	77,882	1,485,090	269,640	214,409	26,723	553,211	40,789	1,104,772	380,318	....	45,000	335,318	117,797
Chicago & Alton	1,025	7,440,310	3,139,380	11,390,670	1,481,153	2,[illegible]37,804	360,339	4,202,616	996,777	8,578,689	[illegible],811,981	28,818	334,500	[illegible]448,663	204,603
Chicago & Eastern Illinois	1,275	[illegible],917,176	[illegible],339,901	[illegible],004,538	1,[illegible]57,560	[illegible],329,089	269,828	4,468,801	368,076	8,693,314	3,311,[illegible]24	15,51[illegible]	333,093	[illegible],97[illegible],619	387,8[illegible]
Chicago & Northwestern	7,951[illegible]	44,883,651	14,942,845	55,356,170	6,901,913	7,499,87[illegible]	1,030,[illegible]91	13,522,836	1,115,777	40,070,689	15,285,481	44,476	2,505,000	12,736,005	1,[illegible]58,9[illegible]
Chicago, Burlington & Quincy	9,074[illegible]	44,490,3[illegible]3	16,050,1[illegible]9	66,642,035	7,[illegible]33,306	11,416,949	1,156,146	21,940,104	1,696,758	43,533,[illegible]63	23,928,772	9[illegible],90[illegible]	2,388,039	20,448,[illegible]31	785,815
Chicago, Indiana & Southern	359[illegible]	[illegible],738,616	226,[illegible]06	3,075,045	413,6[illegible]8	701,876	68,734	1,132,675	76,369	[illegible],393,279	681,766	1,878	114,099	569,545	192,[illegible]95
Chicago, Milwaukee & Puget Sound	[illegible],059[illegible]	9,486,104	1,913,165	11,815,798	854,331	1,336,788	434,578	4,386,167	188,193	7,200,057	4,615,741	81,1[illegible]5	8[illegible],891	3,870,975	572,615
Chicago, Milwaukee & St. Paul	7,511[illegible]	[illegible],450,555	10,505,337	47,804,880	6,164,498	7,[illegible]16,966	954,515	20,366,33[illegible]	869,07[illegible]	3,557,377	12,[illegible]33,503	[illegible]88	2,173,13[illegible]	10,064,[illegible]80	1,[illegible]90,51[illegible]
Chicago, Peoria & St. Louis	[illegible]55	[illegible]74,[illegible]46	260,293	1,301,598	168,997	[illegible]86,574	65,436	589,149	53,861	1,134,017	167,581	.	38,700	128,881	34,170
Chicago, Rock Island & Gulf	477[illegible]	1,584,747	470,989	2,[illegible]07,499	253,855	[illegible]15,143	89,719	773,271	73,739	1,405,[illegible]27	802,072	2,121	60,317	739,634	31,719
Chicago, Rock Island & Pacific	7,565[illegible]	[illegible]9,910,849	13,[illegible]3,480	46,655,057	6,502,[illegible]97	6,298,776	1,419,184	19,299,383	1,[illegible]86,198	34,806,068	11,848,989	144,275	1,[illegible]91,756	9,[illegible]12,958	2,[illegible]52,073
Chicago, St. Paul, Minneapolis & Omaha	[illegible],744	7,[illegible]03,307	3,500,[illegible]99	11,517,394	1,307,[illegible]61	1,[illegible]92,840	240,008	4,866,87[illegible]	[illegible]75,548	8,082,529	3,434,865	530	587,175	[illegible],848,[illegible]20	1,132,[illegible]51
Cincinnati, Hamilton & Dayton	1,[illegible]15	5,476,068	1,[illegible]42,[illegible]13	7,518,410	776,006	1,[illegible]27,736	174,619	3,180,126	169,[illegible]21	5,578,208	1,940,[illegible]02	....	318,[illegible]00	1,6[illegible],[illegible]002	306,[illegible]91
Cincinnati Northern	[illegible]45[illegible]	[illegible]03,[illegible]43	166,034	1,016,[illegible]85	[illegible]83,940	[illegible]13,[illegible]95	24,516	431,701	27,971	[illegible]81,[illegible]23	134,86[illegible]	....	50,991	[illegible]83,871	57,736
Cleveland, Cincinnati, Chic. & St. Louis	[illegible],01[illegible]	15,621,708	[illegible],810,[illegible]55	[illegible],395,090	[illegible],491,348	3,817,[illegible]38	674,386	9,451,824	487,909	16,[illegible]2[illegible],805	6,47[illegible],085	[illegible]5,[illegible]76	867,[illegible]51	[illegible],578,997	1,[illegible]77,464
Colorado Midland	[illegible]38	1,[illegible]96,[illegible]99	[illegible]02,[illegible]59	1,[illegible]31,886	174,[illegible]63	[illegible]66,[illegible]58	63,863	622,078	48,[illegible]76	1,[illegible]75,388	256,[illegible]98	[illegible],[illegible]33	72,000	181,[illegible]65	45,853
Colorado & Southern	1,[illegible]75[illegible]	[illegible],826,601	1,[illegible]48,[illegible]05	6,[illegible]05,[illegible]11	[illegible]08,[illegible]53	1,[illegible]35,[illegible]6	[illegible]05,033	[illegible],033,[illegible]20	[illegible]05,899	[illegible],[illegible]77,[illegible]67	[illegible],027,[illegible]44	[illegible]0,[illegible]26	[illegible]40,[illegible]00	1,[illegible]77,[illegible]18	371,[illegible]88
Cumberland Valley	[illegible]6,[illegible]	1,[illegible]13,[illegible]79	[illegible]99,[illegible]94	[illegible],[illegible]18,[illegible]13	381,[illegible]84	[illegible]88,[illegible]93	[illegible]0,[illegible]75	[illegible]33,[illegible]86	69,[illegible]36	1,[illegible]13,[illegible]64	[illegible]04,[illegible]89	[illegible],[illegible]07	[illegible]3,[illegible]26	[illegible]55,[illegible]40	—[illegible]39,[illegible]0[illegible]
Delaware & Hudson Co. & R. R. Dept	[illegible]85[illegible]	[illegible]3,[illegible]01,[illegible]57	[illegible],[illegible]03,[illegible]16	[illegible]6,[illegible]07,[illegible]87	[illegible],[illegible]85,[illegible]60	[illegible],[illegible]84,[illegible]84	[illegible]99,[illegible]14	[illegible],[illegible]55,[illegible]68	[illegible]18,[illegible]4[illegible]	[illegible],[illegible]43,[illegible]80	6,66[illegible],[illegible]57	[illegible],[illegible]34	[illegible]47,[illegible]98	[illegible],[illegible]22,[illegible]93	[illegible]7,[illegible]58[illegible]
Delaware, Lackawanna & Western	[illegible]95[illegible]	[illegible],[illegible]67,[illegible]17	[illegible],[illegible]98,[illegible]93	[illegible],[illegible]93,[illegible]11	[illegible],[illegible]0[illegible],[illegible]49	[illegible],[illegible]16,[illegible]47	[illegible]95,[illegible]72	[illegible],[illegible]41,[illegible]29	[illegible]81,[illegible]19	17,[illegible]35,[illegible]16	10,[illegible]55,[illegible]95	[illegible]18,[illegible]59	1,[illegible]07,[illegible]70	[illegible],[illegible]68,[illegible]34	—[illegible]91,[illegible]57
Denver & Rio Grande	[illegible],[illegible]45	[illegible]3,[illegible]41,[illegible]56	[illegible],[illegible]18,[illegible]19	[illegible]7,[illegible]29,[illegible]98	[illegible],[illegible]24,[illegible]00[illegible]	[illegible],[illegible]30,[illegible]69	480,[illegible]47	[illegible],[illegible]11,[illegible]67	454,[illegible]53	12,[illegible]00[illegible],[illegible]96	[illegible],[illegible]98,[illegible]02	17,434	[illegible]76,[illegible]00	[illegible],[illegible]34,[illegible]68	—[illegible]13,[illegible]23
Denver, Northwestern & Pacific	[illegible]15	[illegible]54,[illegible]34	[illegible]34,[illegible]06	[illegible]30,[illegible]81	[illegible]29,[illegible]24	[illegible]47,[illegible]60	[illegible]0,[illegible]79	[illegible]36,[illegible]26	30,[illegible]69	[illegible]65,[illegible]58	[illegible]65,[illegible]23	. ....	[illegible]9,[illegible]00	[illegible]35,[illegible]73	[illegible],[illegible]32
Detroit & Mackinac	[illegible]58[illegible]	[illegible]93,[illegible]83	[illegible]53,[illegible]85	[illegible]02,[illegible]97	[illegible]48,[illegible]50	[illegible]58,[illegible]58	[illegible]1,[illegible]81	[illegible]01,[illegible]16	[illegible]8,[illegible]77	[illegible]58,[illegible]82	[illegible]44,[illegible]15	1,[illegible]37	[illegible]6,[illegible]70[illegible]	[illegible]08,[illegible]43	[illegible]0,[illegible]77
Detroit, Grand Haven & Milwaukee	[illegible]91	1,[illegible]00,[illegible]06	[illegible]76,[illegible]08	1,[illegible]70[illegible],[illegible]25	[illegible]93,[illegible]06	[illegible]35,[illegible]07	[illegible]9,[illegible]27	[illegible]03,[illegible]01	[illegible]0,[illegible]92	1,[illegible]33,[illegible]33	[illegible]68,[illegible]92	[illegible]56	[illegible]5,[illegible]19	[illegible]42,[illegible]17	[illegible]6,[illegible]54
Detroit, Toledo & Ironton	[illegible]41	1,[illegible]67,[illegible]17	[illegible]26,[illegible]47	1,[illegible]89,[illegible]04	[illegible]64,[illegible]89	[illegible]67,[illegible]05	[illegible]4,[illegible]55	[illegible]74,[illegible]52	[illegible]8,[illegible]87	1,[illegible]89,[illegible]88	[illegible]09,[illegible]16	[illegible]34	[illegible]3,[illegible]83	[illegible]55,[illegible]99	[illegible]7,[illegible]60
Duluth & Iron Range	[illegible]00[illegible]	4,[illegible]80,[illegible]6[illegible]	[illegible]94,[illegible]56	4,[illegible]59,[illegible]01	[illegible]51,[illegible]95	[illegible]64,[illegible]16	[illegible],[illegible]55	[illegible]66,[illegible]02	[illegible]01,[illegible]21	[illegible],[illegible]99,[illegible]15	[illegible],[illegible]68,[illegible]86	[illegible],[illegible]93	[illegible]28,[illegible]56	[illegible],[illegible]44,[illegible]53	[illegible]7,[illegible]74
Duluth, Missabe & Northern	[illegible]3[illegible]9	[illegible],[illegible]73,[illegible]43	[illegible]30,[illegible]59	[illegible],[illegible]76,[illegible]85	[illegible]84,[illegible]38	[illegible]56,[illegible]98	[illegible]6,[illegible]93	[illegible]83,[illegible]68	[illegible]0,[illegible]38	[illegible],[illegible]60,[illegible]95	[illegible],[illegible]15,[illegible]90	[illegible]3,[illegible]81	[illegible]44,[illegible]19	[illegible],[illegible]05,[illegible]8[illegible]	1,[illegible]63,[illegible]48
El Paso & Southwestern Co.	[illegible]0[illegible]	[illegible],[illegible]76,[illegible]16	[illegible]21,[illegible]35[illegible]	[illegible],[illegible]80,[illegible]01	[illegible]15,[illegible]41	[illegible]72,[illegible]89[illegible]	[illegible]09,[illegible]76	[illegible],[illegible]66,[illegible]09	[illegible]06,[illegible]85[illegible]	[illegible],[illegible]71,[illegible]73	[illegible],[illegible]09,[illegible]28	[illegible]7,[illegible]03	[illegible]1,[illegible]1[illegible]3	[illegible],[illegible]81,[illegible]10	[illegible]7,[illegible]63
Elgin, Joliet & Eastern	[illegible]84[illegible]	[illegible],[illegible]43,[illegible]34	[illegible]36	[illegible],[illegible]54,[illegible]83	[illegible]81,[illegible]81	[illegible],[illegible]53,[illegible]46	[illegible]7,[illegible]03	[illegible],[illegible]68,[illegible]06	[illegible]43,[illegible]25	[illegible],[illegible]84,[illegible]61	[illegible],[illegible]59,[illegible]22[illegible]	.... ..	[illegible]83,[illegible]43[illegible]	[illegible]75,[illegible]79	[illegible],[illegible]17,[illegible]38
Erie	[illegible],[illegible]95	[illegible]7,[illegible]46,[illegible]98	6,[illegible]72,[illegible]40	[illegible]7,[illegible]87,[illegible]31	[illegible],[illegible]06,[illegible]97	[illegible],[illegible]48,[illegible]80	[illegible]44,[illegible]55[illegible]	[illegible],[illegible]96,[illegible]09	[illegible]06,[illegible]25	[illegible]5,[illegible]06,[illegible]18	[illegible],[illegible]39,[illegible]18	156,[illegible]78	[illegible],[illegible]90,[illegible]03	[illegible],[illegible]78,[illegible]07	[illegible]6,[illegible]91
Florida East Coast	6[illegible]0[illegible]	[illegible],[illegible]14,[illegible]10	[illegible],[illegible]20,[illegible]85	[illegible],[illegible]28,[illegible]05[illegible]	[illegible]95,[illegible]18	[illegible]45,[illegible]20	[illegible]7,[illegible]60	[illegible],[illegible]59,[illegible]03	[illegible]9,[illegible]35	[illegible],[illegible]37,[illegible]0[illegible]	[illegible]91,[illegible]30	—[illegible],[illegible]81	[illegible]39,[illegible]80[illegible]	[illegible]50,[illegible]49	[illegible],[illegible]85
Fort Worth & Denver City	[illegible]54	[illegible],[illegible]77,[illegible]77	[illegible],[illegible]20,[illegible]66	[illegible],[illegible]86,[illegible]80	[illegible]33,[illegible]99	[illegible]0[illegible],[illegible]69	[illegible]6,[illegible]30	[illegible],[illegible]69,[illegible]8[illegible]	[illegible]5,[illegible]78[illegible]	[illegible],[illegible]14,[illegible]61	[illegible],[illegible]72,[illegible]19	—[illegible],[illegible]79	[illegible]03,[illegible]75	[illegible],[illegible]24,[illegible]00	[illegible]84,[illegible]79
Galveston, Harrisburg & San Antonio	[illegible],[illegible]38	[illegible],[illegible]95,[illegible]26	[illegible],[illegible]22,[illegible]87	[illegible],[illegible]5[illegible],[illegible]17	[illegible]92,[illegible]35	[illegible],[illegible]55,[illegible]15	[illegible]00,[illegible]80	[illegible],[illegible]75,[illegible]86[illegible]	[illegible]50,[illegible]00	6,[illegible]74,[illegible]97	[illegible],[illegible]77,[illegible]40	[illegible]5,[illegible]68	[illegible]48,[illegible]13	[illegible],[illegible]83,[illegible]3[illegible]	[illegible]62,[illegible]35
Georgia	[illegible]07	[illegible],[illegible]79,[illegible]35	[illegible]99,[illegible]75	[illegible],[illegible]43,[illegible]81	[illegible]26,[illegible]24	[illegible]89,[illegible]14	[illegible]01,[illegible]00	[illegible],[illegible]31,[illegible]46	[illegible]1,[illegible]84	1,[illegible]90,[illegible]88[illegible]	[illegible]73,[illegible]09[illegible]	.	[illegible]4,[illegible]49	[illegible]99,[illegible]44	[illegible]5,[illegible]55
Georgia Southern & Florida	[illegible]95	[illegible]78,[illegible]82[illegible]	[illegible]42,[illegible]61[illegible]	[illegible],[illegible]75,[illegible]40[illegible]	[illegible]88,[illegible]24	[illegible]58,[illegible]78	[illegible]8,[illegible]50	[illegible]21,[illegible]15	[illegible]3,[illegible]6[illegible]	[illegible],[illegible]16,[illegible]93	[illegible]58,[illegible]51[illegible]	.. .	[illegible]7,[illegible]37	[illegible]60,[illegible]74	[illegible],[illegible]97
Grand Rapids & Indiana	[illegible]58[illegible]	[illegible],[illegible]65,[illegible]12	[illegible],[illegible]28,[illegible]03	[illegible],[illegible]88,[illegible]03[illegible]	[illegible]14,[illegible]87	[illegible]42,[illegible]99	[illegible]01,[illegible]49	[illegible],[illegible]66,[illegible]56[illegible]	[illegible]32,[illegible]10	[illegible],[illegible]58,[illegible]86	[illegible],[illegible]30,[illegible]04	1,[illegible]48	[illegible]07,[illegible]81	[illegible],[illegible]70,[illegible]75	[illegible]33,[illegible]98
Grand Trunk Western	[illegible]47	[illegible],[illegible]75,[illegible]63	[illegible],[illegible]60,[illegible]66	[illegible],[illegible]81,[illegible]71[illegible]	[illegible]87,[illegible]07	[illegible]31,[illegible]75	[illegible]71,[illegible]98	[illegible],[illegible]87,[illegible]56	[illegible]3,[illegible]65[illegible]	[illegible],[illegible]01,[illegible]79[illegible]	[illegible],[illegible]79,[illegible]93[illegible]	10,[illegible]48	[illegible]84,[illegible]71[illegible]	[illegible],[illegible]84,[illegible]89	[illegible]5[illegible],[illegible]33
Great Northern	7,[illegible]43[illegible]	[illegible]5,[illegible]98,[illegible]69	10,[illegible]1,[illegible]06	[illegible]9,[illegible]93,[illegible]94	[illegible],[illegible]50,[illegible]16[illegible]	[illegible],[illegible]05,[illegible]60	[illegible]15,[illegible]85	[illegible]3,[illegible]35,[illegible]07[illegible]	[illegible]93,[illegible]60[illegible]	[illegible]6,[illegible]99,[illegible]89[illegible]	[illegible]3,[illegible]09[illegible],[illegible]03[illegible]	[illegible]8,[illegible]13	[illegible],[illegible]98,[illegible]37[illegible]	[illegible],[illegible]83,[illegible]68[illegible]	[illegible],[illegible]58,[illegible]49
Gulf & Ship Island	[illegible]07	1,[illegible]68,[illegible]73	[illegible]1[illegible],[illegible]84	1,[illegible]99,[illegible]38	[illegible]97,[illegible]95	[illegible]68,[illegible]87	[illegible]1,[illegible]29	[illegible]38,[illegible]41[illegible]	[illegible]5,[illegible]70	1,[illegible]01,[illegible]93	[illegible]98,[illegible]45	.	[illegible]4[illegible],[illegible]26	[illegible]55,[illegible]19	[illegible]6,[illegible]88
Gulf, Colorado & Santa Fe	1,[illegible]97[illegible]	6,[illegible]48,[illegible]59	[illegible],[illegible]19,[illegible]85[illegible]	[illegible],[illegible]61,[illegible]31	[illegible],[illegible]67,[illegible]20	[illegible],[illegible]33,[illegible]40	[illegible]40,[illegible]35	[illegible],[illegible]79,[illegible]36[illegible]	[illegible]96,[illegible]94	[illegible],[illegible]17,[illegible]65[illegible]	[illegible],[illegible]43,[illegible]70[illegible]	....	[illegible]46,[illegible]48	[illegible],[illegible]97,[illegible]05[illegible]	[illegible]5,[illegible]88
Illinois Central	4,[illegible]75[illegible]	[illegible]8,[illegible]64,[illegible]09[illegible]	[illegible]0,[illegible]16[illegible],[illegible]98	[illegible]4,[illegible]89,[illegible]06	[illegible],[illegible]16,[illegible]57	[illegible]0,[illegible]59,[illegible]24	[illegible],[illegible]75[illegible]	[illegible]7,[illegible]86[illegible],[illegible]53	[illegible],[illegible]53,[illegible]87[illegible]	[illegible]6,[illegible]47[illegible],[illegible]53	[illegible],[illegible]14[illegible],[illegible]67[illegible]	[illegible]3,[illegible]16	[illegible],[illegible]08[illegible],[illegible]38	[illegible],[illegible]04,[illegible]41[illegible]	[illegible],[illegible]89,[illegible]43
Indiana Harbor Belt	[illegible]05[illegible]	....	....	[illegible],[illegible]96,[illegible]39[illegible]	[illegible]76,[illegible]34	[illegible]28,[illegible]04	[illegible]6,[illegible]05	[illegible]91,[illegible]83	67,[illegible]58	[illegible],[illegible]30,[illegible]51[illegible]	[illegible]35,[illegible]88[illegible]	[illegible]3,[illegible]35[illegible]	[illegible]8,[illegible]37	[illegible],[illegible]20,[illegible]8[illegible]	[illegible]90,[illegible]59
Kansas City Southern	827	5,[illegible]49,[illegible]65	[illegible],[illegible]04,[illegible]86	[illegible],[illegible]31,[illegible]03	[illegible]41,[illegible]19	[illegible],[illegible]01,[illegible]54	[illegible]41,[illegible]08	[illegible],[illegible]08,[illegible]99	[illegible]78,[illegible]04	[illegible],[illegible]71,[illegible]30[illegible]	[illegible],[illegible]60,[illegible]39	.....	[illegible]98,[illegible]14	[illegible],[illegible]61,[illegible]85	[illegible]94,[illegible]34
Lake Erie & Western	886	[illegible],[illegible]23,[illegible]15	[illegible]93,[illegible]13	[illegible],[illegible]57,[illegible]26	[illegible]90,[illegible]08	[illegible]40,[illegible]67	[illegible]1[illegible],[illegible]64	[illegible],[illegible]83,[illegible]92[illegible]	[illegible]98,[illegible]60	[illegible],[illegible]25,[illegible]82[illegible]	[illegible],[illegible]06,[illegible]30[illegible]	....	[illegible]76,[illegible]96	[illegible]50,[illegible]09	[illegible]60,[illegible]83[illegible]
Lake Shore & Michigan Southern	[illegible],[illegible]77[illegible]	[illegible]4,[illegible]55,[illegible]86	[illegible],[illegible]47,[illegible]26	[illegible]8,[illegible]38,[illegible]01	[illegible],[illegible]58,[illegible]63[illegible]	[illegible],[illegible]74,[illegible]38	[illegible]60,[illegible]24	[illegible]2,[illegible]68,[illegible]37[illegible]	[illegible]85,[illegible]7[illegible]8	[illegible]3,[illegible]48,[illegible]00[illegible]	[illegible]4,[illegible]90[illegible],[illegible]90[illegible]	[illegible]8,[illegible]78	[illegible],[illegible]83,[illegible]40	[illegible]3,[illegible]58[illegible],[illegible]68[illegible]	[illegible],[illegible]50,[illegible]49[illegible]
Lehigh & Hudson River	[illegible]9[illegible]	[illegible],[illegible]90,[illegible]89	[illegible]6,[illegible]7[illegible]0	[illegible],[illegible]47,[illegible]59[illegible]	[illegible]33,[illegible]52	[illegible]71,[illegible]03	[illegible]1,[illegible]50	[illegible]25,[illegible]3[illegible]6	[illegible]4,[illegible]22	[illegible]84,[illegible]94[illegible]	[illegible]57,[illegible]64[illegible]	....	[illegible]1,[illegible]00	[illegible]5,[illegible]64[illegible]	[illegible]6,[illegible]70[illegible]
Lehigh Valley	[illegible],[illegible]45[illegible]	[illegible]4,[illegible]34,[illegible]97[illegible]	[illegible],[illegible]31,[illegible]66[illegible]	[illegible]9,[illegible]03[illegible],[illegible]80[illegible]	[illegible]23,[illegible]8[illegible]2	[illegible],[illegible]70,[illegible]05[illegible]	[illegible]27,[illegible]0[illegible]8	[illegible]9,[illegible]84,[illegible]00[illegible]	[illegible]15,[illegible]54[illegible]	[illegible]9,[illegible]49[illegible],[illegible]44[illegible]	[illegible],[illegible]41,[illegible]35[illegible]	[illegible]93,[illegible]59[illegible]	[illegible],[illegible]06[illegible],[illegible]00[illegible]	[illegible],[illegible]54,[illegible]06[illegible]	[illegible]73,[illegible]36[illegible]
Long Island	[illegible]99[illegible]	[illegible],[illegible]70,[illegible]58[illegible]	[illegible],[illegible]96,[illegible]71[illegible]	[illegible],[illegible]03,[illegible]66	[illegible],[illegible]56,[illegible]09	[illegible]76,[illegible]95[illegible]	[illegible]16,[illegible]50	[illegible],[illegible]70,[illegible]56[illegible]	[illegible]91,[illegible]97	[illegible],[illegible]01,[illegible]37[illegible]	[illegible],[illegible]91,[illegible]34	[illegible]82,[illegible]36	[illegible]90,[illegible]67[illegible]	[illegible],[illegible]83,[illegible]99	[illegible]47,[illegible]38
Louisiana & Arkansas	[illegible]55	[illegible]80,[illegible]24[illegible]	[illegible]58,[illegible]18	[illegible],[illegible]81,[illegible]99	[illegible]8[illegible],[illegible]24	[illegible]66,[illegible]25	[illegible]1,[illegible]30[illegible]	[illegible]97,[illegible]86[illegible]	[illegible]1,[illegible]38[illegible]	[illegible]08,[illegible]69[illegible]	[illegible]7[illegible],[illegible]50[illegible]	....	[illegible]7,[illegible]70[illegible]	[illegible]39,[illegible]80[illegible]	—[illegible]2,[illegible]77
Louisiana Western	[illegible]07	[illegible]98,[illegible]57[illegible]	[illegible]89,[illegible]41	[illegible],[illegible]46[illegible],[illegible]03[illegible]	[illegible]74,[illegible]65	[illegible]59,[illegible]74	[illegible]9,[illegible]73[illegible]	[illegible]92,[illegible]27[illegible]	[illegible]9,[illegible]03[illegible]	[illegible],[illegible]05[illegible],[illegible]87[illegible]	[illegible]10,[illegible]15[illegible]	[illegible],[illegible]08	[illegible]4,[illegible]34[illegible]	[illegible]47,[illegible]82[illegible]	—[illegible]61,[illegible]37[illegible]

REVENUES AND EXPENSES OF RAILWAYS.

NINE MONTHS OF FISCAL YEAR, 1912 (CONTINUED).

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses					Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.				
Louisville & Nashville	4,7[illegible]	30,750,831	9,[illegible]25	42,485,057	6,4[illegible]913	7,440,103	882,254	13,683,759	814,818	29,243,847	13,241,210	95,828	1,343,883	11,871,499	665,461
Louisville, Henderson & St. Louis	200	607,192	307,172	974,608	108,344	123,573	38,827	328,428	26,885	726,057	248,551	7,730	27,000	214,281	33,473
Maine Central	1,204	5,064,926	2,515,913	8,051,449	1,359,604	1,047,993	80,067	3,020,434	231,834	5,739,933	2,311,517	16,519	385,374	1,944,662	280,186
Michigan Central	1,817	15,842,810	5,916,880	23,594,746	2,993,502	2,790,487	583,735	9,197,981	402,480	15,568,185	7,956,561	26,191	1,030,371	6,952,381	2,694,601
Midland Valley	373	746,300	338,316	1,124,314	236,646	175,556	27,009	353,757	57,511	850,449	273,865	588	52,008	222,388	—30,957
Missouri, Kansas & Texas	1,744	8,539,645	3,287,157	12,590,095	1,54[illegible]183	1,833,823	319,811	4,167,202	373,470	8,236,489	4,353,606	19,845	500,926	3,832,835	—174,352
Missouri Pacific	3,915	15,[illegible]21,871	3,506,205	18,402,238	3,186,698	3,354,969	533,477	8,614,794	642,606	16,331,544	2,070,694	- 32,082	784,194	1,254,418	—202,271
Mobile & Ohio	1,114	7,031,185	1,097,485	8,649,953	991,089	1,603,791	306,784	3,086,110	286,606	6,274,380	2,375,573	8,564	229,300	2,147,609	—90,554
Monongahela	68	938,917	20,933	973,310	126,490	81,462	3,031	203,987	17,379	432,349	540,961	.....	93,430	517,531	75,230
Morgan's La. & Tex. R. R. & S. S. Co.	104	2,666,965	949,368	3,844,301	487,[illegible]38	502,002	123,141	1,548,395	111,274	2,772,050	1,072,251	17,352	167,300	887,599	—269,926
Nashville, Chattanooga & St. Louis	1,[illegible]30[illegible]	6,[illegible]33,800	2,[illegible]23,254	9,088,155	1,34[illegible]976	1,677,330	346,509	3,360,876	231,981	6,959,612	2,128,543	8,373	2[illegible]300	1,897,870	—216,439
Nevada Northern	165	953,929	98,509	1,079,043	115,309	134,768	3,502	231,761	31,079	515,919	563,123	.....	45,336	517,787	99,472
New Orleans & North Eastern	196	1,148,095	479,625	2,835,219	264,916	530,019	82,109	1,064,728	105,414	2,047,186	778,033	7,798	78,421	691,814	—109,103
New Orleans Great Northern	287	874,545	258,238	1,221,488	187,699	161,697	23,374	333,565	66,142	883,407	389,081	644	16,173	372,264	—75,957
New York Central & Hudson River	3,597	46,711,074	13,907,899	78,961,501	10,122,019	12,938,453	1,676,480	29,929,810	2,008,879	56,675,641	22,285,860	279,355	4,534,443	18,040,783	3,072,283
New York, Chicago & St. Louis	561	7,186,879	1,172,170	8,690,718	958,890	919,749	417,538	3,669,494	152,071	6,317,672	2,373,046	15,873	397,125	1,960,048	288,104
New York, New Haven & Hartford	2,09[illegible]	23,787,345	20,048,705	48,171,976	4,818,472	5,787,703	287,093	18,844,338	1,445,548	31,133,654	17,309,392	1,031,730	3,870,000	15,221,052	1,173,277
New York, Ontario & Western	566	5,369,544	1,280,648	6,909,362	980,924	1,104,599	88,133	2,693,088	154,291	5,066,035	1,847,327	- 10,198	161,250	1,675,879	165,591
New York, Philadelphia & Norfolk	117	1,935,486	388,375	2,454,077	251,507	437,151	36,293	982,335	110,704	1,817,990	636,087	.....	68,700	567,387	—47,496
Norfolk & Western	2,014	24,931,139	3,263,451	29,244,101	3,425,730	5,[illegible]9,590	473,693	8,731,328	564,667	18,924,998	10,319,106	18,450	1,050,000	9,250,656	517,553
Norfolk Southern	608	1,550,850	628,516	2,365,478	273,211	289,972	49,726	780,741	118,356	1,513,006	853,472	3,674	67,500	782,298	3,655
Northern Central	478	7,334,057	1,727,014	9,637,066	1,032,827	1,063,575	133,098	4,824,366	222,313	8,275,179	1,356,883	4,649	350,545	1,010,987	101,122
Northern Pacific	6,03[illegible]	33,936,181	11,515,723	47,580,314	5,46[illegible]191	5,305,761	870,406	15,725,465	743,948	28,107,771	19,472,543	269,878	2,479,161	17,263,260	—315,311
Oregon Short Line	1,762[illegible]	11,165,700	3,452,784	15,577,541	1,705,875	1,537,610	254,145	3,870,681	330,293	7,688,604	7,888,937	- 5,620	1,005,690	6,877,627	177,423
Oregon-Washington R. R. & Nav. Co.	1,930[illegible]	7,701,008	3,725,892	12,296,706	1,595,314	1,301,877	396,919	4,386,007	398,520	8,078,637	4,218,069	10,885	928,319	3,300,635	593,354
Pecos & Northern Texas	479[illegible]	1,132,054	292,631	1,497,585	202,6[illegible]1	304,247	23,397	594,149	49,597	1,104,011	393,574	.....	41,355	352,219	—44,930
Pennsylvania Co.	1,760[illegible]	29,902,545	6,566,735	39,921,438	5,353,584	7,267,844	676,367	14,279,160	789,951	28,316,906	11,604,532	18,531	1,736,682	9,849,319	870,234
Pennsylvania *Railroad*	4,018[illegible]	89,008,103	25,555,081	122,641,108	13,819,385	24,514,838	1,655,314	45,681,832	3,109,931	88,781,300	33,859,808	1,164,080	5,329,004	27,366,724	39,578
Peoria & Eastern	352	1,724,717	537,334	2,435,587	311,948	348,382	46,741	1,010,961	51,499	1,769,531	666,056	.....	87,602	578,454	—12,603
Pere Marquette	1,330[illegible]	8,464,121	3,095,923	12,598,475	1,552,144	2,088,751	319,147	5,908,694	300,101	10,168,837	2,429,638	—82,670	510,442	1,866,526	—14,329
Philadelphia, Baltimore & Washington	713	6,919,807	5,864,025	14,254,579	1,972,699	2,455,699	248,084	6,029,873	351,743	11,058,098	3,196,481	.....	451,990	2,744,491	- 7,374
Pittsburgh & Lake Erie	215[illegible]	10,750,723	1,151,983	12,272,764	1,309,665	1,939,493	115,403	2,934,306	213,390	6,511,257	5,760,507	—2,536	370,389	5,487,582	423,472
Pittsburgh, Cincinnati, Chic. & St. Louis	1,467	21,207,306	6,007,541	30,547,804	3,979,935	5,685,516	610,947	11,086,598	595,888	21,958,884	8,588,920	—7,818	1,134,847	7,446,255	703,856
Rutland	468	1,387,745	893,978	2,576,337	304,483	409,837	65,125	1,036,938	59,337	1,875,720	700,617	.....	101,148	599,469	33,326
St. Louis, Brownsville & Mexico	510[illegible]	1,052,719	537,522	1,726,382	369,357	1,204,086	30,640	614,055	66,743	1,204,881	521,501	.....	49,085	472,416	215,866
St. Louis, Iron Mountain & Southern	3,315[illegible]	16,807,546	4,656,194	23,047,204	3,638,879	3,[illegible]04,579	483,800	7,543,166	646,953	15,517,377	7,529,827	48,268	801,315	6,680,244	575,118
St. Louis Merchants' Bridge Terminal	9	.....	2,898	1,351,370	[illegible]8,814	83,116	3,974	737,594	46,153	1,089,651	268,719	.....	53,133	210,587	77,699
St. Louis, San Francisco & Texas	244	689,276	246,039	997,788	166,559	139,399	27,900	452,817	43,883	829,558	168,230	.....	9,539	158,691	134,256
St. Louis Southwestern	843[illegible]	4,543,510	1,015,264	5,857,891	5[illegible]254	988,182	256,462	1,454,857	220,721	3,416,476	2,441,415	—8,510	190,913	2,241,992	118,435
St. Louis Southwestern of Texas	703	2,411,817	781,792	3,422,149	499,312	738,103	110,333	1,363,938	157,798	2,869,484	552,665	—2,816	95,552	454,797	41,362
San Antonio & Aransas Pass	79[illegible]	3,[illegible]43,058	903,291	3,[illegible]96,538	550,355	4[illegible]4,893	50,919	1,290,845	89,763	2,436,775	1,089,753	.....	99,000	990,753	188,943
Southern	7,060[illegible]	31,963,377	12,835,479	47,913,233	5,735,695	7,601,711	1,251,144	16,569,040	1,415,013	32,572,583	15,350,700	49,858	1,833,693	13,566,965	180,897
Southern Kansas of Texas	1[illegible]5	800,038	142,623	988,441	148,534	[illegible]3,[illegible]4	18,661	378,703	36,757	795,879	192,612	.....	23,472	169,140	85,037
Southern Pacific Co.	6,[illegible]7[illegible]	40,147,[illegible]5	13,488,548	68,[illegible]96,436	7,7[illegible]368	8,4[illegible]1,616	1,582,443	19,821,479	1,761,797	30,288,703	19,037,[illegible]3	202,321	3,031,174	16,208,770	845,131
Syracuse, Binghamton & New York	81	461,319	304,094	870,004	110,461	63,304	15,022	324,735	20,824	536,346	333,748	.....	57,780	275,968	19,283
Tennessee Central	94	772,993	[illegible]3,886	1,134,447	209,[illegible]53	160,282	48,029	428,705	73,638	916,907	217,540	..	37,879	179,661	—166,481
Terminal R. R. Ass'n of St. Louis	3[illegible]	..	2,[illegible]13	3,[illegible]45,857	30[illegible]993	16,758	6,313	779,550	49,617	1,362,731	733,596	80,259	247,011	766,844	—77,977
Texas & New Orleans	458	1,941,[illegible]88	773,[illegible]12	3,[illegible]89,141	478,068	655,073	74,097	1,172,751	94,324	2,474,913	417,228	—3,243	131,760	284,225	—220,579
Toledo & Ohio Central	441[illegible]	3,[illegible]97,[illegible]6	487,[illegible]88	4,073,247	61[illegible]981	597,011	59,791	1,410,578	74,727	2,754,188	1,319,059	—7,025	184,886	1,126,348	310,830
Toledo, Peoria & Western	48	[illegible]90,033	139,[illegible]86	984,848	149,893	[illegible]6,836	20,890	374,549	30,683	79[illegible]550	192,298	..	43,600	148,698	7,644
Toledo, St. Louis & Western	451	[illegible],446,[illegible]21	[illegible]38,747	[illegible],961,793	[illegible]32,548	[illegible]43,804	74,460	1,094,768	76,943	[illegible],125,[illegible]3	839,670	....	132,500	706,520	58,032
Union Pacific	8,53[illegible]	[illegible],268,[illegible]53	7,731,759	35,870,367	[illegible],[illegible]26,[illegible]47	[illegible],[illegible]39,64[illegible]	942,139	10,514,545	958,711	20,180,785	15,689,582	[illegible],949	1,515,867	14,150,766	3,324,058
Union R. R. of Baltimore	[illegible]	[illegible]931,130	[illegible]83,[illegible]99	1,129,179	[illegible]8,866	..	7,[illegible]25	50,611	[illegible]2,519	169,[illegible]24	959,958	.....	51,780	908,178	44,523
Union R. R. of Pennsylvania	31	..	..	3,067,970	78,109	7[illegible]4,379	[illegible]914	1,156,508	33,069	[illegible],192,979	874,991	31,846	58,073	848,764	309,073
Vandalia	8[illegible]7	[illegible],089,779	1,[illegible]8,[illegible]88	7,764,586	1,0[illegible]8,574	1,[illegible]99,[illegible]4	[illegible]28,435	3,078,[illegible]09	168,678	6,003,820	1,760,766	.. ..	254,029	1,506,737	—143,619
Vicksburg, Shreveport & Pacific	171	647,[illegible]59	[illegible]68,460	1,115,143	196,[illegible]93	196,[illegible]73	28,766	350,705	42,[illegible]09	814,[illegible]46	300,[illegible]78	1,540	61,671	[illegible]7,497	69,[illegible]28
Virginia & Southwestern	240[illegible]	1,151,[illegible]83	[illegible]3,[illegible]56	1,307,304	[illegible]55,[illegible]50	[illegible]64,[illegible]80	16,460	381,504	33,[illegible]75	85[illegible]591	454,[illegible]13	..	44,[illegible]54	410,459	123,[illegible]29
Virginian	47[illegible]	3,274,911	196,604	3,570,087	433,637	644,519	45,397	991,718	71,114	2,186,385	1,383,702	46,886	141,400	1,289,188	324,686
Washington Southern	3[illegible]	[illegible]89,[illegible]87	347,[illegible]83	[illegible]47,[illegible]87	102,[illegible]11	92,027	11,100	331,453	[illegible]4,614	560,[illegible]05	[illegible]85,[illegible]67	..	[illegible]0,[illegible]04	56,663	20,[illegible]26
West Jersey & Seashore	3[illegible]6	1,435,361	3,015,917	4,756,385	738,880	[illegible]31,[illegible]85	118,391	2,084,806	100,[illegible]32	3,873,894	[illegible]82,[illegible]91	[illegible]4,[illegible]46	[illegible]30,546	617,[illegible]09	[illegible]34,294
Western Maryland	343	4,469,932	701,151	[illegible],395,[illegible]25	614,963	675,853	91,297	1,974,892	123,995	3,481,[illegible]00	1,[illegible]14,[illegible]25	[illegible]93	189,[illegible]00	1,[illegible]25,332	165,[illegible]82
Western Ry. of Alabama	133	6[illegible]3,[illegible]18	[illegible]75,[illegible]08	1,084,[illegible]24	[illegible]73,[illegible]76	199,208	48,[illegible]19	304,[illegible]71	54,[illegible]80	780,[illegible]04	[illegible]04,[illegible]20	[illegible]67	41,[illegible]11	[illegible]62,[illegible]36	30,[illegible]08
Wheeling & Lake Erie	457	[illegible],[illegible]03,[illegible]47	[illegible]62,[illegible]36	[illegible],[illegible]16,[illegible]44	[illegible]67,[illegible]79	1,[illegible]47,[illegible]35	66,[illegible]39	1,[illegible]02,[illegible]51	126,[illegible]19	[illegible],[illegible]10,[illegible]73	2,[illegible]05,[illegible]79	,[illegible]0,[illegible]49	[illegible]71,[illegible]77	1,[illegible]35,[illegible]04	442,[illegible]62
Yazoo & Mississippi Valley	1,[illegible]72	[illegible],[illegible]74,[illegible]53	1,[illegible]68,[illegible]34	[illegible],[illegible]12,[illegible]09	[illegible]30[illegible]692	1,[illegible]28,821	145,[illegible]92	[illegible],[illegible]65,[illegible]44	[illegible]38,[illegible]25	[illegible],[illegible]77,[illegible]74	1,[illegible]34,[illegible]95	1,[illegible]75	[illegible]39,[illegible]87	[illegible],[illegible]93,[illegible]33	1,[illegible]32,[illegible]14

Operated at the end of the previous period. [illegible]7,550, 4,[illegible]95, [illegible]4,[illegible]34, [illegible]43, [illegible]631, [illegible]7,744, [illegible]9,091; [illegible]341, [illegible]2,005, [illegible]7,[illegible]51; [illegible]471; [illegible]7,549, [illegible]246, [illegible]1,979, [illegible]1,173; [illegible]819, [illegible]930, [illegible]360, [illegible]191; [illegible]317, [illegible]832, [illegible]583, [illegible]587; [illegible]7,328; [illegible]4,576, [illegible]113, [illegible]1,663, [illegible]1,433, [illegible]395, [illegible]4,591, [illegible]1,180, [illegible]1,805, [illegible]324, [illegible]1,737; [illegible]3,911, [illegible]1,955, [illegible]3,591; [illegible]2,040, [illegible]546, [illegible]1,990, [illegible]469, [illegible]6029; [illegible]1,646, [illegible]1,737, [illegible]2963 [illegible],416, [illegible]3,077; [illegible]2,331, [illegible]191; [illegible]501, [illegible]3,318, [illegible]797, [illegible]7,089, [illegible]6,187, [illegible]34, [illegible]444, [illegible]3,473, [illegible]24, [illegible]474, [illegible]358. — Indicates Deficits, Losses and Decreases.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

The officers of the Rome, Watertown & Ogdensburg, the Utica & Black River, and the Oswego & Rome, having resigned, their places have been taken by the officers of the New York Central & Hudson River.

W. J. Cunningham, auditor of disbursements of the Chicago Great Western with office at Chicago, has been appointed auditor of freight receipts, succeeding H. Ernest resigned, M. E. Keehan succeeds Mr. Cunningham.

Lewis A. Riley, president of Lehigh & Hudson River, with headquarters at Philadelphia, Pa., has been elected president pro tem of the Lehigh & New England, to fill the vacancy caused by the death of W. A. Lathrop.

G. C. Jones, general manager of the Central Vermont, with office at St. Albans, Vt., has been appointed vice-president in charge of construction and operation of the Southern New England Railroad Corporation and the Southern New England Railway, subsidiaries of the Grand Trunk, with office at Providence, R. I.

The office of superintendent of motive power of the Atchison, Topeka & Santa Fe System having been merged in that of vice-president in charge of operation, John Purcell, superintendent of shops at Topeka, Kan., has been appointed assistant to the vice-president, with office at Chicago, and will handle mechanical department matters.

Stacy B. Lloyd, assistant general solicitor of the Pennsylvania Railroad, with office at Philadelphia, Pa., has been appointed assistant general counsel. Alan H. Strong, solicitor at New Brunswick, N. J., has been appointed general attorney, with office at Philadelphia, and J. H. Baer, chief clerk to the freight claim agent, has been appointed assistant freight claim agent.

R. N. Begien, whose appointment as assistant to third vice-president of the Baltimore & Ohio, with office at Baltimore, Md., has been announced in these columns, was born in New England, and was educated at the Engineering School of Harvard University, having been a member of the class of 1897. Mr. Begien went to Central America, and for three and a half years was a member of the Nicaragua Canal Commission. Resigning from that position he went to South America, and for a year was a railway engineer in Ecuador. He then returned to the United States to enter the engineering department of the District of Columbia. In August, 1902, he was appointed assistant engineer of the Baltimore & Ohio, with office at Somerset, Pa., and in June, 1908, he was made engineer of the Philadelphia division. Mr. Begien was appointed assistant engineer of the same company, with office at Baltimore, on May 1, 1910, under A. W. Thompson, and when Mr. Thompson became general manager he remained as his assistant, and on May 1, he was made assistant to third vice-president.



R. N. Begien.

C. B. Rodgers, formerly general manager of the St. Louis, Brownsville & Mexico at Kingsville, Tex., has been elected first vice-president of the Louisiana Railway & Navigation Company, with office at Shreveport, La., succeeding C. Ellerbe, assistant to the president and treasurer, resigned. H. B. Helm, secretary and general superintendent, has been elected second vice-president and treasurer; and J. J. Tippin, auditor, has been elected auditor and secretary, both with office at Shreveport.

C. R. Gray, president of the Spokane, Portland & Seattle and the Oregon Trunk, with headquarters at Portland, Ore., is to be made president of the Great Northern, succeeding L. W. Hill, as noted on page 1058. J. H. Young, vice-president of the Copper River & Northwestern, and president of the Alaska Steamship Company, with office at Seattle, Wash., succeeds Mr. Gray, with office at Portland. Robert W. Baxter, general superintendent of the Illinois Central lines north of the Ohio river, succeeds Mr. Young, with office at Seattle.

The Pennsylvania Railroad has discontinued the practice of designating the vice-presidents as first vice-president, second vice-president, etc., and has changed the titles to the following: Samuel Rea, vice-president; W. W. Atterbury, vice-president in charge of operation; George D. Dixon, vice-president in charge of traffic; Henry Tatnall, vice-president in charge of finance; W. Heyward Myers, vice-president in charge of real estate, purchases and insurance. These officers hold the same positions, in effect, as heretofore, with the exception of Mr. Dixon, who has been freight traffic manager and now succeeds to the duties of J. B. Thayer, who was lost on the Titanic. George Dallas Dixon was born in Philadelphia Pa., on March 28, 1857, and began railway work in the general freight department of the Pennsylvania Railroad, in the claim department, from which he was transferred to the rate department, holding different positions there until he finally became chief rate clerk. In December, 1894, he was appointed division freight agent at Baltimore, and in May, 1899, was made assistant general freight agent of the Pennsylvania Railroad, the Philadelphia, Wilmington & Baltimore, the Northern Central, and the West Jersey & Seashore companies, and on June 1, 1903, by a change in the organizations of the above companies, he was appointed freight traffic manager, which position he held at the time of his recent election as vice-president in charge of traffic.



G. D. Dixon.

Operating Officers.

Charles H. Holmes has been appointed assistant general manager of the Wheeling & Lake Erie, with headquarters at Cleveland, Ohio.

A. F. Church, superintendent of the New Orleans, Mobile & Chicago, with office at Laurel, Miss., has been appointed general superintendent with office at Laurel.

Horace McEwen, train despatcher of the Prince Edward Island Railway, with office at Charlottetown, P. E. I., has been appointed superintendent, succeeding G. A. Sharp, retired.

C. L. Brevoort, superintendent of terminals of the Cincinnati, Hamilton & Dayton at Cincinnati, Ohio, has had his jurisdiction extended over the Baltimore & Ohio Southwestern.

J. W. Callahan, assistant superintendent of the Indiana-Harbor Belt, with office at Gibson, Ind., has been appointed general manager of the Illinois Tunnel Company with office at Chicago.

D. Sallee, trainmaster of the Missouri, Oklahoma & Gulf at Allen, Okla., and until recently superintendent of the Texas line of the company at Denison, Tex., has been appointed superintendent, with office at Muskogee, Okla.

J. P. Kavanagh, assistant superintendent of the Indiana division of the Baltimore & Ohio Southwestern, at Cincinnati, Ohio,

has been appointed superintendent of the Baltimore terminals of the Baltimore & Ohio, with office at Baltimore, Md.

E. J. Wright, superintendent of the Hudson division of the New York Central & Hudson River, with office at New York, has been appointed general superintendent in charge of the Eastern district, with office at Albany, succeeding W. J. Fripp, promoted, and C. Christie succeeds Mr. Wright, with office at New York.

Henry B. Voorhees, whose appointment as general superintendent of the Baltimore & Ohio Southwestern and the Cincinnati, Hamilton & Dayton, with office at Cincinnati, Ohio, has been announced in these columns, was born January 22, 1876, at Saratoga Springs, N. Y., and in 1896 graduated as a civil engineer from Rensselaer Polytechnic Institute at Troy, N. Y. He began railway work with the Philadelphia & Reading in March, 1897, as assistant supervisor of the Shamokin division, and was subsequently promoted to supervisor, to assistant trainmaster and then to trainmaster. From December, 1901, until the time of his present appointment on May 1, 1912, he was with the Baltimore & Ohio, having been consecutively assistant engineer at Pittsburgh, division engineer and then assistant to the general superintendent of transportation at Baltimore, superintendent and general agent of the Philadelphia division at Philadelphia; from May, 1910, to July, 1911, assistant to the president, and from the latter date until May 1, 1912, general superintendent of transportation, with office at Baltimore.



H. B. Voorhees.

Edwin C. Blanchard, who has been appointed general manager of the Northern Pacific lines west of Paradise, Mont., with office at Tacoma, Wash., as has been announced in these columns, was born July 29, 1854, at Wapello, Iowa, and received his education in the common and high schools. In December, 1874, he began railway work with the Burlington, Cedar Rapids & Northern, now part of the Rock Island system, as a telegraph operator; and he went with the Kansas Pacific, now part of the Atchison, Topeka & Santa Fe, in 1876, remaining with that road, first as telegraph operator, and later as train despatcher, until 1883. He then went with the Northern Pacific, where he has been consecutively train despatcher, chief despatcher; division superintendent at Minneapolis for six years from 1897, and division superintendent at Duluth from 1903 to 1909. In the latter year he was appointed general superintendent, with office at St. Paul, Minn., from which position he was recently promoted to general manager of the lines west of Paradise.



E. C. Blanchard.

J. T. Olhausen, superintendent of the Baltimore & Ohio, with office at Baltimore, Md., has been transferred to Philadelphia, Pa., succeeding J. B. Carothers, resigned. O. H. Hobbs, superintendent at Cumberland, Md., succeeds Mr. Olhausen, and J. W. Kelly, Jr., assistant superintendent of the Cumberland division, with headquarters at Keyser, W. Va., has been promoted to superintendent at Cumberland. J. D. Brooke succeeds Mr. Kelly, with office at Keyser.

J. W. Meehan, superintendent of the Vicksburg division of the Yazoo & Mississippi Valley at Greenville, Miss., has been transferred to the New Orleans division, with office at Vicksburgh, Miss., succeeding J. W. Dodge, resigned. Patrick Laden succeeds Mr. Meehan. N. W. Spangler has been appointed assistant superintendent of the Memphis division, with office at Memphis, Tenn. J. R. Rison, Jr., trainmaster of the Memphis division at Tutwiler, Miss., has been appointed trainmaster of the New Orleans division, with office at Wilson, La., succeeding V. V. Boatner, transferred to the Vicksburg division, with headquarters at Greenville, Miss.

C. C. Riley, whose appointment as general superintendent of transportation of the Baltimore & Ohio and the Baltimore & Ohio Southwestern, with office at Baltimore, Md., has been announced in these columns, was born on October 1, 1864, at Cumberland, Ind. He attended Butler College and the Indiana College of Physicians and Surgeons, and he began railway work in the operating department of the Cleveland, Cincinnati, Chicago & St. Louis in 1888, remaining with that company until 1897, when he became superintendent of car service and afterwards superintendent of transportation of the Baltimore & Ohio Southwestern, at Cincinnati, Ohio. From 1901 to 1903 he was car service agent of the Chicago Great Western, and was then car service agent of the Erie. He was promoted to superintendent of transportation of the same company, and in 1908 was appointed superintendent of transportation of the Kansas City Southern, from which position he was promoted to general superintendent of that road. Mr. Riley was appointed assistant to general manager of the Baltimore & Ohio in December, 1911, which position he held at the time of his recent appointment as general superintendent of transportation, as above noted.



C. C. Riley.

Albert E. Clift, general superintendent of the Illinois Central lines south of the Ohio river, with office at New Orleans, has been appointed general superintendent of the lines north of the Ohio river with office at Chicago, succeeding Robert W. Baxter resigned to accept service with another company. John F. Porterfield, superintendent of the St. Louis division, with office at Carbondale, Ill., has been appointed general superintendent, with office at New Orleans, succeeding Mr. Clift. John J. Gaven, superintendent of the Tennessee division, with office at Fulton, Ky., succeeds Mr. Porterfield and John J. Pelley, roadmaster of the Tennessee division, with office at Fulton, succeeds Mr. Gaven. William C. Costigan, supervisor at Carbondale, Ill., has been appointed roadmaster, with office at Fulton, succeeding Mr. Pelley.

Traffic Officers.

P. A. Jordan has been appointed soliciting freight agent of the Houston & Texas Central at Dallas, Tex.

L. F. Boss has been appointed contracting freight agent of the Wabash Railroad, with office at Omaha, Neb.

T. J. Faulconer has been appointed soliciting agent of the Kanawha Despatch, with office at Indianapolis, Ind.

J. L. Moore has been appointed traveling immigration and industrial agent of the Northern Pacific, with office at Helena, Mont.

John McGraw has been appointed general agent of the Southern Pacific lines in Louisiana, with office at New Orleans, succeeding J. W. Hyams, deceased.

J. W. Jordan has been appointed traveling freight agent of the Chicago, Indianapolis & Louisville, with office at Indianapolis, Ind., succeeding J. Q. David, resigned.

A. H. Murphy has been appointed traveling passenger agent of the Chicago, Milwaukee & St. Paul, with office at Philadelphia, Pa., succeeding M. S. Bowman, transferred to Atlanta, Ga.

Willis Calloway, commercial agent of the Atlanta, Birmingham & Atlantic, at Jacksonville, Fla., has been appointed commercial agent of the Winston-Salem Southbound, with office at Jacksonville.

E. E. Hook, general agent of the Atchison, Topeka & Santa Fe at Leavenworth, Kan., has been appointed division freight agent, with office at Wichita, Kan., succeeding O. A. Brown, resigned to engage in other business.

G. F. Herr, general passenger agent of the Western Pacific, with office at San Francisco, Cal., resigned on May 1 to devote his time to private business at Los Angeles. No successor to Mr. Herr will be appointed for the present.

J. B. Nessle, general coal and ore agent of the New York Central lines west of Buffalo, N. Y., with office at Cleveland, Ohio, has had his office transferred to Pittsburgh, Pa., and M. D. Flanigan has been appointed general agent of the coal and ore department, with office at Cleveland.

G. O. Somers, for two years general freight agent of the Chicago Great Western, with office at Chicago, has resigned, to become manager of the Canada Bond Corporation, Toronto, Ont. Mr. Somers was formerly for three years general traffic manager of the United Fruit Company, and before that assistant to first vice-president of the Chicago, Burlington & Quincy.

Edwin P. Bates, general freight agent of the Pennsylvania Railroad, with office at Philadelphia, Pa., who has been appointed assistant freight traffic manager, was born in Allegheny county, Pa., on September 19, 1861, and was educated at Beaver College. He began railway work on March 7, 1882, as a clerk in the office of the assistant general freight agent of the Pennsylvania Company. After four years of work as a clerk, he was made chief clerk of the general freight agent of the Allegheny Valley Railroad, and in November, 1887, he was appointed special agent. From February, 1891, until July 31, 1900, he was general freight agent of the Allegheny Valley, and from August 1, 1900, to May 31, 1903, was division freight agent of the Buffalo & Allegheny Valley division, with headquarters at Pittsburgh, Pa. Mr. Bates was appointed general freight agent of the Pennsylvania Railroad on June 1, 1903, which position he held at the time of his recent promotion to assistant freight traffic manager.



E. P. Bates.

J. H. Pierson, soliciting freight agent of the Atlanta, Birmingham & Atlantic, at Birmingham, Ala., has been appointed commercial agent, with office at Birmingham, succeeding O. L. Newton, resigned to go into other business. O. Sanders succeeds Mr. Pierson, with office at Birmingham, and W. L. Wallace has been appointed assistant foreign freight agent, with office at Memphis, Tenn., succeeding J. D. Hardin, Jr., resigned.

Charles W. Tomlinson, commercial freight agent of the Baltimore & Ohio at Chicago, has been appointed general eastern freight agent, with office at New York City, succeeding E. M. Davis, who has been made division freight agent, with headquarters at Youngstown, Ohio. H. S. Garvey, commercial freight agent at Milwaukee, Wis., succeeds Mr. Tomlinson at Chicago; and D. E. Sullivan, export soliciting agent at Chicago, succeeds Mr. Garvey.

Robert Clinton Wright, general freight agent of the Pennsylvania Railroad, with office at Philadelphia, Pa., who has been appointed freight traffic manager, was born in Rio de Janeiro, Brazil, on December 5, 1869, and was educated in the public schools of Baltimore, Md., and at Baltimore City College. Mr. Wright began railway work in March, 1888, as a messenger and clerk at the Patterson's wharf station, of the Northern Central, at Baltimore. From December, 1889, to June 1, 1897, he served as clerk in the general agent's office at Baltimore and from June 1, 1897, to December 31, 1898, he was soliciting agent of the Star Union Line. From January to May, 1899, he was special agent of transportation of the Pennsylvania Railroad, and from May, 1899, to January, 1901, was division freight agent of the same road, at Altoona, Pa. In January, 1901, Mr. Wright became division freight agent at Harrisburg, Pa. On June 1, 1903, he was appointed assistant general freight agent at Philadelphia, and since March 1, 1906, was general freight agent in charge of local freight, and now becomes freight traffic manager.



R. C. Wright.

George Dickie Ogden, assistant general freight agent of the Pennsylvania Railroad, with office at Philadelphia, Pa., has been promoted to general freight agent. Mr. Ogden was born at Homer City, Indiana county, Pa., May 16, 1868. He received his education at the Indiana Normal School and at Washington and Jefferson College, and entered the service of the Pennsylvania Railroad as freight and ticket agent, at Homer, Pa., in June 1887. He was transferred to Allegheny City yard as night yard clerk, in October, 1890, and was made transportation clerk in the superintendent's office, of the West Penn division, in November, of the same year. He was transferred to Butler, West Penn division, as freight and ticket agent, in May, 1891, to McKeesport as freight agent and yardmaster, in February, 1895, and to Harrisburg as freight agent, in January, 1898. Mr. Ogden was promoted to division freight agent, at Altoona, Pa., on January 14, 1901. He was transferred to the B. & A. V. division, Pittsburgh, in the same capacity on June 1, 1903, and since March 1, 1906, he was assistant general freight agent at Philadelphia, and now becomes general freight agent.



G. D. Ogden.

E. M. Jones, traveling freight agent of the Southern Railway at St. Louis, Mo., has been appointed commercial agent, with office at Peoria, Ill. C. S. Bourque, traveling freight agent at

Cairo, Ill., has been appointed commercial agent, with office at Cairo. J. R. L. Wulff, traveling freight agent at Kansas City, Mo., has been appointed commercial agent, with office at Omaha, Neb., in charge of Nebraska and the western half of the state of Iowa, and D. B. Hevron has been appointed freight soliciting agent, with office at Evansville, Ind.

R. C. Wright, general freight agent of the Pennsylvania Railroad, with office at Philadelphia, Pa., has been appointed freight traffic manager. E. P. Bates, general freight agent, with office at Philadelphia, has been appointed assistant freight traffic manager. George D. Ogden, assistant general freight agent, with office at Philadelphia, has been appointed general freight agent, and Walter Thayer, assistant general freight agent, with office at Philadelphia, has been appointed general freight agent. Charles E. Kingston, division freight agent, with office at Wilmington, Del., has been appointed assistant general freight agent. J. L. Eysmans, division freight agent, with office at Pittsburgh, has been appointed assistant general freight agent. John M. Gross, division freight agent, with office at Baltimore, Md., succeeds Mr. Eysmans. J. B. Large, freight solicitor, with office at Reading, has been appointed division freight agent, with office at Erie. F. P. Truesdale, special agent at Uniontown, has been appointed division freight agent, with office at Uniontown.

Walter Thayer, assistant general freight agent of the Pennsylvania Railroad, with office at Philadelphia, Pa., who has been promoted to general freight agent, was born April 27, 1874. He received his early education at the Haverford, Pa., schools, and was graduated from the University of Pennsylvania in the class of 1897. Mr. Thayer entered the service of the Pennsylvania Railroad in the fall of 1895, as a receiving clerk in the Thirtieth and Market streets freight station, Philadelphia. In 1896 he was transferred to Dock street station as a clerk in the claim department, and in 1897 he was again transferred to the rate room at the Broad street station. He was then promoted to freight solicitor of the United Railroads of New Jersey. In the fall of 1901 he was made special agent in the freight department of the Buffalo & Allegheny Valley division, with headquarters at Pittsburgh. In 1903 he was appointed eastern manager and general freight agent of the Erie & Western Transportation Company—Anchor Line—with headquarters at Philadelphia. On June 1, 1910, he was appointed assistant general freight agent of the Pennsylvania Railroad, and now becomes general freight agent of the same company.



W. Thayer.

Engineering and Rolling Stock Officers.

W. I. Rowland, master mechanic of the Baltimore & Ohio at Grafton, W. Va., has been appointed assistant road foreman of engines of the Baltimore division, in charge of the engines of the Baltimore and Washington terminals, with headquarters at Baltimore, Md.

E. A. Gilbert, formerly western representative of W. H. Miner at Chicago, has been appointed general inspector of the motive power department of the Southern Pacific at San Francisco, Cal. He will have charge of all matters pertaining to rolling stock and shop practice.

Thomas McPherson, trackmaster of the Intercolonial at Newcastle, N. B., has been appointed general roadmaster of the Intercolonial and the Prince Edward Island, with headquarters at Moncton. A. P. Giles, trackmaster at Pictou, N. S., succeeds Mr. McPherson, and J. C. Fulmore succeeds Mr. Giles.

John Hair, formerly superintendent of motive power of the Baltimore & Ohio Southwestern, at Cincinnati, Ohio, has been appointed safety inspector, and a member of the General Safety Committee, representing the mechanical department of the Baltimore & Ohio, with headquarters at Baltimore, Md., succeeding W. L. Robinson, promoted.

E. A. Probst has been appointed division engineer in charge of construction of the line of the Southern New England Railroad Corporation, from Palmer, Mass., to Blackstone, with office at Southbridge, Mass., and T. I. Ellis has been appointed division engineer of the Southern New England Railway, in charge of construction of the line from Providence, R. I., to Woonsocket, with office at Providence. These are subsidiary companies of the Grand Trunk.

A. P. Prendergast, superintendent of motive power of the Baltimore & Ohio Southwestern at Cincinnati, Ohio, has had his jurisdiction extended over the Cincinnati, Hamilton & Dayton; and H. H. Hale, who has been superintendent of motive power and car department of the Cincinnati, Hamilton & Dayton at Cincinnati, has been appointed superintendent of the car department of both roads.

John C. Holden, who has been appointed division engineer of the Canadian Pacific, with office at Winnipeg, Man., was born February 18, 1876, at St. John, N. B. He was educated at the Royal Military College at Kingston, Ont., and in 1892 began work with the Intercolonial Railway, remaining with that road for four years. Since 1898 he has been with the Canadian Pacific. He was on preliminary location, construction and reconnoissance work until 1903, and was then for four years resident engineer on maintenance work. From 1907 until April 1, 1912, the time of his recent promotion, he was assistant engineer on maintenance on the Manitoba division.

F. F. Busteed, who has been appointed engineer in charge of grade revision and double tracking from Calgary west of the Canadian Pacific, with office at Kamloops, B. C., as has been announced in these columns, was born October 10, 1858, at Battery Point, Bonaventure, Que. He was educated at a Montreal high school and McGill University, and in March, 1881, began railway work with the Canadian Pacific. He was with the engineering department of that road until 1903, having been consecutively transitman, assistant engineer on construction, rodman, assistant engineer, resident engineer, engineer maintenance of way and structures, and division engineer. He was made superintendent in 1903, and for three years from 1904 he was assistant chief engineer of the Western lines. From 1907 until the time of his present appointment he was general superintendent, first of the British Columbia and then of the Manitoba division.

OBITUARY.

Hon. James P. Mabee, chief railway commissioner of Canada, died at Toronto on Monday of this week from heart failure, following an operation for appendicitis. Mr. Mabee was born at Port Rowan, Ont., in 1859, and was admitted a barrister in 1882, practicing at Listowel and Stratford. In 1901 he was appointed a King's Counsel, and continued practice in Toronto. He was appointed a justice of the High Court of Ontario in 1905, and in 1908 succeeded A. C. Killam, K. C., as chairman of the railway commission.

Work has been started on a 35-mile connecting line of the Midland railway, Uruguay, from Tresarboles to Piedra Sola, in the department of Tacuarembo. This line, although comparatively short, will be of great importance, particularly to the cities of Fray Bentos and Paysandu, as it will afford each an almost straight through line to the border city of Rivera, the northernmost point of the department of Rivera. Paysandu, with more than 20,000 inhabitants, is one of the greatest live stock centers in Uruguay, and Fray Bentos, the capital of the department of Rio Negro, has about 8,000 inhabitants. When the new connecting line has been completed a large section of Uruguay will be reached more easily and cheaply from Fray Bentos and Paysandu than from any other distributing points in the country.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Carolina & Northwestern has ordered 2 consolidation locomotives from the Baldwin Locomotive Works.

The St. Louis Southwestern has ordered 18 consolidation locomotive and 4 mogul locomotives from the Baldwin Locomotive Works.

The Missouri, Oklahoma & Gulf has ordered 5 Mallet locomotives and 4 consolidation locomotive from the Baldwin Locomotive Works.

The Hayden Machinery & Supply Company, New York, has ordered 2 four-wheel switching locomotives from the Baldwin Locomotive Works.

The Detroit & Mackinac has ordered 3 ten-wheel locomotives from the American Locomotive Company. The dimensions of the cylinders will be 21 in. x 28 in.; the diameter of the driving wheels will be 63 in., and the total weight in working order will be 185,000 lbs.

The Bingham & Garfield has ordered 1 Mallet locomotive (0-8-8-0) from the American Locomotive Company. The dimensions of the cylinders will be 26 in. and 41 in. x 28 in.; the diameter of the driving wheels will be 51 in., and the total weight in working order will be 461,000 lbs.

CAR BUILDING.

The Temiskaming & Northern is in the market for 4 steel underframe caboose cars.

The Buffalo Creek & Gauley has ordered 300 hopper cars from the Pressed Steel Car Company.

The American Refrigerator Transit Company has ordered 500 refrigerator cars from the American Car & Foundry Company.

The Barrett Manufacturing Company, New York, has ordered 100 tank cars from the American Car & Foundry Company.

The Chicago, Milwaukee & St. Paul has ordered 15 standard sleeping cars, 10 tourist sleeping cars, 2 cafe-observation cars, and one barber shop-smoking-observation car from the Barney & Smith Car Company; also 20 coaches and 10 baggage cars, 72 ft. 6 in. long, from the American Car & Foundry Company.

The Louisville & Nashville is building 400 gondola cars, 100 flat cars, 100 stock cars, 500 box cars and 100 refrigerator cars at the company's shops. This company has ordered 500 steel underframes from the Pressed Steel Car Company, 500 steel underframes from the Mt. Vernon Car & Manufacturing Company and 200 steel underframes from the Bettendorf Axle Company.

SIGNALING.

New Installations of Block Signals, Interlocking, Telephones for Train Despatching, Etc.

The General Electric Company has received from the Pennsylvania Railroad an order for eighty-two 6-kw. transformers, thirty-seven 1-kw. transformers, and seven sectionalizing outfits, to be used at Wilmington, Del., and Lafayette, Pa.

The Indiana state railway commission has ordered the Cleveland, Cincinnati, Chicago & St. Louis to instal automatic block signals between Delmar and Coal Bluff, 26.4 miles, and has ordered the Baltimore & Ohio Southwestern to equip with automatic signals short sections of the road at and near the principal yards, namely, Vincennes, Washington, Seymour, North Vernon, Cochran and Mitchell; and at the tunnels at Willow Valley and Tunnelton. The commission has approved the manual block system as now in use on parts of the Wabash, and also on parts of the Cleveland, Cincinnati, Chicago & St. Louis. On certain minor lines the commission has decided not to require the use of the block system.

Supply Trade News.

The Union Draft Gear Company, Chicago, has moved its main offices to 1162 McCormick building.

The Automatic Ventilator Company, New York, has moved its main offices from 120 Liberty street to 2 Rector street.

The Adams & Westlake Company, Chicago, has moved its Philadelphia office to 2218 Ontario street.

The Remy Electric Company, Anderson, Ind., recently received an order from the Rock Island Lines for 40 electric headlights.

The Ashton Valve Company, Boston, Mass., has moved its Chicago office from 166 West Lake street to 174 North Market street.

The Chicago-Cleveland Car Roofing Company has moved its New York office to room 368, 50 Church street. Arthur S. Lewis has been added to the staff as eastern representative.

The Roberts & Schaefer Company, Chicago, will on May 11 move its general offices from the Old Colony building to the McCormick building, Van Buren street and Michigan boulevard.

H. McL. Harding, New York, consulting engineer for the design of terminal installation and freight handling machinery, has moved his offices from 20 Broad street to the Whitehall building, 17 Battery place, New York.

The general offices of the Gulick-Henderson Company, Pittsburgh, Pa., inspecting engineers, have been moved to 525-529 Third avenue, Pittsburgh. This company recently opened an office at 444 Market street, San Francisco, Cal.

The reorganization committee of the Allis-Chalmers Company, Milwaukee, Wis., has received a majority of the assents and deposits and will carry out its plan mentioned in the *Railway Age Gazette* of March 22. The time to deposit bonds and stocks with the Central Trust Company, New York, has been extended to and including June 1.

Clayton D. Walworth, formerly with the U. S. Wind Engine & Pump Company, Batavia, Ill., and Fairbanks, Morse & Company, Chicago, has been made manager of the Chicago office of the Q. & C. Company, New York. Henry A. Hawes, formerly in the sales department of the Railway Steel-Spring Company New York, has gone to the Q. & C. Company, with office in New York.

The Zug Iron & Steel Company, Pittsburgh, Pa., has opened an office at Detroit, Mich., to handle its business in that district, including Cincinnati, Ohio, Cleveland, Toledo and Buffalo, N. Y. This office will be in charge of Edward A. Hawks as district sales manager. Mr. Hawks will retain his position as representative of the Beaver Dam Malleable Iron Company, Beaver Dam, Wis., in the territory from Chicago east to the coast.

James Rawle, president of the J. G. Brill Car Company, Philadelphia, Pa., died at his home at Bryn Mawr May 1 at the age of 70. Mr. Rawle graduated from the University of Pennsylvania in 1861 as a civil engineer. In 1872 he became a partner with John G. Brill and George M. Brill in the manufacture of street railway cars. In 1887, when the firm was incorporated as the J. G. Brill Company, Mr. Rawle took charge of the finances.

The court of appeals of the District of Columbia on April 22 rendered a decision in the suit of Peter H. Murphy against the Baltimore & Ohio for infringement of the Murphy outside metal car roof patents in roofs furnished by the Chicago-Cleveland Car Roofing Company, reversing the decision of the Supreme Court of the District of Columbia rendered on November 27, 1911, which held that the patents had been infringed. (See *Railway Age Gazette*, December 15, 1911, page 1256).

The National Fireproofing Company, Chicago, is conducting a series of tests on tile, brick and concrete slabs and walls, under the supervision of R. W. Hunt & Company, testing engineers. Readings will be taken to determine the bending moments in the different constructions up to the failing point and careful compilations of all data secured will be preserved. An invitation has

been extended to all architects, engineers and builders to witness the tests at the company's testing station at Twenty-sixth street and Shields avenue, Chicago. Two tests are being held each day on May 6, 7, 8, 14, 15 and 16.

The Railway Storage Battery Car Company, 30 Broad street, New York, has been organized by F. J. Lisman & Company, New York, and associates, to sell Edison-Beach cars made by the Federal Storage Battery Car Company, Silver Lake, N. J. The company will have $4,000,000 capital, of which $3,000,000 will be common stock and $1,000,000 preferred stock. T. D. Rhodes, vice-president of the New York, Westchester & Boston, and receiver of the Detroit, Toledo & Ironton, will be president of the new company, William Goodman, of F. J. Lisman & Company, will be vice-president, and Ernest Rosenbaum will be secretary.

TRADE PUBLICATIONS.

White Pass & Yukon Route.—The traffic department of this company has published an illustrated folder on Alaska and the Yukon, in which the many attractions of the region are described.

Heater Cars.—The Alcohol Heating & Lighting Company, Chicago, has issued an illustrated booklet, describing its combined alcohol heater and refrigerator cars for the handling of perishable freight.

Unions.—The National Tube Company, Pittsburgh, Pa., has devoted bulletin No. 9 to the results of tests of Kewanee unions. The bulletin also describes the construction of these unions and points out their advantages.

Chicago, Burlington & Quincy.—The passenger department of this company has published an attractive folder on the Yellowstone National Park, giving information which will be found very useful to those thinking of visiting the park.

Chicago & North Western.—The passenger department has issued an attractive folder entitled Short Jumps for Busy People, describing summer resorts in Illinois and Wisconsin; also a booklet on the lakes and resorts of the Northwest.

Pumps.—The Ingersoll-Rand Company, New York, has published form No. 7004 on Cameron steam pumps. This bulletin is illustrated and describes in detail the construction and operation of these pumps. Prices and dimension tables are also included.

Southern Pacific.—The passenger department of this company, in accordance with its co-operative community plan, has published an unusually attractive booklet on Grant's Pass and Josephine County, Oregon. This booklet is exceptionally well illustrated and includes valuable information on the climate, the soil, the facilities, the agricultural products and the mining resources of the Rogue River valley. The booklet also gives a brief account of the irrigation development and discusses the prices of land and of the cost of living.

Quelimane is the outlet for the richest and most productive section of Portuguese East Africa. The Zambezia Company, holding a large land grant from the Portuguese government, owns an 18-mile railway starting from the port of Quelimane. Besides this private enterprise the provincial government has called for tenders for 15 miles of the Nhamacurra railway, which is to connect Nhamacurra with Villa Durão, 50 miles. This railway will tap a most fertile region.

The Australian government proposes to employ 1,500 men on the construction of the Trans-Australian line, and will give preference to union men. The experience of the officials with non-unionists has led them to believe that they are not only idlers, but spend a large part of their time trying to convert union men to their methods and thought. For this reason the government will not change its policy of giving preference to unionists on the government works, especially in railway construction. Tenders have already been called for the supply of 135,000 tons of 80-lb. rails and 2,000,000 ties for the Trans-Australian railway. The rails will be imported, but Australian wood ties will be used instead of concrete, which was originally intended.

Railway Construction.

New Incorporations, Surveys, Etc.

Alberta Central.—Announcement is made that this company intends to complete the line from Red Deer, Alta., to Rocky Mountain House during 1912. A meeting is to be held at Montreal, Que., on June 4, to consider whether the line should be leased to the Canadian Pacific, and to decide upon means of raising funds for building branches and for the equipment of the lines. D. F. McArthur is the contractor, and J. G. McGregor, chief engineer.

Anderson & Saline River.—This company, which operates a line from Clio, Ark., to Millerville, will build a branch, it is said, from Stoudemeyer north to a point at or near Junet. J. S. Bell, chief engineer, Pine Bluff.

Arkansas Roads.—According to press reports, plans are being made to build a north and south line through Harrison, Ark., on which work is to be started soon. L. S. Powers, Hawesville, Ky., is said to be back of the project.

Arkansas Valley Interurban.—Rights of way are being secured, it is said, for an extension north from Newton, Kan., to Goessel, 44 miles. Charles D. Bell, chief engineer and superintendent, Wichita.

Atchison, Topeka & Santa Fe.—According to press reports, this company proposes to pierce a tunnel and improve its line at Cajon Pass, Cal. The grade is to be reduced from 3 per cent. to 2.24 per cent. It is estimated that the work will cost $1,000,000. Some double-tracking work is also to be carried out. C. F. W. Felt, chief engineer, Topeka, Kan.

Atlantic & Western.—Work is to be started at once on an extension. The line is now in operation from Sanford, N. C., to Broadway, 10 miles. The company's charter permits it to build from Goldsboro, N. C., west to the Tennessee river, 300 miles. F. G. Hatton, vice-president, Roanoke, Va.

Aurora, Mendota & Western.—Incorporated in Illinois, with office at Plano, Ill., to build from Yorkville, in Kendall county, Ill., west to Mendota, Lasalle county, about 40 miles. The incorporators include G. H. Simpson, Wheaton; C. S. Williams, Yorkville, and C. A. Darnell, Plano.

Bartlett Western.—This company, which operates a line from Bartlett, Tex., west to Jarrell, 12 miles, and which recently completed an extension west to Florence, will built an extension from Bartlett east to Cameron, about 30 miles, this work is to be financed by the Bankers Trust Company, Houston. An extension is also projected from Florence to a point west. C. J. Grainger, first vice-president and general manager, Bartlett. (November 3, p. 930.)

Boston & Albany.—An officer writes that the company plans to carry out improvements, which depend, however, upon the possible sale of bonds. The work will include laying third-track between Parks Corner, Mass., South Framingham and Ashland. There will be a considerable amount of remodeling at the local freight yard at Worcester, including extensions to a number of sidings to accommodate 50-car trains, this work is to be carried out by the company's forces. The company has not planned to build any new passenger stations this year, but has under consideration the question of extending and enlarging one or two freight stations, including the station at Pittsfield, where a second-story will probably be constructed to accommodate the clerical force, and the space now occupied by the offices on the first floor will be used for freight. The plans call for building a general storehouse at West Springfield, but it has not yet been decided whether this will be built or not. There are a large number of railway and highway bridges to be rebuilt and repaired. This work is a continuance of the company's bridge reconstruction program, under which 64 bridges were replaced within the past 18 months. The greater part of the work will be carried out by the company's forces. F. B. Freeman, chief engineer, Boston.

Campbellford, Lake Ontario & Western.—The location plans of this company have been approved by the Railway Commissioners of Canada, from mile 15 to mile 58½, and construction

work is now under way. W. H. McGann, engineer, with headquarters at Belleville, Ont.

Canadian Northern.—Interests identified with this company are quoted as saying that plans are being made to build an electric line to connect Toronto, Ont., and Guelph, also a line from Toronto to Bowmanville. These two lines are to form part of a system of steam and electric lines to be built by various companies in western Ontario, and connecting with the Canadian Northern lines east and west.

Canadian Northern Pacific.—This company has been granted permission to build a parallel line through the Canadian Pacific right of way on the south side of the South Thompson river between Black canyon and Oregon Jack creek, B. C., four miles. The company will not build a line on the north bank of the river. T. H. White, chief engineer, Vancouver.

Chicago, Milwaukee & St. Paul.—Morris, Shepard, Dougherty, St. Paul, Minn., who have the general contract for 74 miles of second-track work on the Hastings & Dakota division, will sublet about three-fifths of the work. C. F. Loweth, chief engineer, Chicago. (April 26, p. 982.)

Crosbyton-South Plains.—It is understood that this company is planning to build an extension to connect with the Stamford & Northwestern at Spur, Tex., about 28 miles. A line is also projected through Guthrie, Okla., and Benjamin, Tex., to Seymour, where a connection is to be made with the Gulf, Texas & Western, and the Wichita Valley lines. A branch to Matador is also contemplated. J. M. Bassett, vice-president and general manager, Crosbyton, Tex.

Dunlap Northern & Pacific.—Incorporated in Oklahoma, to build from Dunlap, Harper county, Okla., north to a connection with the Union Pacific at Ellis, Kan. The incorporators include H. D. Knight, G. A. Elbow, W. P. Rodman and C. Nowalin, all of Oklahoma City.

Edmonton, Dunvegan & British Columbia.—This company will push construction work at once, and hopes to have the line in operation to the crossing of the Athabasca river, B. C., 100 miles, this year, and to Dunvegan within three years. J. D. McArthur, president, Winnipeg, Man.

Great Northern.—An officer writes regarding the reports that surveys are being made for an extension through McKenzie, Dunn, Oliver and Mercer counties, N. D., that the plans are not far enough advanced to give particulars. A. H. Hogeland, chief engineer, St. Paul.

The line from Princeton, B. C., to Coalmont, 11 miles, has been opened for business.

Ha Ha Bay.—The Canadian parliament has voted a subsidy at the rate of from $3,200 to $6,400 a mile to this company for building new lines as follows: From St. Mathias bay, Que., to Ha Ha bay, about 20 miles; LaBrosse Junction to the Saguenay river, five miles; Laterrierre Junction north to Lake Kenogami, 12 miles; and from Bagotville to St. Alexis, three miles. The Quebec legislature has voted a subsidy of 4,000 acres of land a mile for the completion of the line to Ha Ha bay, for 9½ miles, and 2,000 acres a mile for branches to Chicoutimi, four miles, and to Lake Kenogami through La Terrierre, two miles. J. F. Grenon, chief engineer, Chicoutimi.

Jacksonville, McRae & Dublin.—An officer writes that it has not yet been decided when bids will be asked for building from Jacksonville, Ga., north via McRae to Dublin, 65 miles. The work will include putting up three trestles. The line is expected to find a traffic in cotton, fertilizer, merchandise, naval stores and lumber. M. L. McRae, president, McRae. (March 29, p. 780.)

Kansas City & Memphis.—This company, it is said, is now at work on an extension from Clear Creek, Ark., east. M. Hays, chief engineer, Rogers.

Lake Erie & Youngstown (Electric).—This company has asked the Ohio Public Service Commission for permission to issue $10,500,000 of stock and bonds, to be used for paying for the right of way, 80 per cent. of which has been secured for constructing 70 miles of double-track, and to buy land as follows: Fifty-seven acres of lake front on Lake Erie; 200 acres at Burghill; 256 acres north of the Vienna, Ohio, coal deposits, and 67 acres near Youngstown for terminal facilities. If the commission grants the permission, the company expects to have the road ready for operation by May, 1914. J. H. Ruhlman, president, Youngstown.

Lake Superior & South Dakota.—This company has been incorporated in Minnesota with $100,000 capital, to build from Duluth, Minn., west to the western boundary of Big Stone county, about 225 miles. It is said that this is a project of the Chicago, Milwaukee & St. Paul. J. M. Smith, president; W. R. Gillis, vice-president, Superior, Wis.; W. Getly, treasurer, and Frank Crassweller, secretary, Duluth, Minn.

Live Oak, Perry & Gulf.—An officer is quoted as saying that this line is to be reconstructed from Live Oak, Fla., to Perry. The roadbed is to be regraded and heavy grades eliminated, and the curvature reduced. 60-lb. rail is to be laid to replace the present 40-lb. sections. R. P. Hopkins, secretary and general manager, Dowling Park.

Louisville & Nashville.—According to press reports, this company will spend $12,000,000 for improvements in Tennessee and Alabama, of this amount $5,528,000 is to be spent in Alabama. The work will be carried out if the company decides to sell at this time securities to obtain funds. The improvements include double-tracking work, new bridges, yards, etc. The yards at Montgomery, Ala., are to be enlarged to about three times their present size. W. H. Courtenay, chief engineer, Louisville, Ky. (April 26, p. 982.)

Manitoba & Nelson.—Incorporated in Manitoba, to build from Kildonan, near Winnipeg, Man., north to Sturgeon bay, thence to Grand Rapids and north and easterly to Hudson bay, also to build branch lines. The provincial directors include C. W. N. Kennedy, C. Volkes, Winnipeg; A. C. Clare, Parkdale, and B. S. Benson, Selkirk.

Midland Continental.—An officer writes that the plans call for a line from Edgeley, N. D., north via Franklin, Nortonville and Millerton, to Jamestown, thence northeast to Pembina, about 230 miles: Grading has been finished to Jamestown, and other grading contracts are to be let. Track has been laid on 10 miles. There will be a number of trestles on the line. The company expects to develop a traffic in grain, lumber, etc. F. K. Bull, president, Racine, Wis.; H. Pravitz, general superintendent, and H. H. Hurning, chief engineer, Edgeley, N. D.

Minneapolis, St. Paul & Sault Ste. Marie.—An officer writes that work is now under way by Foley, Welch & Stewart, St. Paul, Minn., building an extension from Fordville, N. D., west via Devils Lake, N. D., to Drake, 130 miles. H. Pederson, assistant engineer, Minneapolis, Minn.

National Railways of Mexico.—An officer writes that a contract has been given to Gonzalez Trevino Hermanos, Monterey, Mexico, to build from Allende, Mexico, kilometer 51 on the Monlcova division, north. The maximum grades will be 0.07 per cent., and maximum curvature 3 deg. There will be two steel bridges of 300 ft. each, and a number of trestles and tunnels. This line will be through an agricultural section, which has been irrigated. A contract has also been given to the Sombrerete Construction Company, F. W. Johnston, president, Mexico City, for building 71 miles between Canitas and kilometer 154½ of the Durango-Canitas line, and a six-mile branch from kilometer 154½ to Sombrerete. The maximum grades eastbound will be 1 per cent., westbound 1.2 per cent., and maximum curvature 6 deg. There will be four steel bridges varying in length from 50 ft. to 160 ft., also some trestles and tunnels. This line is being built through a mining section, and this territory has good agricultural and cattle farms. G. P. DeWolf, chief engineer of construction, Mexico City.

New Iberia & Northern.—This road has been extended from New Iberia, La., south to Charenton, 21 miles. R. J. Lockwood, chief engineer, New Iberia.

Ocilla Southern.—This road has been extended from Alapha, Ga., south to Nashville, 13 miles. J. A. J. Henderson, president and general manager, Ocilla.

Pacific Great Eastern.—Engineers are now at work locating a line out of North Vancouver, B. C., and from Ft. George south. Construction work will be started at an early date and will be pushed to completion. The company is negotiating with

the Burrard Inlet Tunnel & Bridge Company for the use of the bridge to be built over the second narrow of Burrard Inlet, and with the Vancouver, Westminster & Yukon for trackage rights. The Howe Sound & Vancouver, already built from Vancouver north towards Pemberton Meadows, may be taken over by the company. J. W. Stewart, president; P. Welch, vice-president and general manager, and J. Callaghan, chief engineer, Fitzhugh, Alta. The company has an office at Vancouver.

PINE BLUFF, SHERIDAN & SOUTHERN.—An officer writes that contracts are to be let at once to build from Sheridan, Ark., south via Millersville and Mornings Ferry to Mannville. J. F. McIntyre, president, Pine Bluff.

RALEIGH, CHARLOTTE & SOUTHERN.—An officer writes that contracts are let to build from Varina, N. C., west to Colon, about 25 miles. Lane Brothers & Company, Altavista, Va., are the principal contractors. F. L. Nicholson, chief engineer, Norfolk, Va.

ST. LOUIS & SAN FRANCISCO.—According to press reports, double-tracking work is to be carried out on various sections between Memphis, Tenn., and St. Louis, Mo., and between Birmingham, Ala., and Kansas City, Mo. F. G. Jonah, chief engineer construction, St. Louis.

TEXAS ROADS.—A company has been incorporated in Texas with $200,000 capital, and headquarters at San Antonio, to build a terminal belt line, about 15 miles long, to connect with the yards and stations of the railways entering San Antonio. The incorporators include F. Trumbull and C. E. Schaff, of the Missouri, Kansas & Texas; A. S. Coke, St. Louis; and E. Chamberlin, L. J. Hart, G. C. Vaughan and W. Walthall, both of San Antonio.

UINTAH.—This company, which operates a narrow gage line from Mack, Colo., northwest to Watson, Utah, 63 miles, it is said will make improvements, including grade reduction work, piercing five tunnels, the longest of which is to be about 3,000 ft., and changing the existing line to broad gage. M. W. Cooley, general manager, Mack.

WINNIPEG, SALINA & GULF.—Negotiations are now under way for the sale of $13,000,000 of bonds in Paris, and it is expected that as soon as these are completed construction work will be started. The company was organized to build a north and south line from Winnipeg, Man., to the Gulf of Mexico, with a cross line from Kansas City, Mo., to Des Moines, N. Mex. Surveys have been finished on 200 miles. The Brindley Company, New York, has the general contract. H. Leon Miller, president; O. T. Johnson, vice-president; C. C. Whitehead, secretary; and H. E. Wylie, special engineer, Salina, Kan.

RAILWAY STRUCTURES.

BEDFORD, N. Y.—The New York Public Service Commisison, Second district, has ordered the elimination of the grade crossing on the Harlem division of the New York Central & Hudson River at Babbitt's crossing in Bedford, Westchester county. The highway is to be carried under the existing tracks at a point 15 ft. north of the present crossing by means of a subway.

DETROIT, MICH.—The Michigan Central has let the general contract to the George A. Fuller Company for the construction of its new passenger terminal. An order for 10,000 tons of steel, to be used in the station structure and train sheds has been given to Jones & Laughlin.

FREDERICTON, N. B.—The Fredericton & Grand Lake Coal & Railway Co. has given orders to the Dominion Bridge Co., Montreal, Que., for steel work for bridges to be erected, as follows: Over Little river, two 80-ft. half deck girder spans; over Burpee mill stream, one 80-ft. half deck girder span; over Noonan creek, one 40-ft. half deck girder span, and over the Nashwaak river, four 80-ft. half deck girder spans. D. F. Maxwell, Fredericton, N. B., is chief engineer.

HARTVILLE, WYO.—The Colorado & Southern is planning the construction of a roundhouse and shops.

INDIANAPOLIS, IND.—The Pennsylvania Lines are reported to have authorized an expenditure of approximately $200,000 for the construction of a roundhouse and the alteration of yard facilities.

LAUREL, MISS.—The New Orleans, Mobile & Chicago has let a contract for the construction of a new freight and passenger station to W. M. Carter of Laurel.

LOUISVILLE, KY.—The Kentucky & Indiana Terminal is spending about $2,025,000 on a new heavy double-track bridge over the Ohio river, between Louisville, Ky., and New Albany, Ind., with highways on each side for team traffic. On the Kentucky side work is in progress on a new concrete coal elevator of 500 tons capacity and a hump classification yard of 1,200 cars capacity.

MANHEIM, ILL.—The Chicago, Milwaukee & St. Paul has begun the construction of an outbound yard between Manheim and Bensonville, about 15 miles from Chicago, which will be a duplicate of the inbound yard built at this point last year. The work will be done by company forces and will also include the building of a 30-stall engine house, 90-ft. turntable and a mechanical coaling station.

NORFOLK, VA.—An officer of the Norfolk & Western writes that a contract has been given to Henry Steers, Inc., New York, for dredging about 400,000 cu. yds. of material for the new coal pier to be built at Lambert's Point. The company has three other piers at that place. The material dredged is to be used in making land that will be used for extending the yards, approaches to piers, etc. The same contractor has the contract for building a bulkhead, a protecting break-water, and for the substructure of the steel coal pier, which is to be 1,200 ft. long, beyond the bulkhead line, 90 ft. above high water and 60 ft. wide. The Virginia Bridge & Iron Company, Roanoke, Va., has the contract for erecting the substructure of the pier. (May 3, p. 1028.)

PERRY, IOWA.—The Chicago, Milwaukee & St. Paul is planning to build a new passenger station at this point, and is seeking a site for a new roundhouse and machine shop.

PORT ARTHUR, ONT.—The Canadian Northern has completed plans for the construction of a new steel dock at Port Arthur, to cost $30,000. The construction contract has been given to Barnett & McQueen Company; this firm will also construct new grain elevators for the railway company at Port Arthur. The betterments to be done on the company's line between Port Arthur and Winnipeg include the completion of revision work at Rainy Lake, laying out a new freight terminal at St. Boniface, near Winnipeg, with a capacity of 700 cars and 100 miles of track, and the construction of a new bridge for freight traffic into Winnipeg.

PRINCE RUPERT, B. C.—Preliminary contracts have been let by the Grand Trunk Pacific for the construction of a large dry dock and ship building plant, including piers, landing stage, building platform and launching ways, to the British-American Construction Company.

PITTSFIELD, MASS.—See Boston & Albany under Railway Construction.

PORTLAND, ORE.—Extensive terminal improvements, to cost about $3,000,000, are contemplated by the Hill lines on the property recently secured on the east side of Portland.

SPOKANE, WASH.—The Great Northern has let contracts to Guthrie & McDougall for work amounting to about $35,000, including additions to station facilities and trackage and the removal of five steel bridges.

TACOMA, WASH.—The Chicago, Milwaukee & Puget Sound will begin work this summer on a new passenger terminal at an estimated expenditure of $1,000,000.

TORONTO, ONT.—Plans for the grade separation of the Canadian Pacific and the Canadian Northern tracks in North Toronto have been agreed upon and approved by the Board of Railway Commissioners. The plans call for improvements from Summerhill avenue to Dufferin street. Work on the subways at Yonge street and at Avenue road must be started by July and finished by December of this year.

WEST SPRINGFIELD, MASS.—See Boston & Albany under Railway Construction.

Railway Financial News.

Atlanta, Birmingham & Atlantic.—The holders of about 98 per cent. of the $6,216,800 joint notes of the Atlantic & Birmingham Construction Company and the Atlanta, Birmingham & Atlantic, due May 1, 1912, have agreed to extend these notes until May 1, 1915. (See *Railway Age Gazette*, April 12.)

Atlantic & Western.—Middendorf, Williams & Company, Baltimore, Md., have bought all the outstanding stock and bonds, $52,400 and $100,000 respectively, of this company. It is said that the road will be operated by the purchasers. The road extends from Sanford, N. C., to Broadway, 10 miles, connecting with the Seaboard Air Line, the Southern Railway and the Atlantic Coast Line.

Boston & Maine.—See an item in general news.

Boston & Providence.—The railway committee of the Massachusetts Senate has unanimously reported a bill authorizing this company, a subsidiary of the New York, New Haven & Hartford, to issue not over $8,000,000 bonds, due in not exceeding 75 years, guaranteed principal and interest by the New York, New Haven & Hartford, to provide for electrification, additional tracks, elimination of grade crossings, etc.

Canada Southern.—The stockholders of the Michigan Central, of which this company is a subsidiary, on May 2 authorized the guarantee by the M. C. of principal and interest of the 50-year bonds, interest not to exceed 5 per cent. of the Canada Southern, of which $40,000,000 will be authorized and $22,000,000 issued for refunding, etc.

Central Vermont.—Blair & Co., New York, have purchased $1,000,000 5 per cent. notes of the Central Vermont Transportation Company, issued to pay for two new steamships and guaranteed by the Central Vermont, the United States subsidiary of the Grand Trunk. These notes are dated May 1, 1912, and are due $50,000 semi-annually beginning with November, 1912.

Denver, Northwestern & Pacific.—Judge Harry C. Riddle, in the United States district court, Denver, Col., on May 2 appointed Vice-President and General Manager D. C. Dodge and Secretary-Treasurer S. M. Perry as receivers of the property on the application of the Denver Railway Securities Company, the holding company of the railway. Also, upon request of the executors of the estate of David H. Moffat, the court appointed W. W. Watson receiver for the Denver Railway Securities Company. The Denver Railway Securities defaulted May 1 on the principal and interest due on $3,500,000 6 per cent. collateral trust notes dated May 1, 1911. A half interest in the Securities company is owned by the estate of D. H. Moffat, who endorsed $4,000,000 5 per cent. notes of the Colorado-Utah Construction Company. These notes are now deposited as security for the Securities company 6 per cent. notes. A protective committee has been formed of Benjamin Strong, Jr., vice-president, Bankers Trust Company, New York; Herman Waldeck, vice-president, Continental & Commercial National Bank, of Chicago; E. F. Shanbacker, president, Fourth Street National Bank, Philadelphia, Pa.; H. H. Wehrhane, of Hallgarten & Co., New York, and George H. Burr. White & Page are counsel for this committee. (See also comments on another page.)

Denver & Rio Grande.—Stockholders have authorized the $25,000,000 7 per cent. cumulative adjustment 20-year bonds, and have ratified a mortgage of the company's property to secure the issue. The present issue will be only $10,000,000. (See *Railway Age Gazette* of March 15 and April 5.)

Galveston, Houston & Henderson.—See an item in regard to the valuation of this property in State Commission news.

Grand Trunk Pacific.—Jules Hone has been made government representative on the board of directors, succeeding Alfred Brunett.

Interborough Rapid Transit.—J. P. Morgan & Co., New York, will pay off $15,000,000 one-year notes of this company due April 29. These notes consist of $10,000,000 one-year 4½ per cent. notes and a $5,000,000 short term issue. A short term private loan has been arranged to pay these amounts and permanent financing will be deferred until after the proposed new bond issue for subway construction, elevated extensions and other purposes, mentioned in the *Railway Age Gazette* of December 23, 1910.

Louisville & Nashville.—See an item about the possible sale of securities in Railway Construction News.

Michigan Central.—See Canada Southern.

Missouri, Kansas & Texas.—This company has sold to Speyer & Company, New York, $1,000,000 5 per cent. two-year notes. These notes are part of the authorized issue of $16,000,000 of May 1, 1911-1913. All except $650,000 are now outstanding.

New York Central & Hudson River.—This company has sold to J. P. Morgan & Co., New York, $15,000,000 4½ per cent. coupon notes of May 1, 1912-1915. It is understood that the price was par and that a large amount of the notes were placed in London and Paris. These notes are part of an issue of $30,000,000 recently authorized by the New York Public Service Commission mainly to provide for the acquisition of stock of the New York & Harlem, the Rome, Watertown & Ogdensburg and the Utica & Black River.

See also an item in Court News.

New York, New Haven & Hartford.—See an item in general news.

New York State Railways.—The stockholders of this electric railway company, a subsidiary of the New York Central & Hudson River, will vote on May 14 on the proposal of the directors to cancel the company's existing mortgage, authorizing the issuance of $30,000,000 5 per cent. bonds, and to create in its place a mortgage authorizing a total issue of $50,000,000 bonds bearing not more than 4½ per cent. interest. Of the bonds to be retired only $4,500,000 have been issued, and they are in the hands of trustees. The company intends to apply to the New York Public Service Commission for approval of an issue of the new bonds somewhat in excess of the amount necessary to refund the $4,500,000 bonds to pay for the stock of the Syracuse Rapid Transit Company.

Pere Marquette.—This company has sold $605,000 4½ per cent. receiver's certificates to the Peoples State Bank, the First National Bank and the Union Trust Company, all of Detroit, Mich.

The receivers have been granted permission to pay the interest on underlying securities that fell due May 1. The Consolidated Bondholders' Committee neither approved nor opposed this court order.

Rutland.—See an item in Court News.

St. Louis, Iron Mountain & Southern.—Stockholders will vote July 9 on the question of authorizing a mortgage to secure an issue to $200,000,000 refunding bonds to be used for refunding, extensions, additions, betterments and equipment, and for the construction or acquisition of additional railways or property.

St. Louis & San Francisco.—This company has sold about 15,000,000 francs ($3,000,000) general lien 15-20 year 5 per cent. bonds, French series, to Speyer & Co., New York, who have resold them to Paris bankers. The proceeds are to be used for improvements and to take up equipment notes. The amount outstanding is now $64,944,000.

St. Louis Southwestern.—The entire outstanding amount of series B equipment 5 per cent. notes, dated January 20, 1911, have been called for payment at par and interest June 26 at the Bankers Trust Company, New York. On February 24, $1,584,000 of these notes were outstanding.

Union Pacific.—See an item in regard to land sales made by this company in General News.

Wabash.—This company has sold to Kuhn, Loeb & Company, New York, the $1,500,000 additional 5 per cent. receiver's certificates, mentioned in the *Railway Age Gazette* of April 26. These certificates rank on an equal basis with the original $10,000,000 issue, and mature on the same date as that issue, namely, August 1, 1913.

Winnipeg, Salina & Gulf.—See an item in regard to this company in railway construction news.

Railway Age Gazette

Including the Railroad Gazette and the Railway Age

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In an editorial on co-operation between railways and their employees in our issue of May 10 ("The Railway Labor Situation," page 1032) brief descriptions were given of plans adopted by the Baldwin Locomotive Works and the Union Switch & Signal Company for enlisting the interest of employees in the welfare of the companies by enabling them to become stockholders. A plan for assisting employees to buy stock has been in effect on the Illinois Central since 1893, when it was announced in a circular issued by President Stuyvesant Fish. All officers and employees are given the privilege of subscribing for one share at a time for which they pay in instalments of $5 or multiples of that sum to be deducted from their monthly wages. The price paid is the market price at the time of application. When the payments are completed a stock certificate is delivered and registered on the company's books. The employee can then, if he wishes, begin the purchase of another share. While instalments are being paid they are credited with interest at 4 per cent., unless twelve consecutive months elapse without payment, in which case the interest ceases to accrue at the expiration of that period and the sum to the employee's credit is returned to him on application. If an officer or employee making payments desires for any reason to discontinue them he can have his money returned with accrued interest at 4 per cent., by making application to the head of his department. The company, therefore, acts as a savings bank for employees, even though they finally decide not to take the stock subscribed for. If an employee leaves the service he must either pay in full for the share for which he has subscribed and take his certificate, or take back his money with the accrued interest. Employees may also subscribe for one or more shares for cash, providing they have not already an outstanding application for a share on the instalment plan which is not fully paid for. While the number of employees who have taken advantage of the plan is small in proportion to the total number, many have availed themselves of the privilege of thus identifying their interests with those of the company.

Unfair usage or rough handling is responsible for the damage to from 55 to 60 per cent. of the freight cars which require repairs. This is not a guess, or an estimate, but the result of careful and accurate observations extending over 30 to 60 day periods; moreover it checks closely on two roads located in different sections of the country. The equipment of one road is largely of wooden construction, while that of the other contains a large proportion of all-steel cars. It is important to note also that these percentages do not cover the actual cost of repairs, but the number of cars damaged. The percentage for the cost of repairs would be higher, because cars damaged by unfair usage are usually more expensive to repair than those which are damaged because of defective material or poor construction. The conservativeness of these figures will be apparent when it is known that only those cars were credited to unfair usage on which the breaks or damage indicated a good grade of material and proper construction. Where poor construction or defective material was apparent, the treatment of the car was not held responsible for the damage, even though its extent was such as to indicate unfair usage. Is it impossible for the operating department to control this abuse? That department does not fail to criticize the mechanical department when repairs are not promptly made; does it realize how much it could do itself to keep the cars from getting on the repair tracks? If the damage to freight cars because of unfair usage could be cut in two, think of the effect it would have on the balance sheet at the end of the year and of the great amount of wasted time and energy it would save because of overcoming the failure to provide cars during periods of congestion! It is true that labor conditions are to a great extent responsible for this condition. Yet those who control the trainmen's unions can be brought to a realization of the actual magnitude of the losses which are being incurred the country over by carelessness and thoughtlessness on the part of the

trainmen, and, within limits, they can be brought to act on this realization, so as to bring about a better spirit of co-operation between the men and their employers. It may be a long uphill job to do this, but since it would be worth so much to the men, the railways and the public at large, why not make the effort?

In our issue of March 8, page 432, was published an article by Frank V. Whiting, general claims attorney of the New York Central Lines, on a study of the reports of accidents resulting in the deaths of 1,000 trespassers on railways. The article showed that the great majority of these trespassers are not tramps, as might be supposed, but regularly employed working men, business men, and women and children. R. C. Richards, general claim agent and chairman of the Central Safety Committee of the Chicago & North Western, has made a similar compilation regarding the trespassers killed and injured on this road in the year 1911, which corroborates Mr. Whiting's conclusions. Of the 141 persons classed as trespassers who were killed, but 32 were reported as of unknown occupation, 15 as having no regular occupation, and 13 as having no occupation, including the aged and infirm. This leaves 81 who were classified as to occupation, and includes 24 laborers, 17 farmers and farm hands, 9 shopmen and mechanics, 4 woodsmen and loggers, 3 each of railway employees, carpenters and cabinet makers, school children and students, 2 each of sailors and boatmen, miners, merchants and salesmen, and 1 bricklayer, 1 hotel man, 1 janitor, 1 village president, 1 soldier, 1 telegraph lineman, 1 livery helper, 1 domestic, 1 teacher, 1 cigar maker, 1 asylum inmate and 1 infant under 6 years old. Fourteen of those killed were minors between the ages of 14 and 21 years and 3 under 14 years. Of the 151 persons injured while trespassing 18 had no regular occupation and 8 were reported as of unknown occupation, while there were 31 laborers, 16 school children and students, 15 shopmen and mechanics, 10 farmers and farm hands, 7 housewives, 4 woodsmen and loggers, 4 miners, 3 each of bricklayers and masons, carpenters and cabinet makers, clerks, teamsters, and infants under 6 years; 2 each of railway employees, circus laborers and hotel and saloon men; a sailor, a merchant, a teacher, a cigar maker, a musician, a plumber, a housekeeper, a gardener, a ditcher, a florist, a cook, a blacksmith, a physician, a minister, a lawyer and a weighmaster. The list of injured includes 16 minors under 14 years of age and 16 between the ages of 14 and 21. One-half of the persons killed by the railways are persons such as those named who have no business on railway property and whom it is the duty of state and municipal authorities to keep from using the tracks as a highway or stealing rides on trains. Compilations such as those made by Mr. Whiting and Mr. Richards, showing that the trespassers killed and injured are the same kind of people as the average passenger or employee killed or injured, should have some effect in impressing the authorities with a sense of their responsibility.

During the first four months of the present calendar year, from January 1 to May 1, the *Railway Age Gazette* has reported orders for 62,464 freight cars, 1,067 passenger cars and 1,476 locomotives. For the entire calendar year 1911 the orders as reported in our statistical number of December 29 amounted to 133,117 freight cars, 2,623 passenger cars and 2,850 locomotives. In the case of freight cars and locomotives, therefore, the orders placed in the first one-third of 1912 amount to about one-half of those for the entire year 1911; and in the case of passenger cars the number is larger in proportion than for last year. Totals compiled from our weekly reports of equipment orders are, of course, subject to omissions, especially of many of the smaller orders, and are necessarily less complete than our annual statistics. When it is considered that a very large proportion of last year's equipment orders was placed during the last three months of the year, it would appear that the equipment market has at last started on a strong upward trend. Based on the showing for the first four months the total of freight car orders for this year should be 187,000. The annual average for the past five years has been only 35,000. It is true that owing to keen competition among the manufacturers most of the cars ordered this year have been booked at low prices. But they have not been as low as the figures prevailing a year and a half to two years ago when builders were eager to secure orders at cost in order to maintain their organization; and as the amount of business has approached the capacity of the plants prices have naturally hardened. The recent increases in the number and magnitude of equipment orders are ascribed to the fact that the railways have been obliged to refrain from buying for so long that the demand for new cars and locomotives has become imperative rather than to any increase in prosperity on the part of the roads; but when it is considered how far below normal requirements the orders have been for two years past it seems only reasonable to assume that the present tendency will continue for some time to come. The figures for freight car orders since January 1 have been greatly increased by some large orders that have been placed by western lines during May, including those of the Harriman Lines for 9,100, the Frisco for 6,000, the Santa Fe for 5,100 and the Canadian Pacific for 4,000 in this country in addition to those that will be built in this company's shops. There are also many inquiries in the market for large numbers of cars which have not yet been ordered. The Harriman Lines, Canadian Pacific, St. Paul, Pennsylvania and Santa Fe have been large purchasers of locomotives, and the Pennsylvania, New York Central, Harriman Lines and Illinois Central have placed some large orders for passengers cars.

THE LEGAL STATUS OF JOINT TERMINALS.

The decision of the United States Supreme Court in the suit of the government under the Sherman law against the Terminal Railroad Association of St. Louis was briefly abstracted in the *Railway Age Gazette* of April 26, page 975. The decision holds that the Terminal company as now organized is a monopoly in violation of the law. In reality, however, the result is a victory for the Terminal company, or at least for the policy of unifying terminals, as has been done at St. Louis.

The Terminal Railroad Association owns much the greater part of the facilities for handling traffic into, out of and through St. Louis. It, in turn, is controlled by 15 trunk lines. It was organized in 1889 to take over the Eads Bridge, the old Union Depot Company, the Union Railway Terminal Company and the St. Louis Terminal Railroad, all previously controlled by the Wabash and Missouri Pacific, and to build the Union passenger terminal opened in 1894. It later acquired control of the Merchants Bridge Company, the Wiggins Ferry Company and the St. Louis Transfer railway. The government sought the dissolution of the combined property into its constituent parts. It claimed competition had been destroyed, and that only thus could it be restored.

The Supreme Court of Missouri already had refused in a proceeding brought by the state under the state anti-trust law to dissolve the combination of the properties of the Merchants Bridge Company and the Terminal Railroad Association. It held that "the merger of mere railway terminals used to facilitate the public convenience by the transfer of cars from one line of railway to another, and instrumentalities for the distribution or gathering of traffic, freight or passenger, of many scattered industries or to different business centers of a great city, were not properly railway companies within the reasonable meaning of the statutes forbidding combinations between competing or parallel lines," and had graphically described the economic waste and the expense and inconvenience to shippers and railways which would be caused if each road were required to maintain separate terminals. The result to the shipper would be to compel him "to employ the railway with which

he has switch connection or else cart his product to a distant part of the city at a cost possibly as great as the railway tariff." The effect on the railways would be to compel them to multiply passenger stations, freight depots and switch yards, and "then not only would the expense of obtaining the necessary rights of way be so enormous as to amount to the exclusion of all but a few of the strongest roads, but if it could be accomplished the city would be cut to pieces with the many lines of railways intersecting it in every direction, and thus the greatest agency of commerce would become the greatest burden." (182 Mo., 284-289.) The United States Supreme Court recognized the advantages to both the railways and the public of unified terminals, and quoted from this decision of the Missouri Supreme Court with approval.

It found, however, that in some respects the Terminal Railroad Association is not so organized and managed as to escape condemnation as a restraint on commerce. Certain of the features of its management of which the court disapproved were changed before the decision was rendered. For example, it is no longer true, as it was when the testimony in the case was taken, that shipments for St. Louis are billed to East St. Louis. Through rates between St. Louis and eastern points are now made and published and the traffic is billed accordingly. The court condemned the practice of charging an "arbitrary" for transportation across the Mississippi river to points on the lines of the Terminal company of traffic originating within a radius of 100 miles, while a similar arbitrary was not imposed on traffic originating outside the 100-mile zone. If by this it is meant that all the charges for hauling across the river traffic originating within the 100-mile zone must be absorbed so long as the similar charges on traffic originating outside of that zone are absorbed, it follows that there must be a material readjustment of rates into and out of both St. Louis and East St. Louis. It is contended by some that the court meant the same rates must be made from all points to both St. Louis and East St. Louis; but the language of the decision is not open to any such interpretation. The Supreme Court orders that the decree shall not "affect in any wise the power of the Interstate Commerce Commission over the rates to be charged by the terminal company"; and obviously the question of what readjustment shall be made in the rates is one that can best be settled by the commission.

One requirement that the court makes, if the Terminal Railroad Association is to be brought within the law, is the insertion of a provision in the contract between it and the proprietary companies for the admission of any existing or future railway that may desire to come into joint ownership and control of the Terminal properties on terms that shall put it on equality with existing proprietary companies. Since the organization of the Terminal the number of proprietary lines has increased from six to fifteen, which shows there has been no disposition to exclude additional railways from both the burdens and the benefits of proprietorship. Another requirement made is that the plan of reorganization shall provide for the use of the terminal facilities on reasonable terms by any railway not electing to become a joint owner. Nor will this necessitate any radical change in the policy of the Terminal, for railways having no proprietary interest are now using its facilities under contract. A third requirement is the abrogation of the present agreement between the Terminal company and the proprietary companies restricting any of them to the use of the facilities of the Terminal. This will present no serious problem, for some companies are already using other facilities as well as those of the Terminal, and, because of the difficulties of acquiring the necessary property, there is little danger of any very serious competition with the Terminal developing.

The great point established is that the merger of Terminal facilities in large cities, which clearly is economically desirable, is also entirely legal when adequate provision is made for the use of the facilities on reasonable terms by all roads entering or desiring to enter. In many ways the organization and management of the Terminal Railroad Association of St. Louis offer a model which might profitably be followed in other large centers of traffic, and the reorganization which the Supreme Court orders is not calculated to impair its efficiency, although the readjustment of rates required may have an unfortunate effect on railway earnings unless the fact is recognized that a discrimination may often be more equitably corrected by raising some rates, or by raising some and reducing others, than by merely making reductions.

THE COMMERCE COURT QUESTION.

THE *Chicago Tribune*, in its issue of May 11, published an editorial headed "Precipitate Action," which is the ablest and fairest discussion of the Commerce Court question that we have seen. It is in full as follows:

"The action of the house in voting to abolish the newly founded Commerce Court should be very carefully considered in the senate.

"The Commerce Court was created for very excellent reasons to meet a very plain need. To abolish it before it has had any real chance to demonstrate its usefulness through a reasonable period of years, and especially to abolish it because its first few decisions are not approved, is a crude form of recall not only of decisions and of judges but of an institution which yet may prove itself of great value.

"The charges against one of the members of the court, Judge Archbald, involving him in relations with a railway should in no manner affect the existence of the court itself. Should we abolish the Supreme Court if one of its members proved venal?

"As to the arraignment of the Commerce Court by the commerce commission, it offers no sound reason for the destruction of its reviewing tribunal.

"The Commerce Court is criticised because it reversed the commission in twenty cases out of twenty-seven appealed. This fact is by no means conclusive of bias. It is fair to assume that the railways appeal their strongest cases. It is also fair as well as wise to wait for a longer period before checking up on advantages. A court worth its salt, a really unbiased court, does not decide by the methods of compromise, giving each side an equal number of decisions. It is sworn to decide according to the law and the evidence. If the Commerce Court is wrong upon the law and the evidence an appeal to the Supreme Court is pretty certain to correct that error.

"If the Commerce Court has usurped powers there is remedy by appeal to the Supreme Court, or, if that fails, by amendatory legislation.

"In short, none of the objections raised goes to the institution itself, and there remain unchallenged the sound reasons for its creation—namely: to avoid the diversity of ruling necessarily the result of appeals to the regular circuit courts of appeal and to provide a single special court which in due time would become expert in passing upon interstate commerce problems. The commission can hardly be ready to assume that its decisions should be held superior to review.

"It may seem to be good politics for the house to wipe out the Commerce Court, but the senate should not assent unless the case against the court can be shown to rest on much broader and deeper foundations than a remonstrance against a probably temporary and accidental preponderance of decisions favorable to the railways. If the Commerce Court is to be abolished because a greater part of its decisions in the brief term of its existence have favored the railways, the Interstate Commerce Commission's total record with much more justice may be checked up to discover whether its decisions tend greatly in the opposite direction."

As the *Tribune's* editorial indicates, the whole campaign against the Commerce Court has been most unfair. It has been about the most disreputable episode in the history of railway regulation in the United States. It was begun before the court had ever rendered a decision, and it is now being pushed along by every demagogue and peanut politician in the country. It is popular to attack both the railways and the courts; and no demagogue or vender of political peanuts would miss the chance that the existing situation offers to attack them jointly by assailing the Commerce Court. The character of the entire campaign is illustrated by the attempt to slip through the provision abolishing the court as a rider to the appropriation bill.

Suppose the campaign is successful. Will the Interstate Commerce Commission have more authority? On the contrary, every appeal now taken from it to the Commerce Court would then be taken to the circuit courts of appeals. Would the circuit courts of appeals be more apt than the Commerce Court to uphold the commission? On the contrary, the records show that before

the Commerce Court was created the circuit courts, the circuit courts of appeals and the Supreme Court of the United States reversed the commission as often in proportion as the Commerce Court has been doing. There is no reason to suppose the circuit courts of appeals would do differently in the future. There is an impression that the Commerce Court has some special authority over the commission which the other federal courts before its creation did not possess. This is wholly erroneous. It has not exercised, and does not possess, any authority over the commission which the circuit courts of the United States did not have before the Commerce Court was created and which the circuit courts of appeals would not have and exercise after the Commerce Court was abolished.

If the Commerce Court were the only one with whose decisions the Interstate Commerce Commission is displeased the situation might be a little different. But the commission complains as loudly of the decisions of the Supreme Court as it does of those of the Commerce Court. In the Willamette Valley Lumber case, the circuit court upheld an order of the commission reducing certain rates. The Supreme Court (*Southern Pacific v. Interstate Commerce Commission,* 219, U. S., 433) reversed both the circuit court and the commission. The commission thereupon in its annual report for 1911 (page 46) said that it was "impossible to say exactly what significance should attach to this decision" of the Supreme Court, and implied that its tendency was "to put the property interests of this country at the mercy of the railways without that restraint which, in our opinion, the Congress by the act to regulate commerce intended to impose." The commission indulged in similar criticism of the decision of the Supreme Court in *Interstate Commerce Commission v. Diffenbaugh et al* (222 U. S., 42) *and Interstate Commerce Commission v. Peavey & Company* (222 U. S., 42.) These cases involved the right of railways to pay elevator companies for elevating their own grain; and the Supreme Court held unlawful a decision rendered by the commission. In commenting on the Supreme Court's decision in its annual report for 1911 (page 51) the commission used the following language:

"In other words, the Supreme Court holds that a statute which was enacted for the express purpose of forbidding discrimination in favor of the owner of an elevator has permitted and perpetuated a possible discrimination in that very particular."

The commission has said nothing in reference to the Commerce Court more resentful and disrespectful than this. It has implied not only that it knows the law better than the Commerce Court, but that it also knows the law better than the Supreme Court. Why then, is there no movement to abolish the Supreme Court?

The abolition of the Commerce Court at this time would be a public calamity because it would establish a precedent for the destruction of judicial bodies which insist on deciding cases according to their own view of the law instead of according to somebody else's. Even Mr. Roosevelt opposes the recall of judges; and as to the recall of judicial decisions favors it only in the case of decisions rendered by state courts.

There are methods already provided for dealing with any derelictions of the Commerce Court. If its judges are corrupt or incompetent they can be impeached. If its decisions are wrong they can be appealed from and reversed. If, *after it has been given a fair trial over a considerable period of years,* its conduct seems open to condemnation it can be and ought to be abolished. But to abolish it on the ground that its interpretations of the law are incorrect and unfair when, at the time this is written, *but a single case that has been appealed from it has been decided by the Supreme Court*—and that not a case involving a railway but the statistical reports of water lines—would be an act so obviously political in its character, so unfair and ignoble, as to reflect lasting disgrace on every man who voted for it or was concerned in instigating it. Surely, the Senate, unlike the House, will act with some intelligence and decency regarding this matter.

WHEN THE RAILWAYS REFORM THEMSELVES.

MANY loud complaints of unfair discriminations by railways have been made by shippers, and many laws have been passed, largely at their instance, to reform the roads. Sometimes the railways, tired of being at the sharp end of the reform stick, have taken steps to reform themselves. The attitude of the shippers directly affected often has then undergone a striking transformation.

A case in point is the action of the railways in Central Freight Association territory, reported in our news columns last week, in abolishing allowances to grain elevators for providing grain doors for the side door protection of bulk grain loading. The western roads already, on July 1, 1911, had made an arrangement to have a joint agent recover used doors and do the necessary re-coopering of cars. But when the Chicago lines, through the General Superintendents' and the General Managers' Associations, tried to adopt the same plan in Chicago the elevator interests offered stout opposition.

It had been the custom to allow the elevator company to provide the grain doors and for the railway to pay it for them under a published tariff at the rate of 50 cents per door, but not for more than four doors, or $2 per car. There are 65 points in Chicago where grain is loaded and unloaded at elevators, and there are handled annually 150,000 cars at a cost of $300,000 for grain doors. Investigation disclosed that many shippers were regularly charging $2 per car for furnishing doors, whether they furnished them or not. Grain doors once used were seldom heard of again—at least in a form in which they could be identified! Very commonly they were removed from an inbound car, the stencils were changed and they were put on an outbound car, the railway then being charged $2 per car for these "new" doors. In a notable decision the Interstate Commerce Commission told the railways that with proper economy they would not need an advance in freight rates. Representatives of the shippers spoke more plainly and declared the elimination of some of the "graft" from the business of the railways would help them attain a happy condition of prosperity. The roads have applied both suggestions to the grain door business amounting, as already stated, to $300,000 a year in Chicago alone.

The possibility of economy and the need for action were emphasized when the grain shippers in the Chicago district on July 15, 1911, in the face of the cancellation of the grain door allowances in the West, coolly asked to have the allowance per car increased in the Chicago district from $2 to $3. On September 6 the request was modified, and it was indicated that they might be induced to accept $2.50 a car. When an effort was made by the General Managers' Association to secure the co-operation of the Chicago elevator owners in the interest of needed reform, the argument was made that it was not practicable for the railways to furnish the doors themselves, and officers of the Chicago Board of Trade threatened to appeal to the courts to enjoin a cancellation of the grain door tariff as a discrimination unless similar action were taken throughout Central Freight Association territory. There was also heated talk of diverting traffic as a punishment for the railways for not "keeping off the graft." But the compelling influence of tonnage cannot be used against the General Managers' Association as it can against an individual road. Instead of yielding to the shippers, the association asked for an opinion of the Interstate Commerce Commission. Commissioner Lane replied as follows:

"There is no question in my mind but that a carrier may, and, in fact, should, undertake to furnish a fully equipped car for the carriage of grain. The provision of the law under which an allowance is made to the shipper who furnishes part of the service was really intended to give us control over certain charges arising out of railway practices that never should have become railway practices. If grain doors are necessary to the carriage of grain they should be furnished by the carrier, and a shipper has no right whatever to claim that he may provide such doors and receive an allowance therefor when the carrier itself undertakes to furnish such doors. *Of*

course, if there is a profit coming to the shipper out of such doors and you make the allowance to one shipper and to the others furnish the doors yourselves you are just rebating by the amount of that profit to a certain shipper. I think the view of the commission is that the entire car should be furnished by the carrier in proper shape for movement."

The Central Freight Association roads, accordingly, filed their new tariff, effective May 1. Then a number of Indiana grain shippers, acting, it is thought, at the instigation of the Chicago elevator owners, appealed to the Indiana railway commission to suspend the tariff in Indiana, and a similar request was made of the Interstate Commerce Commission. The Indiana commission did suspend it, but after a hearing and after being advised of Commissioner Lane's opinion, vacated its order on April 29.

The strenuous opposition of the elevator owners to the elimination of a privilege so long enjoyed is easily understood when it is stated that one of the largest grain dealers in Chicago had been collecting $50,000 a year in grain door allowances, and another owner of elevators declared the new plan would deprive his concern of $20,000 per annum. Moreover, ex-President Reynolds of the Indiana Grain Dealers' Association stated at the hearing before the Indiana commission that grain door profit had been considered as an "elevator asset."

With the function of providing grain doors in the hands of a joint agent representing the railways, this profit to the shippers, which has been an equal expense to the railways, will be wiped out. Doors from inbound cars will be gathered up and returned to their owners at a charge of 5 cents apiece, and the recoopering will be done under the jurisdiction of the railways. Moreover, it will be a much simpler matter to check and govern the operations of the agent than those of a number of shippers who control a large amount of traffic.

The kind of profit which has been derived from billing the railways for four doors when but one was furnished is certainly a proper object of economy, and the roads are to be congratulated on having cleaned up a situation, which, in fact, should never have been allowed to exist. Railways have been too long criticized for discriminations that have been forced on them by big shippers, and which almost always mean a loss of revenue to the roads. Organizations such as the General Managers' Association, which are not subject to the kind of pressure which the big shipper can put on individual roads, can be made most effective in removing abuses; and Commissioner Lane has furnished an example of the kind of co-operation the railways need from public authorities. Meanwhile, the next time big shippers set up complaints about unfair discrimination by the railways the public may help itself to get the right point of view by considering how this grain door "graft" in Chicago developed, and the methods used to have it continued in the face of the expressed opinion of a member of the Interstate Commerce Commission that the allowances the shippers were being paid were unlawful rebates.

NEW BOOKS.

Standard Forms of Field Notes for Civil Engineers. By Charles C. Anthony, Instructor in Engineering and Mathematics, Union College. 5 in. x 7 in. 55 pages. Cloth binding. McGraw-Hill Book Company, New York. Price, $1.00.

The ability to keep clear, concise and uniform field notes should be a requisite of all instrument men, and the simplification and standardization of such notes is an end which, if attained, would add materially to the efficiency of a field party. This little book by Mr. Anthony is intended to provide forms for such standardization. Suggestions as to details of this kind, which every instrument man works out in a certain measure for himself, are apt to be criticized, but the forms presented have many points to recommend them and are worth the consideration of young engineers seeking good practice in note-keeping and older engineers who have possibly deviated from what they know after years of experience to be the best practice. It may be argued that the book does not cover the entire field of surveying, but the forms given are for the classes of maintenance and reconstruction surveys to which is devoted the least time in technical courses and which young engineers are likely to need first.

Letters to the Editor.

NEED OF CHANGES IN DEMURRAGE RULES.

PHILADELPHIA, April 30, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

We have read with a great deal of interest the communication of Theodore Voorhees, vice-president of the Philadelphia & Reading in your issue of the 5th instant, on the subject of demurrage, and note with astonishment the easy swing with which he handles the subject, which has been one of the most difficult with which the railways have had to contend for the past twenty years.

The present rules were formulated by the National Association of Railway Commissioners, with one Interstate Commerce Commissioner working with its committee, and were adopted by the railways throughout the country in 1910, with the understanding that in their present form they were merely tentative, and subject to such changes and modifications as might be deemed advisable after a fair trial. That the rules are not satisfactory to the shipping public is evidenced from the general dissatisfaction expressed throughout the country; and by the fact that meetings between the commercial bodies representing the shippers and consignees of the country with officers of the Interstate Commerce Commission and the American Railway Association, indicate that the railways and the commission are seriously considering the modifications of rules which have been found after about two years' trial, to need changes in the interest of fairness.

Only recently representatives of the railways and shippers, with the aid and support of one of the interstate commerce commissioners, agreed upon certain revisions of the rules, which revisions will be submitted to the commission, making for some increase in fairness to all parties; though this is not such a complete revision as many shippers feel they should have.

Mr. Voorhees says that experience also shows that those working under the average agreement practically eliminate the demurrage charges, as the rules are favorable to the large shippers, excepting only in the case of one who undertakes to handle a volume of traffic greatly in excess of his capacity for storage, when, of necessity, demurrage charges accrue. This would seem to put the burden of demurrage upon the little fellow. This is a frank and startling admission, particularly in view of the fact that for twenty years past, or during the existence of demurrage regulations, the charge has been made by the shipping public that the little fellows were compelled to pay demurrage, while the large concerns were not; and the experience which the Philadelphia & Reading has had in collecting demurrage charges from the little fellow and letting the big ones go free, emphasizes this feature of the article in question.

There are three important rules to which exception is taken, namely, Inclement weather, Bunching, and Railroad Errors and Omissions. It is apparent even to those with little experience in demurrage, that while no delicate diplomacy may be necessary, the facts in any case are not "readily discoverable," and that the results are not "fixed absolutely by the rules themselves." Careful and impartial investigation, with a uniform course of procedure under the rules, is not only desirable, but absolutely necessary in the fair and uniform adjustment of demurrage claims and the uniform application of car demurrage regulations.

Mr. Voorhees says that "today the railroad agents and their customers are in closer touch, resulting in a better understanding and much less friction than under previously existing conditions." This is all right so far as "friction" is concerned, but how about demurrage under this elysian condition? We have always been under the impression that where there is no friction in enforcing unpleasant regulations, the regulations are not very rigidly enforced. What we need, as stated before, is fair and equitable rules in the interest of the railroads, as well as shippers and consignees, and a uniform application of such rules, with a uniform method of passing upon claims based upon the exceptions provided by the rules.

In other words, *Uniformity* is the most important feature in

the application of demurrage rules, and we cannot see that there is any logical argument to the contrary; nor can we see how uniformity is to be obtained by each railway undertaking to interpret and apply the rules without joint and impartial supervision.

If the railways will not supply this joint and impartial supervision, the government will do so, and it is doubtful if the many small shippers will be content with anything short of governmental supervision of this feature of transportation, which is so peculiarly susceptible to manipulation.

I quite agree with your correspondent in Hartford, Conn. (C. H. M.), that the Peters bill, placing demurrage regulations under the control of the Interstate Commerce Commission, should be enacted by Congress.

PHILIP GODLEY,
Chairman Committee on Land Transportation,
Philadelphia Board of Trade.

MR. ISAACS ON RAIL FAILURES AND ECCENTRIC LOADING.

New York, May 2, 1912.

To the Editor of the Railway Age Gazette:

There appears in the *Railway Age Gazette* of April 18, 1912, an article entitled, "Rail Failures Due to Eccentric Loading," by C. A. Morse, chief engineer of the Atchison, Topeka & Santa Fe. Photographs are shown of the "split head" type of rail failure and the assumption is made that these failures are caused by "eccentric loading" produced by the conical face of the wheels in contact with the curved top surface of the rail.

Assuming, as Mr. Morse does, that the loads upon the head of the rail are vertical, the maximum bending moment due to these loads is the same upon the vertical portion of the head, considered as a cantilever or beam, as that upon the thinnest portion of the web, and as the web is very much thinner than the rail head, from theoretical considerations we should expect that eccentric forces causing failures would split the webs longitudinally at their thinnest section. In point of fact this last rarely occurs, and it has been clearly shown that if the metal in the head is sound it is ample in all sections now in use to stand any such eccentric loads.

This is established by a series of tests made by Mr. Wickhorst, engineer of tests of the Rail Committee (Proceedings of the American Railway Engineering Association, volume 12, part 2, pages 518 to 528). In these experiments the heads of rails were planed down to various thicknesses and subjected to static loads and the extreme edge and to rolling loads applied with a reciprocating machine along the edge. The conclusions drawn were, that a load of 30,000 lbs. (which is about the maximum wheel load in use today) caused a permanent sag with head 3/8 in. thick, but not much, if any, with a head of greater thickness, and further, that a head 1 3/8 in. thick would hold up against permanent sag a rolling load of 90,000 lbs. *when concentrated at the edge.* No split heads resulted, which clearly indicates that eccentric loading plays little, if any, part in the failure of the heads of rails where the metal is sound. In my opinion split heads are the result of defective material in the head.

If split heads were brought about by eccentric loading, in sound material they would occur invariably on the gage side. Such is not the case. The position of the break is determined by other causes, but the existence of internal defects would be sooner made evident on the gage than on the outer side of the rail.

The cuts of split head failures in Mr. Morse's article are typical of those which have been most prevalent on our system for the last five years and are clear attributable to one of the three following causes: (1) An original pipe or unwelded cavity in the rail head; (2) lamination which may contain slag or other foreign matter; (3) segregation of carbon or other hardening elements at the center of the head, reaching down into the web and forming a central core much harder than the surrounding envelope of soft steel.

That the first two of these, which largely predominate, should cause split heads is self evident and needs no comment. The third is explained by the rolling action of the wheels upon the soft metal on the surface of the rail head, which causes a transverse flow of metal and throws stresses into the harder and more brittle metal nearer the center to which it is not capable of adjusting itself. One of these three conditions can usually be detected in a split head. The upper right-hand section given in the article referred to particularly shows laminations throughout the rail section, which could hardly be brought about in sound metal by eccentric loading. The above causes for practically all such failures are brought out by chemical and microscopic surveys of the fractures which almost invariably indicate the presence of high carbon or slag.

I am not now discussing the advisability of coming wheels as against making them cylindrical. If there is anything to be gained as regards the avoidance of eccentric loading by the latter, the same result can be obtained by canting the rail toward the gage side, which is an old and now an abandoned expedient. With the top of the rail flat and the tread of the wheel cylindrical the tires would still be worn into concave surfaces, the load would still be applied, except on new wheels and new rails, at the edge of the flat topped rail so that under operating conditions there seems to be little, if anything, gained by this change of shape.

Formerly it was customary to give the rail head a much sharper curvature than is the present practice on the theory that it would avoid eccentric loading. In some cases this was carried to extremes. One road adopted a section in which the top of the head was nearly semi-circular. It is now recognized that there is a moderate curvature which gives about the best result.

In designing the "A" and "B" sections of the American Railway Association, this matter received careful attention by the committee and the radii of the heads were fixed at 14 and 12 in., respectively. This was considered as far in the direction of a flat head as it was wise to go, all things considered. Prior to this the American Society of Civil Engineers' section had used 12 in., and it was not an uncommon practice to use 10 in. It was recognized that as long a line of contact as feasible between the rail head and the tread of the wheel is desirable, but it was not considered wise by the committee to use a flat-topped rail or too wide a head, as this might bring about undue stresses upon the web or flange.

JOHN D. ISAACS.
Consulting Engineer, Harriman Lines.

The Russian government is considering the construction of the following lines: The extension of the Central Asia and the Caspian railways to Kaschugal; a line from Omsk, on the Trans-Siberian railway, to Tchugtchak; a line from Misovya, on the Trans-Siberian railway, via Kiahkta to Kulon. The object of these three lines is to develop Mongolia. They will be the first railways to reach those points.

Authority has been vested in the British Nyasaland protectorate government to contract with the British Central Africa Company for public lands to which the Shire railway is at present entitled, and to guarantee interest on the capital required to extend the Port Herald railway to the Zambezi river. The Portuguese government has been asked to consent to the passage of the railway through its African territory, and arrangements have been concluded with the Mozambique Company to build a section of the line from the Zambezi to the port of Beira. It is announced that the Portuguese government has given the consent requested and that arrangements for the construction of the whole railway are about concluded. Quelimane would be a much nearer exit to the sea for British Nyasaland, but against this factor the Mozambique Company presents in Beira an established harbor open to vessels of any draft at present plying on the east coast and whose port works are already in process of construction.

NEW LOCOMOTIVE TERMINAL AT CARBONDALE.

The Delaware & Hudson's Improved Facilities for Taking Care of Mallet Locomotives Used in Heavy Coal Movement.

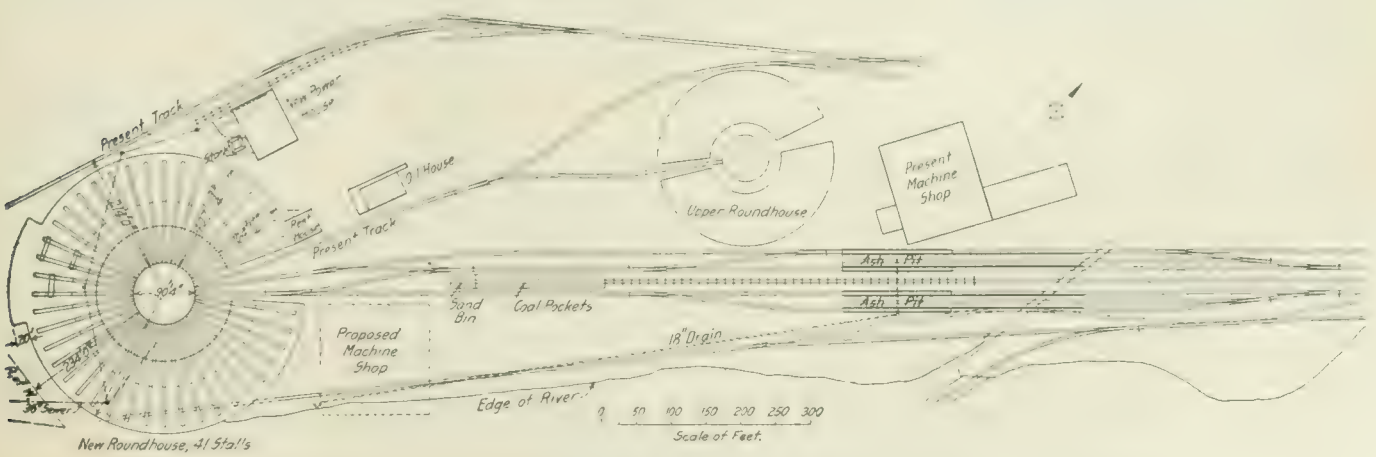
The Delaware & Hudson has recently completed locomotive terminal improvements at Carbondale, Pa., which include an engine house of ample size for Mallet locomotives. Carbondale is the headquarters of the Pennsylvania division of this line, and the principal yard for the shipment of anthracite coal is located there. There is a heavy movement in both directions, and the Mallet engines are in service in this coal movement both north and south. The principal work is the pushing service to the summit of Mount Ararat, north of Carbondale. The old engine houses were not suitable for modern motive power, and the more recent one—that at the north—remains in use for smaller engines, while the new house occupies the site of the older one to the south. To provide ample room for the new location a portion of the old classification yard was rearranged and the car repair shop was moved to the east side of the river.

The locomotive terminal improvements include, in addition to the large engine house, a coal chute, two concrete clinker pits, a power house, an oil house and a three-story building for offices and rest room. The arrangement of all these structures is shown on the general plan.

The new engine house has 41 stalls, and there are three tracks approaching the turntable. The inner circle has a diam-



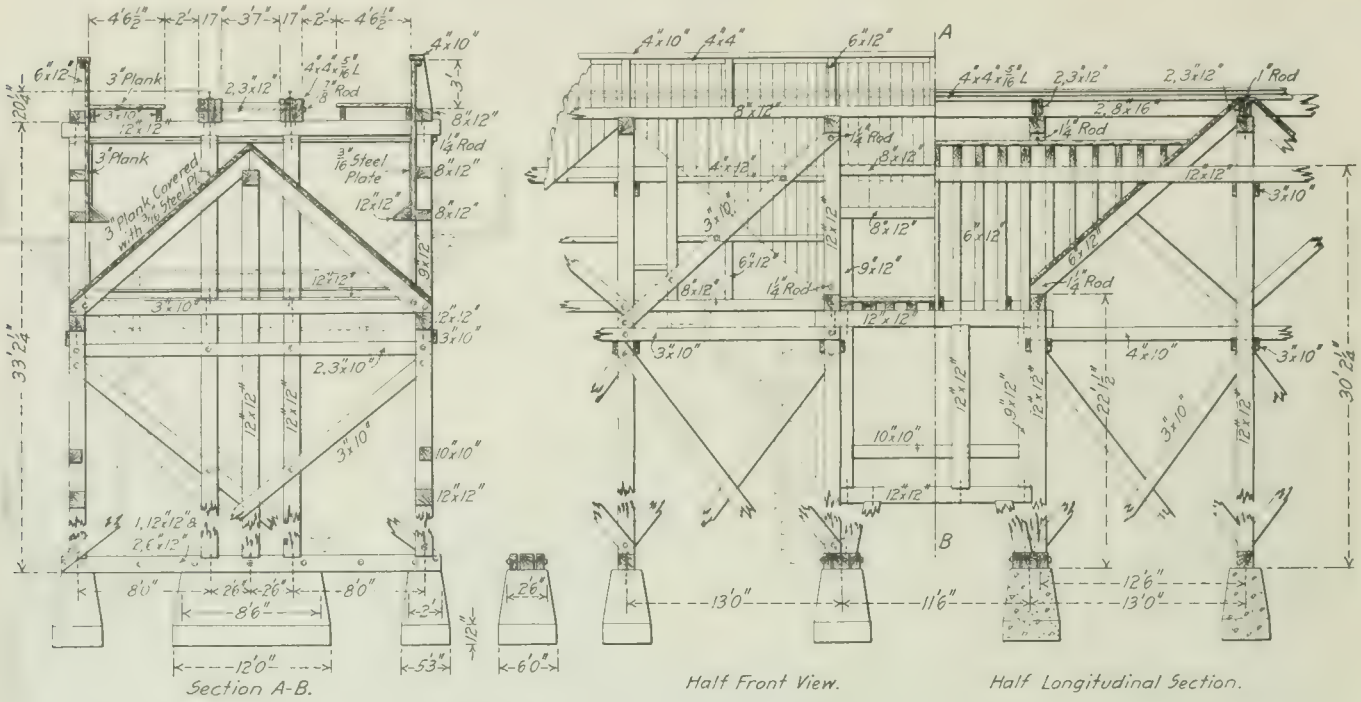
Partial View of New Engine House at Carbondale, Pa.; Delaware & Hudson.



General Arrangement of the Locomotive Terminal of the Delaware & Hudson at Carbondale, Pa.

eter of 199 ft. 8¾ in., and the outer diameter is 407 ft. 11¾ in., giving a stall length of 104 ft. 1½ in. This is adequate for the largest locomotives now in the service of the company, and for any which are likely to be built in the future. The foundation and substructure is of concrete, which extends to the top

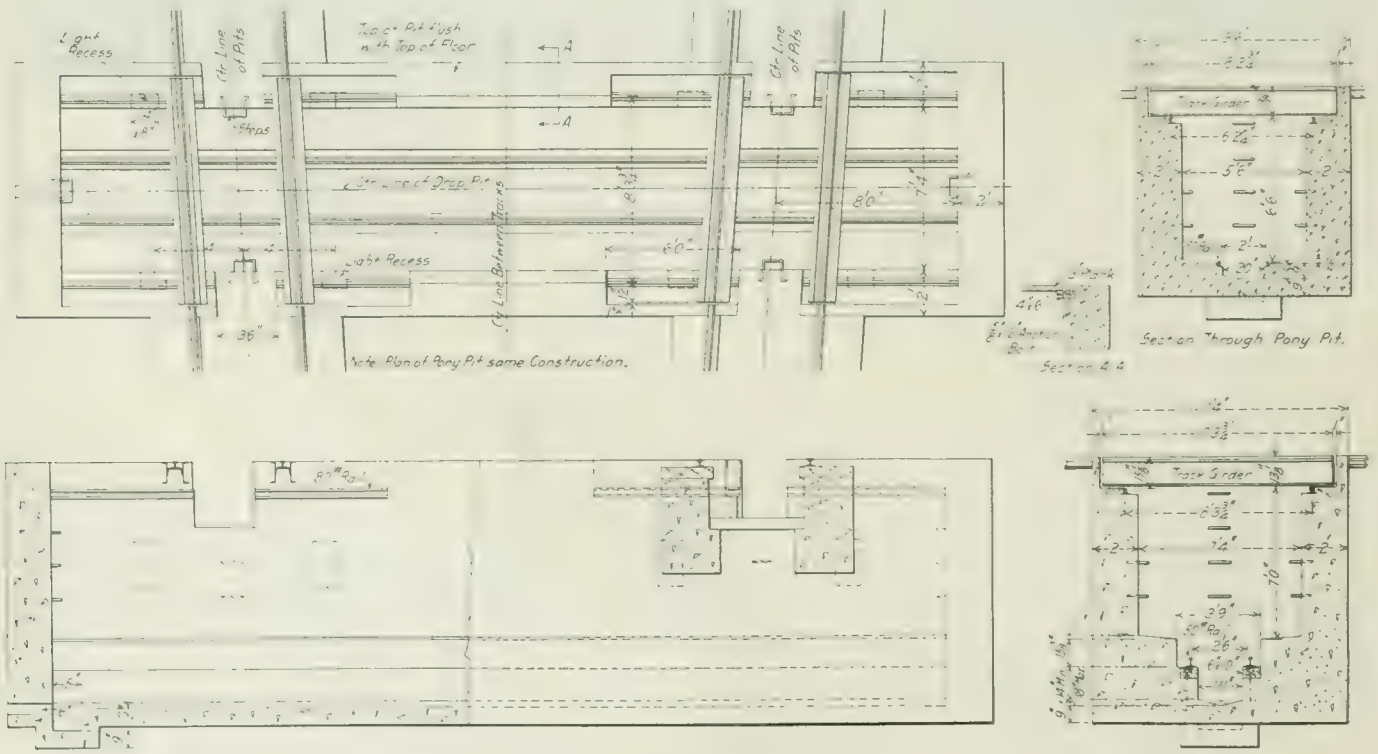
The doors are made with solid wooden panels, but ample provision is made for lighting in the outside walls and at the louvre ventilator. Each stall has approximately 400 sq. ft. of window area in the outer wall. The space below the windows is filled with a reinforced concrete slab carried on projections from



Construction of the Coal Pockets at Carbondale, Pa.

of the water table, 4½ ft. above the top of the rail. Above this the walls are of brick with steel columns, and the roof girders are also of steel, although provision has been made for a cement covering for the steel work to prevent corrosion. On top of the steel roof girders are placed heavy wooden purlins, and on top of these 2-in. matched spruce sheathing which is covered with 5-ply slag roofing.

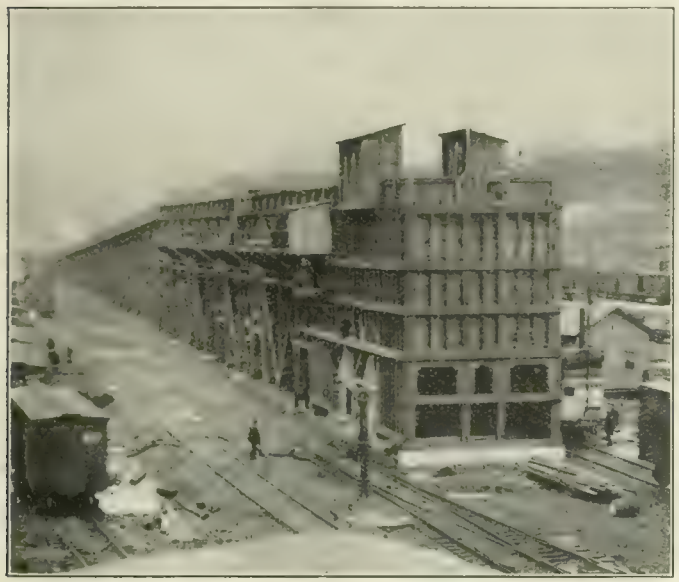
the piers which support the brick work in such a manner that this slab and the filling above the windows are practically independent of the roof structure, thus eliminating the danger of damage to the roof and main side walls in the event of an engine running beyond the pits into the outer wall. Directly opposite the main entrance are three drop pits, two for pony tracks and one for the drivers; and directly back of these is



Drop Pit in the Carbondale Engine House.

a lean-to 20 ft. deep, extending along the width of five stalls. This provides room for sufficient machine tools for engine house use. The floor of the house is of vitrified paving brick laid on 5 in. of concrete with a 2-in. sand cushion.

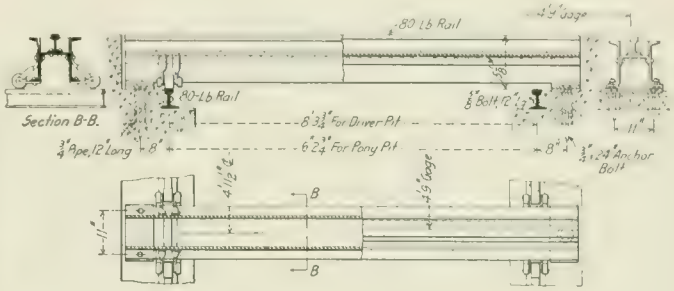
The drop pit for drivers is here illustrated, and the one for trucks is made on the same plan but smaller, the width of the pit being 5 ft. 6 in. instead of 7 ft. 4 in. for the drivers. The wheels are raised and lowered by means of jacks, which run on rails at the bottom of the pit, and the rails at the top of the pit are supported by shallow trucks made of 12 in. channels. When the wheels are raised above the longitudinal rails covering



Coal Wharf at Carbondale, Pa.; Delaware & Hudson.

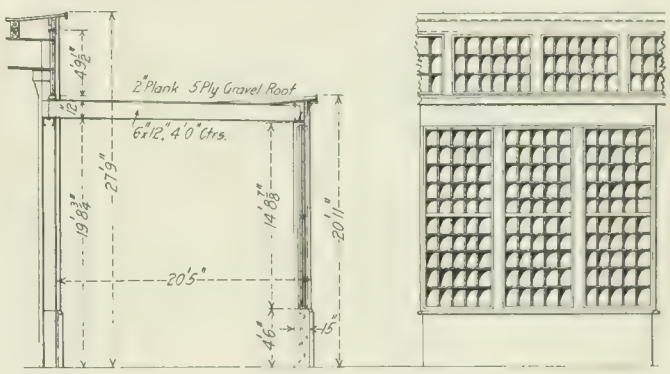
the pit, the latter can easily be moved out of the way, on their shallow trucks. The truck wheels, 4 in. in diameter and having 3 in. faces, are mounted on a ¾-in. steel axle. The cast iron smokejacks were made by Paul Dickinson, Inc., Chicago; and the building is heated by a direct system of coils placed along the pits.

The new power house and chimney are illustrated in the photographic view. The power house is a concrete and brick structure, 66 ft. x 90 ft., with a roof construction similar to the engine house. The boiler room contains 800 h. p. Babcock & Wilcox boilers, with foundation space provided for an equal additional capacity. There is one Cochrane feed-water heater and one Green fuel-economizer blower. The chimney is of reinforced concrete, built by the General Concrete Construction Company. The engine room contains an Ingersoll-Rand air compressor with cylinders 14 in. x 22 in., and 13 in. x 16 in. Fuel for the boilers is delivered to the power house by gravity from hopper cars on a trestle over the bunkers, and the ashes are



Drop Pit Track Truck.

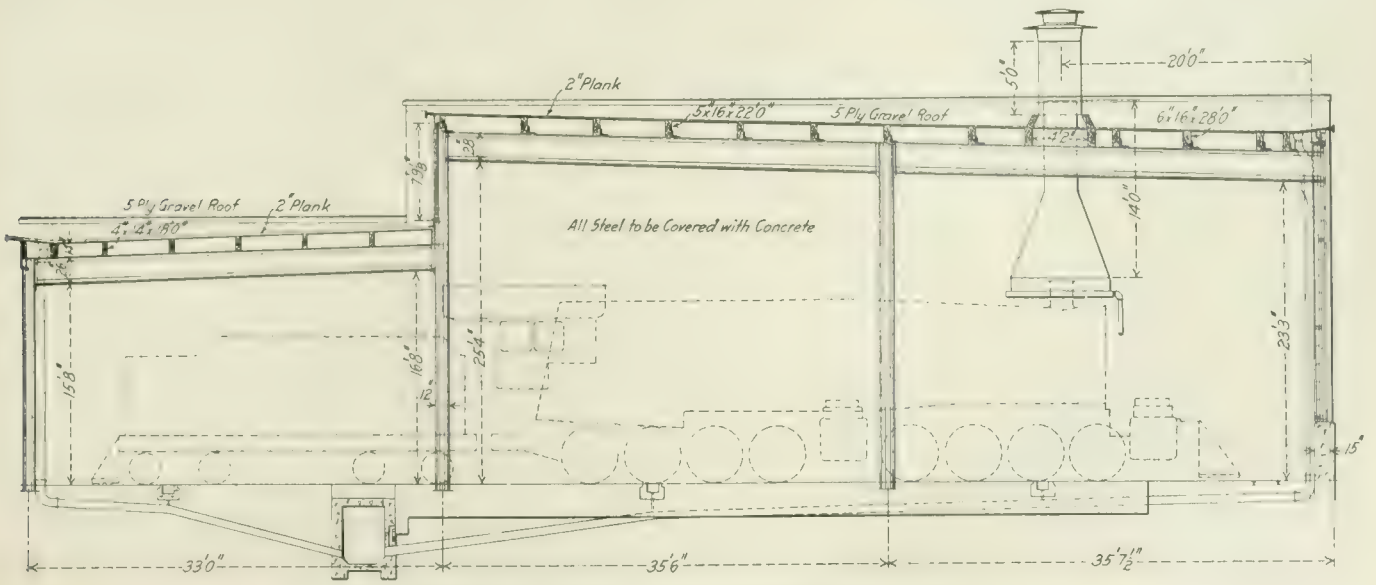
handled by special equipment through a tunnel from the firebox to empty cars on the same elevated track. The sand storage bin and dry kiln are also reached by the same elevated track. The coal wharf, which is built of wood on concrete foundations, has a light grade, long wooden trestle approach, and there is no roof



Lean-to; Carbondale Engine House.

over the coal bin. The coaling station has a storage capacity of 600 tons.

The boiler washing system was installed by the National Boiler Washing Company of Chicago, and the mains for this system, together with the air pipes, are carried on supports suspended from the steel roof girders, with drops at every other column.



Cross-Section Through the Carbondale Engine House.

The turntable is 90 ft. in diameter, with a cone roller center bearing, and was made by the American Bridge Company; it is equipped with a Nichols electric tractor. On the approach to the engine house is a three-story structure with a rest room and locker room on the first floor, and the master mechanic's office on the second floor.

ACCIDENT BULLETIN NO. 42.

The Interstate Commerce Commission has issued accident bulletin No. 42, containing the record of railway accidents in the United States during the three months ending December 31, 1911. The number of persons killed in train accidents was 242, and of injured 4,706. Accidents of other kinds, including those sustained by employees while at work, by passengers in getting on or off cars, by persons at highway crossings, by persons doing business at stations, etc., by trespassers, and others, bring up the total number of casualties, excluding "industrial accidents," to 22,682 (2,726 killed and 19,956 injured). The casualties are classified in table No. 1, given herewith, which includes some details from table 1B not here shown. (The accident statistics of electric lines are given in a separate table). Supplementing the statement of railway accidents proper, the commission gives the following records of "Industrial Accidents"; those occurring to employees of the railway on railway premises in which the movement of cars or engines is not involved:

Industrial accidents to employees.

	Killed.	Injured.
While working on tracks or bridges	25	4,537
At stations, freight houses, engine houses, coaling stations, water stations, etc., where no moving railroad car or engine is involved	22	5,466
In and around shops	9	10,028
On boats and wharves	7	365
At other places	15	1,238
Total	78	21,634

Adding the casualties to employees in industrial accidents to the figures given in the larger table, the total number of employees killed, including those not on duty, is 1,004, and injured 34,679; and this makes the total number of persons killed, all classes, 2,804 and injured, 41,590.

Table No. 1A.—*Comparison of principal items with last quarterly bulletin and with one year back.*

	Bulletin 42.	Bulletin 41.	Bulletin 38.
1. Passengers killed in train accidents	27	65	30
2. Passengers killed, all causes	78	116	96
3. Employees (on duty) killed in train accidents	183	104	199
4. Employees (on duty) killed in coupling	53	42	60
5. Employees (on duty) killed, total (Table 1B)	850	626	841
6. Total, passengers and employees (items 2 and 5, above)	928	742	937
7. Other persons killed (including trespassers, nontrespassers, and employees not on duty), all causes	1,798	2,016	1,722
8. Employees killed in industrial accidents	78	131	107

The total number of collisions and derailments in the quarter now under review was 3,346, of which 244 collisions and 215 derailments affected passenger trains. The damage to cars, engines, and roadway by these accidents amounted to $2,893,948, as below:

Table No. 2.—*Collisions and derailments.*

Class.	Number.	Loss.	Killed.	Injured.
Collisions, rear	337	$377,096	45	669
Collisions, butting	203	454,064	50	993
Collisions, train separating	78	33,372	3	43
Collisions, miscellaneous	808	391,104	32	673
Total	1,426	$1,255,636	130	2,378
Derailments due to defects of roadway	465	$390,191	28	735
Derailments due to defects of equipment	925	735,791	19	341
Derailments due to negligence	111	62,381	3	133
Derailments due to unforeseen obstruction	75	106,293	19	135
Derailments due to malicious obstruction	18	36,906	5	101
Derailments due to miscellaneous causes	326	306,750	26	309
Total	1,920	$1,638,312	100	1,754
Total collisions and derailments	3,346	$2,893,948	230	4,132
Total for same quarter of—				
1910	3,366	2,831,469	219	3,175
1909	3,206	2,733,830	220	3,731
1908	2,684	1,940,133	172	2,626

Table No. 2A. *Derailments due to defects of roadway.*

Cause of accident.	Number.	Killed.	Injured.	Damage.
Broken rail	115	14	356	$163,922
Spread rail	70	2	64	32,055
Soft track	73	..	30	47,851
Bad ties	16	..	12	5,632
Sun kink	2	1	16	311
Irregular track	101	5	132	86,521
Miscellaneous	88	6	125	53,899
Total	465	28	735	$390,191

Condensed accounts are given of investigations by the commission's inspectors of 14 train accidents, and of one accident where a freight train ran into a street car.

The *Railway Age Gazette* accident records for these three months were published December 1, page 1102; December 22, page 1284; January 26, page 154. We copy from the bulletin the facts relating to the causes of these accidents in so far as they afford information not already published. Following are the dates and places:

October 9. Boston & Maine; Hampstead, N. H.; butting collision of freight trains about 3 a. m.; 1 employee killed.

October 15. Missouri Pacific; Fort Crook, Neb.; butting collision, passenger and freight; 8 persons killed, 37 injured.

October 16. Detroit United Electric; Volney Smith's crossing, near Detroit, Mich.; 1 passenger killed, 61 persons injured.

October 19. Pere Marquette; Detroit, Mich.; butting collision; passenger and freight; 1 employee killed, 44 persons injured.

October 20. Texas & Pacific; Marshall, Tex.; collision at division terminal; 1 employee killed, 24 persons injured.

October 29. Fort Worth & Denver City; Bellevue, Tex.; derailment of passenger train; 1 employee killed, 40 persons injured.

November 2. Erie; Smithboro, N. Y.; collision; 1 employee killed.

November 9. Nashville, Chattanooga & St. Louis; Dalton, Ga.; butting collision; 1 employee killed, 4 injured.

November 16. Northern Pacific; Spire Rock, Mont.; collision of passenger and work trains; 6 employees killed, 11 injured.

November 18. Great Northern; Tunbridge, North Dakota; butting collision; 2 employees killed, 5 persons injured.

November 22. Chicago, Rock Island & Gulf; Lively, Tex.; derailment of passenger train; 1 employee killed, 1 injured.

November 23. Chicago, Rock Island & Pacific; Peoria, Ill.; street car struck by freight train; 13 persons injured.

December 6. Pennsylvania; Manor, Pa.; rear collision of freights, and a third train derailed; 6 persons killed, 4 injured.

December 9. Chicago, Milwaukee & St. Paul; Corliss, Wis.; butting collision; 1 employee killed, 9 persons injured.

December 18. Chicago, Milwaukee & St. Paul; Odessa, Minn.; rear collision; 8 passengers and 2 employees killed, 23 persons injured. The report on this case was noticed in our issue of May 3, page 1010.

At Hempstead a westbound regular freight collided with an eastbound regular freight because of a misunderstanding of orders. The westbound train, No. 346, running from A to B, C, D, E, F, and G, received at A an order directing it to wait at B until 2:40 a. m. for No. 307, at E until 3 a. m. for the same and at F until 3:25 for No. 309. At C, about an hour later (2:03 a. m.) it received an order concerning four movements (three of which it had nothing to do with) and saying that No. 307 had right over 346 to F. The conductor and engineman of the westbound train erroneously "believed" that the second order annulled or superseded that part of the first order directing them to wait at E until 3 a. m., and they went on past E and collided with the eastbound train. All of the employees involved were experienced men. The inspector found that a new book of rules was adopted June 21, 1909, but that these trainmen had not been examined on those rules. (It does not appear that this had anything to do with their error).

At Fort Crook (Gilmore Junction) the conductor of an eastbound freight made a mistake in reading the register, before he started on his trip, and assumed that westbound passenger train No. 105 had cleared the single track, on which he afterward met it. He says he felt sure that 105 was in; also that he may have mistaken 155 for 105, or may have looked on the wrong date. The engineman should have examined the register, but he took the conductor's word. The register is at South Omaha. Thence to Gilmore Junction the line is double track and the essential thing to learn from the register was whether or not the passenger had reached Gilmore Junction and passed on to the double track. The freight conductor concluded not only that it had gone on to

TABLE No. 1.—CASUALTIES TO PASSENGERS, EMPLOYEES, AND OTHER PERSONS—OCTOBER, NOVEMBER, AND DECEMBER, 1911.

	Passengers.		Employees on duty.		Employees not on duty.		Other persons not trespassing.		Trespassers.		Total persons.	
	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
Collisions	22	1,425	92	901	...	34	2	10	14	8	130	2,378
Derailments	4	1,083	82	629	4	9	...	5	10	8	100	1,754
Accidents to trains, cars, or engines, except collisions, derailments, and boiler explosions	...	33	1	227	...	8	...	77	2	3	3	350
Bursting of, or defects in, locomotive boilers or boiler attachments.	1	6	8	218	...	...	...	...	...	...	9	224
Total train accidents	27	2,547	183	1,975	4	51	2	92	26	41	242	4,706
Accidents to roadway or bridges not causing derailment, such as fires, floods, landslides, explosions, etc.	...	...	3	20	...	...	...	1	...	...	3	21
Coupling or uncoupling cars. (Does not include accidents with air or steam hose.)	...	...	53	912	...	1	...	...	...	...	53	913
While doing other work about trains (not in shops or engine houses) or while attending switches	...	...	37	4,931	...	...	...	...	...	...	37	4,931
Coming in contact, while riding on cars, with overhead bridges, tunnels, or any signal apparatus, or any fixed structure above or at the side of the track	...	4	23	400	...	3	...	...	7	14	30	421
Falling from cars or engines	11	85	117	1,574	2	11	...	19	102	113	232	1,802
Getting on or off cars or engines	24	648	55	2,055	9	58	3	26	146	383	237	3,170
Other accidents on or around trains not here named	2	773	19	284	1	35	6	165	6	58	34	1,315
Being struck or run over by engine or car at stations or yards	9	30	208	354	30	32	36	67	294	270	577	753
Being struck or run over by engine or car at highway grade crossings	...	...	...	1	...	4	220	623	46	45	266	673
Being struck or run over by engine or car at other places	1	...	150	145	30	13	22	22	763	313	966	493
Other causes	4	198	2	141	...	45	14	276	29	98	49	758
Total other than train accidents	51	1,738	667	10,817	72	202	301	1,199	1,393	1,294	2,484	15,250
Grand total	78	4,285	850	12,792	76	253	303	1,291	1,419	1,335	2,726	19,956

the double track, but that it had reached South Omaha before he was ready to start out. The collision occurred at 8:46 a. m. The engineman of the freight, being on the inside of a curve, saw the passenger train and brought his train almost to a stop. The passenger train was running 40 miles an hour.

The despatcher says that he had sent to the freight conductor a message (not an order) notifying him that the passenger train should pass Gilmore Junction (and enter double track) about 8:50 a. m. Both the operator at South Omaha and the conductor say that they did not receive this message.

The inspector found that the register at South Omaha, kept in the office of the yardmaster of the Missouri Pacific, was made up by information received over the telephone through the office of the Union Pacific despatcher. The M. P. trains use the tracks of the U. P. as far as Gilmore Junction. For example, a passenger train passes Gilmore Junction; the U. P. signal man notifies the U. P. despatcher at Omaha; thence the report is sent to the M. P. despatcher at Falls City, 100 miles south, and the despatcher there issues an order to the M. P. yard office at South Omaha to register the passenger train as having arrived at South Omaha at a certain time. This method, says the inspector, affords opportunities for mistakes and should be discontinued; the register should be kept at Gilmore Junction. The conductor of the freight said that he often had to call up the despatcher in order to learn if trains were in, and had been told to go out into the yard and look for them.

The collision on the electric road near Detroit was due to careless running where the rules required limited speed. The southbound cars were running on schedule No. 59, in three sections, one car constituting each section. The crew of the second section had orders to stop (on double track) whenever they met a certain crew coming north, and change off with them. This northbound crew was in charge of one of the three sections of northbound No. 60, but the southbound men did not know which of the three sections, and so they had to slacken speed on meeting the first and the second sections; the crew proved to be on the third. Thus second 59 had lost some time, and when it finally stopped to make the change it was run into at the rear, within 30 seconds after stopping. The time was about 8 p. m., and the weather is said to have been clear, though there had been fogs at certain points along the track. The motorman of third No. 59 did not know that the men on the second section were to change off. It is also said that he did not reduce speed when he ran into a fog bank. At the point where the men changed off there is a curve which, according to the rules, should have been approached at reduced speed, and also there is a slow board 700 ft. back. Trains are required to keep 3,000 ft. apart, but, says the inspector, it is impossible to carry out this rule in dark or foggy weather.

The butting collision at Detroit, October 19, occurred at 3:40 a. m. A freight in the yard, disregarding an order to keep out of the way of an approaching special passenger train was left standing on a side track with the switch open; and the passenger train, coming on at about 40 or 50 miles an hour, ran over the switch and into the head of the freight. The freight conductor had been notified about 3 o'clock that the passenger would arrive at 3:30, but instead of promptly informing his engineman and brakeman, he remained in the office until it was too late to avert the collision. The passenger train came on at full speed, regardless of a semaphore signal 2,000 ft. from the switch which indicated that the switch was not set for the main track. In clear weather this signal could have been seen 3,000 ft. back, but on this night there was considerable fog. However, there were sufficient landmarks to enable the engineman to "pick up" the signal without difficulty.

In the collision at Marshall, Tex., a hostler in charge of a locomotive which had just been detached from a passenger train ran it through the yard at a speed of 12 to 20 miles an hour and met a freight coming in without a headlight. The hostler reversed the engine, opened the throttle and jumped off; he also released the air brake; and the engine ran back and collided with another passenger train; and a switchman at the rear of that passenger train, engaged in coupling a yard engine to the passenger cars, was killed. The hostler is censured for not having stuck to his engine, and for running too fast. The roundhouse fireman, who was on the engine, had been advised of the absence of a headlight on the incoming freight, but he had not given this information to the hostler.

The derailment at Bellevue, Tex., was due to the loosening of a rail joint; supposed to have been malicious. It occurred at 10:35 p. m. Section men had passed over the track on a hand car a half hour previous.

The collision at Southboro, N. Y., November 2, at 7:59 p. m., was due to the neglect of the engineman of a freight, who ran past distant and home automatic block signals and struck another freight on a crossover. This last-mentioned train had sent out a brakeman with a lantern, which he swung. A brakeman on the other train was riding on the engine and told the engineman that he had passed a flagman. The engineman (who was killed) continued, heedless, and then the brakeman crossed over to the engineman's side of the cab, but not in time to prevent the collision. The inspector holds him at fault for not promptly taking charge of the engine when he saw the engineman's neglect.

The collision near Dalton, Ga., was due to the failure of a teleg-

rapher to deliver an order. This collision occurred at 7:30 a. m., northbound extra, 174, meeting southbound regular freight No. 19. No. 19 encroached on the time of the other train by reason of not having received the meeting order. The telegrapher had delivered a copy of the order to train No. 7 and admitted his signature on it, yet claimed that he did not remember copying it or delivering it to No. 7. His carbon copy has never been found. The despatcher is censured for sending to Dalton a meeting order requiring trains to meet at that point when he might have sent it to another station. According to the rule he should have sent the order to one of two other offices and also have sent a copy to the operator at Dalton, that being the meeting place.

The collision at Spire Rock (Pipestone), Mont., was due to a misunderstanding of flagging instructions. A work train consisting of two platform cars and a caboose, with the engine at the rear, met an eastbound passenger train in a deep rock cut, on a curve of 11 deg. Two light engines and the passenger train were due from the west. The flagman, asking if it was time for him to go out with his signals, was told by the conductor "yes; flag the helpers" (the light engines). When the passenger train came along the flagman boarded its engine, and when asked by the engineman if he was ordered to hold the passenger train replied in the negative. The work train conductor (who was killed) seems to have thought that his train was being protected against the passenger train; but there had been no suspension of the rule requiring him to keep clear of passenger trains at all times.

The collision at Tunbridge (Rugby) was between a westbound freight and an eastbound mail train, the latter having only two cars, one a mail and one an express car. This collision occurred about midnight and in a hard snow storm. The freight ran past the station at which it should have waited for the eastbound train, the engineman having forgotten about the eastbound train. the fireman had taken no interest in the question of the right to the road, as against the eastbound train, and the front end brakeman said he thought (assumed) that his train had been given time over the eastbound. The freight conductor was in the caboose and did not notice when he passed Tunbridge. He claims to have told the engineman that they should have to wait at Tunbridge for the eastbound train, but the engineman denies having had any such conversation. The eastbound train had an electric headlight and the engineman of the westbound saw it in season to bring his train to a stop; but his own headlight was an oil burner.

The derailment at Lively, Tex., was caused by the breaking of a switch rail 15 ft. long. Nothing is said about the quality of the rail or the character of the break. The baggage car and the smoking car were of steel, and their strong construction is believed to have contributed to the safety of the passengers.

The street car struck by a freight at Peoria, Ill., was run on to the railway crossing by its motorman regardless of the rule requiring him to stop and allow the conductor to go forward. The crossing in question has gates but they are not used at night or on Sunday. This accident occurred at 10:15 p. m. The freight train was running at 15 miles an hour; and the inspector says that a lower rate of speed should be required in the city of Peoria. He also says that there should be a derail in the street car track.

The accident at Manor, Pa., was primarily a rear collision of freights, but the wreck from this collision fouled another track and a train of express cars ran into it. The inspector says the collision was primarily due to the failure of a flagman to go back, and that the engineman's fault was "contributory." In point of fact, this engineman ran past two distant and one home automatic signals, the outer distant signal being 6,654 ft. east of the home signal. He seems to have reduced his speed at both of the distant signals, and just before he reached the home signal he saw the flagman; but the rails were slippery. The grade descends at about 1 per cent.; the rate of speed is not mentioned.

The accident at Corliss, Wis., was due to forgetfulness on the part of the men in charge of a freight train and (apparently) disregard of electric indicators at switches. The collision occurred at 6:23 p. m. during a dense fog. A cautionary bulletin calling attention to the fog had been issued and the attention of the engineman of the passenger train had been called to this bulletin. The freight consisted of only an engine and a caboose. To go west it had to cross the eastbound track on which the passenger train was approaching. At the entrance to the main tracks there was a switch indicator. There is an automatic home signal a half mile west of the switch and a distant signal a mile farther. The switch indicator indicates the approach of trains at a point 2,000 ft. still farther west, or nearly two miles. The conductor, receiving from the despatcher his order to proceed, neglected to instruct his brakeman to flag against the passenger train, having forgotten that such a train was due. He had been in to the telegraph office and checked the register, as regards westbound trains, but not eastbound. He had never been examined on the automatic block signal rules and said he understood the automatic signals would protect him. The engineman of the freight was killed in the collision. The front brakeman of the freight says that the switch indicator showed "that the block was clear," and that his train started from the side track "about five minutes" after he had thrown the switches. This brakeman had had experience on the Pennsylvania, but had been on the Milwaukee road only three months. He had no copy of the block signal rules, nor even of the time-table, although he said he had several times asked for one. He did not know that No. 12 (the passenger train in question) was on the time-table. The rear brakeman threw one of the three switches, but without looking at the switch indicators. He had forgotten about No. 12 until he heard it coming. The engineman of the passenger train said that the distant signal, when he passed it, indicated clear. At that point he was running 55 miles an hour, and at the home signal, 60 miles an hour. The home signal was against him and he set the brakes in emergency. He could see only about 150 ft. ahead and jumped off when he saw the freight engine. The operator at Corliss had no carbon copy of the clearance card issued to the freight, although the rules require copies to be kept. He said the conductor asked him nothing about eastbound trains, and he said nothing to the conductor about No. 12, although he knew that it had just passed the last station west of Corliss.

Electric Railways reporting to the commission (not included in the foregoing statistics) had 90 persons killed during the quarter and 1,062 injured; and there were 42 collisions and 23 derailments. Train accidents are charged with 10 fatalities—four passengers and six employees killed in collisions. The total number of passengers killed from all causes was 10, and of employees 21 (5 in industrial accidents). The number of trespassers struck or run over by cars was 48; 30 killed and 18 injured.

When the Hauenstein tunnel in Switzerland was begun the workmen struck for higher wages. The strike was settled by an agreement with the several workmen's unions that for one year the wages should be as follows: Workmen employed outside: masons, 14 cents per hour; laborers, 9 to 10 cents; hod-carriers, 7 to 9 cents, with a ten-hour day. For men engaged inside the tunnel, $1.20 per eight-hour day will be paid to miners and masons, and $1 to laborers removing debris, etc.; 14 cents an hour for carpenters, and 10 per cent. more for overtime; 50 per cent. more for Sundays, and double pay for night work.

The standard gage for Portuguese East Africa is the South African gage of 3 ft. 6 in. This gage obtains in most of the new railways recently undertaken by the government as it utilizes the material and rolling stock discarded by the main Lourenço Marquez-Johannesburg line. This main line is now introducing American locomotives of the Mallet type. English and German locomotives are also in use as well as coaches and rolling stock from the same sources. Many of the trucks are of Portuguese manufacture. American manufacturers interested in the railways and port works of Mozambique province should address communications and literature to A. Direcção do Porto e dos Caminhos de Ferro, Lourenço Marquez, Portuguese East Africa.

ANNUAL MEETING OF THE AIR BRAKE ASSOCIATION.

Convention Report, Including Papers and Discussions on Hose Failures and on Wear of Shoes as Affected by Wheel Loads.

The nineteenth annual convention of the Air Brake Association was held at the Jefferson Hotel, Richmond, Va., May 7-10, W. P. Huntley, general foreman of the Chesapeake & Ohio at Ashland, Ky., presiding.

THE JOB BEHIND THE CLEANING DATE.

After the opening exercises a paper on The Job Behind the Cleaning Date, by C. P. McGinnis, was read by his successor on the Soo Line, H. A. Clark. It relates to the remarkable results accomplished by Mr. McGinnis, in the past two years, in improving the air brake service by careful inspection of the freight brake equipment, systematic testing and cleaning of triples and brake cylinders, and the providing of proper facilities for the purpose. This work has proved so important that representatives of other lines have gone to the Soo yards to inspect and study the methods used.

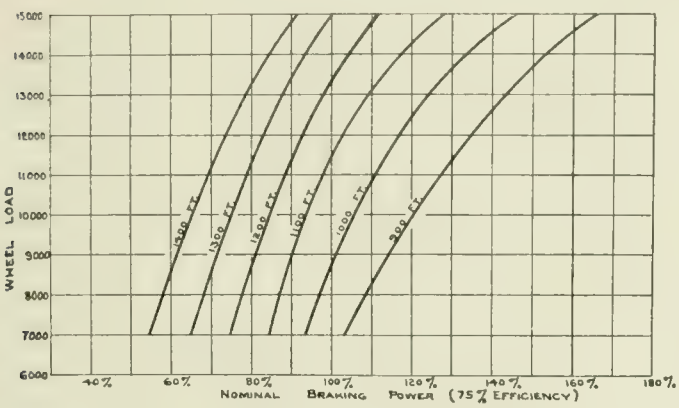


Fig. 1—Braking Power Required to Make Stops from 60 m. p. h. for Various Wheel Loads; Steel Tired Wheels.

In the discussion the Pennsylvania method of testing the leakage of brake cylinders by gage and limiting the leakage to 5 lbs. per minute was generally commended; this practice is extending to other lines and its general adoption was strongly urged. It is difficult to comply with federal laws relating to air brakes and maintain 85 per cent. of the brakes on a train in good order without a well organized system of tests and inspection.

LIGHT AND LOADED AIR BRAKE EQUIPMENT.

W. V. Turner, of the Westinghouse Air Brake Company, gave an illustrated lecture on Recent Air Brake Developments. It dealt more particularly with the improved brake for light and loaded freight cars, and excited such unusual interest that this brake equipment will probably come into more general use.

Discussion.—C. C. Farmer described the successful operation of this system on the Bingham & Garfield in the copper region of Utah. Here 40 loaded cars weighing 3,040 tons are handled safely on a 16 mile grade, 3.2 per cent. maximum. The operation of the trains was one of these most difficult problems encountered by the air brake company. This equipment has also been applied to 500 cars on the Denver, North Western & Pacific, and there are a few in use on the Santa Fe, the Baltimore & Ohio, and the Southern Pacific. Representatives from these lines reported it working successfully and without any unusual difficulties On account of its great advantage in increasing the percentage of brake power to the weight of the train it is expected that the use of this brake will extend to lines in level districts as well as on the heavy mountain grades, and it will be especially useful on 50-ton coal and ore cars.

AIR HOSE FAILURES.

A committee report on this subject, presented by T. W. Dow, chairman, directed attention to the great increase in the bursting and blowing off of the hose from the fittings. Careful observations on a large railway during the past summer indicated that these troubles are worse during the hot weather than during the winter months. While a number of suggestions have been made as to why the difficulties with air hose have increased so greatly during the past few years, there seems to be little question but that it is largely due to the use of poor and inferior material. There is also no question but that a good grade of rubber could be supplied if the railways were willing to pay a higher price for the hose. It was suggested that the Master Car Builders' specifications were not severe enough and should be revised. Also that far better results would be obtained by buying the hose on a service basis rather than on specifications which make no reference to the service results which must be obtained. A considerable amount of trouble is experienced because of frozen or stiff hose, and it is believed that this could also be remedied by using better material. In order that prompt and effective results may be obtained in remedying these difficulties it will be necessary for all the roads to work together as a unit, and it was suggested that the Master Car Builders' Association take some step to bring this about.

Discussion.—Part of the discussion related to the hose blowing off of the nipple, but the principal interest was attached to the quality of the hose. In passenger service, with long cars and short cross-overs, there is such a large lateral movement of the car ends that the hose is pulled off, even with proper holders which provide for a free lateral movement. Some lines limit the service of passenger brake hose to six months, and it is then used in freight service; others make a longer limit and then scrap the hose entirely. They also test the hose on passenger engines with soap suds daily.

The northern lines still have trouble from rigid hose in very cold weather, and it is often necessary to remove hose from freight cars after six months' service in severe winter weather. The inferior quality of the rubber, especially that in the inner tube, was discussed at length, and it was generally admitted that the price usually paid was too low to secure rubber of good quality.

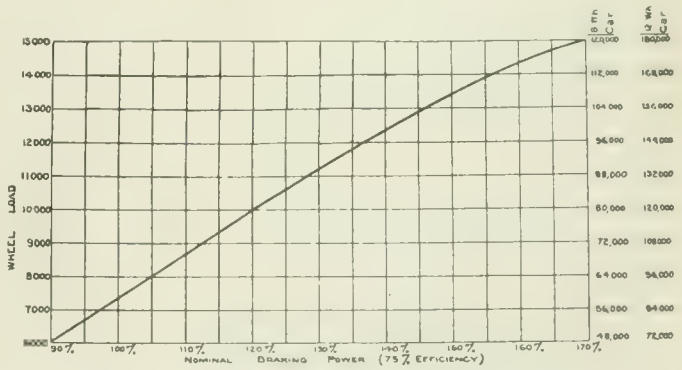


Fig. 2—Relative Braking Power Required for Cars of Different Weights to Produce the Same Retarding Force or Length of Stop.

The M. C. B. specifications should be revised in several particulars, especially in requiring a high tensile strength for the rubber, so as to more effectually exclude poor rubber. Metallic coverings for air hose were approved by some, and by others it was even suggested that a complete metallic flexible coupling be used for passenger cars instead of rubber hose. Considering

the short life of rubber and the expense for hose of good quality, it is possible that a metallic pipe union would prove economical in the end. Attention was directed to the importance of storing hose in a dry place where the temperature is not too high.

UNDESIRED QUICK ACTION OF FREIGHT TRIPLES.

J. W. Walker read a paper on this subject in which he analyzed the cause of the trouble known among trainmen as "kicker," "snapper" and "dynamiter," due to the emergency application when service stops only are desired. The numerous causes of the abnormal action of the triple, because the auxiliary reservoir pressure cannot reduce as fast as the brake pipe pressure falls, are listed on the chart below.

Weather conditions:
- Unequal expansion of different metals.
- Freezing of moisture.
- Gumming up of excess lubricant.

Lubricant:
- Too heavy.
- Too much used.

Feed valve:
- Sluggish.

Engineer's brake valve:
- Condition of—
  - Preliminary exhaust port too large.
  - Equalizing piston:
    - Dirty.
    - Gummed up.
    - Tight.
  - Conical end of piston stem filed off.
  - Removal of exhaust fitting.
- Manipulation of -
  - Lap, allowing brake pipe leakage to
    - Apply brakes.
    - Open graduating valve.
  - Partial emergency position used for service.
  - Too light preliminary reduction.

Equalizing reservoir:
- Leaky.
- Volume reduced by water, etc.
- Too small.
- Choked passage between equalizing piston chamber and equalizing reservoir.

Brake pipe:
- Leaky.
- Long.

Conductor's valve:
- Attempted service application with.

Triple valve:
- Restricted service port in body or passage to brake cylinder.
- Restricted service port in slide valve.
- Dirty.
- Gummed up.
- Excessive friction of slide valve.
- Tight piston.
- Restricted feed groove.
- Piston makes tight seal on bush.
- Gum on piston bevel.
- Graduating valve spring catching in bush.
- Weak graduating spring combined with excessive friction.

Piston travel:
- Short.

Most of these causes can be removed if the brakes are properly maintained. The paper describes a device for locating triples which produce undesired quick action, the invention of C. L. Courson. It consists of an indicator placed between two hose couplers, so as to couple in the train line. When several of them are placed in a train line and brakes are applied, the needle on all the indicators will point in the direction from which the quick action started, and by a process of elimination the defective triples are located.

Discussion.—It was generally agreed that the use of dry graphite as a lubricant for the triple slide valve was the best remedy and has overcome most of the trouble so far as it relates to the triple itself. Air brake students are of the opinion that triples should be so improved that these difficulties will be removed and Mr. Turner, of the Westinghouse Company, said that that company had designed an improved triple which would not apply the emergency unless desired.

FRICTION AND WEAR OF BRAKE SHOES AS AFFECTED BY THE WHEEL LOAD.

R. C. Augur, engineer of tests, American Brake Shoe & Foundry Company, read an elaborate report on this subject. The first part of the paper gave an interesting historical account of brake shoe tests and of brake tests. It showed the loss in efficiency by increased brake shoe pressure and included diagrams illustrating the present conditions in express passenger service. The author proposed a rational sliding scale for proportioning the braking power, the development of which is as follows:

The time has come when a sufficient mass of positive and usable data have been accumulated to enable us to say that the method used for so many years of proportioning braking power on passenger cars to 90 per cent. based on a brake cylinder pressure of 60 lbs. is no longer tenable and must become obsolete in the immediate future. Even though our methods have given good results in the past under other conditions, the situation today has so changed that practice must now be made to agree with known facts. If we wish to operate our passenger trains with smoothness and safety we must adopt a rational sliding scale for proportioning the braking power.

Diagram 1 shows the amount of braking power required to make machine test stops from a speed of 60 miles per hour in a certain distance with different wheel loads. These curves will vary, of course, with different shoes, and had shoes of lower frictional qualities than plain cast iron or Diamond "S" been used, they would have been further to the right and have shown the necessity of higher percentages of braking power for the same length of stop. The general character of the curves would have been the same, however. Similar curves for stops from a speed of 40 miles per hour might have been included, but they would not have brought out the facts any clearer as the angle of slope is essentially the same, although the distances in feet are less.

Diagram 2 shows the percentages of braking power which are necessary to insure essentially the same retarding force or length of stop with cars of different weights. To illustrate the way the diagram should be used we will assume that we have an eight-wheel coach weighing 69,000 lbs. By consulting the diagram we find that the braking power should be 110 per cent. If, on the other hand, we had an eight-wheel coach weighing 104,000 lbs., we find that the diagram calls for 146 per cent. braking power. By adopting a sliding scale such as this in proportioning braking power for passenger cars, stops will be shorter and smoother, while the danger of the wheels sliding under abnormal conditions will be decreased. These are features appreciated by the traveling public, and are also desirable from the viewpoint of the air brake and the transportation department.

The results shown on Diagram 2 can be expressed very nearly by the following formula, the assumption being made that 90 per cent. is a satisfactory braking power for the light cars having a wheel load of 6,000 lbs.

$$\text{Percentage of Braking Power} = 90\% - \left[\frac{\frac{\text{Weight of car}}{\text{No. of wheels}} - 6{,}000}{100}\right]$$

Stated in another form, this means that for every 100 lbs. increase in wheel load in excess of 6,000 lbs., an addition of 1 per cent. braking power should be made. In calculating braking power for baggage cars it is desirable to add 15 per cent. to the weight of the car for the load carried, and base the braking power on the assumed loaded weight.

In all of this discussion we have not referred to the acknowledged advantage of having the emergency braking power in excess of that used in service application. This difference is desirable on all weights of cars, but is of increasing importance with very heavy equipment. What we have desired to emphasize is that the braking power should be proportioned in accordance with the laws of brake shoe friction and that this calls for increasingly higher percentages of braking power as the car weights are increased.

While the subject of brake shoe friction is a vital one in con-

nection with the design of car brakes, the rate of wear of brake shoes is one that is ever with us, as it affects operating costs. In the effort to obtain increased durability and consequently reduced costs, there has been a marked tendency on the part of many roads to use shoes of rather low frictional properties, not realizing that the saving is more apparent than real. On the other hand some of our largest systems appreciate the fact that brake shoes are used to do work, that other things besides durability are essential and that they are not applied simply as ornaments or to permit cars to be interchanged. If the work is done shoes will wear out and all that we should ask is that they render a good return for the investment. It is not the part of wisdom for a road to apply the latest improved brake mechanism and increase the braking power so that good stops can be made and then defeat what has been gained by selecting brake shoes solely because of their durability.

The paper closes with a discussion of brake shoe wear. Mr. Walker believes that we are going beyond brake shoe pressures which are good practice and mentioned experiments which are being made with clasp brakes which may have an important bearing on future practice.

Discussion.—The paper was discussed at length by S. W. Dudley of the Westinghouse Air Brake Company, who showed that while 90 per cent. of the brake power was applied to the shoe only 10 per cent. was realized in efficient work in stopping the train, and the principal loss was due to the brake shoe. The co-efficient of friction which is usually only 10 to 12 per cent. in passenger service, was the real measure of brake efficiency and some improvement should be made in the methods of brake shoe application to increase his efficiency.

W. L. Burton, of the Westinghouse Air Brake Company, then described verbally the clasp type of foundation brake gear for heavy passenger cars, and presented drawings of such gear as applied to four and six-wheel trucks on the Philadelphia & Reading. This gear has been in successful use on that road for about two years, and a service of 12,500 miles per brake shoe is obtained. The total leverage is 9 to 1, and as the usual load on the brake shoe is divided by two the wear is reduced and there is much less heating of shoes than where only one shoe is used per wheel.

W. V. Turner regarded these two papers—that of Mr. Augur and of Mr. Burton—as so important that the subject should be followed up, and it was decided to appoint a committee to further develop the proposed improvements, and report next year.

WESTINGHOUSE PC EQUIPMENT.

Thomas F. Lyons, of the Lake Shore & Michigan Southern, read an extensive paper on this subject in which he brought out the results obtained from the PC equipment in road service in the past few years, and explained in a general way the proper methods of train handling and the care and maintenance of the equipment. In closing he said:

"In conclusion it can be said that the PC equipment has fulfilled all the requirements laid down after the Toledo tests by the air brake supervisors of the New York Central Lines, and also that it does accomplish what was required by the railroad conference held in Pittsburgh in 1909.

"It is essential, however, that the truck and foundation brake gear be of such a design as to withstand the enormous pressure developed by the PC equipment. If this is done, it will only be necessary to state what stopping distance is required above 800 ft. at 60 m. p. h. in order to have it accomplished. As the matter now stands we cannot be sure whether the forces developed are being applied properly or not; that is to say, the trucks tilt, changing the weight on the wheels more or less, the springs are pulled down together, there is longer piston travel, and in various ways the forces are distributed in a detrimental manner. This, of course, largely defeats the object and may result in abnormal stresses in the train, flattening of wheels, etc.

"There can be no question but that the PC equipment will meet all the requirements of service braking and develop all the force required for emergency; but for these features to operate effectively, it is essential that it should have the proper foundation to work upon, and for this, it is not out of place to ask this association to put forth its best efforts to secure such truck and foundation gear design as will meet the requirements."

Discussion.—The discussion related principally to the manner in which the engineers reduced pressure in applying the brake when the PM and PC brakes were mixed in a train. Much of the difficulty from the flat wheels was due to improper application, and in not carefully following the instructions for the use of these brake equipments.

PIPE AND PIPE FITTINGS.

P. H. Donovan read a paper on this subject which related more particularly to the air brake piping on locomotives. It gave the results of an exhaustive investigation made by the Westinghouse Air Brake Company to determine the effect of elbows and pipe fittings on the service operation and quick action of the brake. It was shown that the ordinary data relating to air transmission in pipes does not apply to brake operation and is misleading if so applied. To secure proper brake action the pipes and fittings must be such as will insure a drop of pressure in the brake pipes at the rate of 8 lbs. per second.

AN APPRECIATION.

Following this discusison the executive committee presented the following resolution relating to W. V. Turner, which was unanimously adopted:

"Resolved that as Mr. Walter V. Turner, chief engineer of the Westinghouse Air Brake Company, has devoted so much of his time and efforts towards the welfare and usefulness of this association, it is the sense of this association that a suitably engrossed resolution of appreciation be presented to Mr. Turner as a tangible recognition of our esteem and of his ability and genius."

In response Mr. Turner gave an interesting account of his career in connection with his work in developing air brake equipment.

OTHER BUSINESS.

Brief addresses were made by J. F. Walsh, general superintendent of motive power of the Chesapeake & Ohio, and J. E. New of the Norfolk Southern.

The following officers were elected: President, H. A. Wahlert, Texas & Pacific; first vice-president, W. J. Hatch, Canadian Pacific; second vice-president, L. H. Albers, New York Central; third vice-president, J. T. Slattery, Denver & Rio Grande; secretary, F. M. Nellis, Westinghouse Air Brake Company; and treasurer, Otto Best, Nathan Manufacturing Company. St. Louis was selected as the place of meeting for next year.

At a meeting of the German society of mechanical engineers last February, Herr Hammer, after reporting on the locomotives shown at the recent Turin exhibition, Italy, and recounting the improvements introduced in recent years, named as follows the particulars in which still further improvement is to be sought: Higher steam pressure; the use of steam more highly superheated; improvement in valve gear; utilization of the heat which now escapes through smoke stack, etc.; purification and preheating of feedwater; all with the least possible multiplication of parts.

A contract between the Philippine government and the Manila railway was signed on January 23, which binds the government to furnish funds for the extension of the railway in the south of Luzon. The total advances for this work will eventually amount to $2,250,000. The section covered by this contract lies between Lucena and Legaspi, 110 miles, and the projected line will include a branch to connect the through line with a new port to be established on the east cost of Luzon.

AN "INTER-RAILWAY INSTITUTE OF TECHNOLOGICAL INVESTIGATION"

BY A DIVISION ENGINEER.

The statement by a prominent lawyer to the effect that the railways of the United States could save $100,000,000 annually, by making use of such economies of management as are in force generally in industrial enterprises, is of too recent origin to require more explicit mention.

To the conservative railway manager who continuously strives to reconcile demands for wage increases, on the one side, with demands for dividends, on the other, demands for low freight rates and lower passenger fares with demands for fast freight service and increased elegance of passenger equipment, increasing scarcity of labor with demands for better roadbeds and heavier rail, optimism in regard to this saving is difficult. The actual amount may be dropped from serious consideration because it was in all probability used by the author in a relative sense only, as a means of conveying in a concrete way the assertion that stupendous savings are possible.

The railway official is chiefly interested in the truth or fallacy of this general hypothesis on which the statement was founded.

Which is better managed: the railway or the industrial enterprise? Is there a fighting chance, independent of the foregoing question, to better the methods now in practice of managing the railways? If so, the railway officer wants the opportunity to improve his method, and he wants it now.

True criticism involves the naming and application of the curative. A great deal has been said and printed during the past year about "efficiency" and "scientific management," chiefly of industrial enterprises. Thought has grown and expanded along these lines as means of increasing profits in the face of stationary or even decreasing prices. The factory superintendent has a perfect outfit of machinery; his trade cannot well be increased; profits are very small; cost of raw materials is rising, threatening to wipe out the already small margins of profit; the only means of increasing profits without large initial outlay for facilities is improvement in methods of production. The efficiency expert is abroad in the land in answer to this general industrial need. By study of the details of the methods of working, you may be able to show your "hands" how 10 or 20 or 30 per cent. of their steps may be saved with resulting benefit to yourself, and the employees. Your factory may thus be made to produce the same volume of finished product at much less cost and without any other outlay than the time and thought necessary in evolving the method and instructing your workmen in it.

To all other advantages you may surely add increased respect of your staff for your business acumen, and this means much. Every man enjoys success, whether his own or his employers'; he glories in being concerned in useful work. He abhors working for a weak concern and will not do his best for it.

We hear that bricklayers under the efficiency system, by assuming the proper positions and making correct and no superfluous movements, lay more brick per day; shovellers move more material in an hour. Bricklayers, shovellers and artisans of many kinds are in railway service. Have railway men attained 100 per cent. efficiency?

E. D. Klyce, in an article in the *Outlook* for November 18, entitled "Scientific Management and the Moral Law," says truly:

> "In almost all industrial establishments, the employer knows far too little about the details of each part of the work under him; that is left to the employee. Therefore, there are hundreds of different ways of doing the same little job in different parts of the country, and hundreds of different types of tools are used.
>
> "Obviously, there must be one best way, and one best tool for each job. It was clearly up to the management. The management of an establishment takes upon itself four new duties.
>
> "The first is to develop a science for each element of a man's work, writing out minute instructions as to just what the workman should do to get the best and greatest results; and to provide the best available tools.
>
> "The next is scientifically to select, and then train, teach and develop each workman.
>
> "The third duty is heartily to co-operate with the workman so as to insure the work being done in accordance with the principles of the science.
>
> "And the last duty of the management is to take over all the work for which it is better fitted than the employee.
>
> "This means minutely planning and recording the work and providing and using an immense amount of scientific data."

The application even in a small factory of these four rules, the third including a system of liberal bonuses, would mean at once a large expenditure of money, time and trouble; as anyone who has given the matter even a half hour's serious consideration may readily understand.

Rule 1 does not seem impossible of gradual application. Rule 2 reminds one of the difficulties of the maid servant problem. Rule 3 savors of altruism, while Rule 4 is clearly "keeping tab."

If difficult of application in a small concern, what would it mean to install this system in the managements of the railways of this country?

The employees are legion, the number of officers enormous, the territory covered is immense, the business done is stupendous, the investment is so great as to be almost inconceivable, even in this six cypher era of "high and frenzied finance."

The business of dealing in a rapid transportation of passengers and goods is so important to our nation's life and progress that twenty-four hours' interruption to the traffic of any important railway is far reaching in damage and discomfort; while any circumstance creating even a partial general tie up of the railways is in the nature of a national calamity.

The management of the railways has grown with them. A system has been evolved in these sixty odd years of experience under the keen scrutiny and tutelage of not a few of the master minds of America looking to the best interests of the investors and of their railway properties.

With so many distinct and competing companies doing business year after year, and side by side, the fittest method of management has of necessity survived. To improve on this system is no mere brick laying proposition; no cleaning up of the mismanagement of some small business doing one sort of work with one class of labor. It is a grave problem to attempt an application of four factory rules to the direction of 240,000 miles and lines of rapid transit carrying to and fro, over a territory of nearly three and three-fourths millions of square miles extent, the men and merchandise of a great nation.

There have grown up many wide differences of management between railways and the so-called industrial enterprises, as natural results of the differences in character of the business transacted. Let us examine Mr. Klyce's statement that "In almost all industrial enterprises the employer knows far too little about the details of each part of the work under him; that is left to the employee." If we add "and minor officers," the statement applies more closely alike to the larger industrials and the railways. The employer knows far too little about the details. I venture to say that this sentence embodies the very greatest fault of railway management.

We see funds so curtailed that needed and true economies are perforce abandoned in favor of empirical reductions in equipment, men and all working facilities. We see false economies and glaring extravagances existing cheek by jowl on the same railway. We see starvation wages and fat schedules allowed in different departments of the same railways year after year, and we see the demoralizing effects on the favored and underpaid alike. We see good workmen hampered by poor tools and poor workmen untaught in the use of good tools. We see office labor multiplied without good results. We see materials purchased without due discretion and disbursed with less.

Why should these things be? Because the employer knows far too little of the details. Until each and every officer knows the needs of the men and property under his jurisdiction, these evils cannot be wholly stamped out. It is not sufficient to stop with a knowledge of the work of one's immediate subordinates. The railway officer is most valuable who knows all the work from the ground up, not of one but of all departments. It is not impossible of achievement, this wide range of knowledge.

It is indispensible to the proper, the scientific, management of railways.

Of what value is an army of brave soldiers under ignorant officers; or of intelligent captains under a foolish general; or of a brilliant general and army, under the orders of a blundering government? The whole machinery of railway management must be of the best from the ground up to be effective. The employer must learn the details before he is fitted to understand, much less to teach, the rudiments of scientific management. "Obviously there must be one best way and one best tool for each job," says Mr. Klyce.

There are many excellent methods employed and many good tools used in railway work. But is the one best tool used and the one best way followed in the performance of each piece of work? Evidently not, for there are many different kinds of tools used for the same work and many different methods used in arriving at the same result on different railways.

Few if any railways buy the best tools. The first cost looks big. There is an ancient but ingrained idea lurking somewhere about headquarters that unskilled workmen can do as much execution with poor tools as with expensive tools. Again, we have to think of Messrs. Jones, and the Smith Company; both firms being at the same time manufacturers of tools and large shippers over our railway. Again, we must allow for the suave supply man who is ingenious in argument to convince us that we should try his superior brand of tools at less cost than those we are buying from his competitor. Also, we experiment; and, to a certain extent, rightly. Too much standardization of tools, materials or methods is deplorable. If standards are made, even scientifically, and blindly adhered to thereafter, progress is not possible. Inventions are every day occurrences in this country. Over a million of patents are of record in the patent office in Washington. Many are for devices used by railways. Standards should be decided on, put in use, and adhered to with discretion; laid aside after mature deliberation only, in favor of some later, well tested and better devices.

Excessive standardization means stagnation. Excessive and ill-advised experimenting means confusion and useless expenditure, with attendant poor results. The railways need the best tools. They are the cheapest. They need the best methods, which are likewise cheapest. Both tools and methods should be standardized and only altered in favor of some later discovered and well tried invention or scheme.

How may this ideal be attained—and maintained? Manifestly, it can best be done by some agency acting in conjunction with all, or a number of the most powerful, railway managements. "In union there is strength."

An experiment station, a bureau of investigation into these matters of vital interest to railway life, created and supported by a fund set aside by the railways, will accomplish these objects, which never have yet, and probably never will be, realized otherwise. At present, it is left to railway supply companies, and to the professors of various colleges of engineering. They have done and are doing much toward perfecting and investigating and demonstrating along different lines with different objects in view. But the railways want concentration of purpose and action; a definite policy; an institute having for its sole object the improvement of tools, materials and methods to be used in railway service; and continuous labor along this line by authorized agents of ability with the best of apparatus and experimental purposes, and commensurate emoluments. We need an Inter-Railway Institute of Technological Investigation; we need the results in printed form, for the use of railway men generally. Otherwise how is a busy official to obtain all this knowledge of the different departments? We need practical education in railway management, and we must create and carry on our own school. The United States government issues from time to time through its agricultural department, gratis or at nominal cost, circulars of high value to agriculturists and others, detailing the experiments, the results obtained and conclusions drawn therefrom by experts in government employ at the different experiment stations. Information similarly compiled would be invaluable to the railway man generally, and could be issued from time to time by this suggested institute with railway support.

There is also at every railway officer's disposal a very simple method of increase of efficiency: the asking of questions.

No railway exists the management of which is absolutely perfect in every detail. Therefore, there is always room for improvement. This possibility is best and soonest visible to the man on the ground. He is in direct charge. He is "up against" each difficulty. He has or must find the best practical solution.

True, he occasionally is consulted by his immediate superior. But time after time, year after year, valuable suggestions by such men go begging because they fail to penetrate to the atmosphere of the headquarters' offices. Why not go after this information systematically? Call it in? No; send after it, and don't send a boy. Send men of proper discernment, and authority, and breadth of mind, and ability to separate the wheat from the chaff. Send them direct from, and let them report to, the highest authority of their road. Let them interview the men behind the guns—the switchmen and yardmasters, the local freight and passenger agents, the firemen and enginemen and roundhouse foremen, the building foremen, the section foremen, the chief clerks and the assistant engineers, the train despatchers and roadmasters and trainmasters. These men know the road, they know its needs—from their points of view, and within their territorial horizon. They can tell you how to improve your facilities and your property values, and your material standards, and your tools, and how to reach your patrons and increase your net incomes. Is this not valuable information? Why then not go and get it systematically and scientifically, and sift it and tabulate it, and put it up in plain and proper form to the big boss? He should and must start the system and maintain and profit by it.

An expression common to American journalism is that "the railways are the best financial thermometers." In other words, the railways first feel and reflect the stress of hard times, the shadow of the threatened financial depression, and the railways first show the effects of money scarcity. Men and trains are laid off, construction in all branches is stopped, cars are stored, scrap heaps are scrutinized, "things tighten up." It may be a real panic, or simply a coming financial year end. The effect is the same. A showing must be made—and it is made. It is imperative, whatever the cost. There is only such judgment used as is allowed. The cut must be and is made. Is this good business? What is the necessity? In your private affairs do you not put away money for the rainy day? Would you consider yourself a good grocer if you saved nothing in a good month to tide you over a slack month? Would you stop buying strawberries in July because of poor business or hard times, when your customers were calling for them every day? Neither the extravagances nor the economies of railways are scientifically conducted, nor are normal expenditures made with all possible discernment. The average railway is far better managed than the average commercial or industrial business, the percentage of failure being far less. But there is undoubtedly room for improvement; and the methods of improvement, and field of most lucrative action, are not far to seek.

In addition to the electrification already decided on of the Kiruna-Riksgransen railway through Lapland, for which purpose a large hydro-electric power station at Porjus is being built, the Swedish state railways have now drawn up a plan for the electrification of the local traffic on the Stockholm-Marsta line and the Gothenburge-Alingas Railway. It is proposed to take the electric power for the latter from the state power station at Trollhattan, the three-phase current to be transformed into one-phase current of convenient voltage. It is proposed to obtain the electric power for the Stockholm-Marsta line from the city of Stockholm's central station at Vartan.

AMERICAN RAILWAY ASSOCIATION.

The spring meeting of the American Railway Association was held in New York City on Wednesday of this week.

J. Kruttschnitt, director of maintenance and operation, Union and Southern Pacific Systems, was elected president. R. H. Aishton, vice-president, Chicago & North Western, was elected first vice-president for the ensuing two years. T. E. Clarke, assistant to president, Delaware, Lackawanna & Western, and H. J. Horn, vice-president, New York, New Haven & Hartford, were elected members of the executive committee. The Boston & Maine, the Hocking Valley, and the Pennsylvania Lines West were elected members of the Committee on Transportation. The Atchison, Topeka & Santa Fe, the Norfolk & Western and the Pennsylvania Lines West were elected members of the Committee on Maintenance. The Chicago & Western Indiana, the Lake Shore & Michigan Southern and the Wabash were elected members of the Committee on Relations Between Railroads. Benjamin McKeen, general manager, Vandalia; J. C. Stuart, vice-president and general manager, Erie Railroad, and G. W. Taylor, general superintendent transportation, Southern Railway, were elected members of the Committee on Nominations. The association decided to hold its next meeting in Chicago on November 20, 1912.

There were present 169 members, representing 187 railways. The executive committee reported that the membership now comprises 348 members, operating 259,198 miles, an increase of 1,289 miles. The associate membership now comprises 116 members, operating 5,895 miles, an increase of 17 members and 676 miles. The committee reported that a number of important subjects had been considered and referred to the several committees of the association for attention. The committee also said that it has become evident that the form of accident report now made to the Interstate Commerce Commission by the railways is of such a character as to cause an unjust estimate to be drawn regarding the safety of travel in this country as compared with other countries. The committee has therefore appointed a sub-committee, consisting of the following: J. Kruttschnitt (U. P. and S. P.), chairman; H. J. Horn (N. Y. N. H. & H.), and W. W. Atterbury (Penna.), to consider the subject.

COMMITTEE ON TRANSPORTATION.

The committee on transportation presented a report in which it submitted an inquiry which had been made to it regarding practice under the Standard Code and the reply made thereto by the committee. The committee also referred to the general revision of the Standard Code, the preliminary work of which is now in progress.

COMMITTEE ON RELATIONS BETWEEN RAILROADS.

The committee on relations between railroads, Arthur Hale chairman, presented a report recommending an increase in the per diem rate for freight cars and the establishment of a commission to supervise the observance of the freight car interchange rules, this commission to have power to impose fine for unreasonable delay or diversion of cars. Referring to the opinion of the Interstate Commerce Commission in the case against the Illinois Central reported last autumn, declaring that carriers are bound to maintain through routes and furnish an adequate supply of cars, the committee says that its present recommendations afford the best means of doing away with the difficulties and abuses which have stood in the way of carrying out the view expressed by the Interstate Commerce Commission. It believes that an increase in the per diem rate will stimulate the acquisition of cars and facilities, and the proposed special commission should be able to bring about a fairer and more intelligent interchange of cars. The recommendations now offered have been discussed and largely formulated by a committee of 15 of the Association of Transportation and Car Accounting Officers, at the request of the American Railway Association committee, and it is believed that the recommendations will be approved also by the Interstate Commerce Commission. The rate for interchanged freight cars at present is 30 cents per car per day in the five months, March-July, and 35 cents in the other seven months of the year. The proposition to make a uniform rate of 45 cents, was approved and referred to letter ballot; if adopted, to take effect January 1, 1913.

The proposal to establish a commission is embodied in a new per diem rule, No. 19, which is as follows:

> The Executive Committee of the American Railway Association shall appoint a commission for the purpose of supervising the observance of Car Service Rules 1, 2, 3 and 4, governing the handling of freight cars.
>
> The commission, through its duly authorized representatives, shall be empowered to examine the records of any carrier for the purpose of determining the merits of complaints filed with the commission, under the following conditions:
>
> Any railway, after due notice to offending line of its intention to do so, may refer to the commission cases of persistent delay or apparent persistent misuse of its cars.
>
> It shall be the duty of the commission to make, through its authorized representatives, such investigations as may in its judgment be necessary to determine facts.
>
> Based upon the facts developed by the investigation, it shall then be within the power of the commission to impose a money fine, the minimum of which shall be $2.00 for each violation, such fine to be paid to the car owner, and to be in addition to per diem accrued and expense incurred incident to the investigation.
>
> In the event the case presented is not proven, the expense of the investigation shall be paid by the complainant.
>
> The commission shall not consider a case unless presented within 90 days from date of first alleged violation, nor shall the investigation extend back of a period of 90 days from date of filing of complaint with the commission, nor prior to the adoption of these rules.

This proposition was referred to letter ballot. If approved, it will become effective July 1, 1912, except for the provisions for penalties (in the fifth and sixth paragraphs above) which will not become effective until September 1, 1912.

The Association also approved the recommendation of the committee that Per Diem Rule 3, reading as follows, be referred to the members of the association for a letter ballot; if adopted to take effect September 1, 1912:

> Freight cars must be handled as prescribed by Rules 1, 2, 3 and 4 of the Code of Car Service Rules of the American Railway Association.

The committee also proposed slight changes in those four car service rules which affect the per diem rule, and in Rule 15 concerning transfer of lading. These were adopted, effective September 1, 1912.

Demurrage Rules.—This committee also recommends a number of changes in the demurrage rules, based on extended conferences with a committee of the National Industrial Traffic League held last March, and in particular at a two days' conference at Atlantic City, March 28 and 29, which was presided over by Interstate Commerce Commissioner Lane. These changes are mostly in the nature of explanations designed to prevent misunderstanding of the present rules. A number of concessions had to be made to the shippers, but some also were obtained from them. The shippers' committee asked that the railways charge demurrage on cars containing their own material; this on the ground that when cars are scarce the railways do not unload cars with the promptness which they require of their patrons; and the committee recommends that this request be granted. These changes were approved by the association, effective September 1, 1912. Standard forms of notice covering constructive placement, and also the placement of cars ordered to public-delivery siding which prove to be unavailable, as well as the form to be used in accordance with the instructions under Rule 8, Section A, were also presented by the committee and approved by the association, effective September 1, 1912.

Rule 5.—The committee again recommends the elimination of per diem rule 5. The per diem reclaim, as now practiced, sometimes looks like an illegal discrimination—a thing which must be avoided. The committee believes that adjustments of switching rates could be made, so as to abolish this rule next January without detriment to any material interest. This was

referred to letter ballot; if approved, to take effect July 1, 1913.

Cleaning Stock Cars.—The committee recommends a new rule to provide that when stock cars have to be cleaned or disinfected the cost should be prorated between the carriers participating in the waybill revenue; but where the work is done on a switching line, the payment is to be in the shape of a reclaim of not to exceed two days' per diem charges. This was approved.

Advice of Cars Sent Back.—Acting on a recommendation of the Car Accounting Officers' Association, the committee recommends a resolution that when a car is refused or sent back to a connection, a written notice, giving the reason, should be sent to the proper transportation officer of the delivering road. This resolution was approved.

Storage Rules.—The committee submits a set of storage rules, based on a study of storage rules now in effect and believed to embody the best American practice. These rules have been submitted to the members of the association and amended in accordance with criticisms received, and now are offered for adoption as recommended practice. No. 4 of these rules covers explosives, etc. For this class of goods rates are named (with a minimum of 25 cents per 100 lbs. per day after 24 hours); but the rates of ordinary merchandise are left blank. The rules in general are based on the principles of the car demurrage rates. These were approved.

Rules for Marking.—In its study of the problem of reducing losses and damage to freight, the committee has reached the conclusion that uniform rules for marking and packing freight are very desirable, and its views on the subject are set forth in a special report, prepared by a sub-committee. In this connection, the committee proposes a resolution that the railways take care to always set a good example in this matter, carefully marking company material transported on the trains. The committee also endorses a form, submitted by the sub-committee, for a standard interline astray freight waybill. All these were approved.

Statistics.—The committee presents the usual statistics of freight car equipment and persons, etc.

COMMITTEE ON MAINTENANCE.

The committee recommends that the association postpone consideration of the rail specification approved by the American Railway Engineering Association on March 20, 1912, feeling that the association will be enabled to act more intelligently after the joint committee of railway officers and rail manufacturers, appointed after the rail conference on March 21, have completed their consideration of the subject. The committee on maintenance hopes to submit a full report on the subject at the fall meeting, at which time it believes it can present the conclusions of the rail committee of the American Railway Engineering Association on the question of rail sections as well as specifications.

It is expected that at the next meeting the committee will be able to present a complete report on right of way clearances and maximum dimensions of box cars.

The committee also presented the following summary of replies to Circular No. 1156, respecting the number of freight cars, passenger cars and locomotives equipped with safety appliances as required by the United States Safety Appliance Standards:

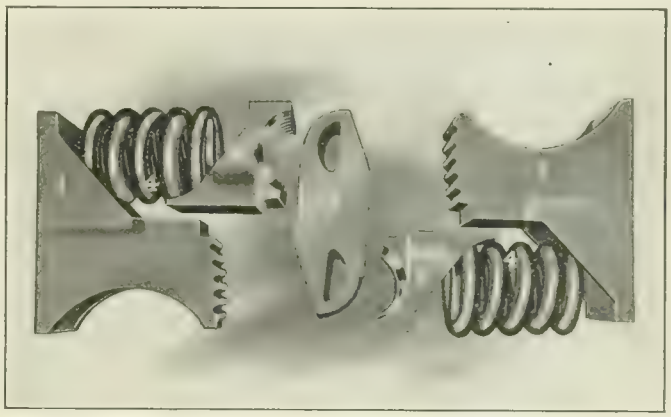
	January 1, 1912.
Number of members reporting	262
1. (*a*) Freight cars in service	1,910,940
(*b*) Passenger cars in service	44,336
(*c*) Locomotives in service	49,980
2. Fully equipped with safety appliances required by United States Safety Appliance Standards:	
(*a*) Freight cars	117,201
(*b*) Passenger cars	8,640
(*c*) Locomotives	13,600
3. Fully equipped with secure grab-irons or hand-holds on the ends and sides of each car, as required under section 4 of the Act of 1893 as amended April 1, 1896, and March 2, 1903:	
(*a*) Freight cars	1,909,717
(*b*) Passenger cars	44,262

The committee on transportation of explosives presented the revised regulations for the transportation of explosives and other dangerous articles by freight, including Shipping Container Specifications 1 to 6, inclusive, which became effective March 31, 1912, and the new regulations for the transportation of explosives and other dangerous articles, effective March 31, 1912, applying to express carriers subject to the Act to Regulate Commerce. It named the 14 express companies by whom the regulations have been issued.

The committee on electrical working presented a revised diagram covering a standard for limiting clearance lines for third rail and permanent way structures and rolling equipment, which was approved by the association. The committee also recommended specifications for overhead crossings of electric light and power lines, which were also approved by the association.

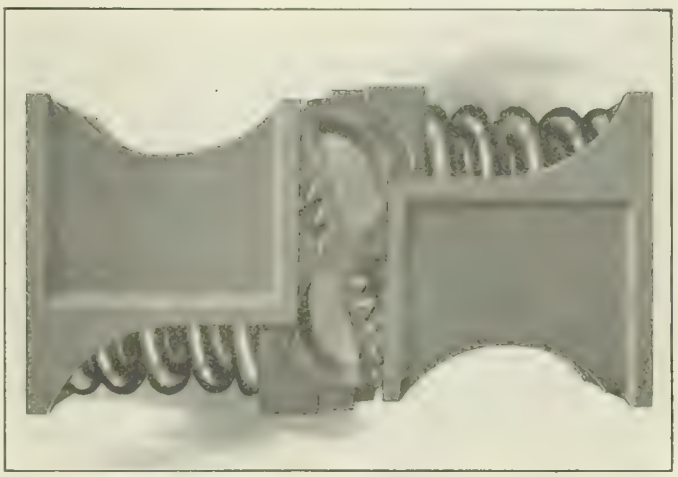
ANDERSON FRICTION DRAFT GEAR.

Friction draft gears of the type here illustrated, have been thoroughly tested by two years' service on the tenders of freight locomotives; the drawing shows a recent application to freight cars which has a greater capacity than the earlier gears. The maximum capacity under static tests is 304,000 lbs., with a 2½ in. deflection, while the earlier gears had a travel of only



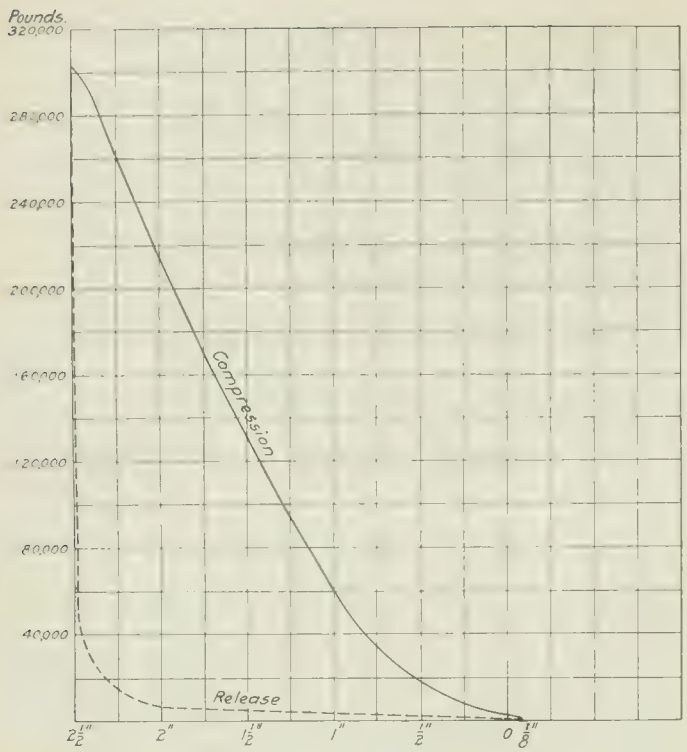
Detail Parts of Anderson Friction Draft Gear.

2 in., and a capacity of 200,000 lbs. Each of the gears consists of only five principal parts, not including the springs. These parts are made of open hearth cast steel, and are shown sepa-



Anderson Friction Draft Gear Parts Assembled.

rately in one of the illustrations. The followers *1* at each end are alike and interchangeable; so also are the spring caps *2*. The lever *3* has V-shaped grooves on the circular faces, and these are the friction elements. They mesh with similar grooves



Static Test Curve of Anderson Friction Draft Gear.

in the spring caps, and these in turn are held against the lever by the draft springs.

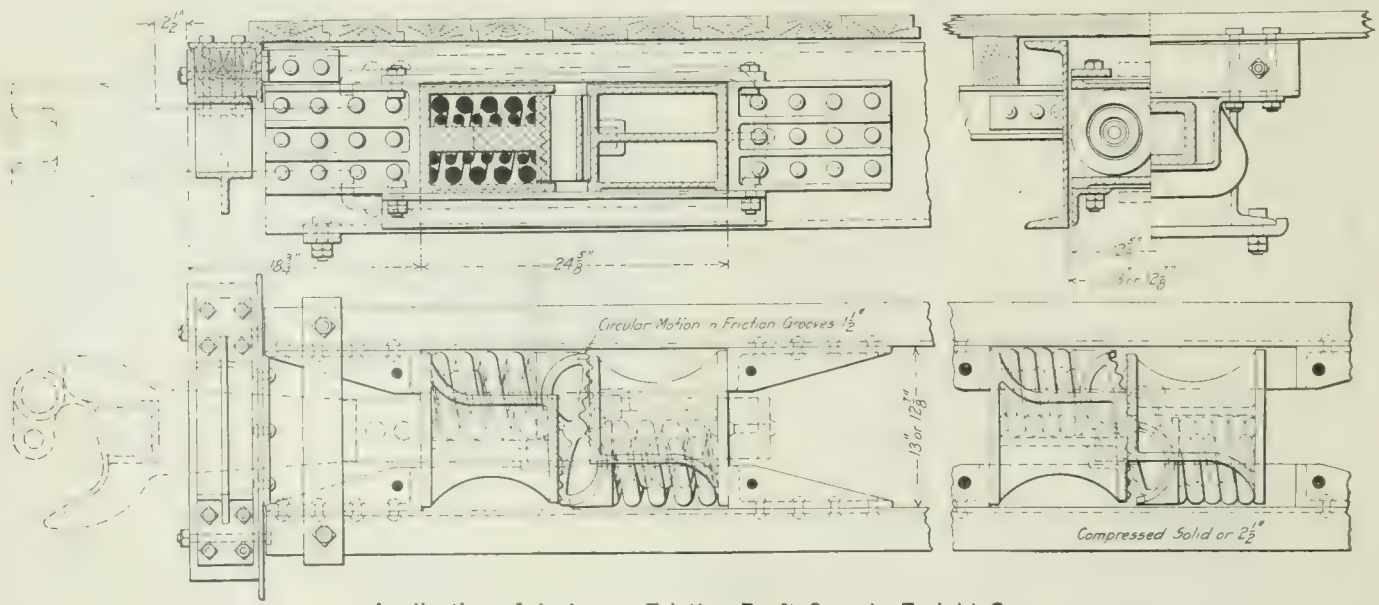
The action of the gear is as follows: As the followers press against the lever the leverage is gradually changed, so that when the stroke is complete the leverage is as one to three against the springs. At the same time the circular portion of the lever turns in the grooves of the spring cap, which increases the resistance to the movement of the follower in the same ratio as the leverage. This resistance is greatly increased by the friction of the V grooves in the circular wearing surface. When the movement is complete the followers butt solidly against each other, thus preventing further stress in the springs and the friction elements and protecting them from breakage under heavy buffing blows. It is obvious that this gear may be adapted for a greater movement than 2½ in., by simply changing the radius of the circular wearing surface. It is advisable, however, when a larger travel is desired to use larger springs also, and a greater frictional resistance will then be obtained.

The advantages claimed for this gear are its simplicity; the weight is 30 to 40 per cent. less than that of other gears of equal capacity, and the wearing parts are interchangeable and easily assembled. The first cost is comparatively low; the expense for application is small and the cost of maintenance is low. Several advantages are also claimed for the action of the gear. Its flexibility is pronounced; that is, it has a smooth action under light as well as heavy loads; the friction resistance is continuous, and there is no sudden shock from the slipping of the wedges or the abrupt change from spring to friction resistance. The reaction is positive and the release immediate. The gear does not remain set on release, as some others do, and the free motion throughout the train enables the locomotive to start it with less tractive effort than if the gears were set rigid. The drawing shows the gear as arranged for a 9⅛ in. coupler butt and the standard drawbar yoke on freight cars. It is manufactured by the Mid-Western Car Supply Company, Peoples Gas building, Chicago.

It is proposed to build a line from a point on the Burma railways, near Mogaung, in a northerly direction through the Mogaung valley past Khamaing, then through the Hukong valley to a connection with the Assam-Bengal Railway at Ledo.

A contract has been made between the Sorocabana Railway, Brazil, and the government of the state of Sao Paulo for the construction of the company's extension from Salto Grande to the port of Tibirica. The government will supply the capital for the construction on a basis of $25,600 per mile, plus $440,000 for the purchase of rolling stock. In addition to this the company agrees to transfer to government all its rights in the concession for the line from Sao Joao to Santos.

The concessionaires of the Ucayali Railway, Peru, have been authorized by the congress of Peru to change the gage of the line from 4 ft. 6 in. to 3 ft. 3 in., but the tunnels and cuts will be built for the wider gage. The preliminary surveys and plans of the route have almost been finished and actual construction work will soon be commenced. This railway will open up a rich region of country in eastern Peru and will place the Amazon valley in direct railway communication with the capital of the republic and the Pacific coast. The estimated cost of the line is $10,000,000, on which the Peruvian government guarantees 6 per cent. a year secured by the income from the tobacco tax. The Ucayali Railway is also known as the Pacific Railway concession.



Application of Anderson Friction Draft Gear to Freight Car.

Maintenance of Way Section.

THE judges of the contest on the Organization of the Extra or Floating Gang which closed April 25, were L. C. Fritch, chief engineer, Chicago Great Western; L. R. Clausen, division superintendent, Chicago, Milwaukee & St. Paul, and G. H. Bremner, district engineer, Chicago, Burlington & Quincy. They awarded the first prize to A. Palmer, roadmaster, Western Pacific, Sacramento, Cal., and second prize to P. J. McAndrews, roadmaster, Chicago & North Western, Belle Plains, Ia. Other papers were submitted by A. Swartz, division engineer, Erie, Huntington, Ind.; F. W. Lawrence, supervisor, Central of Georgia, Macon, Ga.; M. Henry, supervisor, Chicago & Eastern Illinois, Salem, Ill.; S. B. Peter, roadmaster, St. Louis & San Francisco, Pittsburg, Kan.; George Corcoran, roadmaster, Chicago & North Western, Centerville, S. D.; W. K. Walker, division engineer, Missouri, Pacific, Wichita, Kan.; M. Ganley, roadmaster, Atchison, Topeka & Santa Fe, Argentine, Kan.; J. E. Tobin, roadmaster, International & Great Northern, Houston, Texas; G. W. Roberts, roadmaster, Central of Georgia, Columbus, Ga.; Joseph J. Morgan, storekeeper, New York Central & Hudson River, Kingston, N. Y.; P. H. Hamilton, St. Louis & San Francisco, Pittsburg, Kan.; F. M. Patterson, Chicago, Burlington & Quincy, Chicago, and George J. Sharkey, New York Central & Hudson River, Kingston, N. Y. Several of these papers appear in this issue and others will be published in succeeding issues.

IN view of the difficulty encountered in securing work train crews experienced in the unloading of track material many roadmasters are finding it necessary to place a foreman or experienced trackman in charge of such labor. With the agreements existing at present with labor organizations on many roads it is difficult to select the trainmen most experienced, for the rules provide that when a train is to be out for some time it must be bulletined and the oldest man in service who applies gets the train, while if the train is needed for only a few days the first crew out on the call board is assigned to it. Careless or improper unloading of material so often results in serious delays or loss of material that it is necessary to take precautions to reduce this to a minimum. The unloading of rails without proper regard to the exact place where they are to be put in track results in serious delay to the steel gangs, especially if the rails have to be carried some distance. Likewise the uneven unloading of ballast results in waste or requires much trucking back and forth. Any attempt on the part of the roadmaster to get the train crew to take care is likely to fail, for, as they are subject to the trainmaster, he cannot enforce discipline over them. For this reason he is often warranted in having the train crew assigned to work under some foreman who realizes the importance of this work and whom he can hold responsible.

WITH the bridge work for 1912 well organized and under way, the contest on Bridge Kinks will appear timely to those connected with this class of work. Bridge work differs from track work in that each job is a problem in itself and the opportunity for ingenuity is greater. Also, because of the higher class of labor employed improved ideas can be more successfully carried out. Many little devices and methods worked out to meet conditions at one point could also be adopted at other points to good advantage. While the saving in overtime, labor or material may be small individually, the total amount is large, and their development should be encouraged. The problems met by bridge men differ so widely that a wide variety of kinks is possible. The construction of a new bridge or the renewal of an old one where traffic must be maintained with little or no interruption gives rise to a large number of bridge kinks of one class. The building of a structure on a new line where it is hard to get in material or equipment, or where no attention need be paid to traffic, develops another kind. The organization and handling of the continual light maintenance repair work calls forth still a third kind. All these and any other classes of kinks having to do with bridge construction, renewal and maintenance comes within the limits of this contest. If the description is of a device, photographs or sketches should be sent if they will help to make its nature and operation clear. We will pay $25 for the first and $15 for the second best kinks submitted, and will pay our customary space rates for all contributions that do not win prizes, but which are accepted and published. All contributions must be in the hands of the civil engineering editor of the *Railway Age Gazette,* 417 South Dearborn street, Chicago, not later than June 25.

SO many new track devices are being developed and tried experimentally that it is worth while for railways to consider the best way to conduct such experiments and to inquire whether the greatest benefits possible are being secured from them. On many roads there is little, if any, system in testing such devices. An engineer maintenance of way or a division superintendent sees one which he believes has merit, and arranges with the inventor or promoter to test it out in his track. Another officer of similar rank does likewise with a similar, or not infrequently the same, device on his territory. Little information regarding the results is exchanged, and they are therefore known only locally. On some roads, however, including the Pennsylvania and Union Pacific, such experiments are concentrated at a few points under the supervision of a definite group of men. The Pennsylvania Lines West have a section of test track near Wooster, Ohio, and the Pennsylvania Railroad has a similar test track near Tyrone, Pa., where several miles are laid with various kinds of ties, joints, rail anchors, etc. The different devices are in service under the same traffic and climatic conditions and maintained by the same track forces. The advantages of grouping experiments are several. Inspection by the supervising officers is greatly simplified, and they are enabled to keep more closely in touch with all developments than if they had to make trips to see how each particular joint or tieplate is working out. Again, direct comparisons may be made between different devices of the same general nature which are in use under the same conditions. By concentrating the experiments at a few points it is possible to see that roadmasters or supervisors, as well as section foremen, are placed in charge of the track selected for experimental purposes who are in sympathy with the tests and will watch them closely. Cases are not unknown where devices have been unfavorably reported on because of lack of interest or close attention on the part of the track foreman in charge. It frequently happens that by close observation of the actions of any device in service important modifications may be suggested which greatly improve it. It is fully as much to the interest of the railway as to the inventor or promoter that any device based upon practical ideas be given a fair trial, for if possessing advantages over devices in present use the economy resulting accrues to the benefit of the railway. The railways are very willing to test out any device which appears to have merit, and with the number of them being continually developed at the present time it is advisable to consider whether tests are being conducted in a way to secure the greatest amount of information with the least trouble to supervising officers.

ORGANIZATION FOR EXTRA GANGS.

THERE is no work under the supervision of the roadmaster or track supervisor which offers greater opportunity for the display of ability than the economical handling of extra gang work. The money expended is large in proportion to that spent by the regular forces. One western road now has 135 extra gangs working, each of which probably averages 50 men. The papers received in the contest on the Organization of the Extra Gang, which are published elsewhere in this issue, contain many practical ideas of men who from their direct contact with the work realize its importance and are giving the subject careful thought.

With the rapid change taking place in the character of the forces making up the extra gangs, the methods of organization of ten years ago have become inapplicable, but one still finds many gangs handled under the old methods with a resulting loss in efficiency. Roadmasters who have studied conditions and revised their methods to meet these changed conditions are making the least complaint about the quality of present labor, for, while the labor is not what could be desired, in many cases the man who complains is not getting from it all that he can. Its quality will probably not improve, and the problem facing the roadmaster is to so arrange his forces as to get the best results from the labor available.

The first and most important requisite for efficient extra gang work is a good foreman. A man who makes a good section foreman in charge of five or six men will not necessarily be a success when placed in charge of 50 to 75. If possible, the foreman should be selected from those who have been assistant foremen in extra gangs previously and are familiar with the work. An interesting difference of opinion is expressed in the papers regarding the advisability of placing section foremen in charge of extra gangs; and each side has good arguments. The rate of pay of the extra gang foreman is usually $15 to $20 higher than that of the section foreman, and, therefore, the placing of the section foreman in charge of an extra gang is a promotion. It also undoubtedly instills a better spirit among the section foremen to know that these better paying positions will be filled from among their own number. On the other hand, the taking of the regular foreman away from his section during his working season, which is short enough at best, undoubtedly tends to disorganize the regular section force to the detriment of its work. The substitute foreman will, in most cases, not be as capable as the regular foreman, and knowing that he is in charge temporarily will not take as much interest in the work. Also, the foreman who regularly spends his summers on extra gang work is very often inclined to look upon his section as a makeshift to carry him through the winter, and he, accordingly, does not take the proper interest in it.

Having selected the foreman he should be given enough assistants for proper supervison of the men. The number of laborers one man can handle efficiently varies both with the class of labor employed and the kind of work being done. In work such as relaying rail, where the men are strung out and each has his individual duty to perform, the amount of his supervision required differs from that where a gang is bunched and all are doing the same thing. With foreign laborers increased supervision is necessary to instruct the men properly and prevent them from being injured. In most cases gangs have too few rather than too many assistants. The foreman should, if possible, be experienced in handling the class of men used as well as in the work to be done. A foreman who can use the southern negro to advantage will not necessarily be able to handle an Italian gang. The interpreter in foreign gangs is usually a cause of trouble and his control of the men is such that many foremen prefer to do without an interpreter rather than contend with his interference.

Although many times the kind of labor used is governed by the supply available, it frequently happens that men can be selected for their adaptability to the work to be done. The hobo and Austrian are generally recognized as better men for rail-laying gangs than the southern European laborer, because of their greater size, while the reverse is true for ballasting. It is advisable not to collect too many gangs of one nationality in one vicinity because of the greater danger of their acting in unison in a strike or disturbance. In building a new yard on the Baltimore & Ohio at Chicago Junction, Ohio, a year ago the general foreman hired his men so that he had but one gang of any one nationality in the yard, and he had very little trouble with the men. Some foremen prefer to mix the men in their gangs in the same way.

The importance of providing good food as a means of holding the men is not as generally realized by the railways as by contractors. Many contractors are able to maintain full forces at almost any season because of their reputation among the laborers for providing good board. Because of the size of railway organizations it has been considerad advisable in many instances to contract for the boarding of the gangs, with the result that the company loses direct oversight and control of the quality of the food provided. A good boarding camp is a very strong advantage to a foreman in holding his men, for they will many times remain where they are given good board and lodging, even if not satisfied with other conditions.

The elimination of lost motion is to be desired at all times, but especially so in the case of a gang of 50 to 75 men where the labor charge per hour is high. The moving of gangs from one place to another can be carefully planned so that no unnecessary movement will be made, and the moving should be done at a time when it will interfere with their work as little as possible. One source of frequent delay, especially to gangs laying rail, is the necessity of waiting for material or tools. The foreman should be provided with a complete set of tools when the gang is organized, and an ample supply in good condition should be maintained. Likewise, the track material should be provided well in advance of the work. The roadmaster should see that the storehouse is advised of the date material will be needed and should keep a close check to know that it is on hand before sending the gang to any point. In the securing of material, the roadmaster is very largely dependent on the co-operation of the store department, which can see that orders are shipped complete and on the date requested. The frequent experience of a foreman starting to put in a switch, for instance, and finding some essential part missing, is not conducive to good work. Failure to receive the proper supplies at any point not only discourages the foreman, but if he is obliged to lay off his gang for a day or so, his organization will be rapidly broken up.

The question as to the proper dividing line between section and extra gang work is a subject of considerable controversy among track men, and the results secured by either method depend largely on the local conditions and the methods of the individual roadmaster. It is generally granted that all rail renewal and ballasting work should be done by extra gangs, although in ballasting the best results are sometimes obtained by giving the section foreman additional men and allowing him to make the final raise and surface, as he will do the work more thoroughly when he knows he will have to pick up any low joints after the gang leaves. For the same reason it is generally considered advisable for the section foreman to renew all ties unless the track will be ballasted the same season, at which time the ties are renewed in connection with the ballasting. When the ordinary tie renewals are made with an extra gang the tamping is apt to be done unevenly, and the section gang will have to follow very closely after. When comparatively heavy work is done with a large section force the foreman should be provided with an assistant so that if it is necessary for him to make small repairs at some other point the gang will not be idle until he returns.

These and many other details essential to a successful organization of extra gang work must be planned and anticipated in advance of the work, and the roadmaster who most carefully considers them will secure the best results.

THE ORGANIZATION OF THE EXTRA GANG.

Contributions Received in the Prize Contest, Discussing Methods of Successfully Handling Heavy Maintenance Work.

FIRST PRIZE—ORGANIZING AND HANDLING AN EXTRA GANG.

BY A. PALMER,

Roadmaster, Western Pacific, Sacramento, Cal.

In the West it is the practice to ballast, relay rails, build new sidings, clean cuts, etc., with extra gangs. I believe this is the most economical method, as these gangs can be assigned to one class of work and kept constantly at it. If a regular section force of six men is increased to 25 for a job of ballasting, for instance, it is uneconomical in several ways. Every day there is something coming up that takes the time of from one to six men, and if the foreman is handling foreign labor, as is almost always the case, he cannot send these men to do this work, but must go in person and show them what is to be done. If an extra gang is doing the ballasting, and the section gang is attending to its regular duties, both classes of work are receiving proper supervision.

It is often more profitable on small jobs, such as building short spurs, or temporary track a few hundred feet long for contractor's use, to combine two section gangs, instead of taking an extra gang from an assigned job, and moving them possibly 30 or 40 miles during working hours. The extra gang might do the work in one day, while the combined section gangs would consume four days, but the extra gang would consume the greater part of three days in moving to, doing the work and returning to their regular assigned job. As the men are paid while moving during working hours, the cost is excessive. Errors of this kind are often charged against the record of an extra gang foreman and his gang, when it is really the lack of foresight or judgment on the part of someone higher in authority. A foreman is given credit according to the cost of the job, not according to the labor actually spent upon it, and the cost of transportation is not usually figured in the estimate.

A roadmaster usually has several first-class section foremen from whom he can select extra gang foremen. To change a foreman from a section to an extra gang should be considered a promotion, and recommendations for the position of roadmaster can be made from the extra gang foremen, according to ability shown, not as to personal likes and dislikes, as is often the case. If section foremen are used in extra gangs it should not tend to demoralize or break up the section organization. There is hardly a time when a section foreman is promoted to an extra gang, but that the roadmaster has a foreman ready to take charge of the section. The promotion of a section foreman should not disrupt the organization any more than the promotion of a supervisor to roadmaster or an assistant superintendent to superintendent.

A foreman need not necessarily be selected because of his experience with the class of labor handled. He should be a man of good judgment, familiar with the methods he intends to employ, and a close student of the characteristics of different classes of labor. He should have force of character enough to uphold his opinion and give his men the impression that he thoroughly understands what he is doing. When a new gang is organized, the first day is usually a try-out between the foreman and the men. The gang is usually composed of men who have had some experience in the class of work they are about to engage in. If he has confidence in his own ability, the foreman will start in as if he had just moved from one portion of the work to another. The gang will have confidence in him at once and results will be shown from the first day.

Assistant foremen and timekeepers should be selected by the foreman, and he should have the power to hire and discharge them without interference. His decision should be supreme as far as the organization and discipline of his gang is concerned. Roadmasters and other officials should judge him only by results obtained. The roadmaster should examine his requisition for tools, etc., and talk over such requisitions with him on the ground. Tools should be forwarded at once, so the gang will not have to work with inadequate tools for several weeks while the requisition is passing from one department to another. If the requisition is reduced the gang is hindered in making the progress it should, and the foreman is discredited on account of the slow progress of the work, while in reality the fault is not his at all.

I believe that a foreman should be furnished with a copy of all estimates of the cost of the work he is in charge of. To illustrate the advantage to the foreman of having such information, I wish to quote an instance that came to my attention several years ago. A foreman, who was given charge of a ballasting gang was not instructed as to costs, and was found to be approximately $2,000 above the estimate when the work was half completed. A change of foreman was considered necessary at once. The new man was a "method and cost" man, that is, he kept an account of every piece of work he was engaged upon and knew at the end of each day the cost per foot per man. The division engineer gave him the estimates of cost of the work, and told the roadmaster to give him full charge of the work. He found that train crews had been dumping the gravel anywhere that suited their convenience, so as to get rid of it as soon as possible and "get in." He put a stop to that at once, by asking to have the work train conductor report to him and not unload any gravel except under his personal supervision.

The foreman made an estimate of the amount needed between each engineering station, and unloaded the gravel as nearly as possible to conform with this estimate. Such methods resulted in a saving of $1,200 on the whole job, or $3,200 on the last half.

As to the peculiarities and relative advantages of different kinds of labor for the different classes of work, I would say, there is little to choose between them. Our forces consist of Greeks, Japanese, Mexicans and Hindus. Greek labor is most prevalent. The Greek is the stronger; but, as a general rule is lacking in ambition. The larger and stronger he is, the more apt he is to try to shift the burden of the work on to the shoulders of his smaller and weaker brother. The worst trouble we have in these gangs is when an interpreter is engaged. These men instruct the gang to take no orders from the foremen, except through the interpreter, and the gang is usually employed through an agent of the same nationality, who tells them if the foreman does not treat them right to let him know, and he will get a change of foremen for the gang. A Greek's idea of right treatment from a foreman is for him to be afraid of them, or allow them to use their own judgment as to the amount of work they should accomplish. A foreman who is getting good results, as a rule, has complaints made against him constantly. On other roads in this vicinity foremen have been told that if they could not work their gangs without so many complaints their services would be dispensed with. In the last year or so foremen are refusing to use interpreters in their gangs. Their troubles are minimized, and greater efficiency is apparent. The Greeks do not average any better than the other races, but are more numerous. The Japanese are more easily handled than any of the other races. They are more intelligent and more observant. While they are not as strong as the Greeks they are more active and will accomplish as much per man. They are very sensitive. A kind word from their foreman means increased energy on their part. They are always trying to please their foreman, and if he shows that he appreciates their endeavors, there is no doubt as to results. The Mexican must be

constantly watched as he is inclined to shirk his work, but under the charge of an alert foreman will "show up" equally with the other races. The Hindu is a new proposition, but as yet their work has not been as satisfactory as that of the other races.

SECOND PRIZE—ORGANIZING LARGE EXTRA GANGS.

BY J. P. M'ANDREWS.

Roadmaster, Chicago & North Western, Belle Plaine, Ia.

The organization of extra gangs for applying new ballast, laying rail and other extensive improvements needs to be given thorough study before starting the work and efficient supervision during the progress of it. The work should be planned with a view to distributing material by the use of the minimum train service, division operating officials going carefully into this phase of the matter and supplying the most suitable power and equipment for the work. The use of extra gangs or so-called floating gangs for the work of ordinary tie renewals and track surfacing ought to be avoided and sufficient labor furnished instead to the section foreman to enable him to keep his section up to the standard.

It is not advisable to use regular section foremen in charge of extra gangs for the reason that the maintenance of the sections placed in charge of a temporary foreman is usually unsatisfactory. On railway systems having lines in both southern and northern latitudes extra gangs and foremen should be specially employed for that work and moved to the various divisions at suitable seasons. On lines running east and west in the northern latitudes, it is necessary to do the extra gang work on the different divisions at practically the same dates, the only opportunity to shift foremen and gangs from one division to another coming through probable variation in dates of the greatest rush of traffic. To this extent, foremen and entire gangs may profitably be transferred so as to perform the heavy work at a time when traffic is lightest.

On our line the general practice is to use regular section foremen as extra gang foremen, but we avoid taking them from large yards or specially important sections. A successful extra gang foreman, in addition to being an experienced trackman must possess the qualifications of patience, good judgment and even temper. The number of assistant foremen allowed each gang depends on the nature of the work, and the number of men employed, but in all cases sufficient supervision must be given to secure the best results in quality and quantity, as well as to reduce the chance for accidents, which often result from lack of close supervision. A gang of more than 30 laborers should be allowed one assistant foreman, gangs above 50 and up to 70 laborers, two assistants, and for larger gangs an assistant for each 25 or 30 laborers. Timekeepers ought to be employed with all extra gangs and such timekeepers must be competent to render all necessary reports covering material as well as labor. Good salaries must be paid foremen and timekeepers to command the services of the best trackmen.

For ballasting, I use one foreman, an assistant to watch the tamping, and in case it is necessary to remove old ballast or widen embankments ahead of the new ballast, I use another assistant in charge of the portion of the gang doing that work. It is sometimes necessary to use an assistant foreman to raise the track, but this frequently can be done by using a competent laborer and allowing him an increase in the daily rate over the other men.

For steel laying I prefer a separate gang to distribute the new material and attend to the loading of old material. This gang should be of a suitable size to handle new rails properly and wherever practicable, new rails should be loaded in cars that will permit of unloading with air hoist or steam power. When heavy rail sections are being taken up, it is necessary to use air or steam power to load the old rails. I find it advantageous to use a separate gang for the loading and unloading, allowing this gang a foreman and a timekeeper, the principal duty of the latter being to keep correct accounts and render reports of the receipt and shipment of material. The size of the laying gang, should be proportioned to the weight of rail and traffic conditions under which the work is being done. A good steel gang consisting of foreman, two assistant foremen, a timekeeper and 75 men will be found sufficient to lay the steel and attend to spacing of joint ties promptly after laying. One assistant foreman should be in charge of the jointing and gaging gang, while the second assistant could aid the foreman in handling the relaying gang.

The laborers for the different kinds of work should be selected with care. For steel laying the so-called hobo laborer gives fair satisfaction, and but for their propensity to "float" could not be excelled for that work. Where there is a large amount of work to be done in a limited time the hobo gangs are rather uncertain, and the writer believes a gang of Austrians to be better for such work. Our Austrian labor includes the natives of Montenegro and Bulgaria, all of whom are good steel gang laborers. Next to these, in efficiency, are the Greeks, and the same standards will be found to apply to ballasting work. Care must be taken to have competent English speaking flagmen.

A first class outfit of tools and hand cars must be furnished all extra gangs, and the tools taken care of and kept in good repair at all times. I would recommend the use of motor cars for transportation of men to and from work, and in order that the cars might be kept in good working condition, a man should be employed specially for that purpose in large gangs. Good living cars must be furnished for the laborers, and suitable office and living cars for the foremen and timekeepers. Particular attention should always be given the sanitary condition at camps, closets being provided that may be readily moved as the work progresses and the camp is advanced. A great deal of the criticism from people living near railways, is due to the primitive sanitary conditions allowed to exist. A plentiful supply of good water is a requisite at every such camp. Camps should be moved frequently so that gangs will not be required to run any considerable distance to and from work. The time spent in constructing a light spur track to hold the bunk cars amounts to little compared to the time lost by a large gang in pumping hand cars any distance. For spurring bunk cars off from main line, we use rails and points, so arranged that the main track need not be disconnected or disturbed in any way.

Where camps are placed any great distance from the station, a means of communication should be provided from the train despatcher's office to the foreman's office car. This will not only enable the foreman to send his reports promptly and get instructions from his superiors, but in case of emergency the despatcher may call the foreman and his gang. This connection can easily be arranged when the telephone despatching system is in use, and in steel laying, a portable telephone set should be furnished the timekeeper, so he may keep in touch with train movements and avoid delay both to the trains and to the gang. Where telephones are not in use, it will be found economical to provide the steel laying gang with a portable telegraph set, and have an operator accompany the gang to keep the foreman posted.

NEGRO LABOR FOR EXTRA GANGS.

BY F. E. LAWRENCE.

Supervisor, Central of Georgia, Macon, Ga.

Extra gangs necessarily differ considerably in different sections of the country and on different roads, both in the character of the laborers of which the gang is made up and in the nature of work performed. In the "black belt" of the South only negro labor is obtainable and the methods of work and organization outlined below apply only to this class of labor.

The climate is such that extra gangs are carried throughout the year and they are used principally for ditching, building sidetracks and cindering on branch lines. As a rule extra gangs are

not used for applying ties, except when spotting new ties in connection with ballasting of rail laying. Each section gang retains the same number of men the year around and the surfacing, lining and applying of ties are left to the section forces. Of course the heaviest part of such work is done in the summer, but it is carried along to a limited extent in winter as well.

The make-up of extra gangs naturally differs according to the character of the work, but there are certain fundamental features to be observed. On this road the foreman is picked from the likely section foremen, young unmarried men who are ambitious to advance being preferred. A foreman should be young so that he can be trained in the methods of his superior officers with an open mind. His former track experience on a section had acquainted him with the details of track work, but he must learn to work on a larger scale and to handle larger gangs of men economically. It is preferred that he be unmarried for his camp cars are then his home and he has no inducements to carry him away from his gang. He is thus able at all times to control his men and this is important with negro labor. To successfully work negro labor a man is required who is strict to severeness, yet who will take the part of his men when they get into trouble and settle their disputes. When the foreman starts to organize his gang he picks out a leader, or for a rail gang two leaders, one for each end of the rail. The leader is always gifted with a good voice that he uses to advantage and his function is to "deal" for the remainder of the gang. When lining track he uses a chant peculiar to that work and at the right time every man comes up on his bar in an effective manner. An effort is made to do everything possible in unison. For instance, when a number of men are doing pick work together, every pick rises and falls at the same instant in time with the rhythm of the song of the leader and it is surprising to note the speed with which work can be done by this means.

It cannot be said that the negro laborer is more naturally adapted to one class of labor than another, for the results obtained from such labor are simply an indication of the effectiveness of the foreman. The quality of labor in the South has been nearly stationary, for the negro laborer is about the same as he was immediately after the civil war. He needs a master as much now as he did when he was a slave. The increase in the cost of work has been caused mainly by the great advance in the price of labor and not to a decline in its quality.

HOW EXTRA MAINTENANCE WORK SHOULD BE HANDLED.

BY A. SWARTZ,
Division Engineer, Erie, Huntington, Ind.

The heavy work in the maintenance of way department may be done either by extra gangs or by increased section forces. It is safe to say, however, that the extra gang is most commonly used, and as the increasing of section forces is practically an impossibility on account of the scarcity of American track laborers, and the difficulty in securing efficient foreign laborers in small squads, as required for a section gang it is really the only solution for the heavy work problem. It is a well known fact that to lay new rail or to apply new ballast economically requires a gang of at least 30 men, and a gang of this size cannot be called anything but an extra gang since 15 men is about all any track foreman can handle economically. The writer is an advocate of the extra gang on account of the above conditions.

A regular section foreman is the proper head of an extra gang as he is familiar with the requirements and methods of the road. He should be given an American assistant as well as an interpreter of the same nationality as the men. An interpreter is a necessity, otherwise a good many of the men feign ignorance of the foreman's wishes. The foreman should be of even temperament, and should have worked foreigners on his section so he will know more about their peculiarities. A man who has never worked foreigners has not the necessary patience and is apt to make a failure of the work because of his lack of sympathy for their inexperience. Timekeepers should be selected from the supervisor's clerks or from the engineering department. When extra gang work takes away the regular section foreman, the first man on the section should be given the foreman's position and salary, under which plan there should be no disorganization of the regular section force. When double tracking or reballasting is being carried on over an entire division in one season, however, more extra gang foremen may be required than there are available regular foremen, in which case outside foremen must be obtained.

A supervisor should attempt to have stronger men on the ballast gang than on the rail gang and keep them at this class of work as long as possible. The occasion for extra gang work generally arises so quickly, however, that a supervisor is willing to take any class of men he can get in any size gang. The writer has seen gangs that apparently were no good for ballasting do very well at laying rail. I have also seen a gang doing poor work under a foreman who had a good reputation that would do much better work when placed under another foreman. So the supervisor can hardly apply any theoretical or hard and fast rules, but must of necessity handle each season's work according to circumstances. If he is fortunate enough to be employed by a road that does work each year, he is able to obtain the same gangs year after year, which allows him to select his men to a certain extent, and thus apply certain theories as to carrying out his work. If, on the other hand, he is employed by a road that has no regular program of extra work, he must be content to take labor that is left after other roads have had their pick.

Foreign laborers have many peculiarities. In general, it may be said that the Italian is usually very quarrelsome, ill fed, and not very strong, although the writer has seen some very good Italian gangs. The Greeks are usually better fed and more quiet, doing more efficient work. The Teutons, including Hungarians, Bulgarians, Slavs and Poles, are much the best, as they live well and are peaceable, in consequence of which the best work is obtained from them. The writer has had no experience with Mexicans or Japanese. Negroes make very good extra gang laborers, provided the foremen are not prejudiced, for they live well, are happy-go-lucky, can stand the heat, and above all, can talk English. Hobo gangs are of no use whatever, for they are lazy and stick to the work only long enough to get a new pair of shoes and enough to buy a quart of booze. The ideal extra gang would be composed of farmer boys and men from small villages. Pay them say $2.25 per day, furnish them good cars in which to live, contract with some reliable party to board them with good substantial food, and you have ideal conditions. Anyone must admit that the average American will do at least half at much again as foreigners, and it is the opinion of the writer that railways would save money by using American laborers at the higher rate of pay, for they could cut down the size of the gangs and still get a greater quantity of more efficient work.

OUR EXTRA GANGS.

BY W. K. WALKER,
Division Engineer, Missouri Pacific, Wichita, Kan.

The supply of extra and floating gangs for summer work is fast becoming a subject which is requiring close study. The time when all the railway officer had to do to organize an extra gang, was to select the foreman and let him organize the gang, is past. It is now up to the officer in charge of the division or district to secure the men, usually through some labor agency.

Foreign laborers on whom we must depend for our extra gangs are widely different in their mode of living and work. The division officer must give this close study and secure the class of labor according to the work in hand. Different sections of the country have different kinds of labor. In the north and east, you will find the Bulgarian, Slavs, Greek, Italian, etc.—in the west Japs, Mexicans, Greeks,' etc.—southwest, Mexicans—south, negroes. Some foreigners are better adapted to heavy work; such as rail laying, etc., while others are no good on this class of work. We have foremen who can handle one nationality with the very best

results, while if he is given charge of some other nationality, he falls down completely. We work negroes, Mexicans, Greeks and Italians. I have foremen who can speak the language of these foreigners, having learned it from working with them from year to year. When a division officer has familiarized himself with the peculiarities of the classes of labor he usually has under his jurisdiction, the first thing for him to do when work opens up in the spring, is to classify the work and get in orders for the different classes of labor according to the work at hand. Then he must select his foremen for the different classes of men. These extra gang foremen are selected from section foremen. In this section of the country we have about seven months in each year in which extra gangs are used. The foremen handling these gangs are given sections for the remaining five months. In this way we use the same extra gang foremen from year to year. The promoting of section foremen to the position of extra gang foremen gives these men something to look forward to and helps to hold good foremen on the division.

It is important to consider the size of the extra gang. We must organize our gangs so as to have no lost motion. The day of large gangs of 100 to 150 men is fast disappearing. These gangs should be divided up into small gangs of 15 to 40 men each, giving them plenty and efficient supervision. Usually gangs of under 30 men can be handled by one foreman, while with 30 men or more each foreman should have an assistant. As a rule you can do twice as much work with 150 men divided into small gangs, as with them all in one large gang.

Before the gang arrives at the point desired all camp equipment, tools, etc., should be on the ground and the foreman, assistant foreman, and timekeeper should be there in charge, ready to start the work. Nothing tends to break up a gang as much as loafing. It is easy to weed out the drones and fill the places with workers. With proper selection of men and foremen and the gang properly sized we can soon make each dollar do the work of two, as compared with the old method of handling work of extra gangs through the summer season.

ECONOMICAL SIZE OF EXTRA GANGS.

BY S. B. PETER.

Roadmaster, St. Louis & San Francisco, Pittsburg, Kan.

A few years ago it was possible to procure men that could be handled in large gangs to good advantage, but the past two or three years the class of labor usually employed in extra or floating gangs is of the poorest class. I have seen a gang of 40 Mexicans work for a week and not accomplish as much as a gang of 10 Americans did in the same time. I have watched the gang of 40 for one-half hour to try to estimate the time actually put in at work by the gang, and have rarely seen more than 50 per cent. of them working at one time, and the ones who were working were only making a pretense and were accomplishing very little. I have found that better results can be accomplished with the same class of labor by employing small gangs, and where large gangs are absolutely necessary consolidating several gangs under the supervision of a general foreman, each foreman keeping the men of his individual gang together, and the general foreman being responsible for part of work assigned to each foreman. In this manner most of the men can be kept at work; while it is impossible for a foreman with one assistant to keep a gang of more than 25 men working steadily.

I would under no circumstances employ more than 35 men in one gang, and could then accomplish much better results by having two assistant foremen. I would only employ a gang of this size for rail laying. For surfacing, renewing ties, putting on plates, and in fact all kinds of work except laying rail, the small gang will do the work for much less money than the large gang.

In selecting foremen, by all means give the section foremen an opportunity to handle the extra gangs.

EXTRA GANG PROBLEMS.

BY JOSEPH J. MORGAN,

New York Central & Hudson River, Kingston, N. Y.

After an extra gang has been assembled, considerable time is nearly always lost for the first few days, especially in the case of rail gangs, and it is usually two or three days before operations progress smoothly. A considerable portion of this delay is due to comparatively small items being overlooked in the equipment and supplies for the gangs. Often an entire gang is held up on account of certain tools being overlooked. I would suggest as a remedy for a considerable portion of the delay, that a motor car be kept on the ground for the first few days to handle such emergencies. If impossible to do this, have one or two of the most reliable men assigned to the work of securing the articles needed, the quickest way in most cases being the passenger train. Particular care should be taken to send intelligent men who will understand just what is wanted, so as to do away with the necessity of making a second trip.

After everything is progressing smoothly, rainy days sometimes cause the men to lose time, thereby reducing their pay. This naturally discourages the ordinary laborer, and gives him the desire to seek employment where he would be sheltered and where the weather would not interfere with his income. One remedy for this is to have a supply of combination waterproof suits furnished, numbered consecutively so that they could be checked up, and to be used by the men only when working. When it is necessary to stop work on account of a severe storm, breaking up part of a day, the gang should be allowed to work as long as possible overtime, in order to make up for the lost time, which would tend to lessen the cause for discouragement.

ECONOMY IN HANDLING EXTRA AND FLOATING GANGS.

BY GEORGE CORCORAN,

Roadmaster, Chicago & North Western, Centerville, S. D.

On account of the continued decline in the quality of laborers furnished for extra gangs, I would recommend the following choice in selecting laborers, none but experienced men being used for laying rail, applying stone or gravel ballast and relaying yards and switches: First choice, American track laborers (usually consisting of Irish, Germans, Scandinavians and natives of other countries of Northern Europe); second, Bulgarians; third, Austrians; fourth, Italians; fifth, Greeks. When inexperienced laborers are employed in large gangs, the foreman in charge cannot supervise the work closely enough to obtain good work, and the usual result when surfacing track for instance is that one cluster of men will tamp their rail in good shape and the men tamping the next rail will not do such good work, causing the track to settle unevenly after it has been under traffic and causing large expense to re-surface. When inexperienced men are employed, there should be two men to supervise the tamping and instruct the men how to tamp and one foreman with the raising gang; the same also applying to the work of laying rail. This is necessary in order to get perfect gage and have the spikes properly driven. When working inexperienced men, it is discouraging to foremen to try to teach some laborers the proper way to drive spikes. Frequently foreign laborers are picked up that are small in stature, and have never performed any manual labor. They have no interest in the work other than to receive their pay and that are physically unfit to do track work on account of the small quantity of food on which they subsist, in some cases living on 10 cents per day. Men of this class are the most inefficient and expensive laborers that can be employed for track work. Foremen in charge of work should be taught to more fully realize the importance of doing work well rather than trying to make records or showing that he is keeping up with previous records made by men years ago, when a better class of laborers was employed.

For floating gangs, experienced laborers should be furnished, whenever possible, in the same order as for extra gangs, and each gang should consist of from 10 to 20 men, not more than 20 when such gangs are expected to help out on sections doing general repair work. There should be an assistant foreman with all gangs of from 10 to 20 men, and two foremen for gangs of from 20 to 30 men. By following this practice we would also be educating more foremen and helping to overcome the continued shortage of foremen. Unless some change is made in the present way of supplying laborers, the now apparent dearth of foremen will increase from year to year. A first-class section foreman makes the best extra gang foreman, if it is possible to secure such men.

The moving of floating gangs from one section to another where each section foreman has charge of the gang while it is on his territory should not be permitted. Each foreman has a different way of doing the same kind of work and has a different attitude toward the men, which will eventually cause friction with the gang under numerous changes. The man in charge of a crew at the start should handle them during the season.

Careful consideration of the conditions under which our work is now carried on discloses the fact that quality in laborers employed is of vital importance. After that, complete co-operation and intelligent supervision is important and will result in the economy striven for.

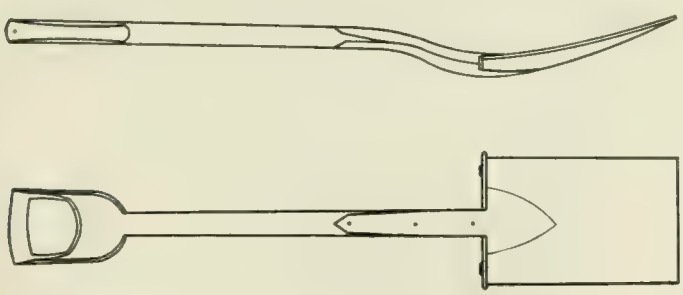
HANDLING STONE BALLAST.

BY A. M. CLOUGH,

Supervisor, New York Central Lines, Batavia, N. Y.

When making a raise of from 10 to 12 in. with stone ballast, the most common method is to unload enough stone for half this raise, put it under the track and tamp it, then repeat the operation. In this way a large amount of work is expended for the results secured. During the past two years another method has been tried on one division of the New York Central in which the entire raise is made in one operation and with excellent results.

With this method about 2,000 to 2,200 yds. of ballast per mile or enough to raise the track about 10 in. is placed at one operation. The track is prepared as formerly by digging out



Tamping Shovel for Rock Ballast.

the old ballast, renewing any ties necessary, gaging the track and driving down the spikes so that every tie is held tight to the rail. The track is filled in level with the top of the ties, or just sufficient to hold it in line, from 1 to 1½ miles of track being thus prepared ahead of the ballast. The amount of track which the quantity of stone furnished each day will lift to the full height is figured, and the stone is unloaded by doubling, or trebling if necessary, over this length of track. The stone is dumped from Hart convertible cars between the rails of the track to be raised and plowed out with a Rodgers ballast spreader. This amount of track, varying from 2,400 to 3,000 ft., is finished each day for trains at full speed with a gang of 50 men, with one foreman and two assistant foremen.

To do this work the men are distributed as follows: Two men dig holes for the track jacks; 13 men handle the jacks and tamp the joint and center ties; 24 men fill in and tamp the ends of the ties; 8 men line track; two flag trains and one carries water. Two jacks are used on each side and both rails are lifted at the same time. The forward jacks are handled by two men each and lift the track up about two-thirds the height it is to be raised out of the ballast. No tampers are required here as the stone being newly unloaded runs under the ties. The other two jacks keep somewhat over half a rail behind the first jacks and raise the track to the full height. Each joint and center tie is tamped with tamping bars and sledged down slightly. Two men are provided with each jack; the second man carries a sledge and ballast fork with him, and he both sledges down the joint and fills in the ballast for the tampers. Two men tamp with each jack and one man levels the track, making 13 men in all with the jacks. This gang is in charge of an assistant foreman, who does the sighting, using a standard lifting board and sighting block. Two men on each side follow the jacks filling in the ballast, while 20 men tamp the ends of the ties and as far under the tie as they can reach. These men use a tamping spade, shown in the accompanying drawing, which has been found to be a very light and efficient tool for this work. The men tamping behind the jacks are distributed in ten sets of two men each, five sets on each side of the track. Each double set of men is numbered 1, 2, 3, 4 or 5, and tamps one-half a rail length; these men go forward to the half rail previously marked with their number on the rail by the foreman and repeat the operation. In this way the men know just where to go and the foreman is enabled to tell just how well or how poor each set of men tamp. The result of this check on the work of the men is very marked. The four men with ballast forks fill in the ends of the ties ahead of the spade men so that these latter men do not have to do any filling in. Neither do they put their foot on the spade when they tamp but rather shove the stone under the tie evenly.

The spade has been found to be a light, convenient tool to work with, making quicker work possible, while the track is evenly tamped and settles evenly under traffic. When trains pass over the track thus tamped it will remain practically as smooth as before it was lifted and no slow order becomes necessary. Of course, as the work of raising is completed for the day, which is when all the stone unloaded that day has been put under, the foreman looks back over the track just raised and raises any places which may have gone down. He cleans all stone from the top of the ties and tamps about 16 in. inside of the rail in the center of the track. An assistant foreman following with eight men lining is enabled to keep the track in perfect line at all times, so that no slow order is necessary and trains pass at full speed.

Track lifted in this manner can be allowed to run for a week or more before the section gang needs to follow up with the final surfacing. With 10 men using tamping picks this gang can easily keep up with the lifting gang. A very light unloading for back fill and the final dressing up complete the operation. With proper care in unloading, no stone need be picked up or moved.

The advantages of this method are, that the stone is always handled shortly after unloading, when it is loose, more than two-thirds of it going to its permanent place by gravity alone. The men engaged always see the end of their day's work and hurry to get to it. The foreman has a knowledge of how well his men do their work, and when a gang is properly handled there is created a spirit of rivalry.

To accomplish the results described it may be necessary to change the work train arrangements for handling and unloading the stone, as it is necessary to get the day's stone on the ground early each morning, but any extra effort or nominal expense added to the train service is amply repaid in a saving of labor in putting in the ballast.

STANDARD PRACTICE CARDS ON THE ERIE.

Approved Methods for Performing Different Maintenance of Way Operations.—Work Standardized on All Divisions.

BY O. S. BEYER, JR.

Under modern operating conditions no part of the physical plant of our railways is more severely taxed than the roadbed and track, and no phase of the general railway maintenance problem, perhaps, presents so many difficulties as that of maintaining the roadbed and track in fit condition for the safe and efficient conduct of high speed and heavy tonnage transportation. That these problems are very serious must be admitted when the many recent failures, which have resulted in such disastrous accidents, are considered. Failures and waste on railways, where they occur, are in part at least due to faulty practices. One of the problems which must be solved effectively is the prevention of faulty practices and their eradication where they exist.

An attempt in this direction made by the Erie Railroad is the extension of the Standard practice card system, as adopted in the mechanical department, to the maintenance of way department. The work of maintaining the roadbed and track of a railway property employs many processes and methods which are more or less the same and in general use over the entire system. Certain definite conditions which are continually being disturbed by the wear and tear incident to operation are periodically reestablished. The standard practice system takes cognizance of these characteristics of maintenance of way work and seeks to standardize the various methods, practices, and conditions in a positive and effective manner.

The benefits which result from a system of this kind are extensive. Instead of following a multitude of varying practices and methods for the accomplishment of certain results, the best and identical methods are employed over the entire system. This eliminates, to a certain extent, waste of material, and assures a greater uniformity in the purchase of material. It insures the use of good and correct processes where otherwise questionable or faulty ones might be employed. Guess work is done away with. Individual judgment, based on limited experience, is replaced by the judgment and experience of a large body of capable men. It establishes definitely, over the entire railway, just exactly what special conditions are to be maintained. The card feature of the system insures the carrying out of the standardized practices, since the cards are placed in the hands of every officer of the department, from the very head down to the section foreman. They all are required to familiarize themselves thoroughly with the practices as established. Instead of disseminating the instructions with which the cards deal either verbally or by means of circular letters, placards, or bulletins, the instructions are forcibly and systematically brought to the attention of the men in the field, who, more than anyone else, are to be guided by them. Verbal instructions are soon forgotten or become stale;

No. 1. ERIE RAILROAD COMPANY. 3-31-11

NEW YORK, SUSQUEHANNA & WESTERN RAILROAD — NEW JERSEY & NEW YORK RAILROAD — CHICAGO & ERIE RAILROAD

MAINTENANCE OF WAY AND STRUCTURES

STANDARD PRACTICE:—Elevation and Gauge of Track

Degree of Curve	Table for Elevation of Outer Rail. Speed in Miles Per Hour: 30 Miles inches	40 Miles inches	50 Miles inches	60 Miles inches	Track shall be gauged to Ft	In	Gauge allowed account of Rail wear Ft	In
1	1	1 1/4	1 1/2	2 1/2	4	8 1/2	4	9
2	1 1/2	2 1/4	3	4 1/2	4	8 1/2	4	9
3	1 3/4	3 1/4	4 1/2	6	4	8 1/2	4	9
4	2 1/4	4 1/2	6	6	4	8 3/4	4	9 1/4
5	3	5 1/4	6		4	8 3/4	4	9 1/4
6	3 1/2	6	6		4	8 3/4	4	9 1/4
7	4 1/8	6			4	8 3/4	4	9 1/4
8	4 3/4	6			4	8 7/8	4	9 3/8
9	5 1/4	6			4	8 7/8	4	9 3/8
10	6	6			4	9	4	9 1/2
11	6				4	9	4	9 1/2
12	6				4	9	4	9 1/2
13					4	9	4	9 1/2
14					4	9	4	9 1/2
15					4	9	4	9 1/2

Maximum elevation should not exceed 6 inches

OVER

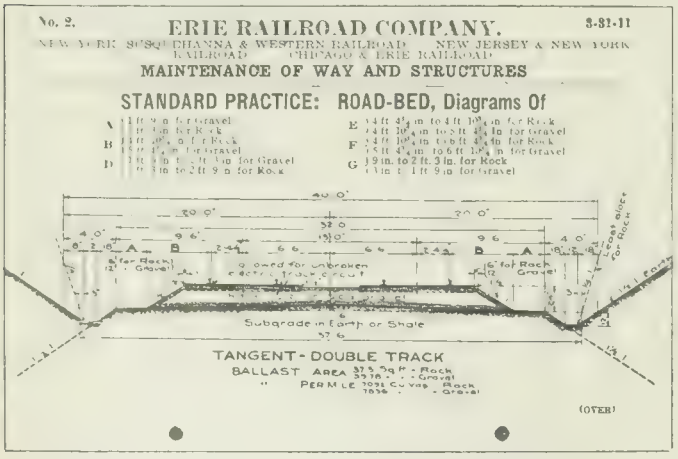
Fig. 1—Standard Practice Card for Elevation and Gage of Track.

No. 2. ERIE RAILROAD COMPANY. 3-31-11

NEW YORK SUSQUEHANNA & WESTERN RAILROAD — NEW JERSEY & NEW YORK RAILROAD — CHICAGO & ERIE RAILROAD

MAINTENANCE OF WAY AND STRUCTURES

STANDARD PRACTICE: ROAD-BED, Diagrams Of



OVER

Fig. 2—Standard Practice Card for Roadbed Diagrams.

No. 3. ERIE RAILROAD COMPANY. 3-31-11

NEW YORK SUSQUEHANNA & WESTERN RAILROAD — NEW JERSEY & NEW YORK RAILROAD — CHICAGO & ERIE RAILROAD

MAINTENANCE OF WAY AND STRUCTURES

STANDARD PRACTICE: Ballast. Application of, Method to be Employed, and Force Required.

NEW BALLAST.

New Ballast should not be applied until the sub-grade has been prepared to conform with standard section per standard practice card No. 2.

Tracks should be raised to stakes set by engineer.

STONE BALLAST—Method.

Pick tamp all ties on both side from the ends to a point twelve (12) inches inside the rail. Center of ties to be lightly filled by use of ballast fork. Allow sufficient time (minimum, one week) to elapse for ties to secure a good bearing, then resurface the tracks with a light raise. In resurfacing joint ties they should be tamped hard at the joint end, easing off on the quarter.

When track has been put to a true line fill and trim to standard section per standard practice card No. 2. Ballast should be neatly lined on the outsides by using a straight edge six (6) inches wide.

OVER

Fig. 3—Front of Standard Practice Card for Ballasting Work.

All surplus ballast should be piled and promptly removed after second raising and resurfacing.

Use ballast forks for handling stone ballast.

In gravel, granulated slag and cinder ballast, tamping picks should be used only on joint ties, using shovels on all others.

STONE BALLAST—Force.

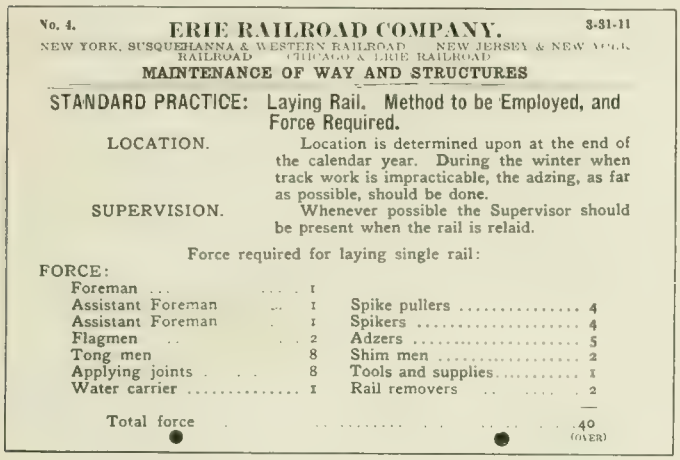
Foreman	1	
Assistant Foreman	1	Sighting track.
Assistant Foreman	1	Track tampers.
Laborers	1	Digging jack holes.
Laborers	2	Holding ties tight to rail.
Laborers	2	Driving spikes home.
Laborers	4	Operating jacks.
Laborers	4	Tamping at jacks.
Laborers	16	Tampers.
Laborers	4	Partially filling and dressing track.
	1	Water carrier.
Total	37	

Fig. 4—Back of Standard Practice Card for Ballasting Work.

circular letters are buried in the files; placards are lost and bulletins are either buried, lost or forgotten. Through the systematic method of establishing and introducing these cards, as well as the prescribed necessity for maintaining a continual check, the higher department officers, too, become thoroughly familiar with the standardized practices. By means of this system, a direct channel is opened, which enables officers to get certain kinds of instruction down definitely to where they are needed. In general, this plan of standardizing practices weeds out faulty practices and establishes good ones, all of which helps to effect efficient and economic maintenance and safe operation.

HOW ESTABLISHED

The supervision of the establishment of the standard practice card system and the continued introduction of new cards is the



No. 4. ERIE RAILROAD COMPANY. 3-31-11

NEW YORK, SUSQUEHANNA & WESTERN RAILROAD — NEW JERSEY & NEW YORK RAILROAD — CHICAGO & ERIE RAILROAD

MAINTENANCE OF WAY AND STRUCTURES

STANDARD PRACTICE: Laying Rail. Method to be Employed, and Force Required.

LOCATION. Location is determined upon at the end of the calendar year. During the winter when track work is impracticable, the adzing, as far as possible, should be done.

SUPERVISION. Whenever possible the Supervisor should be present when the rail is relaid.

Force required for laying single rail:

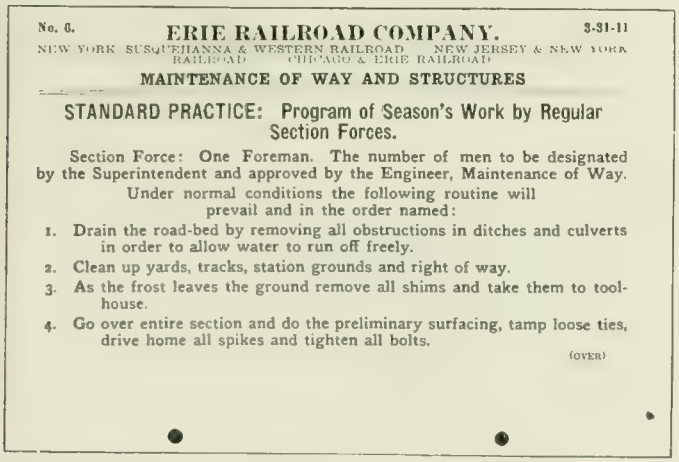
FORCE:

Foreman	1		
Assistant Foreman	1	Spike pullers	4
Assistant Foreman	1	Spikers	4
Flagmen	2	Adzers	5
Tong men	8	Shim men	2
Applying joints	8	Tools and supplies	1
Water carrier	1	Rail removers	2
Total force			40

(OVER)

Fig. 5—Standard Practice Card for Laying Rail.

assigned duty of an expert sufficiently familiar with maintenance of way work to properly suggest and draft up cards himself, check proposed cards, and in conjunction with the head of the department, decide from the result of criticisms submitted on pro-



No. 6. ERIE RAILROAD COMPANY. 3-31-11

NEW YORK, SUSQUEHANNA & WESTERN RAILROAD — NEW JERSEY & NEW YORK RAILROAD — CHICAGO & ERIE RAILROAD

MAINTENANCE OF WAY AND STRUCTURES

STANDARD PRACTICE: Program of Season's Work by Regular Section Forces.

Section Force: One Foreman. The number of men to be designated by the Superintendent and approved by the Engineer, Maintenance of Way.

Under normal conditions the following routine will prevail and in the order named:

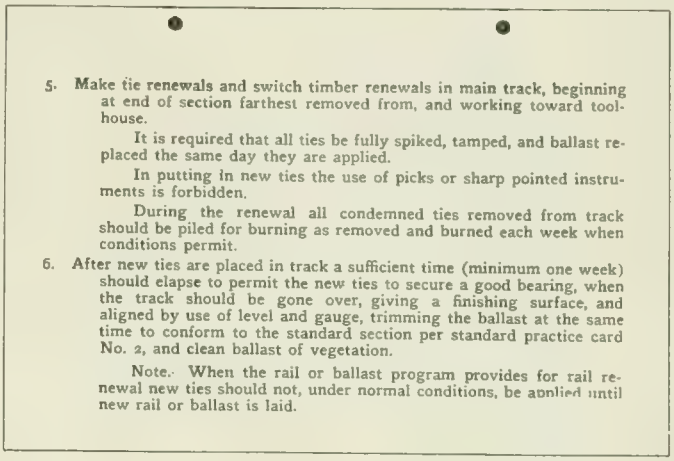
1. Drain the road-bed by removing all obstructions in ditches and culverts in order to allow water to run off freely.
2. Clean up yards, tracks, station grounds and right of way.
3. As the frost leaves the ground remove all shims and take them to tool-house.
4. Go over entire section and do the preliminary surfacing, tamp loose ties, drive home all spikes and tighten all bolts.

(OVER)

Fig. 6—Front of First Standard Practice Card Outlining Program of Season's Work.

posed standard practices which the best practices are to be followed. First, all those practices most apparent and universal are outlined, submitted to every general officer of the department and to the division engineers, who, together with their individual staffs, discuss the proposed practices and criticize them. The criticisms are then submitted to the officer supervising the installation of the cards, who carefully goes over them, tabulates them, and finally, together with the head of the department and perhaps some other persons peculiarly fitted to pass judgment on some particular practices, decides what the final standard practices shall be. These practices are then outlined on a card in clear, concise language. Illustrations, if necessary, are employed to make the meanings clearer. The cards are then distributed to the various officials and foremen who are to use them and be guided by them.

From time to time, as certain things occur which indicate faulty practices, investigations are made with a view of eliminating them and establishing in their place correct practices by



5. Make tie renewals and switch timber renewals in main track, beginning at end of section farthest removed from, and working toward tool-house.

It is required that all ties be fully spiked, tamped, and ballast replaced the same day they are applied.

In putting in new ties the use of picks or sharp pointed instruments is forbidden.

During the renewal all condemned ties removed from track should be piled for burning as removed and burned each week when conditions permit.

6. After new ties are placed in track a sufficient time (minimum one week) should elapse to permit the new ties to secure a good bearing, when the track should be gone over, giving a finishing surface, and aligned by use of level and gauge, trimming the ballast at the same time to conform to the standard section per standard practice card No. 2, and clean ballast of vegetation.

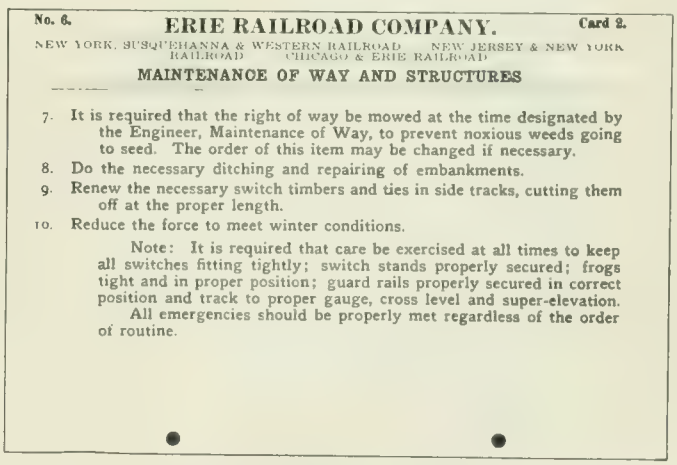
Note. When the rail or ballast program provides for rail renewal new ties should not, under normal conditions, be applied until new rail or ballast is laid.

Fig. 7—Back of First Standard Practice Card Outlining Program of Season's Work.

means of standard practice cards. In order to eradicate as promptly as possible all methods, practices, and conditions which are faulty and wasteful, everyone is encouraged to make recommendations as soon as things are noted to go wrong, or in time to prevent things going wrong. These recommendations are carefully investigated and adopted whenever of sufficient importance to warrant their application. Thus it is not the duty of anyone in particular to help effect the desired object of the standard practice card system. Everybody is expected and encouraged to take a hand.

HOW USED.

The standard practice cards, as finally issued, fit into a loose-leaf binder of convenient size to be carried in a pocket. Those officers and foremen actively engaged in supervising and directing maintenance of way work are required to carry these books with them continually while performing their duties, so that they will



No. 6. ERIE RAILROAD COMPANY. Card 2.

NEW YORK, SUSQUEHANNA & WESTERN RAILROAD — NEW JERSEY & NEW YORK RAILROAD — CHICAGO & ERIE RAILROAD

MAINTENANCE OF WAY AND STRUCTURES

7. It is required that the right of way be mowed at the time designated by the Engineer, Maintenance of Way, to prevent noxious weeds going to seed. The order of this item may be changed if necessary.
8. Do the necessary ditching and repairing of embankments.
9. Renew the necessary switch timbers and ties in side tracks, cutting them off at the proper length.
10. Reduce the force to meet winter conditions.

Note: It is required that care be exercised at all times to keep all switches fitting tightly; switch stands properly secured; frogs tight and in proper position; guard rails properly secured in correct position and track to proper gauge, cross level and super-elevation.

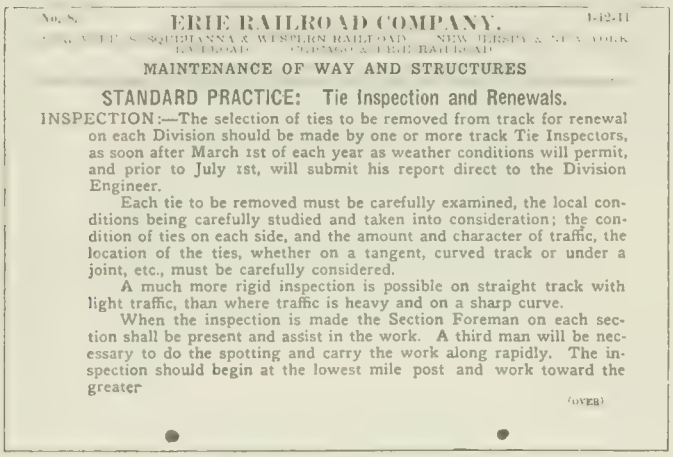
All emergencies should be properly met regardless of the order of routine.

Fig. 8—Front of Second Standard Practice Card Outlining Program of Season's Work.

always have them ready for reference in case any questions come up regarding proper practices and methods to be employed or standard conditions to be maintained.

When new cards are received outlining a new standard practice to be followed, the division engineer, at the first meeting of his staff, introduces a thorough discussion of the new cards. The various features of the standardized practices in their application,

are thoroughly explained and questions raised and answered in regard to them. Each supervisor or roadmaster and section foreman, after having had opportunity to thoroughly familiarize himself with the new practice and its purpose, applies it in his future work. Constant vigilance from the highest officer in the department, down to the supervisor or roadmaster, is maintained by checking the actual work done under the direct supervision of the section foremen, with the results as they should be secured by


No. 8. ERIE RAILROAD COMPANY. 1-12-11

MAINTENANCE OF WAY AND STRUCTURES

STANDARD PRACTICE: Tie Inspection and Renewals.

INSPECTION:—The selection of ties to be removed from track for renewal on each Division should be made by one or more track Tie Inspectors, as soon after March 1st of each year as weather conditions will permit, and prior to July 1st, will submit his report direct to the Division Engineer.

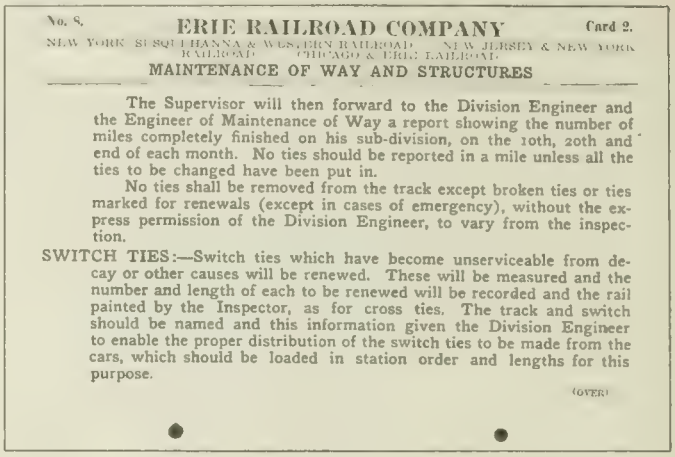
Each tie to be removed must be carefully examined, the local conditions being carefully studied and taken into consideration; the condition of ties on each side, and the amount and character of traffic, the location of the ties, whether on a tangent, curved track or under a joint, etc., must be carefully considered.

A much more rigid inspection is possible on straight track with light traffic, than where traffic is heavy and on a sharp curve.

When the inspection is made the Section Foreman on each section shall be present and assist in the work. A third man will be necessary to do the spotting and carry the work along rapidly. The inspection should begin at the lowest mile post and work toward the greater

(OVER)

Fig. 9—Front of First Sheet of Standard Practice Card for Tie Inspection and Renewals.


No. 8. ERIE RAILROAD COMPANY Card 2.

NEW YORK SUSQUEHANNA & WESTERN RAILROAD. NEW JERSEY & NEW YORK RAILROAD. CHICAGO & ERIE RAILROAD.

MAINTENANCE OF WAY AND STRUCTURES

The Supervisor will then forward to the Division Engineer and the Engineer of Maintenance of Way a report showing the number of miles completely finished on his sub-division, on the 10th, 20th and end of each month. No ties should be reported in a mile unless all the ties to be changed have been put in.

No ties shall be removed from the track except broken ties or ties marked for renewals (except in cases of emergency), without the express permission of the Division Engineer, to vary from the inspection.

SWITCH TIES:—Switch ties which have become unserviceable from decay or other causes will be renewed. These will be measured and the number and length of each to be renewed will be recorded and the rail painted by the Inspector, as for cross ties. The track and switch should be named and this information given the Division Engineer to enable the proper distribution of the switch ties to be made from the cars, which should be loaded in station order and lengths for this purpose.

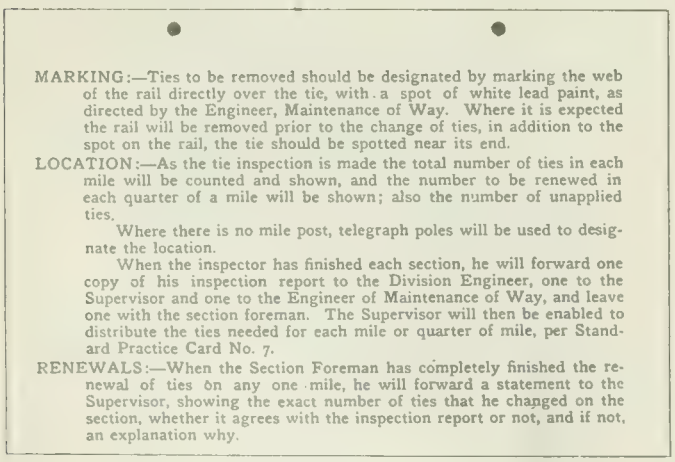
(OVER)

Fig. 11—Front of Second Standard Practice Card for Tie Inspection and Renewals.

the application of the standardized practice. Furthermore, when the prizes are awarded to the section foremen each year after the annual inspection made by the officials, besides taking into consideration the riding qualities of the roadbed and condition of the track as determined by the track testing and inspecting car and the general appearance of the right of way, the adherence of the foremen to the standard practices is also taken into consideration. All this tends to keep everyone keyed up to the spirit of the standard practice card system and insures the carrying out of the work as desired.

EXAMPLES.

A few standard practice cards, as used on the Erie Railroad, are appended hereto, by way of illustrating the system in its


MARKING:—Ties to be removed should be designated by marking the web of the rail directly over the tie, with a spot of white lead paint, as directed by the Engineer, Maintenance of Way. Where it is expected the rail will be removed prior to the change of ties, in addition to the spot on the rail, the tie should be spotted near its end.

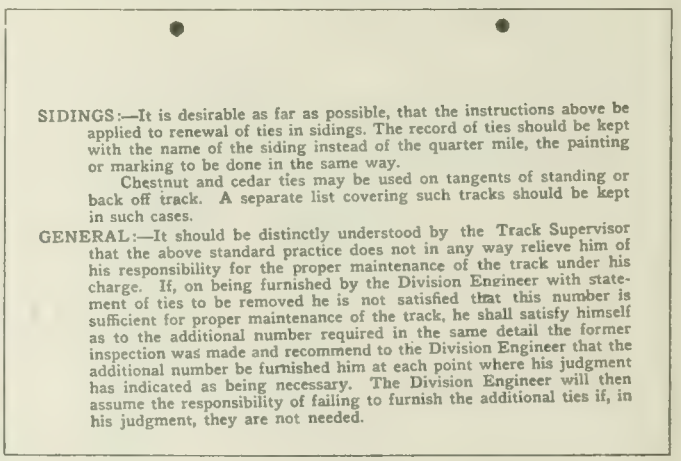
LOCATION:—As the tie inspection is made the total number of ties in each mile will be counted and shown, and the number to be renewed in each quarter of a mile will be shown; also the number of unapplied ties.

Where there is no mile post, telegraph poles will be used to designate the location.

When the inspector has finished each section, he will forward one copy of his inspection report to the Division Engineer, one to the Supervisor and one to the Engineer of Maintenance of Way, and leave one with the section foreman. The Supervisor will then be enabled to distribute the ties needed for each mile or quarter of mile, per Standard Practice Card No. 7.

RENEWALS:—When the Section Foreman has completely finished the renewal of ties on any one mile, he will forward a statement to the Supervisor, showing the exact number of ties that he changed on the section, whether it agrees with the inspection report or not, and if not, an explanation why.

Fig. 10—Back of First Standard Practice Card for Tie Inspection and Renewals.


SIDINGS:—It is desirable as far as possible, that the instructions above be applied to renewal of ties in sidings. The record of ties should be kept with the name of the siding instead of the quarter mile, the painting or marking to be done in the same way.

Chestnut and cedar ties may be used on tangents of standing or back off track. A separate list covering such tracks should be kept in such cases.

GENERAL:—It should be distinctly understood by the Track Supervisor that the above standard practice does not in any way relieve him of his responsibility for the proper maintenance of the track under his charge. If, on being furnished by the Division Engineer with statement of ties to be removed he is not satisfied that this number is sufficient for proper maintenance of the track, he shall satisfy himself as to the additional number required in the same detail the former inspection was made and recommend to the Division Engineer that the additional number be furnished him at each point where his judgment has indicated as being necessary. The Division Engineer will then assume the responsibility of failing to furnish the additional ties if, in his judgment, they are not needed.

Fig. 12—Back of Second Standard Practice Card for Tie Inspection and Renewals.

application. The cards are 4 x 6 in. in size, and where necessary, are printed on both sides. It oftentimes happens that a complete practice cannot be entirely outlined on one card. In such a case two or more cards are used. The cards are punched ready for insertion in the loose-leaf binders.

Fig. 1 shows the card which standardizes the elevation and the gage of the track. Not much comment need be made in connection with the adoption of this first card. This particular practice would naturally be about the first one to be standardized.

Fig. 2 illustrates diagrammatically the features and dimensions of the grade, subgrade, and drainage arrangements which should be maintained for the different types of roadbed employing either rock or gravel as ballast. Data is also provided giving the area of the ballast and the amount per mile necessary. The benefits resulting from this card are apparent.

Figs. 3 and 4 indicate the force required, the method to be employed and the application of ballast. This card eliminates practices which are based on individual judgments, and substitutes, in their place, practices which are the result of the experience and judgment of a considerable number of persons. It outlines the forces to be employed in laying ballast and arranges their distribution. This assists in lining up the gangs at the start of the season's work.

Fig. 5 shows the card which standardizes the method employed and forces required to lay rail. This practice, like the one illustrated by Fig. 3, determines the best and safest methods. It tends to eliminate lost motion and waste. By designating the proper organization of the force employed and the duties of each member of the force, it ought not to be a difficult matter for the section foreman and the supervisor to decide promptly how best to handle the work.

Figs. 6, 7 and 8 illustrate a card outlining the program of the season's work by the regular section forces. This is a comprehensive attempt to fix definitely the general run of work of the regular forces. That one of the results of following this practice will be increased efficiency must be realized.

Figs. 9, 10, 11 and 12 illustrate the card standardizing tie in-

spection and renewals. While, of course, this card does not outline which ties should be renewed and which should not, it does outline the method to be employed when making the inspections, and standardizes the marking, reports and methods of distributing new ties. Uniformity and system in this particular work helps greatly to avoid confusion and aggravating and expensive mistakes in the removal and renewal of ties.

While the foregoing illustrations are of a more or less general nature, the possibilities and range of application of the standard practice card system in maintenance of way work will be recognized. The first cards adopted usually deal with the more general practices. As the system is extended, the more special practices are standardized.

PERSONAL CONTACT WITH THE FOREMAN.*

BY W. W. GREENLAND,
Assistant Engineer, Wabash, Moberly, Mo.

If you want an effective organization take care of the men. We have endeavored to follow this principle in the handling of foremen and future foremen on this division. The foremen and future foremen are made to feel that they are one of the family. The supervisors going over their territory on motor cars get in very close touch with the foremen and the men. In addition to talking over track matters and the economical handling of men and material, they go into the question of the condition of the foreman's house, whether it needs repairs, whether he has enough ground for garden, etc.

The engineer maintenance of way or assistant engineer makes trips over the road either on a hand-car or motor car, not only to advise the foreman that a joint is low in a crossing, but to find out how the foreman and men are satisfied. They inquire as to their realth. If any one is sick or needs a slight operation, they advise him about the company hospital at division point, or suggest a change in location. If the foreman or men come to the hospital, they send some one from the office to see them.

The superintendent makes frequent trips in his car over the division, "highballs" foremen and men and at station stops where the foremen and men happen to be at work, gives them a word of encouragement and asks how they are getting along. We do not make a practice of reducing our section forces in winter months below the requirements of safety, thereby protecting our tracks and giving the future foremen continuous service which tends to make them more contented. Good treatment of foremen and future section foremen, the supplying of good section houses and ground, the hospital service, a trip to the city with the supervisor at times to look over new work or terminals, makes satisfied men who know they will be taken care of in sickness or in health. When these men go out on a car at 7 a. m. they are thinking of their track, and continue to think of it most of the 24 hours. In this way foremen are held and the future foremen are shown that if they work to the interest of the company they will be looked after and will later be made foremen.

A CORRECTION.

We are advised that figures relative to the costs of protecting the yards of the Cotton Belt and Iron Mountain roads at Bird's Point, Mo., just above Cairo, Ill., from the floods of the Mississippi river, which were given in our issue of April 19, as stated by A. M. Van Auken in a discussion before the American Railway Bridge and Building Association, should be revised as follows: In 1897, 3,750 lineal ft. of bank were protected at a cost of $26,634.19; in 1903, 2,930 lineal ft. of bank were protected at a cost of $19,631.85.

*Submitted in the contest on The Section Foreman Problem, which closed April 25, 1912.

ACTUAL ECONOMY IN RAILWAY MAINTENANCE.

BY R. P. BLACK,
Engineer, Maintenance of Way, Kanawha & Michigan.

The study of economy in railroading is largely relative. The economies practiced by a railway of small gross earnings per mile would not be applicable to one of very large earnings and of high speed traffic with excellency of service the paramount issue.

Large opportunities for economies in the purchase of material are afforded by the selection of materials which will give the best, safest and longest service for the money value. This does not necessarily mean that the appliance will be the best that can be had or the most durable. Durability in many a case is very costly. Durability regardless of cost is frequently the standard of the heads of the maintenance of way departments of the larger railway systems. This may be the best policy, but it is often not the most economical.

Since the compound interest on money invested in a device will become equal to the principal in 12 years at 6 per cent. it is not economy to tie up money in an additional first cost to get relatively longer service. Any additional capital is a loss equal to 6 per cent. per year. Should this capital be twice the amount required to get 12 years' service, there is a loss of 100 per cent., being the 100 per cent additional capital plus an equal amount of interest less the first cost required for renewal.

The selection of suitable frogs, switches and guard rails for the renewal and maintenance of turnouts, permits of a great amount of economy. The following practice has been found to be economical in the maintenance of turnouts over which the traffic is chiefly heavy tonnage freight trains without high speed passenger service. The main track is laid with 90 lb. rail, sidings with 70 lb. The country traversed has a mild temperature.

For main track turnouts where the wheelage movement is small over the diverging track the single spring frog giving the closed rail for the main track movement is used. This frog will last in the track as long as the rail which is 8 to 10 years and its cost, say $48, is nominal. The switch for such a turnout should be made of rails of the same analysis or consistency as the main track. Such a switch whose cost is $43 and whose life is the same as the rail in the main track, is the most economical.

For turnouts, where the wheelage movement to the diverging track is 25 per cent. or more of the total, the short solid cast manganese steel frog should be used. This frog's life is at least 10 years and on account of being free from bolts is very cheap to maintain. The cost of such a frog is $85, which compared with the cost of three single spring frogs which would wear out in the same time, at $48 less $6, each scrap value, gives a saving of $41. Besides this saving there will be less labor expense for maintenance which will more than discount the interest on the additional first cost of the higher priced frog. The switch for such a turnout where the wear would be considerably more on the point closed for the diverging route, should be made of the same rail as the main track, equipped with a 30-in. or longer manganese steel point on the side to be closed for the diverging route. Service tests of such manganese steel points at turnouts such as those leading from a yard, where all freight trains pull into and out of the main track, have demonstrated their lasting qualities. The manganese point will last at least five years or more in such a place, whereas the ordinary Bessemer or Open Hearth steel point would not last one year. The cost of a switch equipped with a manganese steel point on one side is $56, as compared with $43 for the ordinary steel rail switch. This is an increased first cost of $13 per switch, but it will show a saving in five years of $82.50.

The guard rails for the two turnouts mentioned should be of similar design. For such service the single piece guard rail made of cast manganese steel should be used. Its construction of manganese steel will give it a life of at least that of the rail in the track. The cost of this single piece cast guard rail is $16, which

compared with the price of the 15 ft. rail, guard rail at $10.45 plus 2 clamps at $3.50 each, making a total cost of $17.45, shows a saving of $1.75 for each guard rail, or $3.50 for the turnout. The use of these improved frogs, switches and guard rails for a turnout of a heavy wheelage movement over the diverging route will show a total saving for each turnout of $127.

For sidings the general practice is to relay the existing lighter rail with the second-hand rail taken out of the main track. This permits of using the second-hand frogs, switches, etc., recovered from the main track in side track turnouts or industrial tracks where the wheelage is not very heavy. In most cases the switch material recovered can be used without any additional use of new material. In the case of badly worn second-hand frogs and switches, since the greatest wear is shown in the plates, they can be made good by the purchase of new slide plates for the switches and the use of repair parts for the frogs. The cost of a complete set of 70 lb. switch plates is $7.72 less a credit of scrap value of $1, or $6.72. Therefore, not considering the cost of the repair part for the frog which generally can be gotten from a scrap frog, second-hand frogs, switches and guard rails can be provided for renewal of such turnouts that will give the required service at a very nominal cost. It has been found that only about 10 per cent. of the second-hand frogs and switches recovered from the main track go to the scrap pile.

On account of the increased axle load of engines and the softness of the Bessemer and Open Hearth rail the old style stiff frog made of the ordinary rail can no longer stand the service in yard tracks that have considerable wheelage. Due to the greater cost of the hard center and of the solid manganese steel frogs, it has been quite a question of values in the selection of the most economical frog and switch material for general utility in yards. For turnouts in yards where there is a very small wheelage movement over the diverging track, the single spring frog at a cost of $42 is economical. The switch should be 15 ft. long and made of rail of the same consistency as the rail in the track. For turnouts such as ladder tracks the double spring frog is economical. This style frog has been given hard service tests and has proven to be safe and of sufficient durability to last as long as the rail in the track. In very cold climates where considerable snow is encountered this style frog would not give entire satisfaction on account of its liability of being blocked with snow. The cost of a double spring frog made of 70-lb. rail is $47.60. The more economical switch to use would be the 15 ft. switch equipped with the manganese point on the side getting the greater wear. For turnouts off of tracks used by engines such as in and outbound tracks to the roundhouse, the short solid manganese steel frog should be used.

A very cheap and effective guard rail for less important yard turnouts can be made by the section foreman out of the scrap 90-lb. rail and second-hand tie plates. This guard rail is made by putting the bends as usual in the 15 ft. piece of rail, but instead of shearing off the base on the gauge side, 5 holes are drilled for spiking to the ties. In placing the guard rail for service the base of the 90-lb. rail is slipped under that of the 70-lb. track rail, and the guard rail spiked down to gauge. The 70-lb. track rail is held up from the tie by the use of the second-hand tie plates cut off to fit the unsupported part of the base of the 70-lb. rail. The top of the 90-lb. guard rail is the same height as the 70-lb. track rail. When the weight of the wheel is on the track rail, it bears down on the flange of the guard rail and with the help of the spikes, prevents it from spreading, no clamps being necessary. The cost of such a guard rail is:

0.5 Ton of [illegible]	$3.50
Metal [illegible]	.50
16 Second-hand tie plates	.80
Labor	2.00
Total	$6.80

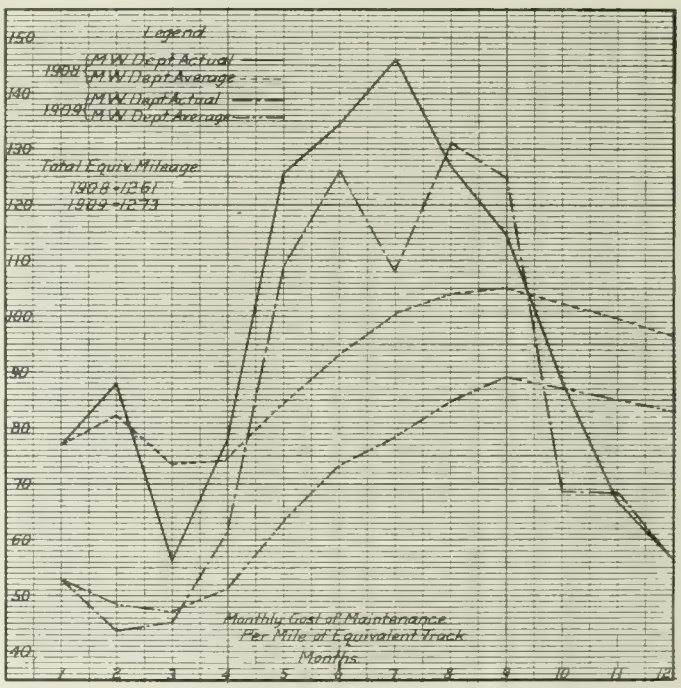
The Great Western Parana Railway, Brazil, has been organized in London for the construction of a railway from Ponta Grossa to Sete Quedas.

EFFICIENCY IN TRACK MAINTENANCE.

BY C. E. LINDSAY,
Division Engineer, New York Central & Hudson River.

The elements entering into the consideration of this subject are numerous and varied. The old saying is that "most anyone can make a good railway if he has all the men and materials he wants, but it takes a good man to make a first class railway out of two streaks of rust and a right of way."

It is not my purpose to dilate upon what constitutes good track, but to show a convenient way to measure the relative efficiency of supervisory officers in charge of track maintenance. Other things being equal, that track is most economically maintained that costs the least per unit on the average for a long term of years. Track conditions, as regards safety comfort and economy, are AVERAGE conditions, and other things being equal, the man who maintains his track to the highest average condition, is the most economical. To illustrate: In the renewal of cross ties, the man who renews all the ties in a given piece of track, and who thereby may for awhile have a very



Graphical Method for Showing Costs in Maintenance Work.

strong, smooth track, is not as efficient as the one who by the judicious renewal of a tie here and there, patiently giving the tie every chance to serve out its life, and carrying on his renewals with the least disturbance of ballast, surface and line, maintains his track in better average condition or at lower average cost.

Track conditions as to safety and comfort are difficult to exactly define. The supervisor must live with it intimately day in and day out to be able to fairly judge of the results attained by different foremen in maintaining it in average condition. His opinions as to these qualities of track are based on his best judgment after years of experience. They are not always unbiased and often disagree with the opinions of those who may be as well qualified to judge.

The same principle holds true with respect to rail and other material in greater or less degree. The track supervisor or foreman is not always left to the exercise of his own judgment exclusively as to renewals of material, so that any method of comparison of results that attaches much value to the element of material is apt to lead to erroneous conclusions, but the duty devolves particularly on the foreman to get "A fair day's work

for a fair day's pay," and to use the labor under his command to the best advantage.

"In days of old when knights (of the road) were bold and (railway) barons held their sway," it was possible for the roadmaster or engineer to adapt his system of accounting to the work to be done and what few figures were kept outside of those necessary for financial probity, were for the officers' use in determining unit costs and relative results, but in these days of state and interstate regulation of corporate accounting, there are so many blanks to be filled out with figures all bearing wholly on the accounting features of the transaction and with little or no time or regard for unit costs or relative efficiency, that it is all the harassed foreman or supervisor can do to make his account balance to the last cent, even though while he is doing so the unit cost of the work is soaring out of sight.

In other words, the present-day system of accounting has been dominated by an auditor and not by an efficiency expert. In the whole maze of records and accounts, classifications and subclassifications, hair splitting and hair pulling, as demanded by the public commissions of today there are no records that of themselves give to "the man behind the gun" any idea of his ability to hit the mark and it is not until the last analysis of the operation of a great railway system that we begin to read about the cost per train mile or per mile of road. Such statistics are too old and too general to be of much value to the trackman who wants to know today what his work of yesterday cost, but even more than that, wants to know day by day what the average cost of his work is.

With the voluminous and wasteful system of accounting exacted today for apparently the sole purpose of insuring "honest," it seems sinful to greatly add to it for the purpose of studying "efficiency" so that the writer has sought some feature of the existing accounting scheme that could be used as a basis for this study with the least possible additional bookkeeping.

As heretofore intimated, the cost of material used in track maintenance is not wholly under a supervisor's control, so that it should not enter into the calculations that from month to month are used to test the results of our work, we turn rather to the monthly pay roll and to the distribution sheet accompanying it which shows the 25 or 30 different directions in which our efforts have been extended.

It is possible to keep additional records to show for instance the number of ties put in per man per day, or the feet of rail per day per man, etc., but such figures are easily misconstrued and difficult to verify, so that they are often valueless as an effective means of attaining true efficiency, but by taking the total pay roll month by month and finding what it costs per unit per month by classification to maintain track, we place before the responsible officer a measure of his ability that appeals at once to his pride and his common sense.

The question arises just here, "what is the proper unit of cost?" evidently it is not fair to take the miles of road because of the difference in the number of tracks per mile of road, nor is it fair to take the miles of track because of the difference in the character of track maintained. A unit based on judgment, has been generally used for such comparisons, which regards two miles of side track as the equal of one mile of main track and 15 switches as costly to maintain as one mile of main track. The unit is purely empirical, but is reasonably accurate for comparative purposes when traffic conditions are given due consideration.

Table 1 shows how these figures may be made useful to the

TABLE 1.—COST PER MILE OF EQUIVALENT TRACK FOR LABOR CHARGED TO M. W. & S. ACCOUNTS FOR JANUARY.

Sub-Division.	Miles.	Superintendence.	Ballast.	Track Labor.	Roadway.	Removal of Snow.	Bridges.	Grade Crossings.	Buildings.	Tools.	Totals.
A	300.12	$1.44	.....	$8.89	$0.82	$23.32	$0.01	$0.16	$0.84	$0.06	$36.54
B	296.21	1.40	..	14.26	.64	16.00	.	.12	.29	.50	33.19
C	306.67	1.36	.....	8.89	.24	24.23	.	.24	.13	.31	35.40
D	207.17	1.41	..	18.00	2.36	5.13	.08	.07		.38	27.43
E	192.26	1.04	....	10.10	.80	17.44	.17	.21	.08	.20	30.04
Total	1,302.43	$1.35	....	$11.98	$0.88	$18.11	$0.04	$0.16	$0.31	$0.29	$33.12

TABLE 2.—COST PER MILE OF EQUIVALENT TRACK FOR LABOR CHARGED TO M. W. & S. ACCOUNTS FOR YEARS ENDING DECEMBER 31, 1916 AND 1915.

Sub-Division.	Miles.	Year.	Superintendence.	Ballast.	Track Labor.	Roadway.	Removal of Snow.	Bridges.	Grade Crossings.	Buildings.	Tools.	Totals.
A	300	1916	$16.96	$1.83	$364.97	$43.53	$21.74	$3.47	$5.10	$3.15	$3.39	$464.14
	292	1915	16.87	4.13	344.19	25.22	64.18	1.19	5.03	2.13	3.85	466.79
B	295	1916	16.80	.36	359.38	48.09	22.54	.97	8.65	4.28	4.82	465.89
	294	1915	16.19	3.41	345.11	55.76	43.98	.41	12.73	3.91	4.45	487.95
C	301	1916	16.60	2.11	371.23	33.32	38.82	.62	8.63	3.85	3.84	479.02
	294	1915	16.52	1.21	361.59	35.78	56.87	.19	10.73	2.59	2.98	488.46
D	207	1916	17.02	8.73	317.56	46.92	9.78	1.82	6.63	1.09	5.28	414.83
	206	1915	16.13	11.13	276.04	34.43	33.16	1.06	5.61	.8	6.82	384.63
E	192	1916	16.89	.. .	232.89	54.92	24.16	.8	13.75	.86	4.16	347.95
	192	1915	16.63	1.12	233.45	53.83	39.91	2.12	8.65	1.0	3.82	360.75
Total	1,295	1916	$16.85	$2.48	$342.03	$42.55	$24.33	$1.45	$8.34	$2.78	$4.30	$434.48
	1,278	1915	16.59	3.98	320.88	40.05	49.28	1.54	8.69	2.27	4.52	448.09

TABLE 3.—COST PER MILE OF EQUIVALENT TRACK FOR ALL EXPENSES OF MAINTENANCE FOR TWELVE MONTHS ENDING DECEMBER 31, 1916, COMPARED WITH PREVIOUS YEARS.

Account No.	Classification.	Entire Division. 1913.	Per Cent.	1914.	Per Cent.	1915.	Per Cent.	1916.	Per Cent.
1.	Superintendence	$34.90	3.0	$34.53	3.4	$40.23	3.8	$38.68	3.4
2.	Ballast	61.20	5.3	41.55	4.1	48.65	4.6	53.20	4.6
3A.	Ties and rails	243.42	21.0	150.99	15.1	177.84	17.1	213.16	18.6
4A.	Rail renewals	89.66	7.9	66.48	6.7	70.98	6.8	137.81	12.0
5.	Other track material	109.12	9.4	69.97	7.0	62.21	6.0	80.22	7.0
6A.	Track labor	378.34	32.7	352.22	35.4	337.58	32.5	354.25	30.9
6B.	Roadway	27.41	2.3	45.27	4.5	52.74	5.0	50.88	4.4
7.	Removal of snow	38.43	3.3	40.76	4.1	55.54	5.3	25.27	2.2
9.	Bridges, etc.	33.50	2.9	44.62	4.4	28.81	2.7	44.80	3.9
10.	Grade crossings	1.78	.1	9.15	.9	11.17	1.0	9.93	.9
11.	Grade crossings, fences, etc.	19.82	1.7	18.99	1.9	19.11	1.8	17.49	1.5
12.	Snow and sand fences	.28	...	.27	..	.40	...	.02	...
13.	Signals, etc.	13.21	1.1	7.41	.7	18.02	1.7	12.11	1.1
14.	Telegraph and telephone lines	.18		.17	..	.56	.	.02	
15.	Electric power transmission	.02		..	..	..	...		
16B.	Buildings, fixtures and grounds	82.80	7.1	88.1	8.5	94.84	9.1	40.96	3.5
16C.	Equipment buildings	.	...	..	..	..	. .	37.61	3.3
16D.	Other roadway buildings	.	...	..	...			8.67	.
17.	Docks and wharves	.18	..	.04	.	1.05	.1		
18.	Roadway tools	7.11	0.6	8.44	.8	11.88	1.1	13.48	1.2
19.	Injury to persons	.18	. .	..	..	..			
20.	Stationery and printing	.16	.	.28	.	.24	.	.1	
21.	Other expenses	.25		.49	.	.55		.61	
22.	Maintenance joint tracks, Dr.	14.99	1.3	17.45	1.7	6.59	.6	4.66	.4
23.	Maintenance joint tracks, Cr.	.16	.	.03	...	.16	.	.29	.
	Operating revenue	...	...	...	...	...		2.21	
	Totals	$1,156.78	...	$994.17	...	$1,038.83	.	$1,144.54	.

supervisor because they can be given to him within six days after the close of the month's account. From these figures he can see in what direction his average expenditures are being made and can compare with previous years and with the work of other supervisors similarly situated. While there are 25 or 30 classification accounts, the ones given are the ones to which the supervisor mostly charges his expenditures for labor, but the totals at the right include all his expenditures whether shown in detail or not. The division covers about 150 miles of territory with high class, high speed, four-track, passenger and freight lines, also double and single track roads, and large terminal and local yards. so that a wide range of track conditions is met with and the figures therefore are averages which could not be used for comparison with other railways, or even perhaps other divisions of the same road.

In Table 1 the first three sub-divisions are comparable as: (A) comprises a large passenger terminal and large freight terminal yards on a four-track system, with double and single tracks of lighter traffic. (B) and (C) comprise straight away stretches of four-track lines with numerous local yards and passenger stations.

Comparisons of costs of these three sub-divisions extending over a period of years on the equivalent mile basis, show remarkably close figures and comparison of the results attained show a remarkable uniformity in physical conditions of the tracks so that the fairness of the unit is reasonably well shown.

Similarly sub-divisions D and E are two portions of a double track road where the physical and traffic conditions, while different in many ways, balance well and prove the value of the cost per equivalent mile as a basis of comparison.

This table is prepared February 6 for one month ending January 31; on March 6 for two months ending February 28, etc., so that the figures give cumulative average results of great value. At the end of the year a table similar to Table 2 is prepared for convenient reference. In order that the supervisor may know what the entire cost per mile is for both labor and material, and what proportion of the whole each classification is, Table 3 is prepared and furnished within 15 days after the close of the year. Without a very considerable increase in accounting expense it is impracticable to give the supervisor in time to be of much use to him, a monthly statement of his material expenses per mile per classification and for reasons heretofore explained is not warranted. Table 3 includes only expenditures incurred under the direct supervision of the division maintenance of way officers. Tables 1 and 2 include only expenditures made under the direction of the track supervisor. A graphical means of showing costs per equivalent mile comparatively month by month and year by year is shown in the diagram These figures are based on the same source as those in Table 3. The actual monthly expenditure per mile for each particular month is plotted as a point and the points are joined by lines of peculiar form or color for each year. The cumulative monthly average is shown by the dotted lines at the bottom of the figures, and this average is a most valuable index of the trend of expenses and a guide to the engineer as to his future expenditures.

It is the hope of every engineer, who is at all interested in efficiency, that the methods of accounting may be greatly simplified to the end that he may have some reasonably accurate but prompt means of determining cost without having to spend more for bookkeeping than he can possibly save by the knowledge obtained therefrom.

"The Evolution of Vertical Lift Bridges," is the title of a 16-page booklet by Henry Gratton Tyrrell, of Evanston, Ill., just published by the University of Toronto Engineering Society, in which the development of the vertical lift bridge is traced from the earliest structures to those bridges of this type erected in the past few years.

LOCOMOTIVE BOILER CORROSION AND TREATED WATER.*

BY J. R. FRANCIS.

During the fall of 1908 locomotive boiler corrosion of a serious nature developed on the Peoria & Eastern division of the Big Four, the writer at the time being in charge of the chemical work for the company.

This division is divided for engine service at Indianapolis, Ind., "west end" engines working between Indianapolis and Peoria, Ill., and "east end" engines between Indianapolis and Springfield, Ohio, except during unusually busy periods, when engines are occasionally transferred for several runs from one district to the other. Engines from both districts, however, run into Moorefield roundhouse at Indianapolis and take water from the Moorefield water softener before leaving Indianapolis on their runs. This softener is a standard, Davidson type, continuous system machine, using lime and soda ash in the usual manner. It had been in continuous service ten months prior to the first evidence of corrosion troubles, and had served as the exclusive water supply for the yard engines working in Moorefield yards, the stationary boilers at Moorefield shops and roundhouse in addition to the road engines.

The first evidence of corrosion in boilers of road engines was reported on October 8, 1908, in the case of freight engine 6169 on the "east end," which gave up its train on account of a bursted flue. Upon examination this revealed a bad case of pitting and corrosion. Following this experience in rapid succession and extending over a period of several months, engine failures due to pitted flues were frequent, a total of 3,335 flues being scrapped in 1909, and 1,069 in 1910. At about the time of the first case in question, the general foreman of Moorefield shops and roundhouse reported that an occasional nipple or elbow in the feed pipes of the stationary boiler plant, between the feed water heater and boilers, had to be removed on account of being honeycombed by pitting and that this trouble had developed after the installation of the water softener, the pipes previous to its installation becoming limed up badly from time to time. Within a short time after this report, yard engine 6522, which had been in service at Moorefield yards using treated water from Moorefield water softener exclusively, was taken to the division shops at Urbana, Ill., where upon being overhauled it was found that the entire set of flues were pitted so badly that they had to be scrapped. In the light of the above-mentioned cases it is not surprising that suspicion pointed toward the water softener; in fact, it was the only new or unusual thing to be found in connection with the water service.

Upon investigation, by a process of elimination, it was found that the stationary boilers of the Moorefield plant were in ex-

*From Appendix A of the report of the Committee on Water Service of the American Railway Engineering Association. The committee prepared the following introductory note:

"The installation of small pumps to discharge a definite quantity of soda ash, in solution, into water tanks instead of relying upon enginemen to place the soda ash itself in the engine tender is not new, as a number of such outfits are in service for the purpose of relieving conditions where the hardness of water from sulphates occurs at points which are not equipped with softeners or where the conditions would not justify that expense, but the committee believes such an installation for the purpose of preventing pitted flues, as described in this article, is new and it is therefore brought to your attention.

"The committee wishes to point out for the benefit of members who may not have had enough chemistry to fully comprehend the suggestions which would otherwise occur, that the pitting of flues was stopped by maintaining in the boiler at all times water slightly caustic from sodium hydrate, and that control of this causticity was made by continuous chemical examination of samples of water taken from the boilers at the terminal or at points between terminals as may at times seem desirable, this examination being for the double purpose of maintaining no greater causticity than necessary and to furnish data for use in cases of alleged foaming trouble and failure to use blow-off cocks. It is the practice on some roads to secure more effective removal of sludge through blow-off cocks by connecting them to a perforated pipe which is laid on the mud-ring and thus withdraw the sludge from the entire ring instead of only in the vicinity of the cock.

"The control of the boiler waters required to make these caustic soda stations successful can best be made by a chemist and engineer of tests, but railways, suffering from thin traffic as well as bad water and unable to afford the expense of a man to devote his exclusive services to such matters, may be able to find a local chemist familiar with water analysis who would be equipped to do such work."

cellent condition, with no evidence whatever of any pitting or corrosion; that the yard engine in question had been in service at another point where a hard water had been used before coming to Moorefield yards, and that the road engines affected were confined to those which were in service exclusively or most of the time on the "east end." Samples of boiler waters from all engines coming into Moorefield roundhouse were then called for, with the object of noting by chemical examination what difference, if any, existed in the condition of concentrated waters of "east end" boilers as compared to "west end" boilers. These samples were drawn at the water gage in a bucket, allowed to cool, bottled, tagged, dated and forwarded to the laboratory for examination. At the laboratory the examination was conducted as follows:

One hundred c. c. of the sample were titrated with phenolphthalein indicator and normal ten hydrochloric acid, the number of c. c. of acid required being noted and the titration completed with methyl orange indicator. The number of c. c. of additional acid required with this indicator was noted, and also the total number of c. c. of acid required with both indicators. For the purpose of explanation, we will call this operation the first step. Another 100 c. c. of the sample were then taken and 30 c. c. of a 10 per cent. solution of barium chloride added, with phenolphthalein indicator, and the mixture titrated with normal ten hydrochloric acid, the number of c. c. of acid required being noted and set down as the phenolphthalein titration of the second step.

In arriving at results from the above, the following procedure was observed: If the acid required with phenolphthalein indicator in the first step exceeded that required by methyl orange, the difference was charged to hydrates and reported in equivalents as sodium hydrate. The amount of acid required with phenolphthalein indicator in the second step was compared with the amount required with phenolphthalein indicator in the first step. If less, the difference was multiplied by two and charged to alkaline carbonates and reported in equivalents as sodium carbonate. The total acid required by sodium hydrate and sodium carbonate was then deducted from the total acid required by both phenolphthalein and methyl orange indicators, the total alkalinity, and the difference, if any, charged to alkaline earth carbonates and reported in equivalents as calcium carbonate.

In case the acid required with methyl orange in the first step was greater than that required with phenolphthalein, the difference was charged to bi-carbonates and reported in equivalents as sodium bi-carbonate. The second step was then conducted the same as before, the sum of the sodium bi-carbonate and carbonate subtracted from the total alkalinity, and the difference charged to alkaline earth carbonates and as before, reported as calcium carbonate.

The use of hydrochloric acid instead of sulphuric acid in the titration is obvious, on account of the use of barium chloride.

By way of comment on the above procedure, no claim is made for scientific accuracy, because the steps as outlined are not absolutely accurate. They are, however, sufficiently so to serve the purpose to which they were put, and reference for explanation in detail will be found in "Sutton's Volumetric Analysis," under "Titration of Alkaline Salts." Besides the above figures on the samples, we also titrated for the chlorine content with standard silver nitrate solution in the usual manner, save that we first carefully neutralized the sample with nitric acid.

The accompanying table is a transcript of results of laboratory examinations of a few boiler water samples.

It will be noted that the average chlorine content of all waters on the east end is about 1.39 parts per 100,000, and that they do not vary a great deal. Comparing this average figure with chlorine content of east end freight engine No. 6571 boiler water, reported, above as having a chlorine content of 35.2 parts per 100,000, we note a concentration of about 25 times.

Attention is called to this observation for the reason that where the chlorine content of water supplies within a district are approximately the same, by comparing the average figure with that found in concentrated boiler water samples, a figure is obtained which serves as an index to the concentration of the boiler water and may be used to check up engine crews working under instructions as to blowing down of boilers, and to check up roundhouse practice as to washing boilers, changing water, etc.

Concerning the general character of the water supplies of the east end as reported in the analyses above, relating to the corrosion experienced, it will be noted that none of them are acid waters. On the contrary, they are so-called alkaline waters, and two are treated waters, showing, as a result of treatment, a slight causticity. Ordinarily one would not expect to find corrosion following the use of such waters, and with corrosion occurring as it did, with their use, it is quite a temptation to theorize as to the exact cause of the corrosion. By way of comment it may be stated that upon chemical examination of corroded or pitted spots of sections of affected flues, taken while yet moist and before samples had had time to become oxidized, the content of such pitted vesicles contained, according to qualitative analysis, ferrous iron and sulphuric anhydride, while on surfaces of other portions of the sections, alkaline earth carbonates were in evidence, most of the pitted and corroded spots on the cleaner flues being universally on the under or lower side.

In searching for a cause for the corrosion, no attention was paid to the composition of the flues in use, further than to establish the fact that the flues in service on this division were no different from flues furnished on other divisions where no trouble was being experienced in the use of mixed, treated and untreated waters.

Attention should be called to the fact, however, that many of the flues affected, although not all of them, had been in use some time prior to the installation of water softeners at each end of the district, and as a consequence were heavily covered with hard scale, the worst corrosion when appearing in the form of blisters in contradistinction to pitted points, occurring in its most active form immediately under the edge of adherent scale. An analysis of a sample of scale, showed:

	Per cent.
Silica	1.48
Ferric oxide	17.47
Calcium carbonate	9.3
Calcium sulphate	65.92
Magnesium oxide	5.62
Ferrous iron	Trace
	99.81

Considering the ferrous iron and sulphuric anhydride found by qualitative analysis of contents of pitted vesicles as mentioned, one might theorize that the sulphates of the alkaline earths had been broken down under the influence of carbon of organic matter, high heat, pressure, etc., but in the examination of the water supplies, no organic matter in appreciable quantity was found. Passing by the exact cause of the corrosion, since, under the conditions under which it took place, any explanation would of necessity be hypothetical in its details, the remedy for counteracting and stopping the trouble was based on the information obtained in the chemical examination of the boiler waters of west end engines as compared to those of the east end. The west end boilers giving no trouble and being quite caustic in comparison, it was concluded that if the east end boilers had caustic in some form added by injection into the raw water supplies, thereby keeping the east end boilers slightly caustic due to "hydrates," that the trouble pending the installation of additional standard water softeners, would cease.

This recommendation accordingly went out from the laboratory in December, 1908, and again in January, 1909, but on account of diversity of opinion as to the cause of the corro-

sion, some of the official staff believing that Moorefield treated water was causing the trouble, the use of the caustic was not begun until March 5, 1909. On this date the use of caustic soda at Arcanum, Ohio, water station was commenced, nine grains per gallon, in the form of solution being injected into the delivery line from the large pump discharging into the wayside tank. The apparatus used consisted of a "Gould's Plunger Boiler Feed Pump No. 2," Fig. 485, Fairbanks, Morse & Co.'s catalog 1909, price about $10, and having a plunger one and a quarter inches in diameter which was attached to the large pump in such manner that it had a stroke of three inches with each stroke of the large pump. This small pump was connected to an iron tank having a capacity of about 200 gal., in which the caustic soda solution was diluted to the desired strength, and discharged into the discharge line of the large pump. It is advantageous to have the line from the small pump enter the discharge line of the large pump as near the tank as possible, on account of the gradual deposit in the pipe occasioned by the interaction of the caustic soda with chemical salts in solution in the raw water.

On May 1, 1909, a similar outfit was put in operation at the Troy, Ohio, water station, where four grains per gallon of caustic soda were used. Following these installations, a passenger engine which had been overhauled at the shops and given an entire new set of flues, was caused to double the district until 28,000 miles had been made, when several flues were removed for examination. There were found to be without any evidence of pitting or corrosion.

During the treatment of these waters with ninegrains per gallon of caustic soda at Arcanum and four grains per gallon at Troy, boiler water samples titrated as shown in the accompanying tables.

It is proper to explain that passenger engines on the east end of their runs east, took water at Moorefield water softener, New Castle, Ind., Arcanum, Ohio, and, going west, at Springfield, Ohio, water softener, Troy, Ohio, and Lynn, Ind. This being true, they received a larger amount of caustic soda in proportion to the total amount of water used than did freight engines which used water from all water stations.

It will be noted that out of 59 samples from freight engines, 35 or about 59 per cent. of them showed presence of sodium carbonate and sodium hydrate. Five of them, or approximately 8 per cent. showed sodium carbonate, but no sodium hydrate, and 19 samples, or about 33 per cent. showed sodium carbonate and sodium bi-carbonate.

It was believed at this time, on account of fewer engine failures because of flues, that under this treatment the corrosion was under control. This assumption, however, was likely not true, as it afterwards was demonstrated that the corrosion did not entirely stop until a causticity due to hydrate was maintained practically all of the time.

The treatment of the waters at Arcanum and Troy, in the proportions already stated, was continued until November 1, 1909, when it was reduced one-half on complaint of enginemen that the treatment of the water was causing foaming. It developed later, however, that most of these complaints were occasioned by an effort on the part of the enginemen to protect one of their number who had carelessly allowed the water to run low in a boiler and burned a crown sheet. This reduction in treatment lowered the percentage of boiler water samples, showing the presence of sodium hydrate so much, that the majority of the samples showed the presence of sodium bi-carbonate instead.

Within four months after the reduction in the treatment several engine failures on account of pitted flues again occurred, and on this account the treatment of the waters at Arcanum and Troy was increased on June 10, 1910, to the figures first used, following which a systematic patrol of the district by the road foreman of engines quieted the complaints on the part of enginemen concerning foaming, it being very clearly demonstrated that these complaints had been greatly exaggerated. Sampling and examination in the laboratory of boiler waters was continued as before, the object being to raise the causticity due to sodium hydrate until all boiler samples showed the presence of at least a slight amount.

This feature was not finally accomplished until a third caustic soda treating station was established at Maxwell, Ind., August 12, 1910, where two grains per gallon were injected into the raw water supply. With this additional installation in operation no more trouble was experienced with samples of boiler waters failing to show the presence of sodium hydrate in appreciable quantities. This point for the third installation was selected only on account of its distance from the other installations. The daily sampling of locomotive boiler waters and chemical examination, as described, was continued for seven months, during which time more than 90 per cent. of all samples showed the presence of 2 to 15 parts per 100,000 of sodium hydrate along with about an equal amount of sodium carbonate.

Under this treatment the corrosion entirely ceased and no more trouble on this account was experienced, neither was there any more complaint of moment on the part of engine crews on account of foaming boilers, the enginemen apparently having learned how to handle the boilers better under the treatment.

It is also worthy of note that under this treatment the boilers became and remained clean and practically free from scale.

To recapitulate, it is desired to call attention to the fact that between November 1, 1909, and June 10, 1910, when the treatment was reduced, with corrosion re-occurring as already stated, that the freight engine boiler waters did not show the presence of sodium hydrate in appreciable amounts with any regularity. They did, however, show the presence of small quantities of sodium carbonate and bi-carbonate. It is desired to emphasize this point because of the fact that only after a sufficient quantity of caustic soda had been added to show an appreciable amount in the concentrated boiler waters, did we succeed in stopping the corrosion.

It is also worthy of note that, in the use of the caustic soda, we at no time used an amount as large as the equivalent of the half-bound carbonic acid of the alkaline earth bi-carbonates in the waters naturally, therefore it must have followed that the caustic soda so used, when injected into the raw waters, became sodium carbonate and that it was finally hydrolized within the boiler and partially re-converted into "hydrate." The question naturally arises at this point why sodium carbonate or soda ash would not have done just as well as sodium hydrate, since it is obvious that the latter when added to the raw water first became sodium carbonate and afterwards was in part reconverted by hydrolysis into "hydrate." In our opinion this probably would have been the case, since it is clear that sodium carbonate and sodium bi-carbonate are partially hydrolized within a boiler. This point again clearly brought out by reference above to the titration of west end boiler water samples from passenger engines. These samples show from 7 to 18 parts per 100,000 of sodium hydrate along with a slightly larger amount of sodium carbonate and are accounted for only by the fact that, in addition to the treated water taken at Moorefield shops, two raw waters on the west end carry sodium bi-carbonate naturally, one of them about four parts per 100,000 and the other eight parts per 100,000, the presence of the sodium hydrate occurring on account of the partial hydrolysis of same within the boiler during concentration.

In our opinion the features worthy of note concerning the above experience consist in part of the troubles which may follow the installation of standard water softening or treating apparatus, where waters in part only are treated within a district.

Also, in the importance of chemical laboratory examination and control of boiler waters, where corrosion as described is

being experienced, the features of such control aim to maintain within the boilers a causticity due to the presence of "hydrates" in an appreciable amount, and that whether sodium hydrate or soda ash be used, that it be used in sufficient quantity and so distributed that boiler water samples upon chemical examination show an appreciable amount of causticity due to "hydrates." This plan, in our opinion, insures a sufficient treatment to counteract the "permanent hardness" of all waters used, therefore controls ordinary corrosion troubles, and does so without using an undue excess of reagent, thereby guarding against any unnecessary aggravation of foaming troubles, due specifically to excessive treatment.

TRACK APPRENTICES.*

BY J. T. BOWSER,

Chief Clerk, Maintenance of Way, Queen & Crescent, Danville, Ky.

The average section foreman of today is not as efficient as he should be. The higher wages paid in other branches of railway work and in other trades and occupations are causing the number of efficient, reliable men who can be obtained as section foremen to become smaller each year.

The average foreigner has not the qualities which should be required of men in this line of work and the problem of educating them is attended by a great deal more difficulty and expense than with the English speaking track men, as they are handicapped not only by the fact that they must be educated in the English language but also by the fact that the preparation may not be started so early in life as is the case with the man who is raised along the road. The English speaking man is more liable to remain with the road permanently, thus justifying the expense and trouble involved in the preparation for this work.

The solution of the problem lies in making the position of section foreman attractive enough to induce young men of intelligence and reliability to take up this line of work as an occupation for life. This can be done by keeping the wages paid section foremen in just proportion to the wages paid in other branches of railway work and in other trades and occupations, and by making it possible for men to rise above this position should he be of the proper ability.

As to the preparation of the English speaking men the following plan is a good one:

Create the position of "track apprentice." These apprentices should be employed somewhat in the nature of assistant foremen and should be selected from the available supply of track laborers. In cases where the labor is colored or foreign, these men may be procured from outside sources, though it is preferable that they be procured from along the road if possible.

Young men of intelligence and with an ordinary school education should be selected, and should be paid wages slightly in advance of the rate paid to ordinary laborers. These men should be given to understand that they are employed with the view of educating them and making them efficient enough to hold the position of section foremen, and the prospect of promotion to the position of supervisor or roadmaster should be held out to them. They should be given to understand that such promotion will come only through faithful attention to duty, and the development of executive ability.

These apprentices should be placed under the best section foremen on the road and the foremen should be instructed to give them the advantage of their experience in matters pertaining to the work. Apprentices should be changed from one section to another and from section to extra gang at the judgment of the supervisor or officer directly in charge of foremen.

Apprentices should be called into the office of the roadmaster, division engineer, or other division officer directly in charge of maintenance of way and should be instructed in the handling of reports, correspondence and time books, and should be given at least a rudimentary knowledge of accounting, that is, the relation which the foreman's reports of labor expended and material used, bear to the preparation of the maintenance of way accounts, and the importance of accuracy in such reports should be deeply impressed upon them.

Where conditions will permit, periodical meetings of apprentices should be called. At these meetings they should be instructed by the roadmaster or division engineer in the more intricate problems in connection with their work, which could not be explained to them by the ordinary foreman with whom they may be working.

When, in the judgment of the supervisor, these men are competent to be placed in charge of sections, they should be used to fill temporary vacancies which may occur. They may then be placed permanently in charge of sections. Personal records should be kept so that no apprentice may fail to get his chance, either through accident or through personal feeling on the part of foremen or supervisors. These men should feel that they will get fair and honest treatment and that ability brings promotion.

After these men become foremen they should be watched carefully and those showing the proper ability and the disposition to take advantage of the opportunities offered, should be encouraged to read and study up on matters not only pertaining to their work, but on all subjects pertaining to railway operation. Provision may be made by the management for the further education of these men through a line of reading or study especially prepared or procured for this purpose. Such literature may be passed from one foreman to another so that the expense entailed would be very slight.

By this plan a supply of reliable, efficient and intelligent foremen will be available, who have been made loyal to the road through proper treatment and loyal to superior officers through personal acquaintance. Through the further education of these men as foremen, they will be available for the position of supervisor, roadmaster, or any other position where men of the type may be required.

*Submitted in the contest on The Section Foreman Problem, which closed April 25, 1912.

THE FOREIGN SECTION FOREMAN.*

BY COLEMAN KING,

Supervisor, Long Island Ry., Jamaica, N. Y.

Section foremen are not graduated from schools or colleges, nor can we hire them from a surplus on other roads, as very few if any railways today are making enough American section foremen to supply their own demand. Can we make our own American foremen by inducing the railway company to increase wages sufficient to attract American young men to track work and eventually fill the position of section foreman? It is my experience that we cannot. Where will you find the young American who will take up his shovel, tamping bar or spike maul and work in a gang of foreigners day after day for four or five years in the hope of eventually gaining sufficient knowledge to attain the position of section foreman?

There is therefore only one solution. We must educate the foreigner, whom we now have in our employ to be the section foreman of the future. By foreigner, I mean European, Asiatic or African.

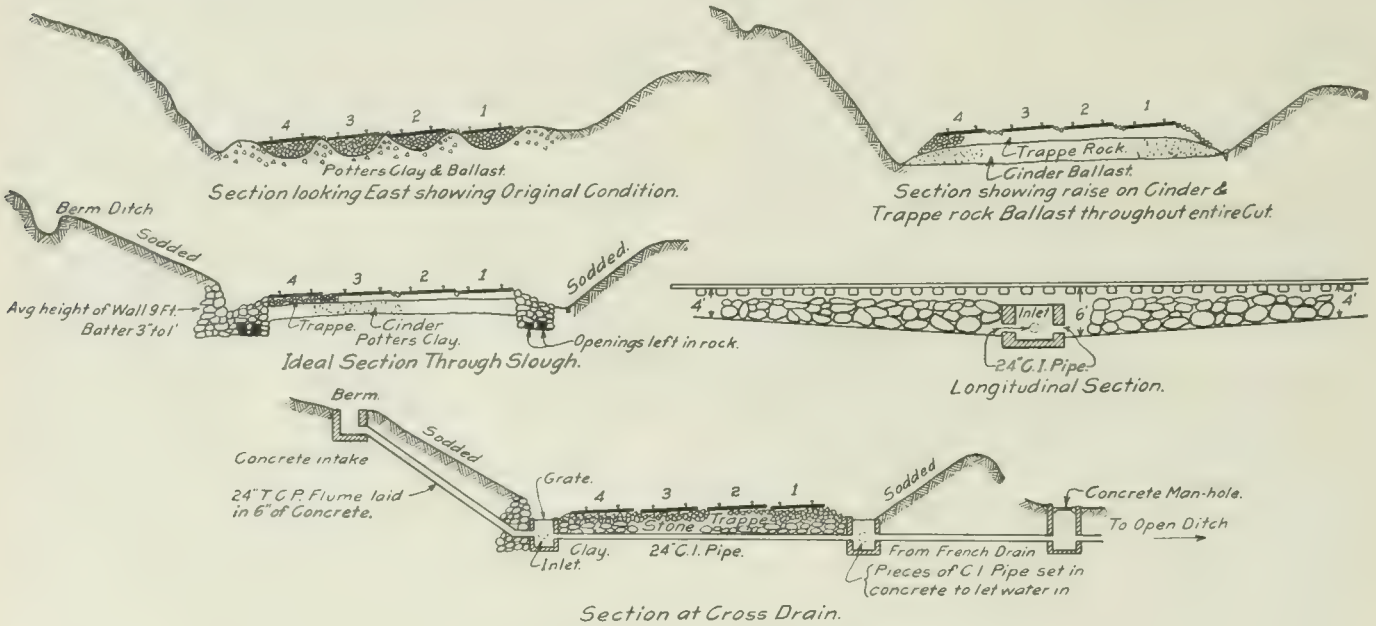
It is certainly no easy task to make a section foreman out of our present foreign laborer. However, many of our foreign laborers have their families here, and their children readily learn the English language and attend our schools. It is my impression that many of the young men of foreign parentage will follow the vocation of their fathers and that on them will greatly depend the means of supply of section foremen for the near future. They have the great advantage of being able to speak the English language and having a minor American school education, the lack of which is the greatest handicap in the progress of their fathers.

*Submitted in the contest on The Section Foreman Problem, which closed April 25, 1912.

HEAVY DRAINAGE WORK ON THE PENNSYLVANIA RAILROAD NEAR PETERSBURG, PA.

The work of improving the drainage conditions at Neff's Cut, Pa., just west of Petersburg station on the middle division of the Pennsylvania Railroad, is now completed, and on account of the difficulties encountered the remedies applied are of interest. The cut is 2,900 ft. long, and is located on a summit. It passes through impervious potters clay, which was depressed under the tracks by the heavy weight of passing trains and raised in the ditches, requiring the constant employment of a large force of men to keep the tracks in surface and line and the ditches open.

When single track was originally constructed at this point it practically followed the contour of the hill on a 6 deg. curve; this was eventually double tracked. In 1890 the alinement was changed, to a 2 deg. and 30 min. curve, by cutting through the hill. During the revision of alinement incident to the construction of third and fourth tracks a 1 deg. and 15 min. curve was installed, which necessitated a deeper cut. When the line was changed to the second location considerable difficulty was experienced in maintaining line and surface. A ditch was constructed along the north side of the tracks and filled with one and two man stone, thereby giving drainage and arresting the trouble. When the tracks were built on their present location, upon very little sub-ballast and a potters' clay bed, an extra force had to be stationed there to maintain them.



Typical Sections, Showing Methods Applied in Drainage at Neffs Cut.

In the early spring of 1909 a survey was made to determine what fall could be had in order to drain the cut, with a view of gradually eliminating the trouble and thereby saving the cost of extra maintenance which had been about $900 per month.

Following these surveys, the grade was revised and the tracks were raised about 24 in. on cinder ballast to prevent the muck from reaching the surface. After this treatment the tracks were raised on 1 ft. of trap rock ballast.

A 24-in. cast iron pipe under the tracks was lowered to a depth of about 6 ft. below the top of the rail, with a good fall and extended by the use of additional terra cotta pipe, to a point south of the Petersburg branch tracks and thence by an open ditch to the river. Two large concrete manholes were installed along the line of the main drain, with basins about 1 ft. lower than the base of the drain, in order that any sediment from heavy freshets could be cleaned out and the clogging of the drain prevented. The northern intake of the drain was connected by a covered flume of pipe down the slope of the cut, which drains all the water carried by a berm ditch during periods of heavy rains. As the rainfall is very great it materially assists in keeping main drain well flushed. Where the main drain crosses the side ditches, concrete inlets were installed, also connected by 24 in. pipe on either side with the French drains, which were laid by hand in the side ditches.

Standard ditches and slopes were constructed on either side of the cut, the banks were sodded, and a curb of small stone set along the foot of the slope to prevent scouring which would allow the sod to slip.

On both sides of the track it was necessary to shore up and excavate through the slough, at the ends of the ties, to the depth of from 4 to 6 ft. and 6 ft. wide; the grade at the bottom running toward the main cross drain. These ditches were filled with large stone in such a way as to provide ample openings to allow the water to find its way to the main cross drain. The weight of the stone combined with its thrusts against the slopes prevents the raising of mud in the ditches. It is interesting to note that where the excavation was being made the men had to leave the ditches when trains were passing, as their weight forced the muck and water from the roadbed into the ditch in small streams, as if shot from a force pump.

On the north side of the railway a solid formation exists about half way through the cut, and where the strata of slate and shale end, a heavy retaining wall 2,100 ft. long was constructed to hold back the slopes, which had constantly slipped and filled the ditches. This wall in connection with a large French drain doubly insures against mud raising.

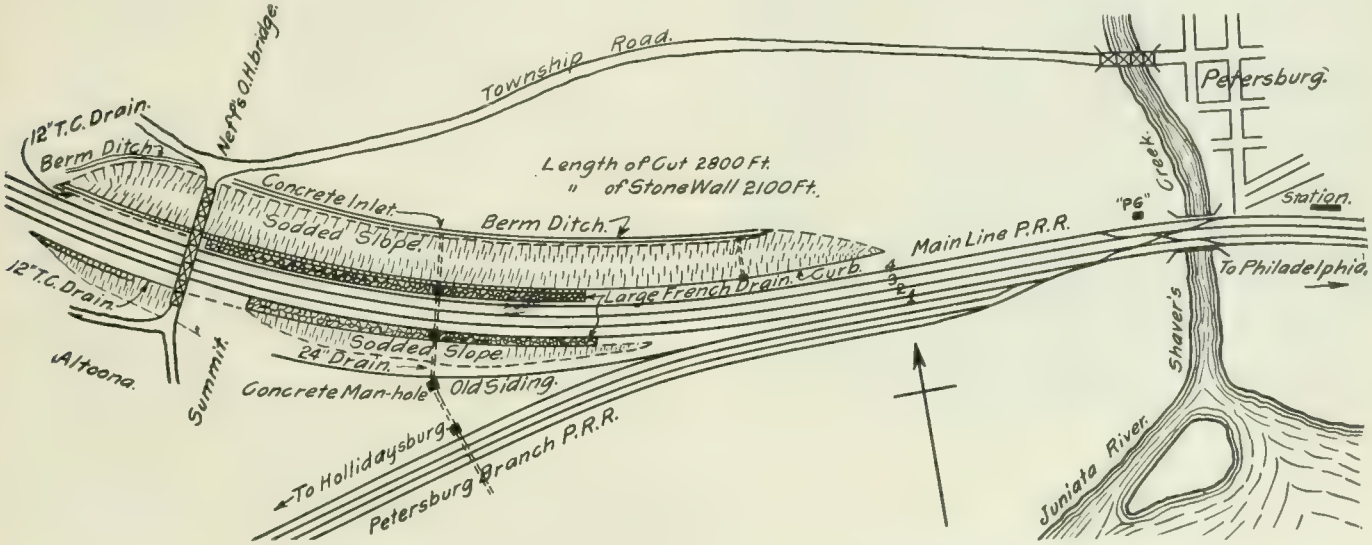
A change of a public road on the north side of Neff's bridge was necessary because of the road being considerably higher than the floor of the bridge. During rains, water ran off the bridge on to the tracks, keeping them wet and muddy. The berm ditch on the old slope was originally carried by a flume on account of the road running parallel to the top of the slope. This flume was frequently undermined and would break, causing water to flow over the banks. The road was moved back and lowered, overcoming this trouble.

Since the completion of this work in August, 1911, it has been possible to maintain line and surface, a standard slope and ditch and to dispense with all extra men, thereby reducing the cost of maintenance of this section by $900 per month. In addition the annoyance of trains reporting daily "track bad in Neff's cut"

has been eliminated. The life of rail and fastenings has been increased, as prior to this treatment the soft roadbed caused many broken splices, line and surface bent rails and the constant gaging lessened the life of ties.

It is worthy of note that through this cut there are four tracks, two east- and two westbound, over which pass daily 73 passenger trains, hauled by engines mostly of K2 type (192 tons), also 125 freight trains moving 6,900 cars hauled by engines of the heavy H8 type (170 tons), most of the loaded freight traffic passing over No. 2 track. On account of the density of traffic horses and carts were used to remove all excavation, which not only obviated the necessity of work trains and detentions to traffic, but was a great saving in money.

The cost of treatment, which has been taken from our expenses over a period of two years is here given, and while the figures may seem large at first glance, when compared to the extra cost of maintenance, which was over $10,000 per year, not to mention interruptions to traffic, annoyance to despatchers and the "slow orders" which it was frequently necessary to resort to before this work was done, it is believed that the money is well spent, and best of all, that the treatment is a success.



Plan of Drainage System Installed at Neffs Cut, Near Petersburg, Pa.

Cost of Treatment of Neff's Cut.

Cost of large stone	$1,120.83
Cost of terra cotta pipe	482.38
Cost of cast iron pipe	66.90
Cost of team hire	3,009.50
Labor picking up and unloading stone on division (73 flats)	665.21
Labor making standard ditch, sloping, excav., etc.	7,392.77
Labor building retaining walls and French drains	1,881.91
Labor changing public road	748.38
Labor unloading large stone purchased	479.21
Labor installing terra cotta and cast iron pipe	279.24
Labor cutting and laying sod	450.69
Total	$16,577.00

Steam shovel work on the Gold Hill section of the Panama Railroad has been completed. This means that all grading for the relocated line is practically complete, as the portions between Pedro Miguel and Panama and between Gamboa and Colon are now in use. The remainder of the work will consist principally of tracklaying and ballasting and the construction of telegraph, telephone and signal systems. It is expected that the line will be ready for freight traffic about June 1, but passenger trains will continue to run over the present route until the canal is practically completed, as all of the larger inland Canal Zone villages are located on the present main route across the canal channel from the relocated line. The building of the Gold Hill line was described in the *Railway Age Gazette* of February 16.

TRAINING THE FUTURE FOREMAN.*

BY J. F. M'NALLY,
Assistant Superintendent, Atchison, Topeka & Santa Fe, Chanute, Kan.

The officers of maintenance of way departments should exercise great care in selecting young men to become foremen, but if the roadmasters keep in close touch with the young men along their divisions they can always secure enough of them to supply good reliable section foremen. There are a great many young men who seek employment during the school vacation and a roadmaster can usually pick up several of these young men and put them in extra gangs as timekeepers at a salary of $45 per month, which is better than they can do at any thing else in a small town. If these young men work with an extra gang for two seasons, and have the right kind of material in them, the third year they can be used as assistant foremen. Some of them can be placed in terminal yards, where they have an opportunity to learn track work of all kinds. I find by picking up these young men and giving them an opportunity to learn track work that they make foremen who will stay with us. I have also found that we can pick up young farm boys 18 to 19 years old, and put them to work on sections at their home towns, instructing the section foreman to encourage them in their work by showing and explaining to them the importance of doing their work in a first class manner. Then when a vacancy occurs for a foreman the roadmaster can use this young man, and if only temporary, it will greatly encourage him.

We pay section foremen in small towns $60.50 per month, while those handling yards get $71.50, and we have experienced very little difficulty in securing plenty of capable foremen, for the simple reason that we do not make a change in foremen unless we find it absolutely necessary. On the 680 miles of track of the Southern Kansas division we have 120 sections, and I find that during the last seven years we have made but nine changes in foremen, three of which were due to the promotion of a foreman to the position of roadmaster. Five of our foremen have been in service from one to five years, four for seven years, 20 for 10 years, 12 for 15 years, 19 for 20 years, 40 for 24 years, 10 for 26 years, 6 for 30 years, 3 for 33 years, and 1 for 47 years.

It is true that some of these foremen on the Southern Kansas division will drop out within the next few years and receive a pension of $20 per month, but we have young men which are learning track work and will be able to take their place; they may not be able to give us as good service the first six months

*Submitted in the contest on The Section Foreman Problem, which closed April 25, 1912.

or the first year as the old foremen have given us, but if they are the proper kind of men and have the proper kind of material in them they will soon make good foremen.

I do not think there is any need to be excited over the scarcity of foremen for the future, if the roadmasters will give young men an opportunity to learn track work. Young men would rather work on the section than to do farm work, as the hours are much shorter and the pay is better.

I do not believe in making a change in section foremen unless it is absolutely necessary, for a foreman should know the weak places in his section, and should know the minute he sees a piece of poor track the best method to follow to build it up and maintain it to a high standard. A new foreman cannot do this. It takes a man from five to six months to get acquainted with all of the weak places on a section and to give them the proper attention.

I have never believed in employing what is known as the "tourist" section foreman any more than I do in employing the tourist brakeman. Within the last few days a young man, about 26 years old, called on me for a position as section foreman. He was a very intelligent looking young man, but I found he had worked for six different railways in the last three years. The only reason he could give for changing was that he did not like his roadmasters. My advice to that young man was to try to hold the next job that he was fortunate enough to get. I believe there are more old section foremen on the Santa Fe system than on any other railway. We have men who feel toward the company just the same as if they owned the track, and I do not believe they could do any more or better work if they did own the track. I believe that if the roadmaster and superintendent will make an extra effort they can arouse this kind of feeling among more of their section foremen.

There are times when a foreman needs encouragement and a roadmaster should not hesitate to give them such encouragement. If he finds the foreman is rendering good service he should not hesitate to show that he appreciates it. If the roadmaster has a man that is not rendering good service he should visit that foreman and talk to him, as it may be possible that he did not understand how the roadmaster desired the work to be done. A roadmaster should talk with his foremen in the same way as he would like his superior officers to talk to him. Never keep lazy foremen. If a track man is out of employment, unless he has had some bad luck there is something radically wrong with him, and a roadmaster should not employ him without first investigating why he is out of employment.

An advantage in training our own foremen is, that if a young man is inclined to have bad habits there is plenty of opportunity to find it out before you promote him to a foreman.

There are a great many ways that a good section foreman can save money for his company. Say for instance that there are 120 foremen on a division. There are certain seasons of the year that these men are renewing ties, and if each one of these foremen were to take out one tie each day that would give one year's service, a great amount of money would be lost. It is the same way with other material, as it is very easy for the foreman to permit his men to loose one or two spikes or bolts each day, but if the right kind of a foreman is in charge this of course will not occur.

I would recommend that all officials in charge of maintenance of way, give a closer attention to track work, as at the present time there is not enough attention given to track work and the foreman proposition.

If the division roadmaster and superintendent will put from one to two young men to work in the yards at a salary of $1.50 per day or $45 per month they soon will have plenty of young men to make good reliable section foremen. Why shouldn't we educate young men for track work the same as we do for operators, agents, machinists, etc. I think if the different railways throughout the country would discontinue the hiring of "tourist foremen" and adopt the method of putting young men to work in their yards and extra gangs that they will have a sufficient number of young men to fill the vacancies for foremen when they occur. There never was a better opportunity for the advancement of young men who have a good education and are not afraid to work than there is in the track department of today.

ABSTRACT OF ENGINEERING ARTICLES SINCE MARCH 15.

The following articles of special interest to engineers and maintenance of way men, to which readers of this section may wish to refer, have appeared in the regular weekly issues of the *Railway Age Gazette* since March 15:

Construction of the Oregon Trunk and the Des Chutes Railways in Central Oregon.—The construction features of the lines built by the Hill and Harriman systems into central Oregon were described in an illustrated article in the issue of March 22, page 680. The building of these lines has been watched with interest by engineers throughout the country both on account of the keen competition between two great systems and the difficulty of railway building in that country.

Construction of the Bingham & Garfield.—A very unusual piece of construction work has been completed by the Utah Copper Company to reach its copper mine in Bingham, Utah. The country traversed is very precipitous and the cost of building the new line was very high, reaching a maximum of $599,250 per mile. The work was described and illustrated on March 29, page 744.

Bridge Construction on the Oregon Trunk Railway.—The Celilo bridge on the Oregon Trunk is an unusual structure in its location and manner of erection. In addition to this bridge, there are on this line two important crossings of the Des Chutes river and a 340-ft. arch span across the Crooked river. The special features of these bridges were described in the issue of March 29, page 756.

Rail Breakage and Wheel Loads. The series of editorials on the rail problem was continued in the issue of April 5, page 785. This editorial called attention to the relation of rail breakages to wheel loads and showed that rail sections have increased in proportion to wheel loads and that the majority of breakages indicate defective material rather than excessive loads.

"Engineering as a Vocation."—A review of this book by Ernest McCullough was published on April 5, page 787. The book is intended for young men contemplating engineering as a profession and contains a great deal of the personal experience of the author.

Union Station and Grade Separation in Joliet.—The problem of providing facilities for handling the passenger business in small cities has become very important in many cases. It has apparently been solved by the roads entering Joliet, Ill., where all tracks in the business district have been elevated and a new union station is nearing completion. The design of the station and the details of the subway work and track elevation were described in an illustrated article in the issue of April 5, page 789.

The Construction Outlook.—The prospect for general construction work and the principal large projects contemplated during the coming season were discussed in an editorial in the issue of April 12, page 830.

Twin City-Twin Ports Line of the Soo.—The Minneapolis, St. Paul & Sault Ste. Marie has completed a section of 73 miles from Frederick, Wis., to Superior, which provides that company with a direct line between St. Paul-Minneapolis and Superior-Duluth. The peculiar difficulties of construction in that portion of the country and the erection of two steel viaducts and a heavy timber crossing of the Great Northern were described and illustrated in the issue of April 12, page 842.

Memphis Union Station.—The station building which has recently been occupied at Memphis, Tenn., is not exceptionally large, but is provided with every facility. A description of the building and terminal was given in the issue of April 12, page 852.

The Development and Use of Rails.—At hearings of the Indiana railway commission P. H. Dudley, consulting engineer of the New York Central Lines, discussed very completely the growth in the use of rails from the earliest strap iron and wooden girders to the present heavy steel sections. An abstract of these papers appeared on page 948 of the issue of April 26.

The Hudson Bay Route.—A discussion of the need for, and the proposed route of, the new Canadian railway to Hudson Bay was published in the issue of April 26, page 960.

Northern Central Station at Baltimore.—A number of photographs of the station recently completed by the Northern Central at Baltimore and a short description of the general features of the building appeared in the issue of April 26, page 964.

Grade Separation at Grand Crossing.—The elevation of tracks and separation of railway grades at Grand Crossing on the south side of the city of Chicago involved very heavy work which required a long period for its completion and attracted considerable attention throughout the country. The preliminary track elevation, the development of the grade separation plans and the details of the construction work involved in elevating the

tracks and building the numerous subways on the four roads interested, were described and fully illustrated in the issue of May 3, page 990.

Study of a Broken Rail on the New Haven.—The management of the New York, New Haven & Hartford has had a careful examination made of the rail which caused the wreck of the Federal Express on February 11 near Leet's Station, Conn. It was found that the structure of the rail on the inside was quite different from the outside and it was concluded that this difference must have existed when the rail was delivered from the mill. A number of the photographs taken of the rail and etched cross sections were reproduced with the article regarding it in the issue of May 3, page 1012.

Two editorials on the rail question appeared in the issue of May 10. One, on page 1030, commented on the increased inspection of rails at the mills, which was described more fully on page 1057 of the same issue in outlining the program of inspection adopted by Robert W. Hunt & Company, who have for many years represented a large number of railways as inspectors at the mills. The other editorial discussed the relation of flat wheels to broken rails, showing the various conditions of wheels which may be responsible for breakages of comparatively sound rails.

Proceedings of the Thirteenth Annual Convention, American Railway Engineering Association. The new Proceedings of this association were reviewed in the issue of May 10, page 1034.

The Florida East Coast Extension.—One of the most interesting pieces of engineering construction undertaken in recent years is the extension of the Florida East Coast railway from Miami, Fla., across the keys to Key West. This project has attracted the attention of engineers and the public throughout the country and has been widely advertised as the "railway over the seas." The construction was divided into three classes, the grading across the Everglades on the mainland, the grading across the keys, and the bridge work between the keys. Concrete arch viaducts were used extensively and in the deeper water steel girders or truss bridges were provided. The problems connected with this work, were, on account of its peculiar location, numerous and required some interesting solutions. All of these details are fully described and illustrated in an article appearing on page 1036, the issue of May 10.

A SMALL STATION ON THE TOLEDO, PEORIA & WESTERN.

The Toledo, Peoria & Western has built a small station at Secor, Ill., which has some unique features. The exterior finish is brick veneer, with stone trimmings and slate roof. The platform shown in the accompanying photograph is a temporary one and will be replaced with one of concrete. The interior is divided between a waiting room, ticket office and baggage room. The ceiling and walls above the wainscoting in the office and waiting room are finished with a prepared wood fiber product called "beaver board." The company has experimented with this



Brick Veneer Station; Toledo, Peoria & Western.

material on two stations, and so far the results have been very satisfactory.

The beaver board replaces the lath, plaster, and wall paper, being nailed directly to the studding with nails ¾ in. long, having a thin, flat head. It is made of wood pulp pressed into sheets 3/16 in. thick, which can be cut into panels of convenient size. The joints between the panels are covered by decorative strips and the panels can be painted to secure very pleasing effects. A finish of two or three coats of flat tone paint applied over sizing has been found to give the best results. It has also been found advisable to paint and size the backs of the panels before they are applied to keep out dampness and prevent warping. At points where there is danger of furniture or other objects striking the wall or being pushed through the panels, the beaver board can be backed up between the studding with a very cheap grade of lumber.

Since plaster finish is not advisable for stations, except when covered with painted canvas or heavy muslin, the cost of such work is high. The common finishing material, beaded ceiling lumber, is constantly becoming more expensive, and it has the disadvantage that it shrinks badly, leaving cracks which are unsightly and which destroy the effectiveness of the wall as a protection. Beaver boards has at least 25 per cent. less joints than a finish of ceiling lumber, and all joints are over the studding and are covered by decorative strips. The cost of beaver boards was estimated in this case to be at least 25 per cent. less than either of the other styles of finish, and so far as experiments have been carried its permanences seems unquestionable. This station has been built under the supervision of J. H. Markley, master of bridges and buildings, to whom we are indebted for this information.



Waiting Room of Toledo, Peoria & Western Station at Secor, Ill.

THE FOREMAN PROBLEM.*

By William Ruhl,
Section Foreman, Atchison, Topeka & Santa Fe Ry., Bergen, Kan.

My idea is for the railways to distribute over their lines a number of young men under good practical foremen at pay that will make the work interesting to them. If they make good they should be promoted to foremen. I do not believe in foreigners for foremen, and think that the United States can furnish enough men if we take as much interest in our boys as we would be compelled to take in training foreigners for foremen. I find that it takes a great deal of time and trouble to make even good section laborers out of foreigners to say nothing about foremen.

A foreigner would rather work for an American foreman than for one of his own nationality. He would rather go three steps to cover up a tray spike or bolt than to take one step

*Submitted in the contest on The Section Foreman Problem which closed April 25, 1912.

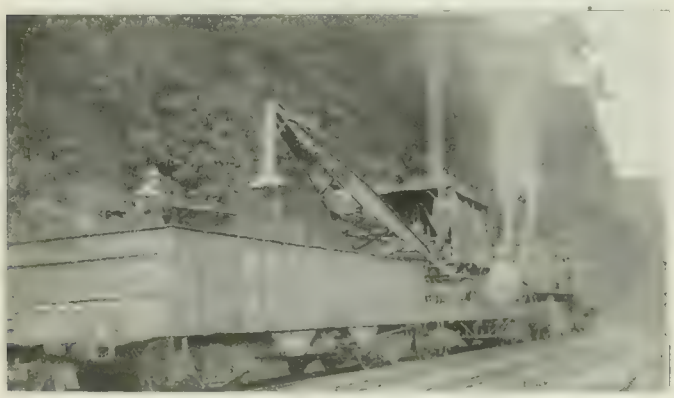
toward the scrap bin. You cannot trust the Italian, Mexican or Greek for anything. He will make a very good track laborer, but from my experience I would say that he will never make a good track foreman. Teach our boys and give them a chance and the foreman problem will be solved.

LOADING RAILS WITH AN AMERICAN DITCHER.

The Southern Pacific has recently relaid many miles of track on its coast division with 90-lb. rails. After the completion of the new track the old rails, second-hand tie plates, angle bars, and scrap, were picked up by a work train, an American ditching machine which was not otherwise engaged at the time being used to pick up and load the rails.

The work train carried empty flat cars with board sides; one for scrap tie plates, bolts, nuts, etc.; one for good second-hand tie plates; and one for angle bars, in addition to the rail cars. Four men were sent out in advance of the train to classify and assemble the small material into piles, so that four men could quickly load it on to the respective cars. The ditching machine which was used had a 24-ft. derrick arm and was arranged to revolve on a circular track which was set on a truck that traveled over a track on a flat car.

A special rail tong was made by cutting off the horizontal handles of an ordinary rail tong and forming rings at the points



Loading Rails with an American Ditcher on the Baltimore & Ohio.

where the tongs formerly joined the handles. These rings were connected by a 3-ft. bridle chain having a ring in its center, into which was fastened the end of a ⅜-in. chain 6 ft. long. The opposite end of this chain was hooked over the middle tooth of the ditching bucket, so that when loading a rail the pull on the bridle chain resulted in the tong engaging the rail.

There were several different orders for loading. One order would call for 30-ft. rails in good condition, with or without angle bars on the same car, another for so many lineal feet regardless of rail lengths, another for curve worn rail, and another for short lengths, etc. There were also a few cars of 90-lb. rails to pick up, left over after the new track was completed. Separate cars were provided for the old switches and frogs. Rather than travel the machine on the car it was found more desirable to load one car at a time. The system was as follows:

Two men kept in advance of the train measuring the rails, and marking with red crayon the length of each rail at its exact center It was found to effect a saving to pick up on only one side of the track at a time. Two men were provided on the ground alongside the car which was being loaded. One of these men clasped the tongs on the rail at the red mark at its center, and the other held the end of the rail to guide it as the derrick arm swung to position over the car. Two men on the car, one at each end of the rail, guided it into place. The section foreman, who had charge of the work, recorded the rail according to the length which was marked. The man on the ground whose duty it was to guide the rail, also threw the angle bars on the car if the order required them to be loaded with the rail. Every second layer of rails, of course, was inverted, and they were therefore picked up upside down. The man on the ground who clasped the tongs on the rail advanced as soon as the tongs were caught, and inverted the next rail with a pinch bar, so that it was ready by the time the car was opposite. In addition to this force of seven men whose duties were directly connected with the railroading, there were the engineer and the fireman of the ditching machine.

After the men became accustomed to the work the train did not always have to stop at each rail, as it was possible to pick them up while moving slowly forward. An average of 400 rails a day was loaded, while 300 was the average with a gang of 20 laborers. A great deal of time was necessarily lost in clearing for main line trains. This time was utilized in having the men sort and pile the material and scrap on the cars, also in breaking the joints on the old rail in advance of the train.

Assuming the cost of the work train as a constant factor, as is also the labor required in picking up scrap, etc., and charging against the rail loading only the work which was actually used to handle it, including that of the ditching machine and its crew, fuel, wear and tear, interest, etc., the items of cost appear as follows:

Foreman	$3.00
7 laborers at $1.60	11.20
Ditching machine as above, approx.	15.00
	$29.20

Dividing $29.20 by 400 rails gives a unit cost of 7.3 cents per rail, or 16.5 cents per ton.

With the all labor method the cost is

1 foreman	$3.00
20 laborers at $1.60	32.00
	$35.00

Dividing $35 by 300 rails the unit cost is 11.6 cents per rail, or 26.2 cents per ton.

Loading by the machine therefore gained 60 per cent. in efficiency, secured a more uniform loading on the car, and obviated the likelihood of more or less damage to the ballast caused by 20 men trampling it. We are indebted for the above information to A. B. Allen, assistant roadmaster, Southern Pacific, who was in charge of this work.

The Chicago Great Western has also used a similar machine for loading rails with excellent results. There were loaded an average of five cars containing 120 30-ft. 60-lb. rails each per day, making 600 rails or 160 gross tons. The estimated cost of this work was as follows:

Work train, including crew, fuel, etc.		$35.00
Loading crew, 1 engineer	at $1.50	4.17
One fireman	at 75.00	2.50
One foreman	at 75.00	2.50
Five laborers	at .15	7.50
Total		$51.67

Average total cost per ton, $0.32.

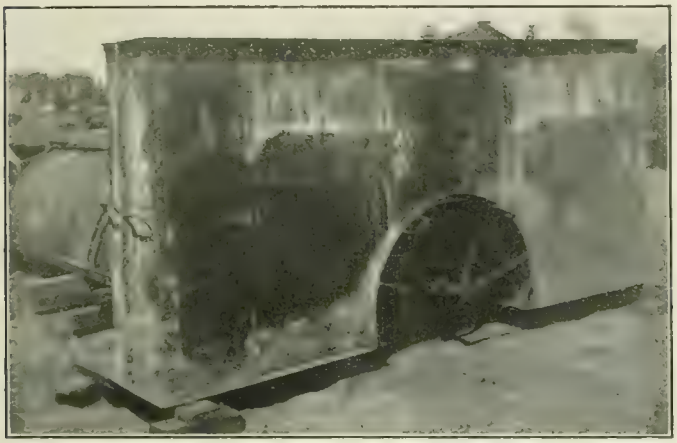
Eliminating train service, which would be necessary with any method, the cost was 10.4 cents per ton. In another instance on the same road a gondola car loaded with ninety 33-ft. 100-lb. rails was unloaded in one hour, the rail being placed on either side of the track in proper position for laying.

The accompanying view shows this machine in use for unloading rails from a gondola car on the Baltimore & Ohio, where it was also used. One important advantage of the use of such a machine is that the rails can be placed on the shoulder where needed and are lowered to the ground without damage instead of being dropped. They can also be spotted in the position desired for relaying and save consequent shifting.

The government of Nigeria is considering the advisability of building a new branch line from Minna to the new tin district of Jemaa. This line has been favorably reported on by the governor of Nigeria and by the chief government inspector of mines.

NEW IRON FORM FOR CONCRETE ARCHES AND PIPE.

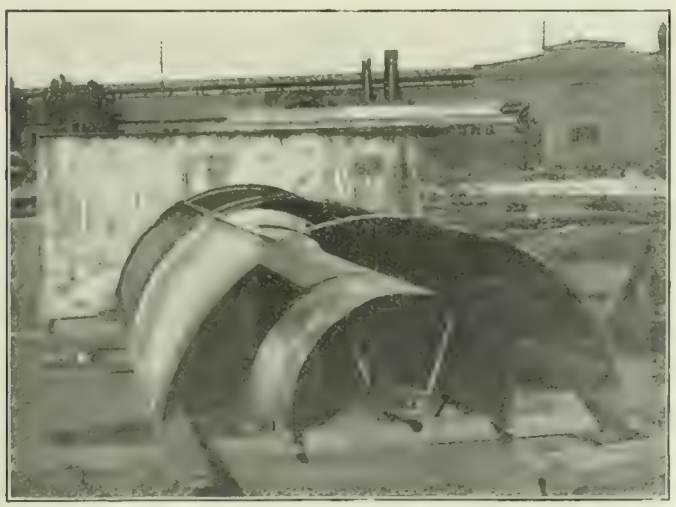
The Southern Pacific has recently completed testing a new collapsible iron form for concrete arches and pipe. The form is made of No. 20 gage iron in 8 ft. lengths, and is of such weight that two men can handle all the pieces for a 36-in. iron form. The form reduces in size by means of a number of eccentrics mounted on a pipe shaft passing through the center of the form as shown in the illustrations. These eccentrics are connected with the sides of the form by iron straps and move the



End View of Collapsible Iron Form, Showing the End Portal in Place.

sides in or out, as the central shaft is turned. They will not move by weight and can only be moved when the shaft is turned, for which purpose an 8-in. wrench is used.

The actual cost of a culvert constructed in this way is but little below the cost where concrete pipe is used, but, considering the loss in concrete pipe due to breakage in shipment and handling and the waste in wooden forms, the arch has been found to be the cheaper. The construction of the continuous culvert and head walls also eliminates the possibility of the joints pulling apart under the fills, which is one disadvantage



View of Collapsible Form for Concrete Arches, Showing Eccentric Shaft.

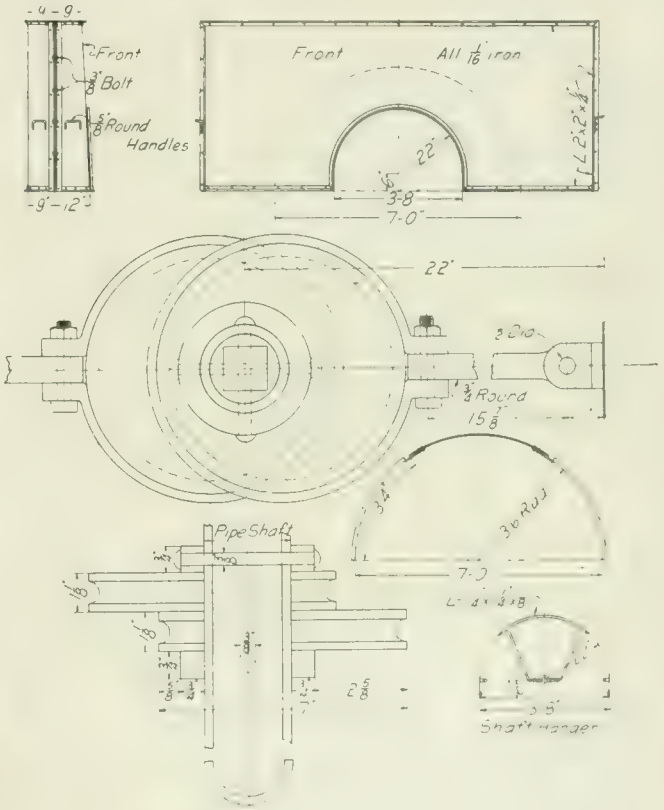
of jointed pipe. The following figures give a comparison of the cost of two culverts of the same size, in one of which pipe was used, and in the other an arch was built. Both culverts were 36 in. in diameter and 22 ft. long. The cost of excavation and back billing was omitted in both cases.

PIPE CULVERT.

7 joints concrete pipe	$6.00	$42.00
½ car concrete gravel	4.00	2.00
8 barrels cement	1.70	13.60
200 ft. B.M. form lumber	14.00	2.80
Total material		$60.40
Unloading material and building forms and concrete platforms		$22.00
Placing pipe in trench		7.50
Placing 8 yds. concrete in portals		29.12
Total labor		$58.62
Grand total		$119.02

ARCH CULVERT.

16 barrels cement	$1.70	$27.20
2 cars concrete gravel	4.00	8.00
Total material		$35.20
Unloading material and building platform to mix concrete		$19.75
Placing forms and concrete		58.25
Total labor		$78.00
Grand total		$113.20



Collapsible Concrete Form.

We are indebted for this information to C. F. Green, supervisor of bridges and buildings of the Southern Pacific at Sacramento, Cal., under whose direction this form has been developed.

FROG AND SWITCH REPAIR OUTFIT ON THE SOUTHERN PACIFIC.

The Southern Pacific has maintained a frog and switch repair outfit, consisting of a work car and a flat car with working tools, including a forge, mandril, drill press and a supply of different sizes of nuts and bolts, on the southern district for several years. The flat car carries all the necessary rivets, plates, bolts and other light material, together with new frogs for temporary replacement; and the crew consisting of one blacksmith and a helper, is thus able to make all light repairs to frogs and switches on the line. When removing frogs from the track or doing other heavy work the track gang is called on for assistance as needed. The crew is under the direction of the district roadmaster on

the line where it is working, and travels from place to place over the division.

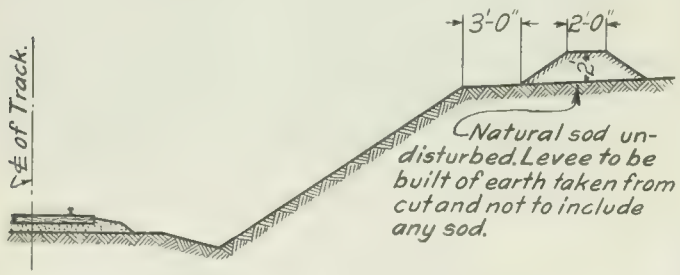
In 1909 records were kept of the cost of this work on the road. In the Saugua district, from Los Angeles to Mojave, the crew repaired 13 frogs and tightened 70 switch stands at an average cost per mile of $1.70. On the Tehachapi district 56 frogs were worked over, the bolts were tightened on 27 switch stands and new rods were substituted when needed, at an average cost of $2.20 per mile. Similar work on the Bakersfield showed an average cost of $2.50 per mile. On the Fresno district of 153 miles 55 frogs and switch stands were repaired and put in shape at an average cost of $1.40 per mile.

BERME LEVEE OR DIKE.

BY A. A. SCHENCK,
Engineer Maintenance of Way, Chicago & North Western, Omaha, Neb.

The ordinary berme ditch dug above the top of the slope of a railway cut is a serious objection in that it facilitates the soaking of water into the material and frequently causes a sloughing down of the material into the cuts. As this broken surface dries it tends to crack more than ordinarily, allowing still more water to get into the ground and increasing the sloughing tendency. The frost action is also increased by the broken condition of the ground. Beginning with a very small amount of trouble, slipping of the material frequently increases until large amounts of the ground above the cut start to slide in.

When there is an underlying stratum of hard material the water soaks down and moistens the top of this stratum, increasing the tendency of the overlying mass to slip into the cut. When the writer was appointed engineer of the Oregon Railway & Navigation Company's line in 1883 he was at once sent to Cascade Locks to make an examination and report on a slide. It was found that this sloughing tendency had broken the entire surface of an overlying mass of great depth and extended down



Location of Berme Levee with Reference to Center of Track.

to the smooth rock. The masses, in some cases, were the large part of an acre in size and cracks were many feet wide. At certain times of the year when the water reached the surface of the underlying rock and lubricated it, the entire slope for many hundred feet drifted toward the railway and the Columbia river. It is manifestly impossible to resist any sloughing tendency which has reached such a size. In general, the inability to secure any firm base from which to create a counter pressure makes it impracticable to stop this movement. Piling has only a small amount of resistance, owing to the usual depth of the slipping material and its great leverage against the small amount of the pile that is stable below the plane of the slipping.

It is desirable to prevent at the very outset the possibility of water getting into the ground and starting such an action. Where there is a natural sod this makes an exceedingly valuable protection against the entrance of the water into the ground and it is desirable not to disturb this natural covering by the construction of berme ditches.

On the extension of a western road the berme levee or dike which is shown herewith is being tried. These dikes were built without disturbing the natural surface of the ground in any way by dumping one wagon load of material from the cut in each wagon length of dike. A uniform finish was readily secured by dragging a Fresno scraper along each side and the top of the dike a coupel of times. Where any stream of water tended to reach this dike the bottom of the water course was filled to the level of the ground in the lower direction and the dike made much larger, so as to divert the water parallel with the cut. It is of course necessary to place the dike some distance back from the slope of the cut, particularly where the slope is steeper than the angle of repose of the material composing the cut. This dike construction gives greater waterway area for any given amount of material than is the case with the berme ditch and provides a greater allowance for the deposit of sediment.

A QUICK METHOD FOR REPAIRING A WASHOUT.

The breaking of the Black River falls dam near Winona, Wis., on October 7, 1911, caused the flooding of about four miles of track on the Madison division of the Chicago & North Western south of Winona. At one point between bridges about 150 ft. of the embankment was carried away to a depth of 2 to 8 ft. below the ties, and water poured through the opening so swiftly that timbers could not be placed to block up under the ties. As the water was not deep enough to drive a pile bridge and cut off the piles low enough to place standard caps and stringers below the ties, a special construction had to be adopted. The ties were blocked up from both ends of the washed-out section as far as the current of the stream would allow and the remaining section was carried on two-pile bents driven 5 ft. apart, the piles being as nearly under the rails as it was possible to drive them. The track was then jacked up and carried on second-hand bridge stringers 8 in. x 16 in. x 12 ft., supported longitudinally over the piles. This offered a support which was solid enough to run cars on from which to dump material into the opening. It required 44 carloads, or about 1,320 yds. of cinders, gravel and crushed rock, to replace the embankment which had been washed away. In 14 hours after the washout the track was ready for trains, but as the roadbed was very soft, trains were not run over it for 24 hours. We are indebted to M. Riney, forman of bridges and buildings, for the above information.

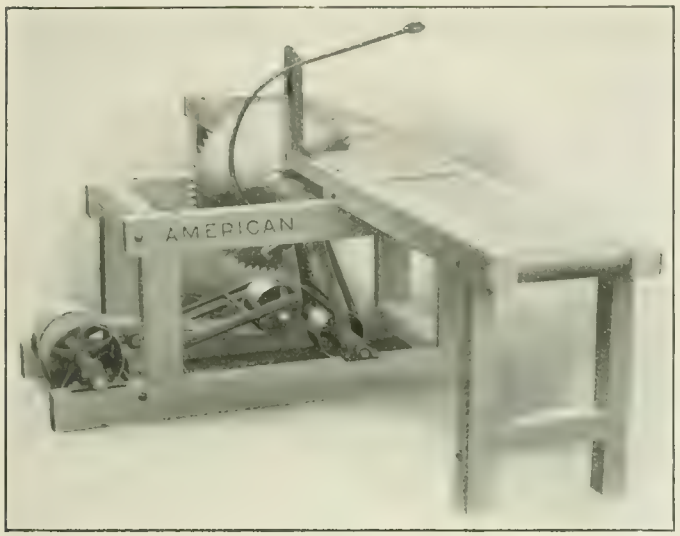
ECONOMICAL HANDLING OF HEAVY MATERIAL

An economical method of handling frogs, rails and other heavy material where forces are limited is used by Roadmaster D. C. Davis, of the St. Louis & San Francisco, at Pittsburg, Kan. In yards especially a considerable amount of material has to be handled with forces of from two to four men. A frog or rail that is to be moved is thrown in the center of the track by bars and a push car is run over it. A piece of light rail is laid lengthwise over the car and chains are thrown over each end of the rail under the frog or rail to be moved. The latter is raised with bars and the chains are fastened up, swinging the weight under the car without any heavy lifting. The push car can then be moved down the track to the point where the frog or rail is needed. In this way heavy material can be moved by two or three men, when four to six would be required to lift it on to a car. There is also no danger of injury to the men by allowing the frog to drop. The only material required is two short chains and a short piece of rail or timber a couple of feet longer than a push car.

A plan has been submitted to the Brazilian government for the construction of a railway from Rio de Janeiro to Valparaiso, Chile.

PORTABLE SAW MILL FOR RAILWAY PURPOSES.

The extended use of secondhand timber and piling offers a profitable field for economy in bridge maintenance. With the development of a portable sawmill which can be readily transported from place to place it will be practicable to resaw much material to eliminate the damaged or decayed portions where previously the entire piece has been thrown aside or burned. The replacement of a trestle with a permanent structure releases a large amount of material which, after sawing, may be suitable for further service. Likewise, piling too short for driving again will furnish ties or lumber. Much material suitable for platforms, sheds, fences, etc., can be secured by resawing at the cost of the sawing alone. The portable saw mill made by the American Saw Mill Machinery Company of Hackettstown, N. J., is adapted for this class of work. The outfit consists of a saw mill and a cut-off saw table, which are mounted separately and can be operated independently, and a gasolene engine. The three units are of such size that they can be loaded and unloaded from a flat car readily, so that the saw can either be operated on the car or unloaded at the work as desired. Where any considerable amount of bridge work is to be done in one vicinity the saw can be located to good advantage at some central point where the timbers from the various places can be brought in and worked over. On a large job it would probably be economical to place the saw at this one location. Such an outfit is capable of wide application in the railway service beyond resawing bridge timber. It should prove valuable in the storage lumber yard to saw odd sizes as required by requisitions. A road owning timber land could also cut its own lumber as required with such an outfit.

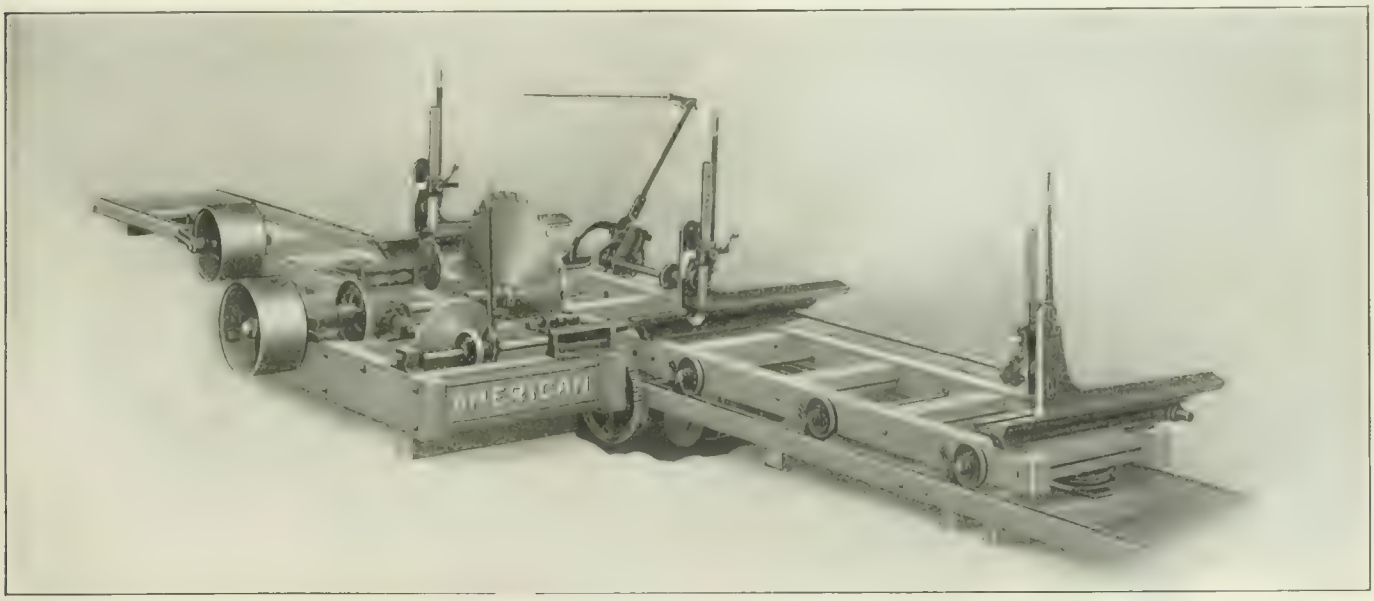


American Cut-Off Saw Table.

LIME WASH FOR FIRE PREVENTION.

On the line of the Hartford, Providence & Fishkill Railroad, built in 1851-55, from Providence, R. I., to Waterbury, Conn., all frame structures were heavily coated every second year with quicklime or common whitewash. This practice was followed for a period of about 25 years after erection and the losses from fire was very small. About 1880 this practice was discontinued, with the result that the fire loss was greatly increased. Some of the Howe trusses on this line were in actual use for more than 50 years, during which time they required very little renewal of timber. During a part of this time, however, they were reasonably well protected from th weather by housing. In presenting these facts to the American Railway Bridge and Building Association, J. B. Sheldon, supervisor of bridges and buildings of the New York, New Haven & Hartford, expressed the opinion that if all frame bridges were heavily coated with lime wash every two or three years fire risks would be greatly reduced and the expense would be very small. He also considers lime wash one of the best of wood preservatives, possibly excepting creosote oil and a few other pressure processes.

The report of the United States consul at Winnipeg, Man., calls attention to a resolution adopted by the Saskatchewan legislature on February 19, 1912, calling upon the Dominion government to abolish the duty on steel rails until the Canadian manufacturers become able to meet the demand. One member stated that the Canadian mills were 37,000 tons behind in their orders. The rapid development of western Canada has made it impossible for the mills to keep pace with the demands and the amount of construction work done is dependent upon the ability of railways to secure the necessary rails. The duty on steel rails imported from the United States is $7 per ton, and from the United Kingdom $4.50 per ton.



American Variable Friction Feed Saw Mill.

General News Section.

The name of the Buffalo & Allegheny Valley Division of the Pennsylvania has been changed to Northern Division.

During the week ended May 10, the Grand Trunk ran west from Montreal nine special trains, carrying 2,225 passengers, who had arrived at Canadian ports by steamship from Europe.

The lower house of Congress has adopted by a large majority the amendment to the general appropriation bill abolishing the commerce court and turning its business over to the district courts. The conservative republicans contested this action with persistence, but without success.

The New York State Public Service Commission, First district, has awarded the contract for building section 14 of the Lexington avenue subway, New York City, to Arthur McMullen, New York, for $3,889,775. This section lies mostly beneath the Harlem river, and the tunnel will consist of four tubes incased in concrete.

At its meeting this week, the committee representing the managers of eastern roads decided to defer action on the demands made by the locomotive firemen pending replies to a letter to be sent by the committee to the officers of all the roads involved, asking if they wish to deal collectively with the firemen as to these demands, or if each road would prefer to deal with its firemen by itself.

The committee of the House of Representatives has continued at Washington the past week its inquiry into the charges of improper conduct which have been preferred against Judge R. W. Archbald, of the commerce court, but not much progress has been made. President Baer, of the Philadelphia & Reading, and several officers of the Lehigh Valley have been called upon to give testimony.

In charging the Mercer County grand jury Supreme Court Justice Trenchard of New Jersey has called attention to the recent charges that Senator Richard Fitzherbert had attempted to mulct the Commercial Acetylene Company of New York for stopping legislative action on two bills aimed to destroy the firm's business in New Jersey. This charge was commented on in the *Railway Age Gazette* of February 23, page 326.

The list of bills before Congress to provide for a parcels post has been increased by the addition of one presented in the Senate this week by Mr. Bourne, of Oregon. Senator Bourne proposes a list of rates to be varied with distances and would have a limit of 11 lbs. For 50 miles he would charge for the first pound 6 cents, and for each additional pound 3 cents; for 500 miles 8 cents and 4 cents; for 2,000 miles, 12 cents and 10 cents.

Three more railways have arranged with Robert W. Hunt & Co., for increased inspection of rails during the process of manufacture, in accordance with the plan described in the *Railway Age Gazette* of May 10, page 1057; namely, the Chicago, Burlington & Quincy, the Chicago Great Western, and the Wabash. With these additions the aggregate length of the railways adopting the new plan will be about 103,000 miles.

In an address before the convention of the Southwestern Postal Association, at Kansas City, on May 10, Joseph Stewart, second assistant postmaster-general, said that during the present fiscal year there have been no deaths on mail cars from accidents. In the corresponding period of the previous year there were 12 fatal accidents in mail cars. The improved condition, he ascribed directly to the increased use of steel cars.

In the House of Representatives at Washington, on Tuesday of this week, the Clayton anti-injunction bill was passed by a vote of 244 to 31, the galleries at the time being occupied by prominent labor leaders. The bill forbids courts to issue injunctions without notice to the parties affected; makes injunctions in certain cases effective for seven days only, forbids injunctions against persons not named, and legalizes "peaceful boycotts."

Operation on the Rock Island lines on Friday, May 10, was affected by a variety of weather conditions. There was a snow storm near Calhan, Colo., and a dust storm driven by a 30-mile an hour wind at Gem, Kan., which piled sand so high in several cuts that it was necessary to send for a gang of workmen to clear the track. At about the same time there was a washout at Smith Center on the Nebraska division that cost the company $6,000.

The safety committee of the Delaware, Lackawanna & Western reports that dangerous conditions have been done away with in more than a thousand instances—in such cases as too little clearance for cars, holes along the roadway, and low bridges. Of the 153 men injured on the road during the month of April, 94 were employees working in shops, roundhouses, and other places not directly connected with transportation. The number of fatalities has been much smaller this year than last.

The budget of the St. Louis & San Francisco for improvements to be made this year includes an appropriation of $270,000 for new ballasting; $160,000 for new stations, not including the station in Springfield, Mo., for which plans are being prepared and which will cost between $300,000 and $400,000, and $250,000 for bridge replacement. Orders will be placed for 30,000 tons of 90-lb. steel rails, and it is planned to double-track 80 miles a line between Kansas City, Mo., and Ft. Scott, Kan.

The anthracite miners, in convention at Wilkesbarre, Pa., are considering in great detail the proposed new rates of wages, and it is conjectured that an agreement with the operators will be reached, but nothing conclusive has been announced, as we go to press. There has been a good deal of rioting in the region of Scranton. Miners in the bituminous fields of Illinois have voted to accept the agreement made at Peoria, which, it is said, will give them an increase of about 5½ per cent.

The committee of conductors, brakemen and firemen who are conferring with the general manager of the Pennsylvania Railroad in regard to the conditions of their work, announce that they have demanded that wherever electric service is in operation the rates of pay and the conditions shall be the same as those in steam service; also that the road shall agree that in case trains of another road shall be granted trackage rights over the Pennsylvania that other road shall be bound by the same conditions.

A Queen & Crescent express train was held up on Wednesday of this week by robbers, who escaped with a large sum of money and securities, perhaps as much as $150,000. The bandits surprised the engineman at Okahola, eight miles south of Hattiesburg, Miss., and crawling on to the tender, ordered the train be pulled around the next curve and then stopped. The engineman and fireman, marched to the express car, were forced to call out the messenger in charge of the car and he in turn summoned the other trainmen. The safe was then blown open.

Special Examiner H. P. Brown, taking testimony in the suit of the government against the United States Steel Corporation, has heard during the past week Daniel G. Reid, a director of the corporation; A. I. Findlay, one of the editors of the *Iron Age;* M. B. Wheeler, secretary of the American Tin Plate Company; John A. Topping, chairman of the Republic Iron & Steel Company, and others. The testimony had to do with alleged agreements between the constituent companies prior to the formation of the corporation in 1901.

The Interborough Rapid Transit Company, New York City, has voluntarily given increases in pay of 5 cents to 20 cents a day to about 8000 of its employees, the gross annual addition to the pay rolls being about $230,000. Motormen who have served five years will receive $3.75 a day instead of $3.50; conductors in their fifth year will receive $2.60, and guards $2.30; porters, train starters, and various other classes will receive an increase of 10 cents a day, and switch tenders 20 cents; gatemen, for the first year, will receive $1.90 a day instead of $1.80.

According to the Boston *Transcript*, the Boston & Maine has decided to build an electric railway to the summit of Mount Washington (New Hampshire) and to build on the summit a large fireproof hotel, the total cost of railway and hotel to

be $1,500,000. The railway will be about 20 miles long, winding twice around the mountain, so as to maintain a uniform grade of not over 6 per cent. The present cog-wheel railway, which is less than three miles long, rises 3,800 ft. in that distance. Water power for the electric road will be furnished by the Ammonoosuc river.

As an incident of the serious war now prevailing in Mexico between rebels and the government, a southbound passenger train was attacked on the night of May 9 near Guadalajara, by bandits or rebels; and, the 70 soldiers aboard the train returning the fire of the attacking party, a fierce encounter ensued, in which 8 soldiers and 12 passengers were killed and as many others injured. The soldiers were overpowered by superior numbers and the passengers were robbed of their money and jewels. The passengers were fleeing from Guadalajara because of the fear of an earthquake.

The commitee of the Senate at Washington is still hearing arguments for and against the proposal to forbid the use of the Panama canal by steamships in which railways are interested. The House committee has tentatively agreed on an amendment to the proposed bill which would authorize the Interstate Commerce Commission to determine questions as to whether competition between land and water carriers existed in a given case, but there is radical disagreement in the committee, and this fact, with other perplexities in connection with the proposed bill, lead some observers to think that no action will be taken by Congress at the present session.

The directors of the Boston Chamber of Commerce, having discussed the proposal of the governor of Massachusetts to have the New Haven and the Boston & Maine roads consolidated, and to require them to electrify their lines in and near Boston, have made to the Chamber a report declaring further discussion of the subject necessary. In other words, they are averse to the passage of such a law at the present session of the legislature. The bill now under discussion would not do anything for Boston in the way of removing discriminations on the part of the railways, while the state could compel electrification just as well without the proposed consolidation. No immediate emergency exists, and undue haste is likely to be detrimental to the public welfare.

About 250 pensioned employees of the Southern Pacific attended the annual banquet at the Palace Hotel, San Francisco, on May 10. The banquet this year fell upon the forty-third anniversary of the driving of the last spike of the first transcontinental railway in the United States, at Promontory, Utah. Approximately half of those now on the pension roll were factors in the construction of the system at that time, and it is the annual custom for the road to be built in reminiscence. Part of the entertainment was the exhibition of a complete set of 250 photographs taken during the construction period of the Central Pacific, and several of the higher officers of the road addressed the gathering. Since the inauguration of the pension system on the Southern Pacific January 1, 1903, $1,015,014 has been paid out in pensions. The system is absolutely voluntary on the part of the company, and 718 former employees have been awarded pensions in these nine years. On May 1 this year there were 477 pensioners on the rolls.

A settlement has been reached between the New York State Public Service Commission and the committee of the New York City Board of Estimate on the differences which have existed between the two bodies as to how the routes of the proposed new subways in the lower part of the city should be apportioned to the Interborough and the Brooklyn Rapid Transit, and it is now said that the long delayed plans for the subways will now have smooth sailing. Instead of having two tunnels paralleling each other near the Battery it was decided to lay out a new line for the Interborough from its proposed west side line through Park place and Spruce or Beekman street to a connection with the William street route, which has already been authorized, and from William street through Old slip, under the East river to Clark street, Brooklyn, and along Clark street to a connection with the present Interborough system at the Brooklyn Borough Hall. To the Brooklyn Rapid Transit Company will be awarded the route that was first mapped out for the Interborough, the Whitehall and Montague streets route. This will enable the Brooklyn company to make an easy connection at De Kalb avenue with the new Fourth avenue subway in Brooklyn, which is nearing completion. This arrangement provides for three tunnels (two in addition to the existing tube) across the East river at the lower end of Manhattan.

"A Harsh Answer Turneth Away Cash."

H. J. Slifer, general manager of the Chicago Great Western, has issued a circular letter to employees on "courtesy," in which he says in part:

"If there is one thing, with the possible exception of the harassing federal and state railway legislation, that has proved annoying to railway companies more than another, and caused the public to look upon them with disdain and suspicion and consider them legitimate prey for all kinds of abuse, it is the discourtesy so frequently found among railway employees, or, what is equally bad, indifference on their part.

"In filling positions requiring contact with the public, there is no easier way to get along with patrons on the road—travelers or shippers—than to give them all the information for which they ask and volunteer something in addition. Such a course cannot fail to make dealings with the public more agreeable and pleasant than by following a contrary plan, and the results to the company more profitable than could be secured by maintaining an arbitrary and indifferent attitude. In business, the adage: 'A soft answer turneth away wrath,' is not only true, but we might add 'A harsh word turneth away cash.'"

Addressing particular classes of employees, Mr. Slifer says: Officers, clerks and office people: Be prompt and courteous in your correspondence, in using the telephone and in personal interviews. Maintenance of Way men: Be courteous to our neighbors, those whose property adjoins ours; the farmers . . . Enginemen and Firemen: The public is not supposed to go to you for information, but if you are "oiling 'round" at a station, and a foolish question is asked, do not give a foolish reply. . . . Train and Station Employees: Do not get a reputation for being bluffers; not only give civil replies, but intelligent ones. If a lady asks what is delaying a train, the answer "board's against us" means absolutely nothing to her. . . . If an excited man asks what time the nine o'clock train will leave, don't tell him "8:60"; he is probably laboring under a nervous strain and does not realize what he is saying.

Dinner to "Katy" Officers.

Frank Trumbull, chairman of the board of directors, and Charles E. Schaff, the new president of the Missouri, Kansas & Texas, were honor guests at a dinner given them at the St. Louis Club, at St. Louis, on Saturday evening, May 11, by W. S. McChesney, Jr., president and general manager of the Terminal Railroad Association of St. Louis. The "Katy" officials had just returned from an inspection of the company's lines in Missouri, Kansas, Texas and Oklahoma, and on their arrival in St. Louis were greeted by a reception committee of prominent railway officers, bankers and merchants. The address of welcome at the dinner was made by President McChesney, and responses were made by Messrs. Trumbull and Schaff. The other speakers were D. R. Francis, former governor of Missouri; B. F. Bush, president of the Missouri Pacific and Iron Mountain system; Breckenridge Jones, president of the Mississippi Valley Trust Company; Judge Henry S. Priest, and George J. Tansey, president of the St. Louis Transfer Company.

Annual Passes for Missouri Pacific Employees.

As a reward for faithful service the Missouri Pacific-Iron Mountain system has decided to issue annual passes to employees who have worked for the company 15 years or longer. The rules provide that for 15 years of continuous service an employee may receive an annual pass for himself over the division on which he is employed; for 20 years' continuous service, one for himself and wife over the division, and for 25 years' continuous service one for himself and wife over the entire Missouri Pacific-Iron Mountain system of nearly 7,300 miles. About 1,500 employees will receive these passes, including agents, conductors, enginemen, brakemen, train baggagemen, switchmen, firemen, hostlers, telegraphers, bridge and building foremen and section foremen. R. W. Waters, a conductor on a suburban train running out of

St. Louis, now in his 52d year of continuous employment, is the oldest man in point of service on the entire system. John Cook, and his son, C. W. Cook, both employed on the Central Kansas division as passenger enginemen under the 25 years of service ruling are entitled to annual passes for themselves and wives.

Chicago Freight Handlers' Strike.

The effects of the strike of the Chicago freight handlers and clerks, called on May 4, after the railways had refused their demands for higher pay and shorter hours, were of short duration. While there was some congestion of traffic at some of the freight houses during the first days of the strike, there was no violence by the strikers, and the railways soon filled their places with men from outside, while many of the strikers returned to work. The Erie, Santa Fe and Pennsylvania were employing non-union men and were not affected. For a time several of the roads filled the places of the strikers with draftsmen from their engineering departments or clerks from their general office forces or city offices.

On Saturday, May 11, the Chicago Association of Commerce issued a circular to its members urging the importance of the prompt removal of inbound shipments from the various freight houses in order to relieve the railways of any unnecessary handling and delay which might result from holding freight in their warehouses awaiting delivery.

On the same day P. F. Flannery, president of the Brotherhood of Railway Freight Handlers, presented a proposition to the managers, that all the men on strike return to their former positions, and that the entire matter of wages and working conditions be submitted to arbitration. W. A. Garrett, chairman of the General Managers' Association, replied by letter on Monday: "Upon receipt of your letter the writer communicated with the general manager of each line affected, and they advised that the situation in Chicago is now practically normal and the places of the men who left the service voluntarily on short notice have been permanently filled. The inconvenience to the public was only of short duration."

Boiler Explosion on the Southern Pacific.

John F. Ensign, chief inspector of locomotive boilers, for the Interstate Commerce Commission, has made the following report of the investigation of the explosion of the boiler of an Oregon & California locomotive, operated by the Southern Pacific Company, which occurred four miles south of Yoncalla, Ore., on April 4, 1912, and in which the engineman and fireman were killed:

This was a consolidation freight locomotive. At the time of the explosion this locomotive was engaged in helper service on a southbound train of 40 cars, weight of train 1,605 tons, drawn by road locomotive No. 3203, with locomotives No. 2538 and No. 2194 coupled together between the caboose and the rear freight car in the train. The boiler was blown clear of the frames, breaking or pulling out expansion plates around fire box, shearing cylinder saddle bolts, and breaking the front side of saddle; it was blown over three box cars, apparently lighting on the back head on an oil-tank car; it rolled off to the right side and landed on the bank of an 8-ft. cut, a distance of 218 ft. from the point where the explosion occurred.

At the time of the accident, the train was ascending a grade of 84.48 ft. per mile, at a speed of 10 to 12 miles an hour. The accident occurred on a tangent 627 ft. south of a left-hand 8 deg. curve. The elevation of the right-hand rail of this curve was from 3½ to 3¾ in. for a distance of 198 ft. in the center of the curve. Our inspection disclosed the fact that almost the entire crown sheet, with the exception of a portion of the left back corner, was overheated. The overheated portions of the sheet extended 4 in. below the highest part of the crown sheet at the right front corner and 1 in. below at the left front corner. At the right back corner it was about on a line with the crown sheet, while there had apparently been water on the left back corner. So far as could be ascertained by our inspection, the injectors, safety valves and steam gage were in good condition. The water glass was so located that the lowest reading was only 1 in. above the highest part of the crown sheet, as indicated by line plate on boiler head. Therefore, on an ascending grade of 84.48 ft. per mile the front of the crown sheet would be uncovered with water still showing in the water glass, and on the high side of the curve it would be, as indicated in this case, 3 or more inches below the highest portion of the crown sheet, and the glass would still show water. It was also found that other locomotives on the same division have the water glass so located that the lowest reading is from one-half to 1 in. above highest part of crown sheet. On some of these a plate is attached to the water glass frame in such a manner that the lower end of the glass is obscured, thus making the lowest reading 3 in. above highest part of crown sheet. The engineman who ran locomotive No. 2538 on its previous trip into Roseburg on April 3, positively stated that no such plate was attached to water glass on this locomotive.

From statements made by engine watchmen at Drain, who watched the engine while there, it is evident that flues were leaking quite badly, as it was necessary to fill the boiler four times from 7 a. m. to 11 a. m., and that 127 gals. of fuel oil were used, whereas only 30 gals. would have been necessary had not the boiler been leaking. Seven flues were found to be plugged, which is in violation of locomotive boiler inspection rule No. 44.

We find that this accident was caused by an overheated crown sheet, due to the fact that the engine crew were evidently misled in the height of the water on account of an improperly located water glass. We consider the local mechanical officials were at fault for permitting this locomotive to be operated with a water glass not the proper height above crown sheet, as required by rule No. 37, and also for permitting the locomotive to be operated with flues in such a condition that it was necessary to plug a number of them in violation of rule No. 44.

Steel Corporation's Unfilled Tonnage.

The report of the United States Steel Corporation shows that the unfilled tonnage on April 30 was 5,664,885 tons, an increase of 360,044 tons over the previous month. This compares with 3,218,704 tons on April 30, 1911. This statement exceeds even the highest estimates by 74,000 tons. The unfilled tonnage on the books of the Steel Corporation at present is equal to six months' production of the corporation's mills, based on the present rate of output. On March 31, 1912, the unfilled tonnage was 5,304,841 tons; on February 29, 5,454,200 tons, and on January 31, 5,379,721 tons. The present unfilled tonnage is the largest since December 31, 1909, when it was 5,927,031 tons.

Gas-Electric Cars for the Frisco.

The St. Louis, Brownsville & Mexico, one of the lines of the Frisco system, has ordered two gas-electric motor cars of the GE-70-B-11 type from the General Electric Company, Schenectady, N. Y. These cars will be built with side entrances for the passengers and a rear door for the use of the conductor when the cars are coupled to trailers. The Frisco system will now have 17 of these cars running on regular schedules over its lines operating between the following points: Brownsville, Tex., and Mission; Orange and Newton; Madill, Okla., and Ardmore; Westville and Muskogee; Lawton, Okla., and Quanah, Tex.; Eunice, La., and Crowley; Dallas, Tex., and Sherman; Enid, Okla., and Bailey; Salem, Mo., and Cuba; Bolivar and Chadwick. The cars are capable of running about 60 m. p. h. on a level stretch and will average 25 to 35 m. p. h. schedule speed with stops two to three miles apart.

The new cars are 70 ft. 5 in. long and are divided into four compartments, one for passengers, which is 33 ft. long; a smoking compartment, 10 ft. long; a baggage compartment, 11 ft. long and the engine room, 12 ft. long. Each car has a seating capacity for 92 passengers, each seat accommodating 3 persons, and the net weight of the car is approximately 50 tons. It is of all-steel construction, except the interior finish, which is of mahogany and composite board. The frame is made up of steel I-beams and channels, with steel plates for the outside sheathing. The under floor is made of wood, having sheet iron on the lower side. A heavy felt lining is inserted between the wood and the iron. The sides of the car are also insulated with felt. The steel roof and the rear of the car are of the turtle back design. The seats are covered with friezette plush in the passenger compartment and genuine Spanish leather in the smoking room. The entire car is lighted with electricity.

The engine is an 8-cylinder, 4-cycle gas engine of the *V* type and is direct connected to a 600-volt generator, which is designed

to meet the special conditions of this service. The engine is started by compressed air taken from the main reservoirs of the air brake system. The main air compressor is driven from the crank shaft of the main engine and is fitted with an automatic governor which maintains a constant pressure. An auxiliary two-cylinder, 4-cycle engine operates a single cylinder air compressor and the lighting generator. This set is used for supplying the initial charge for starting the main engine. Two railway motors of the GE-205-600 volt, box frame, oil lubricated, commutating pole type having 100 h. p. capacity, are mounted on the axles of the forward truck. The voltage of these motors is governed by varying the strength of the generator field and they are placed in series or parallel by means of a special controller. Separate handles are also provided for throttling the engine and for reversing the car, the latter being accomplished by changing the motor connections in the usual manner, without stopping the engine. All the handles are in easy reach of the operator.

The trucks are of the swing bolster type, having elliptic and coil springs. The bearings, wedges and the contour of the wheels conform to the M. C. B. standards. The brake equipment includes the hand and the combined straight and automatic air brakes. A hot water heater, coal fired, is used for heating the car and to prevent the freezing of the engine circulating water this system is connected to the engine cooling system when necessary.

American Iron & Steel Institute.

At the second general meeting of the American Iron & Steel Institute, to be held at the Waldorf-Astoria hotel, New York, May 17, the following addresses will be made: Address of the president, by E. H. Gary, chairman of the United States Steel Corporation; Contract Obligations, by E. A. S. Clarke, president of the Lackawanna Steel Company; discussion by Willis L. King, vice-president of the Jones & Laughlin Steel Company, James A. Farrell, president of the United States Steel Corporation, and others; Competition, Its Uses and Abuses, by Joseph G. Butler, Jr., vice-president of the Brier Hill Steel Company; discussion by John A. Topping, chairman of the Republic Iron & Steel Company, and Charles M. Schwab, president of the Bethlehem Steel Corporation; Some Experiences in India, by Julian Kennedy, consulting engineer; Electric Furnaces, by William R. Walker of the United States Steel Corporation; discussion by Theodore W. Robinson, vice-president of the Illinois Steel Company, Eugene B. Clark, American Sintering Company, and S. F. Wellman of the Wellman-Seaver-Morgan Company; Corrosion of Steel and Its Prevention, by Dr. A. S. Cushman of the Institute of Industrial Research; discussion by Louis J. Campbell, Youngstown Sheet & Tube Company; Metals and Alloys, by John S. Unger, Carnegie Steel Company; discussion by J. D. Waterhouse, Lackawanna Steel Company. A banquet will be held at the Waldorf in the evening at which the following subjects will be discussed: Enforcement of Health Laws, by Dr. Thomas Darlington; Something Doing in Colorado, by Dr. Richard W. Corwin; Rendering Labor Safe, by Raynal C. Bolling; Mining Operations on the Mesaba Range, by William J. Olcott, president of the Oliver Iron Mining Company. Lantern slide views will be shown, illustrating mining operations on the Mesaba range.

Master Boiler Makers' Association.

The sixth annual convention of the Master Boiler Makers' Association was held in Pittsburgh, Pa., May 14 to 17. The first session was called to order by President George W. Bennett. The address of welcome was made by Charles A. O'Brien, the attorney for the city of Pittsburgh, who represented the mayor. L. H. Turner, superintendent of motive power of the Pittsburgh & Lake Erie, spoke of the responsibilities and duties of the boiler shop foreman. T. W. Low, vice-president of the association, responded. William McConway, of the firm of McConway & Torley, gave some reminiscences of the early days of the city and its transportation facilities. George Wagstaff responded to Mr. McConway. J. F. Deems spoke of the work of the foreman and urged that far more could be obtained from men by kindly treatment than in any other way. There are very few men who will not respond to kindness, and when such a man does get into a shop it is well to get rid of him in the shortest possible time. The response to Mr. Deems was made by W. H. Laughridge, the chairman of the executive board of the association. The closing address of the opening session was that of the president, who dealt with the progress of the association and its affairs.

The treasurer's report showed the association to be in good financial condition, with a cash balance of $391.77; the total membership in good standing is 218. The registration of the first day showed an attendance of 266 men and 131 ladies. A letter was read from the International Society for Testing Materials inviting the association to send a representative to the sixth congress, which is to be held in New York in September. Charles P. Patrick was elected to represent the association. An invitation was also received from the Third National Conservation Congress, asking that the association send five delegates and five alternates to the convention in Kansas City, Mo., in September. The invitation was accepted.

Cleveland Engineering Society.

At the regular meeting of the Cleveland Engineering Society, held May 14, illustrated papers on River and Harbor Improvement were presented by Col. John Millis, U. S. A., from an engineering standpoint, and by Charles W. Hopkinson, architect, from an esthetic standpoint. At the special meeting to be held May 27 a paper will be presented on The Engineering of Men by Willard Beahan (L. S. & M. S.).

American Society of Civil Engineers.

At the meeting of the American Society of Civil Engineers, held May 15, a paper by J. V. Davies, M. Am. Soc. C. E., entitled Air Resistance of Trains in Tube Tunnels, was presented for discussion and illustrated with lantern slides. This paper was printed in the *Proceedings* for April, 1912.

American Railway Engineering Association.

The American Railway Engineering Association has moved its offices from the Monadnock block to the Karpen building, Chicago.

MEETINGS AND CONVENTIONS.

The following list gives names of [illegible] meetings, and places of meeting.

AIR BRANE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomas, Boston, Mass.

AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York; next convention, September 12, Seattle, Wash.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Detroit, Mich.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—O. G. Teller, Carew building, Cincinnati, Ohio. 3d Friday of March and September.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York. Convention, October 7-11, Chicago.

AMERICAN ELECTRICAL RAILWAY MANUFACTURERS' ASSOC.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, Monadnock Block, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOC.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

AMERICAN RAILWAY TOOL FOREMEN ASSOCIATION.—M. H. Betz, N. Y. N. H. & H., New Haven, Conn. Convention, July 9, Chicago.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York; spring meeting, May 28-31, Cleveland, Ohio.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 21-23, 1912, Los Angeles, Cal.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago. Semi-annual, June 11, Atlantic City, N. J.; annual, October 21-25, Chicago.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Car Accounting Officers.—G. P. Conrad, 75 Church St., New York. Convention, Oct. 7-11, Chicago.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que., 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

General Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago. Convention, May 22-25, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

Master Car and Locomotive Painters' Assn. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass. Convention, September 10-13, Denver, Col.

National Railway Appliances Assoc.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railroad Club.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Business Association.—Frank W. Noxon, 2 Rector St., New York.

Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

Railway Gardeners' Association.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.

Railway Law Association.—G. L. Stewart, St. L., S. W. Ry., St. Louis, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio. Convention, May 20-22, Buffalo, N. Y.

Railway Supply Manufacturers' Assoc.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

Railway Tel. & Tel. Appliance Assoc.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—J. C. Ryan, C. & N. W., Sterling, Ill. September 10-13, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

Southern Pacific Lines Transportation Officers.—C. Nquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; annual, Aug. 27-30, Chicago.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

C. S. Bather has been appointed traffic manager of the Rockford Manufacturers' and Shippers' Association of Rockford, Ill., succeeding L. D. Rosenheimer.

The Topeka Traffic Association is organizing a traffic bureau, and H. D. Driscoll, heretofore assistant to the rate expert of the Kansas Public Utilities Commission, has been appointed traffic commissioner.

Following the announcement of several of the western lines that they would meet the competition of the Gould lines in extending homeseekers' fares to California, the Western Passenger Association, at a recent meeting, decided to extend these fares also to North Pacific coast points.

On May 1 the Denver & Rio Grande and Western Pacific established a daily line of electric-lighted observation-end sleeping cars between Denver, Salt Lake City and San Francisco, without change of cars, leaving Denver at 8:00 a. m., and arriving at San Francisco at 9:10 a. m. the second morning.

The Southwestern Passenger Association will place on sale on July 1 a new interchangeable mileage scrip book to supersede the present credential system. The new book will be good for 2,000 miles of transportation, and will be sold for $60. After the 2,000 miles has been used a refund of $10 will be made.

At the annual election of the Toledo Transportation Club, L. G. Macomber, president of the Macomber Traffic Bureau, was elected president; W. C. Thoms, commercial agent of the Michigan Central, first vice-president; Simpson G. Harvey, of the Toledo & Ohio Central, second vice-president; J. S. Marks, agent of the Interstate Despatch, secretary, and F. von Nostitz, freight agent of the Michigan Central, treasurer.

J. S. Farlee, of New York, president of the Tuscarora Valley Railroad Company, offers to the largest producer and shipper of milk in the Tuscarora valley, during the year 1912, a handsome sterling silver cup. The cup, a picture of which has been published in local newspapers, is 8 in. high, or 13 in., including its pedestal. The Tuscarora Valley road connects with the Pennsylvania at Port Royal, Juniata county, Pa., 3 miles east of Mifflin.

Traffic Club of New York.

The Traffic Club of New York will play a game of baseball with the Traffic Club of Philadelphia at the annual outing of the latter club in Philadelphia, Pa., May 25.

Revenues and Expenses in February.

The bureau of railway economics bulletin number 32 shows that the railways whose returns are included in this bulletin operate 218,794 miles of line, or about 90 per cent. of all the steam railway mileage in the United States. The total operating revenues for the month of February, 1912 amounted to $211,344,859. Compared with February, 1911, the total operating revenues of these railways show an increase of $20,201,839. These total operating revenues per mile of line amounted to $966 in February, 1912, and $891 in February, 1911, an increase for 1912 of $75, or 8.4 per cent. This increase resulted almost wholly from an increase in freight revenue. Passenger revenue showed a slight decrease.

Attention is directed to the fact that the monthly report of railway revenues and expenses issued by the Interstate Commerce Commission has been modified to cover only those railways having annual operating revenues of $1,000,000 or over. The summary herewith presented by the bureau of railway economics, conforming to this change of base, includes the returns of roads having annual operating revenues of $1,000,000 or over, instead of roads over 50 miles long as heretofore.

Operating expenses amounted to $155,771,838. This was $12,415,255 more than for February, 1911. These operating expenses per mile of line amounted to $712 in February, 1912, and $668 in February, 1911, an increase for 1912 of $44 per mile, or 6.6 per cent. In the cost per mile of conducting transportation there was an increase compared with February, 1911 of 8.2 per cent.; in the cost per mile of maintaining equipment an increase of 7.3

per cent.; in traffic expenses per mile an increase of 5.2 per cent.; and in the cost per mile of maintaining way and structures, i. e., track and buildings, an increase of 1.7 per cent.; in general expenses per mile there was a decrease of 0.2 per cent.

Net operating revenue amounted to $55,573,021. This was $7,786,584 more than for February, 1911. Net operating revenue per mile of line amounted to $254 in February, 1912, and $223 in February, 1911, an increase for 1912 of $31 per mile, or 14.1 per cent. The net operating revenue for each mile of line for each day in February averaged $8.76, and $7.95 in February, 1911.

Taxes for the month of February amounted to $9,569,632, or $44 per mile, an increase of 10.9 per cent. over February, 1911.

The operating ratio for February was 73.7 per cent., which is comparable with 78.2 per cent. in January, 1912, and 75.0 per cent. in February, 1911.

The eastern group of railways show an increase in total operating revenues per mile as compared with February, 1911, of 12.0 per cent., the southern group an increase of 5.4 per cent., and the western group an increase of 6.3 per cent. Operating expenses per mile increased 9.1 per cent. on the eastern railways as compared with February, 1911, 9.2 per cent. on the southern railways, and 3.1 per cent. on the western railways. In the eastern group net operating revenue per mile increased 22.8 per cent. as compared with February, 1911; in the southern group it decreased 3.1 per cent.; in the western group it increased 15.3 per cent. The increase in taxes per mile compared with February, 1911, was 11.6 per cent. in the eatsern group, was negligible in the southern group, and was 14.4 per cent. in the western group.

Comparison of the returns for the eight months of the fiscal year 1912 with those of the corresponding months of the fiscal year 1911 shows a decrease in total operating revenues per mile of 0.9 per cent., a decrease in operating expenses per mile of 0.9 per cent., and a decrease in net operating revenue per mile of 0.8 per cent. This net operating revenue per mile of the eastern group of railways increased 7.2 per cent. as compared with the corresponding period of 1911, the net revenue per mile of the southern group decreased 7.0 per cent., and the net revenue per mile of the western group decreased 5.4 per cent.

The accompanying tables show the per cent. of the various classes of operating expenses to total operating revenue. Both the January and February figures are shown so as to make the year 1912 and its comparisons complete on the new basis of roads whose gross earnings are more than $1,000,000 annually.

The accompanying diagram shows monthly revenues and expenses and net per mile of line for roads divided into three groups. It should be noted that the figures are not cumulative so that the points on the vertical lines are alone of significance.

INTERSTATE COMMERCE COMMISSION.

The commission has decided that free transportation may not be given to traveling secretaries of Young Women's Christian Associations.

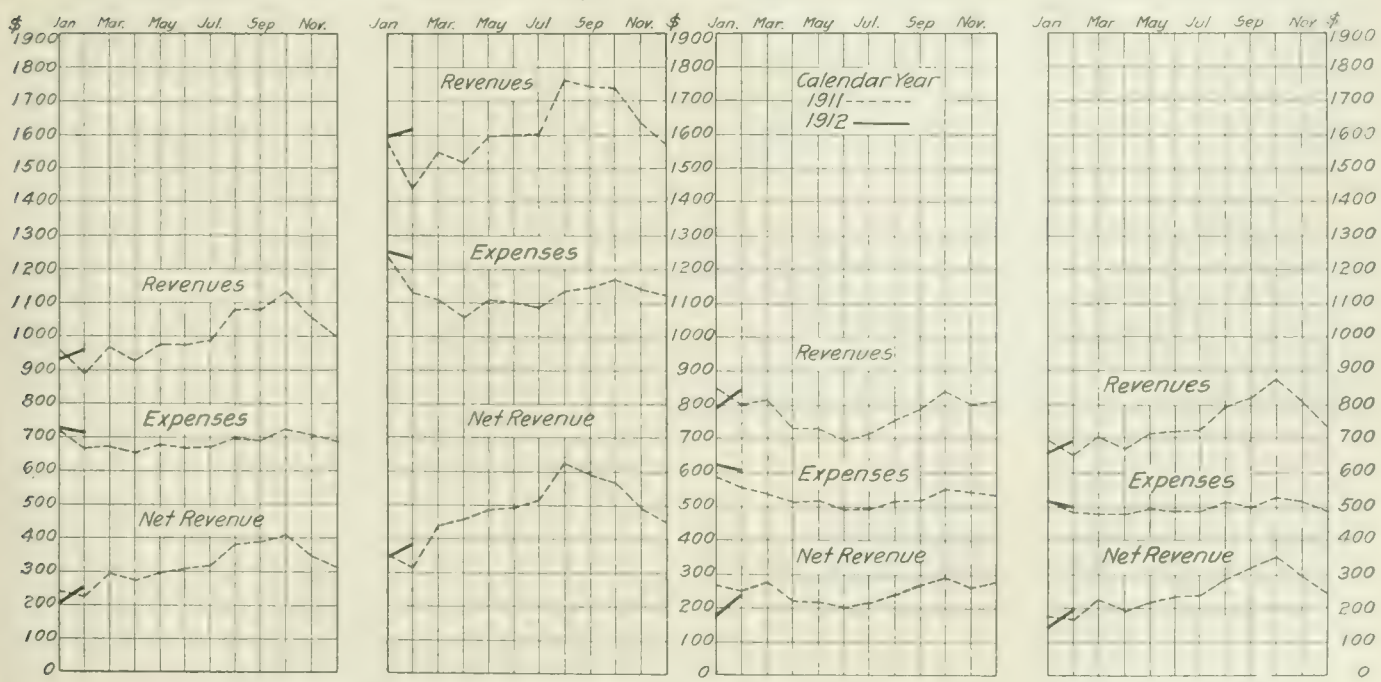
The commission has decided that a railway may not lawfully tell a shipper the name of the ultimate consignee of a shipment re-consigned in transit by the original consignee.

The Dixie Dairymen's Association has complained to the commission of the rates on milk in cans over the Yazoo & Mississippi Valley from points in Mississippi to New Orleans.

The commission has canceled its order suspending the rates on live stock from points in New Mexico and Fort Worth, Tex., Oklahoma City, Okla., and Wichita, Kan. The rates which the commission had suspended correspond with those

	January, 1912.	January, 1911.	Fiscal Year Ended June 30, 1911.	Fiscal Year Ended June 30, 1910.	Calendar Year Ended Dec. 31, 1911.	Calendar Year Ended Dec. 31, 1910.
Per Cent. of Total Operating Revenues:						
Maintenance of way and structures	11.6	11.4	12.5	12.7	12.7	13.3
Maintenance of equipment	18.4	17.5	14.9	14.5	15.5	15.3
Traffic expenses	2.3	2.3	2.1	2.0	2.1	2.1
Transportation expenses	43.0	41.1	34.2	32.2	35.4	34.7
General expenses	2.9	2.8	2.4	2.3	2.9	2.8

	February, 1912.	February, 1911.	Fiscal Year Ended June 30, 1911.	Fiscal Year Ended June 30, 1910.	Calendar Year Ended Dec. 31, 1911.	Calendar Year Ended Dec. 31, 1910.
Per Cent. of Total Operating Revenues:						
Maintenance of way and structures	10.9	11.6	12.5	12.7	11.2	11.5
Maintenance of equipment	17.3	17.5	14.9	14.5	17.9	17.5
Traffic expenses	2.3	2.4	2.1	2.0	2.3	2.3
Transportation expenses	40.5	40.6	34.2	32.2	41.7	40.8
General expenses	2.7	2.9	2.4	2.3	2.8	2.9



Monthly Revenues and Expenses per Mile in 1912 as Compared with 1911.

proposed by the commission itself in its recent investigation of live stock rates in the southwest.

The commission has suspended until September 7, the tariff's canceling commodity rates on tin plate, sheet metal, etc., from eastern shipping points to Oregon, Wash., and north Pacific coast points. The commodity rates are 75 cents per 100 lbs., and cancellation of this rate would put these commodities in third class, on which the rate is $1.65 per 100 lbs.

The commission has decided that when a shipment leaves a point of origin in a single car and is later broken up and put in two cars by the railway company for its own convenience, demurrage should be assessed for one car only, so long as either car is detained, and switching, reconsignment and diversion charges should be assessed for one car only.

The commission has begun a hearing on the question of whether or not pipe lines are common carriers within the meaning of the Interstate Commerce law. The independent oil companies claim that all pipe lines are common carriers, but the Standard Oil Company claims that their lines were built for the sole purpose of supplying their customers and are not therefore common carriers.

The Bozeman, Mont., chamber of commerce has sent a protest to the Interstate Commerce Commission, objecting to the proposed compromise between Spokane and the transcontinental railways which was described in our last week's issue. The compromise plan was submitted to the commission at Washington on May 8, and the commission announced that statements or criticisms of the proposed arrangement may be filed up to June 1.

Special Examiner Pugh of the Interstate Commerce Commission, held a hearing at Chicago on May 7 and 8, for the purpose of obtaining the views of grain shippers as to the proper amount of elevation allowances. The witnesses were practically unanimous in saying that one-fourth of a cent was sufficient for the transfer of grain at elevators, and that this figure approximated the cost of the transaction. The hearing was continued on May 9 at Omaha, and on May 10 and 11 at Kansas City.

Complaint Dismissed.

Association of Bituminous Coal Operators of Central, Pennsylvania v. Pennsylvania Railroad. Opinion by Commissioner Lane:

In this case the complainant alleges that the rate of $1.55 per gross ton of bituminous coal from the Clearfield district of Pennsylvania to South Amboy, N. J., a distance of 345 miles, is unreasonable. The complaint also alleges that the rate adjustment, under which the Latrobe district, which adjoins the Clearfield district on the West, is given the same rate as the Clearfield district, and by which the Greensburg district, which lies immediately West of the Latrobe district, takes a rate of only $0.10 higher than the Clearfield district, is unduly preferential to the Latrobe and Greensburg districts and unduly discriminatory to the Clearfield district. The evidence was not conclusive, so the complaint was dismissed. (23 I. C. C., 385.)

Fourth Section Application Denied.

Grand Junction Chamber of Commerce v. Denver & Rio Grande Railroad Company et al. Opinion by Chairman Prouty:

The application of the Denver & Rio Grande and the Colorado Midland for permission to charge higher rates at intermediate points than are contemporaneously in effect to more distant points on their lines, denied as to all westbound traffic originating at the Missouri river, the Mississippi river, Chicago, and similar rate territory. (23 I. C. C., 115.)

Newport News Discriminated Against.

Chamber of Commerce of Newport News, Va., v. Southern Railway et al. Opinion by the commission:

Until July 31, 1899, Newport News had the same rates as Norfolk to and from common points in the associated railways' territory and in the southeastern freight association territory. On July 31, 1899, these rates were abolished and Newport News, instead of a through rate, was given a combination of local rates which was greater than the Norfolk rates. This was done because the Chesapeake & Ohio, the only road whose lines reached Newport News, declared that it was not receiving a fair division of the through rates. The complainant now alleges that the present rates are unduly discriminatory to Newport News in favor of Norfolk, and that Newport News should be given the same rates as Norfolk. Since the abolition of the equal rates, the Chesapeake & Ohio has maintained that Newport News should be given the same rates as Norfolk, and has offered to agree to any fair arrangement that should be suggested by the other lines to make these rates equal. The other lines, however, refused to make any such arrangement. These lines claim that the lower rates to and from Norfolk are the result of competition, and that as their lines do not reach Newport News, they are not responsible for any discrimination against that point which may exist. The commission found that although competition might result in granting lower rates to one point than to other points reached by the same carriers, it was only when this competition was beyond the control of the carriers that the resulting difference in rates was not unduly discriminatory. The commission decided that in this case the competition was not beyond the control of the carriers, for no complaint of competition had been made while the Newport rates and the Norfolk rates were equal. The commission also decided that since the defendants whose lines did not reach Newport News received traffic to and from Newport News, they were not relieved from the responsibility for the effect of rates which they controlled and in which they participated. None of the defendants contended that a shrinkage in its revenues, necessary to give Newport News the Norfolk rates, would make the reduced rates unprofitable. The commission decided that the present rates were unduly discriminatory to Newport News in favor of Norfolk, and that Newport News should be given the Norfolk rates. No order was made, but if the new tariffs are not filed by June 1, 1912, the commission will take steps to enforce its findings. The commission leaves the points of discussion between the carriers to be settled among themselves. If they cannot agree the commission will determine the matter. (23 I. C. C., 346.)

STATE COMMISSIONS.

Former Governor Samuel W. Pennypacker of Pennsylvania has been appointed a member of the railway commission of that state, succeeding Charles N. Mann, deceased.

The Illinois railway commission has issued an order that the rear doors of all private or special cars shall be kept unlocked, so that the rear platforms may be more readily accessible to flagmen.

The Washington public service commission has announced that a hearing will be held at Seattle on June 25, for the purpose of making an investigation of the express rates charged in state traffic in response to a complaint filed by the Transportation Bureau of the Seattle Chamber of Commerce.

The Indiana commission has declined to order another passenger train run on the Effner branch of the Pennsylvania lines, between Logansport and Effner. The request for additional trains was presented by traveling salesmen of Logansport, who found the present schedule not suited to their itineraries. The commission found that the earnings of the road were not sufficient to warrant the desired order.

The Vermont railway commission has held that the Vermont statute, permitting four days free time for loaded cars, as against the federal rule permitting only two days free time before demurrage is assessed, applies only to intrastate shipments and does not apply to interstate shipments, and therefore is not invalid. The railway companies have appealed to the Supreme Court contending that the statute is unconstitutional.

The Massachusetts Commission, responding to a request from a legislative committee, has written a letter disapproving a bill which would permit the New York, New Haven & Hartford to take over all the trolley lines in western Massachusetts, commonly known as the "Western Merger Bill." The letter declares that the bill is contrary to the recognized policy of the commonwealth; that the board is entirely opposed to it, and that it should be referred to the next legislature. The street railways whose securities and assets it is proposed to take over in whole or in part by the new company are the Springfield, the Worcester

Consolidated, the Milford, Attleboro & Woonsocket, the Worcester & Shrewsbury, the Berkshire and the Worcester & Webster. The commissioners call especial attention to the provision of the bill for capitalizing the amount of premiums paid upon the capital stock of the underlying corporations, and of the notes and indebtedness of these corporations at their face value without any investigation as to whether they were properly issued or incurred. In both of these provisions the bill proposes to reverse the policies under which the commonwealth has kept down the capitalization of public service companies. The enactment of this bill would open the door for an increased capitalization of $22,398,863.

Block Signals in Indiana.

The Indiana commission reports that since action was begun by the commission to require the installation of the block system on railways, in accordance with the compulsory law of that state, agreements have been reached with the railways for the equipment of 792 miles at an estimated cost of $1,168,000. The names of the roads, with the mileage on each, are given in the table shown below. The amounts of the estimates seem to indicate that automatic signals are calculated at $2,000 a mile; while some of the estimates appear to be too small for a automatic signals and too large for a simple manual system.

	Mileage.	Estimated Cost.
Pennsylvania Lines	4	$7,000
Cincinnati, Hamilton & Dayton	48	55,000
Baltimore & Ohio Southwestern	15	20,000
Chicago & Eastern Illinois and Evansville & Terre Haute	64	80,000
Erie	157	350,000
Wabash	40	50,000
Lake Erie & Western	18	25,000
Chicago, Indianapolis & Louisville	300	325,000
Indiana Union Traction	18	18,000
Terre Haute, Indianapolis & Eastern	15	12,000
Cleveland, Cincinnati, Chicago & St. Louis	27	54,000
Grand Trunk	86	172,000
	792	$1,168,000

New York—New Haven Authorized to Purchase Rutland.

The New York Public Service Commission, Second district, on May 10 granted permission to the New York, New Haven & Hartford to purchase $4,704,100 of the stock of the Rutland, owned by the New York Central & Hudson River. This authorization will give the New Haven a control of the Rutland property. The action upon the application was by unanimous vote.

The commission holds that the acquisition of the stock of the Rutland by the New Haven is not believed to be in violation of the Sherman law, and is not in violation of the principles laid down in any decision of the courts to which its attention has been called.

The Rutland, in connection with its subsidiary water line, the Rutland Transit Company, is a natural route between New England territory, reached only by the New Haven, and the West and Northwest. The operation of the Rutland by the New Haven will in effect constitute a new through line from New England to all points reached by the Rutland Transit Company. The New York Central, which at present controls the Rutland, is to a material extent a competitor with the Rutland, while on the other hand the Rutland is by its connection with the Boston & Maine, a natural extension of the New Haven system as at present operated, and the natural effect of the control of the Rutland by the New Haven will be to increase competition and induce a very considerable increase of business over the Rutland from and to New England points.

If such anticipated increase of business over the Rutland is realized it will afford additional facilities to the public, and be of very considerable benefit to the cities and villages reached by the Rutland in New York and Vermont.

The commission adheres to the principle laid down by it in the New York, Ontario & Western case, that in transfers of control of a subsidiary railway it should recognize and protect the rights of minority stockholders. It does not follow, however, from this principle that in every case the purchasing road should offer to the minority stockholders the same price for their stock which it is willing to pay for control. While such a condition might well be imposed in a case where the transfer would create a control by a traffic line which did not theretofore exist, in the present case the control is now in the hands of the New York Central, and the relief sought is merely the transfer of that control to the New Haven. If the result of the transfer to the New Haven is to increase the business of the Rutland, and thereby increase its revenues, it will be to the manifest advantage of the minority stockholders. The position taken by the objecting minority stockholders has been that they are now injured by the treatment received from the New York Central. They do not suggest that the New Haven will accord them worse treatment, while on the other hand the commission is satisfied that it will be to the advantage of the New Haven to develop the Rutland materially beyond its present stage.

It is to the public interest of that portion of the state of New York through which the Rutland passes that the control of the road be put in the hands of the New Haven, and since this can be done without apparent injury to the minority stockholders and in the opinion of the commisison with benefit and advantage to them, the authorization for the transfer should be made.

COURT NEWS.

The Texas & Pacific, the Houston, East & West Texas, and the Houston & Shreveport have appealed to the commerce court from the decision of the Interstate Commerce Commission in the so-called Texas case in which the commission claimed jurisdiction over state rates when they affect interstate rates.

W. C. Brown, of the New York Central & Hudson River, and C. S. Mellen of the New York, New Haven & Hartford, have both filed their answers in the suit brought to enjoin permanently the sale of the Rutland majority stock by the N. Y. C. & H. R., to the New Haven. Both answers claim that the minority interests are in no way hurt by the sale.

United States Judge Carpenter has temporarily enjoined 25 railways from interfering in their tariff schedule with the Michigan, Indiana & Illinois line, steamship operators on Lake Michigan, and the Ludington Transportation Company. The Interstate Commerce Commission recently advised the railways to cancel their joint rates with these lines because they were held to be plant facilities.

Federal Employers' Liability Law.

The Supreme Court of the United States, in a decision by Justice Hughes, in the case of Schubert against the Baltimore & Potomac, holds that acceptance of benefits from a relief association is not a bar to a suit against the railway for personal injuries under the federal employers' liability law. The agreement of the employee with the relief association was made before the federal law was passed, and was claimed by the railway to be a binding contract, but this argument the court rejects.

Schubert was a brakeman and sued for damages on account of personal injuries sustained in the line of his employment. He was awarded judgment for $7,500. The railway company defended on the ground that Schubert had signed certain regulations, among them one agreeing to exempt the company from liabilities.

The court citing a recent decision (at this term) in the case of the Chicago, Burlington & Quincy against Maguire, which sustained the constitutionality of an amendment to the employers' liability law of the state of Iowa, which enacted that an employee could not enter into a contract through a relief society that would exempt the employer from liability, takes the view that the same rule applies to the federal employers' liability act. The contention of the road, that, because Schubert had signed the regulations of the relief fund before the employers' liability act was passed, such agreement of membership amounted to a contract in existence at the time the law was enacted, which could not be impaired by the statute was rejected. Justice Hughes declared that the power of Congress to regulate interstate commerce could not be interfered with by existing private contracts. Railways in organizing and financing relief funds among their employees with a view of securing immunity from damages for personal injuries, must have entered into these contracts with full knowledge that Congress had the power to pass an employer's liability act at any time which would practically annul such contracts.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Lovick P. Miles, general attorney of the Missouri Pacific-Iron Mountain system, with office at Fort Smith, Ark., has resigned to engage in private practice.

H. A. Scandrett, assistant interstate commerce attorney of the Harriman Lines at Chicago, has been appointed interstate commerce attorney, with office at Chicago, succeeding F. C. Dillard, resigned to become vice-president and general counsel of the Rock Island Lines.

Robert W. Baxter, who has been elected vice-president of the Alaska Steamship Company and the Copper River & Northwestern Railway, with office at Seattle, Wash., as has been announced in these columns, was born February 22, 1859, in Scotland. He began railway work with the Union Pacific as a messenger boy, and was with that road continuously from 1878 to 1890, and again from September, 1891, to October, 1903, having been consecutively telegraph operator, train despatcher, chief train despatcher, trainmaster, superintendent and general superintendent. He was superintendent of the Oregon and Washington divisions at Portland, Ore., from September, 1891, to June, 1892; was then until July, 1894, general superintendent of the Pacific division at Portland, in charge of rail and water lines; for the next four years was general agent for the receivers of the road, in the freight and passenger departments, at Portland, and from July, 1898, until he left the road in October, 1903, he was superintendent of the Nebraska division at Omaha. From April to September in 1891 Mr. Baxter was superintendent of the Ohio and Midland divisions of the Baltimore & Ohio at Newark, Ohio. In July, 1904, he went with the Lehigh Valley, with which road he was successively until January, 1910, superintendent of the Pennsylvania division at Sayre, Pa.; superintendent of the Wyoming division at Wilkesbarre, Pa.; superintendent of rail and water lines at Buffalo, N. Y., and superintendent of transportation, with office at South Bethlehem, Pa. He was appointed general superintendent of the Illinois Central lines north of the Ohio river, with office at Chicago, on July 1, 1910, which position he recently resigned to accept the vice-presidency of the two companies mentioned above.



R. W. Baxter.

Operating Officers.

J. P. Church has been appointed superintendent of telegraph of the Wabash, with office at Decatur, Ill., succeeding G. C. Kinsman, retired.

R. O. Roy, division freight agent of the Rock Island Lines at Alexandria, La., has been appointed general manager of the Crossett, Monticello & Northern, with office at Crossett, Ark.

William F. Haley has been appointed superintendent of the American Refrigerator Transit Company, with office at St. Louis, Mo., succeeding J. D. Ahern, resigned to engage in other business.

R. M. Cox, assistant general manager in charge of claims of the Texas Central, with office at Waco, Tex., having resigned, that office has been abolished, and claims will be handled by other officers of the road.

D. L. Sommerville, assistant superintendent of the New York Central & Hudson River, at Jersey Shore, Pa., has been appointed superintendent of the Adirondack division, with office at Utica, N. Y., succeeding J. W. Eber.

F. G. Minnick has been appointed car accountant of the Pittsburgh & Lake Erie, with office at Pittsburgh, Pa. He will have charge of all matters pertaining to car records, per diem and mileage, reporting to the superintendent car service of that company.

Harry C. Owen, trainmaster of the Northern Railway (Costa Rica) has been appointed superintendent, with office at Limon, Costa Rica, succeeding J. H. Burke, whose appointment as general superintendent of the same company, was recently announced in these columns.

J. W. Smith has been appointed assistant superintendent of the Indiana Harbor Belt, with headquarters at Gibson, Ind., succeeding J. W. Callahan, resigned to accept service with another company. N. D. Connelly has been appointed general yardmaster at Gibson.

J. H. Fraser, general superintendent of the Detroit, Toledo & Ironton, at Springfield, Ohio, has been appointed superintendent of transportation of the Maine Central, the Sandy River & Rangeley Lakes, and the Portland Terminal Company, with office at Portland, Maine.

M. J. Foley, trainmaster of the Chicago, Burlington & Quincy at Greybull, Wyo., has been appointed assistant superintendent, with office at Kirby, Wyo., with jurisdiction over the Chicago, Burlington & Quincy line from Billings, Mont., to Thermopolis, Wyo., from Frannie, Wyo., to Cody, and extending south of Thermopolis.

F. W. Peters, assistant to the vice-president of the Canadian Pacific, at Winnipeg, Man., has been appointed general superintendent of the British Columbia division, with office at Vancouver, B. C., succeeding James Oborne, deceased, and A. E. Stevens, until recently superintendent of the Manitoba division at Winnipeg, has been appointed assistant general superintendent of the British Columbia division.

F. J. Easley, general superintendent of the First district of the Rock Island Lines, at Des Moines, Iowa, has been appointed assistant general manager of the First district, with office at Des Moines. J. B. Smalley, general superintendent of the Second district, at Topeka, Kan., has been appointed assistant general manager of that district, with office at Topeka, and T. H. Beacom, general superintendent of the Third district, at El Reno, Okla., has been appointed assistant general manager of the Third district, and the office of general superintendent has been abolished, effective May 15.

R. H. L'Hommedieu, general manager of the Michigan Central, with office at Detroit, Mich., has resigned on account of ill health, and has been appointed assistant to A. H. Smith, vice-president of the New York Central Lines. Mr. L'Hommedieu will have his headquarters at Detroit. His jurisdiction will be confined to the Michigan Central, and he will perform such duties on that line as may be assigned to him from time to time. E. D. Bronner, who has been connected with the Michigan Central for the past 20 years, and who has been superintendent of motive power for a number of years, with office at Detroit, has been appointed general manager, succeeding M. L'Hommedieu.

J. W. Kelly, Jr., whose appointment as superintendent of the Cumberland division of the Baltimore & Ohio, has been announced in these columns, began railway work as a clerk in the office of the superintendent of the Baltimore & Ohio, at Baltimore, Md., and was afterwards transferred to the office of the general superintendent, and then to the office of the general manager. On November 1, 1901, he was promoted to assistant trainmaster, with headquarters at Cumberland, and in January, 1903, he became assistant chief clerk in the general superintendent's office at Baltimore and was later made chief clerk of the same office. Mr. Kelly was promoted to trainmaster of the Baltimore division in April, 1905, and was made assistant superintendent of the Cumberland division, with office at Keyser,

W. Va., on October 1, 1910, which position he held at the time of his recent appointment as superintendent of the same division.

John F. Porterfield, who has been appointed general superintendent of the Illinois Central lines south of the Ohio river, with office at New Orleans, La., as has been announced in these columns, was born February 23, 1871, at Pulaski, Ill. He received a public school education, and in May, 1883, began railway work with the Illinois Central, and he has been with that road ever since. Previous to 1890 he was messenger boy, telegraph operator and agent; was then for seven years chief clerk on various divisions, and from 1897 to 1905 was trainmaster on several divisions. He was made superintendent in 1905, and held that title continuously until his present promotion to general superintendent of lines south of the Ohio river on May 10, having had his headquarters at Vicksburg and McComb, Miss., at Memphis, Tenn., and recently at Carbondale, Ill.



J. F. Porterfield.

Cornelius Christie, whose appointment as superintendent of the Hudson division of the New York Central & Hudson River, with office at New York, has been announced in these columns, was born on September 24, 1864, at Ridgefield Park, N. J., and graduated from the Hackensack public schools. He began railway work in April, 1882, as telegraph operator on the New York, Susquehanna & Western, and from January, 1883, to April, 1888, was telegraph operator on the West Shore. In April, 1888, he was promoted to train despatcher, and in April, 1895, was appointed trainmaster of the New York Central & Hudson River. He was promoted in August, 1902, to superintendent of the River division, and from September, 1908, to November, 1911, was superintendent of the St. Lawrence division of the same road. On November 1, 1911, he was appointed a special representative of the transportation department, which position he held at the time of his recent appointment as superintendent of the Hudson division, as above noted.



C. Christie.

William Tansley, whose appointment as assistant superintendent of the Canadian Pacific, with office at Havelock, Ont., has been announced in these columns, was born on December 27, 1872, at Shelburne, Ont., and was educated in the public schools. He began railway work in September, 1889, with the Canadian Pacific, and for eleven years was operator and agent at various places on that road. He was then for six years train despatcher at Toronto, and from 1906 to 1907 was night chief despatcher at the same place. He was promoted in 1907 to chief train despatcher, and from 1910 to 1911 was instructor of rules. Mr. Tansley was made chief despatcher in 1911, with office at Toronto, which position he held at the time of his recent appointment as assistant superintendent of the same company, as above noted.

Traffic Officers.

J. B. Dunlap has been appointed traveling freight agent of the Southern Railway, with office at Cleveland, Ohio.

John A. Harlow has been appointed traveling passenger agent of the Wabash Railroad, with headquarters at Chicago, Ill.

R. E. Davis has been appointed traveling freight agent of the Atlanta, Birmingham & Atlantic, with headquarters at Jacksonville, Fla., succeeding Willis Colloway, commercial agent, resigned to go to another company.

W. E. Blitchington, third assistant traffic manager of the Georgia & Florida, with office at Augusta, Ga., has been appointed traveling passenger agent, with headquarters at Augusta, and his former position has been abolished.

E. J. Dowie, industrial agent of the Lake Shore & Michigan Southern, the Lake Erie & Western and the Pittsburgh & Lake Erie at Cleveland, Ohio, has been appointed general industrial agent of the New York Central Lines west of Buffalo, with office at Chicago.

F. W. Robinson, general freight agent of the Oregon-Washington Railroad & Navigation Company at Portland, Ore., has been appointed assistant to director of traffic of the Harriman Lines, with office at Chicago, succeeding P. C. Stohr, assistant director of traffic, deceased.

A. R. Brown, traveling freight agent of the Chicago, Burlington & Quincy at St. Paul, Minn., has been appointed general agent, with office at Winnipeg, Man., and F. W. Wolterstorff, who also is traveling freight agent, with headquarters at St. Paul, succeeds to the duties of Mr. Brown in charge of the Duluth district.

J. F. Govan, division passenger agent of the Frisco Lines at Houston, Tex., has been appointed district passenger agent, with office at Cincinnati, Ohio, succeeding W. S. Merchant, appointed traveling passenger agent, with headquarters at Cincinnati. H. J. Neff, commercial agent at Corpus Christi, Tex., has been transferred to Houston, and F. P. Dixon, formerly commercial agent at Corpus Christi, has been again appointed to that position, succeeding Mr. Neff.

Engineering and Rolling Stock Officers.

John Purcell, who has been appointed assistant to the vice-president in charge of operation of the Atchison, Topeka & Santa Fe system, with office at Chicago, as has been announced in these columns, began railway work in 1884 as an apprentice on the Santa Fe, and he has been with that road ever since. He was made gang foreman in 1887, and then filled various positions until he was appointed master mechanic at Argentine, Kan., about 1898 or 1899. He was later transferred as master mechanic to Shopton, Iowa, and in April, 1902, Mr. Purcell was promoted to superintendent of the Topeka shops, which office he held at the time of his recent promotion. In his present position Mr. Purcell will handle all mechanical department matters.



J. Purcell.

E. D. Bronner, superintendent of motive power of the Michigan Central, with office at Detroit, Mich., has been appointed general manager, as noted under Operating Officers.

M. J. Dra[illegible] general superintendent of the Northern district of the western lines of the Atchison, Topeka & Santa Fe, at La Junta, Colo., has been appointed superintendent of shops, with office at Topeka, Kan., succeeding John Purcell, promoted.

Clement E. Crowley, resident engineer of the Northern Railway (Costa Rica), with office at San Jose, Costa Rica, has resigned, and his former position has been abolished. The officers of the road and bridge departments will hereafter report direct to the general superintendent.

Louis H. Evans, until May 1 terminal engineer of the Chicago Association of Commerce Committee on Investigation of Smoke Abatement and Electrification of Railway Terminals, has been appointed special chief engineer of the New Orleans Terminal Company, at New Orleans, La., for the reconstruction and completion of the Chalmette slips.

J. E. Buckingham has been appointed superintendent of motor and refrigerator equipment of Wells Fargo & Company with headquarters at New York City. He will have general supervision of the mechanical department with respect to the construction and maintenance of motor and garage equipment, and refrigerator and ventilator cars.

OBITUARY.

E. Doul, commercial agent of the Illinois Central, with office at Cleveland, Ohio, died in Cleveland on May 9.

R. E. Boswell, superintendent of terminals of the Texas & Pacific, with office at Fort Worth, Tex., died at Fort Worth, on May 13.

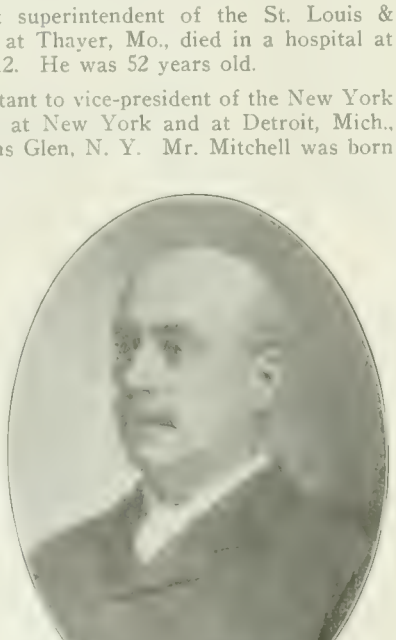
N. M. Maine, general master mechanic of the Chicago, Milwaukee & Puget Sound, with office at Tacoma, Wash., died at Tacoma, on May 10.

James A. Ritchie, traveling agent of the Chicago & North Western, with office at Cincinnati, Ohio, died at his father's home at Wheaton, Ill., on May 6.

Horace Brown Bannard, engineer maintenance of way of the New York & Long Branch, with office at Long Branch, N. J., died on May 10, at Asbury Park, at the age of 62.

B. F. Hunter, assistant superintendent of the St. Louis & San Francisco, with office at Thayer, Mo., died in a hospital at Jonesboro, Ark., on May 12. He was 52 years old.

Barrett B. Mitchell, assistant to vice-president of the New York Central Lines, with offices at New York and at Detroit, Mich., died on May 14, at Watkins Glen, N. Y. Mr. Mitchell was born on September 24, 1846, at Pittsford, Monroe county, N. Y., and began railway work in June, 1867, as a clerk of the Blue Line at Detroit, Mich. From September, 1867, to January, 1871, he was [illegible] and mileage clerk in the general office of the same line, and then to March, 1878, was chief clerk in the same office. He was appointed general manager of the Blue Line in March, 1878, remaining in that position until January, 1895. From June, 1885, to January, 1895, he was also general manager of the Canadian Southern Line. He was general freight agent of the Michigan Central from January, 1895, to March, 1896, and was general traffic manager from March, 1896, to November, 1905, of the same road. In November, 1905, he was appointed freight traffic manager of the New York Central Lines west of Buffalo, and was later made assistant to vice-president of the New York Central Lines.



B. B. Mitchell.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Atlantic & Western is in the market for 2 locomotives.

The Chicago Junction is in the market for 4 six-wheel switching locomotives.

Hocking Valley is in the market for 5 mikado locomotives and 2 Atlantic type locomotives.

Western of Minas, Brazil, is in the market for 9 Pacific type locomotives and 9 mikado locomotives.

The Brazil Railway Company, 25 Broad street, New York, is in the market for 3 mogul locomotives.

The Grand Rapids & Indiana has ordered 3 switching locomotives from the Lima Locomotive & Machine Company.

Grace & Company, New York, are in the market for 4 mogul locomotives for the Arica-La Paz Railway, La Paz, Bolivia.

The New York, New Haven & Hartford is closing negotiations with the American Locomotive Company for 15 consolidation locomotives.

The Pere Marquette, mentioned in the *Railway Age Gazette* of April 26 as being in the market for 40 locomotives, is now in the market for 35 consolidation locomotives, 35 mikado locomotives and 5 Pacific type locomotives.

The Peking-Kalgan, China, has ordered six locomotives from the American Locomotive Company. The dimensions of the cylinders will be 20 in. x 26 in. The diameter of the driving wheels will be 50 in., and the total weight in working order will be 160,000 lbs.

CAR BUILDING.

The Bessemer & Lake Erie is in the market for 1 passenger car.

The Illinois Central is in the market for 2,500 50-ton steel gondola cars.

The Chicago & North Western is asking prices on 1,000 steel gondola cars.

The Atlantic & Western is in the market for 3 passenger cars and 3 freight cars.

The Norfolk Southern is said to be in the market for 1,000 freight cars. This item has not been confirmed.

The Philadelphia & Reading is said to be in the market for 2,000 freight cars. This item has not been confirmed.

The Alabama, Tennessee & Northern has ordered 250 freight cars from the American Car & Foundry Company.

The Newburgh & South Shore is said to be in the market for 125 gondola cars. This item has not been confirmed.

The Great Northern has ordered 1,000 wooden ore cars and 500 automobile cars from the Haskell & Barker Car Company.

The Wabash, as mentioned in the *Railway Age Gazette* of March 29, has ordered 700 steel frame box cars from the American Car & Foundry Company for June delivery. These cars will have a capacity of 80,000 lbs., and the inside measurements will be 36 ft. 5⅝ in. long, 8 ft. 6 in. wide, and 8 ft. high. Some of the special equipment is as follows:

Axles—American Car & Fdy. Co.	Couplers—Sharon
[illegible]	Draft gear—Miner friction.
[illegible] Westinghouse.	Journal boxes—McCord.
[illegible] Ramapo.	Roofs—Hutchins.
[illegible] Hewitt.	Springs—Railway Steel-Spring Co.

This company has also ordered 500 steel frame box cars from the Haskell & Barker Car Company, for delivery in June and July, which will be of the same capacity and dimensions. The special equipment includes:

[illegible] Haskell & Barker.	Couplers—Simplex.
[illegible] Simplex.	Draft gear—Miner friction.
Brakes—Westinghouse.	Journal boxes—Haskell & Barker.
Brakebeams—Haskell & Barker.	Roofs—Hutchins.
[illegible] Haskell & Barker.	Springs—Railway Steel-Spring Co.
[illegible] Hewitt.	

THE ST. LOUIS, BROWNSVILLE & MEXICAN has ordered 2 electric motor cars from the General Electric Company. For a description of these cars see an item under General News.

THE AMERICAN REFRIGERATOR TRANSIT COMPANY, St. Louis, Mo., is said to be in the market for 1,000 refrigerator cars, in addition to the 500 recently ordered from the American Car & Foundry Company. This item has not been confirmed.

THE NORFOLK & WESTERN, mentioned in the *Railway Age Gazette* of April 19 as being in the market for 50 passenger cars, is now in the market for 35 all-steel, 70-ft, coaches, 10 all-steel, 70-ft., postal cars, 8 all-steel, 70-ft., combination baggage and mail cars, 6 all-steel, 70-ft., baggage cars and 5 all-steel 70-ft., combination passenger and baggage cars.

IRON AND STEEL.

THE WABASH is in the market for 20,000 tons of rails.

THE SEABOARD AIR LINE is in the market for 17,000 tons of rails.

THE ATLANTIC COAST LINE is in the market for 20,000 tons of rails.

THE MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE has ordered 10,000 tons of rails from the Illinois Steel Company.

THE MISSOURI PACIFIC has ordered 6,500 tons of rails from the Illinois Steel Company, and is now in the market for 25,000 tons of rails.

SIGNALING.

New Installations of Block Signals, Interlocking, Telephones for Train Despatching, Etc.

Details of agreements of 12 roads to install block signals in Indiana are given in another column, under State Commissions.

THE ST. LOUIS SOUTHWESTERN is planning to install 132 miles of manual signals between Illmo, Mo., and Jonesboro, Ark., in the near future.

THE CHICAGO & EASTERN ILLINOIS will install automatic block signals on 39 miles of double track between Villa Grove, Ill., and Findlay, and on 63 miles of double track between Bismarck, Ill., and Terre Haute, Ind.

A 65-lever electric interlocking machine, made by the Federal Signal Company, is being put up at Ashtabula, Ohio, at the crossing of the Lake Shore & Michigan Southern, the New York, Chicago & St. Louis, and the Pennsylvania.

THE CHICAGO, MILWAUKEE & PUGET SOUND will install about 125 miles of automatic signals during this year. These will be three-position upper quadrant signals and will protect the single track between Cle Elum, Wash., and St. Regis, Mont.

THE CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA is considering the installation of automatic block signals on the double track between St. Paul, Minn., and North Line, 22 miles; and between Eau Claire, Wis., and Merrillan. The work will probably be undertaken during this year.

THE SOUTHERN PACIFIC has completed plans for the installation of 112 miles of single track automatic block signals between Lathrop, Cal., and Fresno on the Stockton division. The work will be undertaken immediately and the construction will follow the Harriman line standards, using two-position lower quadrant Style "B" signals.

THE NORFOLK & WESTERN will install this year 60.3 miles of three-position upper quadrant automatic block signals between Gillmerton and Suffolk, Notoway and Burkeville, Evergreen and Forest, and Jack and Estes, all in Virginia. Of this 24.5 miles are to be alternating current signaling, and 35.8 miles direct current signaling.

THE ATLANTIC COAST LINE is planning to install 38 miles of automatic block signals between Folkston, Ga., and Moncrief, Fla. The signals will be upper quadrant three-position. An electro-mechanical interlocking plant of 24 levers will be installed at Folkston, Ga., to govern the end of the double track junction and a number of cross-overs and switches at that point.

THE BUFFALO, ROCHESTER & PITTSBURGH is planning to install 35 miles of automatic block signals on its line between Lincoln Park, N. Y., and Gainesville. The signals will be three-position upper quadrant, and will be arranged for operation under the plan of the General Railway Signal Company's "absolute permissive" block system. Model 2-A signals will be used. Manual signals will be installed on 94 miles of line between Rochester and Ashford, N. Y.

THE CHICAGO, INDIANAPOLIS & LOUISVILLE will install 140 miles of automatic block signals this year between Monon and McDoel and between Peerless and Bedford, Ind. All of the signals will be upper quadrant, 31 miles being two-position and 109 miles three-position. Manual signals will be installed on 97 miles between McDoel, Ind., and New Albany. One interlocking plant is planned. This is to have eight levers, and will be constructed at the Calumet River drawbridge near Hammond, Ind.

THE ATCHISON, TOPEKA & SANTA FE will install automatic block signals on 60 miles of double track between Flagstaff, Ariz., and Ash Fork. The signals will be operated by alternating current, and the block lengths will average two miles. A power plant will be located at Williams, approximately in the center of the stretch to be protected, and power from this point will be used for all station and signal facilities, except at Ash Fork. Additional installations of alternating current signaling are contemplated for the near future.

THE NORTHERN PACIFIC has just awarded to the General Railway Signal Company contracts for the following: 66 miles of double track automatic block signaling extending from Kalama, Wash., to Tenino, on the line between Tacoma, Wash., and Portland, Ore.; nine miles of single track and eight miles of double track between Cheney, Wash., and Spokane; nine miles of single track and 11 miles of double track between Spokane and Houser, Idaho; 28.5 miles of single track between Athol and Sand Point, Idaho; and 15 miles of double track between St. Cloud, Minn., and Rices.

THE NEW YORK, NEW HAVEN & HARTFORD is planning to equip 110 miles of two-track and four miles of four-track road with automatic block signals: between Savin Hill and Atlantic, Mass.; South Framingham and New Bedford, Mass.; East Providence, R. I., and Fall River, Mass.; and Waterbury and Hartford, Conn. The signals will be of the two-position, center-suspended type of semaphore which the New Haven has adopted. All the automatic signals will be operated by alternating current, and will be electric-lighted. A short stretch of manual signals protecting four tracks will also be installed between Worcester and South Worcester. Eight interlocking plants, two mechanical and six electric, are to be built; two at Worcester, one at Neponset, two near New York, one at New Rochelle, one at Hawleyville, Conn., and one at Westerly, R. I. The mechanical plants will have a total of 64 levers operating 81 units, and the electrical plants will have a total of 151 levers operating 307 units. Seven of the plants will control junctions and one will control a yard entrance.

THE CHICAGO & NORTH-WESTERN has awarded to the General Railway Signal Company a contract for 35 miles of double track automatic block signaling to be installed between Madison, Wis., and Baraboo. The extension of the signals from Baraboo to Elroy, to govern 37 miles of double track, is under consideration. The signals are to be three-position upper quadrant, and will be on signal bridges throughout the entire installation. The contract for a 36-lever mechanical interlocking plant to protect the crossing of the North-Western and the Chicago, Milwaukee & St. Paul at Clinton Jct., Ill., was also awarded to the General Railway Signal Company. A contract has also been awarded to the Hall Signal Company for double track automatic signals on the 37 miles between Butler, Wis., and Clyman. The signals are to be three-position upper quadrant semaphores, and will be on signal bridges. The North-Western is planning to install automatic signals on 44 miles, mostly single track, on the line between Harvard, Ill., and Evansville, Wis., via Janesville. Five miles of this line, through the city of Janesville, is double track. The "absolute permissive" scheme of signaling as developed by the General Railway Signal Company will be used on the single track work, with the exception that although the first signal at the out-bound switch leaving a station is at the switch, the first in-coming signal is 800 ft. past the switch on the single track. The signals on the double-track stretch will be mounted on signal bridges. The average length of block will be one mile. The shortest block will be 4,200 ft. and the longest 6,000 ft. Telephones, connected to the despatcher's line, will be installed at each outbound signal at each station.

Supply Trade News.

Ferdinand Schlesinger, of Milwaukee, Wis., and associates have purchased a tract of 415 acres at Hammond, Ind., with the purpose of building a large steel plant.

J. M. Monroe, foreman of locomotive repairs at the Southern Railway shops at Columbia, S. C., has resigned that position and has gone to the Hunt-Spiller Manufacturing Corporation, Boston, as a representative.

The Bucyrus Company, South Milwaukee, Wis., has opened an office in the Brown-Marx building, Birmingham, Ala., under the management of E. L. Byron, who will have charge of the sales in the southern states.

Edward E. Wright has been appointed manager of the central sales district for the McKeen Motor Car Company, Omaha, Neb., and will have charge of the new office which has been established by the company in the Marquette building, Chicago.

J. E Fries has been made Pacific coast engineer of the Crocker-Wheeler Company, Ampere, N. J., with office at San Francisco, Cal. This company on April 1 opened an office in the Title Insurance building, Los Angeles, Cal.

W. S. Quigley, until recently vice-president and general manager of the Rockwell Furnace Company, New York, has resigned that position to become vice-president of the new Quigley Furnace & Foundry Company, 50 Church street, New York.

Howard K. Porter, a southern representative of the Lorain Steel Company, Philadelphia, Pa., has been made manager of the southern railway department of the U. S. Metal & Manufacturing Company, New York, with office in the Candler building, Atlanta, Ga.

George Price, formerly with the Tidewater Building Company, and later with D. C. Newman Collins and S. Fisher Miller, engineers, has gone to the Flintkote Manufacturing Company and J. A. & W. Bird & Company, both of Boston, as representative, with office at 66 Beaver street, New York.

The stockholders of the Bethlehem Steel Corporation, New York, on May 14, authorized the issue of $50,000,000 5 per cent. 30-year bonds. These bonds will be secured by a general mortgage on the real estate and manufacturing plants of the subsidiary Bethlehem Steel Company, South Bethlehem, Pa., and stocks representing its investment in mining properties. The present issue will be $17,500,000 including $15,200,000 already sold. Proceeds will be used to retire outstanding 6 per cent. notes and $2,668,000 extension mortgage 5 per cent. bonds, which have already been purchased, and also to provide working capital.

The Southwark Foundry & Machine Company, Philadelphia, Pa., manufacturer of turbine engines, has been sold. The new board of directors consists of Alba B. Johnson, Samuel B. Vauclain, Holstein De Haven Bright, John P. Sykes, Reeves K. Johnson, Alba B. Johnson, Jr., Jacques L. Vauclain and Andrew C. Vauclain. The new officers are as follows: President, Holstein De Haven Bright; vice-president and treasurer, James H. Maloney, and secretary, Alfred C. Maule. Alba B. Johnson, president of the Baldwin Locomotive Works, Philadelphia, Pa., said that this was an individual enterprise and that the Southwark company would have no connection with the Baldwin Locomotive Works.

The various steel companies of the Lake Superior Corporation, Sault Ste Marie, Ont., have been combined into the Algoma Steel Corporation, in accordance with its plans for the consolidation of the various subsidiary companies in natural groups. The companies to be included in the consolidation are the Algoma Steel Company, Sault Ste Marie; the Lake Superior Iron & Steel Company, Montreal, Que.; the Lake Superior Power Company; the Fiborn Limestone Company; the Cannelton Coal & Coke Company, and the Algoma Iron Works, Ltd. The authorized capital of the new corporation will consist of $30,000,000 stock and $30,000,000 bonds. An immediate issue of $13,500,000 bonds has been underwritten, which will provide for the refunding of the short term notes of the various companies included in the new consolidation, as well as the three-year notes of the Lake Superior Corporation now outstanding. The Lake Superior Corporation will hold all the outstanding stock of the new Algoma Steel Corporation, and will guarantee the bonds. The financing will be done in London, England. The new arrangement will not place additional charges on the Lake Superior Corporation.

TRADE PUBLICATIONS.

Lock Nuts.—The Boss Nut Company, Chicago, has issued a small booklet describing the uses and principles of the Boss nut, together with price lists.

Oil Filtration.—S. F. Bowser & Co., Ft. Wayne, Ind., have published an illustrated booklet entitled Oil Filtration and Circulating Systems. This booklet contains detailed descriptions of these systems amplified by diagrams. Accessories are also illustrated and described. The booklet ends with 17 advantages of these systems.

Chicago & North Western-Union Pacific.—The tours department has issued an unusually attractive illustrated folder describing its summer vacation all-expense tours to Colorado, Utah, Lake Tahoe, Yosemite valley, California, Yellowstone park, the Pacific coast, Alaska and the Canadian Rockies, for the summer of 1912, the twelfth season of the tours department.

Southern Pacific.—The passenger department of this company has published an unusually good booklet on Morrow County, Ore. In this booklet the numerous opportunities and resources of this county are described in an attractive manner. Excellent photographs and facts about the soil, the climate and industries combine to give a most favorable impression of this region.

A technical commission has just explored 223 miles between Villa Rica, Brazil, and Port Meyboysi on the right bank of the Parana river with the view to constructing a railway over that route.

Since the railway commissioners of Victoria, Australia, decided to install track locking on the suburban lines, the work has progressed rapidly. At present 58 block sections, covering a total distance of 17 miles of double track, have been completed.

Beira, the port and capital of the territories of the Mozambique Company, Portuguese, East Africa, bears the same relation to Rhodesia that Lourenço Marquez does to the Transvaal, and it has been connected with Salisbury, Bulawayo, and practically all South Africa, including the newly opened Belgian Congo hinterland, by the Beira & Mashonaland Railway, which forms the shortest link between the highlands of Rhodesia and the sea. This railway is owned and operated by British capital, but the Mozambique Company retains an inalienable right to a certain number of votes whether it disposes of its shares or not.

The question of a uniform gage for the Australian state railways was recently discussed at the conference of state premiers in Melbourne. The Victorian representatives urged that while the war conference had decided that there should be a uniform gage of 4 ft. 8½ in., the different governments had not concurred, though it was claimed their officers had done so. Victoria and South Australia were concerned at the procedure adopted by the commonwealth to make a uniform gage of 4 ft. 8½ in. The mileage of the different gages throughout Australia was quoted as follows: 5 ft. 3 in. gage, 4,938 miles; 4 ft. 8½ in. gage, 4,468 miles, and 3 ft. 6 in. gage, 7,627 miles. It was urged that a committee of engineers should be called on to report on the matter, and when the gage was finally settled, the question to be met was that the commonwealth should be expected to pay towards the conversion. The advantages of the wider gage were urged and the following resolution was moved: That a committee of the commonwealth and the states be appointed to investigate the question of the selection of the uniform gage between the capital cities of Australia, more particularly in regard to the necessity for uniform gage; the most favorable gage from the point of view of efficiency and economy of operation, having in mind the conditions likely to be experienced in Australia in the future; the estimated cost of conversion to one of the two wider gages in Victoria, New South Wales and South Australia.

Railway Construction.

New Incorporations, Surveys, Etc.

Alberta Pacific.—The Canadian parliament has granted a subsidy of from $3,200 to $6,400 a mile, to this company, which proposes to build from Cardston, Alta., northwest via Pincher Creek to Lundbreck on the Canadian Pacific's Crow's Nest Pass branch, thence north to Calgary. This project was formerly known as the Pincher, Cardston & Montana. It is said that the charter has been taken over by the Great Northern. Some preliminary work has been carried out near Pincher Creek. C. E. Culbert, secretary, Pincher Creek.

Albion-Marshfield.—An officer writes that the surveys are not yet finished for a line from Albion, Idaho, north to Marshfield, about 10 miles. A grading contract has been let to local contractors for work on three miles. Five miles of the route will be through a mountainous section. The maximum grades will be 2 per cent., and maximum curvature 10 deg. The plans call for putting up two trestles, also two stations. T. E. Harper, president; W. C. Calvert, chief engineer, Albion.

Arizona Roads.—According to press reports from Phoenix, Ariz., permission has been granted to build a line through the Colorado River Indian Reservation, and surveys are now being made for the line from Parker, Ariz., south to Ehrenberg. P. Pierce, Los Angeles, Cal.; L. H. Chalmers, and F. S. Hildreth, of Phoenix, are interested.

Atlantic & Northeastern.—Under this name a company is to be organized to build from Milltown, Ga., north and northwest via Nashville, Tifton, Ashburn, Doles and Oakfield to Americus, about 100 miles. W. W. Banks, I. W. Myers, Tifton; J. L. Evans, Ashburn; F. C. Hall, Oakdale; and W. M. Cook, Americus, are interested.

Atlantic & Western.—An officer writes that this company, which operates a line from Sanford, N. C., east to Broadway, 12 miles, is building an extension east via Mohawk, Fishercreek, Edwardsburg and Dorr to Lillington, in all 25 miles. The work is being carried out by the company's men. W. J. Edwards, chief engineer, Sanford.

Boston & Maine.—See an item under General News regarding the construction of a new 20-mile electric line to the summit of Mt. Washington, N. H.

Boston Subways.—A contract has been given by the Boston (Mass.) Transit Commission for building a section of the subway from the public library to Hereford street, under Boylston street, to the Hugh Nawn Contracting Company, at $413,135, this company is also building the first section. The next subway section to be started will be in Winter street.

Butte, Anaconda & Pacific.—This company, which operates a line from Butte, Mont., west and northwest to Anaconda, about 26 miles, with branches aggregating about 13 miles, has plans made for the electrification of the main line. In addition, the company contemplates the extension of the road from Anaconda northeast to the Georgetown district. H. A. Gallwey, general manager, Butte. (February 3, 1911, p. 257.)

Canadian Pacific.—A contract has been given to Larkin & Sangster, St. Catharines, Ont., it is said for piercing a 900-ft. tunnel on the line under construction from a point on the existing line 15 miles west of Smith's Falls, Ont., to a connection with the Canadian Pacific at Agincourt. C. W. P. Ramsey, engineer of construction, Eastern Lines, Montreal, Que. (April 5, p. 824.)

Canadian Roads.—The Quebec legislature will grant a subsidy of 2,000 acres of land a mile to any company that will build railway lines from Chaudiere Junction, Que., southwest to Sherbrooke, 120 miles, with branches from Ste. Agathe to Lyster, 10 miles, and from Ste. Agathe to Black lake.

Canadian Terminal.—This company has obtained an extension of time from the legislature of New Brunswick, for the construction of a line from a point at or near the harbor of L'Etang, to a point on the St. Croix river in York county, N. B. The company was incorporated in New Brunswick, in 1907, when the provisional directors were named as, J. S. Clark, J. D. Chipman, G. W. Ganong, H. I. Taylor, H. F. White, G. W. Marsh and W. L. E. Marsh, St. George, N. B.

Chicago, Milwaukee & St. Paul.—According to press reports, a contract has been given to the Fleet Construction Company, Dubuque, Iowa, to build the line from Crystal Falls, Mich., west to Iron River, 22 miles. C. F. Loweth, chief engineer, Chicago. (March 15, p. 525.)

Chicago, Milwaukee & Puget Sound.—According to press reports, a contract has been given to a contractor of Seattle, Wash., to build from Plummer, Idaho, northwest to Bell, Wash., on the Oregon-Washington Railroad & Navigation Company, 20 miles. It is said that the contract is worth $950,000. E. O. Reeder, chief engineer, Wash.

According to press reports, surveys are being made for a section of an extension from Lewistown, Mont., northwest via Great Falls, towards Kalispell.

Chicago, Rock Island & Pacific.—An officer writes that the work being carried out in Kansas consists of widening embankments preparatory to ballasting between Pratt, Kan., and Bucklin, 50 miles. A contract for the bank widening has been let to Robert Malone, Lincoln, Nebr. A 6-in. raise of gravel ballast is to be put in by the company's men, after the bank widening work is completed. J. B. Berry chief engineer, Chicago.

Colorado & Southern.—According to press reports, this company will replace the present track between Hartville Junction, Wyo., and Orin Junction, 35 miles, with 85-lb. sections. It is understood that Hartville Junction is to be made a division point and that a roundhouse and shops are to be built at that place. H. W. Cowan, chief engineer, Denver, Colo.

Denver, Laramie & Northwestern.—See an item under Railway Financial News.

Flemington, Hinesville & Western.—An officer writes that a contract has been given to N. T. Hewitt, McIntosh, Ga., to build from McIntosh west via Flemington, Hinesville and Gum Branch to Glennville, between 25 and 30 miles. Grading has been finished on two miles. There will be trestles over Goshen and Horse creeks. The company expects to develop a traffic in naval stores, cotton, lumber and merchandise. J. B. Way, director, Hinesville.

Fredericton & Grand Lake Coal & Railway Company.—A contract has been given to A. E. Trites, Moncton, N. B., to build from Gibson, N. B., east to Minto, where a connection is to be made with the New Brunswick Coal & Railway Company's line, 31 miles. A number of bridges are to be built on the line. D. F. Maxwell, chief engineer, Fredericton, N. B. (March 22, p. 701.)

Gatineau & Ungava.—See Ottawa & Ungava.

Grand Lake & Belle River.—Application has been made for a charter to build a 45 mile line through the Grand Lake Victoria district in the province of Quebec from a point on the National Transcontinental (Grand Trunk Pacific). The proposed line has been subsidized by both the federal and provincial governments, but will not be built until the National Transcontinental is completed. The line is to be built to open up timber lands. J. B. Fraser, 74 Nepean street, Ottawa, Ont., may be addressed.

Grand Trunk.—A sub-committee of the Massachusetts legislative Committee on Railroads reported to the full committee today a bill permitting the Southern New England Railroad of the Grand Trunk to extend its lines to Boston. The terms of the bill, as reported, have been approved by counsel of the Southern New England.

Hudson Bay Railway.—Plans have been made for building the second section of 120 miles, and bids will be called for at once. J. D. McArthur, Winnipeg, Man., has the contract for the first section of 185 miles from LePas, Keewatin, northeast. John Armstrong, chief engineer, Winnipeg. (March 8, p. 453.)

Intercolonial.—Subcontracts for building the line between Dartmouth, N. S., and Deans Settlement have been let, as follows: To D. Washburn, Dartmouth, from mileage 1 to 12; to G. S. Whitehead Construction Company, Lawrencetown, from mileage

12 to 27; to W. Waddell, Musquodoboit Harbor, from mileage 34 to 36; to Garrett & Campbell, Masquodoboit Harbor, from mileage 36 to 45; to McDonald & Mackintosh, Little River, from mileage 45 to 55; to Chisholm & McGillivray, Middle Musquodoboit, from mileage 55 to 62; to Billman, Gillis & Company, Deans Settlement, from mileage 62 to 68. Cavicchi & Pagano, Plaster Rock, N. B., are the general contractors. (March 22, p. 701.)

Kansas City & Memphis.—An officer writes that track laying is now under way from Clear Creek, Ark., east to Fayetteville. This is the last section of five miles to complete the line from Cave Springs south to Fayetteville, 20 miles. M. Hays, chief engineer, Rogers. (May 10, p. 1078.)

Miramichi Valley.—Incorporated in New Brunswick to build from Newcastle, N. B., on the Intercolonial, following the valley of the Miramichi river to Tracadie. Steamship and express services may also be operated in connection with the railway. Construction must be commenced within one year, and completed within five years. The capital stock is $1,000,000, and bonds may be issued to the extent of $35,000 a mile. The provisional directors are J. Robinson, E. A. McCurdy, D. Morrison, W. L. Allain, W. A. Park, Hon. A. Ritchie and E. H. Sinclair, Newcastle, N. B.

Nerepis & Long Island.—Incorporated in New Brunswick to build from a point on the Canadian Pacific at or near Welsford, N. B., to a point between Gagetown and Hampstead, Queens county, with a branch from a point in Petersville parish to a point in the Clones district, the work to be started within two years, and completed within four years. The capital stock is $98,000, and the aggregate amount of debentures must not exceed $25,000 a mile, including any amount guaranteed by the provincial government. The provisional directors are H. W. Woods, J. M. Queen, J. B. M. Baxter, F. C. Taylor and A. R. Slipp, Welsford, N. B.

New York, New Haven & Hartford.—According to press reports, this company, which controls the Poughkeepsie bridge system, and the Central New England, is planning to carry out improvements on these lines to include double-tracking the line west of the Hudson river from Poughkeepsie, N. Y., to Campbell Hall, 30 miles, and on the line between Stevenson, Conn., and Shelton, 7½ miles. Edward Gagel, chief engineer, New Haven, Conn.

New York Subways.—The New York Public Service Commission, Second district, has given a contract for the construction of section No. 14 of the Lexington avenue subway to Arthur McMullen, New York, who was the lowest bidder at $3,889,775. Section No. 14 constitutes the tube under the Harlem from 129th street, in the borough of Manhattan, to 135th street, in the borough of the Bronx, and is 3,176 ft. long. McMullen's accepted bid was for type "K," which is four steel tubes in one mass of concrete.

North Shore Railway & Navigation Company.—Incorporated in New Brunswick, to build from a point on the Intercolonial, at or near Adamsville, N. B., to a point at or near Snowshoe lake, to connect with the National Transcontinental at convenient points; from Beersville via Rexton, to a point at or near Richibucto Head on the Gulf of St. Lawrence, and to operate a car and passenger ferry from Richibucto Head to connect with Prince Edward Island, at or near Cape Wolffe or West Point, P. E. I. The capital stock is $1,000,000, and bonds may be issued to the extent of $35,000 a mile, which may be guaranteed by the province. The provisional directors are G. W. Fowler, Sussex, N. B.; M. F. Keith, Moncton; H. J. Von Hagen and E. E. Smith, New York; W. A. P. Davis and J. H. Wood, Philadelphia, Pa.

Ottawa & Ungava.—The Canadian parliament has extended the time for building from the National Transcontinental (Grand Trunk Pacific) at the head of the Gatineau river, Que., northeasterly to Lake Chibougamou, about 140 miles, thence to the east side of Lake Mistassim, 60 miles, and to the northern boundary of Quebec at Homani, or Summit Lake, in all about 450 miles. The line is to be continued via the source of the Big river to Lake Kaniapiskau northwest to Lake Minto, or Leaf river, or north to the Koksoak river, and from either of these places northeast to Leaf lake, or Ungava bay, a total of about 900 miles, and is eventually to be extended from Lake Minto to Payne lake, 200 miles. This project was formerly known as the Gatineau & Ungava. A. T. Genest, civil engineer, Ottawa, Ont., is interested.

Pincher, Cardston & Montana.—See Alberta Pacific.

St. Croix Docks & Railway.—Incorporated in New Brunswick to build from a point in or near St. Stephen, N. B., to a point on the shore of Oak bay, or to a point on the St. Croix river in Charlotte county, also dock accommodation at the latter points. The capital stock is $499,000, and bonds may be issued not exceeding $40,000 a mile of line built. The provisional directors are G. D. Grimmer, D. F. Maxwell, W. H. Berry, F. P. McColl, F. M. Murchie and G. J. Clarke, St. Stephen, N. B.

St. Louis & San Francisco.—See item under General News regarding improvements to be carried out by this company.

Sharpsville & Western.—Incorporation has been asked for in Pennsylvania by this company with a capital of $15,000, to build from Sharpsville, Pa., south to North Sharon. The incorporators include F. K. Smith, Sharon; C. D. Dyer, Pittsburgh; F. W. Tickner, Sharpsville; and D. B. Thompson, Cleveland, Ohio.

Southern Illinois Railway & Power Company.—Incorporated in Illinois, with offices in Chicago, to build from Eldorado, Ill., west and southwest, via Raleigh and Harrisburg to Carriers Mills, Saline county, about 20 miles. The directors include William Rockmann, T. G. Deering, W. M. Klein, S. Kraus and R. G. Crandall. The incorporators are L. D. Hewitt, E. H. Bach and R. A. Phillips.

Southern New England.—See Grand Trunk.

Sugarland.—This company, which operates a line from Sugarland, Tex., to Arcola, 14 miles, has asked for authority to issue $752,189 of bonds, to provide funds for an extension northwest to Hempstead, 57 miles. The extension is to be also bonded as the construction progresses. W. T. Eldridge, president and general manager, Sugarland.

Sussex, Studholm & Havelock.—Incorporated in New Brunswick to build from Havelock, N. B., to a point on or near the Intercolonial at Sussex. The capital stock is $39,000, and bonds may be issued to the extent of $35,000 a mile. The line must be built and ready for traffic within seven years. The provisional directors are S. A. McLeod, G. B. Jones, J. E. McAuley, Havelock, N. B.

Temiskaming & Northern Ontario.—The South Porcupine branch has been extended from South Porcupine, Ont., to Timmens, eight miles. S. B. Clement, chief engineer and superintendent of maintenance, North Bay.

Union Pacific.—According to press reports, this company will begin work soon on a branch from Gering, Neb., west towards Medicine Bow, Carbon county, Wyo. It is expected that the line will be in operation before next winter between Gering and Bordeaux, Wyo., 70 miles. R. L. Huntley, chief engineer, Omaha, Neb.

RAILWAY STRUCTURES.

Albany, N. Y.—The New York Public Service Commission, Second district, has received petitions asking for the elimination of grade crossings as follows: In Friendship, Allegany county, over the Pittsburg, Shawmut & Northern; at Veteran, Chemung county, over the Pennsylvania Railroad; at Erwin, Steuben county, over the Erie; at Potsdam, St. Lawrence county, over the New York Central & Hudson River; at Black River, Jefferson county, over the New York Central & Hudson River; at Nunda, Livingston county, over the Pennsylvania Railroad; and at Lewiston, Niagara county, over the R. W. & O. division of the New York Central & Hudson River.

Armstrong, Ont.—See Moncton, N. B.

Barton, N. Y.—The New York Public Service Commission, Second district, has ordered the elimination of the highway crossing the tracks of the Erie and the Lehigh Valley railways in Barton, Tioga county. A steel bridge with approaches is to be built over the tracks at another point.

Calvert, Ont.—See Moncton, N. B.

Cochrane, Ont.—See Moncton, N. B.

Detroit, Mich.—Bids are being received by the Michigan Central for terminal improvements at Detroit. The work includes the enlargement of the principal freight yard, laying about 20 miles of yard and commercial tracks, and putting up a new engine house and shop buildings. Some of the work will be carried out by the company's men. The cost of the improvements will be about $1,000,000.

Edmonton, Alberta.—The Canadian Pacific has let a contract for a new fireproof office building, to C. W. Sharpe & Son of Winnipeg. The building will be of steel, fireproof construction, and will cost about $300,000. W. W. Blair, of Winnipeg, is the architect.

Edmundston, N. B.—See Moncton, N. B.

Gulfport, Miss.—According to press reports, the Gulf & Ship Island will make improvements at Gulfport to provide additional ship terminal facilities. It is understood that a new pier will be put up at a cost of $500,000, and that the present docks and coal tipple will be rebuilt at a cost of $200,000.

Grant, Ont.—See Moncton, N. B.

Hartville Junction, Wyo.—See Colorado & Southern under Railway Construction.

Laurel, Miss.—The New Orleans, Mobile & Chicago has let the contract for a new two-story brick office building and warehouse, 100 x 250 ft. Work is to be started soon on a new passenger station at Laurel for the New Orleans & Northeastern.

Moncton, N. B.—Bids are being received by the commissioners of the National Transcontinental for the construction of a number of 200-ton mechanical coaling plants, with sand houses and track approaches at the following places: Moncton, N. B.; Edmundston, Grant, Ont.; Calvert and Armstrong, and for putting up a 1,000-ton coaling station with inclined trestle approach at Cochrane.

Newport News, Va.—According to press reports, the Chesapeake & Ohio will soon begin work on a new coal pier at Newport News, to be 1,200 ft. long and 88 ft. high.

Piedmont, W. Va.—The Baltimore & Ohio has given a contract to the Roydhouse-Arey Company, Philadelphia, Pa., for remodeling the passenger station at Piedmont, at a cost of about $7,000.

Portland, Ore.—The Spokane, Portland & Seattle, and the allied Hill lines in Oregon has announced they will ask the city council for franchises for several new lines on the east side of the city, to be used in connection with a large new eight-story concrete-steel freight warehouse and other improvements to cost about $2,000,000.

Savanna, Ill.—The Chicago, Milwaukee & St. Paul will build a new station at this point in addition to a new yard, and improvements to the present yard facilities.

Tucson, Ariz.—The El Paso & Southwestern has asked for bids on a station, freight house and engine house, to be submitted by June 20.

Starting 32 miles from Lourenço Marquez, Portuguese East Africa, on the main line to Johannesburg, Transvaal, a branch, running northeast for 50 miles, is to be laid to the settlement of Xinavane, and also to Magude on the Incomati river. The Incomati Estates, Ltd., a sugar concern that is beginning operations on a large scale, has secured the contract for this line. A request has been made for tenders for the extension of this branch 125 miles in the same general northeasterly direction to Manjacase, where it is to connect with the railway at present under construction from the port of Chai-Chai on the Limpopo river, which enters the Indian ocean about 90 miles up the coast from Lourenço Marquez. This latter road, starting from Chai-Chai, is the Gaza railway, and 20 of the 33 miles to Manjacase are already completed and in operation. It is a narrow-gage road intended to open a fertile region hitherto inaccessible to commerce. Its usefulness is seriously handicapped by the dangerous shoal bar in the Limpopo river that makes Chai-Chai a most difficult port to enter. The materials for this railway, as well as the rolling stock, were furnished by a German firm that secured the contract through public tender. From it three branches are planned.

Railway Financial News.

Alberta Railway & Irrigation.—The stockholders of this company which is leased to the Canadian Pacific, the latter owning nearly all of the capital stock, will vote on May 27 on issuing bonds, the respective amounts, the rate of interest and also on authorizing the form of the mortgage, if any, to be given to secure the payment of the bonds.

Baltimore & Ohio.—This company has called for payment on June 1 $73,000 first mortgage 5 per cent. coal bonds of the Monongahela River at par and interest at the Maryland Trust Company, Baltimore, Md.

Birmingham & Southeastern.—This company has acquired the Tallassee & Montgomery extending from Tallassee, Ala., to Milstead, 6 miles, on the main line of the Atlanta & West Point. The Birmingham & Southeastern runs from Union Springs to Tallassee, about 35 miles.

Boston & Albany.—The Massachusetts railway commission on May 10 granted the application to issue $1,000,000 25-year 4½ per cent. bonds dated July 1, 1912. Proceeds will be used for the following additions and improvements made and to be made, estimated cost $1,025,500: Third tracking, $55,000; passing tracks and sidings, $65,000; yard improvements at Worcester, $250,000; new buildings at West Springfield, Pittsfield and Worcester, $145,000; lengthening platforms, $56,000; rebuilding or repairing bridges, $350,000; signals and interlockings, $22,000, and miscellaneous, $82,500.

Boston & Maine.—This company will soon sell $12,000,000 one year 4 per cent. notes to New York bankers. Part of the proceeds will be used to retire between $6,000,000 and $7,000,000 floating debt maturing before July 1. See another item regarding this company under General News.

Chicago, Great Western.—Edwin N. Hurley has been made a director, succeeding W. G. Lerch.

Chicago & Western Indiana.—This company has called for payment on June 1 at 105 and interest $105,000 6 per cent. general mortgage bonds of December 1, 1882-1932, at the office of J. P. Morgan & Company, New York.

Central of Georgia.—The shareholders will vote on June 3 on a proposition to issue $15,000,000 preferred stock for refunding some obligations of the company, particularly the 3 issues of income bonds, most of which have been acquired by the Illinois Central. First Vice-President Col. A. R. Lawton in his statement said in part: "Less than $500,000 of the total $15,000,000 income bonds are outstanding in the hands of the public. The new preferred stock will be offered to the stockholders for subscription in cash at par. When this refunding is accomplished, the capitalization will be in round numbers two-thirds bonds and one-third stock. This will greatly improve the financial condition of the company, and will enable it to sell such refunding bonds as may be issued hereafter for additions, betterments, extensions, etc."

Chicago & West Michigan.—See Pere Marquette.

Cripple Creek Central.—A quarterly dividend of 1 per cent. has been declared on the $2,500,000 common stock for the quarter ended March 31, payable June 1. This is the first dividend that has been declared on the common stock since October, 1907, when 1½ per cent. was paid.

Delaware & Hudson.—W. H. Williams, third vice-president, has been elected a director to succeed John Jacob Astor, deceased.

Denver, Laramie & Northwestern.—The Denver *Republican* of May 9 gives the following item:

"As a result of the numerous conferences last week by committees representing the stockholders of the Denver, Laramie & Northwestern and its allied concerns—the Northwestern Land & Iron Company, the Denver-Laramie Realty Company and the Colorado-Wyoming Realty Company—it is announced that a definite plan has been agreed upon to put the affairs of these companies in good shape and provide for additional funds for the extension of the railway from Greeley, Col., to Severance.

"The reorganization is to be accomplished by levying an assessment of 15 per cent. on the preferred stock of each company, which it is expected will place all the concerns on a sound financial basis. Two-thirds of the proceeds of the assessment will be set aside for the use of the railway, the company to secure the same by its note, bearing interest at 6 per cent., which will fall due in six months. The sum thus raised will approximate $400,000.

"Of this amount $125,000 will be used by the railway company to pay off pressing indebtedness and $100,000 will be devoted to the construction of the extension. The railway in return will deposit with a trustee $450,000 in bonds to insure the stockholders the return of the $225,000 advanced, giving those who are assessed a security of two for one in bonds for two-thirds of their assessment.

"In a statement issued by the reorganization committee, it is shown that the control of the railway goes to the Northwestern Land & Iron Company, whose president, John D. Milliken, has resigned. S. J. Kent, director in the land company and president of the Denver-Laramie Realty Company, has also resigned from both positions and his and Milliken's places will be filled at an early date.

"W. E. Green, general manager of the railway, who in all probability will be named at the annual meeting as president to succeed C. S. Johnson, resigned, has issued a statement in which he declares that upon the completion of the Severance extension of the road, the company's net earnings from July 1 to June 30, 1913, will total $120,000. The interest on outstanding bonds and floating debt will amount to $64,100, leaving a net surplus of $55,000 according to his estimate. He declares that this showing will insure the sale of bonds for future construction and will enable the road to take care of itself without outside aid."

Detroit, Toledo & Ironton.—Benjamin S. Warren, George K. Lowell, and Thomas D. Rhodes have resigned as receivers, and the three bondholders' committees have agreed to unite in recommending the appointment of George P. Johnson, formerly general superintendent of the Norfolk & Western, as sole receiver. As soon as the appointment is made, suit will be filed in the United States district court for the eastern district of Michigan, southern division to foreclose the Detroit Southern, Ohio Southern division, first 4 per cent. mortgage of 1901.

Frankfort & Cincinnati.—Charles E. Hoge, president of the State National Bank of Kentucky, will on July 1 take over this road, which is now operated by the Louisville & Nashville. The purchase of the control by the Louisville & Nashville was held illegal by the Kentucky court of appeals in June, 1911. A number of local capitalists will be associated with Mr. Hoge in the operation of the road.

New York Central & Hudson River.—See item under Traffic News.

New York, New Haven & Hartford.—See item under General News; also an item under Traffic News.

Pennsylvania.—It is rumored that this company is seeking to acquire the minority stockholdings of the Pittsburgh, Cincinnati, Chicago & St. Louis, and that it will offer its stock for the stock of that company, share for share. The P. C. C. & St. L. pays 5 per cent. on both its common and preferred stocks while the Pennsylvania pays 6 per cent. on its common stock. Regarding this transaction the *Wall Street Journal* says: Such an exchange as share for share of its own stock would cost the Pennsylvania surprisingly little in added immediate disbursement. Pennsylvania owned on January 1 last $22,462,200 of Pittsburgh, Cincinnati, Chicago & St. Louis' $27,475,900 preferred stock and $23,390,300 out of the $37,173,100 common stock, or a total of $45,852,500 owned out of $64,649,000 outstanding. The minority is a little less than 188,000 shares, on which the difference between 5 per cent. and 6 per cent. would be $188,000 a year.

George D. Dixon, vice-president in charge of traffic, has been made a director, succeeding John B. Thayer, deceased.

Pere Marquette.—The receivers have made application to the Michigan court for permission to pay out of earnings the interest on the first mortgage bonds of its subsidiary, the Chicago & West Michigan, due June 1. This interest is $143,950.

Quebec Oriental.—The special meeting of the holders of the first mortgage 5 per cent. Matapedia section bonds held in London April 16 to authorize the issue of $250,000 prior lien bonds or other securities for repairs and renewals to the Matapedia section, was adjourned to May 14 on account of a quorum not being present.

Rutland.—See item Traffic News.

St. Louis & San Francisco.—William Salomon & Company, New York, will receive the 3-year 5 per cent. notes, dated March 1, 1910 (which have been called for payment at par and interest on June 1, 1912) up to June 1, 1912, less discount for unexpired term at 3 per cent. a year, in exchange for the New Orleans, Texas & Mexico division first mortgage 5 per cent. bonds at 95 and interest.

St. Louis & San Francisco.—See item under General News.

Sugarland.—See item under Railway Construction News.

Virginian.—The $25,000,000 first mortgage 5 per cent. bonds, recently issued, are being offered at 99 by Kissel, Kinnicutt & Co., and National City Bank of New York, and Lee, Higginson & Co., Boston. The $50,000,000 of these bonds, authorized but not issued, may be issued for the following purposes:

1. For extension of main line; issue of bonds is not to exceed actual cost of construction and is limited to $75,000 per mile.

2. For additional branch line mileage; bonds not to exceed $50,000 per mile.

3. For second main track; not in excess of $50,000 per mile.

4. For additions and improvements of the Virginian Terminal Railway; bonds issued not to exceed actual cost of construction.

5. For additional equipment and all other additions and improvements to properties; bonds issued to be not in excess of 75 per cent. of actual cost.

6. For acquisition of stocks, bonds or other obligations of any other companies whose properties form in effect extensions of the Virginian Railway's system, or which can be operated advantageously in connection therewith:

(a) At least 60 per cent. of stock in each case must be acquired.

(b) Bonds issued not to exceed 75 per cent. of actual cost of acquisitions.

(c) Bonds of this issue must be reserved equal to any prior liens or obligations of such controlled companies.

(d) Aggregate amount of outstanding securities upon such controlled properties, including these bonds and all obligations equal or prior to these bonds, not to exceed $75,000 per mile of main line owned by controlled company.

(e) An amount not exceeding $10,000,000 of these bonds may be issued to acquire stocks of other corporations.

The importance of the two principal railways of Mozambique, Portuguese East Africa, is out of all proportion to their mileage. The main line from Lourenço Marquez to the Transvaal border is only 55 miles long, but it does an enormous traffic, both freight and passenger for this port is not only the gateway to the Transvaal but is also the source from which the mines draw annually 60,000 natives. It should be noted that an equal number of natives return each year and that they pay full fare. Branching off from this main road is the Swaziland line, 35 miles long. It connects Lourenço Marquez with Mailana and is being extended to the Swaziland border. Its completion will effect a saving not only in cartage costs but also in railway mileage. The Swaziland railway was started with the idea of opening a shorter route from Lourenço Marquez to Johannesburg, and the Portuguese portion was finished years ago, but a hitch occurred on the British section. As a result, Johannesburg, with its annual importation of approximately $30,000,000 worth of goods via Lourenço Marquez, is nine hours farther by rail from that port than it need be. The yearly waste is tremendous, but it is offset in a measure by the advantage that accrues to another section of the South African Union, which sees in the completion of the Swaziland railway the decline of Durban's career as a port of entry for the Rand. Durban has for years been the rival of Lourenço Marquez, and has tried to do artificially for its harbor what nature has done for the latter; eventually the Rand must cease paying this extra freight on its machinery and supplies, and then the Swaziland railway will be an economic factory big enough to change the channel of trade.

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GENERAL NEWS SECTION 1168

THE report of the proceedings of the Master Boiler Makers' convention shows a most healthy condition of that vigorous young association. The papers and the tone of the discussions show that the members are fully alive to the opportunities that are afforded by gathering together in convention. Aside from this, the association is winning a place for itself in the esteem of the controlling railway officers. This is shown by the great increase of membership at the last meeting which amounted to nearly twenty-five per cent. of the former membership; there are now almost three hundred members. There is very little dead timber; nearly two hundred and twenty members were present at Pittsburgh, and this number was increased to over five hundred by the ladies and supplymen present. The railways are beginning to send their men to the conventions, and in one instance a superintendent of motive power paid the dues of four of his men from his own pocket and sent them to attend, for the good of the department. As in all associations of this kind the discussions are experience meetings for the most part, and it is interesting to see how the work and conditions of one road check with those of another, and how in the end the reasons for the differences in practice are accounted for. For pure practical suggestions for the boiler maker there are few places where there is more to be found than in these conventions.

THE desirability of equipping all passenger, freight and electric cars with automatic brake slack adjusters was clearly brought out by W. H. Sauvage at the May meeting of the New York Railroad Club. The general practice at the present time is to so equip passenger cars, but very little has been done on freight equipment along these lines, reliance being placed on manual adjustment on the dead lever to provide the proper piston travel. This is an unsatisfactory arrangement, and it would seem that where the railways have gone to the heavy expense of equipping the freight cars with air brakes, the efficiency of the braking apparatus ought not to be interfered with because of the comparatively small additional expense involved to provide automatic slack adjusters. However a satisfactory automatic slack adjuster for freight cars was not described by either the author of the paper or those who took part in the discussion. The fact was brought out that there might be some difficulty in providing such an adjuster, because the freight cars will not get the same care as do the passenger cars where automatic adjusters are now giving satisfactory service. The statement was made by railway representatives that one reason why the railways did not apply adjusters on their freight equipment was because thus far no automatic adjuster had been placed on the market which could be sold for what was considered a moderate price. A condition that seriously complicates the problem is the difference in the lost motion in the car truck parts when the car is at rest, and when it is in motion. Mr. Sauvage made the assertion that from the economical standpoint of labor and time saved in making up long trains, and properly and uniformly adjusting the air brakes, the investment required to equip cars with automatic slack adjusters would pay for itself very quickly.

THERE are many terms connected with railway operation which are constantly used by railway men in ways that are perfectly clear to them, but not so clear to others. At this time, when the railways are being subjected more and more to public supervision and these somewhat ambiguous terms are brought out in examination before commissions, the railway man frequently has difficulty in explaining to the satisfaction of the board of inquiry the correct meaning of a term as differentiated from the literal meaning. An instance of this is the traffic man's expression of charging "what the traffic will bear." Another misleading term is "signal failure." Present parlance classifies as due to "signal failures" many delays to trains caused by signals at danger. When the block ahead is occupied by a train and the signal is at danger, showing that the signal is performing the function for which it is intended, it is a misnomer to call this a "signal failure." Another instance which has been brought into prominence recently is that of "rail failures" and "broken rails." Because of the increased attention now being given to the rail question it is important that the distinction between "rail failures" and "broken rails" be clearly understood by the public as well as by railway men. Failed rails, as reported by the railways, comprehend all rails removed from the track because of defects, including those broken, those having crushed or split heads, broken base, etc. Many of these defects appear gradually, affording ample opportunity for removal of the rail before complete failure and seldom causing serious accidents. It is only the rails actually broken, and but a small proportion of these, which give rise to accidents. An analysis of the failures reported in a tonnage aggregating 1½ million tons shows that but 25 per cent. of the

rail "failures" reported can be properly classed as rail "breakers." While failed rails of all kinds are a source of serious complaint between the railways and the makers, the public is concerned only with the broken rails because they are the only ones which have any appreciable effect on the safety of operation; and chiefly those broken owing to inherent defects, because they are the most dangerous. It is to be hoped that the railway commissions and other government bodies will appreciate the distinction when studying the reports referring to the rail question.

MARK TWAIN announced some years ago that he had discovered that it was safer to ride in a railway train than to remain at home, because so many more people die in their beds than are killed in railway accidents. The Indiana bureau of statistics has recently issued a comparison of accident records of various kinds for the year 1911 with those for 1902, showing the increases in ten years. It appears that in 1902 249 persons were killed in accidents on steam railways in that state, while in 1911 the number had increased to 364, or 46.2 per cent. For the same years the numbers of suicides in the state were 299 and 409. In other words, the railways do not kill the people of Indiana as fast as they kill themselves. The protective measures of the railways are more effective than the instinct of self-preservation, supposed to be the strongest of human instincts. The Indiana bureau has also compiled figures for other kinds of accidents, not confining its efforts to those associated with some "interest" that can be made a political target. These show that "deaths from natural causes, in which county coroners were called for examinations," increased 50.9 per cent. in the ten years, or from 873 in 1902 to 1,317 in 1911. Homicides increased 32 per cent., or from 103 to 136. Deaths from all accidents *other* than on steam, interurban and street railways increased 51.9 per cent., or from 462 in 1902 to 702 in 1911. The total of all accidental deaths increased 52.7 per cent., or from 755 to 1,153, and the total number of coroners' cases increased 48 per cent., or from 2,030 to 3,015. Thus we find that the percentages of increase of deaths in accidents on interurban roads and street cars, from natural causes and from other accidents were all greater than for the railways. The percentage of increase in suicides was less, but as the figures are larger than for railway fatalities in both the years compared, the suicide habit seems to have got an earlier start. The Indiana railway commission is looking after railway accidents by prescribing block signals, electric headlights, elimination of grade crossings, etc. The figures show that if the state would perform respectably its own special police functions, including that of keeping off railway right-of-way the trespassers who number one-half of the persons killed on railways, the benefits conferred on the public would be much greater and its policy of railway regulation would be much more consistent. And the same remark could be applied to every other state in the Union.

PAVEMENTS FOR TEAM TRACKS AND FREIGHT HOUSE DRIVEWAYS.

PAVEMENTS for team track and freight house drives are subject to very heavy loads from trucks, a large part of which are still horse-drawn. Any satisfactory pavement for such a location must be laid on a foundation solid enough to carry these loads without being damaged and must have a wearing coat smooth enough to cut down the tractive resistance to a minimum and hard enough to resist the grinding action of the wheels of loaded vehicles. In addition to these requirements, the surface must present under all weather conditions a good footing for horses in starting heavy loads.

The most common pavement for such locations is brick. Granite or other stone blocks are frequently used, and macadam is sometimes preferred. For locations where the cost must be kept down and the traffic is comparatively light, gravel cinders or any good filling material may be dumped and allowed to compact under traffic. Brick pavement on a concrete base costs about $2 a square yard under average conditions, and on account of the long experience that engineers have had in laying pavements of this type and the ease with which brick can be obtained in most localities its use is economical in many cases. The numerous joints allow a good foothold, and especially when the courses are laid perpendicular to the direction of the heaviest pull. When laid with solid foundation the life of bricks may be very high. In one instance, where a team yard was laid in a cut of solid stone the pavement has been in service 20 years and is still in good condition. On the other hand, many brick pavements laid on inferior foundations have to be replaced within five years.

Stone blocks are usually more expensive than brick, although in some localities they can be secured at a price that makes them very attractive for such paving. They are laid in the same way as brick and have the same general characteristics, except that as the blocks are larger there are fewer joints, making a surface which furnishes a poorer foothold for horses. Stones are more readily chipped along the edges forming rounded surfaces which make the pavement uneven and slippery. The lift of stone is generally greater than that of brick, and good granite blocks properly laid will in many cases prove economical, even at a first cost greater than that of brick.

Macadam is frequently used under medium weight traffic with good results. Its cost averages between $1.00 and $1.50 and some roads find that it gives a life of seven or eight years. It is likely, however, to wear into ruts and holes under a very heavy traffic or where horses stand continually. The use of an old macadam pavement evened up with concrete as a base for a new brick or stone pavement is a possibility that can sometimes be considered, especially when the pavement is laid in a new yard. In such a location the sub-soil is usually soft and a brick or stone pavement would not be likely to develop its full life because the foundation would not properly support it. In such a location a macadam pavement could be laid which would probably serve the purpose for a few years and then save a part of the cost of a concrete base usually required in the construction of a brick or stone pavement.

The increasing use of creosoted wood blocks for street paving in many cities has led to the consideration of this type by some railway engineers. Although it is not known that any wood blocks have been laid in team tracks they have been used for interior drives in some of the most modern freight houses and seem to have possibilities of wider application for such locations. The principal objection found by one railway company to such pavement in a freight house recently built was the tendency of the blocks to "bleed" in warm weather, making a slippery surface and causing some damage to packages of freight. This condition can be practically eliminated, however, by the use of a lighter oil for treating which will penetrate the blocks more uniformly. The heavier oils have been considerably used for paving blocks on the ground that they would more perfectly waterproof the wood and prevent expansion and consequent heaving of the pavement. Tests seem to show, however, that the results are fully as good when the blocks are thoroughly seasoned and properly treated with a thin oil. Such pavement can be laid in the same way as brick, using preferably a concrete base and either a sand or grout cushion layer. The cracks and surface of the blocks are usually brushed with sand, asphalt mastic or grout. A wood block pavement can usually be laid for less than $3 a square yard. Pine blocks are most frequently used and are considered the best. A government report on tests made at Minneapolis grades other woods in the following order: Birch, tamarack, hemlock, larch and fir. The disadvantage of wood blocks for exterior pavements subject to heavy traffic is that in the winter the surface is likely to become very slippery, making it difficult or even dangerous for heavy traffic teams to use it.

The use of concrete pavements has not been seriously considered for railway purposes as far as is known. Such a pavement is coming into rapidly increasing favor for city streets, however, and when properly placed seems to have some good points in its favor. It can usually be laid for less cost than brick,

but little is known as yet of the life to be expected from it. It has been most frequently used for residence streets under comparatively light traffic, but in a few instances where it has been laid on warehouse drives and streets carrying a heavy trucking traffic similar to that in team yards, reports so far are favorable. The surface furnishes a good footing even when no corrugations are provided in the wearing coat. There are no cracks at which chipping can start, and if properly laid the advocates of concrete claim that the wear on the surface will be more equal than on any pavement made up of blocks.

THE NEWSPAPERS AND THE RAILWAYS.

WE give on another page a letter from N. T. Cobb, manager of the *Freeport* (Ill.) *Journal,* which will be read with interest by both newspaper men and railway men who appreciate the desirability of good relations between the roads and the press. Mr. Cobb's letter implies that their relations are bad and growing worse. This is not the case. It was a few years ago; but many railway men have learned better how to deal tactfully and fairly with the press and public, and many newspaper men have become better informed regarding, and more fair in their comments on, railway matters. But newspaper men have much to learn about the railway business and railway men have much to learn about the newspaper business before they will always give each other a fair deal.

Mr. Cobb's complaints may, perhaps, be summed up as being that the railway press agent tries to get matter which is really advertising printed in the newspapers as news, while when the roads have news, such as that relating to accidents, which the papers really want, the papers are sometimes unable to get it. These complaints are to a considerable extent justified—although railway men may think it significant that the news specially mentioned as the kind newspapers want is that about accidents. Many railway men have become aware that when anything happens on a road that is of public interest or concern, the best policy is frankly to tell the facts, whether they reflect credit on the railway or not. A policy of suppression, either out of regard for the feelings of the railway's claim department, or for any other cause, is not right. Nor is it expedient; for the newspapers are sure, when they hear about an accident, for example, to publish something, and if the railway man does not tell the truth they will sooner or later find it out and get revenge on him and on his road, and meanwhile will almost certainly publish an exaggerated and harmful "story." Unfortunately many railway managers have not learned both the rightfulness and the expediency of dealing thus frankly with the press and the public.

It is also true that many railways leave the handling of news regarding their affairs to their advertising departments; and that advertising agents, and those employed specifically as publicity agents, sometimes send out as news what really is not news, but advertising. Frequently this is the fault of their superior officers, who, while perhaps knowing little or nothing about the newspaper business, are unwilling to be guided by the knowledge and advice of those who do know something about it.

However, there is another side to this matter. The railways' total expenditures for advertising in the year ending June 30, 1910, were $8,347,914. This does not indicate any want of disposition to buy and pay for advertising to such extent as propriety and business conditions justify. While the roads sometimes try to get free publicity for what may be advertising, the dividing line between advertising and news is not clearly defined. One newspaper will gladly publish what another in the same city or town will dump into the inhospitable waste-basket. In every large newspaper office there is "killed" about as much of what those who send it in consider news as there is published, including matter wired by the Associated Press and the papers' own correspondents. When newspaper men themselves differ so much they should not be too hard on others who cannot always guess what they will consider news. In many newspaper offices a story which cannot be "featured"—that is, given some whimsical, mysterious, amusing or sensational turn—is pretty likely to be "killed," no matter how important. Is it any wonder that railway men are often puzzled as to why newspapers print one piece of information under large headlines, and scorn to give a line to another ten times as important? Newspaper men often criticise or express bewilderment at things railway men do. They do not do so any oftener than railway men express themselves similarly regarding what newspaper men do.

Then, there are some papers that can find plenty of news in attacks on railways by representatives of labor organizations, or shippers' organizations, or politicians, but can't find anything worth printing in what railway men have to say on the other side. Naturally, railway men can't understand why anti-railway views and information often are news, while pro-railway views and information on the same subjects are not news. Most newspapers are willing to print both sides of every question; but some habitually print the stories that are unfavorable to the roads on the first page and the stories that are favorable to them on an inside page next to classified advertising. To gain more prominence for their statements or arguments railway men sometimes have bought advertising space; and there are plenty of interested publishers and advertising agencies that constantly tell them they ought to do more of this. But a publication that will give free publicity to those that are agitating against the railways, and then insist on the railways paying for the presentation of their side of the case, is ceasing to be a newspaper and becoming a device for levying blackmail.

Fortunately, most newspapers don't belong to this class, and for the railways to buy advertising space in those that do, except, possibly, under very special conditions, would be unwise and immoral. For them to buy space in a newspaper to get fair treatment in its editorial and news columns—as some advertising agencies, which hope to get commissions on the sale of the space, persistently suggest—would be on a par with buying votes in a legislature to get fair treatment from it. A press that has to be bought, like a legislature that has to be bought, will soon become a very costly purchase, and will not be worth buying.

What the relations between the newspapers and the railways ought to be is easy to state. The roads ought to pay for the publication of everything for which they want publicity that is really advertising, although, as has been said, just what is advertising is sometimes hard to say. They ought to be frank in dealing with the press and give to it all the information to which the public has any right, and, perhaps, a good deal to which the public has no right. The newspapers, for their part, can very properly refuse to print as news what is really advertising. But they cannot in fairness, either to the railways, their readers or the general public, give for nothing publicity to attacks on railways, many of them most misleading and unfair, and then require the railways to pay for a real opportunity to defend themselves. The railway is a quasi-public institution. As such it is properly subject, in the interest of the public, to criticism and regulation. Likewise in the interest of the public, it is entitled to be defended, not only before the same established tribunals, but also through the same channels of publicity in which it is attacked. Otherwise public opinion will be misled, and these quasi-public concerns will be injured to the public's detriment. The press properly holds the railways, as purveyors of transportation to the public, up to a high standard of duty to the public. Can the press, as a purveyor of information to the public, consistently refuse to hold itself up to an equally high standard? Or can there be those who think the furnishing of transportation a function of so much more importance than the furnishing of the information on which the public may base its most vital decisions regarding public questions that the newspapers can justify themselves in performing their function on a lower plane than that on which they demand that the railways shall perform theirs? The railway man may well say to the newspaper man:

> "Do not, as some ungracious pastors do,
> Show me the steep and thorny way to Heaven;
> While, like a puffed and reckless libertine,
> Himself the primrose path of dalliance treads,
> And recks not his own rede!"

LOCOMOTIVE BOILER EXPLOSIONS.

THE explosion of the boiler of the passenger locomotive at San Antonio, Tex., on March 18, described in the *Railway Age Gazette* of April 5, was the most disastrous that has occurred in recent years. The complete destruction of the firebox and boiler, the fracture and distortion of heavy parts of machinery, the large loss of life and the numerous personal injuries render it almost unprecedented.

The report of the federal chief inspector of locomotive boilers has been issued, and his conclusion is that the explosion was due to excessive steam pressure caused by an employee tightening the adjuster screw of the safety valve, which resulted in an accumulation of steam pressure beyond the endurance of the boiler. The steam gage did not correctly indicate the pressure, either on account of its own defects or because of an obstruction in the siphon pipe between the gage and the boiler. To obviate a recurrence of similar accidents, the chief inspector and his assistants have taken action to make necessary the use of two steam gages when setting safety valves, one of which must be so connected that it is in full view of the man who is setting the valve. It is also required that the siphon pipe and its connections to the boiler be cleaned and found open each time the gage is tested.

The report of locomotive boiler explosions in the United States for the five years from June, 1904, to June, 1909, shows that in that time 265 persons were killed and 3,656 were injured; but in no single accident was there any large number of fatalities, in most cases there being only two or three, and very seldom four. During recent years the average number killed per annum by locomotive boiler explosions has been fifty. The average number of accidents in which the boiler shell has been ruptured has been only 4.2 per year, and the number of explosions of fireboxes has averaged 51 per year. The great majority of firebox explosions are due to low water, and there is usually little destruction besides that of the crown sheet, and but a small loss of life. The San Antonio disaster is, therefore, historic in importance on account of the great loss of life, the complete destruction of the engine and boiler and the heavy damage to the adjacent buildings.

Such destruction is an exhibition of the sudden action of terrific forces, and many are not disposed to think that steam at a pressure not far above the normal working pressure of 200 lbs. to the square inch is sufficient to create such havoc. The use of dynamite and other similar explosives has become so frequent in connection with labor controversies that some prefer to attribute this explosion to such a cause, but, while the fracture of the driving axle between the frame and the forcing of both rear driving wheels from the axle exhibit results somewhat like those due to dynamite, there was no violent disturbance of the track below the rail and nothing to indicate a fixed point where any explosive may have been placed. A discharge of detonating compounds would have shattered the plates receiving the full force of the discharge into small fragments. This feature of the accident has been carefully investigated by a representative of the Bureau of Explosives of the American Railway Association, and it is understood that he has concluded that the main force of the explosion was due to steam and superheated water.

The destruction of boilers by excessive steam pressure in explosions, though rapid, is not instantaneous, and the somewhat gradual development of the force stored up in highly heated water exerts a pressure behind the separate pieces, which is better calculated to hurl them to a great distance, than is the force of an explosion acting instantaneously and suddenly dissipated. That a large volume of water at high pressure, and gradually accumulating working steam pressure above the normal working pressure, is sufficient to produce the violent results exhibited in this disaster, has been proved theoretically and practically. It has been demonstrated by competent authority that the destructive energy stored in water in a boiler under steam pressure may be compared with that of gunpowder, and experiments have shown that gradually accumulating steam pressure exceeding the working strength of the boiler can produce violent explosions. There are on record a number of examples where nothing but steam and water under high pressure could have produced the complete destruction of locomotive boilers. A recent one was seen in the explosion of the locomotive boiler of engine No. 1111 on the Frisco Lines, November 9, 1911. This was an oil-burning locomotive hauling a fast passenger train, and it exploded while in motion soon after leaving Fort Scott, Kan. The running gear and machinery were thrown down an embankment and the boiler was projected some distance in another direction. Both engineer and fireman were killed.

A violent explosion can only come by the general disruption of a boiler and the liberation at once of large masses of steam and water. The bursting of a boiler is a local rupture due to the yielding of its weakest part to a pressure which, while not excessive, is too great for the weakened spot. The great majority of so-called locomotive boiler explosions due to low water belong to this class, and the destruction is usually confined to the firebox crown sheet, as the escape of water and steam through the crown stay holes gradually reduces the pressure. A sudden release of pressure when the shell sheets give way is attended by the more violent action which can be more properly termed an explosion. Very little of the destructive effect of an explosion is due to the steam which is confined in the boiler at the time. As soon as steam escapes and its compressive force on the water is diminished, the water is rapidly converted into steam and the enormous quantity of steam so produced in this exceedingly rapid operation produces the destructive effect of steam boiler explosions.

The energy stored in steam boilers is capable of exact computation, and the figures are sufficient to account for the most violent destruction of all recorded cases of explosion. Perhaps the best treatise on boiler explosions in English is contained in Thurston's Manual on Steam Boilers, and in that will be found a full explanation of the phenomenon under consideration, with calculations showing the energy developed, the height projected and the velocity attained by the sudden release of steam and water under pressure in boilers of various weights and cubic capacities. One example is given of a small locomotive boiler weighing 25,000 lbs. containing 7,000 lbs. of water with steam at 125 lbs. and it is estimated that the stored energy was sufficient to project the boiler to a height of 2,850 ft. at a velocity of 400 ft. per second.

NEW BOOKS.

The Earning Power of Railroads, 1912. By Floyd W. Mundy. Published by James H. Oliphant & Co., 20 Broad street, New York. 7½ in. x 5 in. 52 pages.

There are few changes in the 1912 edition of this standard little book of reference. The book is a simple compendium of figures and facts in regard to the earning power of railways. It is divided into two parts, the first part being a set of tables for each of the railways in the United States of more than a few miles long, showing mileage, earnings, capitalization, and division of operating expenses, with certain few traffic statistics. The second part of the book is an alphabetically arranged set of notes on each one of the railways for which tables are shown. These notes show the dividend record of the company, a brief history of the recent financing, and of changes in corporate relations. The work does not lay claim to any analysis of the figures that it gives, and gives comparatively few figures, but it gives them on a uniform basis and in a very handy form to refer to. The book being small, and the roads being alphabetically arranged, it is easy to use and, therefore, meets two very important requirements of a reference book which is often consulted.

Letters to the Editor.

A NEWSPAPER MAN ON NEWSPAPERS AND THE RAILWAYS.

Freeport, Ill., May 14, 1912.

To the Editor of the Railway Age Gazette:

Whether the evolution (or is it de-volution?) of a railway man into a newspaper man can be looked upon as a reformation, is a debatable question; but experience as both on the part of the writer enables him to form opinions which may, or may not, be of value.

From time immemorial, the newspapers have been the best friends of the railway managers, but today, possibly through the acquiescent characteristics of the news man in the past, together with the continual efforts of the railway "press agent" to "put things over" on the newspapers, there is fast crystallizing a change of sentiment on the part of publishers which does not portend good to this great engine of civilization—for the railway and the newspaper are unquestionably the two most potent factors in the world's development; and a spirit of frankness on the part of the railway toward the newspaper would do much to curb this growing feeling of lack of sincerity on the part of the railway, as evidenced by acts of subordinates.

To make the point plain, in my own experience there have been times when information regarding wrecks has been asked of division officers, and either the reports have been denied, or accounts given for publication which minimized the accident. It has been my custom to print the statement of the railway office as a "rider" or "add" to the story brought in by my own reporters, which is often at variance with the story as furnished by the road, and let the public judge for itself. There is no disposition on the part of news gatherers to give the roads anything but a square deal; but it is asking too much of human nature to expect them to give an unbiased account when they are deprived of every means of verifying the reports at the headquarters of the railway company, or when garbled accounts are given.

Many of the larger railways employ press agents to write "inspired" news, which is a most seductive form of advertising, and send it broadcast to the country newspapers with the explanation that "this story is furnished you gratis, and is subject to release on blank date." In all self-respecting newspaper offices, these communications find their way to the junk man, via the waste basket. The American Newspaper Publishers' Association issues weekly a bulletin of such free space grafters, and the wise publisher does not fall for any of their "stuff."

As to advertising. In many of the states, while railways are continually requesting free space for their "inspired" items, and for their timetables, there is absolutely no courtesy extended the papers in return. During labor troubles the small official who has often "crumbed" the reporter, will "hot-foot" it to the paper with columns of his side of the question, and cannot understand why the paper does not sidetrack its live news to give the railway statement the right of way—and, although the subject matter is simply an advertisement, no *quid pro quo* is offered.

The whole question of the relations of the railways to the public is one which intimately concerns newspapers; and the sooner that the views of railway subordinate officers are broadened sufficiently to enable them to see things on the side of the track and their vision is not confined to the two rails which terminate in the perspective only a few hundred yards ahead the better it will be for the railways and the communities they serve.

N. T. COBB,
Manager, *Freeport* (Ill.) *Journal*.

DISCOUNTING MATERIAL BILLS.

Chicago, May 10, 1912.

To the Editor of the Railway Age Gazette:

In these days when railway companies, their officers and employees are being urged from all sides to make the most efficient use of their resources, does it not seem strange that roads do not take more advantage of one very effective method of reducing operating costs, namely, that of discounting their material bills?

Take for instance a road earning $500,000 a month; here is a company with some $40,000 flowing into its treasury each day. This money is one of the tools with which it accomplishes its work. Suppose that this road has material bills approximating $100,000 a month, of which say, half, or $50,000, is subject to a discount of 2 per cent. for cash within ten days from date of invoice or bill of lading. Pay rolls, of course, take first place, when the use to which the daily cash income is to be put is being considered, but should not material bills come second? And would not the directors of the above railway insist that a part of the daily cash inflow be used to discount such bills as carry a discount privilege, when it is called to their attention that by so doing there is a saving of $1,000 per month; probably much more than the entire expense of their purchasing department?

A railway is not like a commercial company, whose promptness in meeting bills depends on its success in making collections. The railway business is on a cash basis; so why should not its payment for material be likewise, particularly when there is so large a gain to be effected?

Material bills have to be met within from 60 to 90 days. Not many concerns can afford to carry the company for a longer period, and those that do probably add enough to the price (knowing the reputation of a given road) to cover interest.

The railway in question by not discounting its $50,000 bills, pays $1,000, or at the rate of 8.16 per cent. a year, for the use of $49,000 for 90 days. In other words, it indirectly borrows $49,000 and pays interest at the rate of over 8 per cent. during such a period as it can successfully stand off its creditors. Of course, the longer it can defer payment the lower the rate of interest becomes; but, as before suggested, creditors who do not insist upon payment after 90 days are probably well protected in the price originally charged for the material, and this is a day when any business house which has as good credit as the average railway can get what money it needs for its business from its bank at 6 per cent.

Then there is the minor consideration of the added labor in several departments caused by the ceaseless tracing and checking of overdue statements, which has to be done on a road which does not pay promptly. Were the company to discount its bills, there would result a more cordial relation between the railway and the supply houses, which should bear fruit in many ways.

PURCHASING AGENT.

The Fukien Railway, a Chinese company engaged in building a road from Amoy, China, to Chang Chow, 30 miles, has completed about 18 miles of its road and exhausted its funds of $1,000,000. To complete the line will require $300,000 for a bridge and $150,000 for the remainder of the road. The 18 miles now completed are being operated at a loss of $1,500 a month; 10,000 passengers a month are carried, but the hauls are too short to net the company a profit. Last year a promise of $150,000 was secured from the Chinese in Java, to go toward completing the road to Chang Chow City, after which it is estimated the road will be on a paying basis. The company is to be reorganized and it is said that Dr. Lim Boon King has been appointed to effect reorganization and will be empowered to raise the necessary capital to complete the construction of the road.

BASCULE BRIDGES OVER BUFFALO SHIP CANAL.

Interesting Work Required in the Elimination of Grade Crossings Involving a Railway, a Highway and a Waterway.

BY EMILE LOW, M. AM. SOC. C. E.

An important piece of grade crossing elimination is at present in progress at "Tifft Farm," Buffalo, N. Y., the crossing of the Hamburg turnpike and the Buffalo Creek Railroad, near the junction of the Beach and Island branches. This work is being handled by the Buffalo Creek Railroad Co., a portion of it being paid for in whole by the railway company, and a portion jointly by the railway, the city of Buffalo and the Buffalo & Lake Erie Traction Company.

EXISTING RAILWAY AND HIGHWAY CROSSINGS.

Although the ship canal referred to in this article is a continuous waterway, it may be stated, for the purpose of accuracy, that the western end is owned by the city of Buffalo and the eastern end by the Buffalo Creek Railroad Co. To avoid useless repetitions the term "City Ship Canal" is used indiscriminately. The Buffalo Creek Railroad is a belt terminal line leased by the Erie and the Lehigh Valley. Its Beach branch, in order to reach the varied industries such as coal trestles, iron ore hoists and warehouses located along the south side of the City Ship Canal, now crosses the Hamburg turnpike at grade, near its junction with the Island branch, and crosses the adjacent canal at an angle of 45 deg. on a swing bridge which was built in 1883 by Kellogg & Maurice, of Athens, Pa.

The Hamburg turnpike also crosses the City Ship Canal on a swing bridge about 200 ft. south of the railway bridge. The highway crossing is at right angles. The channel passages for boats at both bridges are about 56 ft. wide for the main and 50 ft. for the side channels.

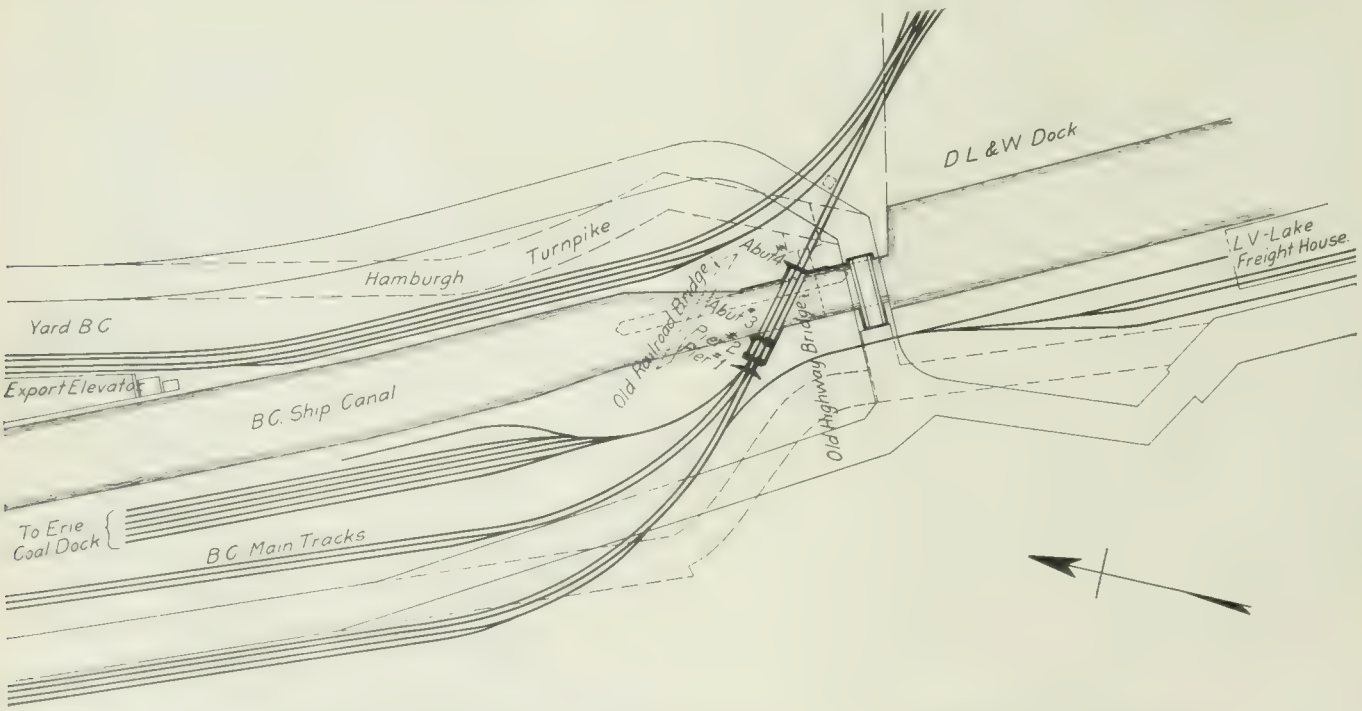
The Island branch of the railway traverses the long peninsula, lying between the Buffalo river and the City Ship Canal, both paralleling the water front of Lake Erie. This peninsula extends from Tiffit Farm to Main street, a distance of 1½ miles, and on it are located most of Buffalo's grain elevators, flour and linseed oil and other mills as well as numerous warehouses.

An interlocking tower is located at the junction of the two branches containing an electric plant which governs train movements from the main tracks into the different yards and connections at this point.

DESCRIPTION OF WORK.

The recent grading and paving of Hamburg turnpike, a highway skirting the water front of Lake Erie and connecting the city of Buffalo with the town of Lackawanna, resulted in producing a large traffic, electric street car and vehicular, including automobiles, which made the separation of grade at these crossings imperative.

In order to accomplish this separation both the present railway and highway swing bridges were abandoned, and new bascule lift bridges in a slightly different position were built. The new railway bridge is several feet lower than the old one and the new highway bridge is enough higher than the old to allow the turnpike to cross the railway tracks overhead. A corresponding change in the location of the highway and the bridge approaches had to be made. All of these changes are shown in the accompanying plan.



Location of Buffalo Creek Railway and Hamburgh Turnpike Movable Bridges Over Ship Canal.

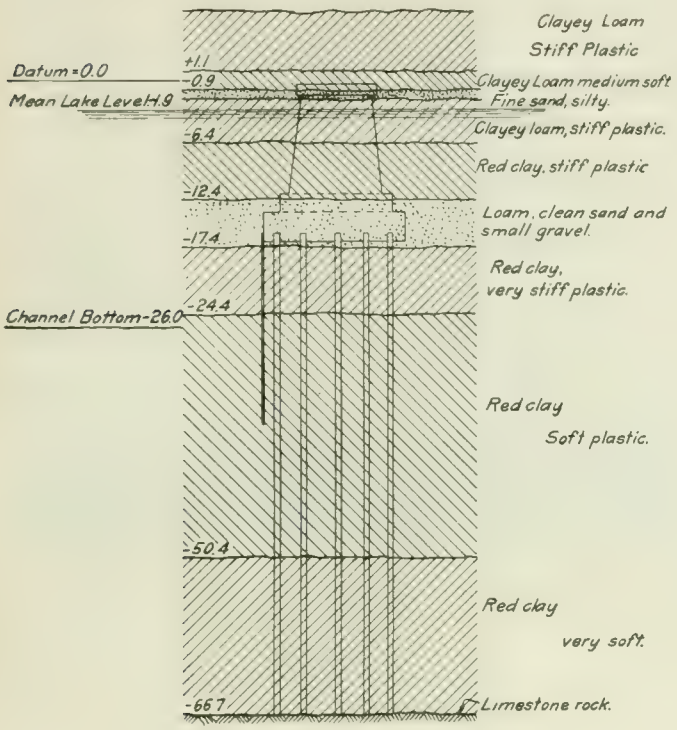
The traffic on the old bridges and a clear channel for the frequent movement of the lake steamers and harbor tugs through the two bridge draws had to be maintained without interruption during construction, a condition which greatly complicated the work. As construction advanced the old highway bridge had to be moved to a new temporary location, to be used while the new highway bridge was being built.

BRIDGE FOUNDATIONS.

The elevation of limestone bedrock at the bridge crossings is about 65 ft. below the mean level of Lake Erie, the overlying material being mainly a reddish colored clay, with occasional seams of sand, gravel and quicksand. The depth of the navigable

channel is 23 ft., the same as that provided in Buffalo harbor by the United States government. In designing foundations for the bridge superstructures, it was decided to use piles driven to rock with the tops 15 ft. below mean lake level, the concrete masonry carrying the superstructure to rest directly on the tops of the piles. The maximum load for any one pile is about 20 tons.

Cofferdams were made of 12¾ in. x ⅜ in. x 30 ft. Lackawanna



Strata Overlying Rock at Bridge Site.

steel sheet piling, the piles weighing 37.187 lbs. per lineal ft., or 35 lbs. per square foot of wall. The first cofferdam was built for pier No. 2. It was 20 ft. wide and 50 ft. long. The elevation of the original surface of the ground was about 16 ft. above water level and was graded down to about 6 ft. above water before the sheet piling was driven.

The photograph of the completed cofferdam reproduced herewith shows how well this sheet piling can be held in a vertical position when driven, and the almost perfect alinement of the walls. The piling was allowed to project about 5 ft. above water level, the remaining 25 ft. being driven into water and the clay bottom.

Upon the completion of the cofferdam, the water was pumped out and the enclosed material removed. Some of the material was handled by orange peel buckets raised and lowered by a derrick and some was loosened with picks and loaded into dump buckets which were handled by the same derrick. As the excavation proceeded, timber struts were placed inside the cofferdam walls in both directions, impinging upon waling strips to distribute the pressure. Three lines of struts about 5 ft. apart vertically were thus placed.

After the excavation reached the required depth, 14 ft. below mean lake level, the bearing piles were driven by a pile driver carried on a platform of 12 in. x 12 in. timbers laid directly on the steel walls. The first pile driven struck rock at a depth of 50 ft., and as the rock surface was found to be almost absolutely level, the remaining piles were all cut to this length.

Five rows of piles were driven, 3 ft. apart each way, with two additional rows under the pedestals. The total distributed load on the 109 piles is 1,482 tons or nearly 14 tons per mile. On the assumption that this load is carried directly by 70 piles, the load would be 20 tons per mile.

The wooden forms for the concrete foundation course were next placed. This course is 5 ft. high with one offset, the piles extending one foot into the concrete. All material between the piles had previously been removed to this depth below the heads. The concrete was made of one part cement and five parts of a natural mixture of sand and gravel. It was mixed in a Smith mixer, and handled from the mixer to the forms in bottom drop buckets.

Old rails were placed 18 in. above the bottom of this foundation for reinforcement, spaced 24 in. apart crosswise and 36 in. apart lengthwise. After the concrete in the foundation course had set the forms were removed and short shores were set between the concrete and the steel walls. The lower set of braces was then removed and forms set up for the course extending up to the next higher set of bracing. After this course was placed and had set, the forms were removed, short struts were put in and the bracing removed as before. This procedure was repeated until the concrete reached the finished top of the pier.

The concrete forms were kept independent of the steel sheet piling, tie rods being used to keep them from spreading. This prevented the concrete before setting from being disturbed by any swaying movement of the steel sheet piling which had but little transverse stiffness.

The ties between the pedestals and the pedestal copings are reinforced by ¾ in. corrugated bars, spaced 12 in. apart each way. Anchor bolts and bearing plates were set before the concrete was placed.

Upon the completion of Pier 2 the steel sheet piling was withdrawn without difficulty, and every piece was found in perfectly good order for redriving in the cofferdam for Pier 3, which was the next one built. This cofferdam was very similar to the first. The bottom of the concrete here is 1 ft. lower or 15 ft. below mean lake level.

As this pier is located in the west channel little excavation of material was required. It was only necessary to pump out the water, brace the steel walls and drive the foundation piles, of which there are 148. The total distributed load is 2,044 tons or nearly 14 tons per pile, the same as in Pier 2. Assuming that 100 piles carry the load, the load per pile would be 20 tons.

In addition to the bearing piles, a single row of 6 in. wooden



Completed Cofferdam for Pier 2.

sheet piling, 20 ft. long, was driven along the channel faces of this pier, to which a waling piece was fastened near the top. This row was anchored to the interior piles by 1¼-in. rods, 9 to 10 ft. long. The concrete in this pier was placed in the same manner as in Pier 2. Upon completion of the pier the steel sheet piling was again pulled and used in the cofferdam of the east abutment.

Part of this abutment is located under the northern end of

the old highway swing bridge. As no interruption to the traffic was permissible, some of the steel sheet piling had to be driven during the night, between the hours of 12.30 and 5.00 o'clock a. m., the draw span being kept open for this purpose. There was a little leakage in this cofferdam, but the leaks were quickly stopped, by dumping small cinders in the water along the outside face, which were forced into the interlock by the hydraulic pressure. Some of the foundation piles were also driven during the night, and all of them were driven to their ultimate depth about 15 ft. below water level, by using a follower.

The main abutment is carried on 69 piles and the wing wall on 45. The spacing is 3 ft. x 4 ft. and 4 ft. x 4 ft. The loading is 521 tons and assuming that this is carried by 50 piles the load per pile is 10 tons. It may be stated that the driving of the steel sheet piling and that of the foundation piles progressed at the same time, all of the latter being driven before the final completion of the cofferdam. The wooden sheet piling, 4 in. thick and 20 ft. long, was driven along the channel faces by a short driver especially constructed to go under the old bridge. The purpose of this wooden sheet piling is to retain the material between the upper ends of the foundation piles, the bottom of the concrete foundations being several feet above the bottom of the channel. The driving of the wooden sheet piling, as well as the excavation and the placing of the concrete in this abutment was carried out during the day. The concrete mixture was 1:3:5.

LIFT BRIDGE.

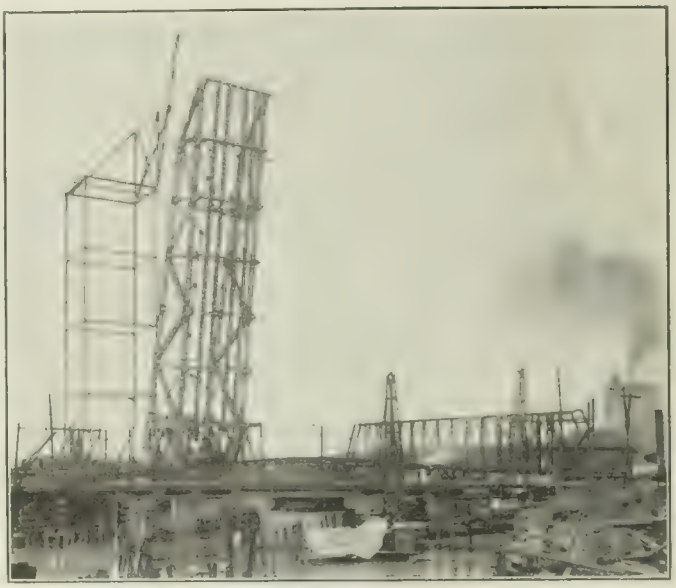
A double track Scherzer rolling lift bridge will carry the railway. This replaces the present single track swing bridge and crosses the canal about 125 ft. south of the old bridge. The crossing angle is 47 deg. 30 min. The main dimensions are 219 ft. 1 in. between back walls, 151 ft. center to center of bearings, 29 ft. 6 in. center to center of trusses, 13 ft. center to center of tracks, 21 ft. head room, and 85 ft. clear channel width.

The American Bridge Co., was the contractor for the fabrication and erection of this bridge. Work was begun immediately after the completion of Piers 2 and 3. It was erected in a nearly perpendicular position, the working plant being a steel skeleton tower located alongside the bridge and carrying the necessary derricks for handling the structural steel.

The superstructure, operating machinery and power equipment of this bridge were designed by the Scherzer Rolling Lift Bridge Company, Chicago, in cooperation with the engineers of the railway company.



Cofferdam for Abutment 4, Showing the Driving of 4-In. Wooden Sheet Piling with Small Hammer. Old Highway Bridge in Background.



Construction of Scherzer Bridge; Buffalo Ship Canal.

(a) Scherzer swing bridge in center distance. Old highway swing bridge and new abutment No. 4 in foreground.

HIGHWAY BRIDGE.

Owing to the interference of the north abutment of the new railway bridge with the old highway bridge, it was necessary to move the latter to a new temporary location for use, pending the construction of the new one. A center pier and side abutments, with necessary approaches were constructed of piles and pile bents, 185 ft. upstream. On the Sunday decided upon for the removal of the bridge, a gale approaching 70 miles per hour was blowing, which interfered somewhat with the moving operations. The entire day and part of the following Monday were consumed in the change, with a delay of five hours to the traffic. The old bridge was moved by blocking up on a dump scow under each arm. It was expected that hydraulic jacks would have to be used, but the unexpected high water due to the gale made their use unnecessary, as the rise in water assisted in floating the bridge off. It was then towed into position on the new supports.

Under the "Hamburg turnpike agreement" the Buffalo Creek Railroad Company builds the new bascule highway bridge over the Ship Canal. The Buffalo Creek pays eight-tenths of the cost, the city of Buffalo and the Buffalo and Lake Erie Traction Co. each paying one-tenth. The city of Buffalo builds the viaducts and ramps adjoining this highway bridge, the Buffalo Creek paying 50 per cent. of the cost, and the city of Buffalo and the Buffalo & Lake Erie Traction Company each 25 per cent.

The new structure is similar in design to the Ohio street bridge over the Buffalo river, although it differs materially in detail from that bridge. The Hamburg Turnpike bridge has pony trusses with a span of 92 ft., spaced 30 ft. center to center. It will be operated by electricity, the counterweights being of concrete. It will carry two electric car tracks, 4 ft. 8½ in. gage, on 13 ft. centers. Two side walks for foot passengers, each 6 ft. 6 in. wide are also provided. The bridge crosses the canal at right angles, and lifts in the same direction as the railway

bridge, the main and rear pier being on the south side and the rest pier on the north side of the canal.

The foundations are of the same character as those of the railway bridge; piles driven to rock, surmounted by concrete masonry, the tops of the piles being imbedded to the depth of one foot. The bottom of the concrete of the rear pier is 8 ft. below mean water level. The rock elevation is 65 ft. below the water, requiring piles 57 ft. long. The two rear piers are T shaped, the dimensions being 20 ft. x 11 ft., with stems 12 ft. long and 13 ft. wide.

The piles are driven on 3 ft. centers each way, with some extra ones under the main towers, 61 piles in all. The uniform distributed load is 282 tons or an average load of 4½ tons per pile. The tops of these rear piers are 11 ft. above water level and have a total height of 19 ft.

The main pier is 64 ft. long and 14 ft. wide. The bottom of the concrete is 22 ft. below mean lake level, the piles being driven on centers about 2½ ft. by 3 ft., with extra ones under the towers. There are 182 piles, carrying a distributed load of 600 tons or about 3 tons per pile. As this load, however, is carried directly by 100 piles, the load is about 6 tons per pile. The length of the piles under the main pier is about 40 ft.

The rest pier is 56 ft. long and 11 ft. wide. The piles are driven on 2½ ft. by 3 ft. centers, there being 5 rows of 19 piles each. The load is 274 tons, about 3 tons per pile, the weight being considered evenly distributed. As this weight is carried by 60 piles, the load is a little less than 5 tons per pile In addition to the bearing piles, a single row of 6 in. wooden sheet piling was driven along the front and end faces, and tied to the other piles by 1½-in. rods about 7 ft. long, passing through a waling strip near the top. The bottom of the concrete is 14 ft. below mean lake level, or 9 ft. above the bottom of the navigable canal.

PLANT EMPLOYED.

The excavation for Abutment 1 and Piers 2 and 3 was made partly by hand and partly by orange peel buckets attached to the boom of a derrick 68 ft. long, located as the work required, sometimes on the adjoining shore and sometimes on the finished structures. The excavated material was generally loaded into dump wagons and distributed along the adjacent right of way. The excavation for Abutment 4 was made by a derrick scow, the material being used for filling behind the abutment.

Two pile drivers were used in the work, one a floating and one a land driver. In driving the sheet piling, many obstructions were met, such as riprap stone, old piles and timbers, making it necessary in many cases to withdraw and redrive the piles. Upon completion of an abutment or pier, the steel sheet piling was pulled in various ways. The pile driver engine with triple fold tackle, hung in the leads was used in many cases; some were pulled with levers and others with a derrick. The pulling was in most cases quite easy, only occasional trouble being caused by binding.

The number of piles driven daily varied considerably, the best day's work being 28 piles in 10 hrs., the regular daily working time. Generally the foundation piles drove very easily, except through the thin strata of sand and gravel occurring about 25 ft. below foundation level.

For Abutment 1 no cofferdam was required, the excavation being carried only 4 ft. below water surface. Short foundation piles from 30 to 35 ft. long were used.

For mixing the concrete a Smith mixer was used, set up in convenient places.

For Abutment 1 and Piers 2 and 3 the concrete ingredients were all wheeled to the mixer and the mixed concrete placed in the forms in drop bottom buckets handled by a derrick. For Abutment 4 the mixer was set up over the cofferdam, the materials were wheeled to it and the mixed concrete placed in the forms by chutes.

For unwatering the cofferdams, two centrifugal pumps were used, the smaller one with an 8 in. suction and 6 in. discharge pipe, and the larger one with a 12 in. suction and 10 in. discharge pipe. Generally the smaller pump sufficed to keep the foundations clear of water.

S. M. Kielland, chief engineer of the Buffalo Creek has charge of all the work for the railway company, Chas. W. Buchholz acting as consulting engineer.

All the work, except the bascule bridge, is being handled under contract by the Henry P. Burgard Co. Charles A. Dennis is the general superintendent and sub-contractor for the pile driving, and J. Carson is the assistant engineer on the work.

E. P. RIPLEY AND R. S. LOVETT ON "WHAT'S THE MATTER WITH TEXAS?"

E. P. Ripley, president of the Santa Fe system, has written a letter to the Texas Welfare Commission, which has been conducting a series of hearings for the purpose of considering whether Texas industries are hampered in their growth and operation by the laws of the state. Mr. Ripley's letter is in response to a request by the commission for his views on the general subject of the relation of Texas to its railways.

Mr. Ripley said that when he became president of the Gulf, Colorado & Santa Fe 16 years ago it was about as good as the average Texas railway of those days. It was originally projected by citizens of Texas, and was mainly built by them under the encouragement of the then Texas laws.

"It may or may not be," he said, "that this railway was overcapitalized at the time I became connected with it. I do not think its capitalization was largely in excess of its cost, but if it was it was the result of financial methods duly approved by the state of Texas, and carried on under its laws and auspices."

He then outlined the great improvements that have been made, notwithstanding which in only four of the sixteen years has the property been able to earn the interest on its debt, and as a net result of 16 years of effort, plus an expenditure of approximately $10,000,000 of new money borrowed from outside the state, the investment is short nearly $2,000,000 of earning its interest.

"The result of this large expenditure has been to create a first-class railway where an exceedingly inferior one existed before. It would be unfair to say that no advantage has been derived from this, because a certain amount of tonnage has been collected on these Texas lines which has paid transportation tribute to other lines of the system. But the fact remains that the most liberal estimate of the earnings of the Texas lines fails to show any substantial return on the amount invested therein, or any substantial return upon a fair valuation of the properties.

"The conclusion is, therefore, unavoidable that the people resident in other states are furnishing the state of Texas with transportation for which it does not pay, and under these circumstances, it would seem quite unnecessary to go further for a reason for the reluctance of investors to trust their money in Texas. Of course, there are also other and collateral reasons for this reluctance to be found, viz.: In the various acts of the legislature which have increased the operating costs, while public sentiment and public prejudice seem also to regard the railways as fair game for predatory laws and all kinds of trespass for which no effective remedy exists. The personal injury and damage payments on our Texas lines are four or five times greater on any basis of comparison than on the average of other lines with which I am connected. This is certainly not due to physical difference in the properties in and out of the state. Other states have adopted some of the injurious laws current in Texas, but I believe that it is and has been true that while some of the other states have, in some respects, been more radical, the latter is still in the front rank; although it is proper that credit should be here given to the policies of your present governor, and the conduct of your last legislature.

"The state tax board of your state entertains apparently an idea of the values of railway property differing from that held by your railway commission, and value our property for taxing

purposes at a sum greatly in excess of what we can earn interest on; this, of itself, would seem to be sufficiently discouraging to investors.

"But the duty of the welfare commission is to consider the best interests of all the industries of the state rather than those of any one special industry, and if the present railway policy is right; if it conduces to the best interests of all the people—then it is manifestly the duty of the state to take over the railway properties and manage them, accepting such losses as may thereby be entailed. I maintain that the interests of the state and its inhabitants would be vastly better served by changes in policy which would result in more railways and better railways. Many of the roads in the state are mere imitations of what a railway should be and if the state is to attain the growth for which we are all working, millions upon millions must be spent in making them equal to the tasks that will be imposed upon them. Texas cannot furnish these millions and would not if it could. What have you to offer to those whose thrift or whose ancestry has endowed them with money to invest? You offer no opportunity for profit and doubtful security for the principal of the investment; the income of the investor is limited by one political body, while another political body legislates him into all manner of expensive restrictions, and much of the earnings are consumed by damage payments far in excess of those inflicted by other states.

"I am not advocating freedom from restraint, or regulation, but only that the regulation be reasonable, business-like, and of a permanent and non-political character. I would have at least one railway man on the commission—not a lawyer or an advocate, but a practical traffic man, appointed and not elected. I would debar any railway commissioner from thereafter holding any political office for at least five years. I would require approval of at least a majority of the commission of any legislation affecting the operating of railways, and I would make illegal the acceptance by lawyers of a percentage of amount recovered in damage suits. I would permit the railways much greater earnings and in return insist upon much higher standards of construction, maintenance and operation. I would permit, and even encourage, the lease or sale of any Texas road to roads outside the state. The present law requiring separate state organizations for small pieces of track is burdensome and serves no useful purpose, or at least no purpose that cannot be otherwise attained."

Robert S. Lovett, chairman of the executive committee of the Harriman Lines, addressed the commission on May 15 at Dallas. He outlined briefly some changes in the railway laws that in his opinion should be made for the welfare of the state, saying that it is impossible to finance a railway in Texas under existing conditions.

"Every railway company should have the right to issue bonds at par to cover existing obligations," he said.

"It's too late now to talk of the validity of existing bonds. Independent railways in Texas cannot succeed. They face failure and receivership with the present laws. Railway rates are like the common law of England. They simply came into existence through the exigencies of the situation. Stocks, bonds and physical value of a railway have nothing to do with the rate schedule of the road. Past mismanagement by individuals at the head of railway companies has been exaggerated by the ambitious politician, who has poisoned the minds of the people and secured the enactment of the present statutes.

"The provision for the forfeiture of railway charters for petty and trivial matters is a menace to the progress of Texas.

"The present personal injury claim provision is a scandal to the state and should be remedied."

The Brazilian government has approved the plans and estimates of a 36-mile extension of the Jaguarao to Basilio railway, as well as those of 34 miles of the San Sebastian to Santa Anna to Livramento railway.

TELEPHONES ON AMERICAN RAILWAYS.

The report of the Interstate Commerce Commission, showing the mileage of railways in the United States on which, on the first of January last, telephones were in use for transmitting train orders, was noticed in the *Railway Age Gazette* of May 10, page 1043, the total length of road thus reported being 58,584 miles, or something more than one-third as much as the mileage on which the Morse telegraph is continued in use for this purpose.

To show the extent to which telephones have been introduced on the larger railways, we have copied from this report the statistics of those roads on which the telephone mileage amounts to 100 miles or more, and these figures are shown in tabular form below; and in connection therewith we have secured from these roads statements showing the extent to which they use telephones over long distances for other purposes, and also the number of portable telephones in use. The statistics from the government report are shown in the columns numbered 1, 2 and 3, and the other information in the last five columns. Attention is specially directed to the foot notes accompanying the table. The headings of the columns in this table are to be read as follows:

1—Miles of railway on which the Morse telegraph is used for the transmission of train orders.
2—Miles of railway on which the telephone is used for the transmission of train orders.
3—Total miles of railway operated by the company.
4—Total miles of telephone circuits in use, on the roads named, in addition to train-despatching wires, but not including block signal wires.*
5—Number of telephones installed at meeting places where there is no operator (including also telephones for use of trainmen, at night, at stations where there is an operator in attendance during the day).
6—Number of portable telephones in use on passenger trains.
7—Number of portable telephones in use on freight trains.
8—Number of portable telephones in use on wrecking trains and work trains.

Railways Using Telephones Extensively.

	1	2	3	4	5	6	7	8
						Trains		
	Telg.	Phone.	Road oper.	Msg. wires.	S.	P.	F.	W.
Atch., Topeka & Santa Fe.	3,880	5,947	9,827	...	...	...	...	...
Atlantic Coast Line[1].....	3,570	837	4,048	736	y	c	o	y
Baltimore & Ohio[1].....	3,281	528	3,441	528	y	o	o	o
Bessemer & Lake Erie....	...	194	200	66	o	o	c	y
Boston & Maine.....	1,994	232	2,238	...	o		o	y
Buffalo & Lake Erie (e)..	...	101	101	...	...	...	...	...
Buffalo, Roch. & P[1].....	...	175	427	o	25	y	y	y
Central Vermont	379	149	528	...	...	...	...	...
Chesapeake & Ohio[1].....	591	998	1,555	177	o	o	o	y
C. & O. of Indiana[1].....	...	262	262	...	o	c	o	y
Chicago & Eastern Ill.....	952	124	1,076	...	...	...	...	...
Chicago & Northwestern[1]..	6,487	1,786	7,897	o	y		o	y
Chicago, Burl. & Quincy..	6,219	2,946	9,022	...	...	...	...	...
Chicago Great Western...	1,180	290	1,470	246	30	11	30	y
Chicago, Mil. & St. Paul..	6,141	1,136	7,277	...	...	...	...	...
C., M. & Puget Sound..	1,948	1,948	1,948	...	...	...	...	...
Chicago, Rock Island & P.	3,945	2,977	6,922	o	28	5	o	12
Chic., R. I. & Gulf....	397	72	469	...	...	...	...	...
Chicago, T. H. & S. E. (e)	196	155	351	...	...	..	...	...
Coal & Coke.....	192	198	198	...	y	'	o	y
Copper Range	...	82	82	...	...	...	...	...
Cumberland Valley	...	207	207	203	y	o	o	y
Delaware, L. & W.....	...	974	985	...	...	...	...	...
Denver, N. W. & Pac.....	214	214	214	...	...	...	...	...
Denver & Rio Grande.....	2,500	52	2,552	o	68	6	6	y
Detroit & Mackinac.....	208	150	358	...	...	...	...	...
Detroit United (e).....	...	135	135	...	...	...	...	...
Duluth & Iron Range.....	...	150	150	...	...	...	...	...
Erie	2,271	217	2,488	...	y	y	o	o
Evansville & T. H.....	56	109	165	...	..	...	...	...
Florida East Coast[1].....	...	522	575	...	38	o	o	y
Ft. Dodge, D. M. & S. (e)	...	159	159	...	...	...	...	...
Fort Wayne & W. V. (e)..	...	139	139	...	...	...	...	...
Georgia	58	245	303	...	...	...	...	...
Great Northern	3,224	3,881	6,905	338	302	42	c	17
Illinois Central	2,531	2,050	4,581	2,000	y	o	o	y
Yazoo & M. V.....	1,371	...	1,371	...	...	...	...	...
Illinois Traction (e).....	...	436	436	...	...	...	...	...
Indiana Union Trac. (e)..	...	313	313	...	...	...	...	...
Lehigh Valley[1]	633	800	1,382	800	150	150	375	75
Los Angeles Pacific (e)...	...	177	177	...	...	...	...	...
Louisville & Nashville....	2,988	1,229	4,217	1,146	y	o	o	y
Macon & Birmingham.....	105	105	105	...	...	...	...	...
Minn., St. Paul & S. S. M.	3,492	212	3,704	...	...	...	...	...
Missouri, Kan. & Texas...	2,105	759	2,886	...	...	...	...	...
Missouri Pacific	3,887	...	3,887	283	y	'	o	y
St. Louis, I. M. & S...	2,849	315	3,203	345	y	.	...	...
New York Central Lines:								
Boston & Albany	10	377	387	200	23	o	o	2
Chicago, Ind. & So.....	...	304	304	...	y	o	o	y
Cleve., C., C. & St. L...	532	1,348	1,880	o	o	o	o	o
Lake Erie & Western...	872	571	872	...	...	...	...	...
Lake Shore & M. S....	337	1,600	1,578	2,000	y	...	...	y
Cleveland Short Line.	...	11	11	...	...	...	...	...
Dunkirk, A. V. & P..	...	90	90	...	...	...	...	...
Lake Erie & Pitts....	...	27	27	...	...	...	...	...
L. E., Alliance & W..	...	88	88	...	...	...	...	...
Little Falls & D.....	10	4	14	...	...	...	...	...

Railways Using Telephones Extensively.

	1	2	3	4	5	6	7	8
			Road	Msg.		Trains		
	Telg.	Phone.	oper.	wire.	S.	P.	F.	W.
Michigan Central	443	816	1,259	188	89	*o*	8	*y*
N. Y. C. & H. River	1,988	912	2,900	582	*y*	...	...	...
Toledo & Ohio Central	118	277	395	...	...	...	...	...
New York, C. & St. Louis	275	248	523	*o*	25	*e*	*e*	*y*
New York, N. H. & Hart.	1,885	121	2,006	633	5	*o*	*o*	*o*
New York, Phila. & N.	...	112	112	...	...	...	...	...
Norfolk & Western	709	982	1,881	783	96	15	...	*y*
Norfolk Southern	519	222	565	...	9	3	3	1
Northern Pacific	3,853	1,817	5,670	...	...	...	...	...
Northwestern Pacific	231	182	413	*o*	...	*y*	*y*	...
Pacific Electric (*e*)	...	803	803	...	...	...	...	...
Pennsylvania	1,635	1,958	3,828	6,313	*y*			80
Cherry Tree & D.	...	28	38	...	...	...	...	...
Cleve., Akron & Cin.	326	...	326	...	...	...	...	...
Grand Rapids & Indiana	580	8	580	...	...	...	...	...
Northern Central	367	49	433	...	...	...	...	...
Pennsylvania Co.	1,211	131	1,342	...	...	...	...	...
Philadelphia, B. & W.	570	120	705	...	...	...	...	...
Pitts., C., C. & St. L.	1,421	2	1,423	...	...	...	...	...
Vandalia	827	...	827	...	...	...	...	...
West Jersey & Seashore	229	84	313	...	...	...	...	...
Miscellaneous, P. R. R.	15	9	18	...	...	...	...	...
Pere Marquette	1,167	562	1,729	...	86	...	...	*y*
Philadelphia & Reading	933	36	983	...	*y*	*y*	*y*	*o*
Pittsburgh, Shawmut & N.	176	138	251	...	...	...	...	...
Queen & Crescent Route:								
Cin., N. O. & T. P.	197	138	335	138	*y*	25		*o*
St. Louis & San Francisco	3,847	746	4,722	750	40	*o*	*o*	*y*
Seaboard Air Line	1,938	1,132	3,070		76		*o*	*y*
Southern	6,916	123	7,039	*o*	*y*	*y*	*o*	*y*
Southern Pacific:								
Arizona Eastern	331	184	371	...	...	...	...	...
Galveston, H. & S. A.	1,247	77	1,336	...	...	...	...	...
Southern Pac.; Pac. Sys.	5,370	713	6,083	578	50	*y*	*y*	*y*
Spokane, P. & Seattle	392	150	542	...	...	...	...	...
Oregon Trunk	...	156	156	...	...	...	...	...
Union Pacific	2,768	606	3,374	3,040	79	26	32	12
Oregon Short Line	1,615	49	1,664	...	6	*y*	*y*	*y*
Oregon-Wash. R. & N.	1,540	180	1,725	...	...	...	...	...
Oregon & Washington	195	113	250	...	...	...	...	...
Tiwaco	...	29	29	...	...	...	...	...
Corvallis & Eastern	119	19	140	...	...	...	...	...
Virginian	...	468	468	...	...	...	...	...
Western Ohio	...	111	111	...	...	...	...	...
Wheeling & L. E.	...	82	508	*o*	11	*o*	*o*	*o*
Canada.								
Canadian Pacific[1]	...	5,000	...	1,084	*o*	*y*	*y*	*y*
Grand Trunk	...	*y*	...	...	24	*o*	*o*	*y*

*The mileage of railway on which telephones are used in manual block signaling, as reported in the government bulletin was, on the first of January, 16,544 miles. To this we can add 824 miles on the Missouri Pacific, which has been thus equipped since January 1.

[1] The mileage shown in column 2 is larger than that shown in the government report, our information having been received in May, four months later than that furnished to the government. The Baltimore & Ohio will soon have an additional length of 235 miles equipped with two circuits, one for despatching and one for messages.

e Electric railway.

o None.

y Items marked *y* indicate that our question was answered affirmatively, but that the number of telephones was not given.

Saving of Time of Trains.—Practically all of the roads replying say that much time is saved by the use of telephones, not only by reducing the time necessary for transmitting orders and messages, but also by having telephones accessible night and day at all meeting places, including "blind sidings." No precise statements are made in this connection, but on the Wheeling & Lake Erie, where telephones were introduced quite recently, a record was kept for 20 days, and during this period the time saved to freight trains was equal to 49 hours for one train and engine crew.

The following occurrences illustrating the effectiveness of telephones in minimizing delay not only of trains disabled, but of other trains which would have been held up, are given by the Lehigh Valley.

The engine of an extra westbound train became short of water, and it was necessary to cut the engine from train and bank the fires. Another extra westbound train was following. Both conductors used their "portables," giving the despatcher prompt notice, and thus enabling him to run a westbound passenger train, due about that time, around the stalled trains, with practically no delay.

The rod on the right side of the engine of an extra westbound train had broken. Conductor promptly notified despatcher by using portable telephone, enabling despatcher to keep traffic moving by using another track while the engine was repaired.

On the engine of a slow eastbound freight train a flue collapsed. "Portable" was used immediately, enabling the despatcher to get the train into a siding and avoid delay to an eastbound passenger train. This would not have been possible had the slow freight been obliged to wait until it reached a telegraph office.

An eastbound mixed freight train was blocked in a siding on account of a car's derailment at that point. The despatcher, being notified, immediately sent an engine and caboose to transfer the passengers, arrange for steam wrecker, etc., all within a few minutes of the time the accident occurred. This accident would otherwise have caused a delay of several hours, as there was no telegraph office within three miles.

A westbound passenger train was derailed. The portable telephone was immediately put in service, and the despatcher arranged for steam wreckers and other assistance, within a few minutes after the accident had occurred.

An extra eastbound engine derailed. At once the train crew was instructed by telephone to pilot an approaching passenger train around the obstruction. This enabled the passenger train to proceed on time.

Work Trains.—The time saved by work trains is particularly valuable, the idleness of a large gang of men being costly. The conditions are, in general, alike on all lines. No statistics are given, except in the case of the Norfolk Southern, which reports that the efficiency of the work trains is increased 50 per cent.

Prevention of Derailments.—The following is a case in which possibly a derailment was prevented as a result of prompt information by telephone:

Members of a section gang on the Lehigh Valley, provided with a portable telephone, noticed a freight train moving eastward with a brake beam hanging down. The despatcher was immediately notified, the train was flagged at the next station, and attention was given to the damaged car.

On the Cumberland Valley telephones are installed at any point where one would be likely to be of service, and there are many at shelters of street crossing watchmen and in the residences of section foremen. Following are instances taken from the records of the transportation department.

Crossing watchman discovered brake rigging down on a car in train 84 passing Carlisle, October 14, and in reporting same averted a possible derailment.

Section foreman discovered brake rigging down on car 1,147 in train 102, June 6, while passing Greencastle.

Telegraph operator discovered brake rigging loose and brake shoes dragging on car in train of extra 1,533 while passing Waynesboro Junction, August 14.

A patrolman discovered a bent axle under car 943 in train 102, May 26, at 84 mile siding.

A crossing flagman at Chambersburg discovered an equalizing bar down, May 27.

Section foreman, Waynesboro Junction, September 7, 1910, reported a bent axle under a car in train 1,550 west.

Other roads report experiences of the same kind, but without giving details.

On a western road (name not given) a runaway freight car was seen by a conductor waiting at a blind siding, and he was able to telephone the despatcher in season to save a passenger train from being struck by the car, the despatcher ordering the train side tracked.

Portable Telephones.—The arrangements of the Lehigh Valley are typical. With each portable telephone there is an 18 ft. sectional "fish pole." These are being installed on all cabooses and baggage cars. Each telephone is fixed in a box under switch lock, and each is accompanied by printed instructions for use, and also blue print showing the location on the cross arms not only of the train despatching circuits, but of the other telephone circuits as well. The telephone case is 14 in. x 15 in. x 5½ in., with a leather handle; it comprises a hand set with transmitter and receiver, a condenser, two cells of No. 6 dry battery, a bell for incoming calls, and a five bar generator. The latter would be used if the train despatching circuit were out of order and it should become necessary to make attachment to another telephone line. When an attachment to the despatcher's

line is made it is unnecessary to use the calling apparatus, as the despatcher is on the line at all times. The despatcher, however, may call the train crew by the use of the "interrupter," should he need the train crew at any time while the connection is attached. Portable telephones and "fish poles" are supplied to bridge and rail laying gangs, track supervisors, work trains, tool trains, train masters and superintendents.

Costs.—$100 a mile for a metallic circuit of copper, strung on poles already in position is a fair average of the cost of telephone lines, figures higher or lower than this representing lines in which other things have to be provided, or in which iron wire (for short lines) or a smaller size of copper was used. Portable telephones for use on cars cost usually from $15 to $25 each. One road reports that some of its portable telephones have cost as little as $12, while others cost as much as $35. Few roads have calling apparatus with the portable phones. The Southern Pacific reports that portable telephones of the railway company's design and manufacture cost $20 each. One road reports its despatching circuit selector apparatus, in the despatcher's office, which is for a line of 40 stations, costs $350. The equipment for each way station costs $60.

Business Cars.—Telephones are supplied to one or more officers' cars on the Chicago, Rock Island & Pacific, the Grand Trunk, the Lehigh Valley, the Missouri Pacific, and the Union Pafiic.

Phantom Circuits.—The "phantom" arrangement, by which two metallic telephone circuits are combined so as to provide a third conducting circuit, is in use on the Louisville & Nashville, the Pennsylvania, and the St. Louis & San Francisco.

Telephones with "Night Keys."—On the Cumberland Valley a number of stations are equipped with telephones fixed in boxes in the wall of the building in such a way that at night when the office is closed the conductor of a train may use the telephone without going inside the building. On this road conductors in charge of work trains are provided with telephones, which are not to be set up in the cars, but are fixed to a post at the side of the road near where the work is being done. Bridge repair gangs are provided with similar facilities.

The "Telegraphone."—The San Pedro, Los Angeles & Salt Lake having no regular telephone circuit, and doing all its despatching by the Morse telegraph, still provides all trains with the means of quick communication with headquarters in emergencies by the use of the "telegraphone." Every passenger train carries in the baggage car and every freight and work train in the caboose a portable telephone with the "fish pole" attachment, and these can be connected with the telegraph line at any point. The main line of this road is about 800 miles long, and stations about 100 miles apart are fitted with apparatus for receiving these telephone messages. An arrangement of this character is also in use on the Delaware & Hudson (250 miles of road) and on the El Paso & Southwestern.

Communication with Outside Telephones.—The telephone train despatching circuits on the Lehigh Valley are thoroughly intercommunicative not only as between despatching circuits but with the entire telephone system over the road. Each despatcher is equipped with special selective apparatus, so that by turning a key he can communicate in either direction with the train despatcher of the connecting division, thus allowing the freest interchange of information between the despatchers of the different divisions, each despatching point being thus kept in close touch with traffic approaching its territory. The official business cars of the company being equipped with telephones, officers when out on the line can get in touch with any superintendent on the road by asking the despatcher for an intercommunicative connection of the character desired.

Each despatcher is provided, under special agreement with the telephone company, with a connection to the private branch exchange of the general telephone system, so that the despatcher can get into touch with the chief despatcher, train master, superintendent, yard master, or any of the general officers, not only at their headquarters during the day but also at their homes at night.

Batteries and Electrical Details; Lehigh Valley.—The earlier selective apparatus was of the local battery bell ringing type, while all of the recent installations are made with selectors using the main line selector battery to ring the bells, thus avoiding the necessity of renewing bell batteries when they become weak. This insures a uniform ring at all times and economy in the matter of battery renewal.

Storage battery has been provided throughout for selector work and for transmitters in despatchers' offices, thus providing a constant voltage and a uniform current to all selectors at all times, and economy in the matter of battery renewals.

For transmitter purposes at way stations three cells of No. 6 dry battery, four and one-half volts, are furnished, the transmitter batteries of the entire line being renewed at one time, approximately every four months, thus providing high efficiency and uniformity in transmission from the way stations.

At all selector way stations a swinging telephone arm, with a positive stop in both directions, is used, which, while leaving the arms of the operator entirely free in the handling of messages, train order blanks, train record books, etc., makes it necessary for him to talk directly into the transmitter at a uniform distance, thus insuring high and uniform transmission from every station. These arms are always thrown to a "cut off" position when not in use.

At each selector way office there is a test panel, permitting the cutting of the line, in either direction, in case of line trouble. As additional lines are erected they will also be cut into the same panel so as to provide for patching wires in case any of the circuits are in trouble.

All telephones, including those in booths at sidings, are equipped with lightning and sneak current protectors so as to reduce to a minimum the interruption from lightning storms and power wire crosses.

Notes.—The following notes are supplementary to the information given in the table.

Atlantic Coast Line.—Telephones are installed at *all* outlying sidings.

Chicago, Rock Island & Pacific.—On a length of 261 miles, both train orders and other communications are sent over the same circuit.

Cumberland Valley.—Telephones are installed at *all* outlying sidings.

Lehigh Valley.—On this road the siding telephones are equipped with bells for in-coming rings from the despatcher to be used by him in case it is necessary to hold the train crew, for a short time (if he is busy), each despatcher being equipped with an "interrupter" for this purpose.

Pennsylvania.—The figure in column 4 covers the whole of the Pennsylvania lines east of Pittsburgh and Erie. In addition to the 6,313 miles there shown, there is a length of 5,376 miles of circuits on which the telegraph and the telephone are used simultaneously. Nearly all of the circuits on this road used for telephoning are of copper wire. Telephones are furnished to foremen of track repairs in 44 cases; but in 25 of these this arrangement is temporary, as telephones are to be installed every half mile throughout that division.

Missouri Pacific.—Telephones are installed at *all* sidings on one division.

New York Central & Hudson River.—The mileage in column 4 represents one line from New York to Buffalo and a second line from New York to Albany.

Southern Pacific.—Telephones are provided on all trains running on those divisions of the road which are equipped with telephone lines.

Union Pacific.—At 57 booths and similar places not regularly attended by an operator, this company has register boxes equipped with train order blanks to enable conductors to receive train orders in the regular way. Each box has four rolls of blanks, three copies to be used by the trainmen and one to be left in the box. This fourth copy winds up on a roller in a locked compartment.

Oregon Short Line.—Telephones are provided on all freight and passenger trains.

MASTER BOILER MAKERS' ASSOCIATION.

Annual Meeting, Including Reports on the Brick Arch and on the Effect of Superheated Steam on Boiler Maintenance.

The sixth annual convention of the Master Boiler Makers' Association was held in Pittsburgh, Pa., May 14 to 17, George W. Bennett, presiding. Opening addresses were made by L. H. Turner, superintendent of motive power of the Pittsburgh & Lake Erie; William McConway, of McConway & Torley, and J. F. Deems, as noted in the *Railway Age Gazette* of May 17, page 1129

LOCATION OF FEED WATER ADMISSION.

The committee which reported on this subject gave the results of a series of tests in which the water was admitted to the boiler at three different points. As a result of the tests and from the practical service which has been obtained from the Seddon method of injecting the water, the committee came to the conclusion that "feeding from the top near the front tube sheet was the most desirable location, because the mud and scale is better distributed throughout the barrel of the boiler and less lime and magnesia deposits are found adhering to the pressure side of the firebox plates than when feeding from any other location."

The discussion centered largely around the advantages of the Phillips check and the Seddon method of injecting the water. With the latter method the water is injected near the top and is thrown upward into the steam space in the form of spray; there is a shield or pan over the upper tubes in which a large portion of the incrusting solids are precipitated. This also permits the feed water to be heated to a higher temperature before it mixes with the water in the boiler. The use of this device on one road is said to have reduced the amount of boiler work in the engine house, cutting the number of boiler makers from 14 to 7, which has resulted in a 50 per cent. decrease in boiler maintenance. It has reduced the number of broken staybolts 35 per cent., and has increased the life of the fireboxes and flues.

It was frequently urged throughout the discussion that one of the best ways of securing good results from any method of feeding water was to washout and blowoff frequently. Instances were cited of engines on the same runs which varied greatly in the cost of maintaining the boilers, because in some cases the engineers would make frequent use of the blowoff, while in other cases this would be largely neglected. The consensus of opinion of those who took part in the discussion was that the use of a method of feeding which delivered the water in the steam space at the front end was of the greatest value.

APPRENTICESHIP.

J. W. L. Hale, superintendent of apprentices of the Pennsylvania, gave an illustrated address on this subject. It did not refer specifically to boiler-maker apprentices, but covered the general problem of apprenticeship. There are now 250 apprentices at the Altoona shops. This large number makes it possible to group them into classes and sections, thus securing better results than where the number of apprentices is so small that they cannot be thus grouped. Each apprentice receives four hours of school instruction per week, divided into two periods of two hours each. This instruction is given during working hours and while the boy is under pay. A certain amount of home problem work is also required. The apprentices work in the shop with skilled mechanics. The monthly reports of the boys' school work, taken in conjunction with the regular records of the shop foremen, give a satisfactory and reliable basis upon which to place the boys to the best advantage in the shop. There was no discussion of this paper.

WEAKEST CONDITION OF BOILER.

The committee, of which J. T. Johnston was chairman, presented a short report, the conclusion of which was as follows: "In conclusion your committee wishes to state that in its opinion the elastic limit of the plates, braces etc., used in the construction of a boiler, should be considered, rather than the tensile strength, in maintaining boilers in safe working condition." There was no discussion of this report.

SPARK ARRESTORS.

Thomas Lewis presented a report on spark arrestors, in which he referred at some length to practical demonstrations in fuel economy which were made on the Lehigh Valley.

In the discussion a few blue prints were presented showing the practice on some of the roads, but the recommendation of the committee that the Master Mechanics' front end was entirely satisfactory was concurred in.

As for the size of the mesh of the netting that it is advisable to use, the practice of the engines running in the Adirondack region of New York state was cited. Here experiments had been made with nettings of three and four meshes to the inch, but the final size adopted was 2¼ meshes to the inch, using No. 11 wire. This arrangement seems to have almost put an end to the fires started by locomotives. Formerly the losses in the region amounted to hundreds of thousands of dollars every year, but last year they were not over $10,000.

It is important that the diaphragm be arranged so that the front end is self-cleaning. If this is not done and cinders accumulate the smokebox must be made air tight or the cinders will burn, often resulting in a red hot front end.

THE BRICK ARCH.

An abstract of the report of the committee on Advantages and Disadvantages of the Use of Arches and Arch Pipes, of which George Wagstaff was chairman, follows:

The committee endeavored to determine as accurately as possible what the advantages of the brick arches are and the true value of these advantages. It has also been the endeavor to determine definitely the disadvantages of the arch and arch pipes and, as far as possible, the actual cost to the railways of these disadvantages.

Under advantages are the following items: 1, Coal saving. 2, Smoke abatement. 3, Flue protection or reduction in roundhouse flue work. 4, Improvement of steaming qualities under demands for maximum power. 5, Reduction of engine failures from leaky flues and low steam. 6, Reduction in flue stoppage. 7, Reduction in honey-combing of flue sheets. 8, Beneficial effect of the arch tubes on circulation and evaporation. 9, Effect on the life of a set of flues.

Under "disadvantages" may be listed the following: A, Cost of maintenance of the brick. B, Cost of maintenance of arch pipes. C, Detrimental effect, if any, on fireboxes. D, Delays, if any, to the turning of power at the engine house due to the presence of the arch in the firebox.

Coal Saving.—The replies are almost unanimous in stating there is a coal-saving, the average of the percentages given being 11.9 per cent. This percentage virtually checks or verifies the result of a very comprehensive test recently made to determine the coal saving of the arch. The test was conducted by a committee made up of representatives from the Pennsylvania Railroad, the New York Central and the American Locomotive Company on a Mallet engine on the Pennsylvania division of the New York Central. The conclusions were to the effect that the brick arch under the conditions tested gave a fuel saving of 11 per cent. We also have information on other well conducted tests which would indicate a coal saving of 12 per cent., or more. The coal saving reported by the different members varies from a slight saving to 25 per cent. This might seem inconsistent but for the fact that the conditions under which these various percentages were obtained are evidently quite variable. The per-

centage of coal saving varies largely with different degrees of intensity of the work. For very light work the percentage will be slight. For very high rates of work, or rather high rates of combustion, the percentage should be high. Again, when the coal is of a low volatile nature the effect of the brick arch on coal saving will not be so great, but with high volatile coal there is much for a brick arch to do and under such conditions it will show a high percentage of fuel saving. The committee feels that 11.9 per cent. may be considered a fair figure for the average conditions.

Assuming a locomotive working 330 days in a year, running 100 miles per day and making on an average of 20 miles per ton of coal, the tons of coal consumed per year are 1,650 tons; 11.9 per cent. of 1,650 tons is 196 tons; money value at $2 per ton, $382.

Smoke Abatement.—The composite report shows favorably for the arch from a smoke abatement standpoint, the average being 40 per cent. This again depends on the nature of the coal used.

Effect on Flue Work and Percentage of Reduction of Frequency of Calking.—Thirty-five report reduction in flue troubles. Two find additional flue troubles, while three report no effect. The average percentage of reduction in frequency of calking is 40 per cent. Just what money value this would represent we are not able to determine, but it would no doubt be considerable.

Steaming Qualities Under Maximum Demand.—Forty-five replies say that arches make the engines more consistent steamers; one reply states, no effect. This would indicate that arches were of decided value. Just what the money value would be we cannot state. However, it indicates that by using brick arches better schedules can be maintained, a thing very important to the railways in competing for high class business. It may mean less double heading, a thing much to be desired. A very small reduction in the number of cases of double heading would pay for much of the brick arch expense. It can mean more tons per train hauled and thus more ton-miles per ton of coal consumed.

Do Arches Tend to Reduce Engine Failures.—The vote on this item is 42 to 5, indicating that arches do reduce engine failures.

Do Arches Reduce Flue Stoppage.—The vote on this item is 37 to 10 favoring the arch.

Honey-Combing of Flue Sheets.—The vote on this is 29 to 9 in favor of the arch.

Effect of Arch Pipes on Boiler Efficiency, Circulation and Evaporation.—Replies indicate 23 favorable to and two neutral on these points. A previous report to the association shows a fraction over one per cent. gain of efficiency per arch per pipe. This gain would more than pay the arch pipe maintenance cost.

Effect on Life of Flues.—Thirty-two replies say life of flues is increased, two say the life is decreased and four say no effect.

As against the above advantage we have the possible disadvantages as follows:

Detrimental Effect on Life of Firebox.—Five claim that the arch with arch pipes prolongs the life of the box, 12 that the life of the firebox is shortened, while 14 report no effect, less than half reporting detrimental effects. A careful review indicates that the experience of those reporting detrimental effect is largely in connection with brick arches supported on studs. It would, therefore, indicate that the effect of the arch on the life of the firebox would depend on the style of the arch used. It would indicate that arches of the proper design supported on tubes have no bad effect on the life of the firebox. At any rate, we believe that we may safely draw the conclusion that the beneficial effect of the arch on the flues will at least offset any possible detrimental effect which the arch may have on the firebox.

Are Engines Held Longer at Terminals on Account of Arches.—The vote on this item is 29 to 12, indicating that less than 30 per cent. of the members reporting find that there is a delay to the turning of power due to brick arches. Several members report less delay to engines equipped with arches. It would seem that the style of an arch has some bearing on this point. One man reports that there is no delay if sectional arch is used. The majority of those reporting no delays are using the sectional arches. Your committee, therefore, feel justified in saying that the delay in the turning of power claimed by some, is not an unsurmountable disadvantage. There are good grounds for argument that in the majority of cases this belongs on the other side of the ledger, due to 40 per cent. reduction in roundhouse flue work.

Cost of Maintaining Arch Pipes.—The recapitulation shows an average of $4.36 total to renew one arch pipe, and the average life of an arch pipe to be 14 months. With four tubes in an engine there would be an average renewal of one tube every three and one-half months. At a cost of $4.36 each the arch pipe cost per year in a box equipped with four tubes would be $15.26. This, we believe, represents a fair average for the cost of maintaining arch pipes.

Cost of Maintenance of Brick Arches.—The replies gave us no line on the cost of maintenance of brick per 1,000 engine miles. We have data, however, showing that the average life of a set of brick in passenger service is 5,490 miles, in freight service 4,425 miles, and in switch 6,500 miles. Assuming 33,000 miles per year as the average for an engine, it would require about 6 arches per year for passenger engines, and about eight arches per year for freight engines. Not having replies on the cost of arches, we are obliged to make some assumptions. We know from other sources that the cost per 1,000 miles for arches in wide firebox locomotives will be between $1 and $3. These wide limits are necessary on account of the wide differences in conditions throughout the country. The condition of the water has a decided effect on the life of an arch; the quality of the coal also has a decided effect and the intensity or degree of severity of the service greatly affects the life of the arch. Assuming $2 per 1,000 engine miles as a probable average and a mileage of 33,000 miles per year, we have for the cost of brick, $66 per year per locomotive. Add to this the brick arch labor, given as an average of $1.70 per month, we have $20.40 for brick arch labor per locomotive per year; add to this the cost of maintenance of arch tubes which we found above to be $15.26 per locomotive per year; and figuring the storekeepers' cost at 2½ per cent. as the average, we have a grand total of $103.31 for the average cost for the yearly maintenance of brick arches and arch pipes in an average modern locomotive.

Compare this with the money value of the advantage of the brick arch, which we found to be on coal saving alone, at about $392 per locomotive per year with the coal at $2 per ton. Subtracting from these coal saving figures the total cost to maintain the arches, we have in districts where coal costs $2 per ton a net of $275 per locomotive per year.

To sum up, weighing the advantages against the disadvantages, it appears from the replies received that brick arches are giving a very good account of themselves on 26 out of the 30 roads reported on.

Many roads have recently adopted the use of brick arches and superheaters, not so much from a desire to burn less coal, but in order to obtain more steam of a better quality, due to the necessity of having maximum sustained boiler power for a minimum of weight and operating expense.

The committee's recommendation, therefore, may be expressed as follows: The improvements in brick arch construction and the advancement in the art of boiler maintenance, including care of arch pipes, render the disadvantages of the use of arches so small in comparison with the advantages derived as to warrant the general use of brick arches in soft coal burning locomotives.

Discussion.—The discussion of the advantages and disadvantages of the brick arch proved to be the liveliest and most ex-

tensive of any of the subjects considered at the convention. It seemed to be quite generally conceded that if the brick arch and arch tubes were properly applied and maintained very little trouble resulted and that the benefits derived far exceeded the cost of installing and maintaining the arch. The use of four supporting arch pipes and the sectional arch were strongly recommended.

Some members seemed to think that the arch would do very well in good water districts but that where the water was bad there would be no end of trouble. This was from men who were not using the arch and they were met by statements from men who were in the worst of the bad water districts to the effect that they would work all right in any kind of water provided they were given the proper attention. They are used where the water will deposit ¼ in. of scale in three months.

The bagging of the arch pipes was discussed at length and it was suggested that if the braces for the front tube sheet were placed so as to allow a free circulation of water to the arch tubes, making it possible to keep the tubes filled at all times, there would be no trouble. The greatest difficulty with the arch tubes seems to be where the water has a tendency to foam.

On the Lake Shore the saving in fuel, due to the use of the arch, amounts to from 8 to 10 per cent. On another road having 110 locomotives it is estimated that $50,000 a year is saved by the use of the arch. The attitude of the boiler makers toward the brick arch has changed since the sectional arch has been introduced, which can be easily removed to allow repairs to be made. Usually the removing and replacing of these bricks is done by regular men who are assigned to the work. The value of the brick arch as a smoke preventer was conceded, but in order to get the best results in this respect it must be properly installed and cared for.

SUPERHEATED STEAM AND BOILER MAINTENANCE.

A committee report on this subject was presented by T. W. Lowe, chairman. The fire tube type of superheater only was considered. The large holes in the front tube sheet are generally drilled about ¼-in. larger in diameter than the body of the flue, the flue being swelled hot to fit that end before application, thus economizing on the labor attached to removals. The large holes in the back tube sheet are drilled smaller than the main flue, which is swedged several inches back, thus providing an abundance of water space at the firebox end, as well as ample material between the tubes, to prevent cracking of the interstices during the setting and maintaining of the flues. No copper ferrules are used to surround these large flues in the back tube sheets, and they are either welded in place or rolled to a joint by using four rollers in the tube expanders, then lapping and beading both ends of the flues with a suitable sized beading tool to take care of the thicker flue.

These large flues are handled in the shops under the same general methods that are followed with smaller flues; the safe ends are welded with a proportionately heavier roller tube welder, and the firebox end of the flue is swedged with a hydraulic push swedging machine or suitable top and bottom die. During six years' experience we have had no weld failures, and are practically free from leakage in service because of reasonable attention, such as stopping all leaks after the fire is drawn, whether reported leaking on arrival at the terminal or not, and, further, by blowing out all cinders with air.

The working steam pressure on superheated engines is generally 180 to 200 lbs., and on light power 160 lbs. The same size engines and boilers under the two former pressures, operating in good and bad water, have not yet shown any marked difference in the cost of boiler maintenance, and unless there is a saving in machinery expense with the low pressure there does not appear to be any good reason why the 200-lb. pressure engine is not better and more powerful than the 180-lb.

Superheating has not reduced the mileage run between washouts and, although the firebox space is found in better condition, we cannot accurately compare the quantity of scale and mud collected between washouts; yet we are satisfied there is a better all-round condition and decreased foaming of the boilers in service.

Competent authorities state that there is a saving in fuel averaging from 10 to 25 per cent. in favor of superheating, the fluctuations during the tests being due to conditions. This is accompanied with a corresponding decreased consumption of water, and a longer life for flues and firebox plates, but because of many other mechanical improvements, which are under experiment at the same time, no accurate statement can be given to show the advantage derived from each; notwithstanding all this there is sufficient proof that there is a much greater percentage of benefit derived from superheating on locomotives than has been attributed to any other known mechanical device introduced on locomotives for many years, and its relation to the upkeep of the locomotive boilers is such, that with ordinary care in the application of the device and proper maintenance in service, the boiler is generally benefited.

During the severe frosty weather in northwestern Canada the superheater engines developed less flue and boiler failures compared to former saturated steam engines, which of itself is an economy not to be overlooked.

Discussion.—The discussion touched lightly on the relation of superheat to the upkeep of the boiler and centered almost entirely on the methods used in applying and replacing the large tubes that are used to carry the superheater units.

CRACKING OF TOP FLANGE OF TUBE SHEET.

In a paper on the best method of staying the front portion of the crown sheet on radial top boilers to prevent cracking of the flue sheet in the top flange, J. W. Kelly advocated the use of flexible stays. Some roads use four rows of such stays near the flue sheet while a few use flexible stays entirely for the crown sheet. T. W. Lowe, in a paper on the same subject, recommended a radius of 3 in. for the tube sheet flanges and that the root of the flange should be at least 4 in. from the edge of the tube holes.

OTHER BUSINESS.

The following officers were elected for the ensuing year: President, M. O'Connor, general foreman boiler maker, Chicago & North Western; first vice-president, T. W. Lowe, general boiler inspector, Canadian Pacific; second vice-president, James T. Johnston, assistant general boiler inspector, Santa Fe System; third vice-president, Andrew Green, general foreman boiler inspector, Big Four; fourth vice-president, Dan Lucas, general foreman boiler inspector, Chicago, Burlington & Quincy; fifth vice-president, John Tate, general foreman boiler maker, Chicago, Milwaukee & St. Paul; secretary, Harry D. Vought, New York; treasurer, Frank Gray, foreman boiler maker, Chicago & Alton. For members of the executive committee: B. T. Sarver, foreman boiler maker, Pennsylvania; A. Lucas, foreman boiler maker, Chicago, Milwaukee & St. Paul; W. H. Laughridge, general foreman boiler maker, Hocking Valley.

It was announced that Chicago had been chosen for the next place of meeting.

At the closing session a resolution was adopted asking the secretary of the navy to name the 500-ft. repair ship that is to be built for the navy, the *Oliver Evans*, in honor of the eminent early worker in steam navigation.

The entertainments for the week included a reception and dance on Tuesday evening. On Wednesday the association was the guest of the Carnegie Steel Company and the National Tube Works on an excursion, visiting a number of the plants of these companies. Wednesday evening there was a theatre party. On Thursday there was a ladies' euchre party in the afternoon and a banquet in the evening.

Among the companies who made exhibits in connection with the convention were the following:

Champion Rivet Company, Cleveland, Ohio.—Rivets. Represented by D. J. Champion and W. H. S. Bateman.

Chicago Pneumatic Tool Company, Chicago.—Pneumatic tools. Represented

by George A. Reese, C. F. Walker, Thomas Aldcorn, A. C. Andreson, A. M. Andreson and H. S. Hunter.

Cleveland Steel Tool Company, Cleveland, Ohio.—Punches, dies, rivet sets and chipping chisel blanks. Represented by J. F. Doolittle, R. J. Venning and V. D. Gilmore.

Flannery Bolt Company, Pittsburgh, Pa.—Tate bolts. Represented by J. Roger Flannery, B. E. D. Stafford, Thomas Davis, C. L. Hastings and William M. Wilson.

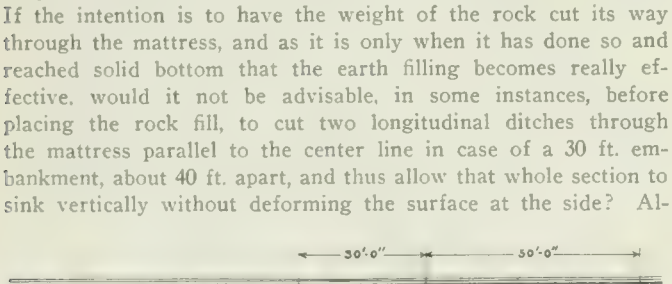
Independent Pneumatic Tool Company, Chicago.—Thor pneumatic tools. Represented by G. A. Gallinger, John P. Bourke, G. C. Wilson, Walter A. Johnson and W. R. Gummere.

Parkersburg Iron Company, Parkersburg, Pa.—Charcoal iron boiler tubes. Represented by George Thomas, 3rd, W. H. S. Bateman, C. L. Humpton, J. A. Kinkead, John H. Smythe and H. C. Hunter.

Vulcan Engineering Sales Company, New York.—Hanna riveters. Represented by A. F. Ehrenhaft.

EMBANKMENTS AND FOUNDATIONS ON THE TORONTO-SUDBURY BRANCH OF THE CANADIAN PACIFIC.*

The Toronto-Sudbury branch of the Canadian Pacific was built in the years 1905-1909. The construction standards were very high, the intention of the company being to insure a thoroughly solid road bed, rather than to keep initial expenses at a minimum. As the greater part of the 225 miles of this line ran through a rock and muskeg country, there was frequently some difficulty in attaining this result. The general mode of procedure through the rock country was to make the rock cut only about a third of the embankment, as this quantity of rock would have sufficient weight to cut its way vertically through the mattress, and as soon as bottom was reached the remainder could be made by train filling. The efficiency of this method of forcing the sink holes through is shown by the fact that, train filling once completed, the percentage of derailments has been at least as low on this new road bed as on that of sections 20 years old or more. This brings up an important question. If the intention is to have the weight of the rock cut its way through the mattress, and as it is only when it has done so and reached solid bottom that the earth filling becomes really effective, would it not be advisable, in some instances, before placing the rock fill, to cut two longitudinal ditches through the mattress parallel to the center line in case of a 30 ft. embankment, about 40 ft. apart, and thus allow that whole section to sink vertically without deforming the surface at the side? Almost every case of deformation is caused by the sand or gravel floating sideways, and it does not become solid for some time.

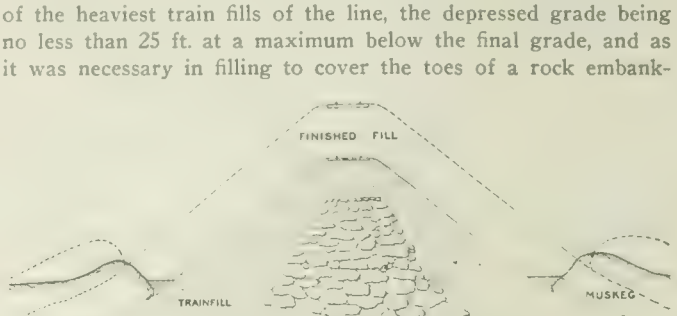


Abutment Demolished by Slide.

Depressed temporary grades of 3 per cent. were allowed. In many cases small hillocks of rock were cut away to allow the temporary grades to descend to the center of the larger gulleys.

At mile 124, during train filling, a low rock embankment, while carrying an engine, gave way suddenly, and the engine sank with such force as to shear the nuts in the track for a distance of 1,000 ft. or more. Between miles 112 and 142 a number of embankments were train filled from temporary trestles, and little trouble was experienced, although in many cases it was found necessary to lower the level of adjacent small lakes in order to give more solid bearing to the toes of the slopes.

At Richmond lake, mile 101, south from Romford, the lake level was about 50 or 60 ft. below the level of the track. A rock embankment rested firmly on the solid rock below, but was not carried up to grade, a trestle being used above water level. The water would probably seep through the rock fill, but, in the event of its not doing so, it would easily flow through the trestle at high water. At mile 76, south from Romford, occurred one of the heaviest train fills of the line, the depressed grade being no less than 25 ft. at a maximum below the final grade, and as it was necessary in filling to cover the toes of a rock embankment up to 30 ft. in height, at least a quarter of a million yards of earth must have been used in this one-half mile of fill.



Depressed Embankment, Showing Sideslip.

At mile 75.5, south from Romford, a temporary trestle beside a lake had been train filled, but the water had apparently dissolved the embankment and caused lateral slipping. The lake was small, and the lowering of its level about 4 ft. left the toe dry and firm.

In many instances where a comparatively dry muskeg was to be crossed, provision was made for thickening the dry supporting mattress by ditching and lowering the level of the water table. This was generally effective, provided there was solid soil in the mattress, but not invariably. At mile 70.5, from Romfort, the track crossed a muskeg about 2,000 ft. long and from 20 to 40 ft. deep, on an embankment about 4 ft. high. A drainage ditch was dug, leaving the water table only about 4 ft. below the level of the surface soil. The track crept very badly and made "sun kinks," elevations taken during the passage of a train showing track undulations of one or two-tenths. The track was made safe for traffic and prevented from creeping by the substitution of 14-ft. bridge ties; later it was diverted to a side hill of solid rock and made thoroughly solid.

At mile 66.7, south, in order to make secure a muskeg, which for its length gave considerable trouble, a depressed grade was built, with a rock embankment about 10 ft. high, the lowest point of which was a maximum of about 20 ft. below the intended finished grade. In this case, although soundings showed a depth of 50 ft. or more to bed rock, the weight of the rock embankment was not in itself sufficient to slice through the surface mattress. This was somewhat unfortunate, as it was always found that although earth alone would eventually reach a firm foundation, yet owing to its specific gravity being so low, it had a great tendency when placed by train filling, to move horizontally rather than vertically, causing the mattress to bulge upwards for some distance out from the toes of the slope.

Although this sink hole had a length of only 600 ft. and had to be lifted to a height of 20 ft. above the depressed grade, a fill of 30,000 yds. raised it only 3 ft. Fortunately, by the use of spreaders, the embankment while sinking retained a good surface and alinement, and no difficulty was experienced in running passenger trains over this temporary velocity grade.

One of the abutments of the South Nascoutyong river bridge was carried to a depth of 10 or 15 ft. below the surface of the ground, and piles were then driven to bed rock, about 20 ft.

*From a paper by A. C. Oxley, read before the Canadian Society of Civil Engineers.

further. Back of the abutment was a temporary trestle about 30 ft. high resting on mud sills, the soil being an alluvial clay which was kept moist by the presence of a stream less than 100 ft. away. No trouble was experienced with the abutment until train filling had proceeded for some time on the temporary trestle, when the earth filling caused a flow of the clay subsoil, and although the bases of the piles remained in their places on bed rock, the flowing of the clay caused the abutment to tilt forwards, necessitating its demolition. No further attempt was then made to fill the embankment, but piles were driven and a trestle constructed, both in place of the temporary trestle, and also between the abutment and the next pier, the new trestle replacing a short girder span.

TESTS OF JACOBS-SHUPERT FIREBOX.

A progress report of the comparative tests being made at Coatesville, Pa., between two boilers, one with a radial stay firebox, and the other with a Jacobs-Shupert firebox, has been made by Dr. W. F. M. Goss, under whose direction the work is being conducted. This report is as follows:

"The tests of Series A, have been entirely completed, with results which in general terms are set forth below.

The Boilers.—"Both boilers are identical in their general dimensions which are as follows:

Outside diameter of shell of boiler at front end	70 in.
Diameter of shell at throat	83⅞ in.
Number of 2¼-in. tubes	290
Length of tubes	18 ft. 2 in.
Inside length of firebox	109⅝ in.
Inside width of firebox	76⅜ in.

"The purpose of the tests of Series A was to determine for each boiler the evaporation from the firebox and from the tubes separately. To make such a determination possible, the back-tube sheet was extended in all directions to the outside of the boiler, thus forming a diaphragm completely separating the water-space on the two sides of this tube-sheet. By this device each boiler was made in effect two boilers, the heating surface of one being all portions of the firebox, excepting the front tube-sheet, and the heating surface of the other being the tubes and tube-sheets.

"In carrying out the tests, each compartment was supplied with weighed water as though it were a separate boiler. The quality of the steam delivered from the firebox end and from the barrel end was determined independently, the purpose being to determine with the highest possible accuracy the heat delivered through the walls of the firebox and the heat delivered through the flues. The heating surface of the two boilers is as follows:

	Radial-Stay Boiler.	Jacobs-Shupert Boiler.
In the firebox	179.2 sq. ft.	201.9 sq. ft.
In the barrel	2,805.1 sq. ft.	2,806.5 sq. ft.
Total for both parts of the boiler	2,984.3 sq. ft.	3,008.4 sq. ft.

Tests with Oil.—"A series of oil-fired tests have been run on each boiler. Three different rates of power have been employed in each series, the rate of fuel consumption ranging from 800 lbs. to 2,100 lbs. of oil per hour. The total water evaporated from both the firebox end and the tube end of the boilers has ranged from 10,000 to 24,000 lbs. per hour, the evaporation per pound of oil being approximately 16 lbs. in the tests of lowest power and 14 lbs. in those of highest power. In all tests a surprisingly large percentage of the total work was done by the firebox. This percentage was greatest when the rate of power was lowest. Speaking in general terms, at low rates of power from 45 to 50 per cent. of the total heat transmitted by the boiler is absorbed by the firebox. With increase of power the percentage falls, but the lowest value thus far obtained is approximately 34 per cent.

"As the heating surface of the firebox is a comparatively small fraction of the total heating surface of the boiler, it is evident that heat is transmitted from the firebox at rates which are extremely high. For example, results of a number of tests show the evaporation of more than 50 lbs. of water per square foot of firebox heating surface per hour, which rate of evaporation is equivalent to the development of more than 300 horse power to the firebox alone. In estimating the significance of these results, it should be remembered that in the experiments, the firebox virtually constituted a boiler by itself, that it had no more water about it than the normal locomotive firebox, and that it could not benefit by the circulation of water from the forward end of the boiler backward into the water legs. The fact that fireboxes subjected to such conditions could be worked at the rate of power stated, is suggestive of new possibilities in boiler design. The full development of these data will make of record facts with reference to the distribution of work between the firebox and tubes of a modern locomotive boiler which have never before been determined.

"The experimental results have not yet been sufficiently studied to permit a final statement to be made concerning the relative performance of the radial-stay boiler and the Jacobs-Shupert boiler. It appears, however, that the absorption of heat by the Jacobs-Shupert firebox is somewhat in excess of that absorbed by the radial-stay firebox, and that taking the boilers as a whole, the Jacobs-Shupert boiler is slightly more efficient.

Tests with Coal.—"The oil-fired tests already described have been duplicated by a series of coal-fired tests. The results obtained, so far as they refer to the distribution of work between the firebox and the tubes, and to the relative performance of the radial-stay boiler and the Jacobs-Shupert boiler, are in entire agreement with those obtained from oil."

The tests for strength under low water conditions in which each boiler will be subjected to a progressive series of tests until the destruction or serious deformation of the firebox occurs, will take place at Coatesville, Pa., on June 20, 1912.

It has been for many years the intention of the Khedive of Egypt to extend the Khedival railway, through the Mariut desert as far as Sollum, and thus shorten the road to Egypt. The Khedival railway already extends 140 miles westward from Alexandria, through the desert. Its present terminal is Sidi el Haggag, quite near to the port of Mirsa Matru. It has very much facilitated the entrance to the northwestern part of the Lybian desert, and it renders more accessible many ancient ruins, especially the Marble City of Mariut and the City of Menas; and stimulates the traffic between Barka and Alexandria. The material has been for the most part delivered by German and Austrian firms; and a few years ago there was talk of German capitalists buying the road. This purchase would have been of great advantage to German capital, but now the Egyptian government will reap the profits. When the line is finished to the Gulf of Sollum, and has been strengthened and double-tracked, there will be fast trains to and from Cairo, and steam connections at Sollum. The sea voyagle between Italy and Egypt will be shortened by a full day; and the new route will be the shortest to the Orient. For the express trains between Sollum and Cairo nine hours will be sufficient; and this route passes through interesting and almost unknown districts of Egypt. The railway starts at Wardian, the proposed new western port of Alexandria. A magnificent station building has been erected after the plans of Chief Engineer Gustav Kayser, who also did the greater part of the surveying of the line. In order to build cheaply, the Khedive made use of native soldiers as laborers. The line runs through the limestone quarries of M, directly towards Lake Mareotis, which it crosses on a dam only wide enough for the track and the telegraph poles. After the train has passed this dam, about an hour's run, the line runs partly parallel with the shore, to the Arabian gulf. It then runs southwest through the desert to the important caravan station of Bir Haman; then turns westwards towards the gulf in order to run nearer to the coast. The special strategic importance of this railway line for Egypt has caused the Egyptian government to buy it from the Khedive. The negotiations are of quite recent date.

RAILWAY STOREKEEPERS' ASSOCIATION MEETING.

Abstracts of Reports and Discussions of Interest to Executive, Mechanical, Engineering and Purchasing Officers.

The ninth annual convention of the Railway Storekeepers' Association was held at the Hotel Stattler, Buffalo, N. Y., May 20-22. After an address of welcome by the mayor of Buffalo and remarks by J. A. Waterman, the past president, and by E. Chamberlain, of the New York Central Lines; W. F. Jones, general storekeeper of the New York Central & Hudson River, the president of the association, made an address. Special mention was made of the work of the committees, and particularly of the tinware committee, which had been in conference with similar committees of the Master Mechanics' and Master Car Builders' Associations for the purpose of standardizing tinware. It is believed that the action of this committee, if accepted, will result in the adoption of standards that will be of great benefit both to the railways and to the manufacturers. In fact, some roads are waiting for this report before ordering large amounts of tinware.

The membership of the association has been increased, the total number, according to the secretary's report, being 625.

ACCOUNTING.

Although the committee on accounting requested more time in which to prepare its report, the subject was thoroughly discussed. There is a wide difference among the railways in the methods of keeping the accounts. For instance, on the Lake Shore & Michigan Southern the accounting is done by a separate department, which is outside the jurisdiction of the supply department, while on certain other roads the supply department has charge of the accounting. The former method relieves the supply department of applying the cost of supplies direct to the operating cost sheet. The Chicago, Burlington & Quincy operates on the same principle as the Lake Shore, except that the supply department puts the price of the material on the bill as it is given out.

RAILWAY SALVAGE.

The subject of railway salvage or reclaiming of scrap material was considered by the committee on recommended practices, of which H. C. Pearce, general storekeeper of the Southern Pacific, is chairman. A separate salvage department was advocated, which should come under the direct control of the supply department. This new department should gather all obsolete and scrap material and arrange for its reclaiming or selling. It should be run according to a definite and well-planned system, so as to prevent any unnecessary handling. It was estimated that 10 per cent. of the total cost of the material could be saved. Three inspections should be made of the material before it was scrapped; the first by the workmen overhauling the equipment for repairs; the second by sufficiently trained men at the scrap piles, and the third as it is being loaded on to the cars for shipment. It was claimed that considerable money is lost in rails and ties which could oftentimes be reclaimed by shortening the rails and by using the ties for secondary track and fence posts. E. J. McVeigh, Grand Trunk, who is a member of the committee, also read a paper on the subject. He mentioned many ways in which material is lost that may be reclaimed. He said that 50 per cent. of all the loss and waste was the result of poor education and the balance was chargeable to "pure cussedness." As an example of the former he mentioned the insufficient storage facilities and the difficulty of making some officers see the necessity for them. As to the latter, he referred to the way in which the employees handled their supplies. He closed by saying that the subject of salvage has been left too much in the hands of the different departments, and that the lack of an organized system was responsible for a large part of the waste.

Discussion.—The discussion brought out the value of the classification of scrap material as drawn up by the previous committees of the association. H. E. Rouse, general storekeeper, Chicago Great Western, said that by following this classification his road had received a large increase over previous prices of scrap and that the extra cost of maintaining the system was more than paid for in this way. D. Kavanagh, general storekeeper, Chicago, Rock Island & Pacific, said that the cost of classifying and reclaiming scrap on that road, using this same system, was only nine cents per ton. The shipment of all scrap to a general overhauling point was criticised by some as not being an economical proposition, since the cost of transportation would be liable to exceed the money saved by the reclamation, but it was conceded that where possible it was better to do this than to maintain salvage crews at each shop. The location of the general overhauling point should be governed by the geographical location of the scrap market. On the Chicago, Burlington & Quincy the reclaiming is done at the shops, the mechanical department co-operating with the supply department in picking out the usable material, the rest being sent to the general scrap docks at Havelock, Neb.

The committee on scrap classifications made a few changes that were found necessary on account of the increasing use of steel. However, no change was made in the classification of No. 1 scrap, which at present includes both steel and iron. This combination is severely objected to by many of the scrap purchasers.

STANDARDIZATION OF GRAIN DOORS.

D. Kavanagh, chairman of this committee, reported that the committee had conferred with the committee of the General Superintendents' Association on reclamation as well as the standardization of grain doors, and with slight modifications had not found any reason to change the recommendations which were made in the previous report. It is still maintained that doors 20 in. wide by 7 ft. long are the most serviceable, and can be used in any freight car suitable for carrying grain having a standard width of door. It was agreed after conference with the committee of the General Superintendents' Association and with Mr. McNulty, the reclamation re-cooperage agent, that better results can be obtained from grain doors constructed with the two end cleats set out flush to the end of the door, instead of 6 in. back from the end as previously recommended. There is more nailing stock at the end of grain door, making it more substantial and less liable to be damaged in removing it from cars. For railways buying grain doors made of hard woods, it is not believed necessary to have a complete double door, i. e., a door made with a full double thickness of lumber all the way through, single thickness hard wood doors being equally as strong and serviceable as double doors made from soft wood, if all cracks are properly cleated.

Roads that can purchase hard wood doors to advantage, constructed as above described, will save approximately $25,000 to $30,000 a year where large quantities of these doors are required. In order to have the marking of grain doors uniform on all railways, it is recommended that on the inside the door should be properly stenciled with the initials of the railway in large letters, and also the name of the manufacturer of the grain door, this latter information for identification purposes. On the opposite side of the door, that is, the outside, should be stenciled also in plain large letters—"This Side Out—Return to A. B. & C. R. R."

STATIONERY.

The report of the committee on stationery was read by H. E. Rouse, Chicago Great Western, chairman. Answers to a circular letter to the members showed that 14 roads gave the general

storekeeper control of stationery and 27 did not. Answers to another question showed a difference of opinion as to whether the stores department should handle the stationery. Eighteen roads require their line officers and agents to order the stationery supplies 30 days ahead of delivery; 14 roads, 60 days; and 4 roads, 90 days. The majority of the roads replying to the circular thought that the division superintendent should approve station agents' requisitions. Two roads operate printing plants and 37 do not. Eighteen thought that it would be practical to operate a printing plant limited to certain classes of work, while 19 did not; eight believed it economical to provide the printer with paper stock and electrotype plates, while 28 did not. The committee was continued for another year.

LINE INSPECTION.

A paper was presented on this subject by J. H. Callaghan, Canadian Pacific, of which the following is an abstract: Line inspection offers a big field for the head of the store department. On some lines there are no less than 50 places where materials are carried, all of which come under the care of the various division storekeepers, and while these form a portion of the line inspection they do not afford anything like the field to work in which is offered by the line proper, or such places as engine houses, car repair yards, bridge and building department shacks, construction yards, steamship, ferry and elevator terminals, freight and baggage sheds, etc, in fact, wherever company material is apt to be found, whether new, second-hand or scrap. These are the places where the general storekeeper with the inspection team can do a lot of valuable work.

The inspection team should consist of the general manager, or an officer of equal rank, the general master mechanic, the master car builder, and the general storekeeper. The general manager because he is in charge of all lines on which such inspections are made and decisions are arrived at on the ground. The general master mechanic because all division master mechanics are subject to his instructions. The master car builder for similar reasons, the various division car foremen being subservient to him; and the general storekeeper because he is the custodian of the materials no matter where located.

A rough outline of the work of inspecting is as follows: The general manager watches the line from the rear end of the car, noticing station buildings, cattle guards, fencing wire, switch material, ties, etc., not properly cared for, and speaks to the general superintendent of the division together with the superintendent in charge of the district as to these conditions and directs as to their proper disposition. The general master mechanic notices 160 to 180 per cent. locomotives hauling regular trains where an engine of less capacity would answer the purpose and arranges at once with the division master mechanic for the proper disposition of this misplaced power. While in the engine houses and machine shops he looks into the work of proper upkeep of machines and engine house practice. The master car builder covers very much the same ground.

There was a time, and no doubt is yet, when officers in making inspections were frequently misinformed. They received a lot of unreliable and erroneous information simply because the information was given in such a manner that unless an officer was conversant with the details, for lack of time on the ground many of them were accepted as genuine. With an inspection team of this sort these difficulties could be cleared up and the correct condition of affairs learned. It is not directly with the stores department proper or material in the care of the department's employees at division or other points where the accumulations of new, second-hand or scrap materials may be found, that the general storekeeper does his best work. These latter accumulations are tabulated by the department's own men and proper records are kept of them, in addition to which the department's inspectors are constantly on the line following them up, their work being mainly directed to the keeping down of surplus stock under the charge of store department employees. They also report any materials which they note on these inspections as being carried in excess by other departments, and copies of their reports are sent to the general superintendents of the divisions on which such inspections are made, but the results in these cases are not always satisfactory, so that it is left to the inspection team to put the finishing touches on them.

A feature of these inspection trips and one which tends to enhance their value is that meetings are held frequently of all officers of the different grand divisions at which the inspection team aim to be present. The efforts made and results affected, particularly as applicable to the material question or work done by the general storekeeper, are usually brought up at these meetings and detailed reports of such savings as have been made are usually illustrated in dollars and cents.

Attention is called to the following statement made by Mr. Yeoman in an article in the *Railway Age Gazette* of February 9: Until the idea is fully recognized and put into actual practice that the general storekeeper is the actual custodian of company materials, the economy which he can affect, if an independent officer, will be largely dwarfed if unnecessary interference is permitted.

Discussion.—The whole idea of line inspection was considered a necessity, and if an inspection team, such as described in the paper, is impracticable, a team should be made up of officers representing those mentioned. Various systems of inspection were mentioned, among them the monthly supply car trips on the Southern Pacific, which D. D. Cain described. This has been fully described heretofore in the *Railway Age Gazette.*

INCREASE OF STORE DEPARTMENT EFFICIENCY.

A paper was presented by H. C. Pearce, Southern Pacific, on how the efficiency of the store department may be increased. An abstract follows:

Efficiency is simply doing the thing we are required to do well, in the most simple and direct manner. If the railway storekeepers are not as efficient as they should be (quoting from Mr. McVeigh's letter in the *Railway Age Gazette,* January 5, 1912), "the fault lies more in the foundation than in the superstructure."

The store department, which is better named the supply department, is particularly unfortunate in that it has no unit of measure. The measure it has made for itself is stock on hand, issues, and pay roll. This, if carried to its utmost conclusion, presents the spectacle of a storekeeper, whose first duty should be to meet the demands of the service, being without stock; whose second duty should be to husband his resources, endeavoring to increase his issues; whose third duty is to take proper care of the property in his charge, and make the most of the salvage by applying it to the company's needs, and the residue for the market (all of which necessarily means an increased pay roll), making every effort to have this work done by others, if it is done at all, and planning in every way to keep his pay roll down to the lowest possible point, regardless of what saving can be made for the company.

The supply department is probably the only department that has not so far developed a proper unit of measure. A railway is operated primarily for the purpose of moving trains, and the officers and men directly engaged in this work are measured by their ability to handle the business. In order to analyze the efficiency of the supply department we must first determine its real purposes, which I conceive to be: Service rendered by providing proper materials promptly; proper inspection and protection of all company property; conservation of its resources; cost of handling and accounting.

If this fairly represents the purpose of the supply department, then we must be measured first by the service given every day in the way of providing suitable materials economically, delivering them to the work when they are wanted, proper protection and control of the property under our charge to prevent deterioration and misuse, the assembling of it at proper locations for proper control so that it can be conserved, the installation of

system and order in the arrangement of the stocks and the men engaged in handling, so that the cost of handling may be as low as possible; the picking up and bringing in of the salvage, assembling it for market, making it over for further use, and arranging and classifying the scrap for the market.

Investment in materials will always be a prominent unit of measure, and rightly so, but is must be coupled with other things and be understood before it can be considered the unit of measure. There is no question but what the stocks of material as represented by the balance sheets of our different roads is too high. I should say as a general proposition that they are double what they should be. Much of this is due to causes over which the storekeeper has no control. Purchases continue to be made of large quantities of materials without the authority of the supply officer. With few exceptions, our railways have not so far seen fit to place all the materials on the road entirely in the hands of the supply officer, in fact, our general storekeepers today are, generally speaking, little more than custodians. Work is started and stopped without regard to material conditions. Everyone knows that labor can be procured in much less time than material, and that labor can be discontinued at a moment's notice, whereas the material has to be contracted for and must be accepted. This feature alone has probably had more to do with the accumulation of large and unnecessary stocks of material than any other one factor.

If all our railways were to adopt a standard classification of material, segregated sufficiently to clearly expose the principal items, and this classification was supported by a uniform accounting system, the issues would be accurately reflected. This would bring clearly before all officers interested the question of why a certain investment was necessary to protect a certain issue. For this reason the stock on hand and ratio of issues always have been and always will continue to be a unit of measure. Summing the entire matter up, the efficiency will be reflected in the ratio of purchases to the actual issues.

The title of the department and the officer in charge should be broad enough to cover all the operations of providing, caring for, distributing, and accounting for all materials unapplied, including the salvage. I believe "the supply department" and "supply agent" is more representative of the work and the officer in charge of it. The general supply agent to indicate the officer in general charge of all materials on the system; the supply agent indicating the man in charge of the supplies on division or district, and the storekeeper indicating the man in charge of certain stores or stocks. This may seem a small matter, but it is of utmost importance in establishing the scope and work of the department, and the responsibility of the officer in charge which is so necessary in order to place the organization in its proper place and broaden its usefulness.

Our storekeepers have been narrow in their conception of the real purposes of the organization, and are guilty of errors of judgment. They have conceived that their purpose was to obstruct and criticize, instead of the broader view that their real purpose should be to serve and assist, but the conditions under which they performed their duties are largely responsible for these errors. This is particularly true in the matter of concealed expense. There is little doubt but that the cost of handling, receiving, distributing and caring for materials by other departments was at least 50 per cent. greater than when done by a separate organization.

Having pointed out some of the faults of the supply department as now organized, it is in order to suggest the remedies. The trouble is with the foundation rather than the superstructure. The owners and executive officers of our roads must first recognize the need for this department, and the enormous economies which can be produced by a thorough system of control by a trained organization.

The first need is to place directly in charge of the supply department an officer thoroughly experienced in providing, handling and distributing of material. It is necessary to have a thoroughly practical man in charge of this work. In addition he must be an executive, and have the power of organization and direction. He must have authority, as well as responsibility, the proper title and renumeration, and be co-ordinate with, and at least on a level with, other general officers. This will place in the hands of the supply department the power to regulate its stocks, meet the requirements and at once restore the confidence which is absolutely essential before any supply organization can reduce its operations to an economical basis.

The next step is to concentrate the stocks in as few places as possible with a proper delivery system direct to the work. With all the material on the railway under the direct charge of the supply officer, this can readily be brought about and sustained. Proper facilities and handling devices must be provided in order to properly store and economically handle material.

Efficiency can be developed from our own organizations. Valuable ideas are more apt to come to the men engaged in the work than they are to men who grab them out of the air. The efficiency idea is merely analyzing in detail each thread of the work and applying it in the simplest and most direct manner. By selecting from our own organizations men with the faculty for analyzing and construction, and giving them the support and opportunity to investigate and apply these thoughts, we get all the benefits of the men who are engaged day by day in this particular work, or, in other words, we get practical efficiency instead of theoretical efficiency.

Several of our large systems have already placed a vice-president in direct charge of their supply departments, and it is only a matter of a short time when this department will be thoroughly reorganized along the lines of greater efficiency and broader usefulness.

Discussion.—The only discussion on this paper was in commendation of it.

OIL AND WASTE.

Three papers were presented on this subject by W. O. Taylor, of the Galena Signal Oil Company; C. H. Tallman, of the New York Central & Hudson River, and E. C. Totten, of the same road. Mr. Taylor considered chiefly the illuminating and lubricating oils, giving valuable information as to the properties of these oils and the manner in which they should be stored. He spoke of absorbent towels which are used as a substitute for waste for general wiping purposes. By means of an "emulsion machine" oil can be extracted from these towels which can be used in the signal department for lubrication of switches.

From a report of a road using these towels it was learned that in one month 6,695 towels were washed at a cost of $26.50 and returned to the shops; there was a saving of 4,000 pounds of colored waste. On this basis 24,000 pounds would be saved in six months at a cost of $1,440. Subtracting from this the cost of the 6,695 towels ($311.28) would give a saving of $1,138.72

Mr. Tallman spoke of the care of hard grease in the storeroom and the saving that can be made by reclaiming old grease. He described a process by which it can be made over into serviceable stock.

HANDLING AND ACCOUNTING FOR MATERIAL AT CONTRACT SHOPS.

When equipment is to be repaired under a contract care should be taken to see that the contract is practical. The accounting, mechanical and supply departments should draw up the contract between them and it should be carefully studied by the accountants, inspectors and checkers assigned to the particular job. As the equipment is received at the shop it should be examined by the inspector with the assistance of the checker and his report should be made in duplicate, one for the contractor and one to be used in checking up new material as it is received. Definite prices should be agreed upon for any piecework done on the equipment and the price of the material, if any, furnished by the railway should also be fixed. It would be best to have all or none of the material purchased and furnished by the railway and still better for the contractor to furnish it all. When the railway company furnishes the material a complete store organization should

be maintained by it at the contractors' shops. In this case all material should be double checked and the inspectors should watch for wasted material and scrap.

OTHER BUSINESS.

The rest of the session was given over to the answering of queries sent in by members and by the closing exercises. In the answer to the question as to whether the saving would justify a $50 or $60 man for classifying a scrap pile of about 70 tons a month, it was brought out that if the man was limited to that work alone it would not be justified, but he would undoubtedly have time and opportunity for other work. A good man at the scrap pile is absolutely necessary for the moral effect it will have on the shops sending in scrap. If the shops receive back useable material, which they send in as scrap, they will be more careful in reclaiming material. On some roads the higher officers require reports showing the amount of useable scrap returned to the different departments.

Concerning assembled shipments of material, the concensus of opinion seemed to be that for requisition for five-car lots or under they should be shipped assembled, although no iron-clad rules could be laid down. Assembled shipments allow the work to be properly begun, limit the misapplication of material, limit the liability of stealing and save in the handling of the material.

G. G. Allen, Chicago, Milwaukee & St. Paul, stated in connection with the subject of surplus material that the general storekeeper should be constantly in touch with what is going on on the road, so as to plan for any new material that may be required and also to pick up material not needed.

The memorial committee passed resolutions on the deaths of J. R. Lawler, Grand Trunk, and A. I. Miller, Missouri, Kansas & Texas.

New officers were elected as follows: J. R. Mulroy, St. Louis & San Francisco, president; J. W. Gerber, Southern Railway, first vice-president; G. G. Allen, Chicago, Milwaukee & St. Paul, second vice-president; J. P. Murphy, Lake Shore & Michigan Southern, secretary and treasurer. There were 210 members present at the convention.

The Rinnai Railway, Formosa, is 18 miles long, is tortuous, and has a grade of six per cent. This railway is called the Mount Arisan line, Mount Ari lending its name to the railway as well as to the giant forests that are the objective point of the undertaking. The exploitation of the valuable forest of Mount Ari is no new enterprise. Years ago a private company surveyed a line and commenced constructing a road. But the undertaking was abandoned after futile attempts to interest private capital. Then the government was approached to take over the property of the private concern and carry forward the work. After considerable discussion in the imperial diet an appropriation of $2,450,000 was made in 1910 for the Mount Ari forest exploitation. Practically the operation and property of the private company were of no value, and the work was started anew. The most capable engineers of the government are directing the construction, and difficult obstacles are being rapidly overcome. Aside from the extension of the frontier lines, no undertaking by the Formosan government is more important to the island's development than the Mount Ari enterprise. American manufacturers should be interested in this Mount Ari forest exploitation, because American locomotives and American machinery are almost exclusively employed. At present two American-built locomotives (the Shay high-geared type) are operating on the mountain section, the gage being 2 ft. 6 in. Two new locomotives of the same type have been ordered from the Lima Locomotive & Machine Company. The rails for this railway were also bought in the United States. The entire railway will be finished probably by January, 1913, when logs will be delivered from the forests of Mount Ari to the American-built sawmill at Kagi.

MANUAL BLOCK SYSTEM ON SINGLE TRACK.*

An instructive illustration of the simplicity of the problems involved in the introduction of the manual block system on a single track line is afforded by the action of the Chesapeake & Ohio, west of Cincinnati.

The Chesapeake & Ohio acquired the Chesapeake & Ohio of Indiana, formerly the Chicago, Cincinnati & Louisville, in December, 1910. This is a line of light traffic, running three passenger and an average of five freight trains each way daily over the eastern part of the line, and three passenger and three freight over the western part. No space-interval rule had been thought of until the Chesapeake & Ohio took charge. Indeed, this was a comparatively new road, built too late to be able as an independent line to secure any considerable amount of through business, and the receipts were so low as to demand the severest restriction of expenses. But the officers of the Chesapeake & Ohio had no sooner examined the condition of their newly acquired property than they decided to adopt the block system, and they did so with no appreciable addition to the plant and with an increase in the force of telegraphers of only 26 per cent. (The 39 telegraph offices were manned by 60 operators; this number was increased to 76); and thus the only addition to the pay roll is about $11,000 yearly.

At the east end of the line trains are run for 6 miles over the Cincinnati, Hamilton & Dayton; and at the west end for a considerable distance over the tracks of other companies, so that the length of line within the jurisdiction of one despatcher is 256 miles. From the eastern terminus to Peru, 155 miles, the average number of freight trains each way daily is five. West of Peru, 101 miles, the average number of freights each way daily is three.

Following is a list of the stations, beginning at the easterly end:

CHESAPEAKE & OHIO IN INDIANA.

Block stations.	Distance from preceding station. Miles.	Office open daily.
Summit	0.0	24 hours.
Miami	9.8	7:15 a. m. to 7:15 p. m.
Fernald	4.6	24 hours (14.4).
Shandon	3.3	7 a. m. to 7 p. m.
Okeana	3.5	7 a. m. to 7 p. m.
Peoria	7.1	24 hours (13.9).
Bath	5.9	7 a. m. to 7 p. m.
Cottage Grove	6.0	24 hours (11.9).
Kitchell	5.9	8 a. m. to 8 p. m.
Boston	4.0	6:30 a. m. to 2:30 a. m. (8 hours).
South Richmond	7.0	24 hours (16.9).
Richmond	1.1	6:30 a. m. to 2:30 a. m. (18 hours).
Williamsburg	10.9	24 hours (13.0).
Economy	5.7	8 a. m. to 2 a. m. (16 hours).
Losantville	6.9	24 hours (13.6).
Blountsville	4.2	8 a. m. to 8 p. m.
Medford	6.0	24 hours (10.2).
Muncie	6.4	24 hours.
Gaston	10.5	6:30 a. m. to 6:30 p. m.
Fowlerton	7.4	24 hours (17.9).
Jonesboro	6.3	6:30 a. m. to 6:30 p. m.
Marion	5.1	24 hours (11.4).
Sweetser	5.6	6:15 a. m. to 6:15 p. m.
Converse	5.7	24 hours (11.3).
Amboy	3.1	6 a. m. to 6 p. m.
Santa Fe	5.9	8 a. m. to 8 p. m.
Peru	7.7	24 hours (16.7).
Shops	0.9	24 hours.
Hoovers	8.7	7 a. m. to 7 p. m.
Twelve Mile	4.5	7 a. m. to 7 p. m.
Fulton	5.9	7 a. m. to 7 p. m.
Kewanna	9.4	24 hours (28.5).
Beardstown	12.0	7 a. m. to 7 p. m.
North Judson	10.6	24 hours (23.5).
La Crosse	9.2	6:45 a. m. to 6:45 p. m.
Malden	8.4	7 a. m. to 7 p. m.
Beatrice	9.1	6 p. m. to 6 a. m. (night 26.7).
Merrillville	8.7	7 a. m. to 7 p. m. (day 17.8).
Griffith	5.4	24 hours.

The list shows all block stations from Summit, 6 miles from the passenger terminus at Cincinnati, westward to Griffith, Ind., which is 29 miles short of the Chicago terminus. It will be seen that in this list there are four block sections, each 10 miles or more in length, which are never

*From the annual report of the Block Signal and Train Control Board of the Interstate Commission.

shortened. Twenty-two of the 39 offices are open less than 24 hours a day, as shown. Most of these are open 12 hours during the day. One only (that at Beatrice, Ind.) is open at night, but not during the day. The lengths of the block sections at night, when the day offices are closed, are shown in parenthesis, as, for example, at night the first block section, that from Summit to Fernald is 14.4 miles long. The longest block section is that maintained at night between the Peru shops and Kewanna, 28.5 miles.

In one average day (November 7, 1911) the number of permissive indications given was as shown below. Peru is about midway between the termini of the road, and the despatcher's office is at the Peru shops. The runs of the local freight trains are from Summit to Richmond, from South Richmond to Peru, and from the Peru shops to Griffith.

EASTBOUND TRAINS.

Local freight No. 86, Griffith to Peru. Clear blocks to Beardstown, 46 miles; permissive, on account of a work train, from Beardstown to Kewanna, 13 miles; thence clear signals to Peru, 28 miles.

Eastbound through freight No. 92. Clear at every block except three permissive signals east of Peoria (Peoria, Okeana, and Fernald).

Second No. 92, starting at Peru. Clear blocks 56 miles; permissive one block 6 miles on account of work train, and thence clear to Peoria; permissive Peoria to Okeana, 7 miles; clear thence to Sumnit.

No. 84, local freight, Peru to South Richmond. Clear blocks Peru to Gaston, 46 miles; permissive through Muncie yard; clear Muncie to Richmond, 40 miles.

Local freight No. 82, South Richmond to Summit. Clear blocks South Richmond to Fernald, 33 miles; permissive thence to Miami, 5 miles; clear thence to Summit.

Extra freight No. 1218, starting from Peru. Clear blocks to Jonesboro, 33 miles; one block permissive to Fowlerton, 6 miles, because of local freight ahead; clear from Fowlerton to Summit, 122 miles.

Extra freight No. 1207, starting from Peru. Clear blocks from Peru to Miami, 145 miles, permissive Miami to Summit, 10 miles. (This is nearly all up grade.)

WESTBOUND TRAINS.

Freight No. 71, Summit to Peru. Clear blocks all the way except permissive on account of yard engines at Richmond, Muncie, and Peru.

Local freight No. 81, Summit to Richmond. Clear blocks from Summit to Boston, 50 miles; permissive signals because of yard engines at Boston and South Richmond.

Freight No. 95, Summit to Griffith. Permissive block to Miami, 10 miles; clear blocks Miami to Williamsburg, 61 miles; permissive block thence to Economy, 6 miles; clear blocks thence to Griffith, 174 miles.

Freight train No. 73, Summit to Peru. Clear blocks all the way except for yard engines at Peru.

Through freight No. 75, Summit to Peru. Clear blocks all the way, the train being next behind a passenger train.

No. 83, local freight, South Richmond to Peru. Clear blocks Richmond to Medford, 33 miles; permissive signals for yard engine at Muncie; clear signals Muncie to Santa Fe, 50 miles; permissive signals for yard engines at Peru.

Local freight No. 85, Peru to Griffith. Clear signals all the way.

If the adoption of the block system is to be deferred because of light traffic, this would seem to be a case where such action would be justified; but even with this light traffic the chance—on 256 miles of road, all single track, operating a million to a million and a half train-miles a year—of having butting collisions is not to be ignored; and a single butting collision would not need to be very bad to cost $11,000, or a sum larger than the annual addition to the pay roll which was necessitated by the introduction of the block system.

And in resolving to reduce that chance, the officers of the Chesapeake & Ohio seem to have decided, almost instinctively, on the block system as the proper means, in the same way that they would adopt the air brake for stopping or controlling heavy trains or the best roadbed, ballast, and rails to guard against derailments. The block system has been in use on the Chesapeake & Ohio in Virginia, including a large mileage of single track, for over 20 years, and for several years on substantially all of the company's lines; and the simple, logical conclusion that the space interval is the only rational method of safeguarding trains against collisions has come to be on this road not a mere doctrine to be discussed in lectures, but a "habit of thought," to be put into practice without question.

THE BEST AND MOST ECONOMICAL METHODS OF HANDLING A STATION.*

BY E. H. CAMPBELL,
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The secret of successfully handling a freight station is a matter of system, close attention to the details and the proper keeping of records. Where this idea is carried out and regular channels are arranged for each branch of the work to pass through, they act as guides to the organization in properly handling the business; in fact, it takes care of itself.

All efforts in the line of economy or the saving of expense do not necessarily show results at forwarding stations, but do at the receiving station if started out right. I will refer occasionally to instances in this respect. I will explain my ideas of the handling of a few of the various details.

RECEIVED BUSINESS.

It should be arranged as far as practicable at large stations to secure waybills from billing stations by mail in advance of the cars. These bills should be revised and expensed as soon as received and turned over to the freight house foreman so that freight can be checked and unloaded promptly (from the freight bills) and thereby be ready for delivery as soon as unloaded.

The expensing should never be deferred until freight is unloaded, for several reasons.

First. The freight house force is not able to effect a prompt delivery and goods remain too long in the house, causing congestion and extra handling, which are expensive as well as liable to cause complaint from shippers and result, in many instances, in the loss of future business.

Second. Where the expensing is not done in advance of unloading, it is necessary to check out cars from waybills or blind talley. Using the waybills to check from delays expensing, "freight received" record and abstract work; blind talley checking causes additional and unnecessary expense in rechecking against original waybills.

Third. Where expensing is done in advance of the arrival of cars and is used in checking out freight from cars, all necessary marks shown on packages not appearing on the waybills should be noted on the freight bill by the check clerk.

It is surprising the number of shipments that are prevented from being delayed by information taken from the marks on packages and inserted on freight bills by check clerks. For instance, about 40 per cent. of the shipments originating east of Chicago do not carry the street address of consignee on billing, but in most cases it is shown on the packages. Check clerks insert this information on freight bills, and it is used in sending out postal card notices. Without street addresses in large cities postal cards do not reach consignees and the result is that freight is not called for promptly.

Checking out freight on freight bills also tends to verify their correctness and in case of exception the original waybill is always referred to. Further, the expense bill is a station record and can be referred to at any time, whereas the original waybills are sent to the accounting office daily, which leaves no record of actual checking on file at the station.

Each shipment should be checked out to the drayman from the freight bill. In case of damage or shortage, proper notations should be made on the bills. Where packages have the appearance of having been tampered with, the delivery clerk should check the contents. The signing of receipts at the cashier's window should not be permitted, as they will not hold in cases of claims. The proper place and time is at the freight house door when freight is delivered to the drayman.

Receipts for freight should be carefully and properly filed for future reference, as they are in many instances the company's only defense in case of claims. They should not be tied up with

*Paper read at a general meeting of the Chicago Great Western Station Agents' Association, Oelwein, Iowa, January 27.

string or rubber bands, but securely bound. Some stations sort them out in Pro. number order, others file them alphabetically under the initial of consignee. At Kansas City we make the receipts also answer the purpose of a cash memorandum.

There is no question as to our having to account for the money; therefore, when we collect freight charges we are forced to dig up the receipt before entering the item in our cash book. While the freight bill is pending settlement, the receipt is retained in the freight bill case in the cashier's office. This has proved to be the safest plan for taking care of receipts that I have ever known, and I believe I have tried them all.

As soon as a train arrives, the yard clerk should take such information from the waybills as is necessary for proper carding and switching of the cars and promptly turn the waybills over to the disposition clerk. The latter should promptly notify each consignee by telephone and then confirm the notice in writing, retaining a copy as a station record. In each case where he receives a move order on the car he should note the switching destination on the waybill and give the necessary order to the yardmaster.

As soon as all consignees have been notified, the order clerk should take a record in the demurrage book, turn over to the switching clerk waybills for all cars to be switched, retaining in the hold file waybills covering the cars on which no move order has been given.

No waybill should be taken into account or removed from the disposition desk until cars have been ordered switched to their final delivery track or connecting line. The switching clerk, on receipt of waybills from the disposition desk, should immediately compile his switching statements and then pass the bills to the revising clerk. The revising clerk should promptly revise and take into account all waybills except those covering grain or commodities subject to board of trade or Western Railway Weighing Association weights. The revising clerk should follow up the latter cars and secure weight certificates promptly and then take the bills into account. Bills for through shipments should be given preference and hurried to the connecting line. Failure to do this results in delays to cars.

FORWARDED BUSINESS, L. C. L.

When goods are offered for shipment, there are many things to consider besides the mere checking of articles from the wagon and the signing of the dray ticket. Receiving clerks should be familiar with rules and classifications. Never accept a shipment billed "charges collect" that is apparently not worth the freight charges. Do not accept a shipment of household goods billed "collect" if the classification specifies that it should be prepaid. Do not accept a shipment of cement sacks not properly bound, not marked on linen tags, and not prepaid. Do not accept a shipment billed to any point without first ascertaining whether or not it is an open station. If it is not open, call the attention of the shippers to the fact and have them prepay. There are enough household goods, cement sacks and other shipments held in Kansas City by all lines, for requirements as referred to above, to fill several cars. Connecting lines will not accept shipments from their connections under such conditions.

By the term, "do not accept," I do not mean that receiving clerks should turn the drayman back with the goods, but that they should get into communication with the shipper over the telephone, or refer the case to the office to straighten out.

Receiving clerks should carefully check each article as it comes off the wagon and not simply count the number of packages, and should be sure that every package is marked in a plain and durable manner. It should be borne in mind that when packages go astray in transit without marks they seldom reach their proper destination. Primarily, the shipper is at fault, but as he holds the agent's receipt, the company pays for the goods. In loading out freight, check the truckers up close to see that they take freight into the proper cars and thereby reduce the chance of freight going astray. A good stowman can prevent many shipments going wrong by keeping close watch on the freight brought into the cars by truckers.

CARLOAD FREIGHT FORWARDED.

In furnishing empties for loading, never use a system car if you have a foreign empty for home in the direction of destination of your shipment. It is expensive to allow a foreign empty to remain on hand and more expensive to haul it home empty.

Keep a close check on your loads awaiting billing, and call on shippers or connecting lines for billing. Keep a close check on billing held for cars from connecting line industries and trace the cars if they do not show up promptly. As a rule the shippers give the revenue line all credit for poor service, seldom making any allowance for poor switching service.

Do not, at terminals, as some do, keep a book record of trains forwarded. It is unnecessary and a waste of time and often delays the departure of a train. Take for your record a carbon of the wheel report you make for the conductor. In billing carloads, read carefully the classification and tariffs covering the commodity. If the size of the car ordered or the one furnished at the company's convenience governs the rate, show it on the billing. At Kansas City we have no end of trouble trying to collect bills where the billing to us fails to show such information. One day last month alone we had so many cases of agents billing in grain with no notation as to size of empty ordered or as to loading with reference to visible capacity of car, that we had to use the duplicating machine to get out enough letters asking for the information. By referring to grain tariffs, agents will find a clause to the effect that the minimum shall be 10 per cent. less than the marked capacity of the car except when loaded to full visible capacity.

At large terminals, cars are switched to mills and elevators on other lines, and receiving agents have no way of knowing how they are loaded; therefore, collection of charges is delayed until information is furnished from the originating station.

COLLECTION OF FREIGHT CHARGES.

If there is any one feature of the details of a station on which more money can be saved than on any other, it is by the prompt collection of freight charges. To substantiate this, a few years ago I took charge of a station where the daily uncollected bills averaged about $30,000. In a short time we brought the daily average down to $10,000. When I took charge at Kansas City the uncollected bills averaged about $60,000 daily. In a short time we brought this average down to less than $25,000. Understand now that this is a daily average, not the bills uncollected at the end of the month. This means that these two stations put in the company's treasury every day $55,000 that was formerly left in the hands of shippers. In other words, some shippers had been doing business on the railway company's capital.

I do not know what money is worth to this company in the way of interest, but say it is worth 4 per cent. That means we have earned $2,200 a year at these two stations. Possibly the same conditions that I found prevail at other stations. I would suggest that each agent give this matter his attention. Draw off your daily uncollected bills for a month, divide the total by the number of working days and then see how much a day you can reduce the average.

The reduction in uncollected bills has never to my knowledge cost the company a cent in loss of business. I have taken but one man off of the credit list since I have been in Kansas City. Never but once has complaint been made; then without reason, and it did not affect us. It is seldom necessary to place a merchant on a cash basis and it is not difficult to secure money promptly without trouble or feeling.

My experience is that the principal cause of large uncollected accounts is improper figures on freight bills caused by wrong weights, classification or rates. If you present a bill for $100 to a reliable patron and he contends for some reason that he has been overcharged several dollars, if the contention seems reasonable, do not allow the entire bill to run until you investigate

through connecting lines, point of origin or other channels, but collect the $97 or whatever amount he admits he owes, and get the bulk of the money working for your company. If the consignee is wrong he will pay the balance due when the investigation is finished and the matter is properly explained to him.

Never allow a collector, or others not fully posted on rates, etc., to argue with a shipper over a bill. Make it a point to present your bills promptly. It leads patrons to believe that if your line is prompt in this respect you despatch their goods in the same manner.

Further, many patrons buy goods with a discount allowance if the bill is settled for in a specified time, and a receipted freight bill is considered as part payment. Therefore, we should not cause patrons to lose discounts by our failure to present bills promptly.

FILING TARIFFS.

Large uncollected lists and delayed payments are due to a great extent to wrong rates caused by failure to file tariffs. The work of properly and promptly filing tariffs is done more laxly than any other station detail. Many agents do not understand how to file tariffs, and often where they do no one else can locate them. Some roads have traveling tariff men to file tariffs, but it is an unnecessary expense. With proper system, the average office boy can file tariffs properly. For instance: the standard tariff case at stations contains 60 pigeonholes. Sort out your tariffs in the various pigeonholes and number the latter from one to 60. Then in one day's time you can index them all, using a small book with pages numbered from one to 100, using the last two figures of the tariff for page number and opposite this number show pigeonhole number. As amendments are received, refer to the index and insert the box number with pencil on each, then you are ready to place each amendment in the proper box. When one tariff is superseded by another, cross reference it in the index book and write up under the new number using the original box number.

When you have occasion to look for a tariff from foreign territory or on a special commodity, refer to the commodity index No. 25-A, issued by the general freight office, which gives you the number. It is then an easy matter to refer to the index and get the box number.

This work could be made much more simple for agents in filing, if the general freight department would maintain four standard files in its office, one for each division, with tariffs properly arranged in each pigeonhole as fast as issued, and in issuing new ones or amendments, stamp the pigeonhole number or box number on each. Unless some system of this kind is inaugurated, I am afraid railways will never be able to keep proper files at all stations.

STATION RECORDS AND THEIR PRESERVATION.

There is scarcely any detail connected with a station that saves more expense not only at the station but in the freight claim agent's office as well, as the proper keeping and preserving of records.

Records are not made simply to give people employment, but are for the purpose of handling claims, tracers, accounts and other matters that follow the shipments from their origin until the accounts of shippers and carriers are finally closed; and unless they are systematically filed, accounts are held open, claims delayed, the company loses money, and shippers become dissatisfied, which often results in loss of business.

I have spent from three or four days to two weeks at all the large stations on this line, and have put in time in proportion at the smaller ones. Several stations (not including Chicago) at times had on hand from 400 to 700 claims and other correspondence in proportion. These conditions were not entirely due to lack of help, but principally to lack of system.

To illustrate: A claim clerk takes a bunch of 30 claims out of the stack of 500, picks up the top one, puts in a few minutes reading it and discovers that the claim agent desires a copy of a receipt for the goods. Knowing that the station receipts have not been filed for months, he figures it is about a two hours' job to find what is desired, therefore he places the claim on the bottom of the stack. He then picks up the next one and finds a copy of forwarded billing is required. The waybill books are not properly numbered, but he looks over a bunch of 10 or 12, finally finds the right one, and then makes out the copy, but has consumed considerably more time than necessary. Picking up the next paper he finds the auditor of freight receipts tracing for the account of a June 10 waybill. He puts in half an hour running through the entire freight received record for that month, but does not find it and again the papers go to the bottom of the stack. Had the station been keeping an index record of received waybills, it would have taken about 15 seconds to discover that the June waybill desired was taken into account on July 7 and the correspondence could have been disposed of.

Claims and other correspondence have to be answered and if put off today on account of poor records, bob up again, so why not have all records in such shape that it is an easy matter to find everything?

In the last few years most railways have adopted loose-leaf records at stations. At large stations this is a great improvement over the books formerly used, for the reason that one clerk writing up records does not monopolize more than one day's business at a time. At Kansas City we use temporary binders which accommodate about 1,000 sheets each and all loose records are placed in these binders daily and when filled are transferred to the permanent binders. Before we put in these binders at Kansas City (about 18 months ago) we had a great deal of difficulty trying to keep sheets in order until ready for the permanent file, and I have noticed the same trouble at other stations.

I have also found that the numbering of books or binders in numerical order and uniformity in marking them saves time as compared with the dating of them only, as they are more easily found and seldom are they put back in the wrong place after being used.

I believe that a proper filing of every record from the time that it is originally made out enables large stations to do the work with at least one man less than where the filing is lax; but avoid two or more records where one will answer all purposes.

O. S. & D. FREIGHT.

Just a few words in regard to "over" and "short" freight, of which Kansas City seems to receive its share. Keep an alphabetical index record of every over shipment, keep another of every short shipment. If consigned or marked to your city proper, index under the name of the consignee; if to a point on a connecting line, index under destination.

When a shipment checks short today destined, for instance, to Lake Charles, La., index it in the short book under letter "L" and send the bill to the connecting line for "revenue only." Three months later a shipment comes in "over" marked Lake Charles, La. Look through your short index and you will find where it belongs, write it up in the over index book and cross reference both entries and then send the shipment to destination on astray bill, referring thereon to the revenue bill of three months previous.

A claim is usually going the rounds by this time. When it reaches you show delivery since the claim started, and the result is that the claim is then withdrawn. Match your city overs and shorts through your index book in the same way. Many a claim for shortage is paid in cases of this kind through lack of having a ready system of checking.

A blind check of every package in the freight house should be taken once a week if possible. The best plan is to take this check on days when the house is most clear of freight, and then compare your bills against this check. This often results in straightening out of overs or shorts and also assists in the delivery of freight. An agent should personally examine this check and make sure that every effort possible is being made to dispose of freight on hand. The check should include freight held for prepay or other similar causes.

From my experience I have found that most agents thoroughly

understand their duties, but often fail to succeed by becoming discouraged when things break badly. If you make up your mind to conquer, there is no such word as fail. Do not get discouraged when work runs behind or when you are sent to straighten out a station that is in a rut. Get into the work personally, put in all the time you can spare at one branch of it until you get it in line, then take up another branch, and so on. It will only be a short time until you are even with the entire game.

Never lay the conditions to the fact that you are unable to obtain good or experienced men. Experienced men are all right when you can get them, but I have secured very good results from having bright inexperienced young men and educating them to do the work as we desire it.

THE DROP TRUCK SYSTEM OF HANDLING FREIGHT.

The drop truck system has some advantages over the old method of handling freight, but its entire success depends largely on conditions and the class of business handled.

The system is applied at some stations on both in and outbound freight, while at others, it is confined to outbound business only. Some lines throw all their laborers into one large chain gang, while other roads claim better results by dividing the men up in separate gangs.

Where all laborers are in one gang they work under the direction of the foreman and one assistant, who are stationed at most suitable house or dock points to direct the men. On the unloading one check clerk and truck loader are placed in each car and as fast as they load a truck it is pulled outside the door on to the platform and an empty truck is drawn into the car. The laborers, in trucking, drop empties opposite such cars and pull the loads into the house.

Most freight houses have from two to four tracks several hundred feet long paralleling each other, all of which are filled with cars for unloading and in many cases truckers can only reach cars from cross-overs around the ends of tracks or through occasional openings through the cars. With the men all in one gang they drop their empty and pick up the first favorable load they come to. The result is that freight nearest the ends of the tracks moves promptly, while freight further down from both ends is neglected. Every little while work is delayed in giving relief to the neglected truck loads.

Check clerks and truck loaders have no jurisdiction over the truckers, and when they find articles in a car too heavy for two men to handle there is a delay in getting sufficient help. Truckers also shun the heavy loads until specifically ordered by foreman to pick them up.

There was so much trouble of this kind at Kansas City that some of the roads have given up the one gang part of the system of unloading and instead are using drop trucks in separate small gangs under the direct charge of check clerks, while other lines are using the old system of gangs. Both of the latter plans are giving better results than the chain gang or "running wild" system. Check clerks are held responsible for their men, and it is impossible for any of the men to drop out without being discovered. Where all the laborers are in one gang, it happens frequently that men will answer the roll call, work an hour or so and then hide out for a couple of hours unnoticed. In checking up at one of the largest houses in Kansas City, 17 men were found to be missing at one time, and every one of them was finally located away from the company's property. In my opinion the chain gang is not a success, nor is it economical.

On forwarded business there is considerable merit in the drop truck system, particularly if the business is heavy and if it is delivered by shippers, to any great extent, early in the day. By furnishing each receiving clerk with one truck loader, freight can be checked off the wagons onto trucks and loaded in station or block number order. These trucks are pulled a short distance away from the door or from the edge of the wagon dock as fast as loaded.

While this work is being done all other laborers are used in the unloading of received freight. As soon as there is an accumulation of loaded trucks or the supply of empties begins to run low on the dock, eight or ten men are taken from the unloading work and pull all the outbound loads out to the car doors where the stowman takes charge of them. As they return they bring back all empty trucks. As soon as the dock is clear of loads, they return to their unloading. As a rule, this performance is repeated once or twice. Later in the day or in the afternoon when shipping becomes heavier the entire force is put on the outbound work.

Where the entire labor force is thrown into one gang considerable trouble is experienced by laborers taking the wrong class of goods to cars first. For instance, laborers will take trucks of package freight and leave long pipe, etc., simply because the former is easier to handle. Pipe, pumps and similar long freight should go into cars first and failure to do this causes the shifting of freight in the car to make room, which, of course, results in delays and expense. When separate gangs are used, check clerks order such freight moved promptly.

The works which will unite the Central Railway of Brazil with Belem, capital of the state of Para, on the San Francisco river, are progressing rapidly. This railway, together with the Sao Paulo to Cuyabas, in the state of Matto Grosso, and the Goyaz railway will connect the federal capital with the states of the Amazon region. A bridge is being built over the San Francisco river.

In spite of great projects and many promising features, the railway situation in China does not presage the immediate development of the country along modern lines. Much has been accomplished, but, in spite of the fact that the interest of the entire world has been centered to an unusual degree upon the building of railways in China, that both Chinese and foreign statesmen well understood that the first requirement in the development of the country's resources and its advancement is railway construction, and that railway systems aggregating more than 13,400 miles have been planned, of which 5,000 miles have been surveyed in a more or less definite and final manner, the construction during 1910 of railways of all classes, including extensions of existing lines, further work on lines already commenced and operated to a certain degree, and entirely new lines, did not exceed 500 miles, and at least part of this construction must be credited to the previous year. Of this construction, about 275 miles is accounted for in the work on the Tientsin-Pukow system, of German ownership. The Ichang-Wanhsien line and other Yangtze valley lines account for about 40 miles; the extension of the Canton-Hankow system north from Canton, including branch lines to various points, and the extension of the same system south near Changsha, including lines to mines, 80 miles; the Canton-Kowloon Railway, the Sunning Railway extension, and work on the Amoy-Changchow and other coast lines, 75 miles; the extension of the French railway from the south to Yunnan, 60 miles; and apparently about 60 miles of new road were constructed in the Manchuria country during the year. Scarcely any of this is actually new work, most of it being the continuation of work commenced in other years. The fact is that while plans for new railways in China are common actual development is proceeding slowly. New plans are carried out with difficulty, modified, or abandoned. For this there are several causes, most of which appear reducible to one or two circumstances—either the people are unwilling that other nations should furnish the money to build roads, and have not the money themselves, or, if willing to borrow from abroad for such work, other considerations have so far prevented the placing of the necessary loans under admissible conditions and circumstances.—*George E. Anderson, American Consul General at Hong Kong.*

General News Section.

The first regular passenger train to cross the new Galveston causeway was a Santa Fe train which made the trip on May 17.

The car shops of the American Refrigerator Transit Company at St. Louis were considerably damaged by fire on the night of May 14.

The Lake Shore & Michigan Southern has been fined $1,000 in the United States district court at Indianapolis for violation of the hours-of-service law.

According to a press despatch from Italy, telephone conversation by means of wireless apparatus was, on May 17, transmitted a distance of over 160 miles, from Monte Marie to Magdalena Island.

At the annual meeting of the National Association of Manufacturers, held in New York City this week, ways of preventing accidents in factories and other places were illustrated by an exhibition of motion pictures.

The city council committee on steam railways at Cleveland has invited steam railway officers to attend a hearing on June 5 to express views on a general policy for electrifying the steam railway lines within the city limits.

The Brotherhood of Locomotive Engineers, in biennial session at Harrisburg, Pa., has voted that hereafter the convention shall be held only once in three years. Warren S. Stone has been reelected grand chief, for a term of six years, by a large majority.

The War Department has announced that a hearing will be held in Chicago in June on the complaints against the fixed bridge built by the Chicago, Burlington & Quincy about 20 years ago across the Illinois river in LaSalle county. The boat owners want a drawbridge.

It is reported from Los Angeles that federal officers have announced their intention of attacking the holdings of the Southern Pacific in the oil sections of California on charges of conspiracy to obtain patents on oil-bearing land as agricultural property.

Mayor Harrison, of Chicago, has vetoed an order of the city council directing the corporation counsel to oppose in court the contract between the Illinois Central and the Board of South Park Commissioners by which the railway gives up its riparian rights to the shore of Lake Michigan in exchange for a wider right of way.

The House judiciary committee at Washington has continued to take testimony in connection with the charges against Judge Archbald of the commerce court during the past week. None of the evidence given has been sufficiently clear and comprehensive to afford material information as to whether or not the charges are well founded.

The lawyer, claim agent, and two detectives, who were indicted at Toronto recently for contempt of court in framing a fictitious damage suit before the court for the purpose of showing how the Toronto Street Railway had been defrauded by suits for damages by persons who had not been injured, have been let off, on making to the Justice a suitable apology.

The Massachusetts legislature has rejected the bill recommended by Governor Foss to provide for the merger of the Boston & Maine with the New Haven, and for the electrification and other improvements at Boston, the Senate rejecting it by a vote of 15 to 20. Governor Foss has told his friends that he shall call an extra session of the legislature in July for the purpose of passing his bill.

The National Civic Federation has sent R. H. Whitten to England to make a four months' study of the governmental regulation of public service corporations in that country. Mr. Whitten is statistician of the New York Public Service Commisison, First district. The National Civic Federation will soon issue a part of its compilation of the public service laws of the United States, England and Canada.

The Panama Canal bill was discussed at great length in the House of Representatives at Washington, on Tuesday of this week, and the proposals to allow American ships to pass through the canal free of toll and to forbid the use of the canal entirely to ships owned by railway companies, were favored by large majorities; but this action was in committee of the whole, and whether it will be confirmed on final vote remains to be seen.

A committee of officers of the Harriman Lines is making a study of the safety committees which have been organized on various railways with the idea possibly of recommending the establishment of similar organizations on the Harriman Lines. The committee is composed of W. R. Scott, assistant general manager, Southern Pacific; M. J. Buckley, assistant general manager, Oregon-Washington Railroad and Navigation Company, and Charles Ware, assistant general manager, Union Pacific.

President Taft, acting on information gathered by the Department of State, has had letters sent to the prominent railways of the country in the interest of the 80 locomotive enginemen and 83 conductors who have recently left the service of the Mexican National Railways, and who are now in the United States, out of work. The State Department kept informed of the differences in Mexico which resulted in the Americans leaving their jobs, and our ambassador endeavored to effect a reconciliation; but was unsuccessful.

After many postponements the trial of the four former Illinois Central officers indicted on charges of defrauding the railway in the notorious "car repair graft" cases has been set for June 3 before Judge George Kersten of the Chicago criminal court. The defendants are: F. B. Harriman, formerly general manager of the Illinois Central; J. M. Taylor, formerly general storekeeper; C. L. Ewing, formerly general superintendent, and J. E. Buker, formerly superintendent of the car department. At a hearing on May 14 the court insisted that the case go to trial on the date set without further delays.

It is announced that the Southern Pacific is to follow the plan of giving publicity to accidents which has been in effect on the Union Pacific and other lines of the Harriman system for several years. Following an accident that is not of minor consequence the ranking officer of the division will convene a board composed of two disinterested persons not connected with the railway, and the division officers representing the operating, mechanical and engineering departments. The board will conduct a thorough investigation to fix the responsibility for the accident, and its findings will be given to the newspapers.

The anthracite coal miners, in convention, at Wilkesbarre, last week adopted the report of their committee recommending an agreement with the operators, on the plan heretofore published. This action, which evidences a business-like dispostion among the rank and file to sustain their leaders, averts the threatened strike, and work will be largely resumed this week. The plan, as presented by the operators, provides for fixed rates of wages, and the sliding scale, which has been in force during the past ten years, is abolished; but it is said that the new rates are enough higher than the old, so that the miners will be decidedly better off than with the sliding scale.

The New York State Public Service Commission and the New York City Board of Estimate are rapidly preparing the details of the plans and arrangements under which the new subway and elevated lines, recently agreed upon, are to be built. When all of the lines now proposed shall have been finished, the rapid transit railways in the city will aggregate 687 miles of track (not line). The elevated and the underground lines to be worked by the Interborough Rapid Transit Company will aggregate 377 miles of track, and those to be operated by the Brooklyn Rapid Transit Company, 310 miles. This does not include the ordinary trolley surface roads, in the streets, operated by the Brooklyn Rapid Transit Company.

The Mississippi railway commission has shown a spirit of cooperation with the railways operating in the state by announcing its intention of taking into consideration the large amount of damage inflicted on several of the roads by the recent floods in the Mississippi river, before ordering them to make expensive

improvements. While the announcement was made informally to railway officers, they have been given to understand that the commission will for a time at least leave the railways that have been most affected by the floods free to use their own discretion in the expenditure of available funds for the purpose of restoring service as quickly as possible to the communities most in need of it. It was recently reported in the *Railway Age Gazette* that on April 29 there were 351 miles of branch lines of the Yazoo & Mississippi Valley in Mississippi under water, and many towns have suffered severely by the lack of communication. Instead of being ordered to make improvements to accommodate the towns that are continually demanding new stations, more trains and more stops by existing trains, the roads will be allowed for a time to devote their energies to repairing the devastation caused by the floods.

The City Club of Chicago has announced a series of exhibitions and discussions on the present conditions and possibilities of improvement of Chicago's transportation problem to be held from May 23 to June 8. The exhibition will deal with transportation by boat, on foot, on wheels, through pipes and over wires. The program includes an illustrated lecture by Samuel Insull, president of the Commonwealth Edison Company, on "Supplying the Energy Requirements of the Community," on May 23; an illustrated lecture by Professor J. Paul Goode of the University of Chicago on "Chicago, the Transportation Focus," on the evening of May 24; an address by F. A. Delano, president of the Wabash, on "The Transportation Proposals of the Commercial Club of Chicago," at 1 p. m. on Monday, May 27; an address on "Freight Interchange in Chicago" by L. T. Jamme, general manager, Chicago Transfer & Clearing Company, on May 28; a discussion on "Freight Collections and Deliveries," by Charles J. Harth, manager J. C. Zipprich Teaming Company, Oscar H. Bell, traffic manager Crane Company, C. O. Frisbie, traffic manager Armour & Company and James J. Wait, president Merchants Lighterage Company on May 29; and an address on "Railway Electrification" by W. F. M. Goss, director, engineering department, University of Illinois, and member Association of Commerce Committee on Smoke Abatement and Electrification, on June 3. The other subjects to be discussed are: "Passenger Subways for Chicago," "The Sub-Surface Pipe and Wire Net Work," "Transportation by Post" and "Methods for Reducing the Demand for Transportation."

Freight Rate on Material for Repairs of Cars Damaged on Foreign Lines.

Joseph W. Taylor, secretary of the Master Car Builders' Association, has issued to members the following circular concerning a proposed change in the M. C. B. rules:

Conference Ruling No. 333, of the Interstate Commerce Commission, reads as follows:

"333. Company Material.—Material for use in the repair of one of its cars was shipped by a carrier to the shop of a connecting line. Upon inquiry whether the material could move free of charge over both roads, it was held, That in cases of this kind company material may move without charge only over the line at whose expense the repair is made."

Inasmuch as present Rule 122 conflicts with this conference ruling, the Arbitration Committee suggests, and it will so recommend to the convention in June, that the first paragraph of Rule 122 be changed to read as follows:

"Rule 122. Companies shall promptly furnish to each other, upon requisition, and forward, freight charges from point of shipment to destination to follow, materials for repairs of their cars damaged upon foreign lines, excepting that the company having car in its possession at the time shall provide from its stock the following:

"Lumber, forgings, hardware stock, paint, hairfelt, piping, air-brake material and all M. C. B standard material.

"Requisitions for such material shall specify that same is for repairs of cars, giving car number and initial of such car, together with pattern number or other data, to enable correct filling of requisition."

Under the ruling of the commission, material for repairs of foreign cars may be moved without charge over the line at whose expense the repairs are made, but your committee believes that less trouble and annoyance will be occasioned if the shipment is made on a freight rate from point of shipment to destination.

An Alternative to Government Ownership.

A suggestion of a plan by which the government might become a partner of the railways, by purchasing a part of their stock, as an alternative to complete nationalization, was made by B. L. Winchell, president of the Frisco Lines, in an address before the Peoria Transportation Club on May 16. He said in part:

"The matter of public control of privately owned property is one which must soon have serious consideration and definite determination.

"How to induce the owners of capital to invest it in property which is, in important details, to be managed by public authorities is as yet unknown.

"Although not yet prepared to advocate any such plan, we may have to come to some form of government partnership, instead of government ownership, which will be the fair and logical outcome of present tendencies, because it is fundamentally unfair to permanently give the owner of property no controlling voice in the management of it.

"We may yet find it wise to have the government purchase say 40 per cent. of the stock of the various railway companies; have a proportionate representation on the boards of control, and perhaps even guarantee future issues of bonds for the purpose of raising the necessary capital for needed facilities and equipment. Such guarantee will materially reduce interest rates in addition to making for a tendency to rate adjustments which will insure fair returns on Uncle Sam's investment in stocks.

"We will some day find a practical way, also, to have compulsory arbitration; it will some day be a legal crime for a railway employee to strike as well as for a railway official to refuse to arbitrate.

"Our cities depend upon daily transportation of commodities, and a way will and must be found to insure continuity of railway service."

The Traffic Man's and the Operating Man's Points of View.

J. C. Stubbs and J. W. Kendrick have each recently made exhaustive reports on Wabash Railroad's traffic and development possibilities for the protective committees which they respectively represent. Stubbs' report is said to be the less optimistic of the two, although both concur in the belief that $40,000,000 to $45,000,000 spent on the property in the next few years will produce big returns.

That Stubbs' report does not hold out as extravagant hopes as does the Kendrick report is attributed partly to the fact that as a traffic man he views the operating problems confronting the Wabash with greater alarm than would be felt by Kendrick, who is essentially an operating man and, therefore, in position to brush these considerations aside as capable of easy solution when money for their remedy is provided.

Kendrick's training on the Atchison has furthermore instilled in him a spirit of optimism. The entire Atchison staff have always been known as enthusiasts from the lowest up to the president, except when the latter is fighting mad, at which times he issues pessimistic utterances. These merely represent too much pressure on the steam valve and not a chronic state of mind.

On the other hand the Union Pacific officials have never expressed themselves in extravagantly optimistic or enthusiastic terms, but have conservatively plotted out a course which they have lived up to to the best of their ability, and the results achieved have been second to none. Whether it is better to overshoot or undershoot the mark is an opinion largely acquired by training and environments.—*Wall Street Journal.*

Chicago Freight Handlers' Strike.

Following the refusal of the Chicago railways to submit to arbitration the demands of the striking freight handlers who left their work on May 4, as reported in last week's issue, an effort was made by President P. J. Flannery of the Brotherhood of Railway Freight Handlers to extend the strike to other cities, but with little success. A few men walked out at Dubuque, Ia., Quincy, Ill., Galesburg, Ill., and Milwaukee, Wis., but their places were soon filled. On May 17 the Illinois state board of arbitration offered its services to adjust the differences between the railways and strikers, but was informed by W. A. Garrett, chairman of the General Managers' Association, that it was contrary to the policy of the railways to arbitrate with men who had left the service, and that so far as they were concerned the strike

was regarded as a closed incident. The railways are planning to establish in the Chicago district a plan of paying freight handlers on a tonnage basis, the rates of pay to vary according to the different conditions at the different freight houses, but to be based on present rates per hour.

Truckers now receive 22 cents an hour and by working 10 hours a day for six days a week earn a weekly wage of $13.20. At the increased rates that the striking employees demanded, including overtime for the tenth hour and for Saturday afternoon, the weekly wage for the same amount of work now performed would be increased to $19.15, or 45 per cent.

"Turning the First Sod"; New Process.

Ascending a platform surrounded by machinery for railway building, Gov. Aram J. Pothier, of Rhode Island, at Woonsocket, May 21, pulled the lever of a giant steam shovel on a farm near the town, and the work of constructing the Southern New England Railway, which will bring the Grand Trunk from Palmer, Mass., to tidewater in Providence was begun.

Special Committee on Relations of Railway Operation to Legislation.

The report submitted by the Special Committee on Relations of Railway Operation to Legislation, W. J. Jackson, chairman, to the railways supporting it was approved at a meeting of these roads in New York on May 15. Three hundred and thirty roads having 217,096 miles of line are supporting its work.

The committee, under the authority of standing resolution No. 10, has felt its way carefully in conducting conferences with representatives of employees and with administrative bodies, and, as a result of its experience and in view of the attitude of the Interstate Commerce Commission and other departments of the government and that of the representatives of the employees, feels that its field of usefulness has been greatly broadened, and that a permanent organization is necessary in order to fully perform its duty.

"Your committee," says the report, "is convinced that by settling differences of opinion between the railways before any discussions are had with other bodies, and by the presentation of the views of the railways as a whole, instead of individually, the results have been more satisfactory, and will be more advantageous in the future than by the adoption of any other course."

Regarding the subject of physical valuation of railways, the report says:

"A bill has been introduced into the House of Representatives, and reported favorably on March 30, 1912, providing for this.

"While it is possible this bill will not pass at this session of Congress, and while this is not a subject of which your committee has charge, yet in view of the repeated requests of the Interstate Commerce Commission for authority to make such a valuation and the reported willingness of Congress to grant it, your committee is of the opinion that the subject must soon become an active question, particularly inasmuch as in a considerable number of states valuations on varying bases are already being made.

"It is therefore probable that federal legislation will ultimately be necessary to provide uniformity of method. Your committee thinks that any bill on this subject will probably provide for the valuations to be made by the railways in the first instance, subject to the approval of the Interstate Commerce Comsion, but this will work out that the valuation must be made by a method prescribed by that commission."

The report states that on January 5, 1912, a conference between representatives of employees and the committee developed that the working arrangement covering the interpretation of the hours of service act agreed on in June, 1911, has proved satisfactory to both parties, and that after conference with the Interstate Commerce Commission it was determined to continue this working arrangement until January 1, 1913, with the tacit acquiescence of that commission. The committee renews its recommendation that steps be taken to form operating committees in the several states, in order to present to legislators and to state commissions through practical men the practical questions involved in any orders or legislation proposed, and that the data and publications of the committee be utilized in state affairs to harmonize the work of these committees.

Exhibit No. 3 of the committee's report gives a list of all bills relating to operation introduced in the sixty-third Congress.

The New York, Westchester & Boston.

The New York, Westchester & Boston line from the temporary station at 180th and Adams streets, New York City, to New Rochelle, N. Y., eight miles, will be opened May 29. The branch to White Plains will not be ready for operation for several weeks.

The road, which is a New York, New Haven & Hartford subsidiary, is a four-track high speed electric line, built to first class steam railway standards, and to be operated by multiple unit trains. It is four track from 180th street to a point a mile beyond Mount Vernon, where two tracks diverge to New Rochelle and a junction with the main line of the New Haven, while another two-track line diverges to White Plains. South from 180th street there is under construction a connection with the New Haven's six-track Harlem River branch at 132nd street.

International Railway Fuel Association.

The opening session of the fourth annual convention of the International Railway Fuel Association was held at the Hotel Sherman, Chicago, May 22. The membership is now 400 and 150 were present at the opening meeting.

The meeting was opened with prayer by Rev. Frederick E. Hopkins, followed by an address by the president, T. Duff Smith, of the Grand Trunk Pacific. Robert Quayle, superintendent of motive power, Chicago & North Western, addressed the meeting at length; he opposed the pooling of engines and emphasized the necessity of team work between the engineer and fireman in the economical use of fuel. He said that if the men were accustomed to the peculiarities of their own engines they could best adapt the fuel methods to suit them. Walter S. Bogle, president of the Crescent Coal and Mining Company, gave an excellent address from the coal producer's standpoint, in which he said that the cost of coal production had increased 100 per cent. within the last fifteen years, and that the recent laws in regard to safety appliances for mines and the conservation laws were tending to still further increase this cost. He concluded that while for a time coal companies might exist without increasing the price of coal, if the process continued it would eventually result in their bankruptcy, and that it was to the best interests of the consumer to pay a price that would permit the companies to remain solvent. He also said that labor demands had largely increased the cost of production. Labor unions should be incorporated so as to have the same responsibilities as to contracts as do other corporations. He advocated united effort on the part of labor employers in adopting methods to meet advancing demands of labor unions, and suggested that such work might well commence in the Railway Fuel Association. Dr. W. F. M. Goss then read a paper on Fuel as a Factor in Locomotive Capacity, which resulted in an interesting discussion. A full report of the convention will appear in the *Railway Age Gazette* of May 31.

Following is a list of the exhibitors:

Duplicator Manufacturing Company, Chicago.—Machine for duplicating railway forms. Represented by W. J. Miskella.

Goodman Manufacturing Company, Chicago.—Photographs of coal-cutting machines, electric mine locomotives and locomotives for general underground use. Represented by W. A. Miller. H. H. Small and C. F. Roeder.

Gulick-Henderson Company, Pittsburgh.—Chemical testing station for determining actual heat of coal. Represented by H. Gulick, W. O. Collins, J. W. Henderson and C. H. Higgins.

Osborne Valve & Joint Company, Chicago.—Working model of an Osborne "Nokut" valve for steam, air, water, gas, etc. Represented by C. M. Schneider and W. A. Tilley.

Roberts & Schaefer Company, Chicago.—Working model of a 100-ton structural steel single bucket counterbalanced type of Holmes fireproof coaling station; photographs of various modern coaling and washing stations and also of a coal briquetting plant. Represented by C. T. Malcolmson and W. R. Ourand.

G. L. Simonds & Company, Chicago.—Vulcan soot cleaner, Hays gas analysis instrument and Dean boiler tube cleaner. Represented by G. L. Simonds and F. A. Moreland.

Shear-Klean Grate Company, Chicago.—Working model of the Shear-Klean grate. Represented by George Kohout.

Stromberg-Carlson Company, Chicago.—Models of mine telephones, wall telephones, extension bells, etc. Represented by E. C. Lewis, C. W. Schafer and C. A. Anderson.

National Association of Manufacturers.

The annual convention of the National Association of Manufacturers was held in New York City this week, with John Kirby, Jr, of Dayton, Ohio, president of the association, in the chair. In his opening remarks Mr. Kirby declared that the past year has witnessed the steady decline of labor unionism of the "Gompers type." The committee on interstate commerce and Federal incorporation in its report defends the Commerce Court. Although the court has not in all instances acted in perfect harmony with the Interstate Commerce Commission, it is not fair to assume that the court merits the criticism directed against it. The proposals for Federal incorporation laws have made little progress during the past year, and the manufacturers are urged to work for them in the interest of a sane regulation of industry. The prime function of our government should be to promote an attitude of sympathy and co-operation.

W. J. H. Boetcker, of Toledo, made an urgent plea for a strenuous campaign to further knowledge and skill in the various trades of our boys and girls. Workers must be taught that we are not their natural opponents because we are their employers, but that there is a mutuality of interest that binds more strongly than the differences which may from time to time arise, and which are sometimes unavoidable.

In the afternoon there was an exhibition of motion pictures showing the cause, effect and remedy for various kinds of industrial accidents, a model factory fire drill and a lifeboat drill at sea. More than 1,000 employers and delegations of workmen attended this exhibition. Frank E. Law, vice-president of the Fidelity & Casualty Company, New York, gave an address on "Workmen's Compensation for Accidents."

Western Railway Club.

The annual meeting of the Western Railway Club was held in the Karpen building, Chicago, on Tuesday evening, May 21. The membership of the club is now 1,437. The following were elected officers for the ensuing year: President, T. H. Goodnow, general superintendent, Armour Car Lines; first vice-president, H. H. La Rue, master car builder, Chicago, Rock Island & Pacific; second vice-president, W. B. Fall, superintendent, Mather Stock Car Company; secretary and treasurer, J. W. Taylor. The members were entertained with a musical program at the close of the meeting.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomaston, Boston, Mass.

AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York; next convention, September 12, Seattle, Wash.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Detroit, Mich.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York. Convention, October 7-11, Chicago.

AMERICAN ELECTRICAL RAILWAY MANUFACTURERS' ASSOC.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, Monadnock Block, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOC.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—M. H. Bray, N. Y. N. H. & H., New Haven, Conn. Convention, July 9, Chicago.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York; spring meeting, May 28-31, Cleveland, Ohio.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago. Semi-annual, June 11, Atlantic City, N. J.; annual, October 21-25, Chicago.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conrad, 75 Church St., New York. Convention, Oct. 7-11, Chicago.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago. Convention, May 22-25, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOC. OF U. S. AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Convention, September 10-13, Denver, Col.

NATIONAL RAILWAY APPLIANCES ASSOC.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

NORTHERN RAILROAD CLUB.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

RAILWAY BUSINESS ASSOCIATION. Frank W. Noxon, 2 Rector St., New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOC.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

RAILWAY GARDENING ASSOCIATION.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.

RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L., S. W. Ry., St. Louis, Mo.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.

RAILWAY SUPPLY MANUFACTURERS' ASSOC.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

RAILWAY TEL. & TEL. APPLIANCE ASSOC.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill. September 10-13, Buffalo, N. Y.

ST. LOUIS RAILWAY CLUB.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Niquist, La Salle St. Station, Chicago.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; annual, Aug. 27-30, Chicago.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

On May 15 the Canadian Pacific established new steamship service between Tacoma, Wash., and Victoria, B. C.

The Illinois Traction Company has posted notices that on Memorial Day it will give every woman passenger on any of its lines a hat pin.

E. J. Dowie, general industrial agent of the New York Central Lines, was elected president of the Railway Industrial Association at its annual convention last week at Kansas City.

The Lehigh Valley has opened another freight station in New York City. It is maintained in connection with the Manhattan Terminal Company at the foot of Fortieth street, North river.

The Chicago & Alton, St. Louis, Iron Mountain & Southern, Texas & Pacific and International & Great Northern, on May 19 established a new through sleeping car line between Chicago and Houston, Tex., and one between Chicago and El Paso, Tex.

The Michigan Central was indicted by the federal grand jury at Indianapolis, Ind., on May 17 on 30 counts for false billing. Chapin & Company of Milwaukee were also indicted for accepting and soliciting concessions from the railways in the same connection.

A spar shipped recently from Shelton, Mason county, Washington, on the Peninsular Railroad, measured 102 ft. in length and was carried on two 41-ft. platform cars, with another car of the same length between them. The spar was 6 ft. 6 in. in diameter at the butt and 3 ft. 6 in. at the smaller end; and it scaled 9,000 ft. of lumber.

The Massachusetts Railroad Commission has authorized the Boston Elevated Railway, operating surface street railways in and around Boston, to carry freight on its cars in five towns. The order contemplates baggage and other things usually transported by express companies, and the commission reserves the right to modify it at any time.

The Ridgeway Coal Company, Wilkes-Barre, Pa., has sued the Lehigh Valley for $1,500,000 damages alleged to have been sustained because of the refusal of the road to build a track to connect with the Ridgeway colliery in the town of Newport. The Lehigh Valley is charged also with preventing the coal company from building a connection to the Lackawanna railway.

The Baltimore & Ohio is to run a new 28-hour train, beginning May 26, between New York and Chicago via Pittsburgh. The B. & O. now has a 26-hour train which leaves New York in the morning. The new train will leave New York at 6 p. m. and arrive at Chicago at 9 p. m. This will afford connection with a number of the principal trains leaving Chicago for the West and Northwest.

Traffic Club of New York.

At the regular meeting of the Traffic Club of New York, which will be held at the Waldorf-Astoria hotel, on May 28, Luis Jackson (Erie) will deliver an address, entitled Industrial Development, in the course of which talk he will have some good points to make on the matter of export trade, judged from what he has seen on various trips abroad. The entertainment committee will present a vaudeville entertainment immediately after the address.

Promoting Agriculture.

The Agricultural Department at Washington finds that the railways of the country which are endeavoring to aid the development of agriculture number about three-fourths of the whole. That is to say, they own about three-fourths of the lines of the country. This, however, includes not alone those which run agricultural instruction trains, but also those whose activities take the shape of distributing free literature.

That railway officers are not the only men, outside the agricultural world, who see the need of improving the science and art of agriculture is indicated by the announcement in Chicago that Sears, Roebuck & Company, the mail order merchants of that city, have given $1,000,000 for this purpose. This sum, which will probably be used to establish farm bureaus in each county throughout large sections of the country, is to be apportioned in sums of approximately $1,000 to a county. The money is to be put into the hands of the Crop improvement committee of the Council of Grain exchanges, the main office of which is in Chicago.

President Finley Reviews the Situation in the South.

"During the prolonged depression in the cotton textile industry mills of the southeast suffered in common with those of other cotton manufacturing localities. With revival of that industry they are again prosperous. By far the larger proportion of cotton mills of the southeast are in territory served by lines of the Southern Railway system and improved conditions in the industry are reflected in increased mill traffic. As with cotton, so with tobacco, timber, iron ore, and the other raw materials of the southeast, present tendencies are in direction of developing manufacture in proximity to the sources of production and to the building up of a large diversity of industries.

"While the late spring and the unusually wet weather have retarded farm work in many ports of the South, there has been comparatively little damage from high water in the territory directly served by the Southern Railway. We have relatively little mileage in localities affected by floods in the Mississippi valley and as the Southern Railway lines run at right angles to the river our losses have been less than would have been sustained had they been parallel with the stream.

"In former years many farmers of the cotton belt have been large buyers of supplies which they could very well have produced on their farms. In order to buy their supplies they have often been under the necessity of selling cotton regardless of market conditions. Increasing numbers of them are now raising their own supplies. They will consequently be able to market cotton with more regard for the economic demand for it and the result will prove beneficial to the entire southeastern section.

"The present outlook in the southeastern states is for the largest crop of corn ever made in that section and for increased production of other crops, while all through the territory traversed by our lines our live stock and dairy agents report increased interest in live stock and dairying, with a tendency toward improvement through purchase of pure-bred animals. In the raising of live stock the southeastern farmer not only has the advantage of long grazing seasons and an abundance of forage crops, but he has the further advantage of being able to use cotton-seed meal and hulls in combination with other feeds, thus finding a profitable use for a by-product of the cotton plant which was formerly largely wasted.

"Berries and vegetables are now moving freely from the more southern localities. The Georgia peach movement will soon begin and the present outlook is that Southern Railway lines will handle between five and six thousand carloads of peaches this year, as compared with about nine hundred carloads last year. The outlook for apples in Virginia, Western North Carolina, and other apple-producing localities on our lines is also very encouraging."

As to progress of improvements on the Southern Railway lines, President Finley said:

"Work now in progress will give the company the benefit of practically fifty miles of double-track north from Atlanta to Gainesville, Ga. It is expected that practically all of this new double-track will be placed in operation in time to be of service in handling the peach movement this year, and that all of it will be put into service early in the fall. Upon the completion of this work the company will have a total of 374 miles of double-track.

"Where traffic is heavy but where conditions are not yet such as to require double-tracking the company is carrying out the policy of constructing systems of lap-sidings to facilitate passing of trains. Since October, 1911, 24 lap-sidings have been put in service, aggregating 28.4 miles.

"The company has adopted the policy of installing automatic electric block signals to replace manual-controlled block signals on those parts of the line that have been double-tracked.

"Work on the large new inbound freight station at Atlanta, Ga., is progressing favorably. Additional yard and freight station facilities at Macon, Ga., used jointly by the Southern Railway and the Georgia Southern & Florida have been completed, in connection the Mobile & Ohio additional wharf facilities have

been provided at Mobile, Ala., and negotiations are under way for the establishment of a direct line of steamers to and from South American ports."—*Interview in the Wall Street Journal.*

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association, in presenting statistical bulletin No. 119, giving a summary of car surpluses and shortages by groups from January 4, 1911, to May 9, 1912, says, "Total surplus on May 9, 1912, was 136,776 cars, on April 25, 1912, was 151,186 cars, and on May 10, 1911, was 188,847 cars. Compared with the preceding period there is a decrease in the total surplus of 14,410 cars, of which 11,180 are coal cars, this decrease being principally due to the resumption of coal traffic. There is a net increase in box car surplus of 1,043 cars. The increase is most apparent in groups 2 (New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania), 3 (Ohio, Indiana, Michigan and Western Pennsylvania), 4 (The Virginias and Carolinas), 5 (Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida) and 8 (Kansas, Colorado, Missouri, Arkansas and Oklahoma); and decreases are shown in groups 6 (Iowa, Illinois, Wisconsin, Minnesota and the Dakotas), 7 (Montana, Wyoming and Nebraska), 9 (Texas, Louisiana and New Mexico) and 10 (Oregon, Idaho, California, Arizona and Washington).

"Total shortage on May 9, 1912, was 6,678 cars, on April 25, 1912, was 12,305 cars, and on May 10, 1911, was 1,569 cars. Compared with the preceding period there is a decrease of 5,627 cars, of which 2,858 are box, 911 coal and 1,699 miscellaneous cars. The decrease in box car shortage is principally in groups 2, 5 and 6 (as above) and 11 (Canadian Lines). The decrease in coal car shortage is mostly in group 2. Compared with the same date of 1911 there is a decrease in the total surplus of 52,071 cars, of which 34,587 is in box, 639 in coal, 4,202 in flat and 12,643 in miscellaneous cars. There is an increase in the total shortage of 5,109 cars, of which 2,379 is in box, 938 in flat, 1,169 in coal and 623 in miscellaneous cars."

The accompanying table gives car surplus and shortage figures by groups for the last period covered in the report, and the diagram shows total bi-weekly surpluses and shortages from 1907 to 1912.

Commerce Court Cases.

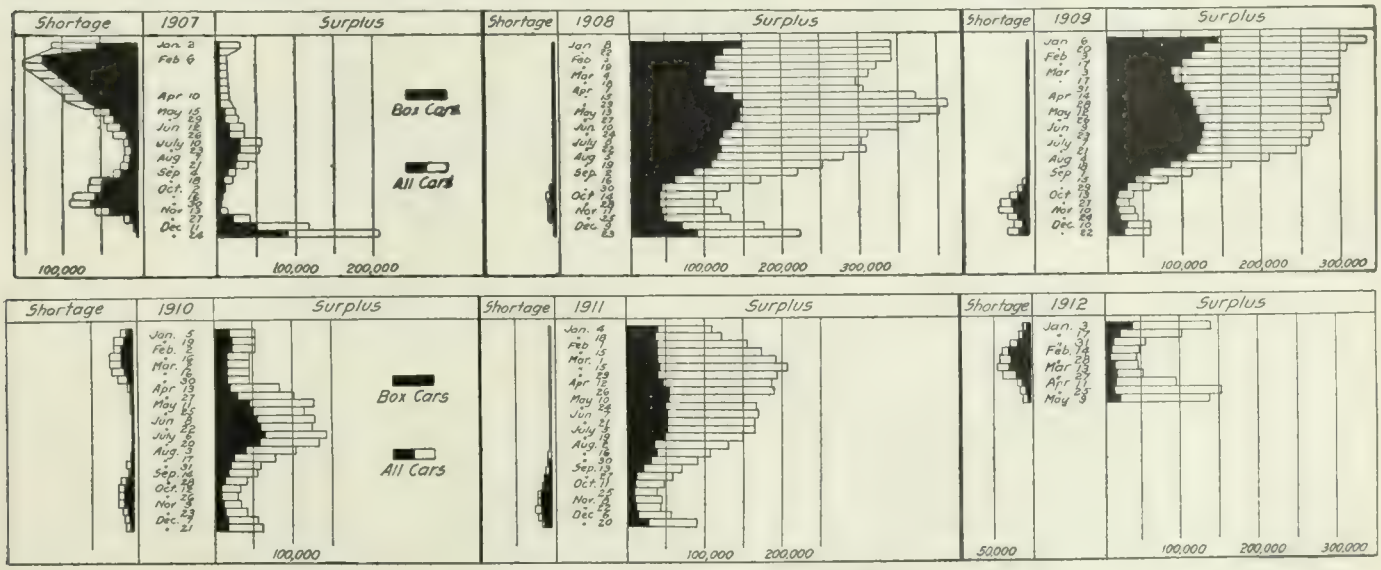
The clerk of the Commerce Court has issued a statement under date of May 13, calling attention to alleged mis-statements concerning the business of the court contained in a letter written by Secretary J. H. Marble of the Interstate Commerce Commission, in reply to a request for information by Representative Sims, the author of the bill to abolish the court, which was published in the *Congressional Record*. The statement gives the number of cases instituted in the Commerce Court up to May 6, as shown by the court record, as 30 instead of 28 as stated by Mr. Marble; the number transferred from the Circuit Courts to the Commerce Court as 36 instead of 33; the number in which permanent injunctions were issued by the Commerce Court as 9 instead of 11; the number of Commerce Court cases appealed to the Supreme Court as 18 instead of 16, and the number of cases on the Commerce Court's docket on May 6 as 22 instead of 24.

In connection with the recent filing of a petition in the Commerce Court by a number of Pennsylvania brick makers, asking the court to set aside an order of the commission denying them reparation while reducing the rate complained of, the Washington correspondent of the *Traffic World* says that of the last eight cases brought to the court six were filed by shippers who think that the Interstate Commerce Commission did not give them what they were entitled to receive. Of the 36 cases brought to the Commerce Court from the Circuit Courts only four, or one-ninth, were instituted by shippers, while of the 33 appealed directly from the Commission to the Commerce Court, eleven, or one-third, were brought there by shippers.

CAR SURPLUSES AND SHORTAGES.

Date.	No. of roads.	Surpluses: Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Shortages: Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1.—May 9, 1912	7	303	405	1,860	142	2,710	494	152	525	0	1,171
" 2.— " 9, 1912	23	1,748	80	35,870	2,152	39,850	5	0	9	1	15
" 3.— " 9, 1912	25	2,619	120	26,356	2,988	32,083	0	200	15	44	259
" 4.— " 9, 1912	10	1,772	31	442	1,602	3,847	926	435	473	5	1,839
" 5.— " 9, 1912	18	1,814	35	5,205	1,428	8,482	27	94	61	7	189
" 6.— " 9, 1912	24	3,948	346	5,797	4,876	14,967	486	120	125	10	741
" 7.— " 9, 1912	4	440	52	877	746	2,115	60	0	25	3	88
" 8.— " 9, 1912	18	3,075	359	5,136	2,672	11,242	29	0	0	2	31
" 9.— " 9, 1912	10	597	190	316	1,553	2,656	0	0	0	0	0
" 10.— " 9, 1912	22	4,264	1,570	1,647	10,800	18,281	9	0	0	600	609
" 11.— " 9, 1912	6	46	73	6	418	543	1,258	453	0	25	1,736
Total	167	20,626	3,261	83,512	29,377	136,776	3,294	1,454	1,233	697	6,678

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages in 1907 to 1912.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF MARCH, 1912.

Name of road.	Mileage operated at end of period.	Operating revenues: Freight.	Passenger.	Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Ann Arbor	[illegible]	$41,678	$34,387	$185,364	$14,829	$21,864	$4,030	$77,030	$7,960	$125,703	$59,661	$3,537	$13,986	$49,212	$24,966
Arizona Eastern	66[1]	[illegible]	36,918	180,885	21,509	13,114	2,451	47,343	7,829	92,246	88,639	190	12,000	76,829	$1,891
Atlanta, Birmingham & Atlantic	[illegible]	[illegible]	43,369	29,046	9,419	53,817	16,694	143,506	14,201	237,634	54,412	.....	15,700	38,712	33,189
Atlantic City	167	[illegible]	47,182	129,578	26,757	14,042	2,057	77,518	948	121,342	8,236	- 4,318	7,000	3,082	39,478
Belt Ry. Co. of Chicago	[illegible]	.....	.....	237,730	12,728	29,624	560	107,175	4,432	154,519	83,211	.....	6,250	76,961	11,738
Butte, Anaconda & Pacific	36	[illegible]	6,944	97,836	9,952	19,482	745	47,618	4,048	81,845	16,051	.....	2,000	14,051	14,438
Central Vermont	311	[illegible]	65,651	338,655	4,977	52,423	5,056	184,070	8,590	255,116	83,539	64	12,100	71,403	5,832
Chesapeake & Ohio Lines	[illegible]	[illegible]	398,989	3,071,886	260,346	690,497	51,872	990,178	66,946	2,059,839	1,012,047	—6,627	84,750	920,670	292,330
Chicago & Erie	576	[illegible]	46,472	440,095	50,368	93,567	21,105	257,210	10,338	432,597	7,498	.....	16,450	- 8,952	-98,738
Chicago, Indianapolis & Louisville	617	[illegible]	119,961	534,936	74,402	88,400	16,566	222,392	14,395	416,155	118,781	.....	22,652	96,129	- 36,955
Chicago, Terre Haute & Southeastern	[illegible]	[illegible]	14,334	182,337	18,975	29,835	3,906	61,300	7,159	121,175	61,162	506	8,700	51,956	6,518
Hocking Valley	[illegible]	[illegible]	62,031	611,708	57,536	94,105	8,232	197,938	14,666	367,477	244,231	.....	28,660	215,571	153,356
Houston, East & West Texas	191	74,787	24,627	105,694	14,399	10,673	2,837	41,535	3,963	73,407	32,287	.....	3,916	28,371	- 7,298
Houston & Texas Central	[illegible]	256,263	111,882	409,622	62,999	66,758	20,083	223,241	18,781	391,162	18,460	—1,572	20,558	- 3,670	-36,797
International & Great Northern	1,159	533,044	160,972	755,539	115,259	108,872	21,608	385,974	29,604	661,317	94,222	—725	22,000	71,497	.....
Kanawha & Michigan	177[1]	181,408	24,401	311,063	27,175	44,430	2,189	66,136	7,394	147,334	63,739	16	8,608	55,115	35,902
Minneapolis & St. Louis	1,586	488,675	173,250	651,805	66,873	99,160	18,215	295,420	20,550	500,218	151,587	60	25,728	125,919	- 131,967
Minneapolis, St. Paul & S. Ste. Marie	3,770[2]	1,752,102	418,995	2,388,446	160,151	292,029	48,535	845,291	46,531	1,372,537	915,909	- 6,145	134,594	775,170	411,131
Missouri, Kansas & Texas	1,346[3]	412,440	245,441	719,181	114,651	123,540	26,132	490,889	27,897	783,109	—63,928	—9,133	21,338	- 87,399	- 66,617
New Orleans, Texas & Mexico	277[4]	116,573	19,444	144,246	30,279	18,531	528	67,058	7,096	123,492	20,754	.....	.....	20,754	13,740
New York, Susquehanna & Western	152	177,397	42,897	249,246	17,081	26,833	2,421	103,457	7,132	156,924	92,322	- 3,008	17,873	71,441	—38,494
Northwestern Pacific	402[5]	81,216	123,386	234,790	53,522	38,103	3,518	97,448	11,080	203,671	31,119	.....	11,077	10,042	8,421
Philadelphia & Reading	1,014[6]	3,783,725	505,360	4,448,829	275,105	758,562	41,210	1,437,349	65,757	2,577,983	1,870,846	54,196	87,413	1,837,629	522,199
Pittsburgh, Shawmut & Northern	278[10]	146,992	7,527	156,769	16,691	32,967	1,069	48,830	4,366	103,923	52,846	.....	1,562	51,284	39,102
Port Reading	21	177,738	.....	178,248	5,839	66	30	52,975	79	58,989	119,259	11,833	3,800	127,292	59,041
St. Joseph & Grand Island	319	71,905	24,252	109,568	17,024	23,953	5,023	60,036	5,877	111,913	- 2,345	77	- 6,396	- 8,664	- 24,302
St. Louis & San Francisco	4,732	2,317,843	817,878	3,263,042	299,512	447,499	83,100	1,352,624	92,342	2,275,077	987,965	.....	158,690	829,275	—275,970
Southern in Mississippi	281	43,388	22,605	72,296	23,851	9,810	2,192	38,899	4,607	79,359	7,063	.....	4,218	—11,281	- 16,267
Spokane, Portland & Seattle	556[11]	232,471	127,641	381,170	48,366	36,074	6,350	101,487	12,354	204,531	176,639	553	53,400	123,792	—41,736
Texas & Pacific	1,885	931,935	314,969	1,332,785	192,726	240,921	35,891	694,839	46,051	1,210,428	122,357	—5,382	48,489	68,486	—15,606
Trinity & Brazos Valley	463	162,978	35,461	206,422	59,235	22,830	9,458	107,083	10,990	209,596	3,174	.....	3,500	- 6,674	11,508
Ulster & Delaware	129	51,368	14,665	72,844	8,613	13,548	1,461	32,269	2,523	58,414	14,430	6	3,300	11,136	11,471
Wabash	2,515	1,589,369	439,668	2,201,081	211,838	474,572	64,879	1,070,490	60,815	1,882,594	318,487	— 6,607	71,655	240,225	—153,846
Western Pacific	935	215,484	80,206	308,557	63,520	38,554	27,687	164,424	26,131	320,316	- 11,764	— 2,877	16,121	—30,762	.....
Seaboard Air Line	3,070[12]	1,529,887	473,395	2,213,531	300,168	297,267	62,354	793,397	64,958	1,518,144	695,387	—3,628	80,000	611,759	—201,175
Sunset	59[13]	39,044	9,990	50,174	12,699	1,531	35	14,721	987	29,973	20,201	.....	2,187	18,014	- 43,959

NINE MONTHS OF FISCAL YEAR, 1912.

Ann Arbor	292	$1,111,311	$413,174	$1,623,189	$170,171	$177,998	$38,871	$590,432	$69,643	$1,047,115	$576,074	- $6,558	$125,870	$443,646	$64,476
Arizona Eastern	366[1]	1,108,868	300,912	1,494,001	214,317	113,347	20,696	396,770	58,179	803,309	690,692	1,621	90,508	601,805	215,516
Atlanta, Birmingham & Atlantic	662	1,881,023	507,546	2,524,321	261,649	419,194	151,438	959,907	101,535	1,893,723	630,598	.....	126,400	504,198	28,658
Atlantic City	167	591,699	905,530	1,575,435	234,308	120,088	21,725	779,920	11,215	1,167,256	408,179	- 38,403	63,000	306,776	62,484
Belt Ry. Co. of Chicago	21	.....	.....	1,989,152	123,168	227,693	5,324	786,849	49,309	1,192,343	796,809	.....	63,809	733,000	51,615
Butte, Anaconda & Pacific	36	715,560	77,686	846,737	88,835	159,493	6,318	384,245	26,258	665,149	181,588	.....	19,764	161,824	26,399
Central Vermont	411	1,994,705	815,886	3,050,436	315,982	491,090	66,590	1,494,906	81,652	2,450,220	600,216	3,663	108,900	494,979	- 71,725
Chesapeake & Ohio Lines	2,281[7]	20,268,098	4,106,783	25,455,814	2,916,171	5,083,294	459,639	7,807,094	566,399	16,832,597	8,623,217	7,532	762,817	7,867,932	308,386
Chicago & Erie	570	3,085,732	518,910	3,980,215	520,315	767,973	188,456	1,991,651	96,028	3,654,423	415,792	.....	142,539	273,253	—272,268
Chicago, Indianapolis & Louisville	617	3,313,332	1,224,548	4,886,029	672,023	709,059	158,555	1,810,814	130,471	3,480,922	1,405,107	.....	208,466	1,196,641	—14,954
Chicago, Terre Haute & Southeastern	351	1,308,691	153,690	1,496,194	198,839	240,310	26,621	470,717	67,236	1,003,723	492,471	- 1,390	78,300	412,781	.....
Hocking Valley	353[8]	4,646,510	668,981	5,635,181	658,056	885,297	74,894	1,718,173	143,522	3,479,942	2,155,239	.....	329,818	1,825,421	186,598
Houston, East & West Texas	191	675,514	246,740	976,580	174,137	101,528	17,911	330,978	33,384	657,938	318,642	.....	38,555	280,087	- 64,436
Houston & Texas Central	789	2,897,694	1,344,921	4,584,066	648,175	760,693	171,831	1,932,402	185,073	3,698,174	885,892	—2,141	201,367	672,384	—505,151
International & Great Northern	1,159	4,664,205	1,433,390	6,284,847	655,761	721,414	150,166	2,429,261	203,439	4,160,041	2,124,806	—2,604	192,500	1,929,702	.....
Kanawha & Michigan	177[1]	2,062,552	259,410	2,369,324	277,290	406,165	20,106	713,595	59,854	1,477,010	892,314	—3	79,543	812,768	- 76,971
Minneapolis & St. Louis	1,586	4,278,969	1,296,168	5,959,808	714,561	887,681	162,896	2,706,505	190,550	4,662,493	1,297,315	—269	255,281	1,041,765	—624,360
Minneapolis, St. Paul & S. Ste. Marie	3,770[2]	14,125,381	4,269,310	19,504,390	1,837,048	2,497,194	406,436	6,484,463	407,391	11,632,532	7,871,858	79,767	1,183,349	6,768,276	2,126,485
Missouri, Kansas & Texas of Texas	1,346[3]	5,308,274	2,831,956	8,677,175	1,815,112	891,196	222,489	4,530,924	271,611	7,731,332	945,843	8,072	243,974	693,797	1,243,120
New Orleans, Texas & Mexico	277[4]	924,377	170,621	1,164,731	232,539	137,302	35,110	512,210	57,005	984,166	180,565	.....	3,473	177,092	45,260
New York, Susquehanna & Western	152	1,563,423	443,959	2,256,993	211,718	210,861	17,287	878,020	46,108	1,363,994	892,999	—4,579	160,862	727,558	-53,802
Northwestern Pacific	402[5]	1,040,894	1,380,103	2,617,858	445,487	361,507	29,664	956,921	86,891	1,880,470	737,388	.....	108,442	628,946	112,097
Philadelphia & Reading	1,014[6]	27,810,236	5,202,219	34,508,877	2,901,250	6,285,538	369,860	11,183,668	596,552	21,336,868	13,172,009	249,926	810,690	12,611,245	921,898
Pittsburgh, Shawmut & Northern	278[10]	1,054,724	77,488	1,149,684	123,819	235,170	9,867	340,633	36,604	746,093	403,591	.....	14,173	389,418	216,176
Port Reading	21	1,025,880	.....	1,036,946	71,908	1,459	278	317,642	993	392,280	644,666	40,561	34,200	651,027	3,689
St. Joseph & Grand Island	319	765,528	312,113	1,185,564	193,899	195,421	44,937	534,172	50,342	1,018,771	166,793	239	61,671	105,361	—11,348
St. Louis & San Francisco	4,732	19,775,832	8,491,035	30,494,079	3,570,781	3,985,095	815,782	10,982,264	896,588	20,250,510	10,243,569	.....	1,436,826	8,806,743	—218,633
Southern in Mississippi	281	536,337	292,199	893,568	205,356	81,915	21,622	348,055	35,975	692,923	200,645	.....	43,629	157,016	- 36,448
Spokane, Portland & Seattle	556[11]	2,110,172	1,306,792	3,646,024	376,947	342,363	63,350	934,831	102,104	1,819,595	1,826,429	10,528	367,204	1,469,753	49,678
Texas & Pacific	1,885	9,371,599	3,179,495	13,375,040	1,456,920	1,828,980	272,314	5,722,825	409,347	9,690,386	3,684,654	— 33,394	570,380	3,080,880	383,566
Trinity & Brazos Valley	463	1,703,657	333,897	2,106,264	360,775	262,177	87,376	963,075	103,691	1,777,094	329,170	.....	39,339	289,831	170,281
Ulster & Delaware	129	477,895	286,413	803,373	109,496	103,205	12,583	333,173	22,578	581,035	222,338	740	29,700	193,378	2
Wabash	2,515	14,558,950	5,300,892	21,574,981	2,457,185	3,827,969	698,416	9,032,127	656,103	16,671,800	4,903,181	18,882	636,663	4,247,636	—1,209,136
Western Pacific	935	2,966,547	807,657	3,896,579	734,395	366,953	250,024	1,642,755	207,995	3,202,122	694,457	—30,905	135,419	528,133	.....
Seaboard Air Line	3,070[12]	11,508,988	3,886,395	17,145,148	2,480,495	2,410,950	541,816	6,201,207	519,603	12,154,071	4,991,077	—13,334	677,000	4,300,743	- 617,328
Sunset	59[13]	544,722	138,640	711,368	106,730	24,054	406	252,540	25,749	409,479	301,889	.....	29,305	272,584	—168,147

†Figures shown here are for period September 16, 1911, to March 31, 1912.
Operated in previous period: [1] 355; [2] 2,232; [3] 350; [4] 176; [5] 3,764; [6] 1,348; [7] 264; [8] 376; [9] 1,022; [10] 240; [11] 551; [12] 3,046; [13] 57. — Indicates Deficits, Losses and Decreases.

INTERSTATE COMMERCE COMMISSION.

The commission has further suspended until December 14 the proposed new freight classification No. 51, which was filed by the railways in Western Freight Association territory.

The commission has suspended until September 17, 1912, the proposed advances of the Chicago, Milwaukee & St. Paul, and the Minneapolis & St. Louis, in rates on malt from Minneapolis and other points to Missouri River points.

In conference ruling the commission has held that whenever a carrier makes any allowance to a shipper under Section 15 of the act (for service connected with transportation), such allowance must be published in its tariffs and open to all furnishing such service; otherwise each such allowance must be considered to be a rebate from the published rate.

In a report of a conference ruling in these columns May 3, it was stated that free transportation might be given to instructors, furnished by companies supplying appliances to railways, over roads on which the instructor was compelled to travel to reach the railway on which he was to give the instruction. This is incorrect. The commission "held further that such experts are not railway employees in the sense that they may be given free transportation to travel over one road or system for the purpose of reaching another road or system, to which they may have been assigned on like duty."

The commission has amended its orders for issuing passes by adding: "For a special or unusual occasion (such as a convention of an association of railway employees, to attend which its members would use the lines of two or more carriers), when compliance with the foregoing regulations would be needlessly burdensome to the carriers concerned, consideration will be given by the commission to an application from the initial carrier (made after an agreement with the other carrier or carriers over whose lines it is proposed to issue free transportation) for authority to issue a special form of pass, bearing coupons for the several carriers over whose lines the pass is to be effective. The commission will specify the extent to which such authority, if granted, shall modify the provisions of the existing regulations."

Plan for Distribution of Coal Cars Ordered.

Colorado Coal Transportation Assn. v. Denver Rio Grande et al. Opinion by Commissioner Meyer:

At present there is no different plan for the distribution of coal cars to different mines in Huerfano and Las Animas counties, Colo. This leads up to fear for discrimination and for the suspicion of discrimination. Railways are ordered to prescribe and publish rules governing this distribution, and file them within 60 days. (23 I. C. C., 458.)

Cotton Rates Raised.

In re investigation and suspension of advances in rates by cars for the transportation of cotton and cotton linters. Opinion by Commissioner Clark:

The rates on cotton and cotton linters from Texas producing points to Galveston and New Orleans are the same. The commercial interests of Galveston complained to the Texas railway commission that these rates were unduly discriminatory against Galveston in favor of New Orleans. The state commission would have reduced the rates to Galveston, had not the carriers anticipated this move by raising the rates to New Orleans from 52½ cents to 63 cents per 100 lbs., including the cost of compression. The New Orleans board of trade entered a complaint with the commission against these advances and the increased rates were suspended until September, 1912. The complainant argued that the advance in the rates was primarily due to contemplated action on the part of the Texas railway commission to reduce the Texas rates; also that New Orleans and Galveston are competitive ports for the exportation of cotton from Texas, and that the practice of carriers has been to equalize rates via competitive ports. The defendants admit that the present low rates to New Orleans are reasonable, but they assert that the traffic would be unprofitable if the rates to Galveston were reduced. They also admit that they would not have increased the rate to New Orleans had not the Texas commission proposed the reduced rates to Galveston. The commission found that the increased rates to New Orleans would not greatly reduce the traffic to that point on account of certain advantages, which it possessed over Galveston, and therefore decided that the suspended rates were not unreasonable. The orders suspending the advances will be vacated. (23 I. C. C., 405.)

Rates on Bulky Articles.

Brunswick-Balke-Collender Company v. Atchison, Topeka & Santa Fe et al. Opinion by Commisisoner Clark:

In this case, the complainant attacked the rule of the western classification, which states that articles, too bulky to be loaded in a 36-ft. box car, shall be charged at actual weight and class rate, but that in no case shall the charge for the shipment be less than that for 5,000 lbs. at first class rate. The defendant is willing to pay this rate where its articles are loaded on open cars, on account of being too bulky to be loaded in box cars, but claims that when its articles, though too bulky to be put in 36-ft. cars, are loaded in 40-ft. box cars, it should be given the regular rate. The commission decided that the rule for bulky articles in the official classification should be substituted for the present rule in the western classification, with the exception that the minimum weight of 4,000 lbs. in the official classification should be increased to 5,000 lbs. This rule as amended, will provide that when articles are loaded on open cars, on account of being too bulky to be loaded in box cars, they shall be charged at actual weight and class rate for each article, provided that in no case, shall the charge for each article be less than that for 5,000 lbs. at first class rate. (23 I. C. C., 395.)

Certain Concentration Charges Found Unreasonable.

Red River Oil Co. et al v. Texas & Pacific et al. Opinion by Commissioner Clark:

While rates providing for transit privileges may be lower than the reasonable through rate, railways cannot impose a penalty unless the transit privilege is used on top of their reasonable rate; and it is discriminatory for railways to grant concentration at competitive points while refusing it at non-competitive points. (23 I. C. C., 438.)

The Commission Refuses to Drop the Spokane Case.

City of Spokane et al v. Northern Pacific et al. Supplemental Report. Opinion by Chairman Prouty:

An injunction was granted by the Commerce Court against the order of the Interstate Commerce Commission in 19 I. C. C., 162, and an appeal on this injunction is now to be considered by the Supreme Court in October. It is now announced that the railways and the attorney for the city of Spokane have come to an agreement, and it is proposed to discontinue the case before the commission. This the commission cannot do without considering the reasonableness of the proposed new rates, and the commission will feel entirely free to dispose of this whole question when it is determined by the Supreme Court what action can be taken. (23 I. C. C., 454.)

Dock Facilities Must Be Furnished to All on the Same Terms.

Mobile Chamber of Commerce et al v. Mobile & Ohio et al. Opinion by Commissioner Lane:

The Southern Railway and the Mobile & Ohio own docks at Mobile, to which they make ship-side delivery on export traffic. They publish rates which include not only service to Mobile, but supplementary service of switching to their own wharves, the use of the docks, and the unloading of cars. For these services they make no separate terminal charge. They also absorb the charges for delivery over the city dock, the municipal wharf near the Southern's docks. When ships are forced to berth at other docks than the three named, shippers have to pay a charge for switching, docking and unloading, in addition to the rate to Mobile. Where a railway has a wharf, at which its tariffs offer delivery, and at which part of the shipping public is served, but to which it does not give all access, it must make delivery at the same rate at some other wharf. This is thought to be in ac-

cordance with the conclusion of the Supreme court in the Pensacola case, 198 U. S., 483, because in the Pensacola case the railway based its argument on the common law, while in the present case the commission makes its finding under section 1, of the act. The commission cannot regard the Mobile docks or the defendants' in any other light than as public terminals. A railway need not make a rate to ship-side unless its lines extend there, but making such a rate must give the shipper access to the terminal to receive the traffic. The service that railways give to the shipper in the interior, who uses one line of ships from the port, must be given to another shipper, who wishes to use a different line of ships, provided both lines of ships submit to the same reasonable conditions imposed by the rail carrier. (23 I. C. C. 417.)

Temporary Compromise in Inter-Mountain Case.

Railroad Commission of Nevada v. Southern Pacific et al. Maricopa County Commercial Club v. Sante Fe, Prescott & Phoenix et al. Opinion by Commissioner Lane:

Delay in the ultimate decision of the questions involved in the so-called long-and-short-haul cases (see *Railroad Commission of Nevada v. So. Pac. Co. and Maricopa County Commercial Club v. S. F., P. & P. Ry. Co.*, 21 I. C. C., 329) led the complainants to make request upon the commission for the establishment of commodity rates complementing the class rates previously instituted. The commission thereupon entered an order upon the carriers to show cause why such commodity rates should not be instituted. The matter coming on for hearing, the carriers defendant presented a proposed schedule of commodity rates which they volunteered to put into effect pending the determination of the questions involved in the long-and-short-haul cases, and covering the great volume of the traffic moving now in carload lots into Nevada and Arizona. The carriers stated at the time that in presenting these rates they were not presented as reasonable, but were regarded by them as established to meet a situation of embarrassment. The complainant would not agree that such commodity rates as were offered met their full demand, but they submitted the question as to the advisability of such rates going into effect to the commission.

Upon full consideration of the matter we see no reason why this commission should object to the course of procedure suggested by the carriers, and will permit upon short notice the carriers to institute the proposed commodity rates, it being expressly understood that the commission in no wise passes upon the reasonableness of these rates or upon any question of discrimination arising from their institution. Our sole purpose is to give as great a degree of relief as is possible immediately to these communities which have been contending before the commission for years against rates which were contrary to the principles of the act. (23 I. C. C., 456.)

Class Rates for Switching Service Upheld.

Merchants & Manufacturers Association et al v. Pennsylvania Railroad et al. Opinion by Commissioner McChord:

While almost universally the charge for a switching service is on a per-car basis, the facts of record held insufficient to justify a finding that the assessment of class rates for switching at Baltimore unduly discriminates against that city as compared with cities where the per-car basis obtains. Except where joint through rates are now in effect covering delivery to or from another carrier within the city of Baltimore, the existing class rates charged for interchanging traffic found to be unreasonable, and the case held open for 30 days to permit defendants to amend their tariffs.

Terminals are either open or they are not; and if a carrier holds itself out as ready to permit the use of its tracks at a certain charge, the fact that such charge may be prohibitive does not mean that the terminals are not open. On the contrary, it would seem to be a potent argument for the reduction of charges for the use of tracks or terminal facilities already extended. That these defendants offer each to the other the use of their respective tracks or terminals is shown by the fact that freight is actually interchanged after its arrival in Baltimore, and for this service charges are provided in tariffs published and filed both with this commission and the Public Service Commission of Maryland. It follows that having elected to perform this service the charge therefore must be reasonable. (23 I. C. C. 474.)

STATE COMMISSIONS.

The railway commissioners of Canada propose to issue an order forbidding railways to put an embargo on any traffic for a period longer than four days without first giving the commission ten days' notice, specifying the reason why the embargo is to be issued.

The New York State Public Service Commission Second district, has postponed until next year the enforcement of its order requiring the use of oil fuel on the locomotives of the Cranberry Lake Railroad; this upon condition that the present engines have satisfactory ash pans and smoke stacks. The state conservation commission has found that the company's right of way has been cleaned up and has withdrawn its objections to the use of coal-burning engines.

The New York Public Service Commission has denied the petition of the International Railway to be exempted from stenciling and numbering their poles, carrying over-head wires. The order requiring the stenciling of poles was made so as to permit inspectors of the commission to promptly and correctly report unsafe construction. The application for exemption was solely on the ground of expense, and the commission says that this expense, three cents per pole, is not great enough to make it reasonable to exempt any company.

The Indiana commission has issued to the railways a circular calling upon them to improve their bridge warnings or telltales. Generally throughout the state these devices are defective, the arrangement of the ropes being such that the exhaust of a locomotive will blow them out of position so that they get caught on their supports, and thereafter are of no value as a warning. If the railways do not cure this trouble within 60 days, the commission will proceed to enforce the law, under which the railways can be required to raise all bridges to a height of 21 ft. above the track. A postscript to the circular says that "the commission is carefully noting such companies as fail to respond to its general circulars, with the intention, so far as those failing are concerned, to proceed to enforce penalties rather than make recommendations."

COURT NEWS.

The Commerce Court has refused to enjoin the enforcement of the Interstate Commerce Commission's decision in the citrus fruit precooling case, in which the commission permitted shippers to do their own precooling, and avoid refrigeration charges.

The temporary restraining order issued last week by Judge Carpenter, of the United States district court at Chicago, enjoining the railways from canceling their joint through rates with the Michigan, Indiana and Illinois lines and the Ludington Transportation Company, in accordance with the recent decision of the Interstate Commerce Commission was dismissed by Judge Landis on May 21 after a hearing on an application of the boat lines to have injunction made permanent. Judge Landis held that his court had no jurisdiction. During the hearing District Attorney Wilkerson read a letter from Chairman Prouty of the commission stating that if the railways did not cancel the joint rates they would be prosecuted for rebating.

The Supreme Court of Missouri, in a decision by Judge Brown, has held constitutional the law passed by the last legislature requiring all corporations to pay employees at least twice a month. The court seems to think that where wages are not paid oftener than once a month men are likely to be discouraged and sit down and fold their hands instead of trying to earn a living; and in conclusion, the decision says: "By common consent, an implied duty rests upon the state to aid those unfortunates who through sickness, old age, extreme poverty or other mischance are unable to supply themselves with those things which are necessary for their continued existence, and consequently any law which encourages people to work by holding out assurances that they shall promptly receive the wages they earn, whether financially able to go to law or not, tends to encourage honest effort, and helps to build up an industrious, thrifty and self-respecting people, who, instead of becoming paupers, will be able to pay their debts, and, being protected by the state in their efforts to better their condition, will have a direct interest in maintaining their protector, and in its good order, moral and general welfare."

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Henry Alexander Scandrett, who has been appointed interstate commerce attorney of the Union Pacific and the Southern Pacific, with office at Chicago, as has been announced in these columns, was born April 8, 1876, at Faribault, Minn. He graduated from Shattuck Military Academy in 1894, and after graduating from the University of Minnesota with the A. B. degree in 1898, he received the LL.B. degree from the same university in 1900. In January, 1901, he entered the office of the general claim agent of the Union Pacific at Omaha, and was transferred to Kansas City as claim adjuster a few months later. In October, 1901, he was made an assistant attorney for Kansas and Missouri; he was second assistant from June, 1902, to April 28, 1908, and first assistant from the latter date until June, 1911, when he was made assistant interstate commerce attorney, with office at Chicago, from which position he has just been promoted, to succeed F. C. Dillard, elected vice-president and general counsel of the Rock Island Lines.



H. A. Scandrett.

Joseph H. Young, whose election as president of the Spokane, Portland & Seattle and the Oregon Trunk, with office at Portland, Ore., has been announced in these columns, was born January 17, 1864, at Salt Lake City, Utah. He attended the University of Utah from 1877 to 1881, and in September of the latter year began railway work with the Utah Southern, now the Oregon Short Line, as warehouseman, clerk and operator. He was with the Union Pacific as bill clerk and ticket agent at Ogden, Utah, from 1882 to 1886, and was superintendent of the Utah division of the same road, now the O. S. L., from 1891 to 1902. For two years from 1886 he was traveling passenger agent of the Chicago & North Western, and from 1888 to 1891 general agent of the Salt Lake & Eastern, a road which was afterwards reorganized under his supervision as the Utah Central. Mr. Young was general superintendent of the Rio Grande Western, now part of the Denver & Rio Grande, at Salt Lake City, for two years from 1902, and then became general superintendent and later general manager of the Colorado & Southern at Denver. For a short time during 1907 he was general superintendent of the St. Louis & San Francisco. He was general superintendent of the Southern Pacific at San Francisco from 1907 to 1910, and in the latter year was elected president of the Alaska Steamship Company, the Northwestern Steamship Company, Ltd., the Northwestern Commercial Company, the Northwestern Fisheries Company, and the North Coast Ligtherage Company, and vice-president of the Copper River & Northwestern, which offices he resigns to become president of the Spokane, Portland & Seattle, the Oregon Trunk Railway, the Oregon Electric Railway, the United Railways, the Spokane & Inland Empire, the Pacific & Eastern, and the Dalles, Portland & Astoria Navigation Company, with office at Portland.



J. H. Young.

L. H. Clar has been appointed secretary and auditor of the Eureka Nevada, formerly the Eureka & Palisade, with office at Palisade, Nev.

James Hagerman, general counsel of the Missouri, Kansas & Texas, with office at St. Louis, Mo., has resigned on account of ill health, and will become consulting counsel. Effective June 1.

George P. Johnson, general superintendent of the Norfolk & Western, with office at Bluefield, W. Va., has been appointed sole receiver of the Detroit, Toledo & Ironton, succeeding Benjamin S. Warren, George K. Lowell and Thomas D. Rhodes, resigned.

W. M. Miller has been appointed freight claim auditor of the Atchison, Topeka & Santa Fe Coast Lines and the Grand Canyon Railway, with office at Los Angeles, Cal. Bowman Jarrott has been appointed claim agent of the Southern Kansas, the Pecos & Northern Texas, and the Pecos River—all Texas lines of the Santa Fe system—with office at Amarillo, Tex., succeeding Edward Prichett.

Operating Officers.

C. W. Hole has been appointed general manager of the Washington Western, with headquarters at Three Lakes, Wash.

George P. Johnson, general superintendent of the Norfolk & Western, with office at Bluefield, W. Va., has resigned, as noted under Executive, Financial and Legal Officers.

E. E. McCarty has been appointed trainmaster of the First and Second districts of the Albuquerque division of the Atchison, Topeka & Santa Fe Coast Lines, with office at Winslow, Ariz., succeeding O. F. Higginson.

F. Wear has been appointed assistant superintendent of the Great Northern, with office at Whitefish, Mont., succeeding W. Carswell, transferred. J. E. Hills has been appointed trainmaster, with office at Whitefish, succeeding W. W. McFadzen, resigned.

J. E. Sexton, assistant to president and traffic manager of the Quincy Western at Hartwell, Cal., has been appointed general manager of the Eureka Nevada, formerly the Eureka & Palisade, and L. R. Gladden has been appointed superintendent of the Eureka Nevada, both with offices at Palisade, Nev.

J. W. Eber, who recently resigned as superintendent of the Adirondack division of the New York Central & Hudson River, has been appointed general superintendent of the Toronto, Hamilton & Buffalo, with office at Hamilton, Ont., succeeding to the duties of H. H. Adams, general manager, resigned to become president of the Kansas City Terminal Railway.

Charles A. Allen, superintendent of the Cincinnati division of the Erie, at Marion, Ohio, has been appointed assistant to the general superintendent with office at Galion. Robert E. Woodruff, superintendent of the Rochester division, at Rochester, N. Y., succeeds Mr. Allen. Edmund I. Bowen, superintendent of the Delaware and Jefferson divisions, at Susquehanna, Pa., succeeds Mr. Woodruff. William A. Baldwin, superintendent of the Chicago and Lima divisions, at Huntington, Ind., succeeding Mr. Bowen. Theodore Mackrell, superintendent of the Allegheny and Bradford divisions, at Salamanca, N. Y., succeeds Mr. Baldwin. Fred M. Hawley, trainmaster at Susquehanna, Pa., succeeds Mr. Mackrell; W. J. English, assistant superintendent, at Jersey City, N. J., has been appointed superintendent of the Susquehanna and Tioga divisions, with office at Hornell, N. Y., succeeding Clarence D. Taylor, resigned and Augustus E. Ruffer has been appointed assistant superintendent of the New York division, with office at Jersey City, succeeding Mr. English.

Traffic Officers.

R. P. Kimbrough has been appointed freight soliciting agent of the Southern Railway, with office at Atlanta, Ga., succeeding C. S. Powers, promoted.

A. E. Wilkinson has been appointed division freight agent of the Intercolonial, with office at Halifax, N. S., succeeding E. S. Smiley, assigned to other duties.

H. J. Perkins has been appointed industrial agent of the Lake Shore & Michigan Southern and other New York Central lines west of Buffalo, with headquarters at Cleveland, Ohio.

H. T. Yeaton has been appointed westbound agent of the Cleveland, Cincinnati, Chicago & St. Louis, with office at St. Joseph, Mo., succeeding A. S. Morrill, transferred to St. Louis, Mo.

F. J. Vanderblue has been appointed commercial agent of the Chesapeake & Ohio of Indiana, with headquarters at Milwaukee, Wis., succeeding A. H. Heckendorf, resigned to engage in other business.

H. D. Swayze, general superintendent of the Kalamazoo, Lake Shore & Chicago, with office at Kalamazoo, Mich., has been appointed traffic manager, with office at Kalamazoo, succeeding E. H. Vivian.

J. A. McWilliams, traveling freight agent of the Southern Railway, at Montgomery, Ala., has been appointed traveling freight agent, with office at Kansas City, Mo., succeeding J. R. L. Wulff, promoted.

E. A. Shewe, city passenger and ticket agent of the Oregon Short Line at Ogden, Utah, has been appointed division freight and passenger agent, with headquarters at Butte, Mont., succeeding F. D. Wilson, assigned to other duties.

J. C. Lettice, soliciting freight agent of the Georgia Southern and Florida, at Macon, Ga., has been appointed commercial agent, with office at Miami, Fla., succeeding R. E. Davis, resigned. W. B. Dewberry succeeds Mr. Lettice, with office at Macon.

Lloyd O. Miller has been appointed traveling freight agent of the Atlantic Coast-Savannah Line and Central-Savannah Line, with headquarters at Philadelphia, Pa., reporting to F. A. MacBride, commercial agent, succeeding W. C. Shannon, transferred.

W. P. Snyder, general eastern agent of the Kansas City, Mexico & Orient, at New York, has been appointed commercial agent of the Grand Trunk, the Central Vermont and the National Despatch, with headquarters at New York, succeeding H. M. Baker, resigned.

F. C. Dumbeck, assistant general freight agent of the St. Louis & San Francisco at Kansas City, Mo., has been transferred to St Louis, Mo., and E. F. Edgecomb, commercial agent at Kansas City, has been appointed assistant general freight agent, with office at Kansas City.

W. G. Howard, commercial agent of the Chicago & Alton and the Toledo, St. Louis & Western at Cleveland, Ohio, has been appointed general agent in the freight department, with office at Pittsburgh, Pa., succeeding John H. McAdoo, deceased. J. C. Kempf succeeds Mr. Howard.

G. M. Weaver, assistant general freight agent of the Michigan Central at Detroit, Mich., has been appointed district freight agent of the New York Central Lines, with office at Chicago. F. H. Thompson, general agent at Detroit, succeeds Mr. Weaver, and William Rogers succeeds Mr. Thompson.

Charles E. Kingston, whose appointment as assistant general freight agent of the Pennsylvania Railroad, has been announced in these columns, was born at Philadelphia, Pa., May 12 1858, and was educated in the schools of that city. He is the son of the late Stephen B. Kingston, who was general freight agent of the Pennsylvania Railroad prior to 1880. Mr. Kingston entered the service of the Pennsylvania Railroad in the fall of 1877 as a clerk at Dock street freight station, Philadelphia. On January 1, 1880, he was transferred to the general freight agent's office, and held various positions in that department until October 1, 1885, when he was made chief rate clerk. He was promoted to chief clerk to the assistant general freight agent in January, 1890, remaining in that position until June 1, 1897, when he was made division freight agent of the Philadelphia, Wilmington & Baltimore, now the Philadelphia, Baltimore & Washington, at Wilmington, Del., and now becomes assistant general freight agent of the Pennsylvania Railroad, with office at Philadelphia.

Engineering and Rolling Stock Officers.

H. W. Coddington has been appointed engineer of tests of the Norfolk & Western, with office at Roanoke, Va.

Joseph Collins has been appointed roadmaster on the Idaho division of the Oregon Short Line, with headquarters at Shoshone, Idaho.

The headquarters of H. B. Welsh, supervisor of the Chautauqua branch, Buffalo division of the Pennsylvania Railroad, will be removed on June 1, from Brocton, N. Y., to Dunkirk.

C. E. Denney, signal engineer of the Lake Shore & Michigan Southern, at Cleveland, O., has been appointed also signal engineer of the Lake Erie & Western, the Ft. Wayne, Cincinnati & Louisville and the Northern Ohio, with headquarters at Cleveland. Effective June 1.

H. Wanamaker, superintendent of shops of the New York Central & Hudson River, at Depew, N. Y., has been appointed superintendent of shops at West Albany, N. Y., succeeding L. H. Raymond, resigned. J. G. Parsons succeeds Mr. Wanamaker, with office at Depew, and B. F. Shone has been appointed general foreman of the Depew shops.

F. W. Thomas has been appointed supervisor of apprentices of the Atchison, Topeka & Santa Fe, and the Atchison, Topeka & Santa Fe Coast Lines, with office at Topeka, Kan. P. O. Walker has been appointed roadmaster of the Oklahoma division, with headquarters at Guthrie, Okla., succeeding L. H. McIntire. F. T. Perris has been appointed manager of the fuel department of the Coast lines, with office at Olinda, Cal., and F. C. Ripley has been appointed assistant manager of the fuel department, with office at Midoil, Cal.

Frank Lee, whose appointment as principal assistant engineer of the Canadian Pacific, with office at Winnipeg, Man., has been announced in these columns, began railway work in 1894, on leaving the Sheffield Scientific School of Yale University. His first experience was on location and construction of the Trinidad government railways, at Trinidad, in the British West Indies. Two years later he entered the engineering department of the Chicago & North Western, and remained with that road for six years, having been rodman, instrument man, assistant engineer, and assistant signal engineer. He then went with the Canadian Pacific as signal engineer, and in 1904 was made assistant division engineer at Calgary, Alberta. He was assistant engineer of the Western lines at Winnipeg during 1905, and from 1906 until April 1, 1912, the date of his recent promotion, he was division engineer, with headquarters at Winnipeg.

Special Officers.

Dr. J. H. Reuss has been appointed chief surgeon of the San Antonio & Aransas Pass, with office at Yoakum, Tex., succeeding Dr. A. Graves, Jr., who has had his headquarters at San Antonio, Tex., the hospital department having been removed from San Antonio to Yoakum.

George Bradshaw, assistant to the claims attorney of the New York Central & Hudson River, at New York, has been appointed general safety agent, of New York Central Lines, both East and West, with headquarters at New York and at Chicago, reporting to the general claims attorney and to the general manager for the lines East, and reporting to the general claims attorney and to the assistant vice-president for the lines West.

OBITUARY.

A. R. G. Heward, assistant secretary of the Canadian Pacific, with office at Montreal, Que., died on May 17, at Montreal, at the age of 52. Mr. Heward had been in the service of the Canadian Pacific for about 30 years.

Franklin Hinchey, formerly and for 50 years land and tax agent of the New York Central & Hudson River, died on May 14, at his home at Gates, N. Y. He was at one time in charge of this department for the whole N. Y. C. & H. R., but as the system grew his jurisdiction was restricted to the main line of the New York Central between Syracuse, N. Y., and the eastern line of Erie county, with portions of the West Shore, the Rome, Watertown & Ogdensburg and the Pennsylvania division. Mr. Hinchey retired from active service in 1910.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Boston & Maine will soon be in the market for 150 locomotives.

The Missouri & Louisiana has ordered one mogul locomotive from the Baldwin Locomotive Works.

The Oklahoma & Eastern has ordered one mikado locomotive from the Baldwin Locomotive Works.

The Chicago, Burlington & Quincy has ordered 50 mikado locomotives from the Baldwin Locomotive Works.

The Newport News Ship Building & Dry Dock Company has ordered one four-wheel switching locomotive from the Baldwin Locomotive Works.

The Seaboard Air Line has ordered 20 Pacific type locomotives, 5 six-wheel switching locomotives, and 1 four-wheel switching locomotive from the Baldwin Locomotive Works.

The New York, New Haven & Hartford mentioned in the *Railway Age Gazette*, May 17, as negotiating with the American Locomotive Company for 15 consolidation locomotives, has ordered those locomotives from that company. This company has also ordered 24 electric locomotives from the Westinghouse Electric & Manufacturing Company.

The Vulcan Iron Works, Wilkesbarre, Pa., has received orders for locomotives as follows: 2 saddle-tank locomotives, Wolcott & Pomeroy, New York; 1 saddle-tank locomotive, Chattanooga Iron & Coal Company, Chattanooga, Tenn.; 2 saddle-tank locomotives, Moffett & Mead, San Francisco, Cal.; 1 saddle-tank locomotive, Richmond Cedar Works, Norfolk, Va.; 2 saddle-tank locomotives, C. W. Reynolds, Sagamore, Mass.

CAR BUILDING.

The Boston Elevated is in the market for 20 passenger cars.

The New York, New Haven & Hartford is in the market for 26 parlor cars.

The Wabash has ordered 5 all-steel mail cars from the American Car & Foundry Company.

The Boston & Albany will soon be in the market for 20 passenger cars and 1,000 freight cars.

The New York Central & Hudson River has ordered 20 milk cars from the Merchants' Dispatch Transportation.

The Seaboard Air Line has ordered 1,000 thirty-ton box cars from the Pressed Steel Car Company, and is now in the market for 200 hopper cars and 25 caboose cars.

The Pennsylvania Equipment Company, Philadelphia, Pa., is in the market for six 50-ton flat bottom steel gondola cars and six 50-ton self-clearing steel hopper cars.

The St. Louis & San Francisco has ordered 1,000 coal cars from the American Car & Foundry Company in addition to the 6,000 coal cars mentioned in the *Railway Age Gazette* of May 10.

The Philadelphia & Reading, mentioned in an unconfirmed item in the *Railway Age Gazette* of May 17 as being in the market for 2,000 freight cars, is now in the market for 1,000 freight cars.

The Boston & Maine will soon be in the market for 2,300 hopper cars, 1,600 box cars, 300 automobile cars, 150 refrigerator cars, 100 flat cars, 100 heater cars, 100 ice cars, 80 caboose cars, and 150 passenger cars.

The Missouri & North Arkansas has ordered 100 box cars from the American Car & Foundry Company and is in the market for three coaches, two mail cars, three combination cars, 50 furniture cars and 50 flat cars.

IRON AND STEEL.

The Illinois Central is in the market for 25,000 tons of rails.

The Northern Pacific has ordered 1,000 tons of bridge material from the Fort Pitt Bridge & Iron Works.

The Great Northern has ordered 2,200 tons of bridge material from the Fort Pitt Bridge & Iron Works.

The Harriman Lines have ordered 84,552 tons of rails, as follows: 17,900 tons from the Colorado Fuel & Iron Company; 10,925 tons from the Illinois Steel Company; 13,727 tons from the Tennessee Coal & Iron Company, and 4,200 tons from the Pennsylvania Steel Company. The total order includes 34,144 tons of 90-lb. rails, and 12,608 tons of 75-lb. rails.

General Conditions in Steel.—The new business of the Steel Corporation since the first of May has been larger than at any corresponding period in the history of the organization. The mills have sufficient tonnage on their books to guarantee full operation well into the latter part of the year, and for the first time in two years, consumers of certain classes of materials are beginning to doubt the ability of the steel companies to make deliveries on specified time. The fact that premiums are being paid for prompt delivery on plates is an evidence of the strength of the general steel situation.

SIGNALING.

New Installations of Block Signals, Interlocking, Telephones for Train Despatching, Etc.

The Grand Trunk has awarded to the Hall Signal Company the contract to install block signals on 82 miles of its line through the state of Indiana, as follows: Maynard to Sedley, double track, 20 miles; Valparaiso to Grangers, double track, 55 miles; Valparaiso to Sedley, single track, 5 miles; Olivers to St. Joe River, single track, 2 miles. On double track the signals will be Hall, style "K," automatic, bottom post, pull-clear, three position type, operating in the upper quadrant and arranged to be worked "normal clear." On single track the system will be controlled manual with continuous track circuits. The materials and specifications will conform to the Railway Signal Association standards throughout. The work will be commenced at once, and the sections between Maynard and Sedley and between Valparaiso and Sedley are to be put in service by September 1.

The Southern Railway is to install automatic block signals from Denim, N. C., to Charlotte, 96 miles, nearly all double track, and has let the contract for their installation to the General Railway Signal Company. The signals will be electric motor semaphores, top-post mechanism, three-position, worked in the upper quadrant, and the block sections will be about two miles long. Alternating current will be used and power will be furnished from a plant at Spencer, N. C. In case of failure of this plant, power can be taken from lines of the Southern Power Company at Greensboro and at Charlotte. The power line along the railway will convey current at 4,400 volts. This wire will be on a new line of poles, to be erected, and besides supplying power for the signals will furnish lights for all of the stations along the road, as well as electric power for certain other purposes. The automatic signals on 12 miles of road in and near Lynchburg, Va., have lately been completed. It is announced that the Southern Railway intends to install automatic signals on all of its double track lines.

A transandine line is approaching completion, which will open up additional traffic between Argentina and Chili. The Great Southern railway has for some time been quietly but effectively pushing on its new line towards the Chilian frontier from Neuquen. This portion of the Great Southern's system was only constructed in deference to the express wish of the Argentine federal government at a time that war was threatened between Argentina and Chili. A substantial guarantee accompanied the concession. Up till now some 40 miles have been completed, leaving about 70 miles further to be laid to reach the Chilian frontier. It is anticipated that the line will be fully equipped and in active operation by the month of August, 1913. The chief traffic carried will be cattle, of which there is an ever increasing trade being conducted between Chili and Argentina. Naturally the other cattle-carrying lines, the Buenos Ayres & Pacific and the Argentine transandine railways, will be effected, but with the anticipated increase in the industry of cattle breeding there ought in the near future to be sufficient remunerative freights for all of these railways.

Supply Trade News.

William C. Wilson, in the sales department of the Transportation Utilities Company, New York, has resigned that position.

It is reported that the Canadian Car & Foundry Company, Montreal, Que., will shortly begin the construction of a large new car-building plant at Port Mann, Ont.

The Sherwin-Williams Company, Chicago, has moved its office from the Steger building to the eleventh floor of the Peoples Gas building, Michigan avenue and Adams street.

The Otis Elevator Company, will on June 15 move its general offices from 17 Battery place, New York, to its own new building, at Eleventh avenue and Twenty-sixth street, New York.

The plant of the American Steel Foundries, New York, at East St. Louis, Ill., is being prepared for regular operation on June 1. This plant has large orders for car material and will run at almost full capacity.

F. D. Reemer, who has been assistant purchasing agent of the American Car & Foundry Company, New York, has been appointed purchasing agent of the Haskell & Barker Car Company, Michigan City, Ind., with office in that city.

The Chicago Car Door Company, Chicago, has received orders for doors for 1,000 box cars being built by the Chicago, Milwaukee & St. Paul, also for 400 cars for the New Orleans, Mobile & Chicago, and 20 for the St. Louis, Rocky Mountain & Pacific.

J. F. MacEnulty, general manager of the Western Steel Car & Foundry Company, Chicago, has been made general sales manager of the Pressed Steel Car Company, Pittsburgh, Pa., and of the Western Steel Car & Foundry Company, with office in New York. This is a newly created position.

The Kip Brush Company, New York, has made Wood, Bowers & Company, St. Louis, Mo., its southern representative. The Kip company recently organized a special railway department under the charge of Harry M. Baxter, formerly in charge of production and sales for the Wolfe Brush Company.

At the recent annual meeting of the Cement Products Exhibition Company, Edward M. Hagar, president of the Universal Portland Cement Company, Chicago, was elected president. It was decided to hold the sixth annual Chicago cement show in the Coliseum, January 16-23, 1913, but to hold no shows in New York and Kansas City, Mo.

Frederick Topping, president of Topping Brothers, Inc., New York, manufacturers of and dealers in railway and heavy construction hardware, died on May 22 at his home in Summit, N. J., of heart disease, at the age of 59. Mr. Topping was born in London, Eng., and came to this country about 50 years ago. The firm of Topping Brothers was founded by him and his brother, Joseph Topping, in 1885.

The plan submitted to the depositing stockholders of the Hall Signal Company, New York, last month, has, in accordance with the deposit agreement of May 10, 1911, been declared effective. An underwriting syndicate will be formed, and the plan put into effect. The plan provides for the formation of a new company to be capitalized as follows: $1,000,000 six per cent., 20-year convertible (into preferred stock) debenture bonds, of which $50,000 must be called each year, commencing four years after issue, or earlier, if the operations for the year show that it has been earned, and before any dividend is paid on the preferred stock for that year; $2,000,000 seven per cent. cumulative preferred stock; and $3,000,000 common stock. The new company will acquire the property of the Hall Signal Company, subject to its present first mortgage of $250,000. Present stockholders may, until June 6, subscribe at $100 per share for preferred stock of the new company, in an amount equivalent to 50 per cent. of present holdings. They will receive, with such preferred stock, common stock of the new company in an amount equivalent to their present holdings. The new company will be assured of $1,000,000 fresh capital, of which up to $500,000 may be used to purchase such debts of the Hall Signal Company as the creditors will not consent to sell for new convertible debentures. Of the preferred stock, $1,000,000 will be held in the treasury for the redemption of the debentures when converted. Of the common stock $1,000,000 will be used to secure the underwriting and to remunerate the reorganization committee.

Railway Construction.

New Incorporations, Surveys, Etc.

Alberta Railway & Irrigation Co.—See Canadian Pacific.

Canadian Pacific.—A special meeting of the Georgian Bay & Seaboard is to be held on June 13 to decide whether additional bonds should be authorized for the construction and equipment of the new branch from Port McNicholl, Ont., to the Ontario & Quebec at Bethany Junction, which will be opened for business soon H. C. Oswald, secretary, Montreal.

A contract has been given to John Timothy, Winnipeg, Man., for building an extension of the Alberta Railway & Irrigation Company's line from Stirling, Alb., 25 miles easterly. This section will be built this year. J. G. Sullivan, Winnipeg, is chief engineer.

Chicago, Milwaukee & Puget Sound.—An officer writes that work is now under way on a branch from Beverly, Wash., south to Hanford, 45 miles, and on an extension from a connection with the main line at Plummer, Idaho, to Bell, Wash., as well as on a branch from Tiflis, Wash., to Nepple on Moses lake, 15 miles. Some minor revision of line is being made on the Tacoma Eastern. E. O. Reeder, chief engineer, Seattle.

Clear Lake.—An officer writes that contracts are to be let within the next few months to build from Lakeport, Lake county, Cal., east to Hopland, Mendocino county, 25 miles. There will be one short steel bridge and a 450-ft. tunnel. The line will traverse a rich agricultural country. C. M. Hammond, president, Lakeport; C. R. Rankin, chief engineer, Hopland; and R. D. Hatch, financial agent, San Francisco, Cal. (July 14, p. 104).

Edmonton, Dunvegan & British Columbia.—Grading contracts have been let for work on 33 miles from Edmonton, Alta., as follows: To D. F. McArthur, 10 miles; to Porteous Brothers, 10 miles; to J. F. Cassils, 3 miles, and to L. A. Johnson, 10 miles. A contract has been let for clearing the right of way for 70 miles. The general contract for building the line from Edmonton to the Athabasca river crossing, about 120 miles, has been let to D. F. McArthur, Edmonton. The company was incorporated in 1907, to build from Edmonton in a northwesterly direction via Dunvegan to Fort George, B. C. T. Turnbull, chief engineer, Edmonton.

El Paso & Southwestern.—An officer writes that track laying has been started on the extension from Fairbanks, Ariz., to Tucson, 67 miles. MacArthur Brothers Company has the contract for the grading work, the American Bridge Company for the bridge steel, and the Missouri Valley Bridge & Iron Company for erecting the bridges. The maximum grades will be 1 per cent., and maximum curvature 3 deg. There will be three steel bridges to have a total length of 1,036 ft. There will also be a station, a freight house and a roundhouse at Tucson. H. J. Simmons, chief engineer, El Paso, Tex.

Erie.—Contracts have been let for double-tracking work between Marion, Ohio, and North Judson, Ind., as follows: To Eyre, Shoemaker & Company, Philadelphia, Pa., from Marion, Ohio, to Kenton, 25 miles, from Preble, Ind., to Uniondale, 12 miles, and from Huntington to Laketon, 20 miles; to the Ferguson & Edmondson Company, Brookville, Pa., from Kenton, Ohio, to Harrod's, 18 miles, and from Elgin to Wren, 16 miles; to the Patterson Moran Company, Morgantown, W. Va., from Harrod's to Lima, nine miles; to John R. Lee, Paterson, N. J., from Lima to Elgin, 20 miles, and from Wren, Ohio, to Preble, Ind., 13 miles; to Jones Brothers, Columbus, Ohio, from Rochester, Ind., to North Judson, 31 miles. A contract has not yet been let for the section from Laketon, Ind., to Rochester, 22 miles. W. J. Harahan, vice-president, New York. (March 15, p. 525).

Georgian Bay & Seaboard.—See Canadian Pacific.

Great Northern.—President C. R. Gray is quoted as saying that millions of dollars are to be spent this year and next year in extending lines into virgin territory of Washington and Oregon, and into the province of British Columbia, to reach the rich grain fields of western Canada by means of north and south feeders. The work under contract from eastern Washington to the Pacific coast will be rushed to completion, and additional contracts will be let soon for extensive development in northern

Washington. Development of subsidiary lines in Oregon will be carried out by the Spokane, Portland & Seattle and other Hill lines.

The Great Northern has plans made for the construction of a 400-mile line during the next five or six years. This new line is to run from a point on the New Rockford-Williston line in North Dakota, a little west of New Rockford, through North Dakota into Montana and thence west to Lewistown. From Lewistown to Benchland, a line has recently been completed. Benchland is about in the middle of Montana, on the Great Northern line that runs south from the main line at Shelby to Laurel, near Billings. North from Benchland no new work will be necessary, as the route will run north along the Laurel-Shelby line to Vaughn. From Vaughn west to Augusta, Mont., about 35 miles, the Great Northern is building an extension which will soon be finished. From Augusta the new line will be built in a northerly direction to a point near Java on the main line. The heaviest grades will be encountered on this section. Java is just west of the great divide. The new route from the main line near Java will run south to connect with the Shelby-Laurel line in Montana, thence to Lewistown and almost due east until it joins the New Rockford-Williston line in North Dakota, which in turn meets the Fargo-Surrey line, just completed, at New Rockford. The work this year on the proposed extension will consist of building the section from Crane, Mont., on the Yellowstone river, east to the Missouri river, North Dakota, about 105 miles. Grading will be carried out eastward from Lewistown, Mont. The new route will give the Great Northern an alternate transcontinental road and will obviate the necessity of double tracking the main line through Montana.

KETTLE VALLEY.—An officer writes that extensions are to be built westward from Midway, B. C., north to Carmi, thence west via Penticton, to Princeton, and north to Merritt, a total of 276 miles. Work is now under way from Midway to Carmi, and on 30 miles south from Merritt. L. M. Rice & Company has a contract for grading from Carmi west 31 miles, and Penticton west 40 miles. A. McCulloch, chief engineer, Penticton.

KINGSTON & PEMBROKE.—See Kingston, Ont., under Railway Structures.

LAWTON RAILWAY & MINING COMPANY.—An officer writes that this company is building a line from Lawton, Okla., north via Ft. Sill, to Medicine Park, 16 miles. Track has been laid on two miles. Contracts will not be let for the work. There will be two trestles of 70 ft. each, and a car barn is to be built. B. R. Stephens, president, McAlester.

NEW YORK, NEW HAVEN & HARTFORD.—A contract has been given to the Jobson-Gifford Company, New York, for the catenary foundations in connection with the electrification of the line from Stamford, Conn., to New Haven.

NEW YORK, WESTCHESTER & BOSTON.—See item under General News regarding the opening for business of a section of this road.

PERE MARQUETTE.—See an item regarding improvements to be carried out by this company under Railway Financial News.

SACRAMENTO VALLEY (Electric).—An officer writes that the plans call for building from Woodland, Yolo county, Cal., via Williams, Willows, Germantown, Orland and Corning to Red Bluff, Tehama county. Contracts for the work will probably be let in about nine months. There will be some car barns and shop buildings. C. L. Donahue, president; M. Dozier, Jr., engineer, Willows, Cal.

ST. JOHN VALLEY.—Contracts have been let for building three sections, on which work is to be started at once, it is said, as follows: To the Corbett Construction Company, from St. John, N. B., to Fredericton; to the Quebec Construction Company, from Fredericton to Woodstock, and to Kennedy & McDonald, from Woodstock to Grand Falls. The Woodstock town council has offered a free site for railway shops, and they will probably be built at that place. A. R. Gould, president. (Feb. 16, p. 321.)

ST. LOUIS & SAN FRANCISCO.—Announcement has been made that this company will build 100 miles of branch lines tapping Peoria, Ill., and Springfield.

SAN ANTONIO BELT TERMINAL COMPANY.—This company was recently incorporated in Texas, with $200,000 capital, by the Missouri, Kansas & Texas interests, to build a 15-mile belt line to connect all the yards and stations of the railways entering San Antonio, Tex. It is understood that the formation of the company means the construction of a terminal by the Missouri, Kansas & Texas. C. E. Schaff, president, St. Louis, Mo.; E. Chamberlin, vice-president, and W. Walthall, secretary and treasurer, both of San Antonio, and C. N. Whitehead, assistant secretary and treasurer, New York. (May 10, p, 1079.)

SAN PEDRO, LOS ANGELES & SALT LAKE.—An officer writes that work has been finished on the branch from Moapa, Nev., southeast to St. Thomas, about 22 miles, and the line is now open for traffic. E. G. Tilton, chief engineer, Los Angeles, Cal. (December 1, p. 1149.)

SOUTHERN RAILWAY.—This company will improve its line between Macon, Ga., and Brunswick during the coming summer. Eight passing tracks aggregating 27,300 ft., or over five miles, are to be constructed. These will be located at Cochran, at Empire, at Godwinsville, at Chaucey, at Achord, at Helena, at Scotland, and at Lumber City. The company has recently completed work on 13 passing tracks between Macon and Atlanta. W. H. Wells, chief engineer construction, Washington, D. C.

SPOKANE, PORTLAND & SEATTLE.—See Great Northern.

TACOMA EASTERN.—See Chicago, Milwaukee & Puget Sound.

TIDEWATER SOUTHERN.—This company, which was incorporated in March as a consolidation of the proposed Tidewater & Southern and the Tidewater & Transit, has made a mortgage to secure an issue of $4,000,000 bonds. The company plans to build from Stockton, Cal., via Turlock, to Fresno, also some branch lines through San Joaquin county and adjacent territory.

TIDEWATER & SOUTHERN.—See Tidewater Southern.

TIDEWATER & TRANSIT.—See Tidewater Southern.

VALDOSTA, FORT GAINES & MONTGOMERY.—See an item regarding this company under Railway Financial News.

WASHINGTON ROADS.—It is said that construction work will be started about July 1 on a line up Salmon creek via East Chehalis, Wash., to reach timberlands. The Monarch Lumber Company, Portland, Ore., and the Metcalf Shingle Company, Kelso, Wash., are back of the project.

WASHINGTON WESTERN.—An officer of this company writes that the line will be opened for business about June 1 between Machias, Wash., Three Lakes and Woodruff. An extension from Three Lakes east and thence north to Granite Falls is expected to be finished about September 1. C. W. Hole, general manager, Three Lakes.

RAILWAY STRUCTURES.

DES MOINES, IA.—Work has been started on a new freight depot for the Chicago, Burlington & Quincy at this point.

FAIRBANKS, ARIZ.—See El Paso & Southwestern under Railway Construction.

KINGSTON, ONT.—The Kingston & Pembroke, which is controlled by the Canadian Pacific, will construct a new turntable at Kingston, also make repairs to buildings and culvert work, and carry out improvements covering buildings and culverts, ditching, putting in additional ballast, and laying some new rails. The cost of the work will be about $200,000.

NEWARK, N. J.—The Lehigh Valley is making plans for putting up a brick passenger station, 110 ft. x 46 ft. and 45 ft. high at the corner of Meeker avenue and the railway company's right of way in Newark.

PORT HURON, MICH.—See an item regarding improvements on the Pere Marquette at Port Huron under Railway Financial News.

TOLEDO, OHIO.—See an item regarding improvements on the Pere Marquette at Toledo under Railway Financial News.

UTICA, N. Y.—The New York Central & Hudson River will make improvements at Utica, to include extending the freight yards and putting up a new passenger station. Work is already under way on the substructure for the passenger station. The cost of the improvements will be about $1,500,000.

WOODLAND, CAL.—See Sacramento Valley (Electric) under Railway Construction.

Railway Financial News.

American Railways.—Senator William C. Sproule has been elected a director to succeed William F. Harrity, deceased.

Baltimore & Ohio.—It is said that $200,000,000 bonds may soon be authorized, $50,000,000 of which will probably be 4 per cent. convertible bonds, exchangeable for the common stock at about 110; in which event an additional issue of common stock would have to be provided for. The remaining $150,000,000 may take the form of refunding 4 per cent. bonds out of the proceeds, of which certain underlying bonds which are callable, may be retired; and the balance will be used for the purposes of the company and to pay off the company's notes.

Bangor & Aroostook.—The Aroostook Construction Company, the holding company for the Bangor & Aroostook, has increased its capitalization from $50,000 to $500,000 and has issued $2,500,000 5 per cent. collateral trust notes of May 1, 1912-1917, of which $1,500,000 have been issued for the purpose of refunding some floating debts of the railway and of the construction company. The notes are secured by $1,350,000 Bangor & Aroostook consolidated mortgage 4 per cent. bonds, 20,000 shares of the stock of the Bangor & Aroostook, which involves the control, and 1,750 shares of the Northern Telegraph Company stock. The notes have been sold to Brown Bros. & Co., New York, and the Old Colony Trust Company, Boston, Mass.

Boston & Maine.—J. P. Morgan & Company, New York, have bought $12,000,000 one-year 4 per cent. notes, from the proceeds of the sale of which $5,000,000 will be used to pay off that amount on B. & M. one-year notes, maturing June 15, 1912; the balance will be used for construction, etc.

Canadian Northern.—Edward Lowber Stokes, Philadelphia, Pa., has sold to the public $2,000,000 equipment trust 4½ per cent. certificates dated April 1, 1912 and maturing in semi-annual installments from April 1, 1913, to April 1, 1922. These notes are secured by equipment which cost over 33 per cent. more than the par value of the notes.

Canadian Pacific.—See Southampton Railway, also item under Railway Construction News.

Chicago River & Indiana.—This company has made a mortgage to secure an issue of first mortgage 5 per cent. 40-year bonds. Of these bonds $600,000 are authorized and the present issue to be $100,000, the balance will be reserved to retire the outstanding $500,000 first mortgage 5 per cent. bonds, which are redeemable after September, 1915. Additional bonds may be issued for the cost of additional properties and franchises since October, 1911, through purchase, construction, consolidation, etc., but none shall be issued for equipment in substitution and replacement of that owned on that date.

Denver, Northwestern & Pacific.—A judgment for $1,940,588 was entered in the district court at Denver, Col., on May 10, in favor of W. W. Watson, receiver for the Denver Railway Securities Company, the holding company of the railway. The judgment represents the amounts advanced in the form of interest on $4,000,000 Colorado & Utah Construction Company notes, now deposited as security for $3,500,000 notes of the Denver Railway Securities Company, to May 1, 1912, and also $500,000 of the principal of the loan paid by the Securities company.

Detroit, Toledo & Ironton.—Judge Clarence W. Sessions, of the federal court for the western district of Michigan, at Detroit, Mich., on May 12 confirmed the appointment of George P. Johnson, of Bluefield, West Virginia, as sole receiver of the property.

Galveston, Houston & Henderson.—Henry Martin, general manager of the International & Great Northern, has been elected a director, succeeding Judge T. J. Freeman, resigned.

Kalso & Slocan.—The Canadian Pacific has bought for $25,000 from the Kalso Syndicate, the Kalso & Slocan Railroad, which the Great Northern sold to the syndicate last year. The Kalso & Slocan serves a number of mines in the mining districts of Kalso and of Slocan, and connects with the Canadian Pacific.

Kansas City, Mexico & Orient.—The protective committee for the International and Union Construction Company's stocks has extended the time for deposit until and including June 4.

Kansas City Southern.—B. S. Guinness, of Ladenburg, Thalmann & Company, New York, has been elected a director, succeeding William F. Harrity, deceased.

Maine Central.—Stockholders will vote on May 24 on the question of increasing the authorized capital stock from $10,000,000 to $15,000,000, and of authorizing the directors to determine the manner of issuing and disposing of the same. The Boston & Maine will have to subscribe to slightly over half of the new offering to maintain its control of this company.

Missouri & North Arkansas.—Francis Bro. & Company and the Mercantile Trust Company, both of St. Louis, Mo., were awarded the $1,250,000 3-year 5 per cent. receivers' certificates, subject to confirmation by the court.

New York & Harlem.—At the annual meeting, minority stockholders asked for certain information, as to the value of their stock, which they claimed they ought to have to intelligently decide whether or not the offer of $175 per $50 share, made by the New York Central & Hudson River for the New York & Harlem stock, was fair. The company claimed that a good part of this information was not available, but the stockholders' meeting voted to request such information from the secretary.

New York, Philadelphia & Norfolk.—The Maryland Public Service Commission has received a letter from its counsel, according to a Baltimore press dispatch, saying that he did not believe the proposed stock dividend of $1,250,000 was legal. The company in its application states that $1,250,000 had been spent for capital betterments out of net earnings, and asks that the commission allow stockholders to be reimbursed for these expenditures by the issue of stock dividends.

New York State Railways.—This subsidiary of the New York Central & Hudson River has applied to the New York Public Service Commission, Second District, for authority to make a new first consolidated and refunding mortgage for $50,000,000 to secure an issue of 50-year 4½ per cent. bonds and to issue $6,357,038 bonds secured by that mortgage.

Pere Marquette.—Receivers Walters and Blair on May 20 made application in the Federal Court at Detroit, Michigan, for permission to issue $2,000,000 receivers' certificates to build new stations, round houses, coaling plants and extensions of the yards at Toledo and Port Huron.

St. Louis Southwestern.—The new $7,500,000 first terminal and unifying mortgage 5 per cent. bonds, dated January 1, 1912, and due 1952, recently sold to a syndicate of New York bankers, are being offered for sale at 90½, to yield about 5.60 per cent. on the investment.

Southampton Railway.—The New Brunswick government has guaranteed the bonds of this company, which is operated by the Canadian Pacific to the extent of $10,000 a mile. The road runs from Millville on the Canadian Pacific to Southampton.

Tide Water Southern.—See item under Railway Construction News.

Valdosta, Fort Gaines & Montgomery.—This is the new name of the Valdosta, Moultrie & Western, operating a line from Milton, La., to Sterling, 45 miles. The company has, it is said, sold $4,600,000 bonds in Paris to pay for the 230-mile line from Valdosta to Montgomery, Ga., as it is constructed. The Georgia railway commission, on March 14, 1912, approved an issue of $2,300,000 of stock and $4,600,000 bonds to be issued only on the construction of five-mile sections at the rate of $30,000 per mile, of which $20,000 was to be in bonds and $10,000 in stock. On May 10 the commission granted a petition to deliver the entire issue and secure the cash on condition that the same be held by the Standard Trust Company, New York, in place of the bonds, to be paid out only under the same terms as those under which the bonds were to be issued.

Winnipeg, Salina & Gulf.—This company has sold its entire issue of $29,997,000 bonds in Paris. It is said that $5,000,000 is already on deposit to the credit of the company, and that additional deposits of the same amount will be made from time to time as construction work progresses.

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GENERAL NEWS SECTION 1210

THE New York Public Service Commission, Second district, in one of its recent news summaries of decisions, told about some of the freak communications which the commission receives in large numbers. One of these letters asked "from the best authority possible" the proper and authoritative date for the opening of the straw hat season. In the latest published volume of cases decided by the commission, which has just come to hand, there is reported, page 244, the case of Wheaton v. Elmira, Corning & Waverly, opinion by Commissioner Decker. The opinion takes up about six-and-a-half closely printed pages, and is rendered after a full hearing by the entire commission. It decides the question of whether or not a 10-cent fare between Holbert's Crossing, town of Chemung, and Waverly, about 3 1/7 miles, is unreasonable and unjust. At first glance, there would not seem to be a world wide difference between the spectacle of five men, receiving annual salaries of $15,000 each, devoting the time that was given to this case, and that of a man appealing to the august Public Service Commission for a ruling on the straw hat question. The generally broad, sound, common sense that the New York up-state commissioners have manifested has been commented upon in these columns. If they are called on to decide cases like the Waverly three-mile fare, it is the fault of the law creating the commission; and if they consider such cases at rather great length, it is at least a fault on the right side. It would seem, however, that there ought to be in the great state of New York some less expensive machinery for the benefit of small bodies of disgruntled or slightly oppressed people who insist on public consideration of their real or supposed wrongs. Hundreds of cases like this are constantly coming before the commission, and it must decide them; but at grotesquely disproportionate cost.

CONSISTENCY is a jewel; and railway men quite generally appreciate the fact. At least the passenger agents and the dining-car men make earnest and quite successful endeavors in that direction. Possibly it was because the passenger men with their reserves of esthetic sensibility, were not invited to join the committee of arrangements that a certain noticeable inconsistency recently happened. A special train, made up to carry a company of railway men on a two-hour excursion, was prepared in the time-honored way; the engine was the last one out of the shops, and its bright parts were brighter than the sun; the engineman and fireman had on clean overalls; the cars were clean and newly varnished, and of very late design; the trainmen were above the average in ability, and their uniforms were immaculate. Somebody had taken care that that train, exposed to a hundred competent critics, should be above criticism. But he forgot one thing: the whistle. It was out of adjustment, one or two octaves too high in tone, and every screech sounded like the appeal of a fiend to draw the passengers' attention away from their pleasant surroundings—and the screeches were very frequent. A deaf person would have enjoyed that trip greatly. The ordinary passenger could enjoy it only by forcibly deadening his auditory nerves—which is not always easy. As the passengers were all deadheads we shall hardly be warranted in addressing our homily directly to the business instinct, for probably no money has been or will be lost; but it seems worth while to consider the feelings of passengers—even deadheads—and indeed of trainmen and the dwellers on the farms along the road, from the purely academic or scientific standpoint. The ideal passenger train should be pleasing to the eye, the ear and the nostrils. Another thing was forgotten, not only the whistle, but the man who blew it. He had never been trained in sane whistling. There was a crossing about every mile, and at each one of them he sounded the whistle two to four or more times as long as was necessary. We do not charge this offense against the officer who planned this train, for this unnecessary disturbance of the atmosphere is very common. It prevails on the best roads and on some of the best trains. The desirability and the feasibility of sounding the crossing signal in two seconds has been set forth in these columns repeatedly, and we are not, perhaps warranted in repeating the lecture at this time; but it will be agreed that every passenger engineman ought to be a good workman—one who knows how to perform his duties in the best manner—and it is obvious that one who cares nothing about time (as defined by the musician) or noise, or the accuracy with which he obeys a rule, and who takes no thought of the feelings of sick persons, or the example of enginemen who sound the whistle correctly, is not such a workman. One of the most

effective ways to promote the efficiency of enginemen in important matters is to compel them to perfect themselves in the small and seemingly unimportant things. "Trifles make perfection."

THE Massachusetts senate has asked the state railway commission for an opinion as to whether the extension of the Grand Trunk (under the charter of the Southern New England) through New Hampshire to Boston would be in the public interest. President Mellen, of the New Haven, was quoted some time ago as saying to the New York Public Service Commission that the entrance of the Grand Trunk into New England was inevitable, and when one contemplates the "hinterland" out of which this project springs one must perforce agree with Mr. Mellen's conclusion. To be sure, this is not the first invasion of New England by the Grand Trunk. The control by this system of the Central Vermont through ownership of a majority of its stock has given it a line through Vermont to White River Junction, and down the Connecticut river to Windsor. From there to Brattleboro it has trackage rights only, but from Brattleboro to New London, Conn., it has a through line as a result of the lease of the New London Northern to the Central Vermont. The successful struggle of the Grand Trunk interests for an entrance to Providence is so recent as to be still remembered. Under the charter of the Southern New England, the Grand Trunk is building from Palmer, Mass., at a junction with the New London Northern, to Providence, where an extensive dock system is to be established. Finally, as lessee of the Atlantic & St. Lawrence, the Grand Trunk runs south through the state of Maine to Portland. But New London and Providence are as yet of little importance, except for coastwise traffic, and there is no immediate prospect of their developing into important terminals for ocean commerce; Portland is of little or no use in the winter. At Boston the desired ocean facilities the year round are available, and the present enthusiastic attitude of the Boston people toward the entrance of the Grand Trunk seems to insure the facilities needed for adequate terminal development. Whether or not the enthusiasm of the Boston business interests is justified, in other words, whether or not the building of the road is defensible from the economic standpoint, depends altogether upon whether the road can create its own traffic. It is practically to parallel the New Hampshire lines of the Boston & Maine. It is obvious that if the new road is merely to divide existing traffic with the old it will impose on the public the added burden of maintaining an unnecessary investment. If, however, it can create its own traffic, its entrance ought not to be stayed, for it will be of tremendous advantage to Boston in increasing its importance as an ocean port, and it will vitalize the entire railway service throughout northern New England. As to the first point, with the rapid development of the Canadian Northwest, and the grip that the Grand Trunk is securing in the territory as it is settled up, there ought to be no question of the wealth of traffic that will pour through the Boston gateway. The new line ought certainly to support its own investment. As to the second point, we have doubtless passed beyond the period of reckless railway competition, and it is fortunate for the public that this is so. But there is still opportunity for a healthy competition in service between railway systems, that will accrue to the advantage of the traveling and shipping public. The Boston & Maine, burdened by a multitude of unproductive leases and with a management not highly progressive, has for many years come short of furnishing a service satisfactory to its patrons. The purchase or control of the road by the New Haven may mean improvement, but the process is slow in face of the financial difficulties, and the improvement since the entrance of the New Haven into possession is not very evident. It is not then surprising that the people of northern New England are watching with great interest the progress of the Grand Trunk in its negotiations.

PREPARED FUEL AND LARGE GRATES.

IN his paper before the International Railway Fuel Association on Fuel as a Factor in Locomotive Capacity, which is published in this issue, Dr. Goss suggests two methods of increasing locomotive capacity: one by better adapting the fuel to the requirements of the service, the other by designing the boiler, especially the firebox and grate to better suit the fuel requirements.

The first method would improve the quality of the coal by screening to exclude the fine coal and slack, by sizing to obtain a fuel of uniform size, and by washing, thereby rejecting much of the slate, bone and other material which produces clinker and ash. The second method deals principally with increased grate area, and suggests the possibility of using an area of 150 sq. ft., having a length of 20 to 25 ft. While there are good theoretical reasons for each of these suggestions, the latter especially involves such radical changes in present practice that it does not seem likely to receive practical application to any extent.

The full realization of the first proposition would be the use of briquettes, and that may become the practice for passenger service in this country, as it now is on European railways. For freight service the tendency is rather in the opposite direction, and run-of-mine coal, which has all the faults which the author regards as undesirable in locomotive fuel, is coming more and more into general use. This is the extreme condition, and the cheapest form in which coal is delivered to railways. There are some grades of coal which require screening, and others where washing would prove economical, but the special preparation of any good coal by screening and washing, for the purpose of obtaining additional capacity in the locomotive, will add to the cost of fuel to such an extent that most railways will continue to use raw coal on account of its low cost. The successful development of the mechanical stoker is also calculated to encourage the use of low grade fuel, for there is no objection to the larger amount to be handled, and it is possible to use larger proportions of fine coal in this way.

The use of a very large grate area with a firebox as long as 20 to 25 ft. is an interesting proposition, but the modification in the design of the locomotive necessary to secure such an arrangement would doubtless be attended with such disadvantages in the operation of both boiler and engine that they would more than offset any gain due to a better boiler performance.

Such a design would be better suited to a power plant or to marine service where the operation at normal capacity is continuous for a week or more at a time. The large amount of coal required to prepare the fire, and that lost when the fire is dumped, would make it a very wasteful operation if repeated every day, as in present locomotive practice. The repairs to stokers and to the grates would increase in proportion to the increase in area, and the time required for such repairs would occasionally keep the engines out of service and the useful mileage per month would be reduced.

The large grates now used in Mallet, Mikado and Mountain type locomotives, though only half as large as those proposed, have several of these disadvantages. When the fire is new it requires skillful firing to keep the grates covered uniformly, and if there are thin places where an excess of air is drawn through by the heavy blast of the exhaust, the furnace is cooled and the gases escape under conditions of incomplete combustion. These objections also increase with the large addition to the grate area, and are liable to neutralize the advantages due to increased capacity and reduced spark loss.

Before such a radical change is made in locomotive design, other methods of supplying heat for increased capacity are likely to be adopted. The application of the Diesel engine to the locomotive, though now in its experimental stage only, may become an accomplished fact, and the large saving in fuel thus made possible will extend the zone in which oil fuel is economical for locomotive use. The saving in weight, due to the removal of the steam boiler, would permit of a large installation for a gas producer in connection with gas engines for locomotive use.

Such a combination might be preferable to the cumbersome grates and stokers which are contemplated in the method which Dr. Goss proposes for obtaining large capacity in locomotives.

THE PANAMA TOLL QUESTION.

THE house committee on interstate and foreign commerce, after investigation, reported in favor of legislation imposing tolls on American vessels using the Panama canal. The house last Thursday rejected the report and passed a bill making the use of the canal free to American vessels. The house bill would also exclude from the canal ships owned or controlled by railways.

The whole people of the United States are paying in taxes for the construction of the canal. It should, therefore, be operated for the benefit of the whole people. If ships using it cannot make rates that will take business from the competing railways, and be even lower than those now made by steamship lines, and at the same time pay tolls that will cover the expenses of maintaining the canal and the interest on the investment in it, the canal, from a transportation standpoint, will be a failure. There is, however, no evidence that vessels using it will not be able both to pay reasonable tolls and make rates between the Pacific and Atlantic coasts lower than any now charged. This being the case, there is no good reason why they should not be required to pay tolls; and there are several good reasons why they should be. American vessels already are given by the navigation laws a monopoly of the coastwise trade of the United States. This is one form of subsidy. If the expenses of maintaining and operating the canal and of paying interest on the large investment in it are not met from receipts from tolls, they will have to be met from taxes levied on the entire people of the United States; and every dollar from the public treasury applied to this purpose will be an additional subsidy to the steamship lines. No wonder, then, that after the passage of the house bill there was rejoicing in the camp of the ship subsidy beggars who have been importunately, but unsuccessfully, besieging Congress at every session for years.

Not only would the passage of a no-toll law involve additional susidizing of the steamship lines, but, while the taxes to pay the subsidy would be collected from all of the people of the country, the effect of its payment would be to benefit some sections at the expense of others. This was recognized in Congress, and the vote on the canal bill was largely on sectional lines. The communities on and near the Pacific and Atlantic coasts already, because of their proximity to water transportation, have an advantage in freight rates over inland communities. The opening of the canal, even if reasonable tolls were levied, would doubtless increase the advantage of the seaboard communities, and the disadvantage of the inland communities; and to make it toll-free is to further increase their relative advantages and disadvantages. Congress passes legislation to prohibit discrimination by railways between sections—and then takes the money of the public and lays it out in ship subsidies to create precisely the same kind of discriminations between exactly the same sections.

The statesmen who voted for the no-toll provision evidently may be roughly divided into four classes. First, there were those who for years have been valiantly representing the ship subsidy beggars, and who saw in this legislation a means of granting the subsidies without seeming to do so. Second, there were those representing districts on and near the Atlantic and Pacific seaboards, who were influenced by considerations of sectional advantage. Third, there was a large class who knew nothing about the merits of the question, and who voted on the theory that a no-toll policy would hurt the railways and that, therefore, it must be a good thing. Fourth, there was a large class who have heard that cheap water transportation is a good thing, and who think that, therefore, water transportation should be made as cheap as possible *for the shipper,* even if the *public* has to pay for it.

The provision prohibiting the use of the canal by boats controlled by railway companies is dictated by the same grade of political and economic intelligence that drafted and voted for the no-toll policy. The National Waterways Commission was created by Congress, and is composed of seven senators and five members of the house. Its final report—made after an investigation covering three years—has just been published. The commission discussed the growth of railway control of boat lines and the refusal of the railways in many cases to make through rates and traffic arrangements in connection with independent lines, and then (on page 20) said:

"This situation calls for additional legislation not only to prevent the elimination of water competition by this means, but also to protect the public against the raising of water rates which railway control over boat lines makes possible. Legislation to this end is as necessary for the preservation of water transportation as is the prohibition of rate cutting and other discriminatory practices, *but it should not be of a character to discourage legitimate investment in the business of water transportation, even by railway companies. If the activities of boat lines are properly regulated in the interest of the public, the question of ownership or control will become of minor importance.*"

The italicized statements show the attitude of the commission toward proposals to prohibit the control of boat lines by railways. It doubtless recognizes the fact that legislation prohibiting railways from acquiring and operating boat lines will not accomplish the desired object. That object is to maintain competition, and it will not be attained by the proposed means, simply because, regardless of the proposed legislation, the same interests that control the railways would get control of steamship lines, even though the railways themselves did not do so, and the results would be very much the same as those of railway control. As the National Waterway Commission indicates, the just and effective way to deal with the situation would be, not to try to control the ownership of the steamship lines, but to give the Interstate Commerce Commission authority, regardless of their ownership, to control their acts. However, inasmuch as Congress habitually ignores alike the lessons of experience and the recommendations of all persons or bodies having even a semblance of expert knowledge, it can hardly be expected that it will pay any more attention to the views of the National Waterways Commission than the house has to the views of its own committee on interstate and foreign commerce.

The whole Panama canal problem is being handled in a spirit of sectionalism, prejudice and political opportunism—in the same spirit which has dictated the handling of river and harbor bills and appropriations for public buildings. The only interest that ought to be considered is that of the nation as a whole; and it is being sacrificed to the interests of particular sections, of ship subsidy grafters and of political aspirants. Imagine what the results to the country would be if government ownership of railways were adopted and Congress were given an opportunity to deal with the operation and development of our 240,000 miles of railway in the same way!

NEW BOOKS.

Laboratory Manual for Testing Materials of Construction. By L. A. Waterbury. 5 in. x 8 in. 270 pages. 68 illustrations. Cloth binding. John Wiley & Sons, New York. Price, $1.50.

It is common for each instructor of courses in materials testing in technical schools to outline the courses for his own classes, and the author of this book has drawn largely on his experience in teaching such courses for the experiments which are included in the book. It has been the intention to cover the subjects fully, and for schools requiring all testing work to be done in a one year course many of the experiments would have to be eliminated. In addition to the tests of cement, which are the same as those published by the same author in a previous book, tests of concrete, stone, asphalt, sand and gravel, wood, iron and steel are included. In addition to these outlines of experiments there are chapters on testing apparatus and a number of appendices covering standard tests and specifications for various materials of construction.

Letters to the Editor.

POOLING OF EQUIPMENT.

New York, April 23, 1912.

To the Editor of the Railway Age Gazette:

The writer of the article on "Pooling of Equipment" in your issue of April 12, 1912, from Houston, Tex., signed "Transportation," evidently believes that the pooling of equipment will be a panacea for all the ills of car distribution; but, given the same conditions that exist today, I cannot see where the pool would be any help.

As a general proposition, when business is good and cars are in demand, this condition does not apply to one road, but to all. Taking his own example, for instance, of a road holding empty cars belonging to its neighbors and the shipper with the full warehouse demanding and pleading for equipment, it must be remembered that on the neighbor's road there is another shipper demanding and pleading for equipment. Now, who is entitled to the cars, the owner or the borrower? What shipper is entitled to the cars, the shipper on the owner's road or the shipper on the borrowing road? If, under pool regulations, the shipper on the borrowing road gets the cars, who is going to take care of the shipper on the car owner's line?

I believe the first principle of a car pool is to apply the nearest car to the nearest load. I can conceive an ideal car pool where every road in the pool will own enough cars to take care of its maximum business, where every road has equally good power to haul the equipment, where every road has equal facilities for repairing cars, where every car is built of the same materials and is of the same capacity and value, where allowances are made for supplying the little roads owning no equipment, where every road has a good car distributor who can keep the balance even between himself and his competitors, where no car congestions and embargoes arise to disturb the balance of equipment so that each road can get its share of the cars without delay, where consignees are all prompt in unloading, where steamships are right on the job when cars arrive at terminals; in fact, where cars can be moved around like checkers on a checker board. But it all seems Utopian to me under the present conditions, and, after all is said, the fact still remains that the owner has the prior right to the use of his cars.

While laying stress on the fact that the Interstate Commerce Commission has demanded that where through routes have been established, the owner must permit his cars to be used, "Transportation" does not emphasize very strongly the statement of the I. C. C., that "The temporary confiscation by carriers of the cars of other railways is alike unlawful," and that "Carriers are required to make reasonable rules and regulations with respect to the exchange, interchange and *return* of cars."

I notice that the writer makes mention of a large system holding its cars at one or the other end of its road for prospective business, while at the same time it is hauling its neighbors' cars empty east and west for delivery to the home roads. Well, what is wrong with that? Are we not required by the commission to recognize the rights of the car owner? Is it not practically hauling cars to a point whence business emanates? If loading in that direction is available, the cars are loaded; but if no loading is available, would it not be necessary to protect the owners even under a pooling system, if not with their own empty cars, then the empty cars of some other road?

Statistics show that approximately 70 per cent. of the car movement is loaded and 30 per cent. is empty. When you take into consideration the large percentage of coal cars which of necessity must run 50 per cent. loaded and 50 per cent. empty, this showing of 70 per cent. loaded is a remarkable performance, indicating as it does that 20 per cent. of the return movement is utilized for loading. And while, theoretically, a pool contemplates the elimination of the remaining 30 per cent. empty, in actual practice I am well satisfied that it would not be able to eliminate 10 per cent. empty, let alone 30 per cent.

Let our friend "Transportation" then get aboard the good ship "Car Service Rules" made mandatory; he will find many of his friends aboard who think they will accomplish the purpose of the Interstate Commerce Commission. And let us all make an effort to stick to these "Golden Rules," even if we have to buy more cars so that we will not have to prey on our neighbors for cars when business is good.

FAIR PLAY.

EMPLOYEES AS STOCKHOLDERS.

New Orleans, La., May 18, 1912.

To the Editor of the Railway Age Gazette:

The editorial on the Railway Labor Situation appearing in your issue of May 10 contains the interesting suggestion that there is no reason why a railway cannot do what some large industrial concerns have done towards creating stockholders among their employees. The organization of the United States Steel Corporation and the reorganization of the Baldwin Locomotive Works afforded better opportunities for the inauguration of a plan enabling its employees to become stockholders on a small scale than have been available to the railways. If the latter could offer their employees inducements comparable to those made by these industrial companies, it is likely that they would be nearly as well received by a large number of employees whose excellent wages and moderate scale of living have placed them in a class of investors whose capacity to absorb high class securities would be by no means small.

Many railway men put their money in investments of doubtful security and are distrustful of any railway or industrial stock that comes from Wall street. It is probable that railway employees will never regard with as much confidence investments in the company that employs them as do the industrial workers, whose relations with their employers have a more personal character. The absence of this personal relationship on the railways makes participation in stock ownership by employees all the more valuable as tending toward bringing about that community of interest that should exist between employer and employees. Judicious investment in securities that are now on the market should accomplish something towards effecting the desired co-operation, and I am inclined to think that the railways would not find it difficult to interest many of their employees in the purchase of such stock. They could safely assist any employee of good standing to purchase on partial payments a single bond or a few shares of stock, although any tendency towards speculation would have to be guarded against. A proposal to encourage in a practical way investments of this class should be laid before employees with great frankness, and the purchase of safe securities, personally solicited through a special representative of the company. By so doing the railways can in a measure supplant the promoter of unreliable investments who now haunts every division terminal and general office in the wake of pay-day.

L. G. PLANT.

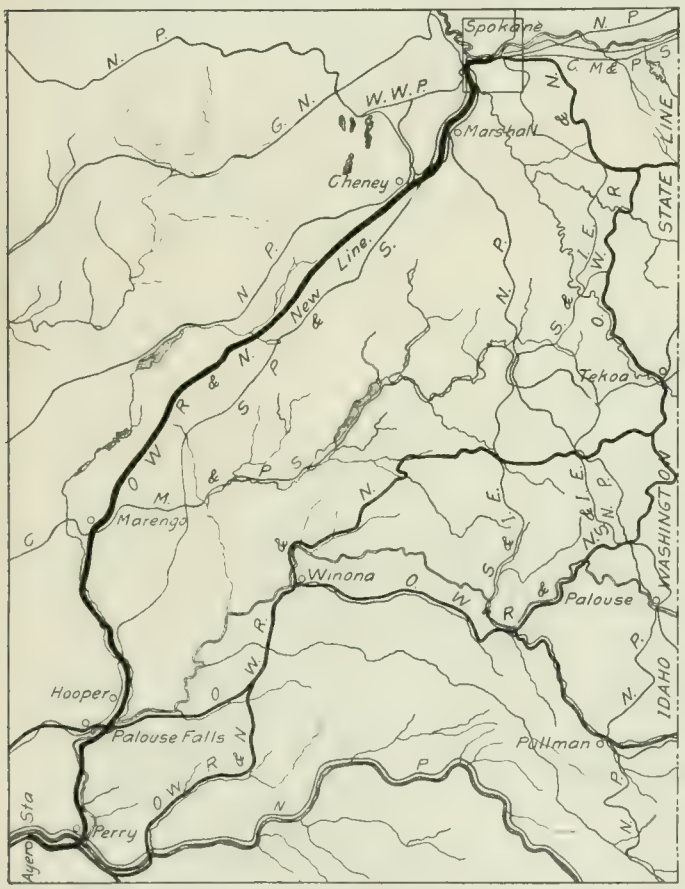
The introduction of electricity on the main lines of Scandinavia is a matter that has long been under consideration, and at present competent officials are working out its practicability. There is not very heavy traffic, and only limited sections are double tracked. The absence of coal in these regions is the cause, of course, of the rapid development of electric power, and has caused its adoption on the railways. Hitherto it has been found by comparative tests that electricity, at all events in these regions, is cheaper as a driving power on the railways than steam.

HARRIMAN LINES SPOKANE-AYER CUT-OFF.

Heavy Work Begun by the North Coast and Continued by the Oregon-Washington Railroad & Navigation Company.

Some of the heaviest construction work now under way in this country is on the new line of the Oregon-Washington Railroad & Navigation Company from Spokane, Wash., to Ayer on the south bank of the Snake river, the grading on which is now largely completed. This line was located and early construction work started under the name of the North Coast railway, whose identity and backing were a question of so much conjecture a few years ago. A description of the successful way in which its identity was kept secret until public announcement was made of the affiliation of the North Coast line with the Harriman interests last spring, with an outline of the work planned in the state of Washington, was given in the *Railway Age Gazette* of August 11, 1911.

The construction of this line indicates the intention of the



Location of New Line from Spokane, Wash., to Ayer.

Harriman interests to compete more strongly for the Spokane-Portland business with the Hill lines, which control the Spokane, Portland & Seattle Railway. The O.-W. R. R. & N. Company has a line from Spokane to Portland, but it is very indirect and is expensive to operate because of its heavy curvature and grades. Starting from Spokane this line goes almost directly east for several miles to Yardley on the Northern Pacific, then turns southeast, passing through Tekoa, near the Idaho line. From this point it swings southwest and crosses the Snake river at Riparia, where it connects with the Portland-Lewiston line of the O.-W. R. R. & N.

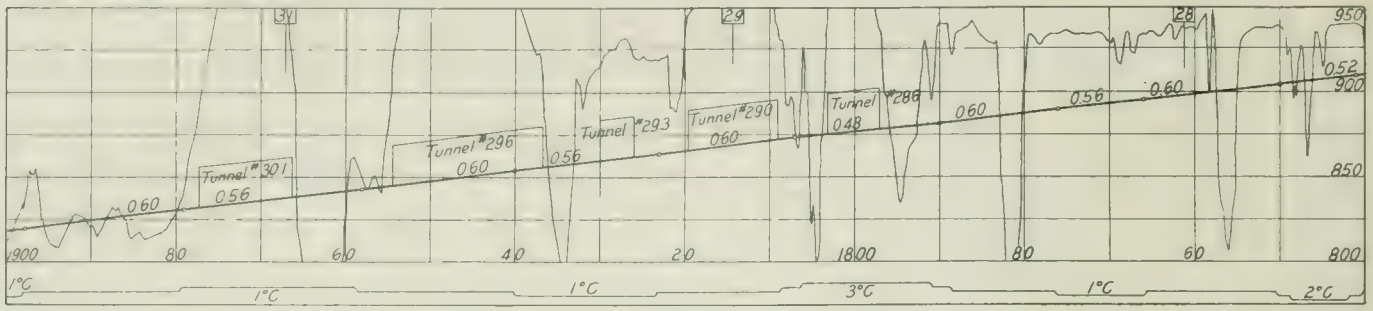
The new line starts from new terminals in the center of Spokane and extends almost directly southwesterly to Ayer, where it connects with this same Portland-Lewiston line of the O.-W. R. R. & N. It closely parallels the Spokane, Portland & Seattle from Spokane to Hooper, about 81 miles, near which point it crosses the North Bank line and runs down the canyon of the Palouse river to the Snake river. After crossing the Snake river and the O.-W. R. R. & N. track on a high bridge, it parallels the old line until it descends to the level of this line and connects with it at Ayer. The distance from Spokane to Ayer on the new line is 102 miles, or 54 miles shorter than by the present line, and 9.5 miles shorter than any other existing line. The grade is reduced from a maximum of 3 per cent. to 0.6 per cent., and a large amount of rise and fall is eliminated. The curvature is also reduced from a maximum of 10 deg. to 3 deg. on the new line. To secure this low grade line required very heavy work, especially near the south end through the Palouse canyon. Starting from Ayer there is an almost continuous 0.6 per cent. grade for 48 miles with but three short sections of level grade included to reach the level of the first bench. The grade is then slightly undulating, but gradually rising for 20 miles, after which there are 13 miles of maximum grade to reach the summit. At Cheney, which is the highest point between Portland and Spokane, the grade is light for about six miles, and then there is an almost continuous descending 0.6 per cent. grade into Spokane. There is no adverse grade against westbound traffic from Cheney to Portland. This compares very favorably with the low grade S. P. & S. line built several years ago, in which the maximum grade from the Snake river to Cheney was established at 0.4 per cent., with a 1 per cent. maximum grade for some six miles entering the city of Spokane.

Sites have been secured for new passenger and freight terminals in the heart of Spokane separate from the existing terminals of the Harriman Lines at that point. Several blocks of property have been bought on the north side of Front avenue, between Monroe and Center streets, for an extensive passenger terminal to be used jointly with the Chicago, Milwaukee & Puget Sound, the Idaho & Washington Northern and the Spokane International. To provide room for this terminal it was necessary to buy the site of the present city hall, as well as several other large business blocks. The station building will face on Front avenue, directly opposite Stevens street. This location puts the new station within two blocks of the center of the business district and closer down town than any of the other stations. The Chicago, Milwaukee & Puget Sound will enter the station from the east, while the Oregon-Washington Railway & Navigation line will come in from the west. The tracks of both roads will be elevated through the city, and all streets will be carried under the tracks. All grade crossings in the residence districts along the new line are also eliminated by the construction of a number of reinforced concrete subways. The work on the Chicago, Milwaukee & Puget Sound entrance into the city is now well under way, while the site is being rapidly cleared for the new station.

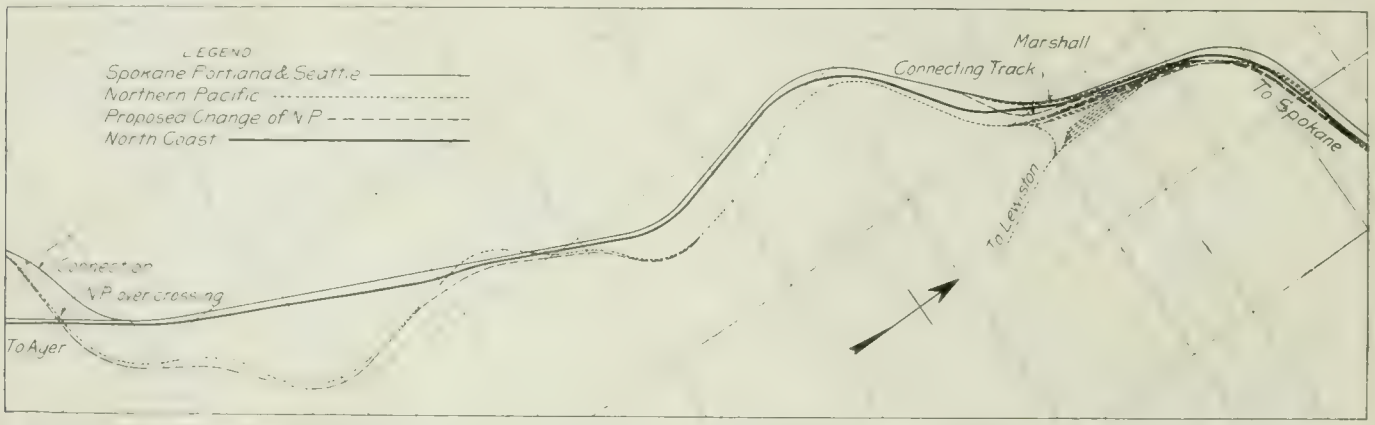
Extending westerly from the new station, the O.-W. R. R. & N. line crosses above the north end of the new Monroe street concrete arch bridge and over the Spokane river on a large steel structure. Just west of this bridge a 700,000-yd. fill will be made, the material for which it will be necessary to haul seven or eight miles. A new freight station will be located on Monroe street, while a new freight yard will be located along the river, about half a mile west of the Monroe street crossing.

A short distance west of this yard the line turns south and crosses the Spokane river and Hangman creek on a steel viaduct 3,400 ft. long and 185 ft. in maximum height. The line follows Hangman creek and Lake creek, about nine miles to

Marshall, between the lines of the Spokane, Portland & Seattle and the Northern Pacific. At Marshall, and also at another point two and one-half miles south, it was necessary to move the Northern Pacific tracks east far enough to enable the new line to be constructed between these tracks and those of the Spokane, Portland & Seattle. At Marshall it was also necessary to move the Northern Pacific station, and to rebuild a connecting track between the two lines. This connecting track is maintained for the use of Northern Pacific trains, a portion of which use the Spokane, Portland & Seattle line from Pasco to Marshall because of the lighter grades, and cross over to their own tracks at Marshall. At a point about two miles south of Marshall the Northern Pacific made a detour around a high rock point. The grade line of the Spokane, Portland & Seattle is about 20 ft. above that of the Northern Pacific at this place. This line cuts through the end of this point, crossing over the Northern Pacific tracks twice on timber bridges. The North Coast line cuts still further into the hill, and to avoid two crossings with the Northern Pacific arrangements were made to move their tracks east of the North Coast line. This required some very heavy rock work, and also made necessary the reconstruction of about five miles of the Northern Pacific. This change of line incidentally reduced the Northern Pacific grade at this point from 1.25 per cent. to 1 per cent., and also improved the alinement. The accompanying photograph shows the character of the work at this point, the trestle in the left-hand corner being that of the Spokane, Portland & Seattle crossing the Northern Pacific line, while the temporary trestle in the foreground is a construction trestle for the North Coast line.

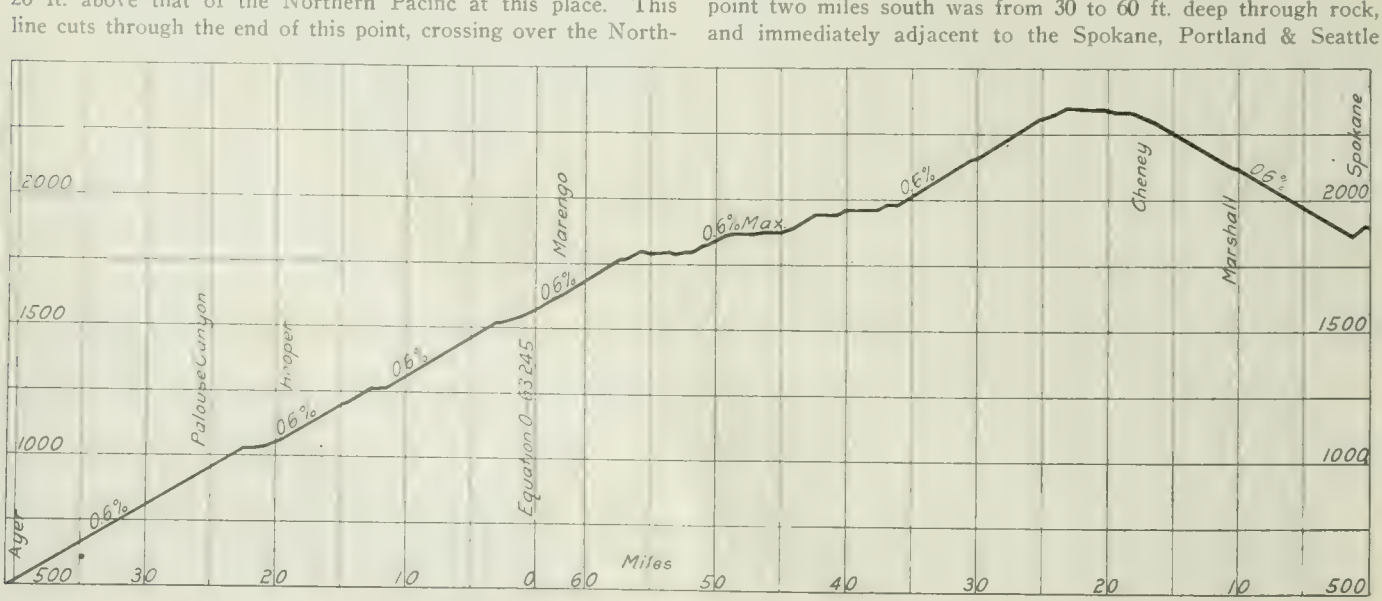


Profile Showing Heavy Work Through Palouse Canyon.



Change of Northern Pacific Alinement Through Marshall Canyon, Showing Location of the North Coast and the Spokane, Portland & Seattle.

The excavation at the Northern Pacific crossing and at the point two miles south was from 30 to 60 ft. deep through rock, and immediately adjacent to the Spokane, Portland & Seattle



Profile of New Line Spokane to Ayer.

line. It was necessary to excavate this material without running any danger of blocking the Spokane, Portland & Seattle line in any way. For this reason the contractor was required to do light blasting and the rock was taken off in successive layers. This caused additional work on the part of the contractor in the construction of switchbacks to get the material down from the higher levels into the fills, but it was necessary, owing to the close proximity of the main line.

Two miles south of this cut at Cheney the North Coast crosses



Material Yard at Hooper, Wash.

over the Spokane, Portland & Seattle and continues southwest generally parallel to this line to a point near Hooper, where it crosses under the Spokane, Portland & Seattle through a 600-ft. tunnel and turns into the canyon of the Palouse river. From Cheney to Marengo the grading, which is all completed, was not heavy, and there was but one waterway requiring an opening larger than a pipe. At Marengo, the main line of the Chicago, Milwaukee & Puget Sound is crossed. This line from Marengo north to Spokane will be used by the Chicago, Milwaukee & Puget Sound as its western entrance into Spokane.

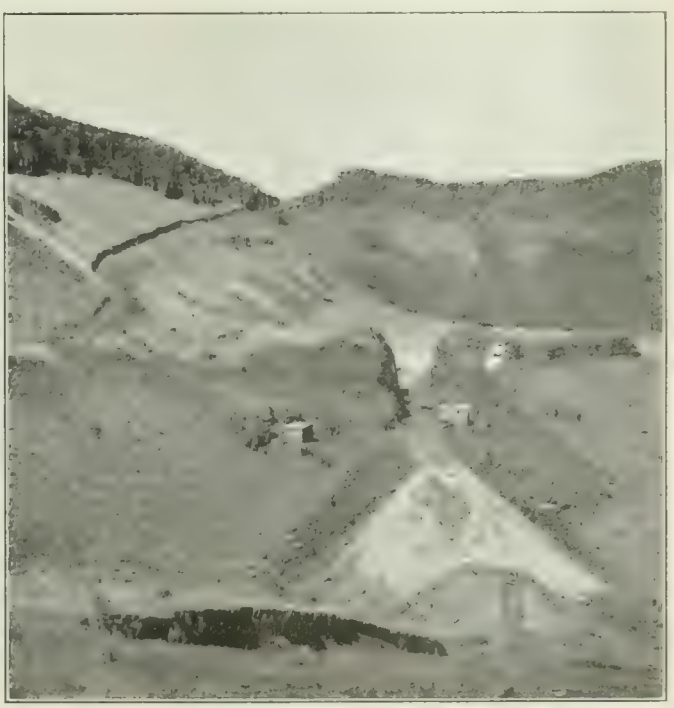


Northern Pacific Change in Marshall Canyon.

South of Marengo the grading to Ayer is divided into four contracts, the limits of which are defined by the first and second crossings of the Palouse and the crossing of the Snake river. From Marengo to Hooper the work is fairly heavy and is now practically completed. South of Hooper the grading is very heavy for the entire distance to Ayer. As this section of the line was built on a supported maximum grade, it was not possible to locate in the bottom of the canyon to secure the easiest work. For a large part of the distance the line is supported near the top and at the second crossing of the river the bridge site is located on the high points shown in the photograph. Such a location made necessary large fills between tunnels passing through projecting points of rock, one such fill across Field's gulch requiring 800,000 yds. of material. With the ex-



Typical Rock Work in Palouse Canyon Section.



Entrance to Tunnel Near North End of Palouse Canyon.

ception of one steam shovel, no heavy equipment was used between Hooper and the Snake river, because of the difficulty of getting it in to the work. Practically all the material is being moved by hand, and a large part of the work is done by station men who take contracts for short sections. Many of the cuts are being taken out by trapping the material into small cars. A small tunnel is driven at grade in advance of the face of the cut and traps are built in the roof through which the material above is loaded into the cars. There are eight tunnels in this section of the work ranging in length from 400 ft. to 1,820 ft. Six of these tunnels are being driven from top headings and two from the bottom. The headings have met on all of the tunnels and they are all practically completed. All other grading is now also practically done.



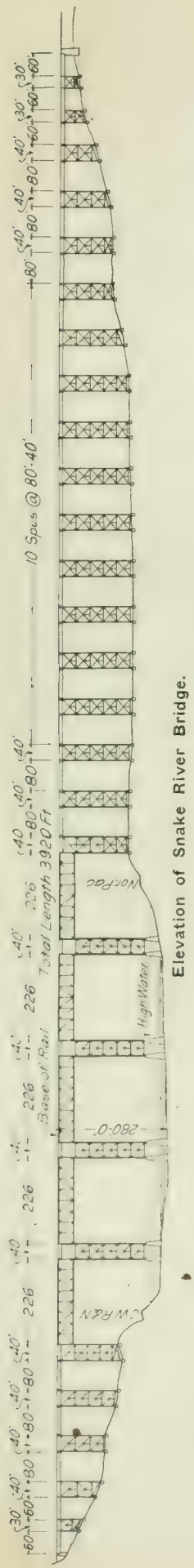
Constructing Embankment by Means of Platform Suspended from Overhead Cableway.

South of the Snake river the line descends on the maximum grade to the level of the main line of the O.-W. R. R. & N. at Ayer. As this part of the line was located high up on the side hill very heavy work was encountered for a distance of about four miles. The contractor on this work has introduced several unusual methods to handle the material. At one point about two miles west of the Snake river crossing the new line was located a short distance back from the face of a cliff overhanging the O.-W. R. R. & N. track. It was about 50 ft. below the top of the cliff and about 150 ft. above the level of the old track. When the location was decided on, two alternatives were considered for building this piece of the line. A tunnel could be constructed or the face could be blown off and the line built as an open cut. Because of the uncertain character of the material which would be encountered in tunnelling, the latter method was decided on. The contractor then made arrangements to remove the material with one shot, and the railway company detoured its passenger trains temporarily by way of Walla Walla, while freight traffic was diverted over the Northern Pacific line on the north bank of the river. The ties and rail on the old track were then taken up. The contractor placed 13 carloads, or about 431,000 lbs., of ordinary black powder in the face of this cliff and shot it off on the afternoon of August 12, 1911, blowing down over 330,000 cu. yds. of rock. The accompanying views show the conditions at the time the shot was fired and the results. Steam shovels were immediately set at work clearing the old line and trains were running regularly after an interval of but ten days.

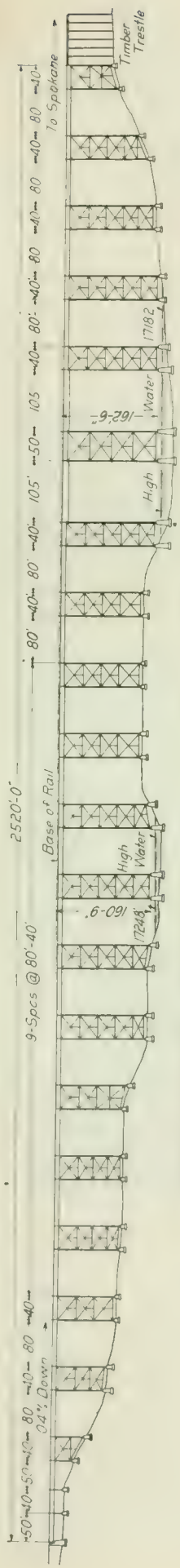
Another somewhat unusual method of construction was followed in making some large fills about a mile further west. Two towers were erected 1,500 ft. apart at opposite ends of a fill and supported a heavy cable between them. One end of a flexible platform was suspended from this cable, while the other end rested on the completed bank. Track was laid from the fill out on this platform and the small cars run out on it and dumped. As the fill was completed the platform was pushed



Effect of Big Blast.

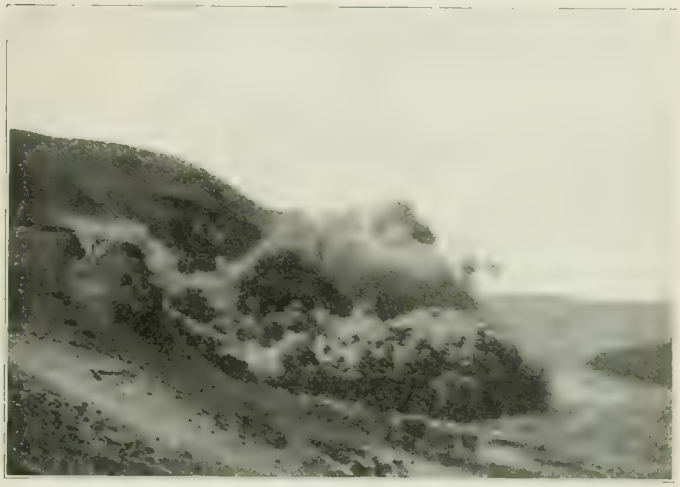


Elevation of Snake River Bridge.



Spokane River and Hangman Creek Viaduct; Harriman Lines Spokane-Ayer Cut-Off.

further out, proper height being maintained by adjustable connections with the main cables. In this way no trestle was required, and no material was buried in the fill. For this span of 1,500 ft. the contractors used seven ¼-in. cables on a side, or 14 cables in all. The fill shown with this arrangement in the accompanying view had a maximum height of 85 ft. and required



Explosion of 431,000 Lbs. of Powder.

300,000 yds. of material. Another fill of 850,000 yds., with a maximum height of 170 ft., and a total length of 2,100 ft., is being made by this same method, which has also been used by this same contractor on other work, including several fills made on the Spokane, Portland & Seattle several years ago.

The roadbed is graded 16 ft. wide on top, except the fill across Field's gulch, which is 185 ft. high, and is built with a 20-ft. crown. Cuts are made 18 ft. wide in rock and 20 ft. wide in earth.

In addition to several smaller bridges, there are three large



Second Crossing of the Palouse River.

structures on this line. The viaduct across Spokane river and Hangman creek in Spokane is 3,000 ft. long, with 175 ft. maximum height. In addition to two 105-ft. spans across the Spokane river, this structure will consist of 40-ft. tower spans, with 80-ft. intermediate spans. The foundation work on this structure has been completed, but no steel work has been erected. An interesting structure will be built at the second crossing of the Palouse, which will consist of a 150-ft. deck Pratt truss with two 42½ ft. girders on the south approach. The truss span will rest on a pier at the south end, and will be hung from a pin connection in the upper chord at the north end. The erection of

this structure will present some interesting problems, for it is desired to erect it as a cantilever from the north end. To do this it will be necessary to construct temporary horizontal and vertical struts under the first panel point of the lower chord and tie the upper chord pins to a very heavy anchorage some distance back from the face of the canyon.

The largest structure on the line will be the Snake river crossing, requiring about 8,000 tons of steel. This will be a viaduct 3,920 ft. long, with a maximum height of 285 ft. The main channel crossing will consist of five 226-ft. deck truss spans supported on intermediate 40-ft. towers. The south approach will consist of one 30-ft., and four 40-ft. towers supporting two 60-ft., and three 80-ft. girder spans. The north approach will consist of 15 80-ft. spans and three 60-ft. spans, supported on 16 40-ft. towers and two 30-ft. towers. It is expected that the shipments of steel for this, as well as other bridges, will commence within 30 days.

About 12,000 yds. of concrete was required for the foundation of this structure, the larger part of which is now in place. At this point the contractors have done a large amount of preliminary work in order to handle concrete expeditiously and economically. False work has been erected from the south bank out into the stream to include the third tower from this bank. On this false work two cranes have been placed, one remaining over the mixer at the shore end, while the other moves back and forth over the piers which are being concreted. The mixer is located on the ground, and the materials are delivered to it from storage bins on the level of the O.-W. R. R. & N. track adjacent. As a batch of concrete is mixed it is picked up by the crane and placed on a small car running on this false work. The crane over the pier places the concrete where desired.

With one exception, all bridges on the entire line will be built in permanent form. This exception is the structure at the crossing over the Connell branch of the O.-W. R. R. & N., at Hooper, and the temporary crossing is built at this point until permanent track arrangements are decided upon.

Corrugated iron pipe is used for all small openings. Ninety-pound open hearth rail is to be laid with Continuous joints on untreated ties. Tieplates are laid on all except joint ties. A large material yard for track and bridge material is being maintained at Hooper, and material for the line is delivered at this point. Track laying will be prosecuted both ways from Hooper, and continued to the Snake river and to Spokane.

This work is being done under the direction of R. E. Strahorn, vice-president and general manager; J. D. Isaacs, consulting engineer; F. L. Pitman, chief engineer, and W. H. Davisson, principal assistant engineer of the third district of the Oregon-Washington Railroad & Navigation, to whom we are indebted for much assistance in the preparation of this article.

Watson, Flagg & Standifer, of Portland, have the contract for the grading work from Spokane to Cheney, while Carlson & Company, of Spokane, W. L. Tribble, of Spokane, Eschbach, Bruce & Company, of North Yakima, Wash., and George Chew, of Spokane, are contractors for the four sections of the grade from Marengo to Ayer. Caughran, Boynton & Company, of Spokane, have the contract for all concrete work.

The railway department of the Formosan government is building a mountain railway that will elicit favorable criticism from the engineering fraternity in many countries. This construction involves steep gradients, sharp curves, a picturesque spiral, and many tunnels and bridges. The entire railway will cover 41 miles, from Kagi to Nimandaira, 7,000 ft. above sea level. From Kagi to Chikutoki, 9 miles, the grade is two per cent. From Chikutoki, Nimandaira is reached after a 32-mile zigzag climb up the mountains to 7,000 ft., the grade being 5 per cent. Nearly the entire line is sinuous, the sharpest curve being 35 degrees. To reach Nimandaira the railway must circle a peak. The spiral construction begins at 1,824 ft. and ends at an elevation of 2,500 ft. Between Kagi and Mount Ari there are 70 bridges, 73 tunnels, and almost innumerable cuts.

TRAIN ACCIDENTS IN APRIL.[1]

Following is a list of the most notable train accidents that occurred on railways of the United States in the month of April, 1912:

Collisions.

Date.	Road.	Place.	Kind of Accident.	Kind of Train	Kil'd.	Inj'd.
12.	Grand Trunk	Wenlock, Vt.	rc.	P. & F	1	6
26.	Central Ga.	Macon.	xc.	P. & F.	0	10

Derailments.

Date.	Road.	Place.	Cause of Derailm't.	Kind of Train.	Kil'd.	Inj'd.
1.	Norfolk & W.	Wytheville, Va.	landslide.	F.	1	4
2.	Ill. Cent.	Medon, Tenn.	d. track.	F	2	4
3.	G. H. & H.	VirginiaPt.,Tex.	exc.speed	P.	1	11
15.	Denver & R. G.	Cuba, Col.	loose tire.	P.	0	21
26.	Wabash	Woodburn.	unx.	P	0	46
29.	C. N. O. & T. P.	Crittenden, Ky.	.....	P.	0	14
30.	St. L. & S. F.	Kosoma.	unx.	P.	0	3

In the rear collision which occurred near Wenlock, Vermont, on the 12th, an eastbound passenger train ran into a preceding freight, disregarding the freight flagman's signal. The passenger engineman was killed and six other persons were injured. The mail car was badly damaged.

The train in collision at Macon, Ga., on the 26th, was the southbound Dixie Flyer. It ran over a misplaced switch and collided with some freight cars standing on a side track. The engine was partly overturned. The engineman, fireman and one passenger were slightly injured. The switch had been maliciously misplaced.

The train derailed at Wytheville, Va., on the 1st, at about 5 a. m., was a freight of 22 cars, drawn by two engines. It struck a landslide 10 ft. deep in a narrow cut, and was so badly wrecked that the track was not cleared for 50 hours. One of the enginemen was killed and four other trainmen were injured.

The train derailed near Medon, Tenn., on the 2d, consisted of a locomotive and a caboose, and the cause was the weakness of the roadbed over a stone culvert which had been undermined by high water. The persons killed were the engineman and the road supervisor. These two men were on the engine. Four men in the caboose were slightly injured.

The train derailed at Virginia Point, Tex., on the 3d, was southbound passenger No. 5 of the International & Great Northern, and the engine and tender fell down a bank. The engineman was killed; the fireman, one brakeman, the conductor and eight other persons were injured. The derailment occurred at about 5 a. m. and was caused by entering a crossover at too high speed. It occurred on a track which connects the Galveston, Houston & Henderson with the Galveston, Harrisburg & San Antonio.

The train derailed at Cuba, Colo., on the 15th, was No. 207, the southbound Rocky Mountain Limited of the Rock Island. The day car was overturned and ditched, and the persons injured were nearly all in this car—21 of them. There were no injuries in any other part of the train. The cause of the derailment was the loosening of the tire of one of the driving wheels. This wheel ran off the track at a frog and displaced the switch point; and everything back of this pair of wheels ran off the track.

On the Union Pacific, near North Loup, Neb., on the 25th, a train was overturned by wind, but it had been brought to a stop, and we have not included the case in the list of derailments. It was westbound passenger No. 35. All of the three cars of the train (but not the engine) were overturned. Some of the 29 passengers were slightly injured.

The train derailed on the Wabash at Woodburn, Ohio, on the 26th, was the westbound fast mail No. 5. The cause of the derailment was not determined. The front truck of the tender is

[1]Abbreviations and marks used in Accident List:

rc, Rear collision——bc, Butting collision——xc, Other collisions——b, Broken——d, Defective——unf, Unforeseen obstruction——unx, Unexplained——derail, Open derailing switch——ms, Misplaced switch——acc. obst., Accidental obstruction——malice, Malicious obstruction of track, etc. ——boiler, Explosion of locomotive on road——fire, Cars burned while running——P. or Pass., Passenger train——F. or Ft., Freight train (including empty engines, work trains, etc.)——Asterisk, Wreck wholly or partly destroyed by fire——Dagger, One or more passengers killed.

believed to have been the first to run off. Four employees, 7 mail clerks and 35 passengers were injured.

The train derailed at Crittenden, Ky., on the 29th, was the northbound Atlanta special No. 10, and the cause was not discovered. Fourteen passengers were injured.

Electric Accidents.—Of the six accidents to electric cars, reported in the newspapers as occurring in the United States in April, three were attended with fatal results. In Chicago a street car was struck by a freight train, 3 killed, 18 injured; at Lima Center, Mich., one was killed and 20 injured, and at Trenton, Ohio, one was killed and seven injured.

NEW PRESIDENT OF THE GRAND TRUNK.

Edson J. Chamberlin, vice-president and general manager of the Grand Trunk Pacific Railway Company, has been elected president of the Grand Trunk and of the Grand Trunk Pacific, succeeding the late Charles M. Hays. William Wainwright, second vice-president of the Grand Trunk Pacific, has been elected first vice-president of the Grand Trunk Pacific, remaining also vice-president of the Grand Trunk. M. M. Reynolds, third vice-president of the Grand Trunk Pacific, becomes second vice-president of that company, and also remains a vice-president of the Grand Trunk. The new president is quoted as saying that no further changes in the staff are contemplated, except that a general manager of the Grand Trunk Pacific will later be appointed.



Edson J. Chamberlin.

Mr. Chamberlin, who is now sixty years old, was born in Lancaster, N. H. He was educated at the Montpelier Methodist Seminary, and began railway work in 1871 as a timekeeper in the car shops of the Central Vermont at St. Albans. He served as a clerk in the paymaster's office and in the office of the superintendent of transportation, then as corresponding secretary for the general superintendent, and in 1877 became private secretary to the general manager. In 1884 he was appointed superintendent of the Ogdensburg & Lake Champlain and of the Central Vermont line of steamers on the lakes. In 1886, he took charge of the construction of the Canada Atlantic as general manager. The project at that time did not seem promising, the line running largely through a then unproductive territory and being without advantageous connections. Mr. Chamberlin, however, built the road at a cost below the estimates, arranged favorable connections and organized a strong operating staff. He was general manager of the company until 1905, when the property was sold to the Grand Trunk, and remained in charge of it for a year more, acting in the interests of the Grand Trunk. He then went into private business as a railway contractor. He built several lines of road in eastern Canada and then went to Mexico to carry out construction work in which he was interested. In 1909, he returned to Canada as vice-president and general manager of the Grand Trunk Pacific. Although his headquarters were in Winnipeg, he has been coming to eastern Canada frequently and has kept in touch with every branch of the Grand Trunk system.

Mr. Chamberlin is an active and public spirited citizen, as manifested particularly during his long residence in Ottawa when in charge of the Canada Atlantic. He is particularly respected for his ability in bringing out the best in his subordinates, and in building up and directing an efficient organization These qualities, in combination with his wide experience as a builder of railways, eminently suit him for the office he is assuming.

The government of Bolivia has now under consideration the granting of a concession to a Mr. Hoskins, an American, for the construction of a railway between Huaicho and Rurrenabaque; while it is also considering an estimate from another applicant, Mr. Curt Scherteron, for the construction of a railway line from La Paz to the town of Yungas, which, however, is to be carried out on behalf of the government, and to be completed under penalty within a period of four years. The original concession, which was held by Señor Horacio Ferreçio, has lapsed, since he was unable to finance the enterprise. There are two other new railways in this republic, one being from Cochabamba to Tarata and known as the Valley Railway, now in so advance a state of completion that it is to be opened in August or September of this year. Some excellent construction work is being done on the roadway, the bridges and the culverts—of which there are a considerable number, and many of importance—and when finished the line will compare with any to be found in Bolivia. The other undertaking referred to is merely in the projected stage, and is to be between Ferrobamba, where the mines of copper are located, and the coast; it is to be run in opposition to the line which now carries the ores from the mines to Mollendo, by means of the Southern railway, one of the group which is managed by the Peruvian Corporation. It is doubtful whether this Ferrobamba railway will be undertaken, since the construction would prove both difficult and costly.

The Bolivian cities of Oruru and Cochabamba are to be linked up by a railway, and construction has been going on for some time past. According to the terms of the Montes-Speyer contract entered into on May 22, 1907, it was stipulated that the line should be completed and open to traffic within two years from that date. As yet, not more than one-fourth of the line has been finished. According to present calculations another five years will be necessary to complete the undertaking, while the total expenditure will probably total about $10,000,000, which is infinitely more than was contracted for.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.

Particularly Successful Annual Convention, the Well-Prepared Papers Which Were Presented Evoking Valuable Discussion.

The fourth annual convention of the International Railway Fuel Association was held at the Hotel Sherman, Chicago, May 22-25. The opening addresses, which were made by the president, T. Duff Smith, Grand Trunk Pacific; Robert Quayle, superintendent of motive power and machinery, Chicago & North Western; and Walter S. Bogle, president of the Crescent Coal and Mining Company, were reported in the *Railway Age Gazette* of May 24, page 1170.

FUEL AS A FACTOR IN LOCOMOTIVE CAPACITY.

Dr. W. F. M. Goss, dean and director of the College of Engineering, University of Illinois, read a paper on this subject, an abstract of which follows: The power developed by a steam locomotive is derived from the fuel it consumes. Other things being equal, the greater its rate of fuel consumption the greater will be its capacity. The weight of the modern locomotive cannot be greatly exceeded except at the expense of extensive improvements in track or through the adoption of an arrangement of wheels which will permit the load to be much more widely distributed than at present. As it is not likely that the demand for higher power will cease, the problem of supplying it is one of more than academic significance. It presents two possible lines of solution. One is through the better adaptation of fuel to the needs of locomotive service, and the other is through the better adaptation of the locomotive to the requirements of the fuel which it has to burn.

It is obvious that anything which will successfully promote the combustion of fuel in the firebox of a locomotive will operate to increase its power. Every pound of coal effectively burned represents a definite output in the form of power at the drawbar, and if through care in the choice and preparation of the fuel the rate of combustion can be materially increased, it is evident that the maximum capacity of a locomotive may be advanced. This fact is lost sight of when locomotives performing service, in which maintenance of schedule is a matter of great importance, are supplied with coal bad in its composition and which is a mixture of the finest dust with lumps of every possible size. Conditions of service which demand high power will justify unusual care in the selection of fuels. The coal used under such conditions should have a high thermal value, and it should be low in clinker and ash. It should be sized before it is put on the locomotive tender, and if necessary it should be washed and sized. One who looks upon sized coal in a car and then upon a carload of run-of-mine coal and considers that on the grate the combustion of coal can only proceed as air can pass through the bed and around the individual particles of coal, will easily understand the superior advantages offered by the sized fuel. A principal advantage of the briquetted fuel so much used in foreign railway practice is to be found in the fact that the briquettes are of uniform size. When the coal fired is made up of pieces of uniform size, it forms a bed on the grate in which the interstices between the pieces of coal are uniform and the admission of air over the entire area of the grate is in finely divided and uniformly distributed streams. The result is that every part of the fire is maintained in a condition of maximum efficiency; the temperature of the firebox will be higher than when mixtures of lumps and fine coal are fired; the rate of combustion will be greater, and, as a consequence, the capacity of the locomotives will be increased.

It is obvious that the power of a locomotive cannot be increased indefinitely merely through the proper selection of fuel, but the limits of its maximum performance may be materially extended. There are no objections to the general introduction of especially prepared fuel for locomotives excepting those of cost. The fuel bill of the railways is already an enormous one, and those who are responsible will always hesitate before permitting an increase in the purchase price per ton. But the ultimate cost, when measured in terms of service given, will be found in many cases justifiable. Under present practice, railways, in their desire for some increase in power, do not hesitate to increase the weight of their locomotives by giving them larger boilers, by raising their steam pressure, by the adoption of compound cylinders, and by the addition of superheaters. All of these are expensive measures, but they have been justified in practice by the results obtained. The more careful preparation of fuel is to be looked upon as a means to an end. It constitutes an embellishment in locomotive operation and is not different in purpose from embellishments in design. It will add to the expense, but will give a return in increased power which at the head of important trains may be greatly needed for the maintenance of service. I believe that a great opportunity, which as yet has been but little appreciated, lies awaiting the attention of the prophet who will proclaim the gospel of increased power of locomotives through the more careful selection of their fuels. The time is at hand when lump coal will be washed and sized, and when the fine coals will be washed and briquetted. These processes, excepting that of briquetting, are inexpensive and a demand for their employment will soon be forthcoming from the railways.

The alternative plan whereby the power of the locomotive may be increased, is that which provides for a development of its design along lines which will give it greater capacity to consume the indifferent fuels which under present practice are commonly supplied it. What changes need be made in present practice to provide a greater fuel-burning capacity? The first requisite in the development of such a design is a large grate. If a design could now be made which would permit the present maximum grate area to be doubled, several important results would at once be secured. First, while the total amount of fuel burned per unit of time might be materially increased, the rates of combustion per unit area need not be increased, they could even be reduced. The increase of power would be proportional to the increase in the total fuel burned, while the reduced rate of combustion would avoid the necessity for special care in the selection of fuel; would allow the use of fuels now normal to locomotive service; would operate greatly to reduce the loss of fuel in the form of sparks, and would prolong the period during which the locomotive could be kept in continuous operation. For example, when 6,000 lbs. of coal are burned per hour on a 60-ft. grate, the rate of combustion is 100 lbs. per foot of grate per hour, and the spark loss with many fuels represents fuel values which approach 10 per cent. of the coal fired. The collection of ash and clinker on the grate so much impedes the draft as to require a thorough cleaning of the fire after a run in passenger service of from 100 to 150 miles. A greater distance, if attempted, must generally be run at reduced power. With a large grate these conditions are all changed. The burning of 6,000 lbs. of coal on a 120-ft. grate would reduce the rate of combustion to 50 lbs. per foot of grate per hour, and the spark loss to 2 or 3 per cent., and would permit continuous operation for a passenger run of 300 miles between the cleaning of fires.

It is true that the larger grate would be at a disadvantage with reference to losses of fuel on the grate at the end of the run, and in the larger amount required to cover the grate in the process of starting fires; but these would be entirely neutralized by the possibility of increased mileage between the starting of new fires. With the larger grate, only half as many new fires would need to be made per thousand miles run as

were formerly required. While the same total amount of coal is burned in each case, it is evident that the 8 per cent. saving in spark losses would at once be made available as an 8 per cent. increase of power; also that among the possible variations in the method of taking advantage of the presence of the larger grate will be included the possibility of increasing the rate of combustion. For example, an increase in the total fuel consumed from 6,000 to 8,000 lbs. an hour, would increase the power capacity of the locomotive by 33 per cent., and would involve rates of combustion which, judged by present-day standards in locomotive service, would be accounted low. If the rate of combustion were forced to a total of 10,000 lbs., the increase of power would be 66 per cent., and the rate per unit area of grate would still be below the maximum now common in locomotive service. There is, therefore, much to be accomplished by increasing the grate area of a locomotive. If the output of power remains unchanged, it will permit lower rates of combustion, a reduction of spark loss, and the use of inferior grades of fuel. If, on the other hand, the rate of combustion per unit area of grate remains unchanged, the output of power may be increased in proportion to the increase in the area of the grate.

Locomotive grates having an area of 150 ft. or more would necessarily involve some new departures in locomotive design. As the width of such a grate could not greatly exceed 7 ft., its length would need to be from 20 to 25 ft. This may mean a complete abandonment of the existing type of locomotive boiler and the substitution therefor of some new type, but it does not necessarily imply such a change. It does mean, however, the adoption of an articulated form of locomotive which will admit of a space of 25 ft. or more between the two systems of wheels. It should be possible either to increase the spacing of the frames over this space or to drop the frames so low that the firebox and boiler with attachments may have an unobstructed area the full width of the track clearance for all heights 3 or 4 ft. above the rail.

In working out details, automatic stoking must be provided for. This can best be done by having the stokers feed transversely across the boiler from both sides of the firebox. The stokers themselves may be either of the chain belt or of the Roney type, or they may consist of any simple feeding mechanism, delivering to fixed inclined grates. They would be very short in the direction of the fuel movement, probably not more than 30 or 32 in. in length, and they would discharge on a flat dump grate running the whole length from front to rear of the firebox. The aggregate width of the individual stokers on each side would, of course, be from 20 to 25 ft., but they would be split up into as many different units as would best provide for the construction of short arches over them. By such an arrangement, the green coal would pass under the mud-ring of the boiler and under a short arch, where it would ignite. It would gradually be pushed forward toward the center of the firebox to the flat dump grate, where it would be met by fuel coming in from the other side. The inward movement of coal from both sides toward the center of the grate would, of course, proceed throughout the full length of the firebox, that is, for a distance which might be as great as 25 ft. The fact that the ignitions of the fuel would be under an arch would make the combustion nearly or quite smokeless, the mild draft would make the cinder losses small, while the low rate of combustion per unit area of grate, and the provisions for cleaning supplied by the stokers and dump grate, would permit continuous operation at full power for a very long period.

Narrow hoppers supplying these stokers would open up along the whole length of the firebox on both sides to the full width allowed by the track clearances. The operating mechanism of the stokers, which would be beneath them, would be allowed the same total width. An extension of these hoppers upward on both sides to the level of the top of the boiler or higher, would provide space for all the coal necessary for a run. No coal would be carried on the locomotive tender and none would need to be rehandled on the locomotive. It would all be loaded at once into an extension of the stoker hopper, and its weight would be added to the wheel loads of the locomotive.

In the discussions of the preceding paragraph, I have assumed that the general type of boiler employed would not be materially different from that now in service. Difficulties would, of course, appear in the construction and maintenance of a staybolt firebox 25 ft. in length, and whatever the outside form of the boiler might be, some special provision would need to be made in the working out of its construction. A demand for a firebox of such dimensions would doubtless call out various means for supplying it. There would probably be no difficulty in constructing a Jacobs-Shupert firebox of any desired length. The boiler would be so located on the frames of the locomotive that its back-end would be just in advance of the first of the rear system of driving wheels, and a foot-plate carrying all of the auxiliary machinery of the locomotive would extend rearward over the axles of these rear wheels and perhaps over the wheels themselves. A fire door, as usually placed, would supply the fireman an opportunity to inspect his fire, and guided by such inspection he would be able to so control the operation of the several stokers as to maintain uniform conditions throughout the length and breadth of the grate. The barrel end of the boiler would extend out over the forward system of wheels. So much for the arrangements involving a normal boiler. If it should be desired, an attempt could be made to work out the details of the design, using an entirely new form of boiler, such, for example, as a boiler of the water-tube type; but it is not likely that the adoption of any such new type would of itself simplify the general problem as herein outlined.

In conclusion, permit me to say that I appreciate thoroughly the danger of attempting within the limits of a few paragraphs to outline successfully a locomotive design that is entirely new. I appreciate also the many difficulties to be met in applying any such conception. I cannot even claim that I have yet given the matter such attention as will permit me to say that all difficulties are surmountable, but I am convinced that the general scheme is sufficiently promising to justify any study which is likely to be bestowed upon it. My purpose in presenting it is to place before the members of this association in as forceful a way as possible, the importance of larger grate areas in locomotive practice. If the capacity of locomotives is to increase in the future as it has in the recent past, and if locomotives are to be supplied with such grades of coal as are now commonly used in locomotive service, such a change will be found imperative.

Discussion.—The discussion was, in the main, favorable to the methods proposed by Dr. Goss for increasing the capacity of the locomotive, first, by improving the quality of the coal, and, second, by the use of large grates. Comments, stating some objections to the practical application of the recommendations, are given in our editorial columns.

LOCOMOTIVE FUEL PERFORMANCE SHEET.

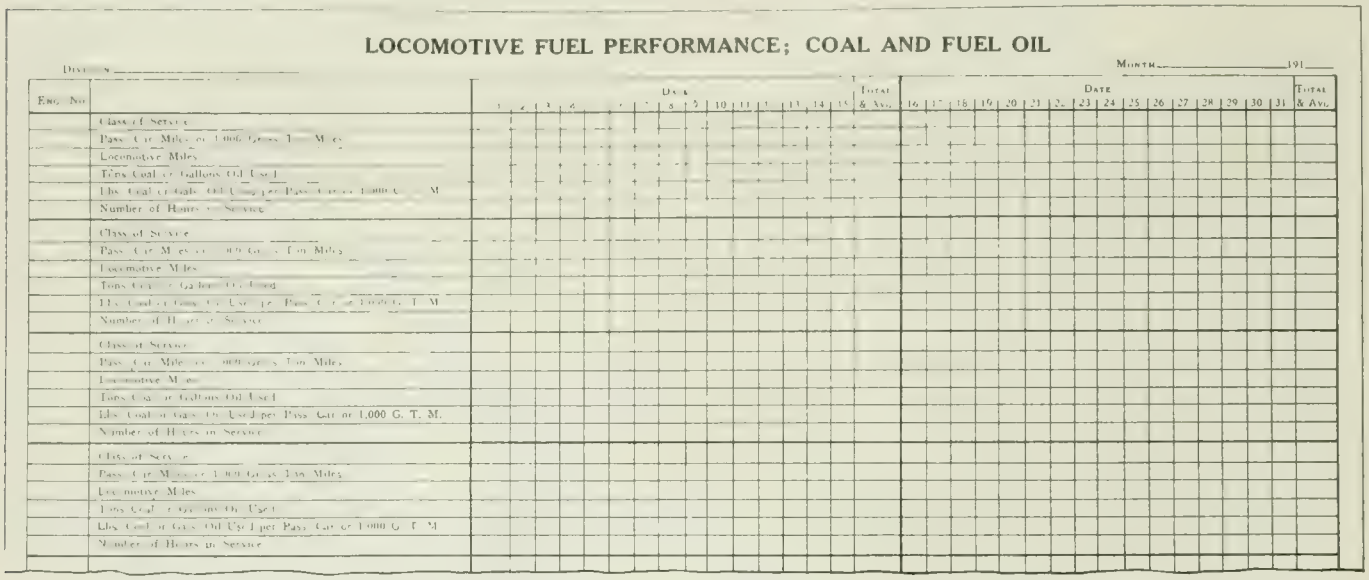
Robert Collett, superintendent of locomotive fuel service of the St. Louis & San Francisco, presented a paper on this subject in which he described the locomotive fuel performance sheet used on the Frisco and also summed up the replies to a circular letter which had been sent to the members of the association.

A little more than a year ago, the St. Louis & San Francisco decided to try out, on one division of 250 miles, an individual engine daily performance sheet. Formerly a monthly performance sheet had been kept, but this had been discontinued about three years previous, because the information was more or less inaccurate and reached those interested so late that it was not considered worth the expense of compilation.

It was the opinion of the general officer who originated the later plan, that if sufficiently close supervision could be given

to all of the separate features, a correct daily record of each engine's performance could be obtained and that with this information, as well as a knowledge of what constituted good average performance in each class of service, a good idea could be obtained as to what each of the engines were doing and should do in the use of fuel. Accordingly, a daily performance sheet, such as shown herewith was started and sufficient time was spent on one division to get in thorough touch with all the month. This constitutes the daily record, and from this is made, on typewriter, a monthly report, which is the performance of each engine on the division, in each class of service; from the reports from each division a general report is compiled

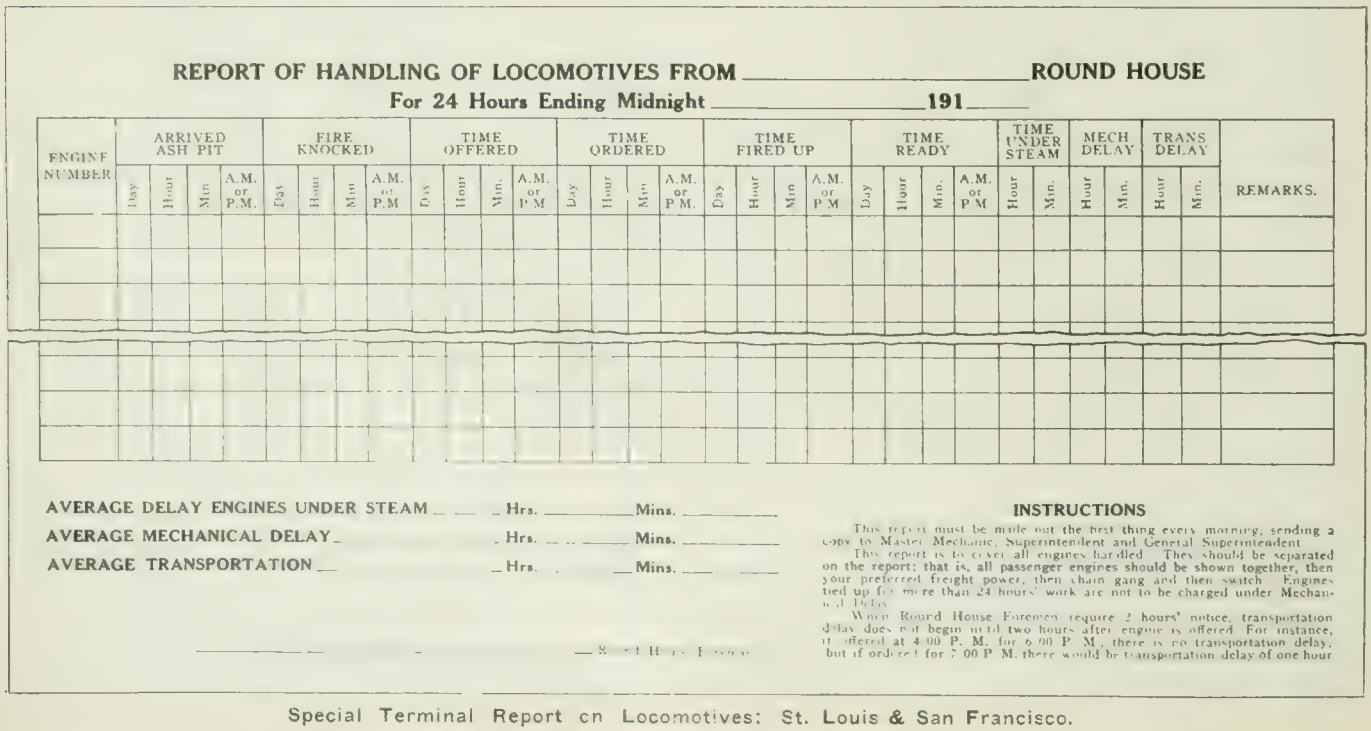
As a basis for what constitutes good average performance, numerous records of trips have been made, taking every-day conditions and including coal used in getting engines ready for


LOCOMOTIVE FUEL PERFORMANCE; COAL AND FUEL OIL

Individual Engine Daily Performance Sheet; St. Louis & San Francisco.

details of its operation. Later the plan was put in effect on all other divisions.

At first all of the compilations were made daily, but it was found that it was not necessary to figure out the number of pounds used per car mile or per thousand ton miles each day, but the tonnage for car miles, fuel, hours of service, and, where the engine made only a single trip, names of engineers, are set down daily and the person handling the report can thus locate unreasonable performance. A recapitulation is made of each engine's performance at the end of 15 days and at the close of each the trip. It was early found by experience that merely taking the daily reports and tickets, as furnished, did not fulfill the requirements, as considerable carelessness was manifested in making coal tickets and making up daily fuel reports, and, by accepting reports as made out, an engine might consume 500 lbs. of coal per thousand ton miles one day and 50 lbs. the next, or none at all. One instance is recalled where an engine was charged with 24 tons of coal during a 24-hour period, while being held in for work; the engine was not fired up during that time, and on this account, of course, other engines


REPORT OF HANDLING OF LOCOMOTIVES FROM _____ ROUND HOUSE

For 24 Hours Ending Midnight _____ 191_____

ENGINE NUMBER	ARRIVED ASH PIT				FIRE KNOCKED				TIME OFFERED				TIME ORDERED				TIME FIRED UP				TIME READY				TIME UNDER STEAM		MECH DELAY		TRANS DELAY		REMARKS.
	Day	Hour	Min	A.M. or P.M.	Day	Hour	Min	A.M. or P.M.	Day	Hour	Min	A.M. or P.M.	Day	Hour	Min	A.M. or P.M.	Day	Hour	Min	A.M. or P.M.	Day	Hour	Min.	A.M. or P.M.	Hour	Min.	Hour	Min.	Hour	Min.	

AVERAGE DELAY ENGINES UNDER STEAM _____ Hrs. _____ Mins. _____

AVERAGE MECHANICAL DELAY _____ Hrs. _____ Mins. _____

AVERAGE TRANSPORTATION _____ Hrs. _____ Mins. _____

_____ Round House Foreman

INSTRUCTIONS

This report must be made out the first thing every morning, sending a copy to Master Mechanic, Superintendent and General Superintendent.

This report is to cover all engines handled. They should be separated on the report: that is, all passenger engines should be shown together, then your preferred freight power, then chain gang and then switch. Engines tied up for more than 24 hours' work are not to be charged under Mechanical Delay.

When Round House Foremen require 2 hours' notice, transportation delay does not begin until two hours after engine is offered. For instance, if offered at 4.00 P. M. for 6.00 P. M., there is no transportation delay, but if ordered for 7.00 P. M. there would be transportation delay of one hour

Special Terminal Report on Locomotives; St. Louis & San Francisco.

were not charged with the actual coal they received. This instance is mentioned to show the close attention necessary to be given this feature. The clerks or fuel foremen, handling daily fuel reports, do not always realize the importance of correct information.

It is a hard matter to convince the average person handling fuel station reports that it is not necessary for him to arbitrarily change the amount shown on the ticket in order to keep his balance somewhere nearly correct, but that the matter should be regulated with the party delivering the fuel to the locomotive. Likewise, it was found difficult to reconcile the average ticket furnished by the engineer with the amount of coal delivered to the engine as shown by scale weight, although the coal might be weighed immediately before being placed on the chute. The fact that this distribution requires such close supervision makes a daily record, in our opinion, desirable.

If performance sheet is kept, is it an individual engine record or engineer's record of fuel consumption? Replies indicate that one method is in use about as much as the other. Some members prefer both the engineer and engine record and are handling it in this way. Our opinion is that the engine record is preferable to the engineer's record, for the reason that we should have tickets to cover the individual trip. In freight service it sometimes happens that the engine will be handled by more than one crew in going over the division, and it is not possible to separate the fuel used by each crew; again, an engine may run over more than one division, handled by two separate crews, not taking any fuel at the intermediate terminal. Where engines are manned by regular crews, this report practically becomes an engineer's record also.

While the operation of the engine does have a great deal of bearing on the fuel consumption, the condition of the engine also is important and where it is necessary to rely to some extent on the engineer's estimate, as at chutes where a night force is not employed, the engine record, we believe, best serves the purpose. The waste due to the condition of the engine is apt to be as great as that due to improper operation, and it is necessary to have the enginemen's co-operation in obtaining this information, both as to the condition of the engine and the amount of fuel used, while the waste due to improper handling or firing is more a matter of education through personal contact than through the medium of the performance sheet. The least skillful man is most likely to give a short ticket or cultivate the good will of the chute tender, to the engineer's advantage perhaps and to the discredit of another man who is really more economical in the use of fuel. Whereas, if it is an engine record, for each division, it reflects to a large extent the condition of the locomotives and is for, or against, the division mechanical officers. One division cannot be altogether checked against another division, but records of service tests on that division should also be used for comparison.

What is your opinion as to separating the fuel used at the terminal from that used on the trip? The opinion of those replying were almost equally divided, many objecting to the accounting necessary to separate the charges and taking the view that as it must necessarily all be charged to locomotive operation, nothing could be gained from the separation. A great many thought it unfair to charge crews with the fuel used at the terminal over which they had no control.

We do not attempt to separate the fuel used in firing up the engine from that used on the trip, but do undertake to give credit for the fuel used over and above the amount required to fire the engine up and which may be consumed by lack of facilities or other causes. This has been taken care of by a special terminal report, which has taken the place of a report formerly used to show the time engines were in terminal and the mechanical and transportation delays. This has been changed to include the time that engines are held under steam at terminal. All time in excess of three hours that the engine is fired up is shown as terminal delay and credit is given on the basis of a certain number of pounds per hour. This amount is deducted from the fuel used by all engines.

What methods are used to interest enginemen in economical performance? Class meetings are held on the different divisions, as often as convenient to interest the enginemen in fuel economy. They are not only attended by enginemen, but others who may care to attend, together with all of the officers that can be present. All points involved are discussed freely, suggestions and criticisms are invited, and division and system performances are gone over, so that all may be advised of the progress being made. Separate educational meetings are held with the firemen. While special effort is made to have the accounting as correct as possible, we depend more on personal contact than writing to the enginemen to obtain results. On divisions where the crews have regular engines, mimeograph forms are sent out at the close of each month, advising the engineer of the amount of coal consumed by him and the pounds per passenger car mile or the pounds per thousand gross ton-miles for freight trains and the average for all engines in that class of service. Information from the daily performance sheet is furnished the proper officers, who take the matter up personally with the crews. Crews are also complimented by letter for good performance where it comes under the personal observation of master mechanic or assistant superintendent locomotive fuel service; copies of these letters are frequently attached to the enginemen's personal record. Monthly bulletins are posted by the superintendents calling attention to what has been done on their respective divisions as shown by the division fuel statement, thus encouraging renewed effort.

Do you consider the extra expense of scales in mechanical chutes advisable? The majority of the replies indicated that scales are not in general use, about one-half favoring their use in connection with the fuel performance sheet, and several advising that experience with scales had proved unsatisfactory.

On our lines there are a number of mechanical chutes, only two of which are provided with scales; also several gravity chutes holding from 200 to 300 tons, with no means of measuring the coal delivered to each engine; a few pocket chutes which have been calibrated and stencilled in ton measurements; several locomotive cranes and at some points we shovel direct from the car to the engine tank. Our experience has been that the most accurate distribution is by using the billed car load weights as a guide, taking the fuel foremen's or hostlers' estimate, and requiring them to observe the space in the tank. We find they become very familiar with the amount of coal that is required to fill a given space. All coal is weighed on our railway track scales after leaving the mines and special attention is given the feature of correct weights. Fuel oil tanks are provided with calibrating rods, stencilled in gallons. We do not use meters at our fuel oil stations. On a recent 30-day test of a Mallet locomotive, the hostler's estimates of coal taken from a mechanical chute at one end of the line and a fuel foreman's estimates at an intermediate pocket chute station, showed a difference of but 1.22 tons when compared with the amount recorded by the man making the test. This case is unusual, but serves to illustrate that a reasonably correct charge can be obtained.

In the opinion of the writer, scales are not necessary at terminal points, unless engines of foreign lines are to be coaled. Our observation leads to the belief that unless the person assigned to that duty has nothing to do but look after the scale, or if a large number of engines are handled, the weighing is apt to resolve itself into guess work, due to certain engines taking coal and the chute men not being at the scale at the time.

At intermediate coaling stations, if the chute is located at a pumping station where a night man is employed, or if there is enough work to justify the employment of two men to operate the chute, I believe the scale is desirable, as it does not rep-

resent any additional cost for operation and gives a better distribution than that made by relying upon the engineer's estimate.

We do not undertake to include an adjustment in the performance sheet for the difference between coal chute measurements and the billed weights, but make a special effort to have the amounts shown tally as closely as possible with the fuel actually used. All concerned know that it is to their interest to have this shown; for if all the fuel used is not charged in any particular month, it will be reflected in the poor performance the following month when the error has been corrected.

The work on each division is under the direct supervision of the assistant superintendent locomotive fuel service, who formerly held the position of road foreman of equipment and who has practically the same duties, giving special attention, however, to the matter of fuel economy. The number of engines assigned ranges from 70 on the lightest to 130 on the heaviest division.

The handling of the performance sheet requires the services of one clerk for each division, and unless the division is a very heavy one, he can also handle the correspondence.

No extra expense is incurred in procuring data on tonnage, car miles, hours of service, etc., this being furnished on the report made up in the despatcher's office for the car accountant's records.

Too much emphasis cannot be given the matter of correct distribution. No greater mistake can be made than to assume, with the posting of a bulletin requiring correct fuel tickets to be made out or the installation of weighing or measuring methods, that the problem of distribution is solved. A little first hand experience will soon dispel this illusion. Nothing will cause an engineman to lose faith in a performance sheet more quickly than to find that some person handling the fuel report is changing tickets to suit his own convenience, while on the other hand, a sincere effort to give every one a square deal will meet with a very hearty response.

Some details which have had an influence in keeping up interest and also helped reduce the fuel bill, are as follows: Weekly reports submitted by the fuel inspectors on the condition of the flooring of coal cars placed for loading at the mines; a monthly report showing the diameter of the exhaust nozzles of each engine; a crusade on the overloading of engine tanks at coaling stations; waste at the coal chutes, and deck guards on engine tanks to prevent the coal wasting at the gangway.

Discussion.—There was considerable opposition to a performance sheet which would include the engine only and have little reference to the performance of the engineer and fireman. Some members thought that with a little addition the men's part of the work in saving coal could be included on the same sheet which shows the engine performance.

The second form which the report recommends relates to the time occupied at terminals, and gives the average delay of engines under steam due to the mechanical department and that due to the transportation department. Although such a form is not generally used, it was favorably considered, and the statement was made that while in some instances an hour and a half to two hours are required to clean the fires, good work on the part of the engineer and fireman in coming into the terminal with a light fire, and good work on the part of the men at the ashpit, would reduce this time to less than ten minutes. R. Emerson took the position that locomotive fuel performance sheets as made by the railways of this country are of very little use, as they are not at all accurate, and, in order to be of some value, they should be accurate within 1 or 2 per cent., which is very far from that attained by any at present.

ANTHRACITE COAL FOR LOCOMOTIVE FUEL.

T. S. Lloyd read an extensive paper on this subject, an abstract of which follows: Because of the limited supply (the entire anthracite production for all markets is less than the total consumption of fuel by all the locomotives of the United States), there can be no general introduction of hard-coal by the railways of this nation, even for their passenger locomotives. The roads of the anthracite region must long continue to have the advantage over those of other sections of the country in this respect.

For use in and near large terminals and cities, however, very serious consideration is merited in favor of this fuel. The only alternatives to its adoption are: The continuance of soft-coal, with the usual attendant smoke and popular clamor; the substitution of coke, which is harder to burn than anthracite, and also higher priced and limited in quantity and locality of production; the possible future use of briquets as in Europe; the substitution of oil, or electrification.

Briquets have yet to prove themselves, against the relatively cheap coals of this country; but their ultimate introduction on a large scale in locomotive service here seems certain. The most successful and extensive use of a briquet so far in America, has been of one made from anthracite culm.

Oil, while being in most respects an ideal fuel, except for its destructive effect on firebox sheets, and while now used extensively and economically on locomotives in the southwest, is practically out of the question for urban use elsewhere, because of the limited supply and of the vast extension of the demand for it in refined form for the hundred thousands of automobiles today and of air-craft tomorrow, making the price for the crude, basic petroleum, prohibitive for extensive railway use.

Freedom from smoke and cinders makes anthracite an ideal fuel generally, and especially in the neighborhood of large cities. The small amount of inoffensive gas from a few hard-coal burning locomotives is unobjectionable. The only questions are as to its adaptability to locomotives in present service at the different cities, and as to its cost.

About half the locomotives causing smoke near large cities are in switching service. It is well known that the draft on a yard engine is usually not heavy, and therefore, the yard locomotives in present use could almost without exception be adapted for anthracite by changing the grates only. The lower priced, small sizes of coal can be successfully used.

Almost all of the freight and passenger engines now built have quite wide fireboxes, the narrow fireboxes rapidly being retired to small branch-line service or to limbo. The wide boxes have a grate area sufficient to burn a mixture of anthracite and bituminous coals with a full head of steam while in the city and suburbs, and such a mixture properly fired, is practically smokeless.

As a practical method of firing on lines running in large cities, I would suggest on going out:

1. Cover over a brightly burning soft-coal fire with anthracite, preferably pea.

2. Place enough hard-coal in the forward part of the tender for feeding through the city and suburbs.

On coming into the city:

1. Load the necessary supply of hard-coal in the back of the tender at the last preceding coaling station, or at a special small anthracite coaling station 10 or 20 miles from the terminal, perhaps at the first suburban stop, or

2. If the distance does not exceed 10 or 15 miles, and the grades do not require too much work, for the fireman to be trained to prepare in advance a heavy soft-coal fire, and gradually let it burn down, so as to enter the city with only the lightest charging of coal by careful placing of small scoopfuls.

If the locomotives engaged in suburban, transfer and yard work alone were arranged to consume anthracite for fuel the abatement of the smoke nuisance would be so pronounced, it would mean practically abolition, as far as concerns that emanating from locomotives. If the gases, and more particularly smoke from locomotives using bituminous fuel, are as destructive to property and goods in business houses as claimed, it should accentuate the importance of at least a trial of hard-coal.

Having had long experience on both hard and soft-coal roads, I recommend for your earnest consideration this possibility of a use of anthracite for locomotives in spite of its higher cost, as an offset to the propaganda for electrification, particularly in the present unstandardized condition of electric construction and operation. Urban electrification, from the only sufficiently large installation yet attempted (at New York City), is now known to be prohibitive—to require hundreds rather than tens of millions of dollars, for any of a dozen large terminals in this country—and to yield a minus quantity in a net operating economy over all charges, without offsetting increases in revenue.

The employment of anthracite on trains, etc., will not only entail certain inconveniences, but also materially augment the cost of fuel for locomotives, and this will naturally not be a welcome proposition to the stockholders and managements of railways already facing advanced costs of raw materials and manufactured products purchased, wage increases, etc., besides further embarrassment resulting from the exactions of federal, state, and municipal commissions and inspections, without any allowance for compensating increases in rates. The use of hard-coal on locomotives in cities is suggested as worthy of serious consideration to abolish the smoke nuisance, therefore, chiefly as an offset to the unreasonable demand for electrification, which, as stated, would involve prohibitive additions to capital outlay, and annual interest charges thereon—unless, of course, the municipalities would finance the change themselves, since it is exclusively for their benefit; leaving to the railways only the costs of repair and operation.

The paper also gave tables, statistics, diagrams and maps relating to coal production, maps showing the occurrence of the anthracite, and the proportion of coal produced by the different railway companies.

Discussion.—On the Lehigh Valley anthracite coal is used rather extensively, but is almost always mixed with bituminous coal. In passenger service about 60 per cent is bituminous, in freight service about 40 per cent., and in switching service about 20 per cent. Statistics show that about 5 per cent. of the locomotives in the United States now burn anthracite coal, and about 5 per cent. burn oil.

FUEL ECONOMY.

D. C. Buell, chief of the educational bureau on the Union Pacific, Illinois Central, Yazoo and Mississippi Valley and Central of Georgia, presented an individual paper on the Proper Method of Firing Locomotives, in which he covered, more or less thoroughly, the entire field of fuel economy. The following abstract omits that portion of the paper which gives the detail instructions for proper firing.

Is it not fair to assume that the reason we fail to get better results along the line of attempted fuel economy on railways is due to the fact that we have been working along the wrong lines? Is it too much to admit that our efforts are not based on sound principles, and that we need to discard the old and begin anew to work out this problem on basic principles, the following out of which must, from the nature of things, bring results?

Drastic measures seem to be necessary, and if statements in this paper appear harsh or radical it should be remembered that the object is not to criticize present practice, but to cause an awakening as to fundamentals—the better understanding of which will be necessary before any great improvement over present practice can be expected.

The army of combustion experts who are fighting for fuel economy center their attacks on the locomotive fireman. Books, lectures, chemical demonstrations, road demonstrations, premiums, bonuses, and a thousand and one other things, are hurled at the fireman in a vain endeavor to make him burn the fuel more economically. Nevertheless the proper firing of a locomotive is an art known and practiced by but a small percentage of the locomotive firemen of today. The onslaught on the fireman has been so fierce, that in the smoke of battle many of those attacking this problem have entirely lost sight of the fundamentals which are beyond the control of the fireman, and consequently cannot be remedied by him. The proper training of the fireman to fire according to correct principles of combustion is but one of the steps leading to the solution of the problem of fuel economy on a railway.

Proper Grade of Fuel.—The officers of most roads have recognized the importance of a knowledge not only of the heat value per pound of the different grades of fuel available on their roads, but also of other properties of coal, such as whether it clinkers, how much ash it contains, its coking or caking properties, etc. Still another factor is determining what grade of a certain coal can be used most economically; that is, whether it is more economical to use mine-run, or the higher priced screened coal. The traffic department and the operating department must be consulted to make sure that, as far as possible, the interests of the company may be served well in the selection of the fuel to be used. The dependability of the mine in working steadily and turning out a uniform grade of fuel is also a factor. After the proper grade or grades have been determined they should be regularly used so that locomotives may be properly designed and drafted to burn the fuel furnished them economically; and so that the men can familiarize themselves with the proper handling of the class of fuel furnished to them.

Inspection.—Proper inspection of coal at the mines is just as essential as the inspection of locomotives or cars built for the company. Inspection should be made for both quality and weight.

Distribution.—The economic distribution of the fuel from the mine to the point used is one of the big items of fuel economy. I venture the assertion that on roads where this matter is not carefully handled, as much money is wasted through this channel as by improper firing. It is an operating matter pure and simple, and deserves a most careful study. A few years ago, J. G. Crawford, of the Burlington, worked out very complete statistics along this line and presented his results in a paper before the Western Railway Club.*

In this connection the direction of the volume of traffic must be considered, so that the company coal can tend to balance the tonnage instead of throwing it further out of balance. Other factors are the reduction of mileage of empty coal cars, the tonnage that can be hauled over ruling grades, etc.

As an example of what can be accomplished, it has been found economical on one of the transcontinental lines to haul a large quantity of company coal from mines in the far west to eastern terminals, and store it there for a time, the reason being that at certain seasons the traffic is almost entirely westbound. Then coal cars are needed east. These cars can be loaded at the mines, hauled east by power that otherwise would run light; the coal can be unloaded and stored and the cars released where wanted; all at an expense that is negligible compared to what it would cost to keep those eastern terminals supplied at a later season when the traffic was nearly balanced or heavier eastbound.

Coaling Stations.—There is an astounding variation in the cost of coaling locomotives. Cost may vary from two or three cents a ton at a modern link-belt station, to 25 or 30 cents a ton at some more primitively equipped plant. One road that I know of arranged with a company that makes a specialty of erecting coaling stations to finance the erection of a number of stations on its line. This road in a short time saved enough on the cost of coaling engines to not only pay interest on the capital invested for them, but to pay the principal as well.

It is safe to say that a master mechanic or road foreman in territory where this item of cost has not been carefully supervised could save more money, save it more quickly and make the saving permanent, by reducing the cost of coaling engines than by a campaign among his firemen.

Waste at Terminals.—It is ridiculous to talk fuel economy to a fireman, when the road foremen, roundhouse foremen, or mas-

*See The Railroad Gazette, January 10, 1908, page 49.

ter mechanics will allow them to bring engines in from a trip with a ton or more too much of unburned fuel in the firebox—practically all of which is wasted when the fire is cleaned; and when, at this same terminal, hundreds of pounds more fuel are wasted keeping fires in engines that are allowed to pop off around the yard or in the engine house, or in rekindling fires. Such little economies (where they are economies) as the kindling of fires with oil and shavings make the fireman realize that coal is a valuable commodity, and set him thinking about how he can save some.

Condition of Locomotives.—There is nothing more discouraging to a good fireman than an engine that will not steam properly. But a poor steamer seems to have some hypnotic effect on a poor fireman or a new man that not only causes him to forget everything he has ever heard or known about the correct principles of firing, but suggests that he is no longer a fireman—merely a coal-heaver—and he acts on that suggestion. The average man, overtaken by the feeling that he has a good excuse for making a failure, fails with ease. The man to heed fuel economy talk is one who knows that the boiler plant of his locomotive is in good condition.

Stop Steam Leaks.—It is folly to delude ourselves into thinking that the fireman of today is stupid or weak-minded enough to listen with attention to either orders or pleading about economical firing when the engine he fires wastes more steam than he wastes coal. The waste of steam mentioned in this connection includes not only the steam that is wasted past piston and valve glands, packing rings, valve rings or seats, etc., but that steam which is wasted from poor valve setting, excessive engine friction, etc.

Accounting.—The accounting for fuel on most roads is a joke. There are but few, if any, of you in this room, connected with the motive power department of a railway who do not know of the pencil adjustments made every month at each coal chute to balance the tons of fuel charged against that point. This adjustment has become such a common-place affair that the engineers and firemen know of it. Then how can we command their respect if we talk about proper firing of an engine to produce fuel economy, when they know that we can't come within from 50 to 300 tons per month of balancing our fuel accounts at different coaling stations?

Common Sense Statistics.—How do you know whether or not a fireman is firing economically? What statistics have you to prove it? Our ideal is maximum work at the drawbar with a minimum number of heat units. Our performance sheets at the best show only inconclusive comparisons. Pounds of coal per thousand ton miles on a water level division and on a 2 per cent. are totally different propositions; and even comparing the same class of engines on the same run we fail miserably because we have no accurate method of checking the amount of coal issued to an engine, nor of knowing the amount left on the tank at the end of the run. Neither do we credit the fireman with the coal consumed while the engine is at the terminal.

On some roads every one of these items is receiving careful attention and good results are being accomplished. It is probably safe to say that on every road one or more of these items is the particular hobby of some officer and, therefore, is closely watched.

My object in calling attention to this matter has been to defend those hundreds and thousands of loyal men who are daily striving against staggering odds to get their firemen to fire locomotives properly. The reason that road foremen, master mechanics, fuel experts, combustion experts—call them what you may—have not been able to get permanent results has, to my mind, been due in most cases to the overwhelming odds they have had to work against.

Proper Firing.—The proper method of firing a locomotive is the logical method for all firemen to follow, for the simple reason that it is the easiest, the least laborious, and most satisfactory method. If an engine is fired properly there are fewer scoops of coal to be handled, little or no necessity for using the rake or slicebar, or of cleaning the fire; and the shaking of the grates is reduced to a minimum. In addition to this, an engine that is fired properly steams, unless there is something radically wrong with the engine, or the coal is devoid of heat units. But even in such a case proper firing produces the most steam possible under the conditions; and the fireman may safely feel that no one could have done better than he did under the circumstances.

Educating the Fireman.—So far as I know there are only three ways by which firemen can be brought to a realization of the importance of the subject and lined up so as to actually fire their engines properly, even when not under the eye of some one in authority. The first of these methods is by personal instruction and demonstration right on the deck of the engine during a trip. The second is a combination of instruction by lectures, or otherwise, at the terminal and an accurate check of performance by an observer on the engine. Both of these methods are, comparatively speaking, expensive, and both require considerable time in which to accomplish any appreciable results.

The third method is by offering premiums or bonuses to enginemen and firemen for economy in the use of fuel. This method, however, is as a rule unsatisfactory on account of the lack of a proper system of accurately checking the results. The plan in practice seldom is fair and this causes dissatisfaction.

With all due respect to those advocating other methods I must say that my experience has been that such other methods accomplish only the minimum in the way of results. Their only recommendation is that they keep the subject alive and that in some cases they are so economical that if they do any good at all they more than pay for themselves. Classed in this latter category are combustion lectures, circulars and bulletins, instruction books, etc.

The ideal plan is to have a bright young engineer or an experienced fireman appointed as traveling fireman. Each traveling fireman should be able to handle successfully about a hundred engines, if not spread over too wide a territory. These men should not be assigned permanently to one particular territory, but should be moved from division to division or from district to district about once in 30 or 40 days so that they will be kept wide awake by the new surroundings and new problems they meet; and, in addition, so that they won't get calloused to improper local conditions, nor so well known to the engineers and firemen that familiarity will breed contempt for their instruction. These men should be more or less familiar with the principles of combustion, should be able to take the scoop away from the fireman at any time or place and fire the engine successfully, and should be able to explain, and in simple language, the principles they recommend and demonstrate. There are many such men in engine service on every one of our railways today.

With a crew of this kind reporting to the general road foreman of engines or to the superintendent of motive power of a road which is awake to the other conditions required to produce the ideal of fuel economy, such a crew of men should be able to pay a yearly dividend on the investment represented by their salary and expenses of from 500 to 1,000 per cent. or more.

The second plan that can be worked out successfully is through the agency of a first-class fuel man, who understands thoroughly the practical side of locomotive work, and in addition is well posted on the theory of combustion and the science of fuel economy. This man should be able to handle the problem on a road having not over 750 engines. He should be a good talker, should be equipped with statistics, charts, stereopticon and lantern slides, and perhaps with a very simple chemical outfit for demonstrating purposes, and, if he is right up to date, with moving pictures. He can be furnished with a car if extra equipment is available; or he can cut down his outfit and simply travel from roundhouse to roundhouse. He should have sufficient official standing to command the respect and co-operation of road foremen and master mechanics. Arrangement should be made so

that all firemen would have to attend his talks at least once every 60 days.

This much alone, however, will not accomplish the desired results. He should have under him two or three bright apprentice boys equipped with a little pocket counter, a pail, and a small spring scale. He should keep these boys on the road all the time riding engines. The duties of these boys would be to count and keep record of the number of scoops of coal fired between stations. By means of the pail and scale and a little horse sense they could weigh four or five test scoops of coal to determine the average weight per scoop of coal fired. The boys' records should include the engine number, names of engineer and fireman, the kind of coal, number of cars in the train, the tonnage of the train and the weather conditions, and alongside the column showing station names and the number of scoops of coal fired, the time of leaving, arriving or passing the stations, including a record of the time the engine was standing at intermediate stations. The record should also show the number of times the engine popped off and approximately the number of minutes the pops were open; and, in addition, the number of times the grates were shaken, a record of the use of the rake or slice bar and memorandum of anything out of the ordinary regarding the condition of the engine or the method or running or firing it.

The fuel man, with these boys assisting him, is now in a position to have an accurate up-to-date check of actual performance to use in connection with his talks and demonstrations. From the very first the records that the boys obtain show up conditions that get both engineers and firemen interested. The data collected soon show that some men are going over the road and shoveling several tons less coal than other men, and the knowledge of proper methods gained from the lectures combined with a determination to do as well as the other fellow starts more men to firing according to correct principles.

The reason why both of these plans are successful is that both demonstrate to the fireman that the proper method of firing a locomotive is the easiest and least laborious method for him to follow. It seems impossible to make him believe this by talking alone, no matter what arguments you bring to bear.

When conditions do not permit either of these plans being put into effect and the premium or bonus plan is not considered practical, about all that remains to be done is to put as forceful a circular or instruction paper as can be written on the proper method of firing, letting master mechanics and road foremen follow the matter up as thoroughly as time will permit.

There are, of course, special cases where other methods may be worked out; for example, the moving pictures are to be used by the educational bureau on the Central of Georgia for the instruction of the colored firemen. It is also the intention of the Union Pacific Educational Bureau to put a plan into effect to break in the new firemen that are hired on the road as we now do men entering station service—the method would be a combination of class-room instruction and student trips on the road, both under the supervision of an experienced instructor. This method of breaking in will take no longer than the present method but should start the man in with proper ideas and correct habits instead of in the present hit or miss fashion.

An appendix to Mr. Buell's paper contained the instructions for firing with oil which have been issued by F. F. Gaines, superintendent of motive power of the Central of Georgia.

Mr. Buell's paper was illustrated with stereopticon views, including a large number of moving pictures which admirably brought out the effect of good and bad firing on the production of smoke. The presentation of these lantern views occupied a large part of Thursday afternoon's session. Some of the moving pictures represented two freight locomotives hauling a heavy train over quite a distance on a grade. Views were taken with the camera on a car ahead of the engines so as to show the engine from the front, and others were taken from a rear car to show the amount of smoke which is made by bad firing and to the annoyance of passengers in the observation car. Other moving pictures showed the firemen actually at work, one of them firing properly and the other producing lots of smoke by bad work.

Discussion.—H. T. Bentley, assistant superintendent of motive power and machinery of the Chicago & North Western, regarded the paper of so much value that he thought it should be printed in a separate pamphlet for use by the railways. He thought it was necessary also to educate the engineer as well as the fireman, as different methods of operating the locomotive which are under the control of the engineer affect the coal economy, and the engineer should be instructed to use the best methods of engine operation. The traveling public and those who occupy the observation cars are critical in regard to smoke conditions and are demanding better service on the part of the enginemen. Having paid for a ticket to insure a comfortable ride, it is necessary for the railway to do whatever is possible to prevent smoke from trailing along and behind passenger cars. It was, therefore, a serious duty of the Fuel Association to see that passenger engines especially are fired with as little smoke as possible.

W. H. Averell, assistant to the general manager of the Baltimore & Ohio, said that during the past year that road had made some effort to economize fuel. Five supervisors of locomotives were working along lines almost identical with those recommended by Mr. Buell, with very favorable results. The total saving in coal during the past year was about 12 per cent., as compared with the previous year. Not all of this, however, was due to better firing. Some of it should be credited to the large new engines that have been put in service, and some to increased train haul, but the larger part was due to the better education of the enginemen.

Reference was made to the effect of the shaking of grates on the fuel consumption and the time occupied in cleaning fires at terminals and on the line. A representative of the Missouri Pacific stated that that road had introduced the methods recommended by T. E. Adams of the St. Louis Southwestern, and had succeeded in operating engines over a division of 147 miles without shaking grates or dumping the ashpan. The time required for cleaning fires was reduced from 47 minutes to 17 minutes.

LOCOMOTIVE DRAFTING.

H. B. MacFarland, engineer of tests of the Atchison, Topeka & Santa Fe, presented a paper on Locomotive Drafting and Its Relation to Fuel Consumption. This paper makes up a pamphlet of 85 pages, and records the results of tests of draft appliances of all classes of engines on the Santa Fe. It gives tables and diagrams showing the maximum and minimum draft, the exact pressure and the back pressure expressed in horse power for speeds of 10, 15, 20 and 25 miles per hour. In the case of some of the Mallet locomotives this back pressure amounts to over 1,000 h. p., but in all cases the high back pressure is in connection with oil-burning locomotives, where the ashpan is considerably restricted and a high blast is necessary for the oil burning.

The figures relating to the enormous amount of power to produce the draft in locomotives are rather surprising, as it amounts in some instances to from 800 to 1,000 h. p., which is more than the average useful work performed by most locomotives. For coal-burning locomotives the maximum power reported is 590 h. p., in connection with a 2-6-6-2 Mallet compound freight engine. An abstract of the concluding portions of the paper follows:

General charts have been prepared and are presented to show the relation between back pressure horse power, the indicated horse power and the drawbar horse power. The observations were taken from actual tests made on different types of locomotives, both in freight and passenger service, both coal and oil burners. These curves are plotted with horse power as ordinates, and miles per hour as abscissae.

The chart shown in Fig. 1, was prepared from data secured in the test of a single expansion Mikado type locomotive in

mountain service between La Junta and Trinidad, Colorado. The full line curves show the back pressure horse power, indicated horse power, drawbar horse power and the mean effective pressure.

Assuming an exhaust pressure of 4 lbs., the back pressure horse power is shown with a dotted line. The difference then, between the dotted line and the full line curves, is the horse power to be gained, if the exhaust pressure could be reduced to 4 lbs. This reduction in back pressure would increase the

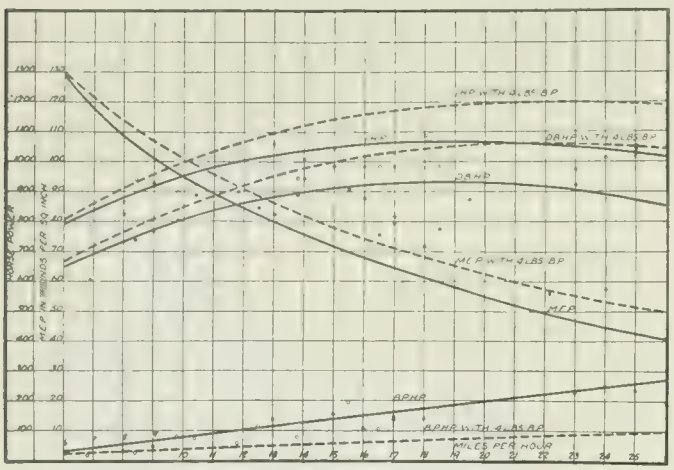


Fig. 1—Chart of Performance of Mikado Locomotive.

mean effective pressure an equal amount. This increase is shown by a dotted line curve.

Since we have supposed that the mean effective pressure is increased, then the indicated horse power would increase to an amount equal to the gain in back pressure horse power. Then, assuming that the machine friction of the locomotive would not increase with the reduction of back pressure, we have with the drawbar horse power an increase equal to the increase in indicated horse power. A dotted line also shows these results.

This locomotive, which is a coal burner, shows very favor-

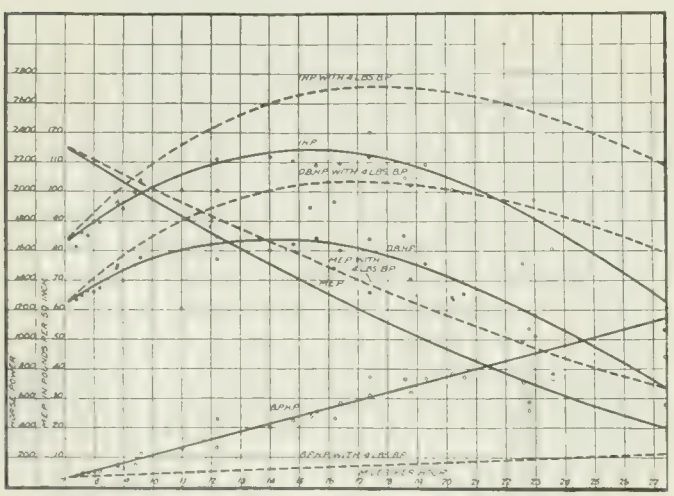


Fig. 2—Chart of Performance of Mallet Locomotive.

able conditions of operation so that the actual gain is relatively low. The maximum speed shown is 26 miles per hour. The back pressure horse power at this speed is only 270, which is 32 per cent. of the drawbar horse power, and 26.5 per cent. of the indicated horse power. In comparison with conditions on other locomotives these figures are considerably below the average and indicate very favorable performance of this locomotive.

The chart presented in Fig. 2 has been prepared in similar manner to the preceding one and shows the performance of a locomotive of the Mallet type. This is an oil burner in heavy mountain service. A study of this chart will very readily show that the increased tractive horse power, due to the decrease in back pressure is very great. In this case the back pressure horse power and the drawbar horse power curves cross each other at a speed of 24.5 miles per hour, the power for drafting at this speed being equal to the effective work obtained at the drawbar. The maximum drawbar horse power is reached at a speed of 14 miles per hour, the back pressure horse power at this speed being 400, and the drawbar power 1,680.

If we assume a back pressure of 4 lbs. at a speed of 14 miles per hour, the drawbar horse power would be 1,960, and the back pressure horse power only 100, or the back pressure would then be 5.0 per cent. of the drawbar horse power instead of 24.0 per cent. The indicated and drawbar horse power decreases very rapidly at speeds above 14 miles per hour, and at a speed of 28 miles per hour the back pressure horse power and indicated horse power curves would come together at 1,200 and the drawbar horse power would be about 600, or 50 per cent. less than the back pressure horse power.

It can very readily be seen that the reason for the Mallet locomotive being a low speed engine is not due to machine friction,

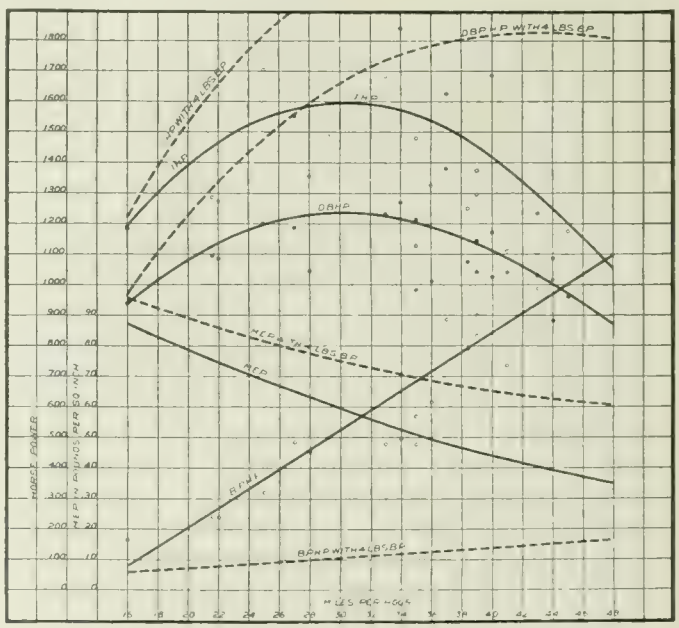


Fig. 3—Chart of Performance of Pacific Type Locomotive.

as has been frequently claimed, but to the amount of back pressure which is required to produce a draft. If the assumptions made were correct, with a back pressure of only 4 lbs. at 28 miles per hour, the indicated horse power would be 2,100, the drawbar horse power 1,500, and the back pressure horse power slightly above 200, which would mean that either greater speed could be obtained or, if this were not required, there would be a greater saving in fuel consumption.

The chart in Fig. 3, has been prepared from data secured in tests of a Pacific type coal-burning balanced compound passenger locomotive with cylinders 17½ in. x 29 in. x 28 in., and shows performance over heavy mountain grades with a train of 11 cars, or 644 tons. The back pressure on this engine was exceptionally high. At speeds ranging from 16 to 45 miles per hour, the back pressure horse power was 175 and 1,000 respectively. At a speed of 20 miles per hour the back pressure horse power was 220, the drawbar horse power 1,080, and the indicated horse power 1,400, or the back pressure horse power was 20.5 per cent. of the drawbar horse power and 15.9 per cent. of the indicated horse power. This locomotive attained maximum indicated horse power at a speed of 34 miles per hour. At this speed the back pressure horse power was 650, the drawbar

horse power 1,200 and the indicated horse power 1,580, so that the back pressure horse power was about 55 per cent. of the drawbar horse power and about 41 per cent. of the indicated horse power.

It will be seen from a study of these charts that the back pressure horse power and drawbar horse power curves cross at a speed of 45 miles per hour and at a horse power of about 1,000. Assuming an average of 4 lbs. back pressure, the back pressure horse power curve has been plotted as a dotted line. The increased mean effective pressure, drawbar horse power and indicated horse power resulting from the reduction in back pressure are also shown by dotted lines. The increase in mean effective pressure, due to decrease in back pressure, is 10 lbs. at 20 miles per hour and 23 lbs. at 45 miles per hour. At the maximum indicated horse power, the possible increase in indicated horse power and drawbar horse power would be about 800.

This locomotive is of very recent build and its design is consistent with most modern practice for mountain passenger service. While it is giving satisfactory service, the great savings to be made in fuel consumption or the possible increase in speed by reduction in back pressure are readily apparent. With so high a back pressure it would be impossible for this engine to be efficient at any high rate of speed; in fact, it would be impossible for the engine to maintain a high rate of speed with any considerable weight of train. At the speed of 45 miles per hour, where it should show its highest efficiency, it must give up an equal amount of power, to produce the required draft, as is delivered at the drawbar.

The calculation of the theoretical horse power required to draw the gases through the flues and front end of a locomotive is comparatively simple. The method employed in arriving at the data herein presented was as follows:

$$\text{H. P.} = \frac{PAV}{33{,}000}.$$

P = Pressure per unit of area against which the gases were pulled.
A = Total area of the tubes.
V = Average velocity of the gases in feet per minute, calculated as follows:

$$V = \frac{CB}{60A} F.$$

C = Cubic feet of air necessary per pound of fuel.
B = Pounds of fuel burned per hour.
A = Area of flues in square feet.
F = Factor for increase in volume of gases due to increase of temperature from 60 deg. F. to 700 deg. F.; assuming conditions from 60 deg. F. to 700 deg. F., this value is 2.2.

In obtaining the values of C, calculation was based upon the analysis of the fuel and flue gases as obtained upon tests of both coal and oil burning locomotives.

The weight of air per pound of fuel burned was calculated as follows:

$$A = 3.032 \frac{N}{CO_2 \text{ plus } CO} C.$$

A = Weight of air supplied per pound of fuel.
N, CO, CO_2 = Percentage by volume of nitrogen, carbon monoxide, and carbon dioxide in the flue gases.
C = Proportional part by weight of carbon in the fuel.

Substituting actual figures in the above formulae, after reducing to unit of volume, gives a value of 185 cu. ft. of air per pound of coal burned.

Calculation by the same method for oil burners gives a value, in round numbers, of 200 cu. ft. of air per pound of fuel burned.

The following specific example will show the method:

ENGINE 923—COAL BURNER.

Run: La Junta to Trinidad.
Average fuel per hour = 4,415 lbs.
Draft in front end = 5.8 in. water.
Draft in front of tube sheet = 4.4 in. water.
Areas of flues = 1,265 sq. in., or 8.78 sq. ft.

$$V = \frac{185 \times 4{,}415}{60 \times 8.78} = 1{,}552 \times 2.2 = 3{,}415 \text{ ft. per minute.}$$

The power required to draw the gases through the flues alone will be

$$\text{H. P.} = \frac{(4.4 \times 0.0361) \times 1{,}265 \times 3{,}415}{33{,}000} = 20.8.$$

The horse power required to draw the gases through the flues under the diaphragm and through the netting equals 27.43.

The actual horse power utilized producing a draft in any given class of locomotive is taken as the horse power due to the back pressure in the cylinders. This back pressure horse power is not entirely chargeable to the production of draft because of the impossibility of operating non-condensing engines without at least 3 or 4 lbs. of back pressure. A greater part of the power thus expended, however, is used in producing draft alone.

The relation of horse power extended for producing draft to the theoretical horse power required to draw gases through the flues and front end is shown in the following example, Table 1:

TABLE 1.—RELATION BETWEEN POWER NECESSARY TO DRAW GASES THROUGH FLUES AND POWER EXPENDED IN LOCOMOTIVES AS DRAFTED.

Engine Number.	Calculated H. P. required to draw exhaust gases through boiler.	Back pressure at M. P. H.	H. P.	Excess power in jet H. P.	Per cent. of Required.
923..... Coal burner	28	10	160	132	471
		15	275	247	882
		20	390	362	1,294
		25	500	572	2,041
917..... Oil burner	25	10	150	125	500
		15	300	275	1,100
		20	450	425	1,700
		25	600	575	2,300
1700..... Oil burner	65	10	290	225	346
		15	385	320	493
		20	480	415	639
		25	575	510	784
1301..... Oil burner	25	20	300	275	1,100
		30	500	475	1,900
		35	600	575	2,300

The above table is calculated from actual data secured in road tests of representative locomotives covering both freight and passenger, simple and compound, and coal and oil-burning engines. The figures given under the heading, "Calculated horse power required to draw the exhaust gases through the boiler," were obtained by the above method. The horse power of the steam jet for the various speeds in miles per hour was obtained from representative engines in actual service. The difference in these two values gives the excess in power directly chargeable to the exhaust jet. In the last column the values for this excess power consumed are given in percentages of actual work done.

It will be seen that the efficiency of the steam jet, as a means of producing draft in a locomotive boiler, is extremely low from a power standpoint. The efficiency, based upon a mechanical standpoint, i. e., the simplicity and reliability of this form of apparatus, is not included in this statement. It will be seen from a study of the above figures that the loss in horse power, due to the throttling of the engine exhaust, is somewhat startling, amounting in many cases to several hundred horse power.

If other means could be provided to draw the necessary volume of gases through the boiler for the same rate of combustion possible with a steam jet, at an expenditure of power somewhere near the calculated power required to draw the gases through the boiler, a tremendous saving in power would be accomplished. The power thus saved could be utilized in useful work, either as increase in speed or as a direct saving in fuel consumption.

The argument is often advanced that it is not economical to run locomotives at high speeds on account of the great back pressure and the loss in efficiency. This is a very pertinent argument in view of the facts. In service it is shown conclusively that the maximum power is obtained at speeds less than those desired for present time schedules. With increase in speed there is a proportional loss in horse power due to back pressure. The result is that at some speed a locomotive will have its highest efficiency and that speed is generally lower than the speed at which the locomotive is required to do maximum duty.

Discussion.—This paper was received with unusual interest

and discussed by a number of motive power men. W. E. Symons presented a long written discussion, and it was generally agreed that the subject was one in which there is an opportunity for large improvement by the introduction of methods which would reduce back pressure and add to the useful capacity of the locomotive. The variable exhaust was mentioned by a number of the speakers, and, while it was admitted that it is a correct and simple solution of the difficulty, yet there are difficulties in the way of maintaining a variable exhaust in proper working condition. The author mentioned in his closure that he had found by experiment that it required only about 50 h. p. to operate an exhaust fan by a steam turbine, which was sufficient to produce the necessary draft for a large locomotive, and that he hoped to make such an application in regular service.

INSPECTION OF FUEL FROM PRODUCER'S STANDPOINT.

A paper on this subject was presented by J. E. Hitt, in which he said: Before we reach the discussion of inspection of fuel, it is assumed that the fuel purchaser of the railway buys the coal best suited for its needs, taking into consideration the three items; quality, cost per ton on the cars, and the haul to the point of consumption. He can figure with mathematical precision the last two items, but cannot figure so easily, and never accurately, the respective merits of various coals from the standpoint of quality.

In buying coal, it has been the observation of the writer that quality is given more or less consideration by fuel agents, usually less, and generally more attention is paid to the cost on the cars. This is done very often for reasons of policy to divide the tonnage between several operators, knowing when the purchase is made, that the quality of coal in one mine is inferior to the product from another one nearby. After this serious mistake has been made, the fuel agent's only recourse is to get for his company, as nearly as possible, a perfect preparation of an inferior grade of coal, or if he has given the question of inherent quality of the coal full consideration, then he must watch closely its preparation, or the advantage he has gained by buying a superior grade of coal will be more than offset by its depreciation, due to careless mining. We are compelled to admit that you will find many careless operators, sometimes through ignorance, sometimes intentionally careless, but, I believe in most cases, through necessity, because of competition with neighboring operators due to the present over-production forcing him to sell his coal for less than the cost of production, if in the cost is included an ideal preparation.

There is no doubt in my mind but that too little attention is given to the inspection of coal by railways, and that a more rigid and careful inspection would meet with the approval of most operators and eventually work to the benefit of the operator. It would tend in time towards a better preparation of the entire production from his mine. I do not know of a commodity entering into the operation of a railway which apparently is given as little thought as to the quality of the product, especially when we consider that it constitutes so large a portion of the purchases of the railway, as fuel. It is hard to take seriously complaints received at long intervals from our railway customers when they generally seem so disinterested as to the impurities in the coal they are buying.

I would suggest that a coal miner be selected from each mine producing railway coal, to act as inspector, one man for each road taking coal from the mine; or preferably, to save expense and avoid confusion and possible opposition from operators to the plan, one man to represent all companies. This man would be qualified and would know whether the company was getting the best prepared coal from the mine and, if it was not, would know how best to remedy the trouble. He would know what miners are loading dirty coal, and by co-operation with the management could overcome the difficulty to a great extent.

INSPECTION OF FUEL FROM CONSUMERS' STANDPOINT.

Glenn Warner, fuel inspector of the Cincinnati, Hamilton & Dayton, read a paper on this subject in which he said: A fuel inspector should be an energetic, frankly diplomatic man of broad-minded, sound judgment and with an analytical mind. The analytical mind is sometimes a natural gift, but more often the result of scholastic training; however, this quality is needed, for the fuel inspector must analyze each problem and from results find causes. Having appointed the fuel inspector, copies of the contracts should be given him that he may study them preparatory to visiting the different mines, for each mine should be visited and an extensive report made on it and its characteristics. Enough time should be spent to make each report complete in itself. The exact location of the mine, altitude, name and characteristics of the seam should be carefully noted so that there may be a tie with the government geological data. The method of mining, preparation of the coal, facts relative to mining equipment and labor conditions, and statistics regarding the mine output and railway facilities at the mine should be carefully noted. Too much stress cannot be laid on making this mine report complete in itself. The reason is very evident to the men among us who have been asked questions concerning the mines. The fuel inspector should become so well acquainted with all the mining conditions that he will be in position to answer all questions that may be asked of him. While at the mine he should take standard characteristic face samples of the seam so that the analysis may accompany the mine reports. The inspector should become acquainted with the active operators and carefully note and discuss with them the coal contracted for as it is being loaded in the cars.

Contracts in general, and railway coal contracts in particular, are rather more favorable to the buyer than to the seller, and such contracts should be interpreted with good judgment by one who is acquainted with all of the mining conditions.

After acquainting himself with the traffic movement between the mines and the final destination, the inspector's place is on his road. It is my opinion that road work, combined with an occasional visit to the mines, will accomplish more than a constant watching of the mines, for I do not believe that the active operators belong to a class of men that must be watched all the time.

Being on the road, it now becomes the inspector's duty to first see that it is getting the best grade of coal that can reasonably be expected from the different mines. To carry on this work I have found it convenient to have a tabulated statement of all cars shipped, showing the name of the shipper, car number and initial, date of shipment, name of mine and grade of coal. This tabulation may be arranged in ten sections, so that the car numbers ending in the same numeral may be grouped. The interval of time elapsing between the mine loading and the arrival of a shipment is ordinarily long enough so that the tabulation may be made up from the mine shipment notices and placed in the hands of the inspector before the shipment arrives. Armed with this specific data and knowing what grade of coal is to be expected, the inspector is qualified to pass final judgment soon after the coal arrives.

At the start the attitude of the fuel inspector should be that poor coal is the result of unpremeditated carelessness on the part of the mine operator. The coal men mean to be fair, but are sometimes careless at the mines, especially with railway fuel. This carelessness sometimes becomes rather chronic and occasional bad doses must be prescribed to bring conditions to a healthy state. This bad dose consists of condemning the coal, demanding and requiring the coal company to reconsign it. The latter part of the procedure should be only recommended by the inspector. The responsibility connected with all coal condemnation should be shouldered by him, and he should be able to justify any action he may recommend. All of the coal inspection should be done on the receiving road,

and the operators are justified in criticising the railway company for condemning poor coal, resulting from carelessness, after it has reached its destination. The road company ought not to be expected to furnish inspectors at the mines to keep the miners from being careless. A penalty system is hardly practicable at this stage, because of the various grades of coal used, the territory covered in the distribution, and the great amount of work involved.

At stated intervals, the inspector should supervise the weighing of all cars, for a short period, with the view of checking up weights and locating any discrepancy that may be present.

Being on the ground and in contact with the actual operating men of the road, the inspector ought to be able to make valuable suggestions for the betterment of the fuel service. To be successful in his work, he must have the hearty co-operation of the motive power department. Since the fuel inspector must be, in a way, responsible for good fuel service on his road, he should either conduct or be present at all fuel tests, and carefully note the behavior of the different fuels.

The fuel inspector should gather enough definite data so that an equation may gradually be formulated between the actual value of the fuel from a standpoint of efficiency, and the commercial value of the contract. When these equations are formulated and taken into consideration in the purchasing of fuel a great deal of money will be saved.

STANDARD COAL ANALYSIS.

J. S. Sheafe (Illinois Central), as chairman of the committee on this subject, read a report in which the methods recommended by the American Chemical Society were stated to be the most suitable. If the association does not wish to adopt any standard at this time, the committee urged that the method actually used in any case be specified as the results would vary considerably. Some form of Baumé calorimeter was recommended. The committee was continued and asked to keep in touch with the other societies interested, and make an effort to secure a general standard analysis.

OTHER BUSINESS.

W. F. M. Goss, dean and director of the College of Engineering, University of Illinois, was unanimously elected an honorary member of the association.

The following officers were elected for the ensuing year: President, H. T. Bentley, assistant superintendent of motive power, Chicago & North Western; first vice-president, R. Collett, superintendent of locomotive fuel service, St. Louis & San Francisco; second vice-president, D. B. Sebastian, fuel agent, Chicago, Rock Island & Pacific. Executive committee, two years, D. C. Buell, J. G. Crawford, R. Hibbet; one year, R. Emerson, W. H. Averell and W. C. Cox.

Chicago was practically the unanimous choice as the location of the next convention.

RESULTS OF OPERATION OF THE FRENCH STATE RAILWAYS 1909 TO 1911*

BY C. COLSON.

The influence of the buying up of the Western railway system by the French government on the French budget makes itself felt nearly uniquely through the results of operation. We know that the conditions of the purchase were such that the shareholders received exactly the same revenue as before. The state, which receives the net profits yielded by the railway formerly owned by the stockholders pays them that revenue as an annuity, while it formerly made up that amount as guaranteed interest. The deficit it has to meet hence only varies to the extent that the net profits, which go to reducing the capital charges, vary by the effect of the change of administration. The addition to capital of the deficit of the year before the purchase certainly was one of those disguised loans which lighten one budget at the expense of future budgets. The development given, with good reason, to supplementary constructional works will in the future increase the capital charges very largely. But these are facts which only exercise a secondary influence on the magnitude of the deficits which have to be met, and it is in the traffic accounts that we find today the essential element for appreciating the financial results of the state working. As yet one hardly hears any remark that the service now supplied to the public is better than that of the company, which was so severely criticized. What difference is there as regards net cost? That is what the examination of the accounts for 1910 and of the credits asked for 1911 and 1912 will show us. We also have to consider to what extent the differences result from causes which would have equally affected both the company and the state, and that is a question difficult to solve.

In the accompanying table No. 1 we give comparative figures for the last three financial years of the administration of the old state railway system, and also for those of the Western Railway, now bought up. In the latter case, the figures for 1908 are given arranged in the form adopted by the administration in the 1909 accounts, so as to make it possible to compare the last year's operation by the company with the first year's operation by the state. The 1909 and 1910 figures, moreover, include the expenses called *normal* by that administration, those it calls *arrears left by the Western company,* and which amount to about 7,700,000 francs ($1,590,000) for each of those two financial years. These expenses, by their nature, are in fact included among those which every railway administration which keeps its accounts properly includes among normal expenses, and there is no reason for thinking that *from the point of view of maintenance and of working expenses,* the business taken over by the state is burdened by any exceptional charges.

That is a point which it is necessary to mention and to lay stress on, for it is one of those which have given rise to very

*Abstract of an article in the Bulletin of the International Railway Association.

Table 1.

	Old Railway System.			Nationalized Western Railway.		
	1908.	1909.	1910.	1908.	1909.	1910.
Average mileage operated	1,844	1,844	1,844	3,683	3,683	6,702
Operating revenue—						
Passengers	$3,960,000	$3,980,000	$4,020,000	$18,240,000	$18,440,000	$18,840,000
Additional quick freight	1,620,000	1,760,000	1,840,000	5,120,000	5,240,000	5,440,000
Slow freight	6,100,000	6,440,000	6,640,000	18,700,000	18,660,000	20,220,000
Other receipts	120,000	100,000	140,000	1,460,000	1,520,000	1,420,000
Total	$11,800,000	$12,280,000	$12,640,000	$43,520,000	$43,860,000	$45,920,000
Expenses—						
Management and administration	$100,000	$60,000	$80,000	$220,000	$220,000	$260,000
Working	2,820,000	2,760,000	3,080,000	11,500,000	11,260,000	15,860,000
Locomotive and rolling stock	3,460,000	3,480,000	3,800,000	11,040,000	11,180,000	14,560,000
Way and works	2,200,000	2,360,000	2,540,000	4,060,000	5,280,000	6,740,000
Miscellaneous	940,000	980,000	1,020,000	2,880,000	3,460,000	3,760,000
Expenses	$9,520,000	$9,640,000	$10,500,000	$19,600,000	$31,040,000	$36,180,000
Net profit	2,280,000	2,640,000	2,140,000	13,910,000	12,460,000	9,740,000
Receipts per mile	6,405	6,665	6,855	11,810	11,910	12,390
Ratio of expenses to revenue	80.7%	78.4%	83%	68%	71.7%	78.8%
Train mileage	11,600,000	11,700,000	11,900,000	35,500,000	36,200,000	36,800,000
Average rate per passenger per mile	.94%	.94%	.930%	1.008%	.998%	.992%
Rate per ton per mile on slow freight	1.482	1.478	1.478	1.504	1.492	1.500

vexatious misunderstandings. All the information which it is possible to collect, from the engineers of the state administration, from those of the old company and from those of the head authorities, shows very clearly that the Western Company, till the very last days of its existence, kept its system in a good state of maintenance.

In saying this, we do not wish to assert that the state of the old Western Railway was satisfactory. But what really showed deplorable arrears was the rolling stock, and also the supplementary works necessary in consequence of the growth of the traffic. Those are expenses which do not appear in the working accounts and the postponement of which could neither increase the net profits during the last years of the company, nor reduce them during the first few years of the state management, except perhaps indirectly, owing to the reflex influence of the insufficiency of the installations on the progress of the service. It is hence necessary to include the so-called arrears among the normal expenses of 1909 and 1910, if a proper comparison is to be made between the results of the last few financial years, and this we have accordingly done in the accompanying table.

This table shows how quickly the real net profits of the bought-up system are decreasing. However, we could not consider as exceptionally high the net profits of 70 millions ($14,000,000) obtained by the company in 1908, its last year of working, when the corresponding figures were 80 millions ($18,000,000) in 1907 and 89 millions ($19,800,000) in 1906; while the average for the ten years before the nationalization was about 78 millions ($15,600,000). In order to make the variations shown in the table intelligible, they should be compared with those of the preceding years, and also with those obtained during the same years on the system of the five large companies which have not been nationalized. It is of course clear that these comparisons can only apply to the absolute magnitude of the variations in receipts or working expenses of a very unequal character, and it is the importance of those variations, as compared with the figures to which they apply, namely the percentage, which is to be compared. Table No. 2 contains a summary of this for the last four years. Increases are marked with the plus sign, decreases with the minus sign.

The final figures for 1911 may differ materially from those which the present position of the receipts and the credits asked for allow us to forecast. We think, however, that we may be certain that we do not stray far from truth when we say that the reduction in the net profits, after three years of state working, will be between 40 and 50 million francs (between $8,000,000 and $10,000,000) (say half more), for a year (1911) to which no external circumstance gives any exceptional character, from the point of view of receipts or of expenses. Before the nationalization we said (and the event has confirmed it) that the operation would have no result, from the point of view of the relations between the state and the company, that consequently its financial results would depend exclusively on the difference between the company's management and the state's management. It was difficult to doubt, after all the experience gained in France and abroad, that state operation would be, for one and the same kind of service, more expensive than operation by a concessionary. Would it be right to say that the new experiment had confirmed this opinion, to that very large extent that the figures given above show?

In the first place, it is only right to state that in the increase in the expenses during the last three years there are certain elements which have a temporary character; the difficulties and even the disorganization of the service, which will soon become reduced, and it is to be hoped will in the end disappear, entailed extra expenses and the payment of claims of much greater amount than normally; the compensations for loss, damage and delay, which were already excessive in the preceding years, again doubled in 1911. On the other hand, without accepting the fable of badly-maintained tracks, it must be recognized that the system of general repair adopted by the Western company, having come to an end in 1901, had sooner or later to result in a recurrence of the expenditure previously described as exceptional by the company. Finally, the extension of the supplementary works charged to capital account is also not without influence on the operating account, as there is the very wise rule on all railways that that account is immediately debited with the cost of the installation done away with. The actual increases in the expenditure hence include several million francs which will gradually disappear in the future.

There are also some increases in expenses, due to causes which burden all railway administrations. Everywhere the general rise in prices and in wages, increasing the expenditure on materials and on the staff, increases the net cost of transportation, and we know that in many countries state administrations and companies are compelled to try to counteract the increase in their expenses by raising their rates. In France the need of raising certain wages, especially in the lowest grades, makes itself felt on all the railways. In addition to these sacrifices which are indispensable in order to keep the remuneration of the employees at a proper level corresponding to the state of prices generally, recent legislation has added others in order to give retired employees pensions quite out of proportion to those which the state grants its own employees. The expenditure imposed by the pension law would evidently have increased the operating expenses to the same extent if the railway had not been nationalized.

On the other railways, the extra charges incurred in 1909 and 1910 were appreciable, and the companies on the whole, although they had rather less earnings to meet them than the state, succeeded in slightly increasing their net profits. It hardly seems doubtful to us that, in 1911, the first year that the pension law came into force, the profits will finally show a slight decrease on the whole of the railways operated by companies. Nothing, however, as yet makes it probable that there will be a collapse anything like that shown by the figures given for the state system.

A summary of the share of the employees in this increased expenditure is given in Table 3, taken from the preamble of the supplementary budget for the state railways for 1912. The figures refer to this future budget, and as a considerable part of the increases only came into force on October 1, 1911, they no doubt exceed appreciably those for that year.

Thus the expenditure incurred for improving the lot of the employees in 1908 amounted on both systems together to 32 million francs ($6,400,000), in which payments towards pensions only figured for 4 million francs ($800,000). On the Western system, the increases in pay, premiums and sundry allowances amounted to 32 per cent. of the sums previously granted, and on the old railway, the generosity of which towards its employees was, however, always extolled, it amounted to just over 20 per cent.

Now if by means of these sacrifices which have to be paid by the tax payers of the whole of France, the administration of the state railway had secured the devoted services and the gratitude of its employees, one might perhaps maintain that it had not paid too much for such a manifest advantage to itself and to its customers. But if there is one point about which there is a general agreement among all those who are in direct contact with the employees of the nationalized railway, it is that these employees have never been less zealous and more fertile in complaints and recriminations. Some trace the origin of this state of affairs to the bad habits formerly tolerated by the company; others attribute this corruption of employees formerly satisfactory to the agitation for and against nationalization and to the sudden introduction of state regulations on a railway system to which they were not suited.

The administration of the state railway, like any other employer, would no doubt have received gratitude from its employees if it had gradually granted, without showing any ill will about it, the increases necessary in order to bring the pay to a level corresponding to the general state of the labor market, and compatible with the financial requirements. By suddenly granting, at the eve of the strike or the day after it, increases absorb-

ing nearly half of its net profits, it gave its employees the impression that the sole reason for its concessions was fear and undue parliamentary influence. One saw the astonishing spectacle of the nominal defender of the budget compelling a weak public administration to incur expenditure which it did not deem necessary. The thoughtlessness with which decisions were arrived at has since been made evident by the impossibility of establishing proper budget provision to allow for them. Nevertheless the employees have been showing, since then, more discontent than satisfaction. In fact, as soon as it is admitted that it is good will towards the workers, and not the value of their work, which is to regulate their pay, there is really no reason why they should be contented with 5 francs ($1) per day, rather than 6 francs ($1.20), with 7 francs $1.40), etc.

The impression of weakness, of contempt for the financial results, spread among the employees by the prodigality which the figures given above make clear, is certainly one of the causes which have led to the general relaxation of discipline to which is due the bad service recognized by many of the partisans of the nationalization. The defenders of the state administration now lay stress on the special difficulties connected with the operation of the state system, whose traffic consists chiefly of troublesome items, such as seasonal traffic to the seaside, suburban services requiring many sidings at stations for very small returns, harvests exceptionally variable. In addition to all these causes of irregularity, there is a navigable waterway, paralleling the main line, which on some days dumps on to the railway, in case of ice, or low water or flood, a mass of traffic. We wish to confirm here that the administration of the state railway has in fact to contend with difficulties which seldom are found united; and we only regret that its partisans have so often treated these same considerations as vain pretexts invented to excuse the incapacity of the company when the opponents of nationalization brought them forward formerly.

To meet all these difficulties, the administration of the state railway took over a railway system which, it must also be admitted, was not equal to requirements, and it is from this point of view alone that the arrears that we mentioned at the beginning of this article, exist. This was not a state of affairs peculiar to this railway system. Simultaneously on the railways of nearly all the chief industrial countries, the great rush of traffic in 1907 had not only caused the reappearance of the difficulties bound to arise during all exceptionally busy periods, but had passed the limit where small improvements would help. Hence, nearly everywhere it became necessary to increase the traffic-capacity of the railway by duplicating many lines, by building several new lines, by building yards; in fact, by undertaking a large quantity of work taking a long time.

To return to the nationalized railway, the bad financial state of the company, the indecision of the governments who were sufficiently wise to oppose nationalization and too weak to bring to a head the agreements always being prepared in order to avoid it, had resulted in producing a state of uncertainty which has led to the postponement of most of the improvement projects prepared by the engineers, in order to meet conditions which would necessarily arise if traffic grew. It was only during the last few months of its existence that the company, no longer daring to accept responsibility for the suburban service, with means which had become utterly inadequate, decided to bring forward the scheme for electrifying the lines ending at Saint-Lazare station and for re-constructing that station, and to disregard the reproach of presumption which it incurred by speaking of building and of improvement just before its death.

The administration of the state railway has again taken up this scheme, and widened its scope, so that it will involve an expenditure of about 140 million francs ($28,000,000). There is some talk of a nearly equal expenditure on yards and on the reconstruction of the chief stations of the railway, and of an expenditure of about 40 millions ($8,000,000) on sundry junction lines. What with the duplications and the strengthening of the tracks, the construction of new lines, especially to give another route between Havre and Paris, the reconstruction of Montparnasse station and the electrification of the lines ending there, the figure of 500 million francs ($100,000,000) of capital, to be spent within a comparatively short period, will be much exceeded. The expenditure of this kind, in addition to the interest on the stock to be issued which will also form a large item in the budgets of the state railway system, will, if the net profits do not grow rapidly, show a very serious deficit. In this respect, as in that of the employees, it is of importance that the administration of the state railway should do what is necessary as quickly as possible, but it must not think that the best way of answering the attacks aimed at it is the indiscriminate expenditure of money. Too sudden advances are often followed by sudden stops.

As regards more especially the increase of rolling stock, it is not long ago that the representatives of the state system, in a commission over which we had the honor to preside, recognized the very serious inconvenience to national industry as well as to railways, of irregularity in ordering from companies. Is there not some forgetfulness of what they then said, in the present enormous orders for rolling stock and for materials for permanent work which is rather far off, just at the time when it is necessary to increase operating expenses in order to counteract the lack of facilities?

We have just examined the financial position of the two nationalized systems. But in the operation of railways, the financial result is not the most important one; one may almost say that it is a secondary one, of such vital interest is the proper service to all the places concerned. From this point of view, what are the causes of the disorganization existing on the state system? It is impossible for us to avoid expressing our opinion on this subject, for it is at present the most serious question in connection with the traffic.

We already referred to one of the more important causes of the existing difficulties, when we mentioned the arrears left by the company, not as regards the maintenance of its tracks and its safety appliances, for from this point of view the most careful supervision had not found anything to reproach the company with, but from the point of view of the indispensable extensions

Table No. 2.—Increase or Decrease in Gross Amount of Revenues and Expenses of the Great Western and of the Private Companies.

	Revenues.	Expenses.	Net Earnings.
1906-7—			
Western	+$240,000	+$2,020,000	—$2,140,000
Other companies	+ 700,000	+ 2,020,000	— 640,000
1907-8			
Western	+ 620,000	+ 2,600,000	— 2,840,000
Other companies	+ 320,000	+ 780,000	— 200,000
1908-9—			
Western Nationalized	+ 160,000	+ 1,220,000	— 2,100,000
Other companies	+ 520,000	+ 700,000	+ 340,000
1909-10			
Western Nationalized	+ 940,000	+ 3,040,000	— 4,360,000
Other companies	+ 540,000	+ 680,000	+ 360,000

Table No. 3.—Forecast of the Results of Operation of the Old State Railway System and of the New Nationalized Western System in 1911.

	Revenues.	Expenses.	Net Revenue.
Old state system—			
Original budget	$13,040,000	$10,680,000	$2,360,000
Increases	160,000	920,000	.....
Total	$13,200,000	$11,600,000	$1,600,000
Western Nationalized—			
Original budget	$46,600,000	$34,260,000	$12,540,000
Increases	600,000	6,460,000	....
Total	$47,200,000	$40,720,000	$6,480,000

Table No. 4.—Increases in Expenses from 1908 to 1912 Due to Increased Cost of Labor.

	Old State System.	Western Nationalized.
Expenses in 1908		
Salaries	$4,484,000	$14,444,000
Contributions toward pensions	383,000	1,371,000
Increases due to advanced wages paid those in service at time of nationalization of the Western:		
Salaries	930,000	4,627,000
Pensions	195,000	636,000
Normal increase deductions made for dismissal, retirement, etc.	280,000	1,120,000
Increase due to increase in number of staff	430,000	2,340,000
Total expenses provided for in 1912	6,503,000	24,539,000
Total increase in four years	1,836,000	8,724,000

in the last years, the equipment and the staff, so as to be able to meet future needs. As regards this point, the responsibility is equally divided between the company, who managed the affairs of the railway until 1908, and its adversaries who, by urging incessantly that the company should end, made it really very difficult for it to work with an eye to the future. Above all it was the delay in the vote of the senate which was vexatious. The senatorial commission, which had decided at first to reject the nationalization measure and which would no doubt have obtained the requisite majority at that moment, did not wish to risk the downfall of a minister who raised the question of confidence, and the resulting compromises certainly seriously aggravated the difficulties of the situation.

The day after the vote of the senate we even expressed the opinion that once the public authorities had decided to take the Western Railway out of the hands of the men who managed it, there was nobody able to replace them outside the administration of the state system. Even the men who regretted to see that administration obtain that reward for the part it had taken in the campaign involving such serious risks, saw no other solution, and we continue to think that it would have been difficult to find one which was less bad.

The new management thought in good faith that all that would be necessary would be to introduce its staff and its methods everywhere, and then all difficulties would cease. Instead of carefully studying the organization it took over, before attempting to modify it, instead of listening to the advice of the men who had taken part in developing it, it wanted to change everything at once. It divided all its services in half, without making any room among the new heads for any officers of the old company, who were disregarded and hardly even consulted. It considerably reduced the very necessary authority of the head of each department over his subordinates, by appointing a special staff management which selects the men for difficult work, and gives rewards and punishments. It has introduced a whole organization of promotion and discipline committees which could give good results on a little railway system easy to operate, but which would require serious modification before it could be applied to a much more complicated railway system and to employees upset by a long period of uncertainty with respect to their future. Finally, by a singular contradiction, at the same time when it was making complaints about the tool handed over to it, it imagined that it could do far more with this tool than the men expected who had previously been accustomed to handle it. Trains were multiplied, and the speed of the express trains was materially increased before any time had been spent to ascertain whether the rolling stock, the staff and the permanent way were able to cope with a denser and faster traffic.

For the first few weeks after the state took over the railways it seemed that considerable progress was being made, all employees showing exceptional zeal, as is always the case at the beginning of a new regime. But the honeymoon does not last for ever, and very soon the mistakes we have just mentioned, added to the difficulties of the situation, resulted in a disorder which led to a number of complaints far exceeding those made against the company. Accidents increased in number and several produced real catastrophes. As regards railway men, it is by the frequency of accidents and of irregularities that the operation is judged; but what moves public opinion is the number of the victims, and this is often only the result of a deplorable combination of circumstances. The minister of public works thought it necessary to dismiss the chief officers. In replacing them, he had the happy thought of re-establishing the organization adopted on all large railway systems, namely establishing three great divisions dealing respectively with traffic, permanent way and transportation. Each of these departments has a technical head who has authority to take or to propose all measures relating to the employees, and who consequently can be held responsible both for the faults of his subordinates and for his own.

The new management had the courage to reduce the number and the speed of the trains at once and to strengthen discipline; for some time there was then at least some regularity in the service. But this new honeymoon also came to an end; again complaints multiplied, again there is a disorder which makes itself felt everywhere and which it would be cruel to draw attention to, and again one hears of changes as regards the officials who manage the system.

Whatever steps may be taken, it will not be possible to put an end to the existing difficulties in a day or two. Time is required for making the necessary improvements on trains, tracks and at stations where the work must be carried out without interrupting the service. Time is also required to re-establish cohesion and discipline in a body of employees who are very much upset, at a period when any strong measures in the case of the lower grades are hardly possible. Yet more time is required in order to find, train and advance gradually to the front rank those very rare men who are capable of satisfactorily filling the higher offices of a great service. One has seen, one will perhaps again see private companies whose management was satisfactory neither to the public nor to the shareholders, where the higher officers who were growing old had been unable and unwilling to train up successors to themselves in sufficient numbers to meet all requirements. It has taken boards of management years to repair the mistakes made; they have had to follow, with perseverance, a wise course of conduct, training gradually new department heads. But in such cases one at least had, in order to get over the times of difficulty, traditions guiding the whole of the employees, and it was possible to appeal, in case of necessity, to men coming from outside, to whom were guaranteed positions equivalent to those they left. On the railway system bought by the state, all traditions were upset, and nobody could guarantee to the most eminent chief the time necessary for properly carrying out a long work of reorganization. It would consequently be very difficult to find men skilled in the higher branches of railway work, who would be willing to leave a situation gained by a long period of work, in order to undertake a very difficult and uncertain piece of work, particularly when they would by no means feel certain of being supported with sufficient attention and energy.

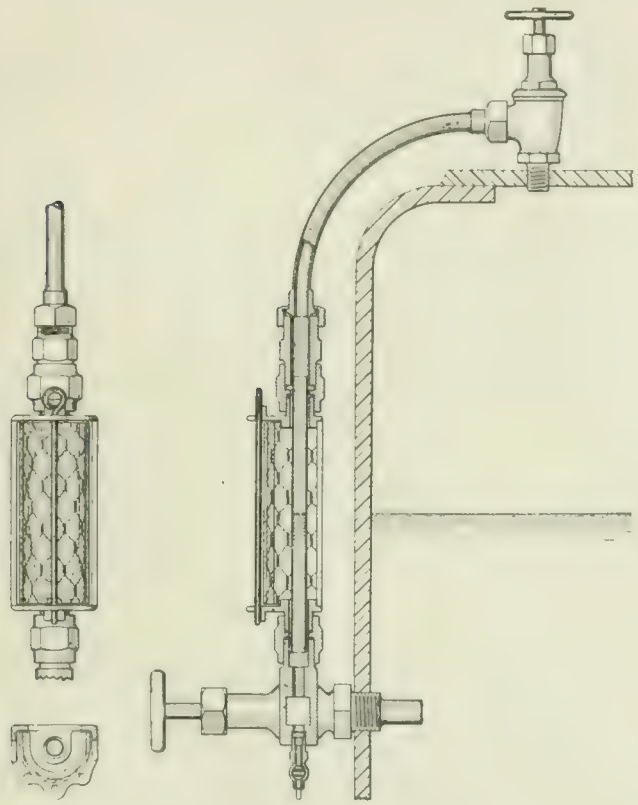
It is true that the finance act of 1911, in reorganizing the state railway system, has given them a railway council which cannot direct them (is not the work of the council), but can control the management, support it when encountering difficulties, correct if necessary any mistakes, and bring that foresight to bear without which all future progress is impossible. But this council is purely a consulting body and has very little authority, and considerable room is given in its composition to elements which will not contribute much towards its strength. The financial organization given to the railway system is satisfactory. It establishes the necessary distinction between capital account and operating expense; it provides means for regulating each year the amount added to the capital, in accordance with its needs. Although it allows certain arrears to be charged to loans, it has at least limited the total amount of this to 75 million francs ($15,000,000). It provides that the capital charges should appear in the accounts, divided as between the part which will be definitely charged to the general budget of the state and that which it is advisable to charge to the special budget of the railway system, provision being of course made for the state to provide for deficits.

Experience will no doubt show that it will be necessary to correct this legislation in certain particulars, especially by giving the council more authority so as to ensure a certain stability in the management of the railway system; but in its essential features it forms a considerable improvement as compared with the preceding regime. Unfortunately laws and regulations are not able to remedy in a day a disorganization due partly to old mistakes, partly to recent errors, finally partly to the difficulties inherent in state operation. We can but repeat the wish we expressed the day after the nationalization, namely, to see at last the success of the administration of the nationalized railway system.

IRONCLAD WATER GLASS PROTECTOR.

The federal rules and instructions relating to the inspection and testing of locomotive boilers require "that every boiler shall be equipped with at least one water glass and three gage cocks. Locomotives not now equipped with water glasses shall have them applied on or before July 1, 1912. All tubular water glasses and lubricator glasses must be equipped with a safe and suitable shield which will prevent the glass from flying in case of breakage, and such shield shall be properly maintained."

These requirements will make it necessary to equip a large number of locomotives with water glasses, as some of the larger



Ironclad Water Glass Protector.

railways have not used them. The other requirement, that the water glasses must be protected, will make a large demand for a safe and suitable shield to prevent glass from flying in case of breakage, as many lines which use water glasses have not used any protector.

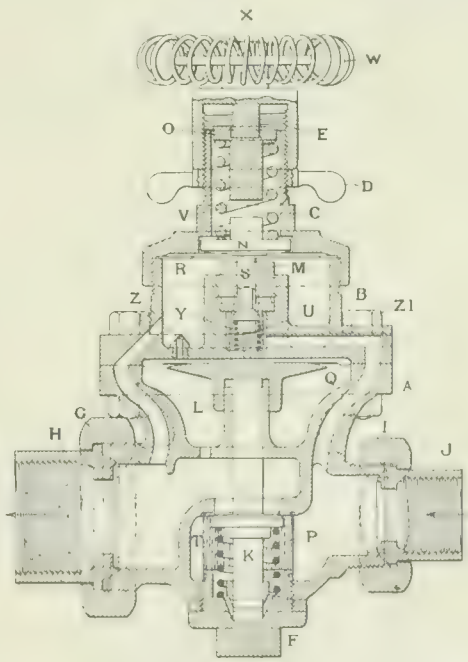
The Sargent Company, Fisher building, Chicago, which has been making safety appliances for various locomotive cab fixtures, recently developed an improved water glass protector, which is named the "Ironclad." It consists of a curved section of wired plate glass entirely surrounding the water glass. This wired glass is imported from Germany and is specially made for the purpose. It is held in position by a malleable iron frame with top and bottom flanges having holes for the outside rod.

These protectors are made to fit any style of water glass cocks now in service, so that it is unnecessary to purchase new equipment in order to comply with the federal rules. With the glass protector the water level is plainly visible from any position in the cab, and the life of the glass water tube is considerably lengthened, as it is protected from drafts of cold air and splashes of water. The wire glass protector has been in successful use over three years on many railways, but recently the "Ironclad" fixture has been designed to combine in one cast member a simple form of holder for the wired glass and a rigid alinement for the water glass stuffing boxes. This device not only protects the enginemen from flying glass when the water glass breaks, but it acts as a shield when shutting the valves. It is not necessary to remove the protector from its frame when the gage glass is removed.

STEAM PRESSURE REGULATOR.

A steam pressure regulator, or reducing valve, which regulates uniformly and practically automatically, has recently been developed by the Gold Car Heating & Lighting Company, New York. It consists essentially of two separate valves having ordinary valve seats, thus doing away with many of the defects found in other pressure regulators with sliding and double seated valves. It has shown up well under a series of severe tests that were made by Arthur M. Waitt, and which consisted of cutting in the cars of a train one after another as the car before showed steam at the drip. In some cases three coaches were thrown in at one time, and with the valve regulated at 30 lbs. no appreciable change could be noticed on the gage.

Another test consisted of allowing the rear valve to be open for fully two minutes, and then all the cars were cut off suddenly by closing the connection between the tender and the first car. Also, the hose connection behind the tender was broken and the steam allowed to flow to the atmosphere at full supply pressure. In both of these cases the gage on the reduced side of the valve did not vary. Another test with the regulator set at 40 lbs. was made by opening the steam line at the end of the train; this did not affect the pressure as indicated by the gage. During these tests the boiler pressure of the locomotive ranged between 200 and 205 lbs. The regulator is shown below. It takes steam on the right hand side; it passes upward through a passage to the controlling valve and fills an annular opening surrounding this valve. The pressure is regulated by the handle *W*, which when turned compresses the spring *V*. This spring bears on the seat *N*, which rests on the diaphragm *R*. The stem *S* of the controlling valve bears on the underside of this diaphragm and is



Gold Pressure Regulator.

controlled by it. When the train line pressure is below the predetermined value the controlling valve will be forced down, allowing steam to pass up by it and down through the passage shown by dotted lines, to the top of the diaphragm *Q*. This pressure will force the main valve *K* open, allowing the steam to pass through the valve. When the predetermined pressure is reached, which acts under the diaphragm *R*, the top diaphragm plate *N* will be raised, compressing the spring *V* and relieving the pressure from the controlling valve, allowing it to be closed by the spring *U*. The reduced pressure also acts under the diaphragm *Q*, and when the controlling valve has been closed it will allow the main valve to be closed by its spring *T*. A small leakage plug *Z* takes care of any leakage by the controlling valve. The valve seats are protected by the strainers *Y* and *P*.

General News Section.

The Wabash and the Mobile & Ohio were fined $100 each in the district court at St. Louis on May 25 for violation of the federal laws regulating the transportation of cattle.

The Brotherhood of Locomotive Engineers in session at Harrisburg, Pa., has elected three assistant grand engineers: L. L. Griffing, Long Island, N. Y.; F. A. Burgess, Louisville; Ash Kennedy, Winnipeg.

Mechanical department employees of the railways west of Chicago are taking a vote on the question of striking on June 1 in sympathy with the shop men who struck last fall on the Illinois Central and the Harriman lines.

Cable despatches from Paris, May 19, report a collision on the Northern of France a short distance out of the city in which 13 persons were killed and 45 injured. Two passenger trains came together by reason of a defective switch.

Carl R. Gray, who has resigned as president of the Spokane, Portland & Seattle to become president of the Great Northern, and his successor, J. H. Young, who has been vice-president of the Copper River & Northwestern, were the guests of honor at a dinner tendered by the Commercial Club of Portland, Ore., on May 20.

The railway commissioners of Canada have notified the Canadian Northern and the Midland & Great Northern that they must not lease trackage rights to railways of this country to run their trains in Canada except on condition that the men in charge of such trains shall be Canadians. A fine of $100 a day would be the penalty for running trains with American crews.

Winfield A. Huppuch, vice-president and general manager of the Standard Wall Paper Company, announces his intention of resigning his place as a member of the New York State Public Service Commission, Second district. He has been vindicated by a jury in the Federal Court on charges of violating the anti-trust law and so says that no reason longer remains for delaying the resignation.

The Mississippi State Railway Commission has ordered an inquiry into reports that the Yazoo & Mississippi Valley has been sold to the Illinois Central, and that the New Orleans, Mobile & Chicago has been sold to the St. Louis & San Francisco. Such a merging of competing roads would be contrary to the law of the state, and if the reports are true the commission intends to prosecute offenders.

The Chicago Great Western has announced a "get-together" meeting to be held under the auspices of the roundhousemen, shopmen, track and bridgemen at Oelween, Ia., on June 8. Employees of other departments are invited and any officers who may be present will be expected to take back seats and consider themselves, for the evening, as employees, and not as officials. Mrs. H. J. Slifer, wife of the general manager, will give a lecture on "A Trip Across the Isthmus of Panama," illustrated by about 200 stereopticon pictures.

The proposal of the Secretary of the Interior to utilize equipment now in use on the Isthmus of Panama in building a railway in Alaska has taken the shape of a bill prepared by Secretary Fisher and introduced in the House of Representatives last week by Congressman Sulzer of New York. The bill provides for a commission of seven members to be appointed by the President, and carries an appropriation of $100,000 for its expenses; and the line of the proposed railway as well as regulations for mining coal on the government lands are set forth in considerable detail.

The United States Steel Corporation, with the purpose of promoting every kind of safety device for the benefit of its workmen, now gives out (to visitors of sufficient importance) cigars, bearing bands reading "Boost For Safety." When the smoker reaches for a match and strikes it he is confronted with a line reading "Safety, Quality, Cost, Tonnage," Gold buttons are given to employees who show originality in suggesting new devices for protecting the workmen, these buttons also reading "Boost for Safety." The number of serious and fatal accidents occurring in the plants of the Steel Corporation has decreased every year since 1906.

The suit of the government against the Southern Pacific to recover California oil lands, which was announced in Los Angeles last week, was begun back in 1910. Attorney General Wickersham says that the suit has brought out "sensational and startling disclosures of a remarkable picture of criminal conspiracy among high officials of the Southern Pacific Company to acquire from the United States under an agricultural grant oil lands valued at $15,000,000." The suit is to set aside patents and revest in the government title to 6,000 acres of land in Kern county. The lands are within the indemnity limits of the grant of July 27, 1866, to the Southern Pacific Railroad Company, in aid of the construction of the road.

The New York State Workmen's Compensation Committee (labor leaders) has issued a statement urging the passage by the National House of Representatives of the Workmen's Compensation bill, now pending before the Judiciary Commitee. The bill known as S. 5,382, has been passed by the Senate by a decisive majority, but there is danger of delay in the House, which may carry it over for consideration until the next session. Such delay might seriously jeopardize its passage for the reason that conditions may be changed after the national election. While the bill applies only to railway employees, the committee sets forth that it is to the advantage of every working man in the country to have it enacted into law because such Federal legislation would influence the states to pass laws for the benefit of other industries over which the United States Congress has not jurisdiction.

President E. P. Ripley, of the Atchison, Topeka & Santa Fe, interviewed in Chicago last week, on his return from Pasadena, Cal., spoke optimistically of the crop prospects in the West and Southwest. He also said that the Panama canal would operate to the disadvantage of the Middle West by decreasing the rates from the Atlantic coast and giving that section an advantage over the Middle West. "I see no reason," he said, "why canal tolls should be free for coastwise steamships or any others. It will cost $4,000,000 to $6,000,000 to operate the canal and if tolls are not charged the cost will fall on the country at large in the form of taxes." Asked what he thought of the recent suggestion of President Winchell of the Frisco lines that the government should purchase a large interest in railway securities, he replied: "Why not let the government take over the railways entirely? It might be a good thing for the stockholders; but not for the Republic."

The Pennsylvania Railroad reports that 2,040 of its active employees have been in the service of the road for 40 years or more; and 1,572 who had served that length of time, or longer, are now receiving pensions. Of the men now on the pay rolls, including both active employees and pensioners, 489 began their service more than 50 years ago; and one of these, Charles A. Jefferies, of Lancaster, has been on the rolls since July, 1846. He began on the Columbia & Philadelphia as a fireman; was made engineman in 1849 and in 1883 became a signal repairman. Andrew Abels, a retired clerk, now living in Philadelphia, is 95 years old, and there are seven other pensioners who are over 90. Of the 178 officers of the Pennsylvania, whose biographies are officially recorded, 171 have been with the company throughout their business life; and 84 out of the 178 received a college education. The seven officers who were not brought up on the road are men who were employed because of special training of a kind which could not have been acquired in the service of the road.

Conductors, brakemen and firemen of the Pennsylvania Railroad running on the electric trains between Newark and New York have complained to the general manager because some of these trains are manned by employees of the Hudson & Manhattan; but the general manager replies in substance that the company cannot and will not relinquish its right to enter into a joint arrangement with the other road. These trains run over the Pennsylvania for about six miles, but for a short distance at the New York terminus (Cortlandt Street) as well as for a short

distance at the Newark terminus (Park Place) the tracks of the H. & M. are used. General Manager Long, in a letter to the committee representing the employees, reminds them that for the company to bind itself not to run trains jointly with the other road, would probably result to the dissatisfaction and disadvantage of the men. It would tend to encourage the other road to build a competing line. The present arrangement, which avoids destructive competition, tends to assure improved service and thus is for the benefit of the public. No employee of the Pennsylvania was dismissed because of the inauguration of the joint service. Mr. Long also reminds the committee that the Pennsylvania has always taken special care to safeguard its employees and that in the event of the further introduction of electric power, the employees affected would be carefully looked after.

"Office Cars" on the Illinois Central.

The Illinois Central has changed the inscription "private," which has heretofore appeared on the doors of cars used by officers in traveling over the road, to "office car." In announcing the change President Markham said that the word "private" was a misnomer so far as it indicated the purpose for which the cars are employed. He said:

"The cars on the Illinois Central used by the officers are not in the slightest sense the sanctuary which the word 'private' implies. They are 'office cars' pure and simple, and used for the same purpose as the offices in the general headquarters at Chicago—to transact business with the public and our employees. The cars in question are in reality offices set on wheels, where the business of the company in its internal relations, as well as with the public, is conducted in practically as great volume and with as much regularity as in the home offices of the respective officials who are assigned the cars. On this account, the words 'office car' will convey the true purpose for which the cars are constructed, and not set up the idea in the mind of anyone the impression that the cars are used exclusively for the private advantage of the individuals occupying them. We thus hope to banish any feeling of timidity which may exist in the mind of an individual having business with our officers on entering these cars."

The Linguists of the Passenger Department.

We anxiously await the first crop of railway summer-books in order that we may get an idea of how the Mother Tongue has expanded in the past year. It will also be heartening to hear of the number of Jersey lake resorts that have lined up with that portion of the map in which "mosquitoes and malaria are absolutely unknown."—*Railroad Men.*

A Kansas Opinion.

Travel is a great educator, including in its curriculum the knowledge that a dining car is no place to look for bargains.—*Atchison Globe.*

"Children" of 16, Half Fare.

Mr. Steiger, speaking at the celebration of the 17th anniversary of one of his dry goods stores, declared that his success in the dry goods business is in no small measure due to the training received from D. L. Gillett, of Westfield, with whom Mr. Steiger was first employed. At 16 Mr. Steiger was a buyer for Mr. Gillett, and made over 50 trips to Boston to buy goods when he could still use a half-fare ticket. The confidence placed in him by his employer increased Mr. Steiger's self-confidence and ability, and was among the foundation stones of his later success. . . . —*Springfield Republican.*

British Railway Accidents.

The report of the British Board of Trade for the year ending December 31 last shows 14 passengers, 5 employees and no other persons killed in train accidents, and 468 passengers, 115 employees and 8 other persons injured. The number of passengers killed is 9 less than in the preceding year, and of injured 643 less. Of the 14 passengers killed during the past year eleven were the victims of a single rear collision, at Pontypridd, on the Taff Vale Railway, January 23, when a passenger train ran into a standing freight, because of a failure of block working. Accidents of other kinds happening in connection with the movement of trains or cars, added to the foregoing, bring the totals up to 1,070 persons killed and 8,345 injured. This includes 84 persons killed at highway grade crossings and 462 trespassers killed. Under the head of trespassers there are included 215 killed and 21 injured who are classed as suicides.

Casualties unconnected with the movement of vehicles are not shown in the principal table, but appear in a footnote. Adding these to the totals of the table we have 1,159 persons killed and 32,258 injured, as compared with 1,121 killed and 30,110 injured in 1910.

President Ripley on Texas Law.

E. P. Ripley, president of the Santa Fe system, appeared before the Texas Welfare Commission at Ft. Worth, Tex., on May 21, advocating the repeal of the state stock and bond law as the first step in the betterment of Texas railway conditions. He especially urged a modification of that provision of the law that provides that no bonds shall be issued in advance of construction. He did not object to a rigid accounting to the state of the proceeds of bond issues, but contended that it was an actual compliance with the spirit of the law if the money so raised was spent on the property. In his opinion it would be better for the people of the state if all the railway lines were consolidated in management with the main systems.

Association of Railway Claim Agents.

At the twenty-third annual convention of the Association of Railway Claim Agents, held at Los Angeles, Cal., last week, officers were elected at follows: President, H. J. Franklin, claim agent of the Gulf, Colorado & Santa Fe, Los Angeles; vice-presidents, F. A. Hruska, of the New York Central Lines, Cleveland, S. H. Patterson, of the Pennsylvania Lines, Pittsburgh, and D. H. Kimball, of the Great Northern, St. Paul; secretary and treasurer, J. Roger McSherry, of the Chicago & Eastern Illinois, Chicago.

National Railway Mail Association.

This association held its annual meeting at New Orleans, May 23-25. The president for the ensuing year is Peter I. Schardt, Milwaukee; secretary, George A. Wood, Portsmouth, N. H.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRANE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomaston, Boston, Mass.

AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York; next convention, September 12, Seattle, Wash.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Detroit, Mich.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York. Convention, October 7-11, Chicago.

AMERICAN ELECTRICAL RAILWAY MANUFACTURERS' ASSOC.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, Monadnock Block, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOC.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—M. H. Bray, N. Y. N. H. & H., New Haven, Conn. Convention, July 9, Chicago.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago. Semi-annual, June 11, Atlantic City, N. J.; annual, October 21-25, Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York. Convention, June 25-26, Bluff Point, N. Y.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

Master Car and Locomotive Painters' Assoc. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass. Convention, September 10-13, Denver, Col.

National Railway Appliances Assoc.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railroad Club.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Business Association.—Frank W. Noxon, 2 Rector St., New York.

Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

Railway Gardening Association.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.

Railway Industrial Association.—G. L. Stewart, St. L., S. W. Ry., St. Louis, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio.

Railway Supply Manufacturers' Assoc.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

Railway Tel. & Tel. Appliance Assoc.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling, Ill. September 10-13, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

Society of Railway Financial Officers.—C. Niquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; annual, Aug. 27-30, Chicago.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The National Industrial Traffic League has issued a circular to members requesting them to telegraph or write to their representatives in Congress urging the adoption of the Pomerene substitute bill of lading bill.

For the first time in the history of the Memorial Day celebration at the National Cemetery, at Chalmette, La., near New Orleans, special trains were this year run to the cemetery. The Frisco ran trains hourly, beginning at noon.

At a recent meeting of the Central Passenger Association the Grand Trunk and Pere Marquette served notice that they will continue to make week-end and Sunday excursion rates this year. The Nickel Plate is considering doing so, but the other lines in the association will not.

A pocket-size pamphlet of 20 pages, entitled Corn Culture, to be distributed free by the freight department, is the latest agricultural venture of the Pennsylvania. The essay is fitted particularly to the state of Pennsylvania, and was prepared by the professors of the department of agricultural extension of the Pennsylvania State College. The farmers are told that on their lands the profit from an acre of corn is greater than in the western states, where corn is the principal crop.

The charging of storage on freight in freight houses is coming to be done in a more businesslike manner than formerly. The Intermountain Demurrage Bureau, headquarters at Salt Lake City, reports for the month of April that on the 20 roads within its territory storage was charged on 49,923 tons of freight, the amount collected being $976.77. This is equal to nearly one-seventh of the demurrage charges on cars of bulk freight assessed during that month ($7,423). The expenses entered as chargeable to the storage department aggregated $247.41. This leaves the net earnings $688.60, sums aggregating $40.76 having been refunded.

Relations Between Railways and Waterways.

The twelfth International Navigation Congress, which was in session in Philadelphia last week, has been mainly occupied with ocean navigation and details of the construction and operation of inland waterways rather than economic questions concerning the latter. At one business session, however, a resolution was adopted declaring that it was necessary that the public own and operate all wharves, docks, warehouses, and other facilities for handling freight for public use. The resolution set forth that the government should have some control in facilitating, combining, and harmonizing the transfer of freight between railways and waterways. The conclusion of the resolution was as follows:

"The co-operation of private railways with waterways should be secured by the effective regulation of railway services by national, state, and local governments. The legislative and administrative requirements of the several public authorities should so supplement each other as to make a unified transportation system of the railways and waterways in each country."

Freight Car Balance and Performance.

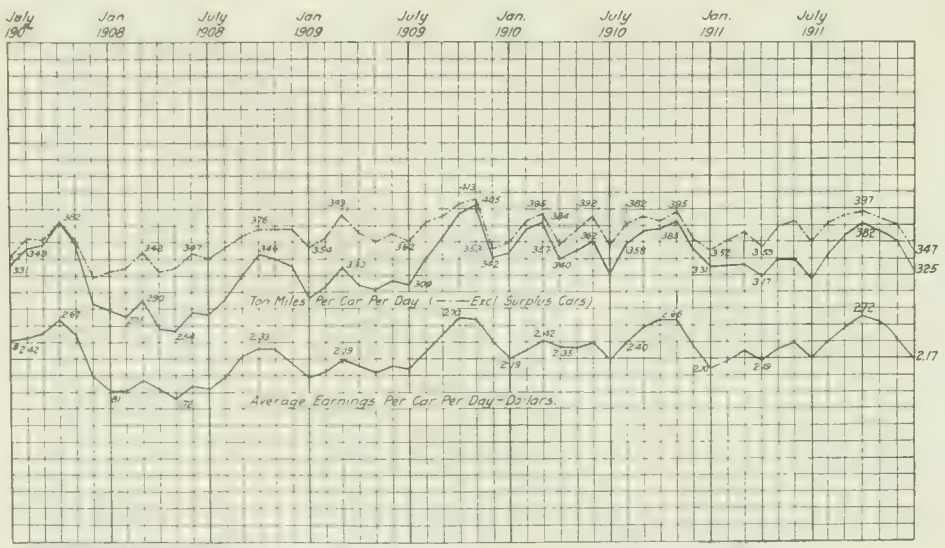
Arthur Hale, chairman of the committee on relations between railways of the American Railway Association, in presenting statistical bulletin No. 120, covering car balance and performance for January, 1912, says:

"So far as general results are concerned there was no marked difference in the performance for this month as compared with an average January performance. While the general homeward movement of cars increased the proportion of cars on home lines from 56 per cent. in December to 58 per cent. in January, the percentage of cars on home lines was the same as a year ago, and it will be noted that the per cent. of loaded mileage increased from 68.0 in December to 69.2 in January, compared with 67.2 in January, 1911.

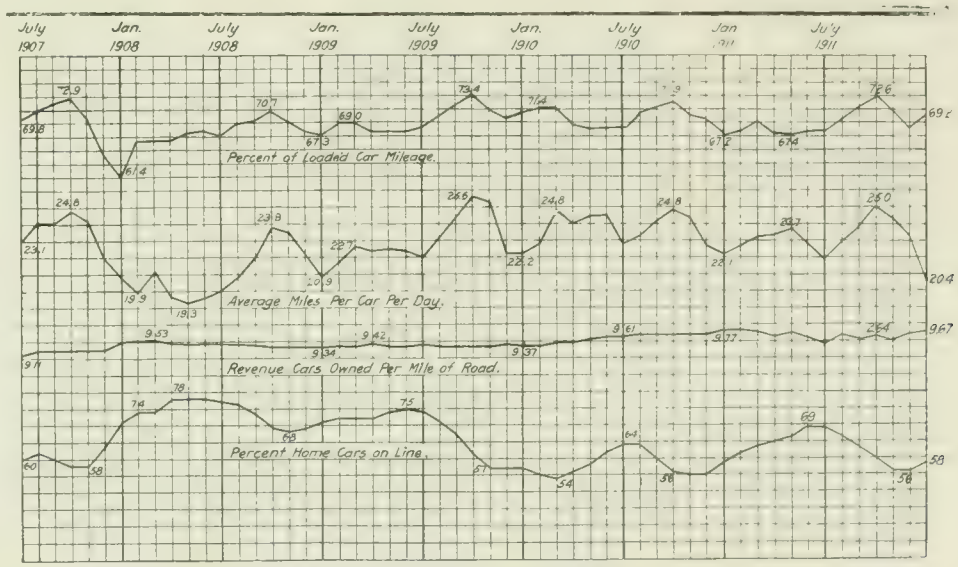
"The average miles per car per day decreased from 23.4 in December to 20.4 in January, compared with 22.1 in January, 1911. The ton miles per loaded car increased slightly over December (0.3), but there was a marked decrease in the average ton miles per car per day for all cars from 361 in December to 325 in January, as well as in the average miles per car per day,

Freight Car Balance and Performance in January, 1912.

	New England.	N. Y., N. J., Del., Md., Eastern Pa.	Ohio, Ind., Mich., Western Pa.	Va., W. Va., No. and So. Carolina.	Ky., Tenn., Miss., Ala., Ga., Fla.	Iowa, Ill., Wis., Minn.	Mont., Wyo., Neb., Dakotas.	Kan., Colo., Okla., Mo., Ark.	Texas, La., New Mex.	Ore., Idaho, Nev., Cal., Ariz.	Canadian Lines.	Grand Total.
Revenue freight cars owned	84,618	580,074	214,465	186,227	172,336	397,022	17,737	136,923	27,410	143,490	111,033	1,991,335
Average number of system cars on line	46,619	297,922	117,164	108,889	95,057	244,003	5,683	72,709	21,825	69,151	75,689	1,154,711
Railway-owned cars: Average foreign on line	41,428	165,000	96,796	63,112	74,323	131,319	13,826	57,386	29,952	56,533	44,567	774,242
Total Railway-owned cars on line	88,047	462,922	213,960	172,001	169,380	375,322	19,509	130,095	51,777	125,684	120,256	1,928,953
Excess	3,429	37,152	505	14,226	2,956	21,700	1,722	6,828	24,367	17,806	9,223	62,382
Per cent. of cars on line to total owned:												
Home	55	60	55	58	55	61	32	53	80	44	68	58
Foreign	49	33	45	34	43	34	78	38	109	38	40	39
All railways	104	93	100	92	98	95	110	91	189	82	108	97
Private cars on line	3,616	31,824	11,749	4,856	7,388	15,165	1,523	7,129	3,821	12,091	2,917	102,079
Total, all cars on line	91,663	494,746	225,709	176,857	176,768	390,487	21,032	137,224	55,598	137,775	123,173	2,031,032
Per cent. of cars in shop	6.83	5.75	6.42	6.47	7.38	6.58	4.96	8.25	4.54	4.58	5.66	6.37
No. of freight engines owned	1,428	10,427	3,049	3,145	2,767	6,417	525	2,709	732	2,693	2,146	36,038
Average cars on line per freight engine owned	70	63	74	56	64	61	40	51	76	47	57	56
Total freight-car mileage	49,085,404	467,988,494	126,130,240	123,353,547	108,030,786	230,844,735	20,433,679	84,455,793	36,664,433	110,069,783	75,590,812	1,432,647,706
Average miles per car per day	14.9	20.8	18.0	22.5	19.7	19.1	31.3	19.9	21.3	25.8	20.8	20.4
Per cent. loaded mileage	72.0	65.8	70.8	65.1	71.2	71.9	76.0	70.0	64.9	70.4	79.1	69.2
Ton-miles of freight, including company freight	569,803,241	7,955,429,436	2,198,765,837	1,906,545,021	1,531,119,097	2,757,135,818	351,299,473	1,211,203,230	356,223,892	1,570,858,047	1,277,597,027	21,685,980,119
Average ton-miles, including company freight:												
Per car-mile	11.6	17.0	17.8	15.5	14.3	14.9	17.7	14.3	11.7	14.5	16.1	15.7
Per loaded car-mile	16.1	25.8	25.1	23.7	20.1	21.1	23.2	20.7	17.8	20.6	20.3	22.8
Per car per day	184	368	321	349	283	290	566	299	248	372	335	325
Gross freight earnings	$6,191,119	$45,169,066	$11,613,004	$11,276,510	$10,904,522	$23,522,267	$2,183,645	$10,303,470	$3,852,200	$15,453,771	$7,809,581	$148,219,155
Average daily earnings: Per car owned	$2.12	$2.04	$1.75	$1.95	$2.04	$1.91	$3.97	$2.34	$4.53	$3.10	$2.27	$2.21
Per railway car on line	2.09	2.32	1.75	2.11	2.08	2.02	3.61	2.55	2.40	3.97	2.09	2.29
All cars on line	2.00	2.17	1.66	2.06	1.99	1.94	3.35	2.42	2.24	3.62	2.05	2.17



Car Earnings and Mileage, 1907 to 1912.



Car Performance, 1907 to 1912.

which is undoubtedly attributable to the unusually severe weather during the entire month of January. The average for this month was 6 to 9 miles per car less than it was in January, 1911.

"There was a decrease in the average earnings per car per day, the decrease being from $2.39 in December to $2.17 in January, and compared with January, 1911, an increase of 0.07 per car per day is shown."

The accompanying table gives car balance and performance in the month covered by the report, and the two diagrams show car earnings and car mileage and certain car performance figures monthly from July, 1907.

Variations in Stenciled Tare Weights.

In our issue of May 10, page 1064, was published a statement recently submitted to the Interstate Commerce Commission by A. S. Dodge, superintendent of the Western Railway Weighing Association and Inspection Bureau, showing that, of cars weighed by the association weighmasters during the year 1911 for the purpose of showing variations between the stenciled and actual tare weights, 73 per cent. had a stenciled tare exceeding the actual weight and therefore operated "to the advantage of the shippers." As the statement has been misconstrued in some quarters it should be stated that the term "shippers" was used in a broad sense in contradistinction to the carriers, and was not intended to signify that the benefit necessarily accrued to the consignor any more than to the consignee.

Agricultural Possibilities of the Canal Zone.

This is the subject of report No. 95 issued in pamphlet form by the Department of Agriculture, the work being the results of studies by H. H. Bennett and William A. Taylor. The conclusions are not very encouraging. Large farming operations are impracticable at Panama on account of the broken topography. Small farms, intelligently managed, would be possible. Crop rotation and scientific management would be absolutely necessary. Choice pineapples, mangos, and other tropical fruits and vegetables could be cultivated, the most hopeful prospect being to raise products which could be shipped to the United States at times when good prices could be secured. Corn, sugar cane, bananas and upland rice, also, cocoa, coffee and rubber are things for which the soil is probably well adapted. Government lands probably will be leased at $1.21 per acre per annum. Northern types of vegetables and other things could be adjusted to tropical conditions by selection and breeding. This would take a long time, but as the operation of the canal will call northern people to that region, there will be need of fruits and vegetables for such people to eat, as they will not be easily reconciled to tropical vegetable products.

Fifty-eight Dining Cars.

The Pennsylvania Railroad superintendent of dining-cars and restaurants has his office in the new station in New York City. Under his supervision there are 48 steel dining-cars, ten wooden cars and six station restaurants. The normal force of employees working under his direction is about 1,120. Last year there were 1,130,000 meals served in the dining-cars on this road (east of Pittsburgh), and 1,993,000 in the restaurants; a total of 3,123,000 meals, every one of which had to be duly recorded and checked against the amount of supplies given out and the cash receipts in the office of the superintendent.

The new Sunnyside yard on Long Island has the largest and best equipped dining-car plant in the world. In it is kept everything from a toothpick to the carcass of beef. A list of supplies issued one day recently to conductors by the storekeeper included 209 varieties of foods, drinks, cigars, cigarettes and miscellaneous articles, such as linen, cooking utensils, silverware and crockery.

When a car is put into service it is fitted with a standard equipment costing about $2,000. The steward is the captain of the dining-car crew, which consists of nine men besides himself, four cooks and five waiters. All the cooks and waiters employed by the Pennsylvania are colored, and the waiters are assigned to crews according to size and shade; the short mulattoes on one car and the tall blacks on another. When the meal begins, and they line up by their tables they present an even rank.—*Railroad Man's Magazine.*

INTERSTATE COMMERCE COMMISSION.

The commission has further suspended to December 1, 1912, the Toledo, St. Louis & Western's tariff, which contains advances in rates on soft coal from Illinois mines to stations on the St. Louis & Hannibal.

Reparation Awarded.

Atlantic Refining Co. v. Baltimore & Ohio et al. Opinion by the commission.

The rate of 15 cents per 100 lbs. on petroleum, C. L., from Philadelphia, Pa., to Utica, N. Y., reduced to 13½ cents per 100 lbs. (23 I. C. C., 492.)

R. R. Black v. Great Northern. Opinion by the commisison:

In this case the commission found that the rate of 46 cents per 100 lbs. charged the complainant for the transportation of bulk corn in carloads from Sioux City, Ia., to Hinsdale, Mont., was unjust to the extent that it exceeded 38 cents, and ordered that the latter rate be established in future. (23 I. C. C., 402.)

Henry E. Meeker v. Lehigh Valley. Opinion by Commissioner McChord.

In this case, the complainant sought reparation for shipments of coal from the Wyoming coal region in Pennsylvania to Perth Amboy, N. J., on which it was charged rates which were found unreasonable in *Meeker v. Lehigh Valley*, 21 *I. C. C.*, 129. (23 I. C. C., 480.)

Frank Simpson Fruit Company v. Wells Fargo & Company. Opinion by the commission:

On a shipment of 400 cases of eggs, each case containing 30 doz. eggs, the complainant was charged at the rate of $3 per 100 lbs., applied to a total weight reached by estimating the weight of each case at 55 lbs. The complainant argues that each of the cases weighed 53 lbs., and that it should have been charged accordingly. The commission decided that the estimated weight of 55 lbs. for a case containing 30 doz. eggs was excessive, and that the tariff of the defendant should be changed to make the estimated weight 53 lbs. (23 I. C. C., 412.)

Complaint Dismissed.

Reno Grocery Co. v. Southern Pacific. Opinion by Commissioner Lane:

The joint rate under which this shipment moved not having been attacked, and the proper parties defendant not having been joined, the complaint must be dismissed. (23 I. C. C., 400.)

New Orleans Board of Trade v. Louisville & Nashville et al. Opinion by Commissioner Clements:

The rate on pig iron from Birmingham, Ala., to New Orleans, La., is not found to be unreasonable or discriminatory. (23 I. C. C., 429.)

C. M. McClung & Co. et al v. Louisville & Nashville et al. Opinion by the commission:

The rate on carload shipments of sheet-iron roofing from Newport, Ky., and Cincinnati, Ohio, to Knoxville, Tenn., is not unreasonable or discriminatory. (27 I. C. C., 414.)

Blodgett Milling Co. v. Chicago, Milwaukee & St. Paul et al. Opinion by Commissioner Meyer:

While the commission will refuse to permit discrimination through the use of transit privileges, it finds that the difference between the transportation of grain products from Minneapolis and St. Paul to the Pacific coast is so unlike the transportation conditions from Janesville, Wis., that the railways are warranted in affording milling and transit rates at Minneapolis and St. Paul that they do not give at Janesville. (23 I. C. C., 449.)

Alfred Jouannet v. Atlantic Coast Line et al. Opinion by Commisisoner Harlan:

In this case the complainant alleges that the rate of $0.45 per crate, holding 1½ bushels of vegetables, from Charleston, S. C., to New York was excessive. While this case was pending, the defendants withdrew the any-quantity rates and substituted a carload rate of $0.42 per 100 lbs., and a less-than-carload rate of $0.46 per 100 lbs. The commission held that these latter rates were not unreasonable. The complaint was dismissed. (23 I. C. C., 392.)

Definition of Granulated Cork.

Fred W. Wolf Co. v. Mallory Steamship Co. et al. Opinion by the commission:

A shipment of cork for use in an ice making plant was charged the rate for cork shavings. Granulated cork is the by-product after punching out cork from the bark and weighs about 100 lbs. to a three-bushel bag, while a three-bushel bag of cork shavings weighs only about 35 to 40 lbs. The shipment in question was granulated cork, taking the first-class rate, as against the double first-class rate applicable on cork shavings. (23 I. C. C., 490.)

Special Rate on Second Hand Articles Refused.

Minneapolis Traffic Association et al v. Chicago & North Western et al. Opinion by Commissioner Clements:

Complainants in the present proceedings asked an order re-establishing half rates on returned shipments damaged in transit, and also on returned articles, simply because they are returned articles and are shopworn or out of repair. The commission adheres to its ruling *in re rates on returned shipments* 19 *I. C. C.*, 409. The difficulty of determining the value of returned articles, and how much they have depreciated in value, is very great. Moreover, the commission is not prepared to lay down the principle that old or second hand articles must be treated differently from new, or that the value of the article is the controlling element in making rates. The complaint therefore is dismissed. (23 I. C. C. 432.)

Import Rates from Philadelphia.

Joseph E. Thropp v. Pennsylvania Railroad et al. Opinion by Commissioner McChord:

A rate of $1.45 per gross ton on ore from Buffalo, N. Y., to Mount Dallas, Pa., and Saxton, not found to have been unreasonable or unjustly discriminatory. Much of complainant's disadvantages appears to be due to the adjustment of import rates from Philadelphia, which rates the complaint failed to attack. The case held open to permit a readjustment of rates or the filing of an amended petition. (23 I. C. C., 497.)

Commission Very Much Modifies Its Findings in Proctor & Gamble Case.

Fels & Co. v. Pennsylvania Railroad et al. Opinion by Commissioner Lane:

The complaint is against eight companies, and asks for reparation on L. C. L. shipments of soap from Philadelphia to official classification territory points. The complainant relies on the sweeping decision in Proctor & Gamble v. Cincinnati, Hamilton & Dayton, 9 I. C. C., 440. The two points to be decided are, first, whether the findings of the commisison in the Proctor & Gamble case may be considered as making the fourth-class rate a criterion of reasonableness on L. C. L. shipments of soap, by which any or all railways in official classification territory should have been guided after April 10, 1903; secondly, if the first question is decided in the affirmative, has the claim been barred by the statute of limitations. At the time the Proctor & Gamble case was decided the commission had no authority to prescribe rates for the future. It is, perhaps, not surprising that the complainant has been misled by the sweeping character of the findings in Proctor & Gamble. In stating its conclusion in that case the commission said that "the chief question here is as to the justice of the change in the classification of soap, not only as regards Proctor & Gamble, but as affecting all soap shippers in this classification territory."

It is very clear, however, that the commission in that case had no warrant for announcing such broad findings. While the opinion in the Proctor & Gamble case purports to make findings of fact as to the application of rule 26 by all railways in official classification territory, its findings as a basis for the awarding of damages can be applied only to the extent of the particular railways which were in that case before the commission. Therefore, the Baltimore & Ohio is the only one of eight roads against which the present complaint can be considered.

While the original complaint was not well drawn, it was sufficient to state a good cause of action, and therefore stop the running of the statute of limitation. Reparation against the Baltimore & Ohio, based on rule 26, is awarded.

Commissioner Clark dissenting:

I am not able to agree with the majority report for the reason that it proposes reparation on the basis of fourth-class rates, which is not now, and has not been since January 1, 1900, the lawful classification of such shipments. I feel that the maximum amount of reparation that can properly be awarded is measured by the difference between the rates which it did pay and the rates which it would have paid under the present rule 28. (23 I. C. C., 483.)

Galveston Wharf Co. Losses.

In re wharfage charges of the Galveston Wharf Company. Opinion by Commissioner Harlan:

The order suspending a tariff of the Galveston Wharf Company increasing its charges on traffic moving over its piers made permanent, and the petition of the Texas City Terminal Company for increased divisions denied. The trunk line carriers ordered to correct discriminations in the allowances made out of the rate to the two companies.

A commission of 1½ cents a bale paid by the terminal line to a broker for routing cotton for export through the port of Texas City is an unlawful concession from the rate. A subsidy paid to certain ocean carriers to enable them to offer shippers a lower ocean rate from Texas City than from Galveston operates as a rebate and is unlawful.

Free wharfage is a legitimate means of making a port attractive to ocean lines, and the Texas City interests in pursuing that policy will be protected against any coercion by the carriers. (23 I. C. C., 535.)

Withdrawal of Proportional Rates Upheld.

Wisconsin State Millers' Association v. Chicago, Milwaukee & St. Paul et al. Opinion by Commissioner Harlan:

The withdrawal of proportional rates on grain and grain products from Kansas City, Omaha and Council Bluffs to certain milling points in central and eastern Wisconsin leaving local rates only in effect held not to result in any unlawful discrimination in favor of Chicago and Milwaukee millers. (23 I. C. C., 494.)

Slightly Advanced Milk Rate Approved.

In re suspension of an advance in the rate by the Delaware & Hudson for milk. Opinion by Commissioner Clements:

Proposed advanced rate from Poultney, Vt., Rupert and West Pawlett, and Cambridge, N. Y., Granville, Middle Granville, Salem and Shushan, to Eagle Bridge, N. Y., on milk in carloads destined to Boston, Mass., found to be unreasonable to the extent it exceeds the rate prescribed herein, which permits a slight advance in the present rate. (23 I. C. C., 500.)

Grievances Adjusted Through Lease.

Gay Coal & Coke Co. et al. v. Chesapeake & Ohio et al. Opinion by Commissioner Clements:

The complainants in this case have claimed that certain charges and arrangements which the Chesapeake & Ohio had made with them in regard to switching coal cars were improper. Since the filing of the case, however, the Chesapeake & Ohio has executed a lease to the satisfaction of the Island Creek Railroad and has taken over the operation of that road, and the commission is informed that the execution of this lease will remove all causes of complaint. The case is therefore dismissed without prejudice. (23 I. C. C., 471.)

Discrimination in Export Rates.

New Orleans Board of Trade, Ltd., v. Illinois Central et al. Opinion by Commissioner McChord:

The rate on transportation of unmanufactured tobacco from Henderson, Ky., and Owensboro to New Orleans for export is lower when destined to Liverpool, England, and Bristol than when destined to other European points. The defendants claim that this adjustment of rates is to meet competition through Atlantic seaboard points, and that conditions surrounding the transportation of tobacco to European ports as contrasted with Liverpool and Bristol are so similar as to warrant the existing dif-

ference in export rates. The difference in conditions is beyond the export point. The right claimed by the defendant would afford unlimited opportunity to discriminate between shippers of tobacco in the United States. If one grower of tobacco sends his traffic to London, and another to Bristol, and the railway desires to favor the latter, all that would be necessary would be for it to publish a 15-cent rate on the traffic destined to Bristol, and a 20-cent rate on the traffic destined to London. While it has been decided that a lower rate may be granted on export traffic than on traffic destined only to the seaboard, it has not been decided that a difference may be made as between different export rates, because of different final destinations, and in this case we cannot find a substantial enough dissimilarity between the conditions applying on traffic destined to Liverpool and Bristol, and to other points to warrant the discrimination complained of. No reparation is at present awarded, but further testimony may be introduced. (23 I. C. C., 465.)

STATE COMMISSIONS.

The New York Public Service Commission, Second District, has ordered the New York, Ontario & Western to reduce from 50 cents a ton to 40 cents its rate on ice in carloads from Mechanicstown to Middletown; but if the complainants do not ship at least 24 carloads during the coming twelve months, the higher rate may thereafter be restored. The length of the haul is about four miles.

The Mississippi commission, reporting its valuation of the railways of the state, shows a total of about $20,000,000 greater than the valuation of last year. The main line of the Illinois Central has been raised from $18,000 a mile to $27,000 a mile; Mobile & Ohio, main line $14,000 to $25,000; branches $7,500 to $9,000; Southern Railway, $8,500 to $14,000; Gulf & Ship Island, $10,000 to $15,000.

The New York Public Service Commission, Second District, has ordered the New York Central to refund 75 cents to each user of a commutation ticket between certain points on the Rome, Watertown & Ogdensburg and Rochester, the tickets having by inadvertence been sold at too high a price. The road obtained permission to abandon trains on the line from Windsor Beach to Rochester and to carry passengers to Rochester by a route about two miles longer, without change of fare. The excessive fare was charged for three months. The company is ordered to notify each holder of a monthly ticket of its willingness to refund the 75 cents.

COURT NEWS.

The supreme court of Texas, considering the question of the legal right of the Kansas City, Mexico & Orient to move its shops and general offices from Sweetwater to San Angelo, has decided in favor of the road. The court makes permanent its writ of prohibition by which the district court at Sweetwater is enjoined from further hindering the enforcement of the judgment of the supreme court in favor of the road and permitting the removal of its shops and general offices.

There are three electric railways in operation at present in Scandinavia. Two of them are narrow gage and one is a small suburban line in Sweden, from Borensberg to Klokricke. The other is in Norway and runs between the towns of Tamshavn and Lokken-Tromdheim. The length of this line is 15 miles. On the third, which is a standard gage line, traffic was begun in the summer of 1911. This line is in the midst of the chemical industry of Norway, in the province of Telemarken. It is partly opened for traffic between the town Nottoden and the Lake of Tinn. It is 18 miles long and the tension in the conductor is 11,000 v. The trains are made up with a motor car at each end, which is a common system in Norway. The line gets its current from its own motor generator sub-station, and the power is obtained from the Svalgfos establishment. The three phase current of 11,000 v. is transformed into single phase. The sub-station is near the station of Svalgfos, which is situated about 15 miles from one end of the line and 3 miles from the other.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

W. A. Webb, general manager of the Texas Central, at Waco, Tex., has been appointed assistant to president of the Missouri, Kansas & Texas of Texas, with headquarters at Dallas.

George T. Reid, vice-president of the Spokane, Portland & Seattle at Tacoma, Wash., has been appointed assistant to the president and western counsel of the Northern Pacific, with office at Tacoma.

E. J. Chamberlin, vice-president and general manager of the Grand Trunk Pacific has been elected president of the Grand Trunk and the Grand Trunk Pacific, and also a member of the Grand Trunk board, succeeding Charles M. Hays, deceased. An account of his life is given on a preceding page. William Wainwright, second vice-president of the Grand Trunk Pacific, has been elected first vice-president of the Grand Trunk Pacific, remaining also vice-president of the Grand Trunk. M. M. Reynolds, third vice-president of the Grand Trunk Pacific, has been made second vice-president of the Grand Trunk Pacific, remaining also a vice-president of the Grand Trunk and becoming a director of the Grand Trunk Pacific.

Operating Officers.

A. A. Stebbins, superintendent of the Barre Railroad, at Barre, Vt., has been appointed superintendent of the Montpelier & Wells River.

The office of R. A. Easley, road supervisor of the Nashville, Chattanooga & St. Louis, has been transferred from Wartrace, Tenn., to Tullahoma.

J. R. Dillon has been appointed general manager of the Texas City Terminal Company and the Texas City Transportation Company, with office at Texas City, Tex.

F. A. Parker has been appointed chief despatcher and division operator of the Iowa division of the Rock Island Lines, with office at Des Moines, Iowa, succeeding T. W. Ward, resigned.

P. T. White, assistant despatcher on the Cleveland division of the Cleveland, Cincinnati, Chicago & St. Louis, has been appointed trainmaster, with office at Indianapolis, Ind., succeeding F. E. Jones, who has been made terminal trainmaster at Indianapolis.

Charles L. Bent has been appointed inspector of passenger train and station service, so far as it relates to the care and convenience of passengers, of the Illinois Central and the Yazoo & Mississippi Valley, with office at Chicago, succeeding Robert E. Mills, resigned.

W. S. Becker, superintendent of the Pocahontas division of the Norfolk & Western, at Bluefield, W. Va., has been appointed general superintendent of the Western General division, succeeding George P. Johnson, whose resignation has already been announced in these columns. W. J. Jenks, chairman of the company's car allotment commission, has been appointed superintendent of the Pocahontas division, succeeding Mr. Becker, both with offices at Bluefield.

Edmund I. Bowen, whose appointment as superintendent of the Rochester division of the Erie has been announced in these columns, has been appointed also superintendent of the Bath & Hammondsport and the Lake Keuka Navigation Company, with headquarters at Rochester, N. Y. Mr. Bowen was born at Williamsport, Pa., and was educated at Rensselaer Polytechnic Institute, Troy, N. Y. He began railway work in July, 1890. For two years he was assistant engineer of the western division of the New York, Lake Erie & Western, now the Erie, and then for one year was supervisor. He was then appointed roadmaster of the western division, and later was made division engineer of the same road. In June, 1903, he was appointed trainmaster of the Allegheny division of the Erie, and in August, 1906, his jurisdiction as trainmaster was extended over the Bradford division. The same year he was made acting superintendent of the

Allegheny and Bradford divisions of the same road, and in January, 1907, he was appointed superintendent of both those divisions. Mr. Bowen was promoted to superintendent of the Delaware and Jefferson divisions, with headquarters at Susquehanna, Pa., in July, 1908, which position he held at the time of his recent appointment as above noted.

John William Dean, assistant superintendent of transportation of the Missouri Pacific-Iron Mountain system at St. Louis, Mo., has been appointed general superintendent of the Southern district, with office at Little Rock, Ark., succeeding M. M. Richey, resigned. Mr. Dean was born January 15, 1867, near Lexington, Mo., and he received a common school education. He began railway work with the Chicago & Alton in 1877, and was with that road for five years, having been messenger, operator and agent During 1882 and 1883 he was with the Kansas City, Fort Scott & Memphis, now part of the Frisco, as operator and brakeman, and then until 1886 was with the Missouri Pacific as copy operator in the despatcher's office. He went to the Atchison, Topeka & Santa Fe in 1887, and remained with that road until 1902, having been consecutively operator, brakeman, yardmaster, despatcher, chief despatcher and trainmaster. During 1902 and part of 1903 he was trainmaster and superintendent of terminals of the Denver & Rio Grande, and was then until September, 1910, consecutively superintendent of the Colorado & Southern, superintendent of the Mexican National, trainmaster of terminals of the Illinois Central at Memphis, Tenn., superintendent of the Missouri Pacific from 1905 to November 22, 1909, and general superintendent of the Denver & Rio Grande from the latter date until he resigned in September, 1910. He subsequently returned to the Missouri Pacific as assistant superintendent of transportation, from which office he has just been promoted.



John W. Dean.

Traffic Officers.

N. E. Mann has been appointed general agent of the Atchison, Topeka & Santa Fe, with office at Leavenworth, Kan., succeeding E. E. Hook, transferred.

A. J. Ribe has been appointed freight soliciting agent of the Southern Railway, with office at Birmingham, Ala., succeeding J. B. Dunlap, transferred.

R. W. Owens, general agent of the Wabash Railroad, at Denver, Colo., has been appointed assistant general freight agent, with office at Kansas City, Mo., succeeding J. D. Lund, transferred to Denver as general agent in place of Mr. Owens.

Oscar Townsend, assistant general freight agent of the Chicago Great Western, with office at St. Paul, Minn., has been appointed general freight agent with office at Chicago, succeeding G. O. Somers, resigned to engage in other business.

R. E. Lay has been appointed traveling freight agent of the Galveston, Harrisburg & San Antonio, the Texas & New Orleans, the Houston & Texas Central, the Houston, East & West Texas and the Houston & Shreveport, with office at Dallas, Tex.

T. J. Faulconer has been appointed traveling freight agent of the Lake Erie & Western, with office at Indianapolis, Ind., succeeding Walter A. Smith, resigned. This corrects the statement in our issue of May 10, page 1073, that Mr. Faulconer had been appointed soliciting agent of the Kanawha Despatch at Indianapolis.

W. C. Shannon has been appointed commercial agent of the Merchants & Miners Transportation Company, with office at St. Louis, Mo., succeeding S. S. Dudley, resigned to go into other business. Charles E. Thomas, Jr., soliciting agent, with office at Philadelphia, Pa., has been appointed soliciting agent with office at Boston, Mass., succeeding Lloyd O. Miller, promoted. T. V. Blackburn, soliciting agent at Philadelphia, succeeds Mr. Thomas; and T. M. Shaw has been appointed soliciting agent, with office at Philadelphia, succeeding Mr. Blackburn. Effective June 1.

Julien L. Eysmans, who has been appointed assistant general freight agent of the Pennsylvania Railroad, as has been announced in these columns, was born in Brussels, Belgium, March 18, 1874, and was educated in the public schools of Baltimore, Md. Mr. Eysmans entered the service of the Pennsylvania Railroad as a messenger in the office of the division freight agent at Baltimore May 1, 1891, and in October, 1893, he was transferred to Washington, D. C., as a clerk. In July of the following year he returned to Baltimore as a clerk, and on August 1, 1896, he was appointed freight solicitor. He was made agent of the Anchor Line at Baltimore, in April, 1899, and the following March became freight solicitor at Reading. Three years later he was appointed district freight solicitor at Baltimore, and on January 1, 1904, he became eastern superintendent of the Star Union Line at New York. Mr. Eysmans was promoted to general freight agent of the Cumberland Valley in February, 1906, and on June 1, 1911, was made division freight agent of the Pennsylvania Railroad at Pittsburgh, which position he held at the time of his recent appointment as assistant general freight agent of the same company, with office at Philadelphia.

Engineering and Rolling Stock Officers.

Charles Hamilton has been appointed consulting engineer of the Nevada-California-Oregon Railway and the Sierra & Mohawk, with office at Reno, Nev.

Walter H. Flynn, division master mechanic of the Michigan Central at St. Thomas, Ont., has been appointed superintendent of motive power, with office at Detroit, Mich., succeeding E. D. Bronner, promoted to general manager. T. J. Burns, assistant to the superintendent of motive power at Detroit, has been appointed assistant superintendent of motive power. E. R. Webb, division master mechanic at Michigan City, Ind., has been transferred to St. Thomas, succeeding Mr. Flynn, and W. H. Corbett, road foreman of engines at Jackson, Mich., succeeds Mr. Webb.

M. J. Drury, whose appointment as superintendent of shops of the Atchison, Topeka & Santa Fe, with office at Topeka, Kan., has been announced in these columns, was born May 24, 1849, at Berkenhead, Eng. He came to this country with his parents when he was three years old, and received a common school education at Parkersburg, W. Va. In 1886 he entered a contract shop as a machinist apprentice, and in 1870 began railway work with the Baltimore & Ohio at Grafton, W. Va., with which company he remained for ten years, working at Grafton, Newark, Ohio, and at Chicago. He was then made a machinist for the Missouri, Kansas & Texas at Parsons, Kan., and was later gang foreman and machine foreman on that road. In 1887 he went with the Lake Shore & Michigan Southern at Elkhart, Ind., as a machinist, and the next year went to the Denver & Rio Grande as night foreman. On February 1, 1889, he went with the Atchison, Topeka & Santa Fe, with which road he has been ever since. He was consecutively machinist gang foreman, general foreman first at La Junta, Colo., and later at Arkansas



M. J. Drury.

City, Kan., and division foreman on the Oklahoma division at Arkansas City. He was appointed master mechanic at Winslow, Ariz., in October, 1902, and was transferred with the same title to Raton, N. Mex., in May, 1906. On November 1, 1906, he was appointed mechanical superintendent of the Western lines, with headquarters at La Junta, from which position he was recently promoted to superintendent of shops as above noted.

OBITUARY.

John F. Trout, superintendent of dining cars and restaurants of the Pennsylvania Railroad, died on May 23 at his home in Jersey City, N. J., of heart failure. Mr. Trout was born at Landisville, Pa., in August, 1843.

J. M. Lee, formerly superintendent of the San Antonio Branch division of the Galveston, Harrisburg & San Antonio at San Antonio, Tex., and recently chief engineer of the Oklahoma Corporation Commission, died at Houston, Tex., on May 21.

Dan Shea, general foreman of masonry, with jurisdiction over all Erie lines west of Salamanca, N. Y., was killed on May 17, being struck by a train at Cambridge Springs, Pa, while traveling on a motor car. Mr. Shea had been with the Erie for 47 years, and had been general foreman of masonry for 30 years.

From 1895 to 1908, the operating ratio on the Austrian railways increased from 66 per cent. to 76 per cent.; on the Bavarian state railways from 55 per cent. to 71 per cent.; on the Prussian state railways from 65 per cent. to 72 per cent. During that period, this ratio on the Hungarian state railways increased from 55 per cent. to 77 per cent., and in 1910 reached 81 per cent. The large increases in the expenses on the Hungarian state railways counteracted the enormous growth of traffic during that period.

The increase in salaries on the Hungarian state railways since 1893 has been one of the principal causes of the poor showings that have been made by that system. These salaries have increased $4,400,000 since 1903 and form a serious drain on the railway budget. Another cause of the poor showing made, is the higher cost of materials and supplies of all kinds; from 1905 to 1909 these expenses increased $2,614,000. The price of ties increased 53 per cent., but the increase in cost of fuel has been one of the largest factors in the increase of expenses. This is due not only to the increase of the cost of fuel itself, but also to the increase of fuel needed to move a given tonnage a given distance.

During the past few years, the maintenance cost of engines and cars on the Hungarian state railways has increased enormously. In 1909, the maintenance per locomotive was $600, and in 1909, $910. During this period, the maintenance cost of a passenger car increased from $128 to $164, and that of a freight car from $19 to $27. The total maintenance of equipment in 1909, cost $3,440,000 more than in 1905. This was partly due to the higher cost of labor, and partly to the heavier use to which the equipment was put. In spite of this carloading instead of increasing, fell from 48 per cent. of capacity to 37 per cent. of capacity. This state of affairs is partly attributory to the adoption of 15-ton cars, but although 56 per cent. of the cars now in operation are of that capacity, the shippers are obliged to pay premiums to have those cars loaded to full capacity.

One of the principal obstacles to the successful development of traffic on the Hungarian state railways, is the lack of double tracks and the poor station facilities. The new double-tracked lines, which were regarded as indispensable from a strategic point of view, were built almost entirely on that account. The lack of proper station facilities is such that long trains are obliged to enter some stations in two sections; a fact which, added to the lack of extra tracks, causes numerous and serious delays. The stations at Budapest are in a particularly deplorable condition. During the past 20 years the passenger traffic increased 550 per cent. at the east station and 900 per cent. at the west station, and the number of trains arriving and leaving, increased from 140 to 290. Freight traffic at those two stations increased 100 per cent. during that period, but in spite of these enormous increases, the conditions at those stations have scarcely shown any improvement in the last 20 years.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Montpelier & Wells River is in the market for 1 passenger locomotive.

The Hocking Valley has ordered 5 mikado locomotives and 2 ten-wheel locomotives from the American Locomotive Company.

The Cuba Railroad, New York, has ordered 4 ten-wheel locomotives from the American Locomotive Company. The dimensions of the cylinders will be 18 in. x 24 in.; the diameter of the driving wheels will be 52 in., and the total weight in working order will be 127,000 lbs.

The Chicago Junction Railway has ordered 6 six-wheel switching locomotives from the American Locomotive Company. The dimensions of the cylinders will be 20 in. x 26 in; the diameter of the driving wheels will be 51 in., and the total weight in working order will be 148,000 lbs.

The Cambria Steel Company, Johnstown, Pa., has ordered 1 six-wheel switching locomotive from the American Locomotive Company. The dimensions of the cylinders will be 19 in. x 26 in.; the diameter of the driving wheels will be 50 in., and the total weight in working order will be 125,000 lbs.

CAR BUILDING.

The Central of New Jersey is in the market for 1,000 gondola cars.

The Montpelier & Wells River is in the market for 3 coaches and 7 refrigerator cars.

The Cuba Railroad, New York, is in the market for 100 box cars, 50 flat cars and 10 dump cars.

The Mineral Point Zinc Company has ordered 41 tank cars from the German-American Car Company.

IRON AND STEEL.

The Louisville & Nashville is in the market for 8,000 tons of bridge material.

The Chicago, Milwaukee & St. Paul has given an order for 5,000 tons of bridge material to the American Bridge Company.

General Conditions in Steel.—New business in finished steel is sagging, while specifications on contracts continue to occupy the mills at almost full capacity. Many of the mills are far behind in shipments and are not making any effort to increase their already large tonnages. Manufacturers welcome the shrinkage in orders for certain classes of steel as it will give them an opportunity to catch up with specifications. Prices for the finished products are holding firm with premiums for bars and plates for prompt delivery. It is generally believed that the present lull in the volume of new business will continue until a better estimate of the crops can be obtained.

SIGNALING.

New Installations of Block Signals, Interlocking, Telephones for Train Despatching, Etc.

The New York, Chicago & St. Louis is preparing to introduce automatic block signals throughout its line in Indiana, 150 miles, the signal to be installed by the American Railway Signal Company of Cleveland.

The Argentine port of San Antonio and the Chilian port of Valdivia are to be connected by means of a new railway connecting up with the Patagonian system. Both governments seem to be favorable to the carrying of the project. Bailey Willis, a resident of Buenos Ayres, Argentina, is the promoter of the enterprise.

Supply Trade News.

John G. Platt, mechanical representative of the Hunt-Spiller Manufacturing Corporation, Boston, Mass., has been made sales manager, with office in Boston. This is a newly created position.

The MacArthur Concrete Pile & Foundation Company, New York, has received an order from the Boston & Maine for 2,700 pedestal concrete piles, together with a large amount of concrete capping, etc., for the new shops of that road at North Billerica, Mass.

Robert Law, formerly general manager of the Missouri lines of the Chicago, Burlington & Quincy, and more recently vice-president and general manager of the Colorado & Northwestern, has recently become connected with the United Car Company of Chicago, as vice-president and general manager.

The Duntley Pneumatic Tool Company of Chicago has been incorporated under the laws of Delaware by J. W. Duntley and his associates, with a capitalization of $100,000. The company has entered into a contract with the Gibbons & Lewis Company of Fond du Lac, Wis., for the manufacture of a full line of pneumatic tools and the Duntley Manufacturing Company of Chicago will act as the selling agency.

The General Electric Company, Schenectady, N. Y., has received the following orders from the Boston Elevated: Five hundred motors of the split frame type; 200 K-28 controllers; 75 four-motor car equipments, each including motors and controllers; one 15,000-k.w. Curtis turbo generator for the South Boston power station. This turbo generator will be a duplicate of the two units now being installed, generating current at 6,600 v. and stepping up by compensators to 13,200 v.

James Stewart Andrews, vice-president of the Blair Engineering Company, New York, died at Cleveland, Ohio, on May 22. His death was wholly unexpected, as Mr. Andrews was supposed by himself and by his family and friends to be in robust physical condition. For several years prior to 1908 Mr. Andrews was a prominent figure in the railway supply business, which he entered under the tutelage of Harry W. Frost, about 1897, in the service of the Monarch Brake Beam Company. By hard work, a genial disposition and marked intelligence, Mr. Andrews made his way rapidly. He had a peculiar gift for selling things. In 1901 he joined Albert Waycott in the Waycott-Andrews Supply Company, St. Louis, Mo. This connection lasted a year, and then Mr. Andrews, with some friends, organized the Commonwealth Steel Company, St. Louis, of which he became vice-president. When this organization was acquired by Clarence H. Howard and his associates, Mr. Andrews retired from the company. Mr. Andrews in the meanwhile had acquired a number of patents and had developed among other things, the Andrews side frame, which was sold to the American Steel Foundries, New York, in 1906, at which time Mr. Andrews entered the sales department of that company. When, having acquired a very comfortable fortune, Mr. Andrews retired from the service of the American Steel Foundries, he talked seriously of returning to his native country and living the quiet life of a country gentleman. Mr Andrews was born in Coleraine, Ireland, on April 9, 1864, so that when he entertained these pleasant expectations he was a comparatively young man. His youth and vigor, as well as the business habits of an active life, were too much for him, however, and he was very soon in active business again, having joined Thomas S. Blair in the organization of the Blair Engineering Company, of which he was vice-president at the time of his death. Mr. Andrews had also at one time been president of the Metal Ties Company, which is no longer in existence. He was buried at Easthampton, L. I., on May 24.



J. S. Andrews.

On May 27 the Supreme Court for the District of Columbia entered a final decree dissolving the injunction and dismissing the suit in the case that Peter H. Murphy brought against the Baltimore & Ohio for infringement of his car roof patents. This case was noticed in the *Railway Age Gazette*, of December 15, 1911, page 1256, and May 10, 1912, page 1056. The roofs were furnished by the Chicago-Cleveland Car Roofing Company, which protected the Baltimore & Ohio in defending the suit. This final decree was in accordance with the decision of the Court of Appeals for the District of Columbia, which, on April 22 last, entirely reversed the previous decree of the lower court. The previous decree had held that the patents were valid and infringed upon, but the Court of Appeals wholly reversed it, and also, on May 14, denied Mr. Murphy's petition for a rehearing. On May 17 the Court of Appeals also overruled Mr. Murphy's opposition to granting the Baltimore & Ohio a large item of recoverable costs of the suit. There was also on April 29 a ruling of the Supreme Court of the United States that precluded any further appeal in such a suit. The Baltimore & Ohio was thus entirely sustained in the matter.

J. F. MacEnulty, who, as announced in last week's issue, has been appointed general sales manager of the Western Steel Car & Foundry Company and of the Pressed Steel Car Company, with office at New York, was born in Pittsburgh, Pa., January 10, 1879. In 1899 he entered the service of the Pressed Steel Car Company at Pittsburgh as inspector, and later became foreman of the truck and bolster department, chief inspector and engineer of construction. He was then transferred to New York as sales agent, and about six years ago went to Chicago as general superintendent of the Western Steel Car & Foundry Company. In 1909 he was made general manager, which position he now leaves to take charge of the sales department in New York. The position of general sales manager of the Pressed Steel Car Company and of the Western Steel Car & Foundry Company, is a newly created position, as was previously mentioned.



J. F. MacEnulty.

The report of the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., for the year ended March 31, 1912, shows that gross earnings were $34,196,446, as compared with $38,119,312 in 1911. The net manufacturing profits were $3,591,596 as compared with $5,608,765 in 1911. The gross income in 1912 was $4,752,038 as compared with $7,124,296 in 1911. The net income, applicable to interest and other charges, in 1912 was $4,043,121 as against $6,466,592 in 1911. The surplus for the year 1912 was $2,444,093 as compared with $4,881,105 in 1911. In 1912 5.9 per cent. was earned on the common stock after deducting the full 7 per cent. dividend on the preferred stock. This compares with 12.3 per cent. earned on the common stock in 1911. As the year 1911 was the most profitable of the last six years, the earnings for 1912 compare more favorably with the other years since 1906. Guy E. Tripp, chairman of the board of directors, says, in part, that the decrease in gross earnings in 1912 was due partly to actual reduction of output, but to a greater extent to the lower prices obtained. The value of unfilled orders on March 31, 1911, was $7,616,058 as compared with $8,137,961 on March 31, 1912. During the month of April, the

value of orders booked exceeded that of any month during the year ended March 31, 1912, so that the value of unfilled orders on April 30, 1912, was $9,218,303. The surplus on March 31, 1911, was $5,964,225. This balance was increased by the net income to the year, $2,244,693, to a gross surplus of $8,331,270. Dividends of 7 per cent. on the preferred stock and 1 per cent. on the common stock reduced the surplus to $7,699,250, against which depreciations of investments were written off as follows: Westinghouse Electric Company, Ltd., stock, $250,000; Societe Electrique Westinghouse de Russie debentures, $243,243; Lackawanna & Wyoming Valley Rapid Transit bonds, $557,042. As a result of these depreciations, the surplus on March 31, 1912, was $6,648,964. The value of the property and plant increased $1,503,042 over the previous year. This increase is chiefly due to the completion of the extensions of the buildings on the additional ground purchased for the plant at Newark, N. J.; also to the purchase of a new plant at Pittsburgh, Pa., by the R. D. Nuttall Company; also to the erection of a new building and other general improvements at the East Pittsburgh works. The buildings already erected have resulted in a considerable increase in the capacity and efficiency of each of these plants. As a result of sinking fund payments made during the year, there were retired a total of $537,000 face value convertible bonds and $260,000 face value debenture certificates. The British, French and Canadian Westinghouse companies, in which the Westinghouse Electric & Manufacturing Company has the largest investments, have improved in net profit during the year ended December 31, 1911, as compared with the previous year. The Italian company has suffered because of the war between Italy and Turkey. The assets of the company include, property and plant, $19,195,188; investments, $23,384,516; total current assets, $19,848,706; of which $8,340,081 was cash on hand, $3,395,426 was notes receivable, and $7,976,044 was accounts receivable. The working assets, including raw materials, supplies, etc., was valued at $13,119,286. The liabilities include, capital stock, $40,698,988; funded debt, $22,334,000; collateral notes, $6,720,000; long term notes, $1,383,650; current liabilities, $3,047,874; of which $2,187,666 was accounts payable. The reserve for adjustments of inventories, notes and accounts receivable, etc., was $1,294,178.

TRADE PUBLICATIONS.

Structural Beams.—The Carnegie Steel Company, Pittsburgh, Pa., has published a pamphlet entitled Structural Beams, which gives information and data on the new lines of I-beam sections.

Grates.—The Shear-Klean Grate Company, Chicago, has published a small booklet on Shear-Klean grates, in which their many advantages are pointed out and in which their construction is briefly and concisely described. It is claimed that these grates save both coal and labor.

Michigan Central.—The passenger department of this company has published an attractive illustrated folder entitled Michigan Resorts. In this folder the choice vacation spots along the lines of this company are briefly described and their various attractions are enumerated. Hotel prices are included.

Lamps.—The General Electric Company, Schenectady, N. Y., has published bulletin No. 4947 on the illumination of electric railway cars and the advantages possessed by Edison Mazda and Gem lamps for this service. The bulletin contains illustrations showing the illumination of cars by these two types of lamps as compared with that resulting from the use of the old carbon filament lamp.

Southern Pacific.—The passenger department of this company has published an attractive booklet entitled Grandview, Washington. This booklet tells of the opportunities and resources of the Yakima Valley, Wash. It is fully illustrated, and discusses the success with which many of the inhabitants have made in the production and cultivation of agricultural products. Interesting facts about the climate, the soil, and the prices of land are also included.

Railway construction progressed very materially during 1911 on the 20 lines under construction for the Chilean government, covering 1,580 miles, to cost $56,580,331 when completed. At the close of the year rails were laid on about one-half of these new lines.

Railway Construction.

New Incorporations, Surveys, Etc.

Alaska Roads.—See item in general news regarding the construction of new railway in Alaska.

Algoma Central & Hudson Bay.—The Canadian parliament has granted a subsidy at the rate of from $3,200 to $6,400 a mile for building the following lines: From Sault Ste. Marie, Ont., to the Canadian Pacific, between White river and Dalton, not to exceed 200 miles; from Michipicoten Harbor towards the Canadian Pacific, 50 miles; from a point on the Canadian Pacific towards the National Transcontinental, 50 miles, and for a line from a point on the Canadian Pacific north to a junction with the National Transcontinental, 65 miles. The junction with the Canadian Pacific is at Franz, near Hobon, 194½ miles, and of this mileage, about 14 miles remains to be laid, and several bridges have to be constructed. It is expected that all the work will be completed by the fall. From Michipicoten Harbor towards the Canadian Pacific, track has been laid to Magpie Mine, about 26½ miles. Grading is in progress on the extension from Franz, north on about 100 miles to a junction with the National Transcontinental, at a point about 142 miles west of Cochrane, Ont., to be named Grant. Subsidies at the same rate have been granted to the Algoma Eastern, a subsidiary of the A. C. & H. B., for a line from a point between Sudbury, Ont., and Little Current, towards the A. C. & H. B. for 76 miles, and from Sudbury north for 30 miles. R. S. McCormick, chief engineer, Sault Ste. Marie, Ont.

Algoma Eastern.—See Algoma Central & Hudson Bay.

Buctouche & Western.—This company has been granted an extension of time to build from Buctouche, N. B., north to Rexton, thence to Richibucto, about 20 miles, or to some other shipping point. The company was incorporated in New Brunswick in 1905. The provincial directors, when the company was chartered, included R. A. Irving, A. B. Carson, E. J. Smith and F. W. Summer, Buctouche.

Carolina, Clinchfield & Ohio.—This company has sold $5,500,000 of notes to carry out the work on the proposed extension from the present northern terminus at Dante, Va., north to Elkhorn, Ky. About eight miles has been finished, and the company expects to have all the work completed by the end of 1913 The extension will be through a mountainous country, and calls for very heavy construction work, including the piercing of 19 tunnels. The Rinehart & Dennis Company, Charlottesville, Va., will be given a contract to build 35 miles. The cost of the work will be about $5,000,000. Ward Crosby, chief engineer, Johnson City, Tenn. See an item under Railway Financial News.

Cherryvale, Oklahoma & Texas.—See Kansas, Oklahoma & Southwestern.

Chicago & Eastern Illinois.—President B. L. Winchell has announced that a line will be built into Peoria, Ill., but the route has not yet been announced.

Cincinnati, Licking Valley & Virginia.—Incorporated in Kentucky to build from a point on the Ohio river in Kenton, Campbell or Bracken counties, via the Licking river valley south to the Virginia state line, about 160 miles. J. B. Walker, president; T. G. Stuart, vice-president, Winchester, Ky.; and F. D. Buskirk, secretary and treasurer.

Cincinnati, Louisville, Lexington & Maysville Traction.—An officer writes that grading work is now under way from Covington, Ky., south via Independence, Walton, Crittenden, Dry Ridge and Jonesville, to Owenton, about 45 miles. Grading work has been finished on 10 miles. There will be one steel bridge about 400 ft. long. Perry Simpson and J. Dawatt, Dry Ridge, are the contractors. W. T. S. Blackburn, president, Dry Ridge.

Colorado, Texico & Aransas Pass.—According to press reports, M. C. Vaughn, of Portales, N. Mex., representing Chicago capitalists, has bought a right of way, which had already been graded, for this company. The plans call for a line from the Colorado coal fields to the Gulf of Mexico. It is understood that the first work to be carried out will be on the section from Texico, N. Mex., through a rich agricultural section, to Virginia City. Arrangements have been made for financing the project.

ELKIN & ALLEGHENY.—This company has sold $1,800,000 of bonds to carry out work on the line building from Elkin, N. C., through Allegheny, Ashe and Watauga counties, 150 miles, to provide railway facilities in a mountainous but very productive section. The line is being built by the state of North Carolina, and is completed from Elkin to Thermont, 12 miles. J. A. Mills, president and general manager, Raleigh. (March 29, p. 780.)

GEORGIA COAST & PIEDMONT.—This company has been authorized to make a new mortgage, part of the proceeds will be used to extend the line from Darien, Ga., south to Brunswick, 15 miles, also for an extension from Reidsville to Vidalia on the north, about 25 miles, and for other improvements. A. de Sola Mendes, vice-president and general manager, Darien. See an item under Railway Financial News.

GRAND TRUNK.—See comments in another column regarding the extension of the Grand Trunk to Boston, Mass., under the charter of the Southern New England.

GRAND TRUNK PACIFIC.—The province of Saskatchewan has passed a bill authorizing this province to guarantee the payment of the principal and interest on the bonds, stock and other securities of the Grand Trunk Pacific Saskatchewan, to an amount not exceeding $13,000 a mile. The company plans to build the following lines in Saskatchewan: From Watrous southwesterly via Swift Current to the international boundary; from Saskatoon westerly and northwesterly to Battleford; from Melville northerly and northwesterly to Regina; Saskatoon southeasterly, southerly and southwesterly to Regina; from township 36, range 8, west of the third meridian, southwesterly and westerly to a junction with the Biggar-Calgary line. Part of the lines must be completed during 1912, and all of the lines must be finished by the end of 1914. B. B. Kelliher, chief engineer, Winnipeg, Man. (March 1, p. 1912.)

GRAND TRUNK PACIFIC SASKATCHEWAN.—See Grand Trunk Pacific.

KANSAS, OKLAHOMA & SOUTHWESTERN.—This is the new name of the Cherryvale, Oklahoma & Texas. The new company has a capital of $20,000,000, and plans to build from Kansas City, Mo., southwest through Kansas to a point in Oklahoma, about 900 miles, with a branch from Caney, Kan., southeast to Fayetteville, Ark., and another branch from Pawhuska, Okla., southeast to Shreveport, La., 300 miles. A branch is also to be built from Pawhuska southwest to El Reno, and another branch from Oklahoma City south to a point in Texas. It is the present intention of the company to make Houston the main southern seaport terminus. R. E. Wade and S. A. Masters, Perry, Okla.; J. H. Brewster and F. D. Brewster, Independence, Kan.; and S. M. Porter, Caney; are the promoters.

LAKE ERIE & EASTERN.—See Pittsburgh & Lake Erie.

LAKE SHORE & MICHIGAN SOUTHERN.—See Pittsburgh & Lake Erie.

LONG ISLAND.—A contract has been given by the Brooklyn Grade Crossing Commission to W. H. Gahagan, Brooklyn, N. Y., for the reconstruction of about 6,000 ft. of the Manhattan Beach division of the Long Island in East New York. There will be a tunnel of four tubes, about 3,530 ft. long, and an embankment from about Granite street at Evergreen Cemetery to the borough line. The work is to be finished within two years. J. R. Savage, chief engineer, Jamaica, N. Y.

LOUISVILLE & NASHVILLE.—A franchise has been granted by the authorities of Clarksville, Tenn., permitting this company to build an extension to a point near the public square in Clarksville. The improvements will cost about $200,000. W. H. Courtenay, chief engineer, Louisville, Ky.

MEXICO TRAMWAYS COMPANY.—This company is now at work building interurban electric lines from the City of Mexico, Mex. One line is to be built from Mexico City southeast to Puebla, about 80 miles, and another line southwest to Toluca, about 45 miles. It is expected that the Toluca line will be ready for operation as far as Cuajimalpa, about nine miles, by July, and the Puebla line is expected to be finished to Tlulyhualaco about the same time. H. Harren, general manager.

PECOS VALLEY SOUTHERN.—This company has under consideration a proposition to build a branch from Saragosa, Tex., southeast to Fort Stockton, about 60 miles. It is said that the branch will be built if residents along the route will subscribe a bonus of $200,000 in aid of the project, also a right of way and ground for terminals, etc. Extensions are also planned from Pecos northerly to Lubbock, about 200 miles, and from Balmorhea south to Alpine, about 50 miles. It is said that work will be started soon on both these extensions. L. W. Anderson, general manager and chief engineer, Pecos.

PITTSBURGH & LAKE ERIE.—The Lake Erie & Eastern, a subsidiary of the P. & L. E., and the Lake Shore & Michigan Southern, has now under way 10 miles of very heavy work through the city of Youngstown, Ohio. This line crosses the Mahoning river five times, and also crosses the tracks of the Pennsylvania, the Baltimore & Ohio, and the Erie several times. All grade crossings with streets and railways are separated. Contracts for the three middle sections of work have recently been let to H. A. & R. L. Culbertson, Cleveland; the McKelvy Hine Company, Pittsburgh; and the Duquesne Contracting Company, Pittsburgh. Bids have been received on the remaining two sections, and contracts will be let shortly. The contracts call for the completion of the line within one year.

ST. LOUIS, BROWNSVILLE & MEXICO.—This company is planning to build a branch, it is said, from Heyser, Tex., on the Port O'Connor branch, to Austwell on San Antonio bay. Surveys are now being made, and construction work will be started soon. F. G. Jonah, chief engineer, St. Louis, Mo.

TEXAS ELECTRIC.—An officer writes that the projected route is from Dallas, Tex., south via Waxahachie, Hubbard, Marlin, Temple, and Taylor, to Austin, with a diverging line southeast via Corsicana to Palestine. Contracts are to be let in about 90 days to build the section from Dallas to Waxahachie, and for a section of the branch from Corsicana to Palestine. There will be three small steel bridges and about two miles of trestling work. J. V. Watkins, president, 502 Scollard building, Dallas.

WESTERN MARYLAND.—An officer writes, that contracts have been given to R. Galiardi, Connellsville, Pa., for grading, etc., and to the Pennsylvania Steel Company, Philadelphia, Pa., for the steel bridge work, on a branch to be built from Charlton Station, Md., in a general southerly direction about 3½ miles, crossing the Potomac river into West Virginia. There will also be a spur in West Virginia from this branch, about one-half mile long, to proposed quarries. The work includes putting up an 1,175-ft. steel bridge over the Potomac river. H. R. Pratt, chief engineer, Baltimore, Md.

RAILWAY STRUCTURES.

AUGUSTA, MAINE.—Work is now under work on the abutments for a new 70-ft. steel bridge, to carry two tracks, for the Maine Central, over Two Mile creek at a point two miles northeast of Augusta.

CHARLTON, MD.—See Western Maryland under Railway Construction.

COVINGTON, KY.—See Cincinnati, Louisville, Lexington & Maysville Traction Company under Railway Construction.

DALLAS, TEX.—See Texas Electric under Railway Construction.

GAINESVILLE, GA.—According to press reports, the Southern Railway is making plans for putting up a new passenger station, remodeling and enlarging the present freight station and also rearranging the tracks at Gainesville. The new passenger station is to be of brick construction with tile roof, 34½ ft. x 133 ft.

LONG ISLAND CITY, N. Y.—A contract has been given by the New York Connecting Railroad to the P. A. Gillespie Company, New York, for the masonry and foundation work between Stemler and Lawrence streets, about 3,500 ft., on one-half of the approaches in Long Island City to the bridge, to be built over the East river.

NORTH FOND DU LAC, WIS.—The Minneapolis, St. Paul & Sault Ste. Marie has announced that a new 37-stall roundhouse will be built at this point.

WICHITA, KAN.—An agreement has been reached between the city officials and the Wichita Union Terminal Association providing for the erection of a union station and track elevation estimated to cost over $2,000,000.

Railway Financial News.

Boston & Maine.—F. S. Moseley & Co., New York, and Lee, Higginson & Co., Boston, are offering at 99⅞, yielding about 4⅛ per cent., $12,000,000 1-year 4 per cent. coupon notes, of June 10, 1912-1913.

Canadian Northern.—William A. Read & Co., New York, and the Dominion Securities Company, Ltd., Toronto, Ont., have purchased jointly $5,000,000 Canadian Northern 4½ per cent. equipment trust notes, payable in semi-annual instalments over a period of 10 years, and secured by new equipment, on which the railway makes an initial cash payment of 25 per cent. Of the total amount of $5,000,000, $2,000,000 was issued as series C-1 of 1912, and sold in Philadelphia, Pa., as previously mentioned. The remaining $3,000,000 will be known as series D-1 of 1912, and will probably be offered for sale in the near future.

Canadian Pacific.—It is said that this company has bought the Kootenay Valley, which runs from Bonner's Ferry, Idaho, to Creston, B. C., and that operation will be turned over on June 1.

Carolina, Clinchfield & Ohio.—Blair & Co., New York, have bought $5,500,000 5 per cent. notes of May 1, 1912-1917, secured by a first mortgage on the proposed extension of the road, from its northerly terminus, Dante, Va., to Elkhorn, Ky., a distance of 40 miles.

See item under Railway Construction News.

Cincinnati, New Orleans & Texas Pacific.—W. Cooper Proctor has been made a director, succeeding M. E. Ingalls, resigned.

Duluth, Missabe & Northern.—This company has called for payment on July 1, at the New York Trust Company, New York, $210,000 general mortgage 5 per cent. bonds of January 1, 1906-1914 at 105 and interest.

Elkin & Allegheny.—See item under Railway Construction News.

Georgia Coast & Piedmont.—The Georgia railway commission has authorized this company to make a new mortgage to secure an issue of $3,500,000 bonds, of which a block will soon be sold to extend the road from Darien, Ga., to Brunswick, 15 miles. The mortgage will also provide for the extension from Riedsville to Vidalia and other improvements; a sufficient amount to be reserved to take up the underlying bonds. This roads runs from Darien to Collins, 82 miles.

Interborough Rapid Transit.—J. P. Morgan & Co., New York, have bought $170,000,000 first mortgage five per cent. 53 year bonds. The purchase contract is contingent upon the approval by the Court of Appeals of the preferential payment of 8.76 per cent. provided for in the arrangement between the city and the Interborough company. Of these bonds, $200,000,000 have been authorized. The proceeds of the present issue will be used as follows: for refunding present debts, $50,656,950; new subway construction, $56,000,000; Manhattan Railway improvements $30,000,000; equipment of new subways, $21,000,000; other charges, including discounts, $9,500,000. The payments will be distributed over a period of four years.

Interoceanic of Mexico.—This company on May 13 issued a circular letter to the holders of the $7,000,000 first preference non-cumulative 5 per cent. stock, advising them that owing to the disturbed political conditions in Mexico, the payment of the dividends on this stock would be deferred until the accounts for the year have been audited, which will be about November.

Kootenay Valley.—See Canadian Pacific.

Maine Central.—Stockholders on May 24 authorized the increase in the capital stock from $10,000,000 to $15,000,000.

New York, Ontario & Western.—This company has made application to the New York Public Service Commission, Second district, for authority to issue $2,171,000 general mortgage bonds. The proceeds are to reimburse the company for money spent since December 1, 1910, from income, etc., as follows: Construction of second track on Scranton branch, $711,520; additional sidings and extensions of sidings, $234,782; shops, engine houses and turntables, $307,150; machinery and tools, $151,305; equipment, $278,375.

Norfolk & Western.—W. W. Atterbury, a vice-president of the Pennsylvania Railroad, has been elected a director, succeeding John B. Thayer, deceased.

St. Louis, Rocky Mountain & Pacific.—Fisk & Robinson, New York, have sold at 84, $532,000 first mortgage 5 per cent. bonds due June, 1955. There are $7,500,000 of these bonds outstanding. The proceeds have reimbursed the company for payment of $251,000 short-term notes due April 1, 1912, and provided additional working capital. A statement by the company says that no unfunded debts are now outstanding.

St. Louis Southwestern.—The Guaranty Trust Company, Rhodes & Company, and William Salomon & Company, all of New York, it is understood, will shortly make a public offering at 99½, yielding about 5.60 per cent.; the unsold portion of their block of $7,500,000, first terminal and unifying mortgage 5 per cent. bonds. Of these bonds, $100,000,000 was authorized and $7,500,000 is outstanding, as was mentioned in our issue of February 16. The proceeds of the present issue, will be used as follows: New terminal properties at St. Louis and Ft. Worth, at cost, $2,250,000; to retire outstanding equipment obligations of an equal face value, $2,165,000; to acquire $400,000 first refunding and extension mortgage bonds of the Gray's Point Terminal Railway, $400,000; to reimburse improvements, etc., already made out of revenue, $2,685,000. The balance of $92,500,000 may be issued as follows: To refund, purchase or acquire prior mortgage bonds of like face amount, viz., St. L. & S. W., first consolidated mortgage 4 per cent. bonds, due 1932, $25,000,000; and bonds of controlled companies, $15,950,000; total, $40,950,000; for additions, improvements, new equipment, etc., $51,550,000.

Seaboard Air Line.—Walter Rosen has been elected a director, succeeding Benjamin S. Guinness, resigned.

From 1890 to 1909, the freight and passenger traffic on the Hungarian state railways increased 301 per cent., and in that period, not only were the conditions and betterments insufficient, but also the new acquisitions of rolling stock. In one year where the traffic increased 9.05 per cent., the number of freight cars increased only 2.05 per cent. In another year, the traffic increased 11 per cent., and the number of freight cars increased 0.1 per cent. In regard to the locomotives, the number now in operation is entirely insufficient. In 1900, on account of the increasing traffic, 255 new locomotives were needed, but only 57 were bought. In 1905, 22 locomotives were bought where 283 were needed. In 1910, it was estimated that the system was operating 606 less locomotives than were actually needed to handle the traffic under normal conditions. While the traffic increased 51 per cent., the number of locomotives was only increased by 21 per cent. The system possesses a very large number of locomotives over 35 years old in proportion to the total number of locomotives in operation. While these locomotives, which are designated as locomotives of the third class, cover annually about 12,000 miles, the locomotives of the second class cover about 21,600 miles, and those of the first class about 24,000 miles.

Among railway projects submitted to the Russian committee on proposed new railways, particular attention is attracted by the proposed line Uchta-Petchor-Kama, which is designed to serve the great Petchor area and, if the Uchta oilfields should turn out as well as some anticipate, the line would have a considerable economic importance. The district has very few railways, although on the other hand the waterways are plentiful enough; but the want of the railway is severely felt and is the subject of continuous agitation on the part of the business people of the region. The direction the line is intended to take would serve districts producing gold, copper, lead, manganese, iron, asbestos, salt, gypsum, coal, turf, fireclay, magnesite, pyrites, limestone and marble. It would follow a line from the station of Usobye on the Usobye branch of the Perm railway north to Solikamsk and Tcherdyn to the village of Troitzk-Petchor on the Petchor river. Then the line would turn back to the village at Ust-Uchta. The probable traffic on the line has been carefully worked out. The capital for construction is $116,116,800, to be raised in shares and bonds of which the interest would be guaranteed by the government, and it is thought that as the construction of the line would mean a vast increase in the government timber traffic, there is every inducement to afford the guarantee.

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THE letters from Charles Frederick Carter and Arthur J. Carruth, Jr., both journalists, on the relations of the railways and the newspapers, which we publish elsewhere, present two quite different points of view. Mr. Carter extols the advertising policy by which the railways have helped to build up the population and industries of extensive sections, but implies that as to news regarding railways, the railway men often won't furnish it and the newspapers often won't print it. Mr. Carruth's experience is that railway men will furnish news and that the newspapers will print it, although the railway man often complains with justice that it isn't printed correctly. These two points of view to some extent reflect, on the one hand, newspaper and railway conditions in Gotham and the East, and on the other hand, the like conditions in the West. On the whole, the relations between the railways and the newspapers in the West are probably closer than they are in the East. This is largely because the western press has commonly been more disposed to hammer the roads, and has thereby taught many railway men that it is best in a democratic country for the managers of large businesses to get down off their pedestals and keep in touch with their fellow-citizens both personally and through the press. A pedestal is not precisely the best place from which to negotiate or fight, and diplomacy and war have played the most important parts in railway management in recent years, especially in the West. They are going to continue to play the most important parts. The railway problem is far from solved. Two things are requisite to solve it and avoid the terrible economic and political calamity of public ownership. One is continued rapid advance toward the reduction to the practicable minimum of abuses in the railway business. The other is the substitution in the public mind of the facts about the railway business for the fictions that now so largely occupy it. The one instrumentality that can do most to eliminate the abuses in, and to educate public opinion about, the railway business is an intelligent and honest press. A considerable part of the press needs reforming worse than the most dishonestly and incompetently managed railway that ever existed. There is no hope of a fair deal for the railways from what Mr. Carter describes as "erotic, neurotic and tommyrotic journalism." But as the management of most railways is sound and honest, so is the management of most newspapers; and as the better class of concerns of each kind greatly predominates, surely it ought to be possible for the one to furnish and to get published, and the other to obtain and publish, the sort of information whose publication will be beneficial to them and to the public, to which they owe an equal duty.

THE Massachusetts railway commissioners have made a report on the disastrous collision which occurred in the Hoosac tunnel last February—a very clear and temperate document; and their conclusions are reasonable. Most railway men will say, probably, that the commissioners are excessively cautious; but in cases of doubt or disagreement that is about the only recourse available to public officers. Moreover, that is often the way that railway officers themselves settle these difficult questions. The railways cannot complain much at this attitude of the state until they themselves make more thorough and persistent effort to remove the causes of doubts. On the immediate question of the cause of the collision, the commissioners can only say that probably it was a false clear block-signal indication. And from the facts, as stated, it does not look as though anybody could do any better. The story of the runner of the steam engine of the passenger train is of the kind which would stimulate most investigators to inquire into his motive and see if he were under any temptation to falsify; but the commissioners, who, we judge, were awake to every circumstance, do not suggest anything of that kind. If the four men on that engine were lying, or if a part were lying and the others were deceived, we should expect the inquiry to have at least given some hint of the fact. And the fact that the runner of the electric locomotive increased his speed, apparently with purpose, tends to confirm the statement that the signal did change to clear while the freight train was in the block. In ordering the railway to operate the automatic block signals as "stop and stay" signals, the commissioners are not unreasonable, for, with the telephone available, this need not be an inconvenient arrangement. The company is going to put in a telephone at every signal in the tunnel. Of course, it will be desirable, and perhaps necessary, to avoid stopping heavy freight trains on that part of the line which is up-hill, which means that the signals must be kept in perfect order and that freights must not be admitted to the tunnel on such short time intervals that they will habitually overtake one another. The use of automatic block signals as "stop and stay" signals would

be an interesting and useful experiment to try at many other places. With this plan, the recommendation that passenger trains (not freight) be kept three blocks (five miles) apart seems an excess of caution. Probably the greatest danger from a rear collision in the tunnel is the possibility of obstructing the adjacent track and the liability to fire; and in this view a collision of freight trains is as bad as one of passenger trains. The remorse over this collision is in one sense like that over the Titanic disaster: an alert person could have prevented it. Accepting the view that the automatic block signal wrongfully cleared—the home and the distant being seen to change at the same time—a thoroughly experienced, wideawake and thoughtful runner would have known that the clearing was abnormal. The commissioners are right in saying that enginemen cannot be required to compare, reflect and make mental deductions when they read a signal; but the fact remains that very often lives are saved because men do thus reflect, carrying out in two seconds a mental process for which the ordinary person would take perhaps minutes. Every passenger runner should have all the accomplishments of the best passenger runner. No superintendent can train all of his runners to be equal to the few of the best grade, for their natural deficiencies will partly thwart his efforts; but he can apply the training process to all, and that task is comparatively easy and simple. But it is not inexpensive.

MODERN LOCOMOTIVE BOILERS.

THE development of the locomotive boiler in recent years has been remarkable. It would seem that its size had been pushed to the maximum limits for both freight and passenger service. Those for Mallet locomotives furnish steam for a tractive effort of 100,000 lbs., and for passenger service they have reached the limits in height and width which roadway and structures will permit, and their capacity is more than 2,200 h. p. Improvements in the locomotive engine, the use of superheated steam, liquid fuel and very large cylinders, have all resulted in decided modifications of the type of boiler in general use a few years ago.

Some of these changes have their effect on the maximum working pressure, and there is a marked tendency toward pressures below 200 lbs. Passenger engines are now designed for boiler pressures of 185 lbs., while recent large freight engines have a working pressure of only 160 lbs. per sq. in. The heavy cost of boiler maintenance with high pressures and frequent failures of tubes and staybolts have had their result in movements favoring the lower pressures. Experience with reduced boiler pressure has been so favorable in this respect that the change is now well established and the loss in capacity has been made up by various improvements in the design of both engine and boiler.

A study of recent locomotive boilers reveals some variations in practice and some inconsistencies which are difficult to explain. When radically different designs of firebox are used for the same purpose, it is probable that one form is better than the other, but in the absence of exact experimental data it is difficult to prove it. If each of them furnishes sufficient steam for the engines when performing the service expected they are regarded as satisfactory, though a careful test might show one design more economical in fuel than the other, while its capacity may be less.

We shall consider only one prominent illustration of this, and that is the wavering practice in the use of combustion chambers, with tubes of moderate length in one lot of locomotives and straight tube sheets and very long tubes in another lot, when there is nothing particular in the service which should determine one or the other type of firebox. The combustion chamber was welcomed as a simple expedient for maintaining a moderate tube length in the very long boilers used where there are numerous coupled drivers. We were told that the front portion of a 20-ft. tube has little value as evaporating surface, and the larger area of firebox heating surface exposed to the direct effect of the hot gases and to the radiant heat of the red hot fire bed more than made up for the slight loss of 2 or 3 ft. of the front tube end. Then, too, very positive claims are made for the advantage of larger firebox volume which the combustion chamber furnishes for the complete combustion of the hot gases, and we have published the results of tests which show a saving in coal consumption of 10 to 15 per cent. as a result of such construction.

In the design of the boilers for the Chesapeake & Ohio Mountain type passenger locomotive advantage was taken of these claims. These engines are required to haul passenger trains weighing 650 to 700 tons over mountain grades 80 ft. per mile at speeds of 20 to 25 miles per hour, and they are the largest and most powerful simple engines in one unit ever built. A boiler of maximum capacity was demanded, and it has a combustion chamber 42 in. long and tubes 19 ft. long; with this construction the locomotive has exceeded the required performance. Another locomotive intended for higher speeds—the experimental Pacific type, No. 50,000—has since been built for maximum capacity per unit of weight, and by careful design the weights of machinery have been kept as low as possible, so that the boiler might be enlarged without exceeding conservative wheel loads. Great care was taken in the design of this boiler, and its proportions may be taken as representing the latest and best ideas in regard to firebox and tube relations. In it we find a straight tube sheet and no combustion chamber and the tubes are 22 ft. long. The performance of this engine exceeds in capacity that of any other Pacific type engine, having developed 1 h. p. for each 121.4 lbs. weight of engine. It also shows a greater economy in fuel per indicated horsepower than other locomotives of this type and equal weight.

The railway manager who is ready to order passenger locomotives of maximum capacity and economy will naturally ask why it is that where these considerations were paramount in another case, the tubes are 3 ft. shorter and a long combustion chamber was used. It may also puzzle the engineer, for we have seen no explanation of these vagaries in boiler design in the most recent practice. It might be said that the Chesapeake & Ohio Mountain type locomotives were intended for slower service on heavy mountain grades and the question of speed has some influence on the design. This explanation fails when we find the largest locomotive boiler ever built—that for the Pennsylvania simple Mallet for slow mountain freight service—has tubes 24 ft. 8⅞ in. long and no combustion chamber. This boiler is 104 in. in diameter at the throat sheet, and with the superheater has an equivalent heating surface of 8,000 sq. ft. The Pennsylvania has made experiments at its locomotive testing plant at Altoona with plain fireboxes and those with combustion chambers, to determine the relative value of firebox and tube heating surface; and, though the results of these tests have not been made public, we must conclude that the extremely long tubes in the new Mallet locomotive built for that road clearly indicate a preference for a design which excludes the combustion chamber. The boiler performance of this engine will be examined with special interest, for if it meets expectations as to economy and capacity we may conclude that for either passenger or freight service there is no economic limit to the length of locomotive tubes excepting those imposed by the deflection due to their weight and other questions apart from their function as heating surface.

We expect that something definite on the general subject here considered will be shown as the result of the extensive and important locomotive boiler tests now being conducted at Coatesville, Pa., under the direction of Dr. W. F. M. Goss. The first series of these tests concerns the determination of the efficiency of fireboxes of different construction independently of the tubes, and they include measurements of the relative evaporating capacity of a unit area of firebox heating surface as compared with the capacity of a unit area of tube heating surface. With this information at hand, the development of locomotive boiler design should proceed consistently and without the variations here noted which are now so difficult to explain.

THE NEW YORK, WESTCHESTER & BOSTON.

THE New York, Westchester & Boston, the construction of which is described elsewhere in this issue, is unique in that it is the first new electric line built in this country to first class steam railway standards. Physically, it is comparable to the electrified lines of the New York Central, the New Haven and the Pennsylvania. The project is particularly interesting for its traffic possibilities, and these cannot be accurately forecast. The road was originally promoted by independent interests, two separate companies, in fact, having obtained conflicting franchises. Four years ago the New York, New Haven & Hartford bought these companies. To a certain extent it did so in self-protection, as the territory to be served was one much of which was tributary to the New Haven's main line and its Harlem branch. The justification for the expenditure of the New Haven's money on the construction of the new road, however, does not by any means rest on this. At that time the New Haven had no intention of parting with the New York, Ontario & Western and a direct connection between that property and the New Haven's freight terminals at Harlem river would be of great advantage, particularly, for handling Ontario & Western coal. The refusal of the New York Public Service Commission recently to allow the transfer of the control of the Ontario & Western to the New York Central makes this possible connection as desirable as it was before. The Westchester line has no immediate plans at present for building north from White Plains. It may eventually build north to the Central New England to get its connection with the Ontario & Western, or it may reach the same point by trackage rights over the Harlem division of the New York Central. The lower part of the line may be given additional business if a line is built from White Plains northeast to a connection with the New Haven in the Berkshires, which will make a shorter route from this increasingly valuable territory than the present New Haven line down to South Norwalk, Conn., and thence to New York over the main line.

The more immediate traffic which the Westchester may expect is the suburban passenger traffic into New York and, in fact, it is at present planned to operate only passenger trains. The part of the line in the northern part of New York City runs through a territory which, though now hardly built up at all, is on the frontier of one of the most rapidly growing sections of the city. The population of the borough of the Bronx more than doubled between 1900 and 1910, and the population of Westchester county, in which that part of the line north of the city boundary is located, increased over 50 per cent. in the same period. The line reaches towns from which suburban business is now heavy, and when its southern terminal arrangements are completed it can expect to carry a large part of the passenger traffic which now moves over the New Haven and the New York Central into the Grand Central station at New York. The main terminal of the line is really the station at 180th street. This is a few blocks from the present terminus of the easterly branch of the Interborough Rapid Transit subway, and the latter is to build a connection into the Westchester's station, although there will be no track connection. The Westchester also runs south from this transfer station to a connection with the Harlem branch of the New Haven, over whose tracks it runs to the terminal at 132nd street. Here passengers will be interchanged with the Second and Third avenue elevated lines, which must ultimately be third tracked, so as to give a better service to the lower part of the city. Further extensions of New York subways into this general region are assured, so that the Westchester can ultimately send its passengers down into the city by at least three rapid transit routes.

The company's methods of handling its passengers, particularly the use of zone tickets which the passengers will give up at destination, so that no ticket collectors need be used on the trains, are novel and will be described in a later issue. These arrangements are typical of the attitude of the management in doing all it can to give the public good service and relieve them of minor discomforts. Another innovation looking to this end is the distribution among all its station and train employees of booklets giving the names of all stations, the principal streets, with the name of the station nearest to each, the connecting trolley lines, residence parks, etc., the purpose being to help the employees to give the public accurately and courteously such information as it is likely to ask for. A management that starts with this idea of giving the public what it wants before the public even knows what it wants, much less demands it, has taken a long step toward getting generous support.

THE RAILWAY ACCIDENT SITUATION.

ON the initiative of F. C. Rice, chairman of its transportation committee, the American Railway Association, at its meeting in New York in May, adopted three resolutions regarding railway accidents. We present elsewhere a summary of the resolutions and also Mr. Rice's remarks in introducing them.

The association was justified in directing attention to three of the most important facts regarding the accident situation. As its resolutions set forth, first, a majority of the fatalities on American railways is due to trespassing on their property for which they are not responsible; second, a large majority of the remaining accidents is due not to defects of plant or equipment, but to shortcomings of the human element in operation, and cannot be prevented by the use of automatic safety devices, whether installed voluntarily or in obedience to legislation; third, the existing rules of operation would prevent most of these latter accidents if they were rigorously enforced and implicitly obeyed.

The statement of these facts suggests the remedies for most accidents. First, trespassing ought to be stopped by the compulsion of law. The fatalities due to this cause, outnumbering those from all other causes, are of all the most unnecessary and preventable. People must ride on trains and work on railways, but they don't have to steal rides on trains or walk on railway right of way. And when the public becomes as zealous in plucking the accident beam from its own eye as in trying to remove the mote from the railways', there will be a sweeping reduction in fatalities. In England any one except a railway servant who ventures on a right-of-way is promptly arrested and fined or jailed. In this country such action, whether against a citizen of the community or a hobo riding on a brakebeam, would be considered an outrage. This imbecile attitude of public and public authorities caused 14 people to be killed yesterday, 14 to be killed today, and will cause 14 to be killed tomorrow, and the next day, and the next, if the average of the last ten years is holding good. As the studies of fatalities to trespassers made by Frank V. Whiting, general claims attorney of the New York Central Lines, and by R. C. Richards, general claim agent of the Chicago & North Western, the results of which have been published in the *Railway Age Gazette*, show, a large majority of these people are working people and business people, just like those killed in trains. A public and public authorities that will year after year allow such a horrible slaughter to go on, and lift hardly a finger to stop it, act the part of contemptible hypocrites when they denounce and legislate about accidents due to other causes.

However, as Mr. Rice said, the initiative in reducing accidents ought to come mainly from the railway managers, for they know the conditions and remedies better than any other persons. It is quite true, as he stated, that existing rules of operation, based on the experience and worked out by the wisdom of the railway men of the United States, would, if enforced and obeyed, prevent most of the accidents not due to trespassing. But accidents continue simply because the rules are not enforced and obeyed; and before they will be enforced and obeyed, there must be developed in the personnel of the transportation business a very different spirit from the present one. We have often pointed out that many accidents are due to infractions by the employees of orders and rules of the companies. But, as we

also have said, that is not the whole story. While automatic devices will not alone remedy the situation, experience has demonstrated that block signals, and especially automatic signals, do increase safety; and their installation has not been carried forward as fast as it ought to have been. Furthermore, the railway managements cannot escape responsibility for many of the violations by employees of train and signaling rules. There is no question that in some cases the managements have so scheduled trains that it is almost impracticable for employees to run them as required, and at the same time obey the rules. In other cases, while this could be done it is difficult. It is not a thing wholly unknown for operating officers to wink at infractions of orders and rules committed by employees to get their trains over the road on time until an accident results and for the officers to then shield themselves behind the violated orders and rules.

Now, a rule that is not fit to be enforced is not fit to exist, and when accidents result from a practice on the part of the employees that has been winked at by their superiors, the railway management is more responsible than the employees are. The difficulties that a railway officer will meet who insists on trains making their schedules and on all rules and orders being at the same time implicitly obeyed, and who deals with an infraction of a rule which does not cause an accident in precisely the same way that he deals with one which does cause an accident, are apt to be very great. But that is the only policy that will ever stop most accidents. It may meet with resistance from employees' organizations at first. But if its carrying out be accompanied by a campaign of education which will bring home to employees the imperative need, for their protection as well as that of railway patrons, of better co-operation between managements and employees to promote safety, and of stricter administration of discipline in the cases of those employees who cannot otherwise be prevailed on to do their duty, the results are certain to be marked and beneficial.

It is to be hoped that the resolutions adopted by the association are but the forerunner of vigorous, persevering action. Mr. Rice did not exaggerate the danger to the railways in the present situation. The public and Congress, ignorant as to the causes of railway accidents, and misled by the leaders and legislative agents of the railway brotherhoods as to the proper remedies, seem disposed to try to regulate all the features of railway operations affecting safety except the human element, which is the most vital factor of all. To regulate all the phases of operation affecting safety would be to regulate almost every phase of operation whatever. This would involve transferring to public authorities as much control over operation as they now have over rates. Most of the regulation of operation that has thus far been adopted has been finely adapted to causing the railways trouble and expense, but hardly at all adapted to preventing accidents. The handling of the question of the transportation of explosives and other dangerous articles by the bureau established for that purpose by the American Railway Association has had excellent results. The men employed are highly competent, and they do not consider it their function merely to find fault with the railways or gather evidence on which to base prosecutions of them, but, rather, to adopt means which actually will prevent accidents. On the other hand, the investigations of and reports on accidents being made under the supervision of the Interstate Commerce Commission, under the provision of the safety appliances law and the accident law of 1910, are such as to reflect discredit on the regulating authorities and to contribute almost nothing to the solution of the accident problem. The wide difference between the character of the work of the Bureau of Explosives and of that of the commission's investigators and inspectors is an overwhelming argument for railways taking more vigorous concerted action than they have ever done to reduce accidents, both because the accidents ought to be reduced, and because if the railways don't reduce them they will invite further government interference of the character just mentioned.

NEW BOOKS.

Economics of Contracting. By Daniel J. Hauer, Eastern Editor of *The Contractor*. 6 in. x 9 in. 269 pages. Cloth binding. E. H. Baumgartner, Monadnock Block, Chicago. Price, $2.50.

The amount of literature treating of the business or profession of contracting is not large, doubtless for the reason that the men engaged in contracting are in general not trained readers. They are apt to discount very heavily the knowledge gained from the experience of some author in favor of the experience they gain by their own successes and failures. No university courses in contracting have been offered, and it is usually considered a subject which cannot be thus taught. Many engineering graduates and many young men not technically trained are entering the field of contracting, however, with little knowledge of the details of the work they will do, expecting to learn it as the men now engaged in the work have learned it, "by hard knocks." For such young men the very detailed experience of Mr. Hauer as set forth in his book should be interesting and valuable. To a student the title of "economics" may suggest a broader and more scientific treatment of the subject than a reading of the book will reveal, but, as this class of readers will no doubt be numerically small, the title cannot be seriously objected to. The author states that the purpose of the book is to set forth the "how" of contracting, and in following out this purpose he covers details of the work as minutely and as widely separated as oiling harness and handling business correspondence. Some of the most interesting chapters treat on "Forms of Contract," "Construction Camps," "Contractor's Outfit and Plant," and the other chapters contain a great deal of matter regarding the organization and management of contracting companies.

Electric Traction for Railway Trains. By Edward P. Burch, consulting engineer. Cloth, 583 pages, 6 in. x 9 in., illustrated. Published by the McGraw-Hill Book Company, New York. Price, $5.

There has been a demand for a book of this sort in the railway engineering field, both for the technical student and the practicing engineer. It is not presented in the nature of a popular treatise on the subject, but with the desire to satisfy the wants of the engineer. The first chapter is devoted to a resume of the history and the present status of electric traction, including tables presenting the general data of roads using electricity in America and Europe. The second chapter concerns the characteristics of modern steam locomotives, giving operating data and diagrams of some of the most recent power. The next two chapters consider the advantages of electric traction and the various systems available, citing the various railways using these systems. The following chapters consider the arrangement and design of the trains and locomotives in detail, giving technical descriptions of the direct current, the three-phase and the single phase locomotives. The way in which power of different kinds may be transmitted and developed at the power plant is considered. Tables are given with operation cost data and information about the equipment for different roads. Throughout the book references are made to articles in the standard engineering journals.

The Coal Trade. By Frederick E. Saward, Editor *Coal Trade Journal*. 20 Vesey street, New York. Price $2.

The 1912 Coal Trade is the thirty-ninth annual handbook covering statistics and conditions in the coal trade. It is a handbook that is essential to those interested in the coal business, and is of value to railway men whose roads carry any considerable amount of coal. A good history of the trade, not only for the whole country, but for the important individual sections of the country in which coal is produced or marketed, is given, and the handbook also includes a great number of short studies on various subjects connected with coal which are very useful as references. The book might be compared to a newspaper almanac, devoted, however, entirely to one subject. The value of such a handbook is affected very much indeed by the kind of index which accompanies it. The index of *The Coal Trade* seems to have been prepared conscientiously and fairly fully.

Letters to the Editor.

INSPECTION OF RAIL MANUFACTURE.

Montreal, May 27, 1912.

To the Editor of the Railway Age Gazette:

In your issue of May 10, pages 1030 and 1057, you refer to a method of increased inspection of rails, which you state has been devised and put into operation within the past two months by one of the rail inspection bureaus, by means of which the rail is followed through the process of manufacture by placing additional inspectors in the converting works, in the blooming mill and at the testing machine.

As a matter of history it may not be amiss to mention that in the early fall of 1911, in conjunction with Chief Engineer Ashby, Engineer of Maintenance of Way Moore, and others of my associates on the Lehigh Valley, I developed in connection with rail inspection on that road, a system by which, with a corps of ten inspectors, a definite record was kept of each operation throughout the manufacture and rolling of the steel, taking particular note of any unusual occurrences in the mills, night and day, and making record of the more important matters upon special printed forms.

From the above statement of facts, which are widely known today in railway circles, you will note that there is nothing novel in the plan which you state has been "devised and placed in operation within the last two months," since its essential features were devised by us last fall and have been in successful operation since that time. Evidently, however, you were not informed correctly as to the origin of the method, and as a matter of fairness to myself and my associates, I trust that equal publicity may be given to this statement in your next issue.

Another feature of our new system, but to which you did not refer, consists in following up the ingots in each heat and seeing that the ingot number in its proper order is stamped on each rail in addition to the heat number, so that any rail after being laid in track can be identified at any time. Six test-butts are taken from the tops of six ingots selected by us at random from each heat, and these are subjected to the drop test. In case of failure of one of the butts, the rails of the ingot (about five in number) are rejected, and in case of failure of the butts from two ingots the entire heat represented is rejected.

We devised our new system of rail inspection, because as a result of long critical study of the rail situation and of rail failures in service in many parts of the United States and of Canada it was clearly proved that in many instances the failure was due to a single defective ingot, and that the rails from other ingots in the same heat were of normal quality and gave good service. Thus, it was evidently desirable to develop a practicable system by means of which a defective ingot, if present, could be detected, and this conclusion naturally led to the adoption of the test by ingots, a plan which was proposed a number of years ago. The object of our new system, in a word, was to lessen the liability of the production of defective material, by means of careful oversight of the process of manufacture, and then to safeguard the quality still further by means of the "test-by-ingot system," so that there would be a far greater certainty of identifying defective material when present than under the ordinary method of test.

Our original specification proposed testing a butt from the top of every ingot, accepting or rejecting the rails of each ingot, but as the drop testing facilities at the mills were too slow to render the plan feasible without causing delay, the plan of testing six butts from each heat was finally adopted, and about 10,000 tons of rails were rolled under the new system of inspection back in the fall of 1911.

If the speed of operating the drop testing machines at the mills is increased, as can readily be done, and with the addition possibly of another drop test machine, it should be quite possible to make the test entirely by ingots; that is to say, testing every ingot in a heat and rejecting only such ingots as might be found defective, unless, of course, a large proportion of the ingots in a given heat were of bad quality, in which case, as a matter of safety, the entire heat would be properly rejected. Such a plan would be to the advantage of the railways, since it would enable them to identify and reject defective material with far greater certainty than under the old system, and it would be of great benefit to the mills, since much good, serviceable material which would otherwise of necessity be rejected together with defective material, could under this system be proved to be of good quality and be safely accepted and placed in track.

ROBERT JOB,
Chemist, Lehigh Valley.

[While Mr. Job's statement is equally interesting and accurate, it nevertheless is true that the system of inspection described in the *Railway Age Gazette* of May 10, was new in respect to its introduction at so many mills for so many railways.—Editor.]

"THE NEWSPAPERS AND THE RAILWAYS."

New York, May 27, 1912.

To the Editor of the Railway Age Gazette:

Your confession in your editorial of May 25, entitled, "The Newspapers and the Railways," that you don't know what news is, nor the difference between news and advertising, is so shocking that someone should hasten to enlighten you. Having been for some years on the editorial staffs of daily papers in constant irritating contact with the business office's obsession on the subject of advertising perhaps I may as well get my hat into the ring.

It seems incredible that any one could squander his pennies all these years on those most conspicuous examples of erotic, neurotic and tommyrotic journalism, the New York evening papers, without discovering what news is; but since you haven't, you must needs be told that if its fit to print it isn't news. The only legitimate sources of news are the police station, the divorce courts and the imagination of the rewrite man.

Advertising is any information of public interest offered for publication by any one connected with a railway. It is a great comfort to be assured by Mr. Cobb that, thanks to the American Newspaper Publishers' Association, the editors of the country are on their guard against these railway space grabbers and are determined that no advertising shall pollute their news columns except at regular rates, with the usual discount for cash.

Something should be done about these railway press agents. If they would only bring us around some hot stuff of genuine interest to our readers, to-wit, the gentlemen who devote six afternoons a week to watching the baseball bulletin boards, the kind furnished by the press agents of prize fighters and leg shows, we might give them the regulation daily allowance of two pages of free space. But when they try to work us for a few lines about an educational train to teach farmers how to make more money by increasing their crops, or something of that sort, why, it is going a little too far to ask publishers to help the game along.

It is a peculiar thing about railway advertising that it always helps others before it helps the railways and helps them more than it helps the railways.

Where would the west be but for the railways? The railways were the pioneers. They did not stop with furnishing transportation, but went ahead and created traffic by the unstinted use of money to develop the country. Remember how the Santa Fe boosted Kansas? How a single detachment of immigrants secured through the exclusive efforts of the Santa Fe consisted of 1,900 souls with $2,250,000 gold in their jeans? That was only a sample of many similar instances. But for the railways there might be a scalp dance tonight on the spot where the *Freeport Journal* is now published; and Manager Cobb, if present at all,

would be there as the central attraction in a barbecue. The same sort of development work in which the state and its citizens profit first is still continued by the railways. In the seven northwest states in which two railways are spending half a million dollars a year in development and exploitation work the population increased 37 per cent. in the last decade, as compared with an average of 21 per cent. for the rest of the country.

And where do you think the resorts of California and Colorado would be but for the persistent and lavish exploitation of them by the railways? Yet the tourists who frequent them spend many times as much on hotel bills and incidentals as they do on railway fares. All this helps to support the whole community, including the newspapers. For every cent the railways get in returns from the advertising they do, other folk get a dollar, and they get the dollar first.

Talk about biting the hand that feeds you!

No wonder the railway doesn't "reciprocate" every time Manager Cobb gives it a free advertisement by printing its name in an account of an accident! Didn't he help elect the reformers who legislated the pass out of existence? The railways used to "reciprocate" to the extent of 15 per cent. of their passenger traffic. Even at that some of them managed to pay dividends, while, as for the rest of us, we made money so fast we couldn't stop to count it. Then a Great Noise was heard in the land. It was the sound of preparation for a third term. As the easiest way to acquire popularity and, hence, votes, it swatted the railways. The rest of us came in strong on the chorus. Since then we have had plenty of time to wear out our old clothes.

Mr. Cobb is unduly alarmed about railway press agents. As a matter of fact the railway press agent is a joke, and the efforts of the railways to utilize his services is a three-act farce. One tried to keep me from getting a perfectly innocuous story about his road. Another has never responded to various requests to furnish information. I never knew him to volunteer information to any one. Even those highly paid space grabbers, the general advertising agents, are but little better. I wrote a lot of them for information you would suppose they would be tickled to death to have published. How many do you suppose even answered my letters? One in nine!

No, indeed; the trouble with the railways is not that they are space grabbers. Most railway officers are courteous, long-suffering gentlemen when you get 'em cornered where you can extract information with forceps; but they lack the gumption to make a perfectly proper use of legitimate opportunities to obtain publicity for matters of prime importance to the community at large and of incidental advantage to the railways.

When Mr. Cobb once finds out on which side his bread is buttered he will print all the stuff the railway space grabbers send him and yell for more.

CHARLES FREDERICK CARTER.

Topeka, Kan., May 27, 1912.

To the Editor of the Railway Age Gazette:

I have read with interest your editorial and the letter of N. Y. Cobb of the *Freeport* (Ill.) *Journal* on the relations between the railways and the newspapers. As a reporter who has wormed news out of the railway men for the last few years, I would like to offer a little evidence on the subject.

I do not agree with Mr. Cobb. It has been my experience that railway officials have realized that subsidized news does not pay. It is true that railways are sending out many columns of "free advertising" through their press agents, but, on the other hand, I believe they are furnishing the newspapers with good live news stuff—material that never was given out before because of reporters who did not know how to write it.

Every day a newspaper man will hear a railway official complain: "I wouldn't mind giving out a story now and then if the reporters wouldn't 'ball it up.' They don't pay attention to any of the details we give them—just slide the stories out of their typewriters and try to attract the attention of the city editor with a sensational feature."

The railways realize that the public is demanding a certain amount of publicity, and they have selected men to write out the details for them. The newspapers don't have to print it as written. But the railways do ask that they use the details as sent out by the publicity agents.

Mr. Cobb says his division officers hold up news on wrecks—and he judges all railway men by the reports given him by his reporters. Here in Topeka two big railways have headquarters offices—the Santa Fe and the Rock Island. The details of a wreck are given out as cheerfully and honestly as an item concerning the luxury of their California limiteds.

Here is the way western railway officers figure it—and it is a philosophical way of gauging the public mind:

A newspaper hears of a bad wreck. The railway officials refuse to give the details. The paper hears more rumors. Still the officials are silent. Press time is nearing. Opposition papers are crowding the field. What is there to do? Print the rumors, of course. Display the story on the front page under a big headline. More rumors, more headlines, more sickening "reported" details. "Whew!" says the reader, "That was a terrible wreck on the Santa Fe today, wasn't it?" That is the old-fashioned spirit in railroading.

Now suppose the officers give out all the details. The newspaper publishes everything. It's all over in one or two issues. The next day Taft or Teddy claim Ohio or New Jersey, or the entire nomination, and the public forgets about the wreck. If the officers refused to give out the news, the newspapers would print rumors, reports, experiences and corrections for days—and the reading public would be confronted every morning and evening with the "terrible wreck."

Every day I receive publicity agents' letters and "stuff" at my desk. I can say honestly that four-fifths of it is good, readable matter; very little "bunk." The railways in a great many cases choose newspaper men to handle their publicity agency—and newspaper men are not disposed to distribute poor stuff. They know better than to peddle raw free advertising.

It is my observation that the newspapers themselves publish more rot about the railways than the railways ever will be able to have printed through their publicity departments.

Of course, railway officers do not tell their business plans to newspaper reporters. Suppose an officer informed the newspaper that his road intended to build shops immediately on a certain tract of ground—before the ground was purchased. The value of the land would rise like a toadstool in the night.

I think a large part of the trouble between the newspapers and the railways in the past has been due to the reporters—the representatives of the newspapers. Like everyone else they have been raised to believe that the railway officials are red dragons and that railway news has to be procured with dynamite and abuse.

I think this sentence in your editorial just about covers the situation: "Newspaper men have much to learn about the railway business and railway men have much to learn about the newspaper business before they will always give each other a fair deal."

ARTHUR J. CARRUTH, JR.,
Topeka State Journal.

They talk of the "growing" traffic of the Siberian railway. It seems that in 1910 the number of passengers from places outside of Russia who passed over the line was 5,022, who paid fares amounting to nearly $650,000. This is equivalent to less than seven persons each way daily and to $162 per mile of railway—which will not go far towards supporting it. Yet this is an increase of 36½ per cent. in the number of passengers and to 38 per cent. in the earnings, compared with 1909. Evidently it is the local traffic that supports the road, so far as it is supported.

THE NEW YORK, WESTCHESTER & BOSTON.

Construction of the New York, New Haven & Hartford New High Speed Electric Line Running North from New York City.

BY GILBERT G. BROWNE

The New York, Westchester & Boston Railway, part of which was put in operation last week, is a four-track electric line owned by the New York, New Haven & Hartford. It runs from White Plains, N. Y., to 174th street, New York City, where it joins the Harlem branch of the New York, New Haven & Hartford, and when completed will be operated as a part of that system. Beside connecting with the Harlem branch at 174th street, interchange of traffic will be made with the West Farms branch of the Interborough Rapid Transit subway at 180th street and Morris Park avenue. There is also a branch connecting with the New Haven main line at New Rochelle.

The proposition of building a line along the general location of the New York, Westchester & Boston is not new. The original company was formed many years ago, and right-of-way was purchased from time to time. About ten years ago actual construction work was begun on the southern end of the road, but the company was unable to finance the project and was forced to give it up. Later, control of the road was bought by the New York, New Haven & Hartford, which company relocated the line, and commenced construction work in 1908.

Throughout its entire length, the line has been built to conform with the main line standard of the New Haven. The rail is 100-lb. section and creosoted ties with 22 in. of ballast are used. All bridges are of concrete and steel, and have been designed to stand heavy traffic at high speed. They are all waterproofed. The road will be operated by single phase current as a part of the New Haven electrical system, and multiple-unit trains will furnish the passenger service. There will be no freight service for the present. It is four-tracked from 174th street to Mount Vernon, where two tracks diverge to White Plains, and two to New Rochelle. The entire line will be fenced in private right-of-way, protected with block signals and free from grade crossings.

The maximum grade is 1.0 per cent., except for one stretch of 2.5 per cent. from 174th street, the junction with the Harlem branch tracks, to the south end of the West Farms Viaduct at 177th street. The adjustment of alinement and grade at this point was one of the most difficult problems which the engineers encountered and the present location was adopted only after trying and discarding many others. Certain fixed street grades over which the tracks must have sufficient clearance, certain other points, like the junction point, at which the elevation was fixed, added to difficulties in obtaining right-of-way, all served to confine the possible solutions within narrow limits, and made the task one not so much of choosing the best, but of avoiding the worst. It was finally decided to carry the tracks over 177th street, and this extraordinary grade was necessary to give the tracks sufficient clearance. The curvature is limited to 4 degs., except for one 6-deg. curve through Mount Vernon.

From the Harlem river to about 174th street the road will be operated over the tracks of the Harlem River branch, which will be completed so as to be available for such operation under a contract granting perpetual rights to the New York, Westchester & Boston. Just north of the present West Farms station on the joint tracks, the road diverges from the Harlem, and after crossing upper West Farms on a four-track steel viaduct 2,000 ft. in length, makes its first independent stop in the transfer station at 180th street, near the eastern border of Bronx Park. The plans for this station call for a steel and concrete structure, 200 ft. wide by 540 ft. in length. Half a mile north the road crosses over the Morris Park viaduct. This viaduct is of reinforced concrete 400 ft. long, and varying in height from 20 to 30 ft. It is very carefully designed architecturally, to secure a

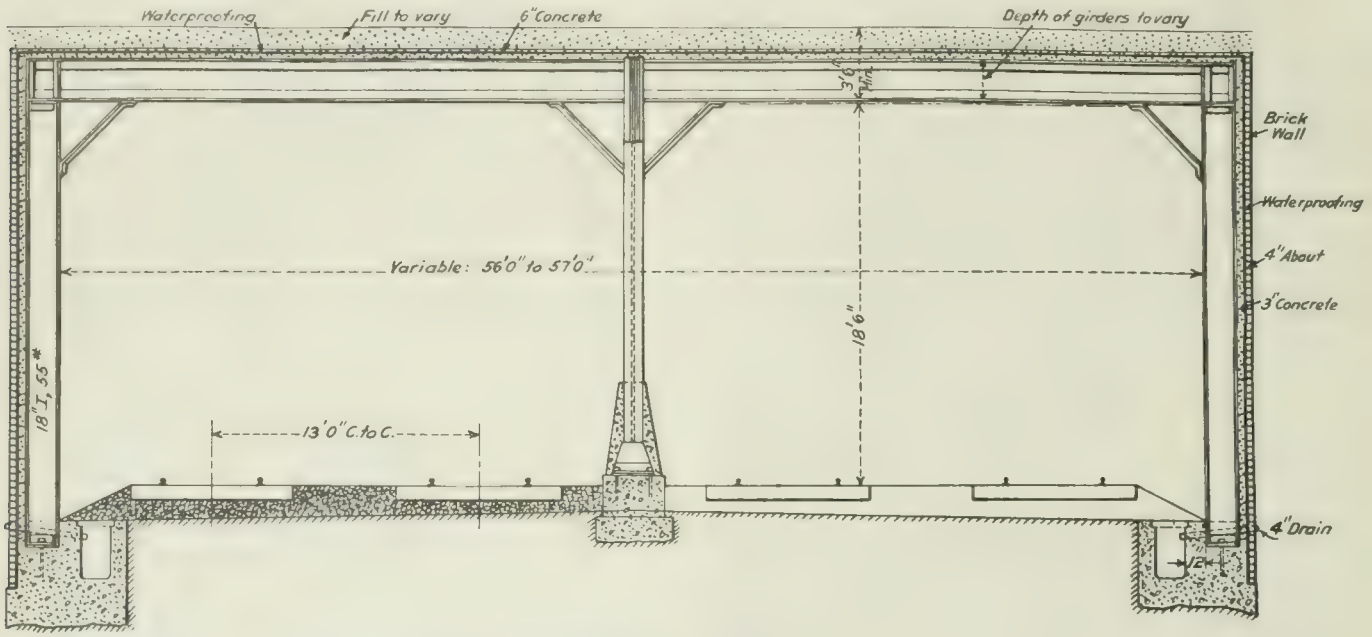


New York, Westchester & Boston.

pleasing effect, so that the value of the surrounding property for residential purposes might not be impaired. The walls rise several feet above the track and have been finished with great care to add as much as possible to the appearance of the structure. All exposed surfaces are dense and smooth, and all exposed edges chamfered.

Immediately north is the Pelham Park subway, three quarters of a mile long. The company was forced to build this subway, instead of leaving an open cut, in order to obtain the right-of-way. After the cut was made, concrete piers were sunk and on these piers the steel framework was built. The general type of steel work is shown in the accompanying photograph and cross section. After the erection of the steel, the side walls and the top were filled in and the whole then waterproofed. It was then back-filled to the original grade.

The interesting problem connected with the building of this subway was that of adjusting the grade and section of roof members to the conditions imposed by the varying levels of the streets which cross the subway. The clearance from base of rail to under side of roof is 18 ft. 6 in. Where the level of the street was higher than the average, the difference was taken care of partly by varying the gradient and partly by making a deeper and therefore more economic section of the I-beams in the roof structure. As few variations in section were made as consistent with economy so as to facilitate fabrication and erection. Another problem about which there was considerable dis-



Typical Cross-Section of Pelham Park Subway.



Steel Work for Pelham Park Subway of New York, Westchester & Boston.



Subway with Brick and Concrete Work Completed and Back Fill Under Way.

cussion was as to the footings of the columns of the sidewalks. The base of the column rests on the same level as the floor of the subway. Some 3 in. from the near side of the column base a concrete wall 9 in. thick and 12 in. high was made, the intention being after the walls were in place to fill in the space between the column bases and this wall with concrete. There was some question as to whether this, combined with friction, would be sufficient to withstand the earth thrust. After the roof members and side curtain walls were in place, there was a heavy slide of material from the sides of the cut at one point, which forced the whole steel structure out of place, driving the bases of the columns up against the 9 in. wall, which held. This practical test settled any doubts. In general, to resist side pressure the whole subway structure acts as a unit, the floor system and the roof system dividing the horizontal thrust. At the station in the southerly end of the subway, and at the one in the middle, the stairway wells make it impossible to continue the integrity of the roof system, so at these points concrete retaining walls on each side of the subway are put in to take care of the earth pressure. The waterproofing is four-ply Barrett specification.

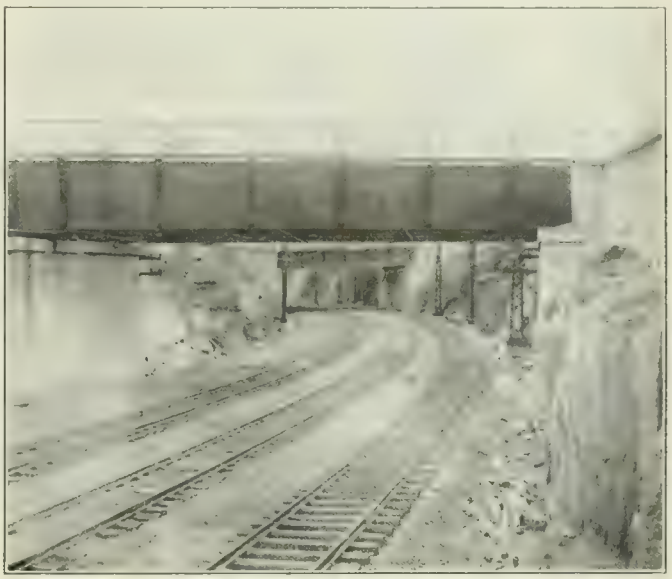
From this point to the East Sixth street station at Mount



Bridge Near Southern Portal of Pelham Park Subway.

Vernon there is comparatively light work, most of it embankment. East Sixth street marks the southern end of the cut through Mount Vernon. This cut is from 20 to 40 ft. deep, and is almost solid rock throughout. From the northern end of this cut the tracks run out upon the Columbus avenue viaduct. This viaduct is about 400 ft. in length, including the through girder bridge of 104 ft. span over the main line of the New York, New Haven & Hartford R. R. The main girders are supported by towers resting on concrete pedestals; these towers are made up of 10-ft. girders supporting the main girders and resting upon H columns. In this structure each end of every longitudinal girder rests on a column and never on a transverse girder. This results in what at first sight appears a peculiar arrangement of columns in some places, particularly near the crossing of the New Haven tracks and the streets just north of the tracks. The columns are built up of ¾ in. plates and 3 in. single-bars, and their bases rest on ¾ in. bed-plates 48 in. x 56 in.

The girders used in the span over the New Haven tracks are exceptionally heavy, those in the center supporting two tracks weighing 96 tons apiece, and the outside ones, 54 tons. The distance between bearings is 104 ft. and the depth of the girders 10 ft. 6 in. The erection of this span was most interesting. The viaduct was built from the north end, as there was no point to the southward at which the steel could be brought in economically. The traveler used in the erection of the viaduct could handle the outside, 54-ton, girders alone, but not the three heavy girders. After the abutments and piers were built, the steel



Cut Through Mount Vernon.

work was erected up to the abutment north of the New Haven tracks. The two light girders were then erected by the traveler, one at a time, close together in a temporary position on about the center line of the bridge, the girders being lifted from freight cars on the New Haven tracks below, as shown in the accompanying photograph. A temporary floor system was then put on these girders and a track laid. A derrick car was then run under the traveler and over this temporary track to the south abutment, from which position it erected the first span of the viaduct south



Typical Concrete Bridge.

of the abutment. Tracks were laid on this span and the derrick car run out on it (having first, of course, to be run back over the traveler and to the nearest point where it could be turned around so as to face the work on the long span over the New Haven tracks). Skids, consisting of rails on grillage, were then put on the two abutments. Two of the heavy girders were then lifted up from the New Haven tracks, each being handled by the

derrick car on the viaduct working together. These girders were put in temporary positions on the skids at each side of the light girders. The temporary track and floor system under the light girders was then removed and these girders were lifted out to their final positions. The two heavy girders were then moved on the skids to their final positions, which could not have



Typical Tower of Columbus Avenue Viaduct.

been done before because of the position of the temporary track; and the third girder was lifted direct to its final position.

A few hundred yards north of this viaduct is the junction point where the tracks diverge, two running east through New Rochelle to the New Haven main line, and two extending north through Eastchester, New Rochelle and Scarsdale to White Plains. Immediately upon leaving the junction the former cross the Hutchinson river on a steel concrete floored viaduct 700 ft. long. The general type of construction of this viaduct is very similar to that of the Columbus avenue viaduct. At Fifth avenue, North Pelham, is a large concrete arch bridge which carries the tracks over the avenue below. The structure was designed to be a station also, and the combination is very effective. Between the station and Webster avenue, half a mile north, there is considerable heavy cutting, and from Webster avenue the road drops down for nearly a mile on a 1 per cent. grade to the junction with the New Haven main line.

The White Plains branch extends northward after leaving the junction point and runs over a 30-ft. fill for several hundred feet before it also crosses the Hutchinson river. This fill, while not very large, is mostly earth and has given much trouble from settling, particularly when concrete piers for the catenary bridges, which carry the electric contact wires, were being set. The bridge over the Hutchinson river is a single span deck girder, 105 ft. long. Except for the cut at Wykagyl station and the Essex road crossing, there is comparatively little heavy work between this point and the heavy cut south of Quaker Ridge station.

At Heathcote, a mile north, the site of the station was at the intersection of Heathcote road and Palmer avenue, all upon the same grade. Both roads were therefore raised for several hundred feet back from the station and are now carried over the tracks on steel girder bridges.

Norton avenue, which crosses the line half a mile from here, marks the southern end of a solid rock cut, less than 500 ft. long, but over which the company has had to build three bridges for street crossings. At Mamaroneck avenue a tunnel section is used under the surface car tracks. The Mamaroneck avenue cut, over half a mile in length, is the longest on the White Plains branch, and furnished much of the material for the great



Heavy Girders Used in Span Over New Haven Tracks.

fill just north of it, which marks the White Plains station, the terminal of the line. Just before leaving the cut, the two tracks are increased to four. The two inside tracks are carried on a slightly rising grade to enable them to be carried on over the city when the Westchester Northern is completed. The outside tracks descend to the station and yards.

The system of electrification used on the New York, West-



Columbus Avenue Viaduct, Looking West; New York, Westchester & Boston.

chester & Boston is the same as—in fact, a part of—the general New York, New Haven & Hartford system; namely, a single-phase current of 11,000 volts on the contact wire, and a system frequency of 25 cycles. In adopting the voltage of 11,000 on the contact wire, the New Haven road has planned with the idea of permitting the operation of any adjacent company's equipment upon its own lines, or vice versa. This voltage is recommended



Raising Light Girder to Temporary Position in Span Over New Haven Tracks.

as a minimum potential, it being recognized that there is no objection to a higher voltage on other lines individual to themselves where transmission economy can be obtained by the use of a higher voltage.

The method of suspension of the contact wires for the New York, Westchester & Boston is quite different, however, from that now in use upon the New Haven main line, and shows the advance in catenary suspension design since the latter was erected several years ago. The wires are strung in sections between



Hutchinson River Viaduct.

"anchor" bridges, situated about two miles apart, which take the entire strain from these wires in the direction parallel to the track. These anchor bridges are of heavy construction, 42 ft. in height to top of towers, and 61 ft. between centers of side frames. Between these bridges at intervals, which are normally 300 ft. but liable to change to meet special conditions, are the catenary bridges which support the contact wires and hold it in its proper position with respect to the track which it serves. They are of lighter construction than the anchor bridges, for there is no strain upon them, save from the weight of suspension wires, and wind pressure. The truss is supported by latticed posts, 31 ft. in height, and surmounted by towers with cross arms. The arms are so arranged as to carry feeder and signal wires, two on each arm. Seventy-five feet each side of the catenary bridge 3-in. I-beams, running across the four tracks, are hung from the ⅞-in. main steel messenger strands; and on the beams are installed the suspension insulators. The lower insulators hold the track messenger, ⅝-in. steel strand, to which is pendant, by means of hangers, a copper trolley and a steel contact wire below. There is practically no corrosion of the steel wire, for it is constantly covered by a film of grease due to a generous amount of this material being placed upon the pantagraph shoe of the cars. The steel wire is suspended from the conducting copper wire by means of metallic clips which fit very tightly into V-shaped grooves in the two wires, and afford a perfect connection between them.

In all cases, the masonry work has been completed first, and often before any earth work was done. Concrete was used throughout, not only in retaining walls, abutments, etc., but also in highway crossings, viaducts and stations. All exposed surfaces have been finished very carefully, and the general design has been so well planned that the masonry work is one of the most effective features of the road.

For embankments, temporary wooden trestling was usually employed on work of any considerable size. The great majority of fills are of rock, the only large earth fill being on the White Plains branch just north of the junction point.

The work has been carried out under the direction of J. L. Crider, chief engineer, and E. J. Langford, principal assistant engineer. The Columbus avenue and Hutchinson river viaducts were erected by the American Bridge Company, under the direction of A. H. Rhett, structural engineer of the railway company. The general contracting work from White Plains to the junction with the New Rochelle branch was done by the Henry Steers Company, and by Murray & Gilbert; from this point through Mount Vernon by Lathrop & Shea; from this point to New York by the O'Brien Construction Company.

The northern portion of the Trans-Persian railway will probably be built from Baku via Aliat and Astara to Yezd, but there is much uncertainty as to its further course. The two routes spoken of are from Yezd to Kerman and thence to Guadur, and from Yezd to Guadur by way of Bunder Abbas. Via Kerman the length of the line from Baku to Karachi is estimated at 1,994 miles, while the deflection to Bunder Abbas would increase the total to 2,056 miles. The entire cost of the line from Aliat to Karachi would be approximately $172,400,000 via Kerman and $177,929,000 via Bunder Abbas. The portion of the line from Guadur to Karachi would be coastal and almost unproductive. The gross receipts would amount to $8,547 per mile, except in certain portions of the coast section where they will be somewhat less, and the operating expenses would amount to 70 per cent. of the gross receipts. It is estimated that there will be an annual deficit of about $2,500,000 in case either route should be chosen, but it is hoped that this estimated deficit would be wiped out by subsidies from the Russian and Indian railways based on those allowed under the Indian branch railway terms, namely amounts equal to the net earnings of interchange traffic. One of the chief points remaining to be settled is where the break of gage demanded by the British government, from the Russian gage of 5 ft. to the Indian of 5 ft. 6 in. shall be. The Russian government demands that this should be at the border of Baluchistan; the British government desires that it should be at the point where the line enters the British sphere of influence in Persia. Even if the British carry their point, it would seem that India will be largely cut off from participation in the trade of the so-called neutral zone of Persia.

REPORT ON HOOSAC TUNNEL COLLISION.

The Board of Railroad Commissioners of Massachusetts, F. J. Macleod, G. W. Bishop and Clinton White, have made a report on the rear collision which occurred on the Boston & Maine in the Hoosac tunnel near North Adams, Mass., February 20, last (reported in the *Railway Age Gazette* of February 23, p. 350, and March 1, p. 395), and have sent the report to the legislature in response to a special order of that body asking whether the reduction in the number of employees of the railway had been one of the causes of the collision, and also whether it is safe and expedient to allow more than one train, traveling in the same direction, to be in the tunnel at the same time. As to a reduction in the number of employees contributing to the collision, the board briefly states that no evidence was presented which would warrant such a conclusion. The board had the assistance of Professor W. L. Puffer, an electrical engineer. We omit details which have already been laid before our readers and pass to the conclusions of the commissioners.

The tunnel is 4¾ miles long, and was opened in 1875. The electrified section of the road is eight miles long. Each track in the tunnel is divided into three block sections, each end section extending a little way out of the tunnel. Eastbound, the first block is 8,013 ft. long, the second, 8,031 ft., and the third, 9,600 ft. The setting point for the automatic block signals is about 200 ft. in the rear of the signal so that the engineman sees the signal change from clear to stop as he passes it. At the setting point there is a white light, fixed to the wall of the tunnel. The signals are "light signals." Each one has a red and a green light for the home indications, and a yellow and a green for the distant indications. The freight which was delayed had 37 cars, and when it broke in two, about a half hour was taken to recouple the train. During this half hour the steam engine of the train emitted some smoke and gas, and the commissioners think that this may have obscured, or partly obscured, the tail lights of the freight from the view of the motorman in charge of the passenger train. After coupling up, the freight proceeded, and was stopped by the block signal outside the tunnel while the rear end of the train was still about 1,200 ft. within the tunnel. The collision occurred a *few seconds* after this second stop

The passenger train picked up the freight flagman and went along slowly; but after passing the signal at the entrance of the block which was occupied by the freight train, increased its speed, and was running at an estimated rate of 20 or 30 miles an hour when it struck the freight. From the distances given it appears that the freight caboose was about 1½ miles ahead of this signal. Whether this increase in speed was due simply to the fall in the grade or to this, combined with the use of power, or was moderated by the application of brakes, does not appear. All of the men on the electric locomotive were killed in the collision. The report indicates that the man, or men, in charge of the electric motor knowingly increased the speed. The engineman of the passenger steam engine, immediately behind the electric motor, testified that he put his head out of the cab window and saw the block signal. He says that he looked ahead and saw it showing red and yellow; that the lights changed to "double green" (both indicating all right) and that on seeing this change he called out "double green." The three men in the cab with him (his fireman, an engineman learning the road, and a freight brakeman who had been picked up at Williamstown) testified that they heard the signal thus announced.

There being no switch in that block section, the distant and home signals normally could not change to green at the same time; for the train, proceeding through the blocks, could not clear the second block until an appreciable time after clearing the first. The commissioners hold, however, that as at interlockings, it is normal for a home and a distant on the same post to clear at the same time, it is unreasonable to expect an engineman, every time he sees a signal, to make a special deduction based on the varying conditions in different blocks. They find confirmation of this opinion in the testimony of other enginemen, who say that in this tunnel case they should have felt free to proceed on seeing both lights change to green.

The corroboration of the passenger engineman's testimony by his three companions in the cab, and the fact that the men in charge of the electric motor increased their speed, leads the commissioners to conclude that probably that signal did show "double green"; this notwithstanding that the officers of the road contended that such an abnormal movement was impossible. The road claimed that the passenger engineman must have been mistaken. Professor Puffer has defined two theoretical abnormal conditions which would result in causing the supposed false indication. There is no evidence to show that these conditions existed in this case, nor have they been artificially produced. The inspectors of the board have known of false clear automatic signals outside of the tunnel. There have been no complaints of such failure in the electric zone, but since the collision, evidence has been obtained that there have been cases where the signals in the tunnel have not worked properly (meaning, presumably false clear indications).

The board holds that these automatic signals are as reliable and trustworthy as any which are available; but all signal devices "have failed at times to work properly." This system "offers as nearly an absolute guarantee of safety as it has been possible up to this time to devise by human agency."

When the tunnel was opened (single track) no two trains were allowed within it at the same time. On the completion of the second track, trains were allowed to meet in the tunnel, but not to follow each other. Later the manual block system was introduced, with a station at the central shaft; but many years prior to the electrification of the tunnel, the central shaft station was abandoned and each track was worked as a single five-mile block. When the tunnel was electrified each track was divided into three blocks.

The electrification of the tunnel was a very commendable undertaking, but the full benefits will not be realized until steam locomotives are kept out completely. To exclude them now would be very costly; to lengthen the electrified zone so as to make it economical, would also be costly; but it is desirable that the Boston & Maine proceed as soon as practicable to make a study of the situation, with a view to extending the electrified zone or adopting some other means to keep the steam engines out. Until this is done, the commission orders that the three block sections be made absolute, no permissive operation being allowed except on the order of some officer of the road specially authorized. It is recommended that each passenger train in the tunnel have the exclusive use of its track—that is to say, passenger trains should be kept three blocks behind preceding trains, and should not be followed by any train within three blocks. And in view of the difficulty of estimating speeds in the tunnel, the electric locomotives should be equipped with speed indicators.

Five Chilean government lines are to be completed and opened to traffic in 1912. During the year 8,500 persons were employed on the several works. Owing to a shortage of funds work is not to be pushed so hard on the government railways during 1912. More attention is being devoted to equipping the lines now constructed. It is estimated that 240 engines and 2,500 cars will be needed within the next year to handle the traffic.

There has been a good deal of talk of a tunnel under the Caucasus, which would give Russia a more direct access to its provinces south of the mountains, which are now reached by the Black Sea. A commission of experts has reported that the tunnel would be practicable—and would be 15¼ miles long. The traffic through such a tunnel would be unimportant, and Russia is poor. We may guess, therefore, that it will be a long time before this tunnel is built.

USE OF FORM 19 FOR ALL TRAIN ORDERS.

Discussion from Several Correspondents as to Advisability of Never Requiring Signature of Conductor or Engineman.

The proposition advanced by J. P. Finan, of the Atchison, Topeka & Santa Fe, Needles, Cal., to use form 19 of the American Railway Association (not requiring the signature of conductor or engineman) for all train orders, abandoning the use of form 31, on which orders cannot be made "complete" without the signature of one or both of the men in charge of the train was printed in the *Railway Age Gazette* of March 8, last. Letters from railway officers, agreeing with or criticizing the views presented were given in our issues of March 15, March 22 and April 5. The communications on this subject which have been received since April 5 are too numerous and too long to be printed in full and, therefore, we give, somewhat abridged, the essential portions of those communications, omitting repetitions so far as practicable.

Mr. Finan, following his first communication, made a somewhat careful examination of the quarterly accident bulletins of the Interstate Commerce Commission, and from a study of these for four years he offers the following comments on the causes of collisions found in that record; and at the same time answers some of the criticisms of his proposal. He says:

Take the case where an operator held a 31 order for a train, the train order signal showing clear. The train gets by the office. Is it not fair to assume that if the order was on a 19 form, the operator would have been out on the platform trying to make the delivery and would have noticed his train order signal improperly displayed and been in position to have given a hand signal?

Take the cases where collisions were caused by operators getting outside and handing up 19 orders, giving additional rights and at the same time overlooking a 31 order which restricts the rights of the train, leaving the 31 order on the table in the office. With the 19 order system in vogue, the operator would be required to ask the despatcher to clear the train with orders No. ..... and ..... and in event of the operator overlooking one of the orders, the despatcher would prompt him about it.

Take the collisions caused by the common error [misconduct] of telegraph operators signing the conductor's name to four orders, then delivering to the conductor only three. If the four orders had been on 19 form, the operator would have asked to clear the train with the four orders, giving the numbers; after having recorded them on his clearance card he would get from the despatcher his O. K. Then if the operator only gave the conductor three orders, with four numbers on the clearance card, the conductor would have inquired regarding the other order.

These are a few samples of grievous errors picked from the Interstate Commerce Commission Accident Bulletins covering the past four years. These are cases where we claim the 19 order would have prevented several collisions. Can anyone imagine a case where the 19 order would be the means of causing a collision? If so, I for one would be pleased to have an example. If no such cases can be cited, then why not admit that the 19 order is a safer means handling trains than the 31 order?

Train and enginemen will obey a 19 order just the same as they would a 31 order, and they will not forget to fulfill one more than the other—is it not reasonable to assume that the operator has a better chance to get the order into the hands of the men who are to execute it by being out upon the platform as the train is passing his office than to sit in his office and wait for the conductor to come in? One has only to read the Interstate Commerce statistics with an impartial eye to arrive at such a conclusion.

For the benefit of the author of the article from the N. Y. N. H. & H. (*Railway Age Gazette,* March 22, page 675), I wish to say that, under the method which governs the 19 order system, the despatcher, when he restricts a train with a 19 order, has just as much assurance that the engine and train-crew are aware of the restriction as he would have if the conductor and engineman both signed for a 31 order. When a train for which orders are held approaches a station, the operator calls the despatcher, in accordance with an ironclad rule, and asks to clear (for example) No. 10 with orders 45 and 52. (The rule requires that the operator first write these order numbers on his clearance card and then repeat them from the clearance card to the despatcher.) The despatcher checks with the operator, and if he finds that orders 45 and 52 are all the orders held by that operator for that train, he gives O. K. to the clearance card and the operator so notes thereon. This gives the despatcher an absolute check on the delivery of all orders, and he has just as much assurance that they will be properly executed as though they were on a 31 form.

Under our system of delivering the 19 order, there is little or no chance of the copies becoming soiled or mutilated, and as despatchers are expected to exercise care and judgment in the placing of a 19 order which restricts the rights of a train, train and engine crews will have ample time to become familiar with the contents of all orders before arriving at the point where orders are to be executed. The rules require that in case an order is sent to a train restricting its rights at that particular station, the train must first be brought to a stop before the operator delivers the order. The despatcher must guard against restricting the rights of trains at stations where the order is to be delivered, and should it become necessary to do so, he must take the precaution to remind the operator to bring the train to a stop and take such other precaution for safety as local conditions may demand.

The real intent of the 19 order is to expedite the movement of trains. If a railway manager feels that it is more important to keep his operators at the ticket windows than to get out upon the platform to deliver a 19 order, to avoid stopping a train, that is a matter for him to decide. The question we are trying to solve now, is, do we consider the 19 order a safe and practicable method of handling trains on railways not protected by block signals? The conditions under which operators are working and the density of traffic ought not be considered in arriving at the proper solution of this important question.

Answering the New Haven man further: If a question should arise between the operator and the conductor as to the delivery of one or more orders, the clearance card would be evidence as to who was in the right. If the conductor held all the orders shown on the clearance card, and an order was not delivered, it would be evidence against the operator. But if the clearance card showed all the numbers of the orders the operator claimed he delivered to the conductor and the conductor claimed one was missing, then the conductor would be to blame for not checking his orders against his clearance card, and if he found the clearance card called for a number of an order which was not delivered to him, his train should be brought to a stop, and not started again until the error was corrected.

Mr. Forman, in his article in the *Railway Age Gazette* of March 15, page 466, agrees that the 19 order is a safe method, so long as the middle order is used.

An officer of the Union Pacific in his article in the *Railway Age Gazette,* March 22, page 675, says that the 19 order has been extensively and successfully used, and is a wonderful help

in expediting the movement of trains, but should not be used on lines not protected by automatic block signals. He gives as the reason that to do so would require 100 per cent. efficiency. Can we not say the same about the 31 order? Will he say that they have had any trouble, even a hazard caused by the use of the 19 order system which could have been prevented by the use of a 31 order? If not, why can we not, with at least as much safety, use the 19 order exclusively, on roads not protected by automatic block signals?

Mr. Connors, general manager of the Hocking Valley, in his article, *Railway Age Gazette*, March 22, page 675, says they have used the 19 order, almost exclusively, during the past four years, on a busy single track road; that he knows of no instance where the 19 order was not entirely satisfactory, and that it is the unanimous opinion of his despatchers, including the chiefs, that the exclusive use of the 19 order is just as safe as the exclusive use of the 31 order would be. This is the busy railway east of Chicago, to which I referred in my article of March 8, a road not protected by automatic block signals.

Mr. Fay (April 5, page 788) says that to make the exclusive use of the 19 order effective, the train order signal, when displayed for a 19 order, should authorize the train to which it is given to proceed on the main line and take the order running. If there is a rule in the standard code which authorizes a procedure of this kind, I am sure I never heard of it. Such a rule would be dangerous.

With the exclusive use of a 19 order, it must be borne in mind that we restrict the rights of trains as well as give additional rights. This being so a train approaching a station, finding the signal indicating "orders," has no right to assume that the order is one conferring additional rights. As a matter of fact, the rules on any road where the 19 order system is in vogue, either with or without automatic block signals, require the train to enter the siding when its orders do not permit it to proceed beyond that point against an opposing train or ahead of a train of superior right or class. And if the despatcher wishes to confer additional rights, he must either direct the operator to take the order to such train at the switch, or permit the train to pull through the siding. And this is the only safe method of dealing with that particular situation.

Operators must not be permitted to "high ball" trains down the main line and the train and engine crews must not obey such a signal.

Of all the examples submitted by Mr. Fay, there is not one that could be the cause of a collision, or even a hazard, if the rules are obeyed.

Take, for example, his first illustration: A train running from W to A, B, C, etc. Despatcher expects the train to make B for an opposing superior train. He wishes to hand it a 19 order at A concerning some other train. The inferior train has lost time and is unable to make B for the opposing train and should take siding at A. The operator at A holds the 19 order and gives the belated train a signal to proceed along the main line and pick up his 19 order running. The engineman, he says, does so, and by the time he finds out that the order gives him nothing on the opposing superior train, it is then too late to avert a collision.

There is no rule in the standard code which authorizes that train to pass the first switch under such circumstances. The rules require that train to head in. The crew has no right to assume that the order confers additional rights; they must know it for an absolute fact, before proceeding along the main line. As to situations that may arise making it risky to deliver a 19 order running, Mr. Fay should describe such situations.

The only element of danger in the 19 order is restricting the rights of a train at the point where it gets the order. But the rules forbid despatchers to indulge this practice, except in case of emergency, in which case the operator must bring the train to a full stop. Mr. Fay's article conveys a wrong impression in assuming that the train order signal, when displayed for "orders," always indicates "proceed."

We are confronted with a proposition where custom and precedent are blocking the road of progress. Railway managers are clinging to the 31 order because of its supposed superiority in point of safety, but the government statistics are evidence that this is a mistaken idea.

J. O. Kelly, International & Great Northern, gives a leaf from his experience as follows:

In Mr. Fay's comment on 19 orders in your issue of April 5, he seems to contemplate that the rules authorize trains to *assume* that a 19 order permits them to "proceed on main line and take order running." But would not that be the fault of the rules rather than the fault of the 19 order? The 19 order has been used effectively for a long time on many roads where the rules expressly forbid trains assuming anything. If the train has no right on the main track to the train order signal, the rule should authorize it to do only one of two things—head into the siding or protect in accordance with rule 99. When despatchers find out that trains are not permitted to proceed on the main track against the right of a superior train on zigzag signals from the operator, they usually take care of the situation by figuring ahead; or in case of emergency tell the operator to take the order to the switch at which the train should pull in.

G. F. Turley, Norfolk & Western, gives an estimate of time lost, and tells of the practice of his road as follows:

I have read with much satisfaction the articles on the unrestricted use of the 19 train order. I am thoroughly convinced that this is a sound movement in the direction of twentieth century advancement, and I have for several years advocated the elimination of the 31 order as it is generally used. For a number of years our company has used the 31 order only to the train whose rights were restricted. Where the conductors signs 31 orders at the telegraph office and after reading to the operator, goes to the engine, delivering to engineman, and requiring him to read the order and then sign the conductor's copy, we have a slow and tedious process, and one that consumes a lot of time, especially where trains are doubleheaded, necessitating two transactions with the enginemen. It is conservative to say that an average period of ten minutes is required at each station to handle 31 orders. The conductor in many cases has to walk almost the entire length of his train to reach the telegraph office and then comply with the usual requirements. It is fair to assume that a ruling train which is late will be stopped as often as half a dozen times on a district where there is considerable traffic, particularly on single track; thus one hour is lost getting orders, and this probably means one hour overtime for the crew, unless the time lost is recovered on the run. If it is recovered, it is likely accomplished by excessive speed, bordering on the danger line.

I am well aware that there are many sticklers for the 31 order. The advocates of the 31 order would contend that if a train got by a station without an order, the despatcher would notice the omission and would probably be able to get one or both trains before collision. But despatchers are not so extremely vigilant. Is it not true that within the recollection of most railway men of long experience, there have been collisions which would have been prevented if the despatcher had kept a careful check on his orders and discovered immediately that a certain order had not been delivered to a train? The despatcher's excuse for not discovering the error, in nine cases out of ten, was that he was too busy and overlooked it.

An operator displays his signals for 19 as well as 31 orders; is it reasonable to suppose that a train will pass the signal without orders or a proper clearance? Certainly not. Our clearance card bears an additional line following the address reading:

"Herewith orders No....."

And the operator is required to fill in the numbers of the orders delivered with the card. This gives the conductor and engineman an opportunity to check the orders received. If an order mentioned on the card is not delivered the train can be instantly stopped.

Our clearance card reads, "Herewith orders No....."

and the operator must write in the number of each order delivered. A note at the bottom requires the conductor and engineman each to check the number of orders against the statement in the clearance card. The train-rule committee of the American Railway Association refused to recommend the adoption of this form, but it has been in successful use on the Norfolk & Western for a number of years.

I feel certain that the unrestricted use of the 19 order will become universal because it appears to be the most rational method. The 31 order may have been all right under the old regime. To my mind the only thing that sustains it today is tradition and perhaps some sentiment. We are advancing in all other lines. Why not take another long step forward by relegating the 31 order to the archives along with our ancient rules and time tables?

Sundry Experiences of Despatchers.—After reading the correspondence concerning the exclusive use of 19 orders in the management of trains on single track lines, the general superintendent of one of the Harriman lines held a discussion on the subject with his despatchers and chief despatchers, and has given us the results of that discussion. These despatchers have used form 19 exclusively, in some of their territory, for one or two years, or longer, and some of them have used it extensively for a longer time. All of them agree substantially with the views of Mr. Finan. From the memoranda of these despatchers' views we extract those paragraphs which throw additional light on the subject.

Mr. A, an assistant superintendent, believes that there is less liability of failure in handling 19 orders than in handling 31 orders.

Mr. B, a chief despatcher, discussing the question whether the use of form 19 will increase the hazard of accident, concludes that it will not. He has observed that in handling 19 orders the efficiency of the operators improves; they are compelled to be more alert, and with the increased responsibility they take a more lively interest in their work.

Mr. C, a despatcher, referring to the rule of his road to require enginemen to see the train order signal move from the stop to the proceed position, and to stop and call for a clearance card if he does not see it move, says that the unrestricted use of the 19 order would reduce to a minimum the accidents due to the human factors; and this regardless of whether or not block signals, either automatic or non-automatic, are in use. In his experience of two years and six months with the unrestricted use of form 19, he has known of no instance where an order restricting the rights of a train has failed to be delivered or has been forgotten or overlooked by any trainman or engineman.

Mr. D, a despatcher, says that during his 16 years' experience the greatest hazard that he has known was in connection with 31 orders, where the operator, in violation of the rule, would send to the despatcher the signatures of conductors before these had actually been affixed to the orders, and then leave out one order when delivering two or more to the conductor. With the proper use of clearance cards, as a safeguard against this danger, from 19 is wholly satisfactory.

Mr. E, a chief despatcher, agrees with the others, but would make an exception. In sending an order to a train at a blind siding, restricting the rights of that train, the order being sent in care of another person, he would use form 31. Also, in the case of an order at a meeting point where the view from an approaching train is obstructed, he would require the train to be stopped. He thinks, also, that the safety of form 19 might be questionable in the case where a train has been cleared from a station and is subsequently delayed there and the despatcher wishes to have the operator call the conductor into the office to receive further orders; would it be safe to move another train against that train, without first securing the conductor's signature?

Mr. F, a despatcher, referring to the liability of operators to transmit a conductor's signature, and even then fail to deliver an order; and agreeing with Mr. C, illustrates the advantage of the rule not to require signatures by the following description of the ordinary routine:

An operator has five orders for a train; when the train shows up the operator prepares his clearance card, placing on it each individual order number which that train is to receive; these numbers are transmitted to the despatcher from the clearance card for his O. K. If an order is omitted, the despatcher detects the omission; or if the operator should misplace an order after receiving O. K. from the despatcher and before making delivery to train or engineman, the omission would be detected from the train or engineman's check of orders against the clearance card. But it is imperative that the operators receive the O. K. from the despatcher for the orders as they appear on the clearance card, and not on a reading of numbers from the original order; this for the reason that should an operator transmit O. K. for order numbers from the original orders and prepare his clearance afterwards, there is a chance that he might not enter all the orders on the card. But if the orders are entered on a clearance card and O. K. received from the despatcher for orders as they appear on the card there is a material reduction of the chances for a "man failure"; each one connected with the transaction has a check against each other with whom he deals.

F. C. RICE AND THE AMERICAN RAILWAY ASSOCIATION ON ACCIDENTS.

At the May meeting of the American Railway Association, F. C. Rice, chairman of the transportation committee, made a brief talk on railway accidents, and introduced three resolutions regarding the subject which were adopted and referred to the executive committee for action. The first requested the executive committee to confer directly, or through whom it may delegate, with the national authorities concerning steps to educate the public regarding the danger of trespassing on railways and concerning what action, in the form of legislation or otherwise, there should be taken to stop this practice, which in the ten years ending June 30, 1911, cost the lives of 50,708 people. The second resolution expressed it as the sense of the American Railway Association that its members should bring the facts about railway trespassing and its results to the attention of the authorities of the states and municipalities through which they operate, with a view to securing proper laws or enforcement of existing laws to prevent trespassing and its consequent loss of life. The last resolution set forth that the association and its members appreciated the need for increased efforts by this organization, by the railways individually and by their employees to reduce accidents, but it depreciated hasty, ill-advised action to compel the railways to make enormous expenditures for changes in their plants. It set forth that the present earnings of many railways would be insufficient to bear the additional burden thereby imposed and that statistics on the subject demonstrate that no improvements in existing facilities would prevent a vast majority of the accidents that now occur, because these are not due to defects of the equipment or plant of the railways, but to failures of the human element in railway operation, and are, therefore, preventable only by improvements in the human element. In introducing these resolutions, Mr. Rice said:

This association after years of experience, and faithful, public-spirited labor, has developed and adopted a system of train rules, despatching rules, manual and controlled manual and automatic block and interlocking rules, founded on the best judgment and the best practice of its members. There is no want of perfection in these systems to prevent collision accidents.

Collision accidents, which have been and are now occurring, are in about every instance the result of disregard and disobedience of this association's standard rules. None of this class of accidents would occur if these rules were obeyed. The railways have also adopted rules to govern other details of opera-

tion, which, if they were properly enforced and obeyed, would reduce accidents to the practical minimum.

Still, there is a belief in the minds of our congressmen and other public officials, which is finding expression in the press and in legislation, that the railways are almost criminally delinquent, or mercilessly penurious and disregardful of human life in not more lavishly expending money for imaginary safeguards. We all know the mistaken attitude to which the public is being led, and that the safety which we can and should furnish is not dependent on expensive installations of any description.

The statistics of the Interstate Commerce Commission show, contrary to the popular impression, that the accident situation on our railways is actually improving. During the four years ending with 1911 the number of passengers killed was less by 25 per cent. than the number killed in the four years ending with 1907, and likewise the number of employees killed during the four years ending with 1911 was 18 per cent. less than the number killed in the four years ending with 1907. This absolute reduction in fatalities to passengers and employees was accomplished in spite of an increase in the traffic handled. But, unfortunately, our accident record is still very unsatisfactory. During the year ending June 30, 1911, and the three months of July, August and September next following, a total period of 15 months, there were killed in connection with railways from all causes 12,715 persons.

Of this number 6,841, or nearly 54 per cent. were designated by the Interstate Commerce Commission as trespassers. The public thinks only of the entire 12,715 people killed, without giving any consideration to the fact that for the deaths of more than one-half—that is, of the 6,841 trespassers—the public itself is responsible.

From a recent reliable statement, the number of passengers, employees and all others killed on 204,486 miles of European railways for 1910 were 7,634, and for 1911 on 240,830 miles of United States railways 9,857. Of this latter number the Interstate Commerce Commission states that 5,284 were trespassers either upon the trains or by reason of unrestrained access to places or situations which are reserved to those professionally employed by the railways. If we subtract the 5,284 trespassers from 9,857 it leaves 4,573. The figures would then stand 7,634 killed in all Europe, and 4,573 killed in all the United States.

Referring further to the 4,573 persons killed in the United States who were not trespassers, I would like to say that the odds of risk are against the United States, because of our preponderance of freight tonnage, which is more than twice that of all Europe. This injects the freight trains and the auxiliary mileage of freight yards, which equals the combined mileage of the four principal countries of Europe, namely, 113,084 miles.

Our principal fatalities to employees are in freight yards, which are indispensable, and owing to our preponderance of freight tonnage and freight train mileage, we cannot obviate this excess of yard mileage, but perhaps we can restrain the reckless exposure of the lives of our train and yardmen, who, to excel in the physical things they do and in their desire to carry out the spirit of haste, subject themselves to danger by many acts of imprudence, contrary to the advice and rules of the companies.

Why should not the public be urged to feel and to assume some responsibility for this loss of more than one-half of the total number of lives in connection with operation of railways? In some states the laws regarding trespassing on railways are inadequate. Generally there are abundant laws, but they are not observed by the people or enforced by public authorities.

Besides the trespassers killed, there remains the large number of 5,874 persons whose lives were lost during these fifteen months, and for whose deaths the public cannot be held wholly responsible.

Of this number, 974 passengers and employees were killed in collision and derailment accidents. This leaves 4,700 deaths to be accounted for in other ways. One thousand were lost at highway crossings, in which cases there must have been in almost every instance individual responsibility, or, at least, very great contributory negligence. The cause of the remaining 3 700 deaths are mostly classified by the commission under the following heads:

Coupling cars, doing work about trains, insufficient clearance, falling from cars and engines, getting on and off cars and engines, being struck or run over by cars and engines, employees in shops and those classed as industrials. One hundred and fifteen were charged to insufficient clearance of structures. Statistics of accidents are being given wide currency in the public press. Regardless of their causes, responsibility for them is universally charged up in a lump against the railways. In spite, therefore, of all that this association and that the individual roads have done to reduce accidents and to educate public opinion regarding them, it seems imperative that we should deeply consider whether there is not much more regarding this matter that we ought to and can do.

The large amount of money which the railways are voluntarily expending for safeguarding the transportation of explosives and other dangerous articles is an illustration of what the railways are doing primarily for their own protection, but also largely for the protection of the people against themselves.

Notwithstanding this, the sentiment of the public, of the lawmakers and of regulating commissions is indicated both by legislation that has been enacted and by legislation which is proposed and is now pending. We have already the federal safety appliances law, the federal boiler inspection law, the hours-of-service law, the ashpan law, and the law under which the Interstate Commerce Commission investigates accidents. We all know how some of the inspections and investigations under the supervision of the commission are being made.

We have full crew laws in several states. We have pending in Congress bills to require the widening of clearances, the substitution of steel for all wooden passenger train cars, the universal installation of block signal systems, etc. There have even been introduced bills to require the use of automatic stops, although their desirability, if they were practical, and their practibility, if they were desirable, under ordinary conditions of steam operation, have both yet to be demonstrated. Our lamented Mr. Melcher sent out to us shortly before his death a bulletin in which he stated that the total estimated initial expense to American railways for compliance with pending federal bills would be $1,360,000,000.

The Block Signal and Train Control Board, which, as an auxiliary to the Interstate Commerce Commission, has been engaged for the past four years in investigating devices designed to circumvent the disastrous results arising from neglect and oversight of enginemen and others, has given voice to statements of the following character in each of its four annual reports, which, in my opinion, are most to its credit: "It being admitted what is most needed is automatic performance of one's duties rather than automatic mechanical devices, how shall we get it?"

The board has repeatedly called attention to the superiority of the human element for safeguarding railway transportation over mechanical and automatic contrivances. The board has kept in the foreground the importance of the education and proficiency of the men.

No one who surveys the past history of railway regulation in this country can doubt that the railways are facing the pretty certain fact that, unless they shall take steps and give assurance that they will reduce the number of accidents and fatalities more notably in the future than they have in the past, the same public opinion that has compelled them to equip their cars and engines with safety devices, that has fixed the limits of hours of service, that fixes the rates that the public must pay for the transportation of themselves and their property, and that regulates the conduct of the roads in numerous other ways, will cause regulation to extend its control to all the details of operation, with many of the inconsistencies and incongruities which can be anticipated.

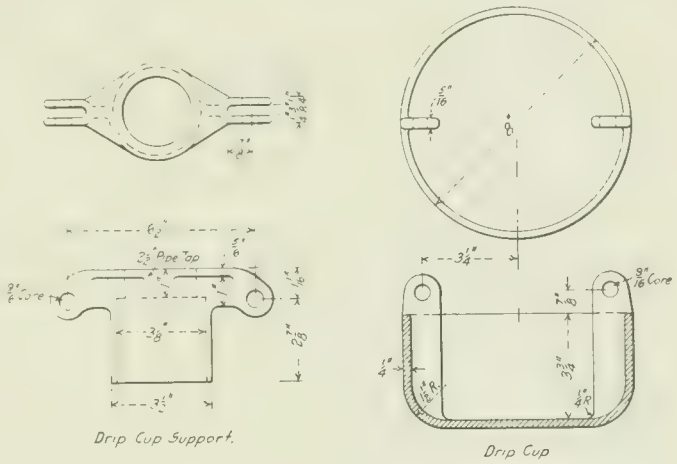
In view of these conditions, is it not almost imperative that this association, as an association of the American railways, shall call the attention of the national and state governments to the large proportion of the total loss of life in railway accidents which is the result of trespass or unlawful entry on the trains or property of the railways, and invite the national and state governments, and the governments of municipalities, to exercise their influence and authority in controlling this class of fatalities, for which the public is responsible? Should the Interstate Commerce Commission not be notified that we think it unfair to permit unrestrained trespass of the character which produces such large loss of life, and then to send the figures of accidents to the country in quarterly and annual reports as the results of railway operation? Should we not go still further and indicate to the public, to public authorities and to railway employees that, as railway officers, we fully and frankly recognize the responsibility and duty of railway managements in connection with the accident situation, and that if they will give us the co-operation on their part, which is essential to a solution of the accident problem, and will not interfere with operation with regulation which is well meant, but which often hinders, rather than helps, the increase of safety in transportation, we will do our part toward reducing the railway accident record?

I believe that the initiative in regard to this matter should come from the railways themselves. I also believe that if the railways individually and this association shall enter with increased enthusiasm and energy on a campaign for the reduction of accidents, and shall tactfully seek the co-operation of others concerned, a great improvement in conditions will be brought about.

Recently a number of railways have organized safety committees, composed of both their officers and employees, to study and remedy the conditions that cause accidents, and the reports indicate that they have been getting excellent results. Is it not worthy of consideration whether this association, through some committee or commission designated by it, should not begin a nation-wide campaign against accidents, similar in its methods to those followed by the safety committees on various railways? As one who has been long in railway service, and has witnessed many changes in the relations between the railways on the one hand and the public and their employees on the other, I entertain grave fears as to the results, unless some long and important step be taken very soon, both to reduce railway accidents and to educate public opinion regarding them and regarding the efforts that are being made to reduce them.

CENTRAL OF NEW JERSEY ICE CAR.

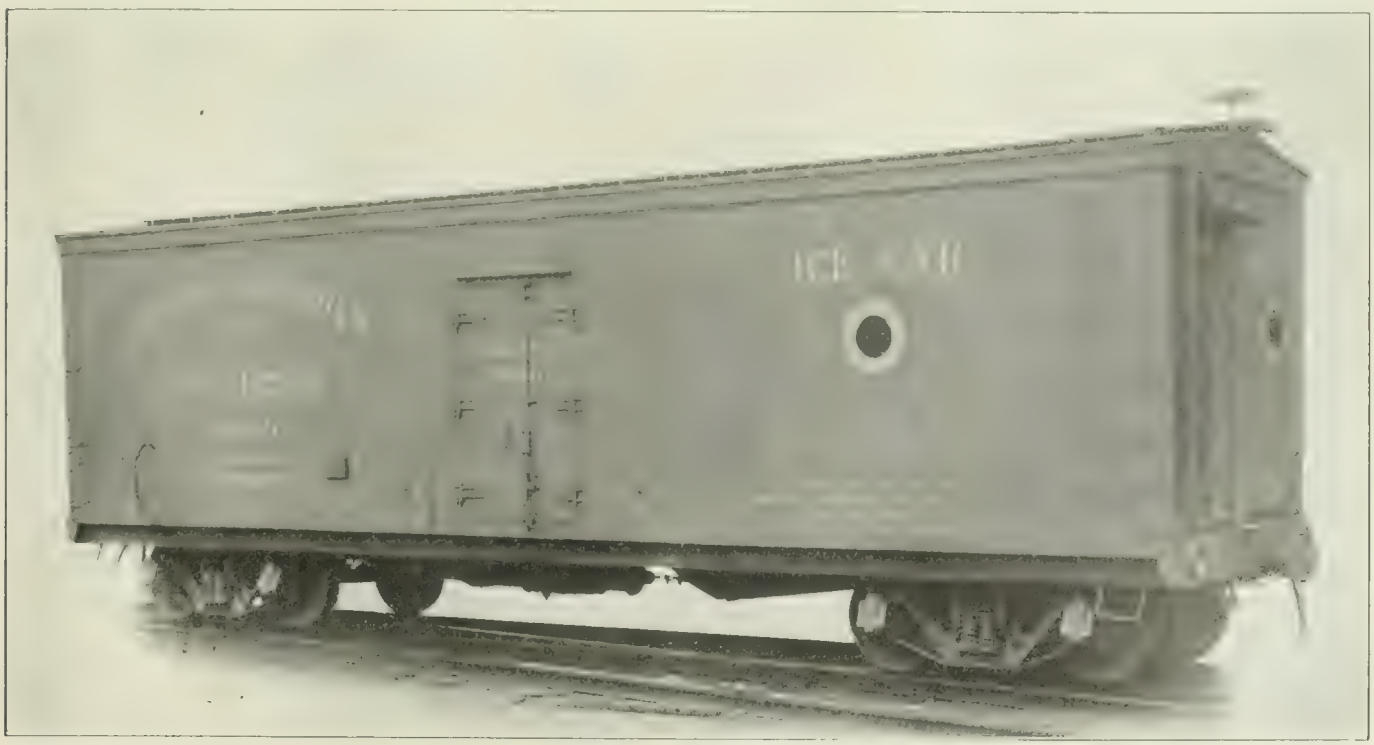
Ice must be carried in well insulated cars that are securely braced to withstand the impacts due to the shifting of the load. A load of ice is more liable to shift than almost any other commodity and the car must have a strong end construction. The floor must be made water proof to prevent water from leaking through and rusting or rotting the underframe. Two hundred



Drip Cup for Ice Car.

and fifty cars in which these requirements have been carefully considered have recently been delivered to the Central Railroad of New Jersey by the Standard Steel Car Company, Pittsburgh, Pa. They were designed jointly by the engineers of the railway company and the builders.

The car is 38 ft. 4 in. long over the striking plates and has a capacity of 80,000 lbs. The inside is 36 ft. long x 8½ ft. wide x 8 ft. high, providing a space for about 140,000 lbs. of ice, but it



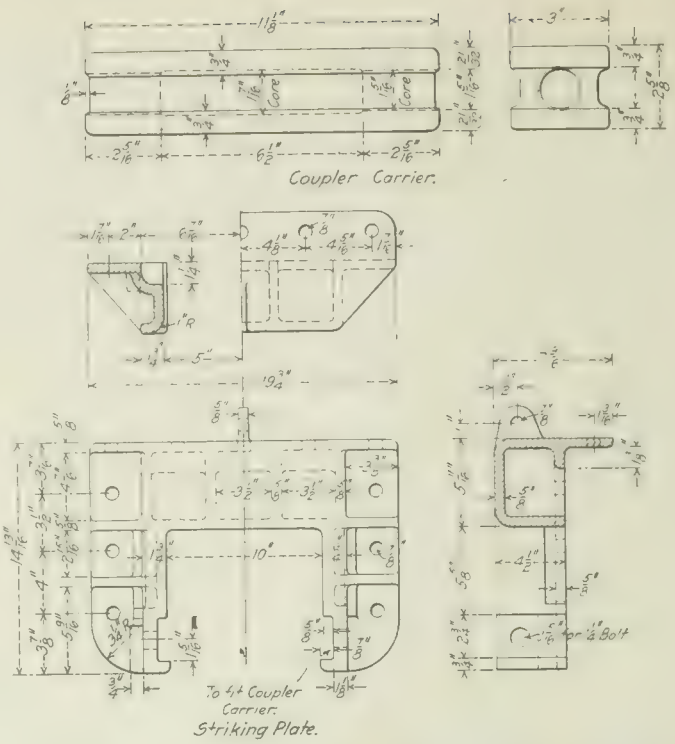
Ice Car of 80,000 lbs. Capacity; Central Railroad of New Jersey.

is impractical to load such a car to its full cubical capacity and only about 80,000 lbs. can be loaded conveniently. The construction of the body of the car is clearly shown in the accompanying drawings. There are two belt rails, 3 in. x 4 in., extending along the sides of the car and two 4 in. x 4 in. rails at the ends of the car. The end corner posts and the two intermediate end posts are 4 in. I-beams, with fillers of yellow pine. The intermediate posts and braces along the sides of the car are 3 in. x 5 in. yellow pine, while the door posts are of white oak.

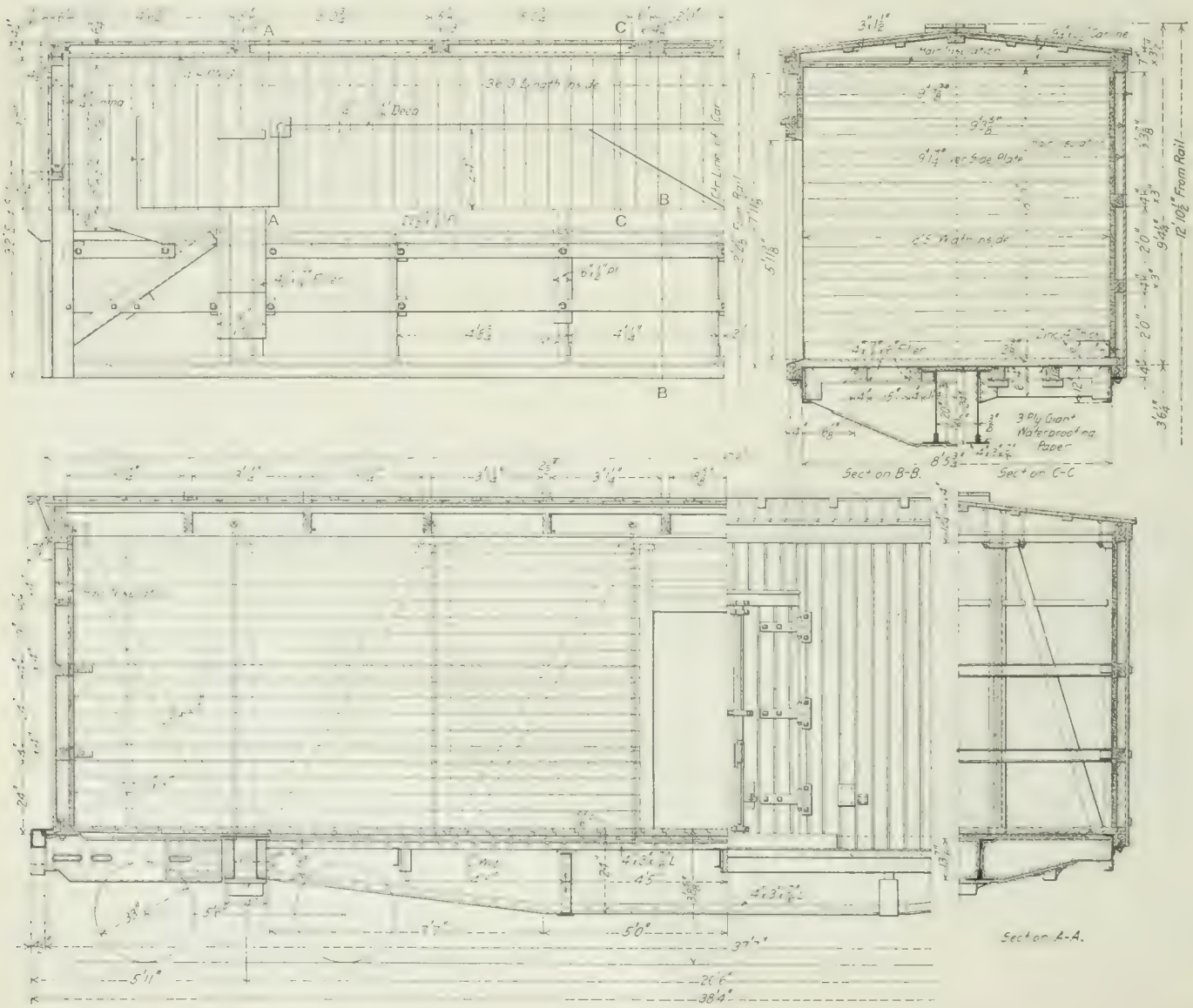
The details of the side door, which is provided with the Unoit car seal, are clearly shown. It has three layers of hair felt and two air spaces, one ⅞ in. and the other 2 1/16 in. thick for insulation. The sides and ends of the car have yellow pine lining grooved and tongued; it is 1¼ in. thick at the sides and 1¾ in. thick at the ends. One layer of hair insulation is placed on both sides of the air space which is 3 in. wide at the sides and 4¼ in. wide at the ends. The roof consists of two layers of yellow pine boards 13/16 in. thick; there is also a ceiling of 13/16 in. lining boards which is covered by a layer of hair insulation fastened to the underside of the carlines.

One half of the cars are provided with the Hutchins improved plastic roofing while the other half has the Lehon Company's roof. This special roofing is placed between the two layers of boards.

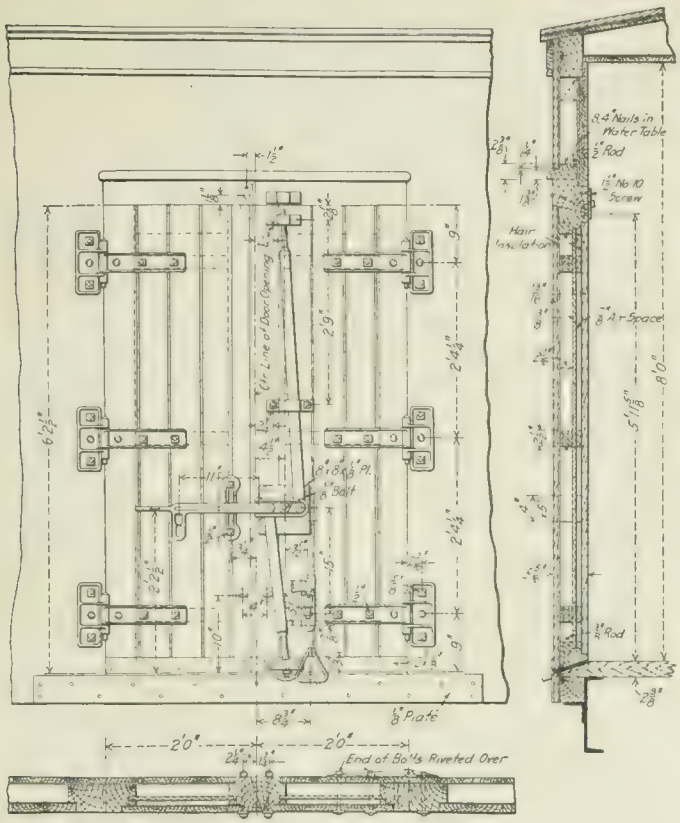
The junction of the floor with the sides and ends of the car is water-proofed by a zinc angle, 0.4 in. thick. The flooring of yellow pine is ship lapped and is 2⅜ in. thick. On the underside of the floor a three-ply water-proofing paper is placed over



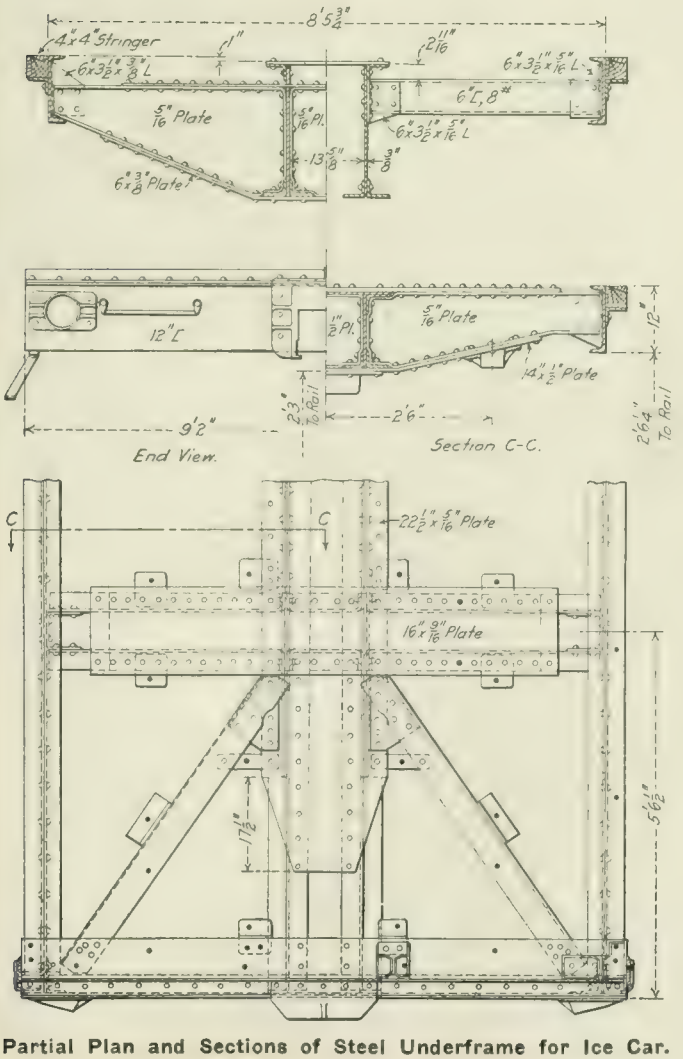
Striking Plate for Ice Car with Special Design of Coupler



Plan and Elevations of an 80,000 lb. Capacity Ice Car; Central Railroad of New Jersey.



Side Door for Ice Car.



Partial Plan and Sections of Steel Underframe for Ice Car.

the stringers and center sills to protect the underframe from any moisture that may permeate through the floor. Four air seal drip cups of a special design shown in one of the illustrations are used to drain the car.

The center sills are I-beams 24 in. deep at the center and tapering to 13 7/16 in. at the ends. Two needle beams extend across the car 4 ft. 5 in. each side of the center, while three 6-in. channels serve as cross-bearers. The end sills are 12-in. channels with their flanges turned inward. The side sills are also made of 12-in. channels with the flanges turned inward and with a 4 in. wooden sill on the outside supported on angle irons.

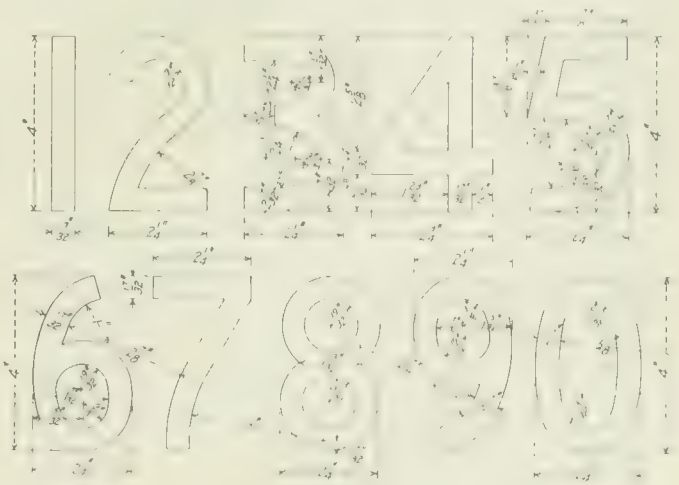
The striking plate is of special construction, being designed by G. W. Rink, mechanical engineer on the Central Railroad of New Jersey. Its special feature is the coupler carrier, which is so designed that when one surface is worn by the coupler yoke it can be inverted or renewed, providing a new surface for wear and prolonging the life of the plate.

Four different kinds of draft rigging have been applied as follows: The Farlow-Westinghouse on 50 cars; the Farlow-Gould on 50; the Farlow-Session on 50 and the Miner friction, class A-7, on 100 cars, the idea being to test out these different types of draft gear in this particular service. The trucks are of the cast steel side frame type made by the American Steel Foundries and the truck bolsters are also made of cast steel. The truck frames are provided with removable wearing plates at the opening for the bolster. The wheels are 33 in. in diameter and weigh 675 lbs. The underframe and the trucks are designed for 88,000 lbs. capacity each, in addition to the light weight of the car body. This provides a leeway of 8,000 lbs. on the rated capacity of the car.

NEW DESIGN FOR HEADLIGHT AND CAR NUMBERS.

The accompanying drawing shows the design of lettering which has been adopted for headlights on the western lines of the Canadian Pacific. They are also used on time cards, and it is expected that they will be put on engine cabs, and possibly later on box cars.

They were designed by George Bury, vice-president, with the idea of making them so distinct that it would be impossible to mistake them. In many designs of figures in common use the "3", the "6" and the "8" may often be mistaken for one another. This is



Headlight Numbers Used on the Canadian Pacific.

largely because the loops on the 3's and 6's are long, and it will be noted that this feature particularly has been eliminated in the accompanying figures. The difference between the "5" and the "6" has also been noticeably increased.

Figures on locomotives and cars have to be read hurriedly in all kinds of light, and the accidents sometimes due to misreading engine numbers and the trouble resulting from misreading car numbers make it worth while to try to improve the legibility of the figures.

THE TAP LINE CASE SUPPLEMENTAL REPORT.

In the original report, after stating the history of the several tap lines there mentioned and setting forth the salient feaures in connection with their ownership, physical condition, and the manner in which their operations for the proprietary company are conducted, the commission found that in none of the cases there disposed of did the tap line perform a service of transportation either in the movement of the products of the mill of the proprietary company or in the movement of its logs from the forest to its mill. The commission held that the service in each case, so far as the logs and lumber of the proprietary company are concerned, was a plant service. It was also said at the close of the report that in a supplemental opinion, to be announced in the near future, the commission would state the facts in relation to all the other tap lines in this territory.

In the supplemental report many of the lines described differ only in detail from the lines described in the original report and consequently are controlled by the same principles. Each case is decided separately by the commission, which, however, calls attention to a practice that finds frequent illustration in the cases. In a number of cases the tap line without charge hauls the logs of the lumber company that owns it. In other cases the lumber company itself hauls its logs over the tap-line rails to its mill. In some instances its right to do this is evidenced by a formal trackage contract; in other instances it is done under a verbal understanding. In some cases no charge is entered up by the tap line against the lumber company for this use of its tracks, and in a few cases the lumber company pays a small compensation. In several instances the trunk lines themselves have given trackage rights for a small toll to lumber companies. The commission has not understood that special privileges of this kind may lawfully be granted to a shipper. It is not uncommon for one railway to give the use of its rails to another railway under a trackage agreement, but the commission sees no way in which a shipper may enjoy such a privilege over the rails of a common carrier, particularly when the compensation for the privilege is not published and the privilege is not open equally to other shippers. Except in one or two cases where the tap line crosses the state boundary line such arrangements are possibly to be regarded as purely local and therefore beyond our control. But they are inherently unlawful, and afford strong evidence that a tap line whose rails are used in that manner by its proprietary lumber company is a mere plant facility. On the other hand, such an arrangement with a shipper, even though it be purely local and therefore beyond the commission's control, may nevertheless operate as a rebate and be punishable as such under this law when it appears that the concession is made in order to secure the interstate traffic of the shipper. All such arrangements are wrongful and the commission expects them to be discontinued. Doubtless, the commission says, the same or generally similar conditions exist in other extensive lumber-producing districts and may be duplicated elsewhere in connection with different classes of traffic. But it is obvious that matters of this nature can not be dealt with in a wholesale manner, but must be considered separately and in the light of the surrounding conditions and special facts. Of the many cases decided by the commission there are printed herewith two by way of examples and also the commission's general remarks.

LOUISIANA & PINE BLUFF.

The Louisiana & Pine Bluff is owned by the Union Sawmill Company, which itself is subsidiary to and owned by the Frost-Johnson Lumber Company. The three companies are one in interest. The facts are somewhat involved, but it will be well to state in some detail the history of the whole investment.

The Union Sawmill Company was incorporated in December, 1902, and acquired a large body of timber lying in southern Arkansas and across the line in Louisiana. It opened a sawmill at Huttig, Ark., and as a facility for the lumbering operations the Little Rock & Monroe railway was incorporated, and 44 miles of track were constructed, extending from a connection with the El Dorado & Bastrop division of the St. Louis, Iron Mountain & Southern at Felsenthal to Monroe, passing through Huttig.

Immediately after the completion of this line, in the spring of 1905, it was sold to the Iron Mountain for about $580,000 in cash, the right being reserved to the sawmill company, in a contract with the Iron Mountain, to operate its logging trains over the Little Rock & Monroe, the El Dorado & Bastrop, and Farmerville & Southern, being subsidiary lines of the Iron Mountain system, at a trackage charge of 35 cents per train-mile. At about this time, and apparently pursuant to a suggestion by the Iron Mountain officials, the sawmill company acquired extensive additional holdings of timber land valued at more than $1,000,000. The contract heretofore referred to required the sawmill company and C. D. Johnson individually to organize a railway corporation for the construction of a new line northerly from Huttig, to reach the timber in that direction and make it available for manufacture at the mill at Huttig. The provision in the contract was that the proposed railway should be constructed and incorporated in such manner as to justify the publication of joint rates and the payment to it of allowances. In accordance with this agreement the Louisiana & Pine Bluff was incorporated in March, 1905, with a capital stock of $300,000, which was issued to practically the same persons that owned the Union Sawmill Company. The so-called terminals in the vicinity of the mill at Huttig, as well as the locomotives, cars, and other equipment that had been used on the Little Rock & Monroe previous to its sale to the Iron Mountain, were turned over to the tap line by the sawmill company in exchange for stock, which stock is still held by the sawmill company. This, in brief, is the story of the investment.

The Louisiana & Pine Bluff, as described on the record, has a main track 3 miles long connecting with the Farmerville & Southern and Little Rock & Monroe divisions of the Iron Mountain at Huttig, and extending to Dollar Junction, where it meets the El Dorado & Bastrop division of the same system. There is also about 5 miles of track beyond Dollar Junction which was not yet completed for operation at the date of the hearing. From Huttig a track nearly 22 miles long runs westward in a general way parallel to the Iron Mountain. This track was not included as part of the incorporated road until shortly prior to the hearing. We shall refer again to the logging tracks, aggregating 75 miles in length, some of which are included as part of the incorporated line, while others are not. A track or branch about 3 miles in length, extending from Felsenthal to the river, was reserved when the Little Rock & Monroe was sold to the Iron Mountain, and was afterwards conveyed by the lumber company to the Louisiana & Pine Bluff. It was used for hauling logs from the river, and when the lumber company ceased getting logs from that source the track was abandoned and taken up. The equipment of the tap line consists of 12 locomotives, 1 combination passenger car, 1 caboose, 31 box cars, 36 flat cars, 22 coal and other cars, and 152 logging cars.

The track 22 miles in length from Hutting to El Doardo & Bastrop Junction, which has been referred to above, was constructed by the tap line, but until a year and a half before the hearing it was operated by the Huttig Logging Company, owned by the Frost-Johnson interests. The annual report for 1911 does not include this track as part of the tap line, but it is distinctly so included on the record. Nothing was paid by the logging company or the Union Sawmill Company to the tap line for the use of the tracks. Connecting with the tap line at various points are logging branches, one of which is 7 miles in length and another 21 miles long. These are referred to on the record as main logging stems; and connecting with them are logging spurs which are built by the logging company, the necessary

steel being loaned by the tap line without charge. These spurs are operated by the logging company, which uses locomotives and cars belonging to the tap line, no rental being paid, although the locomotives are kept in repair by the tap line at its own cost.

The logging company loads the cars in the timber and moves them, with the engines borrowed from the tap line, to the main track. The cars are taken the rest of the way to the mill by the tap line, no charge being made against the lumber company or the logging company for the movement, although the trainmen employed by the tap line do the unloading.

The mill of the lumber company, as heretofore stated, is at Huttig and is directly accessible to the Iron Mountain. The plant covers about 160 acres. The lumber could be taken by the Iron Mountain directly from the mill; but as a matter of fact it is moved by the tap line for a distance of 3 miles to Dollar Junction, and there delivered to the Iron Mountain, which allows 5 cents per 100 lbs. out of its rates on yellow-pine lumber to all destinations. The rates on hardwood lumber are about 2 cents lower than the rates on yellow pine, and on such traffic the Iron Mountain allows 3 cents per 100 lbs. On all lumber the rate of the Iron Mountain from the junction point is published as a joint rate from points on the tap line.

The Wisconsin Lumber Company, which is affiliated with the International Harvester Company, has a large hardwood sawmill on the tracks of the tap line at Huttig. It obtains a portion of its hardwood logs from the Union Sawmill Company, at a price including their delivery at the mill. Such logs are hauled to the mill in the same manner as the yellow-pine logs moving to the Union Sawmill. The hardwood logs which the Wisconsin Lumber Company obtains from the lands owned by others are also brought to the mill without charge, the service being performed by the logging company and the tap line in the manner already described. The manufactured lumber is moved from the Wisconsin Lumber Company's mill to Dollar Junction by the tap line, which receives the divisions heretofore stated. The annual report to the commission for the fiscal year ending June 30, 1910, shows no tonnage other than forest products moving outbound and coal coming inbound. The coal was consumed entirely by the sawmill company, the logging company, and the tap line itself, and aggregated 3,835 tons. Out of the total of 317,473 tons of logs and lumber handled during the same year, about 7,900 tons was manufactured by others than the sawmill company from logs cut on the lands of that company. The tap line has joint rates with the Iron Mountain on coal as well as lumber, but not on merchandise or class traffic. The record indicates that no charge is made for hauling logs that are cut by farmers or others and manufactured at the mills on the tap line. Although the tap line claims to run "two passenger trains daily" between Dollar Junction and Huttig, it has but one combination coach, and its receipts from passengers for the year 1910 amounted to only $587.24. Its mail revenue amounted to $101.31. Its operating revenues for that year aggregated $78,714.93, and this amount was substantially less than its operating expenses. On June 30, 1910, it had an accumulated deficit of more than $85,000, which we assume has been taken care of in some way by the lumber company or its owners.

This is a typical instance of a mere manipulation of its facilities in such a way as to give the tap line the appearance of performing a service as a basis for an allowance out of the rate. Indeed, it was agreed, as heretofore stated, that the tap line should be constructed in such a manner as to justify allowances. The Iron Mountain reaches the mill with its own rails, and is, therefore, in a position to serve the mill directly without making a concession to the lumber company out of the rate. The lumber company, however, has constructed a track of its own 3 miles in length to the Iron Mountain rails, and in compensation for its service in switching its lumber over that track it receives allowances of 5 cents a hundred pounds, or from $20 to $30 a car. We have already said that the extension of the trunk-line lumber rate through the mill point to the tree stump on a tap line is discriminatory unless the same rate adjustment is in effect on the trunk line's own rails. The only service of transportation, therefore, that this tap line can be said to perform for the lumber company that owns it is the switching of the product of its mill to the trunk line, and this the latter is equipped to do upon its own rails. Under these circumstances we regard the arrangement as a mere device for the payment of allowances, which we hold to be unlawful.

We have already pointed out that a tap line claiming to be a common carrier can not render service for others without charge. It follows, if that is its status, that its practice of hauling hardwood logs without charge to the mill of the Wisconsin Lumber Company is unlawful. The divisions received by it for switching products of the Wisconsin Lumber Company's mill to the Iron Mountain are also unlawful.

TIMPSON & HENDERSON RAILWAY.

The mill of the Ragley Lumber Company was built in 1900 at Ragley, Tex., and about 10 miles of track laid to a connection with the Houston East & West Texas and the Texas & Gulf at Timpson. The following year there was incorporated the Timpson & Northwestern Railway. The lumber company retained the ownership of, or constructed, about 12 miles of additional track extending northwest from Ragley into the timber. In August, 1909, a new corporation was formed, known as the Timpson & Henderson Railway, about 60 per cent. of the stock of which was issued to and is held by the stockholders of the Ragley Lumber Company; about 40 per cent. was taken by citizens of Henderson. The new corporation not only took over the track of its predecessor, but also the 12 miles of logging road from Ragley to Pine Hill. The track was extended about 12 miles into Henderson, so that the tap line as in operation at the time of the hearing was 34 miles in length, beginning at Timpson and terminating at Henderson, where a connection is made with the International & Great Northern. In addition to the mill of the Ragley Lumber Company there are two small mills near Pine Hill, and a planing mill at a point known as Long Branch. There are also four small towns or settlements, each having one or more stores, and two of them having banks. Timpson and Henderson, the terminal points, each has a population of 3,000 or 4,000.

In addition to the capital stock, amounting to $250,000, mention should be made of an indebtedness by the tap line to its president, who is also president of the Ragley Lumber Company, of nearly $50,000. The two companies have the same officers.

In addition to the tracks already referred to the lumber company at the time of the hearing had unincorporated logging tracks connecting with the tap line near Pine Hill and extending into the timber. It hauled the logs with its own engines over this track to the incorporated line, and thence under a trackage right for which it paid 25 cents per train-mile, to the mill. The tap line moved the lumber from the mill to the trunk lines, a distance of 10 miles in the case of shipments routed through Timpson, or a distance of 25 miles on traffic moving through Henderson and over the International & Great Northern. It receives a division of from 3 to 4 cents per 100 lbs. from the Houston East & West Texas, and from 2 to 3 cents per 100 lbs. from the International & Great Northern. The Texas & Gulf is a part of the Atchison, Topeka & Santa Fe, and has made no allowances to this tap line since 1908; it formerly paid 1½ cents per 100 lbs. The statement made at the hearing was that the timber holdings of the lumber company would be entirely cut out within another year. We are now advised that the lumbering operations of this company will be brought to a conclusion within 60 days. We are also advised that one or two other new independent mills have recently been erected in proximity to this tap line, in which neither the Ragley Lumber Company nor any of its stockholders has any interest.

There are also joint class rates with the trunk lines and some commodity rates, out of which the tap line receives, for example, a division of 23 cents per 100 lbs. on cotton destined to Houston

and Galveston when moving through Timpson, and 20 cents through Henderson. In the calendar year 1910 it handled 1,029 carloads of lumber, of which 506 carloads belonged to the controlling lumber company. It also handled 15,274 tons of miscellaneous freight, consisting chiefly of grain and grain products, fertilizer and cotton. It does not file tariffs with the commission, but is a party to and concurs in tariffs issued by the trunk lines naming joint rates to and from points on its track. It runs one "mixed" train daily in each direction on a regular schedule and its receipts for passenger traffic for the calendar year 1910 are said to approximate $11,000.

The Timpson & Henderson makes annual reports and claims to keep its accounts in accordance with the rulings of the commission.

In this case we hold that the connecting carriers may properly allow a division out of the rate on the products of the mill not exceeding, however, 2 cents per 100 lbs.

IRREGULAR PRACTICES OF TAP LINES.

It appears from the lines described in the supplemental report, as well as from the statement of those described in the original report, that there are many respects in which the law and the rules and regulations of the commission are not observed by the tap lines. Although claiming to be common carriers, some of them did not file annual reports with the commission until recently. The reports of others are so far from being complete that they can not be said to comply with the requirements of the act. Many of them also do not publish any local rates to apply on traffic received from or delivered to their trunk-line connections. Many of them carry passengers and less-than-carload shipments without charge at all; others make a charge without the authority of published tariffs. We have already referred to the use made by controlling lumber companies of their tap lines under formal and informal agreements for trackage rights with and without charge, and all without any tariff authority. The hours-of-service law, the safety appliance act, and other acts imposing certain requirements on common carriers engaged in interstate commerce are not fully complied with in many cases and in others are wholly disregarded. There is a lack of attention also to our rules and regulations respecting the filing of tariffs and the keeping of accounts. In some cases our examiners have been refused full access to the books of tap lines. With respect to all these matters the law makes no exception in favor of any railways that purport to be common carriers. While our conclusions in no instance have been based on the failure of a tap line to comply with our rules and regulations, we must give warning to all such companies that purport to hold themselves out as common carriers that such irregularities must promptly be corrected.

GENERAL COMMENTS.

The rates of the trunk lines for the movement of logs in this territory are penalty rates; that is to say, the inbound rate to the mill is higher than it should be and is reduced to a net rate, provided the lumber goes out over the rails of the same carrier. Such rate adjustments are adverted to and criticized in *Red River Cotton Oil Co.* v. *T. & P. Ry. Co.*, 23 I. C. C., 437. So far as we can see from a careful examination of the record there is no real necessity for any such rate adjustment in this territory. The penalty rates should be withdrawn, and in their place the carriers ought to fix reasonable flat rates for the inbound log movement.

Orders will be entered as soon as possible to give effect to the views expressed in the original and supplemental reports herein. Tariffs fixing rates and switching charges in accordance with our conclusions may be filed on three days' notice. The carriers will also be expected to submit for the approval of the commission the basis of allowances to lumber companies, under section 15, in the cases where in the original and supplemental reports we have said that such allowances might properly be paid. When approved by the commission such allowances must be published.

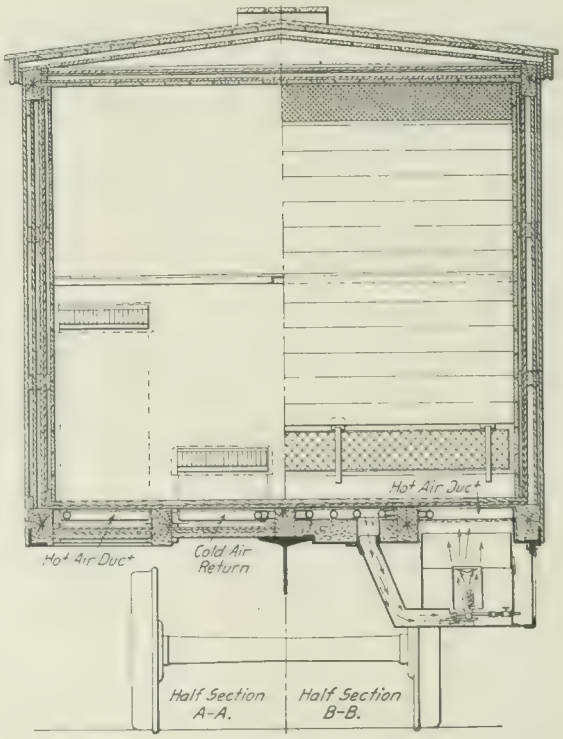
In the majority of cases the tap lines have made no joint class and commodity rates with their trunk-line connections. In other cases joint rates have been established, at least to some destinations. Where joint through class and commodity rates are in effect or are hereafter made effective to or from points on tap lines the trunk lines and the tap lines will be expected to submit to the commission for approval the basis of their divisions. It is expected also that they will submit for our approval reasonable and non-discriminatory rates on forest product when shipped from tap-line points other than the mills of the controlling companies, and will also submit the bases of the divisions thereof

When all these matters shall have been adjusted in compliance with the views of the commission an order will be entered authorizing trunk lines to make settlements on these bases with respect to all traffic moving after May 1, either under section 15 or as allowances out of the rate, as provided herein in the respective cases.

ALCOHOL HEATER CAR.

The continued increase in the number of cars of perishable freight handled by the railways of the United States and Canada has made it more difficult each winter to provide the necessary protection from freezing and to bring perishable products to their destination without a large percentage of loss. The value of heater cars to a region producing perishable products and dependent on a distant market is of vital importance, and increasing demands are being made for heater car service. The alcohol heater car was designed to take care of these conditions and this demand.

The system comprises two heater boxes, or chambers, which



Cross-section Through Car Equipped with Alcohol Heater.

are placed at each side of the car under the floor. These boxes each contain two alcohol supply tanks and two burners. Between the heater boxes, and immediately beneath the floor of the car, run four horizontal ducts or flues, two for heated air and two for the return air. These ducts are connected to vertical flues placed in the end walls of the car, and from the two outside ducts heated air is admitted to the ice compartment at a point 3 ft. 6 in. above the floor. The ice compartment acts as a chimney and induces a rapid movement of the heated air through

the upper grated opening in the bulkhead into the loading space. The air diffuses between the lading and returns through the lower grated opening in the bulkhead and thence through the two return air ducts to the heater box. This arrangement causes a vigorous circulation of heated air within the car.

The ducts are provided with shutters or registers, which can be closed tight when the car uses ice in warm weather. The ducts are of galvanized iron and approximately 2½ in. in depth and 20 in. in width, and are properly protected by mill board and asbestos cloth. Being placed under the floor, they are not only economically constructed, but assist materially in insulation, as they are filled with warm air which radiates through the floor, the total floor radiating surface being 265 sq. ft.

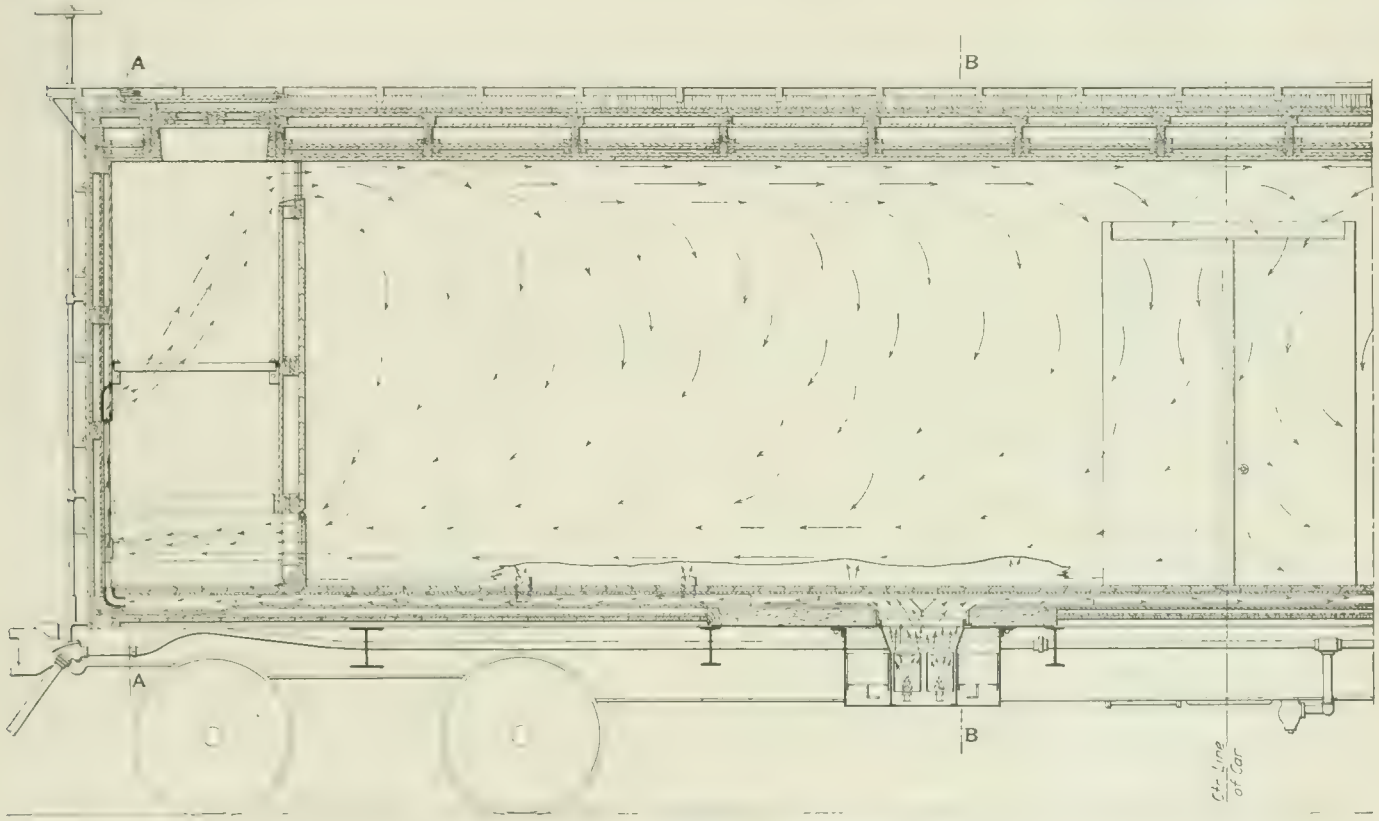
Various fuels have been tried in many different kinds of burners in the attempt to find something that would heat fruit and vegetable cars in winter. Experiments were made with oils and gases, but have not proved entirely satisfactory. Other types of stoves not only require constant attention, but give off noxious odors, gases and soot, which vitiate the air within the car to such an extent in some cases as to damage the lading more than the low temperature.

In casting about for a suitable fuel it was finally decided that for several reasons denatured alcohol was the very best for this purpose. First, as used in the patent automatic burners it is reasonable in cost, requiring only one-half a pint per burner per hour at a cost of approximately 2¼ cents. Second, it is a safe fuel to use. The vapors will not explode when confined and ignited, as will gasolene, nor will the liquid soak into the floor of the car to make it more combustible; in fact, the denatured alcohol as used in the alcohol heater cars has been favorably passed on by the Bureau for the Safe Transportation of Explosives and other Dangerous Articles, and the railways have agreed to accept these cars for transportation over their lines without attendants. Third, alcohol requires less air per pound of fuel burned than any other fuel tried for this purpose, and no provision is required to admit free air to the combustion chamber. The products of combustion are used directly as the heating agent, and no smoke, soot or noxious gases are produced, nor is there any residium, such as ashes and clinkers, to be removed.

The burners used in the alcohol heater are equipped with patent automatic valves which are self-contained within the burner and do not require adjustment. When heat is applied this valve opens and allows a free flow of vaporized alcohol into the burner which produces a clean smokeless flame about 5 in. high. In case the flame is extinguished the control valve closes and the supply of fuel is automatically shut off. Thus the use of manually operated valves is abolished and it is not necessary to have an attendant travel with the cars.

The method of operation of the alcohol heater car is very simple. It is only necessary to pour a small amount of alcohol into the pan beneath the burner and apply a match. The automatic valve within the burner does the rest. When the burner is sufficiently hot the valve opens and the supply of vaporized alcohol begins to flow. This mixes with the proper amount of air to support combustion and continues to burn until extinguished. Each car has a reservoir capacity of 24 gal., or enough to keep one burner in each heater box going continuously for eight 24-hour days without attention. These reservoirs can be filled at regularly established stations where a large supply of alcohol may be kept on hand. This parallels the case of the same car, which, when used as a refrigerator in summer, has to be re-iced. It is not necessary to open up the car from the time it is loaded until it reaches its destination. There are several hundred of these cars in service, and it has been found in actual practice that two burners, one in each heater box, will afford sufficient heat to keep the car at the proper temperature even in the severest weather.

These car heaters are supplied by The Alcohol Heating and Lighting Company, Chicago.



Alcohol Heater as Applied to a Refrigerator Car.

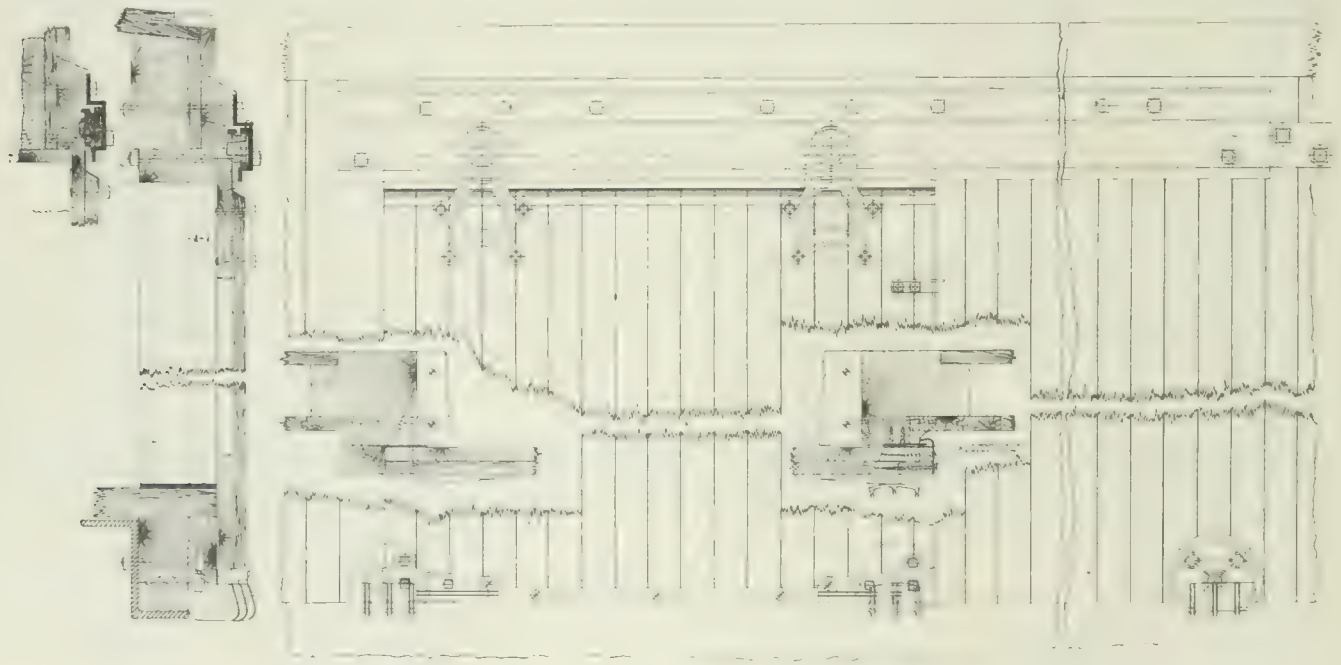
From 1900 to 1910, the average yearly pay of all classes of men employed on the Prussian state railways increased from $338 to $427, or 26½ per cent.

THE CHICAGO CAR DOOR.

The question of defective car doors and consequent damage to lading is attracting considerable attention, and in recent issues we have described some of the improved devices which are intended to overcome the objections to the ordinary doors now in service. The car door here illustrated is one of recent design, and the principal feature is the combined track and hood, the lower flange of which interlocks with the hangers, making it impossible to lose the door except when the car is wrecked. The hood also forms an excellent weather protection to the top of the door, as it projects down 2 in. below the top edge of the door, on the outside. Being housed inside the track the rollers are thoroughly protected from ice and snow, and as they project above the top of the hangers they prevent the door from cramping, one of the rollers running on the inside top of the track if the door is tilted. This is a feature appreciated by anyone that has ever tried to close a door by pushing on the lower corner of it.

The back edge of the door is protected from the entrance of sparks or water by a plate attached to the edge of the door, the inner edge of the plate being bent at an angle towards the door opening and interlocking with a plate attached to the face of the back door post. Another feature of this design is the burglar proof bracket at the bottom back corner of the door. This bracket is attached to the sill of the car by two bolts and one lag screw, the head of the lag screw fitting between two ribs on the face of the bracket. The bottom flange of the bracket is provided with a slot extending almost its entire length; when applying the bracket to the car it is raised up the length of the slot, the lag screw is screwed into place and the bracket is driven down to its proper position, when the bolts are run through the sill and tightened up. The bracket must be applied before the door is hung as, when the door is in place, it is impossible to remove the bracket, even if both bolts are taken out, without raising it up about 3 in. to release the head of the lag screw from between the ribs on the face of the bracket.

The lower corners of the door are provided with malleable iron corner irons, securely attached to the door, forming wedges to crowd the door against the face of the door posts. They are also provided with projecting wedges which fit into corresponding recesses in the abutment brackets and securely hold the door in position, whether open or closed. All the fixtures of this door are heavy and substantial and have been designed for hard usage. They are supplied by the Chicago Car Door Company, Chicago.



Application of the Chicago Box Car Door.

WAGES OF BRITISH RAILWAY EMPLOYEES.

The Board of Trade (London) has published the following statistics of wages of railway employees, not including "other workers." The figures show average wages (including bonus) of "6-day workers" in the principal grades of adult workmen:

Occupation.	Number paid wages.	Average rate of wages.	Average actual earnings.
Engine drivers	26,430	$9.80	$11.37
Goods guards and brakemen	15,643	6.86	7.34
Passenger guards	6,586	6.75	7.12
Signal men	26,849	6.17	6.69
Firemen	26,029	5.80	6.67
Shunters	14,097	5.78	6.23
Porters (goods)	18,506	5.05	5.31
Laborers (permanent way)	27,197	4.87	5.27
Plate layers and packers	44,355	4.73	5.13
Porters (coaching and traffic)	18,146	4.54	4.80

The hours of duty in a full week, exclusive of meal time and overtime, for adult "6-day workers" averages 58; for engine drivers and firemen, 62 hours; guards, 61 hours; porters, 60 to 61 hours; signalmen, 57½ hours; shunters, plate layers and laborers, 55 hours. A considerable proportion of employees receive allowances of uniform or other clothing, house rent free, etc., in addition to their cash wages.—*Consular Reports.*

The Smyrna-Cassaba railway, Asia Minor, is extending the Smyrna branch northward to the port of Panderma on the Sea of Marmora, 112 miles. Work was commenced last year and its completion is announced for 1912. The trip from Smyrna to Constantinople, Turkey, by this line will be made in 12 hours, of which eight will be by rail to Penderma and four by steamer to Constantinople. This will effect a saving of 12 hours on the present sea trip and 36 hours on the present overland route, via Afion Karahissar on the same line. The saving of time which will therefore be effected through this new route, will be of the greatest benefit to Smyrna, as nearly all the passenger and mail traffic comes through Constantinople.

General News Section.

The brotherhood of railway clerks met in convention at Boston this week with an attendance said to be 200.

Suits were filed in the United States district court at Cleveland last week against the Lake Shore & Michigan Southern, asking penalties of $4,500 for nine alleged violations of the hours-of-service law.

President W. A. Gardner and other officers of the Chicago & North Western during a recent inspection trip with an oil-burning locomotive made an investigation of the Salt Creek oil fields in Wyoming.

The Texas Midland has announced its intention of establishing a gasolene-electric motor car service this fall between Paris and Dallas, Tex., each car making one round trip daily, a total distance of 232 miles.

A hearing in the Illinois Central car repair graft case was called in the criminal court at Chicago on June 3, but was again postponed, this time at the request of the state's attorney on account of the absence of an important witness.

Members of the Traffic Club of Chicago will make an inspection trip over the Chicago railway terminals on Tuesday, June 11, in a special train furnished by the Chicago & Western Indiana through the courtesy of Traffic Manager F. A. Spink.

Suits have been filed in the Circuit Court at Van Buren, Ark., against the St. Louis, Iron Mountain & Southern and St. Louis & San Francisco, to recover penalties of $37,500 and $16,500, respectively, for alleged violation of state safety appliances laws.

A special train carrying a delegation of Shriners made a fast run on the Union Pacific from Denver to Omaha on May 23, covering the distance in 12 hours and 30 minutes. The fastest regular schedule between the two cities is 14 hours and 25 minutes.

The Grand Trunk has granted increases of pay to its firemen. The old rates of $2 to $2.70 per 100 miles will be supplanted by a schedule of from $2.15 to $2.90. Within these limits the increase is from 10 to 30 cents per hundred miles. The monthly rates of $57 to $74 are increased to $70 and $80.

The special committee on railway terminals of the Chicago city council, of which Alderman Geiger is chairman, has been holding a series of conferences with the railway presidents to discuss the various plans which have been suggested for building railway passenger terminals south of Twelfth street.

Elroy Judson Bucknam, of Tomiko, Ontario, ten years old, has received from the Temiskaming & Northern Ontario Railway Commission a gift of a gold watch, in recognition of his presence of mind in flagging a passenger train with his red cap, when he discovered a broken rail on the 26th of March, last.

The Pennsylvania this week has taken a large number of its station agents by special trains to the Pennsylvania State College to acquaint them with the source of the agricultural education which the railway company has been disseminating among the farmers, partly through the instrumentality of the station agents.

The new Union Station at Norfolk, Va., accommodating the trains of the Norfolk & Western, the Norfolk Southern, and the Virginian was opened for business June 1. This station, costing about $1,000 000, has been built by the Norfolk Terminal Railway, the Norfolk & Western holding the principal interest.

The Pennsylvania, the Lehigh Valley, the Central of New Jersey, the Erie, the Lackawanna, and the Baltimore & Ohio have filed suits in the federal court at New York against the New York, New Haven & Hartford for balances for car service in 1907 and 1908 when the rate of 50 cents a day was in effect. The sums claimed aggregate $490,256.

The scheme for rail inspection outlined in the *Railway Age Gazette* of May 10, page 1057, has now been extended to every rail mill in the United States. The following railways in addition to those already mentioned, are having their rails thus inspected: The Chicago & Western Indiana; the Maine Central; the Wabash; the Delaware & Hudson, and the Minneapolis, St. Paul & Sault Ste. Marie.

The Boston Elevated Railway is building for its street surface lines a "jointed coach"; that is to say, a street car made in two parts, or two cars fastened permanently together, with a covering or hood at the middle, the entrance for passengers being at the middle. The car will have the capacity of an ordinary car about 50 ft. long, while at the same time it can be run around curves at street corners, where a straight 50 ft. car could not conveniently be run.

In the *Railway Age Gazette* of May 24, page 1168, was published a news item stating that the Southern Pacific is to follow the plan which has been in effect on other Harriman lines of having accidents investigated by a board including two disinterested persons not connected with the railway, as well as the division officers, giving the findings of the board to the newspapers. As a matter of fact, the Southern Pacific adopted the board of inquiry and publicity method of dealing with accidents several years ago, and its policy has in no wise been changed.

F. H. Newell, director of the United States Reclamation Bureau, held a two-day conference at Chicago on May 31 and June 1, with land and immigration representatives of the western railways for the purpose of discussing ways and means for encouraging settlement on western lands. The more special object of the conference was to discuss plans for bringing about a concerted movement on the part of the government, the railways and the land owners to provide prospective western settlers with reliable and impartial information regarding western lands and conditions, to prevent misrepresentation and to do what is possible toward securing the right kind of settlers.

By a traffic agreement which has long been under consideration between the Illinois Central and the Chicago, Lake Shore & South Bend Electric Railway, through cars are now running between Gary, Ind., and the down-town terminal of the Illinois Central in Chicago. This service was established on Sunday, June 2, the electric cars being hauled by Illinois Central steam locomotives between Pullman and Randolph street. Six trains a day are being operated, making four stops on the Illinois Central and giving through service between Chicago and Hegewisch; Hammond, East Chicago and Gary, where connection is made for South Bend and other points reached by the Indiana interurban lines. For two years, since the electric railway was built, passengers have had to change cars at the Pullman terminal of the electric line.

The Elgin, Joliet & Eastern Railway has had safety committees actively at work since January, 1911, and in these 16 months the local committees have sent to headquarters over 1,200 suggestions for the promotion of safety; and all but about 75 of these have proved useful. This information appears in the last accident bulletin of the Indianapolis State Railroad Commission, which has recommended that all of the roads of the state establish safety committees, and which is making inquiries to see what the roads are doing. The Elgin, Joliet & Eastern uses stereopticon pictures and other up-to-date means of informing employees concerning every-day dangers. Bulletins are issued giving notice of important discoveries and conclusions. Cases have been found where men injured but slightly had made no report to the medical officer, with unfortunate results—in one case loss of life.

The House committee on interstate and foreign commerce has voted to make a favorable report on a bill providing that switchmen and signalmen must not be required to work more than eight hours a day. The Senate has passed a bill, which already had been passed by the House, stipulating that eight hours a day shall be the working limit for all persons engaged on contracts for the United States government. The House has passed without debate a bill to prohibit the entry at American ports of foreign vessels belonging to any person or combination violating the Sherman anti-trust law. This

bill has a clause authorizing the postmaster general to cancel any contract with the owners of any such vessel for carrying mails. The Senate has refused to concur in the action of the House in withholding appropriations for the Commerce court, but the appropriation bill as it passed the Senate, retains a clause limiting the traveling expenses of the judges of the Commerce court.

The Congressional committee investigating the conduct of Judge Archbald of the Commerce Court has concluded its public hearings. The testimony presented has not been of such a character as to warrant definite conclusions. On Monday of this week the clerk of the district court at Scranton, Pa., testified concerning a gift of money made to Judge Archbald by lawyers when the judge went to Europe. District Attorney Wise, of New York, was called to testify concerning the action of Judge Archbald in imposing minimum fines of $1,000 each on 83 defendants in the cases against the wire pool, some months ago. Mr. Wise had protested against such mild punishment and he gave the committee his reasons for complaining of the action of the judge. E. E. Loomis, vice-president of the Delaware, Lackawanna & Western, when testifying before the committee, demanded that his name be cleared of the charges made in the vicious lies which he said had been told in the testimony at the hearing concerning him and his relation to negotiations for the sale of coal at Scranton.

Problem of Railway Nationalization in England.

Replying to a trade union deputation which urged the nationalization of the railways, the British prime minister, Mr. Asquith, recently said to his hearers: "Quite frankly, I do not think the burden of proof—which is placed on those who are in favor of nationalization of railways—has been satisfied. The profits earned by the companies are not extravagant return for commercial ventures." "The real point," said Mr. Asquith, "that we have got to consider as practical men is what changes, if any, are necessary to bring our railway services in better conformity with the general needs of the community. The paid-up capital for 1911 was £1,324,000,000. The gross receipts were 127¼ millions, and the expenditure 78½ millions, and the net receipts were, therefore, little more than 48½ millions. That brings out a net return upon the capital of 3.66 per cent. If you take the years from 1902 until 1907 you will find that the average percentage was about 3.44. The percentage return of 3.66 is the highest figure obtained certainly during the last ten years, and it is not a very high return for a commercial undertaking. Even when you have deducted all the 'watering' the return does not work out at more than 4.3 per cent. That is substantial, but not an extravagant return for a commercial venture which is attended with a great deal of risk. In a great many cases the ordinary shareholders have been kept for a long time without any return at all. The real practical question, apart from all the obvious difficulties, attending a gigantic undertaking of this kind, is whether we should be better off after the operation was concluded."

New Y. M. C. A. Building for New York City.

"The Railroad Branch" of the Young Men's Christian Association at 45th street and Madison avenue, New York City, adjacent to the Grand Central Terminal, whose beautiful building at that point was given to the association by the late Cornelius Vanderbilt, is to have a large new building, three blocks north and one block east of its present location; and the $500,000 necessary for the purpose has already been subscribed. The land at the new location is given by the New York Central & Hudson River Railroad. It is bounded on the east by Park avenue, on the south by 49th street and on the north by 50th street; and its depth west from Park avenue is 67 ft. The new building will be six stories high and will have about 70,000 sq. ft. of floor space. It will be the most elaborate institution of the kind in the country, and probably in the world, and will have 250 sleeping rooms. The walls will be of white brick trimmed with white granite. Park avenue, running north and south above the tracks of the approach to the Grand Central Terminal and extending southward through the center of the yard to the station building at 45th street, will be one of the most beautiful streets in the city. It is understood that members of the Vanderbilt family are large subscribers to the building fund. The site of the present building is needed for other purposes, and, being disposed of in this way, it will furnish a considerable part of the money for the new building.

City Club of Chicago Dissects Chicago's Transportation Problem.

The City Club of Chicago this week concluded a series of discussions and exhibitions on Chicago's Transportation Problem. On Monday, May 27, F. A. Delano, president of the Wabash, described briefly the transportation proposals of the Commercial Club and sketched a history of the various attempts that have been made to organize a scientific system of terminals for Chicago, saying he thought that the desired conditions were now nearer fulfillment than ever before, but that the railways had made no progress whatever in lowering the cost of handling freight at terminals.

On May 28 L. T. Jamme, chief engineer, Chicago Transfer & Terminal Company, spoke on freight interchange in Chicago, emphasizing the need of a system for interchanging through freight outside of the congested district so that no through traffic need be brought into the city.

On May 29 Charles J. Harth, manager J. C. Zipprich Teaming Company; Oscar F. Bell, traffic manager Crane Company; C. O. Frisbie, traffic manager Armour & Co., and James J. Wait, president Merchants' Lighterage Company, discussed various methods of local freight collection and delivery.

On Monday, June 3, W. F. M. Goss, director engineering department of the University of Illinois and a member of the Chicago Association of Commerce committee on Smoke Abatement and Electrification, discussed the subject of railway electrification, emphasizing the enormous cost that would be involved in changing the motive power of all the railways in the city, which, he said, the Association of Commerce committee would be in a position to report on in the course of another year. He said that the committee is performing its work in a manner to command the confidence of the community in its findings, and urged that judgment be suspended on the question of electrification until the committee had rendered its report. He suggested that it might be considered that the railways might do more for the benefit of the community by spending the money which electrification would cost for needed improvements of other kinds, such as block signaling, double-tracking and improvement of terminal facilities.

Among the exhibits are a collection of maps prepared by Charles K. Mohler, consulting engineer, showing the growth of steam railways in Chicago by five-year periods since 1850; a map showing the number of railway crossings; plans showing the transportation proposals of the Commercial Club; a relief map prepared by H. H. Evans, secretary of the city council committee on local transportation, showing the density of population in different parts of the city, and the location with reference to population of transportation lines.

The Travel Show.

The Travel Show, held under the auspices of the Transportation Club of New York at the New Grand Central Palace, New York, during the week beginning May 27, was an interesting exhibition of the development of ways and means of transportation. Almost every device that was ever used to facilitate travel by land, water or air was shown in its early stages of development and contrasted to the most modern and improved type. Among the most interesting features was a full-size model of the first railway train ever run in the State of New York. The original train, which consisted of the De Witt-Clinton locomotive and three stage coaches converted for use on rails, ran from Albany to Schenectady on August 9, 1831, attaining a speed of 15 miles an hour. The locomotive was of the 0-4-0 type, with 52-in. driving wheels and 5½-in. x 16-in. cylinders, and, with the tender, weighed six tons. It was operated from the tender and wood was used for fuel. Another interesting exhibit was a model of the Empire State Express locomotive of 1891, which was shown in operation. This model was about 7 ft. long and was capable of generating power from its own boiler. It was built at a cost of $5,500. There was also a model of the entire line of the Cincinnati Southern showing every detail of construction, including stations, yards, bridges, cuts and

fills, rolling stock, and even telegraph poles and wires. A section of the first rail used by the New York Central was also exhibited. An original stage coach of Wells, Fargo & Company, which was built in 1858 and which once covered 20 miles in one hour and 34 minutes, was shown. An automobile was shown which was built by the Columbia Motor Company in 1895 and was not taken out of service until 1909. It was claimed that this was the first automobile that was ever used in this country. A fully equipped and inflated balloon was suspended in the center of the room, and models of various air craft, including the Zeppelin dirigible, were suspended nearby. Two aeroplanes were also shown. The sledge used by Peary in the discovery of the North Pole was exhibited, with a team of eight stuffed dogs hitched to it. The War Department had lent a large relief map of the Panama canal, and the Department of Agriculture had an interesting exhibit of the methods of construction of the various types of roads.

Tony Donatto.

His was an unknown name in this city Monday, unknown that is to all but those who knew him in his social and work-a-day world. Today, he stands forth as a hero, a man who gave his life that others might be saved. The story is the more impressive because of its simplicity. There was no brilliant stage setting. He was at work with his fellows upon the tracks of the New Haven railway when the warning of the approach of a fast express train was given. The men jumped away, but he went back to remove a tie that had carelessly been left on the tracks and would have wrecked the train with a probable heavy loss of life. The act cost him his life and deprived his family of his support. No more impressive sacrifice can be conceived of, and no additional words are needed to bring it home to a generous world. It should become, as it doubtless will become, the gentle duty of the corporation to see that his family never come to want, or lack the protection the victim of his own sense of duty afforded them.—*New Haven (Conn.) Journal-Courier.*

Safety Committees for New York Central Lines.

Safety committees have been organized on the New York Central Lines west of Buffalo under the supervision of Vice-President A. H. Smith. A general safety committee includes the assistants to the vice-president, the general manager of the Lake Shore, the general manager of the Big Four, the general manager of the Michigan Central, the general superintendent of the Indiana Harbor Belt, the general claims attorney and the general safety agent. As previously announced, George H. Bradshaw, assistant to the claims attorney of the New York Central & Hudson River, has been appointed general safety agent, with headquarters at Chicago, and will be secretary of the general committee. In addition, a central safety committee has been appointed for each line, including the assistant general manager, general superintendent, assistant chief engineer, superintendent of motive power, signal engineer, mechanical engineer, inspector of freight transportation and chief claim agent. Division safety committees have also been appointed and shop committees will be appointed at the larger shops. The central division and shop committees will meet at least once a month.

M. M. and M. C. B. Associations.

The program for the M. M and M. C. B. conventions at Atlantic City, is as follows:

MASTER CAR BUILDERS.

Wednesday, June 12, 1912.

9:30 a. m. to 1:30 p. m.

Address by the president ..... 9:30 a. m. to 10:30 a. m.
Reading the minutes of the last meeting .. 10:30 a. m. to 10:35 a. m.
Report of secretary and treasurer ..... 10:35 a. m. to 10:50 a. m.
Miscellaneous business ..... 10:50 a. m. to 11:20 a. m.
Discussion of reports on:
- Nominations ..... 11:20 a. m. to 11:30 a. m.
- Revision of Constitution ..... 11:30 a. m. to 11:45 a. m.
- Revision of Standards and Recommended Practice ..... 11:45 a. m. to 12:00 m.
- Train Brake and Signal Equipment .... 12:00 m. to 12:30 p. m
- Brake Shoe Equipment ..... 12:30 p. m. to 1:00 p. m.
- Car Wheels ..... 1:00 p. m. to 1:30 p. m.

Thursday, June 13, 1912.

9:30 a. m. to 1:30 p. m.

Discussion of reports on:
- Safety Appliances ..... 9:30 a. m. to 10:00 a. m.
- Rules of Interchange ..... } 10:00 a. m. to 10:30 a. m.
- Prices for Labor and Materials ..... }
- Rules for Loading Materials ..... 10:30 a. m. to 10:45 a. m.
- Damage to Freight Equipment by Unloading Machines ..... 10:45 a. m. to 11:00 a. m.
- Overhead Inspection ..... 11:00 a. m. to 11:15 a. m.
- Coupler and Draft Equipment ..... 11:15 a. m. to 12:15 p. m.
- Car Trucks ..... 12:15 p. m. to 12:30 p. m.
- Springs for Car Trucks ..... 12:30 p. m. to 1:00 p. m.
- Consolidation ..... 1:00 p. m. to 1:10 p. m.
- Train Lighting and Equipment ..... 1:10 p. m. to 1:30 p. m.

Friday, June 14, 1912.

9:30 a. m. to 1:30 p. m.

Individual paper on:
- Car Shop Apprentices, by I. S. Downing (L. S. & M. S.) ..... 9:30 a. m. to 10:00 a. m.

Discussion of reports on:
- Train Pipe and Connections for Steam Heat ..... 10:00 a. m. to 10:30 a. m.
- Tank Cars ..... 10:30 a. m. to 11:00 a. m.
- Specifications for Tests of Steel Truck Sides and Bolsters ..... 11:00 a. m. to 11:30 a. m.
- Capacity Marking of Cars ..... 11:30 a. m. to 11:45 a. m.
- Lettering Cars ..... 11:45 a. m. to 12:00 m.

Unfinished business; Reports of Committees on Correspondence, Resolutions, and such other committees as may be named during the convention ..... 12:00 m. to 12:15 p. m.
Election of Officers ..... 12:15 p. m. to 1:30 p. m.

MASTER MECHANICS.

Monday, June 17, 1912.

9:30 a. m. to 1:30 p. m.

Prayer ..... 9:30 a. m. to 9:35 a. m.
Address of president ..... 9:35 a. m. to 9:50 a. m.
Action on minutes of convention of 1911 .. 9:55 a. m. to 10:00 a. m.
Reports of Secretary and Treasurer ..... 10:00 a. m. to 10:15 a. m.
Miscellaneous business ..... 10:15 a. m. to 10:45 a. m.
Discussion of reports on:
- Advisory, Technical ..... 10:45 a. m. to 11:00 a. m.
- Mechanical Stokers ..... 11:00 a. m. to 11:30 a. m.
- Revision of Standards ..... 11:30 a. m. to 12:00 m.
- Specifications for Cast-steel Locomotive Frames ..... 12:00 m. to 1:30 p. m.

Tuesday, June 18, 1912.

9:30 a. m. to 1:30 p. m.

Discussion of reports on:
- Main and Side Rods ..... 9:30 a. m. to 10:00 a. m.
- Consolidation ..... 10:00 a. m. to 10:15 a. m.
- Safety Valves ..... 10:15 a. m. to 10:45 a. m.
- Safety Appliances ..... 10:45 a. m. to 11:00 a. m.
- Design, Construction and Maintenance of Locomotive Boilers ..... 11:00 a. m. to 12:00 m.
- Contour of Tires ..... 12:00 m. to 12:30 p. m.

Individual paper on:
- Increased Power Obtained with Superheat as Compared with the Maximum Power Obtained with Saturated Steam, Prof. C. H. Benjamin and Prof. L. E. Endsley ..... 12:30 p. m. to 1:00 p. m.
- Steel Tires ..... 1:00 p. m. to 1:30 p. m.

Wednesday, June 19, 1912.

9:30 a. m. to 1:30 p. m.

Discussion of reports on:
- Flange Lubrication ..... 9:30 a. m. to 10:30 a. m.
- Minimum Requirements for Headlights . 10:30 a. m. to 11:00 a. m.

Standardization of Tinware	11:00 a. m. to 11:15 a. m.
Maintenance of Superheater Locomotives	11:15 a. m. to 12:00 m.
Engine Tender Wheels	12:00 m. to 12:30 p. m.
Resolutions, Correspondence, etc.	12:30 p. m. to 12:40 p. m.
Unfinished Business	12:40 p. m. to 12:45 p. m.
Election of Officers	
Closing Exercises	12:45 p. m. to 1:30 p. m.

Railway Signal Association.

The regular New York meeting of the Railway Signal Association will be held at the Hotel Astor on Wednesday and Thursday, June 12-13, the Thursday morning session beginning at ten o'clock. Preliminary reports will be made by committees 2, 3, 5, 6, 7, 8, and 9, and by the special committee on storage batteries. It is planned to discuss these reports as follows: Wednesday, committee No. 3, Power Interlocking, Specifications for Mechanical and Electric Releases, for Vitrified Conduits for Fibre Conduits, and for Protection to Drawbridges by Power Interlocking; committee No. 5, Manual Block Signaling, Diagrams for Discussion, Showing the Development from a Simple Manual Block Station, without Siding, to a Complete Equipment; committee No. 9, Wires and Cables, Proposed Changes in Existing Specifications; committee on storage batteries, Specifications for Lead Type Storage Batteries for Power Stations, Thursday; committee No. 2, Mechanical Interlocking, Seven Drawings for Tower Leadouts; committee No. 6, Standard Designs, Drawings for Pipe Carrier, Cable Post and Cast Iron Relay Box; committee No. 7, Definitions of Technical Terms; committee No. 8, Electric Railway Signaling, Specifications for Oil Cooled Transformers and Impedance Bonds.

The May number of the journal of the association contains these reports, and also the proceedings of the meeting which was held at Chicago last March.

American Society of Civil Engineers.

At the regular business meeting of the American Society of Civil Engineers, held June 5, a paper by C. E. Grunsky, M. American Society of Civil Engineers, entitled The Appraisal of Public Service Properties as a Basis for the Regulation of Rates, was presented for discussion. This paper was printed in the *Proceedings* for April, 1912.

MEETINGS AND CONVENTIONS.

The following list gives the [illegible] meetings and conventions.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.

American Association of Demurrage Officers.—A. G. Thomaston, Boston, Mass.

American Association of General Passenger and Ticket Agents.—W. C. Hope, New York; next convention, September 12, Seattle, Wash.

American Association of Freight Agents.—R. O. Wells, East St. Louis, [illegible] Detroit, Mich.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September.

American European Railway Association.—H. C. Dereker, 29 W. 39th St., New York. Convention, October 7-11, Chicago.

American Electrical Railway Manufacturers' Assoc.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

American Railway Association.—W. F. Allen, 75 Church St., New York.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago.

American Railway Master Mechanics' Assoc.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

American Railway Tool Foremen's Association.—M. H. Bray, N. Y. N. H. & H., New Haven, Conn. Convention, July 9, Chicago.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York [illegible]

American Society of Engineering Contractors.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

American Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

Association of Railway Claim Agents.—L. R. McSherry, C. & E. I., Chicago.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago. Semi-annual, June 11, Atlantic City, N. J.; annual, October 21-25, Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York. Convention, June 25-26, Bluff Point, N. Y.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

Master Car and Locomotive Painters' Assoc. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass. Convention, September 10-13, Denver, Col.

National Railway Appliances Assoc.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railroad Club.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Business Association.—Frank W. Noxon, 2 Rector St., New York.

Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

Railway Gardening Association.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.

Railway Industrial Association.—G. L. Stewart, St. L., S. W. Ry., St. Louis, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa. Meeting, June 12-13, New York.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio.

Railway Supply Manufacturers' Assoc.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

Railway Tel. & Tel. Appliance Assoc.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling, Ill. September 10-13, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

Society of Railway Financial Officers.—C. Niquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; annual, Aug. 27-30, Chicago.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The Munson steamship line announces that beginning June 15 its steamers will make regular sailings from Baltimore to Havana twice a month.

The Bessemer & Lake Erie in the month of May hauled from Lake Erie to the mills of the Pittsburgh district 23,584 cars of ore, 1,115,000 tons. This is 62,000 tons more than was ever before carried over the line in a single month.

It is announced that after its July meeting the Southern Classification Committee will accede to the repeated requests of shippers and publish its dockets regularly, thus enabling interested parties to have a complete knowledge of changes proposed.

Attorney-General Hogan of Ohio has written a letter to the general counsel of each of the railways passing through the state, with reference to the recent action of the Central Passenger Association roads in discontinuing Sunday excursions, in which he attacks the right of the roads to make rate agreements and charges that they have violated their state charters.

The United States District Court for Alabama has issued a decision under which the Central of Georgia and the Western of Alabama will be free to advance rates in Alabama regardless of the statutes of that state which have been declared unconstitutional. The decision of the court is similar to that recently given in the case of the Louisville & Nashville.

Extensive improvements in its suburban service out of Chicago were made on Sunday, June 2, by the Chicago, Burlington & Quincy, by which the runs of many trains were extended out as far as Downers' Grove and Aurora, involving an addition of 15 trains to Aurora. One-hundred pound rails have recently been laid on the line between Chicago and Aurora, and the roadbed will be oiled for the entire distance. The railway has invited criticisms and suggestions relating to the new service by committees representing each community.

The Chicago & Alton recently has made an important addition to its through passenger service to the southwest by establishing in connection with the Gould lines two through standard sleeping car lines from Chicago to Houston and El Paso, Tex., in addition to the through service from Chicago to Little Rock and Hot Springs, Ark., and Chicago to Dallas and San Antonio, which has been established for some two or three years. The Little Rock and Hot Springs car leaves Chicago on the Alton Limited every morning, and reaches Little Rock and Hot Springs early the next morning via the St. Louis, Iron Mountain & Southern. The Houston-El Paso car leaves Chicago on the Alton 9 p. m. train via St. Louis and the St. Louis, Iron Mountain & Southern, International & Great Northern and Texas & Pacific, reaching Houston at 2:10 p. m. the second day, and El Paso at 8:55 a. m. the third day. The Dallas-San Antonio car leaves Chicago on the same train and reaches San Antonio via the Katy Limited at 8:30 p. m. the second day.

With the permisison of the New Jersey State Board of Public Utility commisisoners, the Pennsylvania Railroad has established a fare of 17 cents on the electric trains between Newark and Jersey City (Summit avenue), which is 2 cents above normal; and each passenger at destination will receive a rebate of 2 cents. The new station at Jersey City is at Summit avenue, a mile or more west of the Hudson river, and the net fare from Newark (six miles) is 15 cents; but as tickets cannot be conveniently examined or punched between Summit avenue and the Manhattan terminus, it is necessary that tickets to New York and to Jersey City shall be dealt with alike; and, of course, if the Summitt avenue tickets were sold at a lower rate, there would be passengers who would take the longer ride on the shorter ticket. By the rebate device this little game will be thwarted. Tickets of the Pennsylvania Railroad are now accepted in the Hudson tunnels to and from the uptown stations in Manhattan, as well as to and from the downtown stations, provided the pasesngers pay 2 cents adidtional, the tunnel fare to the uptown stations being 7 cents as compared with 5 cents to Church street. For a 5-cent ride the Pennsylvania absorbs the tunnel fare.

The Cotton Crop.

The United States department of agriculture estimates that the condition of the cotton crop on May 25 was 78.9 per cent. of a normal, as compared with 87.8 on May 25, 1911, 82.0 on May 25, 1910, 81.1 on May 25, 1909, and 81.5 the average of the past ten years on May 25.

Comparisons of conditions, by states, follow:

	May 25.				
States.	1912.	1911.	1910.	1909.	Ten yr. av.
Virginia	89	93	90	85	85
North Carolina	87	83	84	83	83
South Carolina	83	80	78	83	81
Georgia	74	92	81	84	83
Florida	75	95	80	91	87
Alabama	74	91	83	83	81
Mississippi	72	86	82	78	81
Louisiana	69	91	76	74	80
Texas	86	88	83	78	80
Arkansas	73	87	81	84	82
Tennessee	74	83	86	85	84
Missouri	74	86	87	93	85
Oklahoma	78	87	84	84	84
California	96	95	90	..	..
United States	78.9	87.8	82.0	81.1	81.5

For the purpose of comparison, the condition of the cotton crop in the United States monthly for the past ten years is given below:

Years	May 25.	June 25.	July 25.	Aug. 25.	Sept. 25.
1911	87.8	88.2	89.1	73.2	71.1
1910	82.0	80.7	75.5	72.1	65.9
1909	81.1	74.6	71.9	63.7	58.5
1908	79.7	81.2	83.0	76.1	69.7
1907	70.5	72.0	75.0	72.7	67.7
1906	84.6	83.3	82.9	77.3	71.6
1905	77.2	77.0	74.9	72.1	71.2
1904	83.0	88.0	91.6	84.1	75.8
1903	74.1	77.1	79.7	81.2	65.1
1902	95.1	84.7	81.9	64.0	58.3
Average 1902-1911.	81.5	80.7	80.6	73.6	67.5

Canadian Colonization.

The *Wall Street Journal* has been making an investigation of the Canadian situation as respects crop, railway and financial outlook, and the first report on these subjects contains the following:

"The immigration department [of Canada] maintains in the United States a small army of skilled agents to promote the exodus of well-to-do American farmers to the Canadian Northwest. It is said on good authority that the government spends hundreds of thousands of dollars in advertising Canada in the United States, using literally thousands of American publications to create favorable impressions, and yet it is extremely doubtful if the average American can recall having seen any such advertising.

"This work is carried on under the direction of an expert newspaper man, who is an official of the department, and who uses the services of one of the large United States advertising agencies, which places a vast amount of reading matter concerning western Canada in a great number of country and farm papers. A great deal of this matter is placed in papers printed in foreign languages in the middle western states and is very skillfully written, so as to leave a favorable impression and to rouse a desire to know more about Canada. It is at this point that the immigration agent begins his work.

"In many cases he rents the best store in town, fills it with an attractive exhibit of Canadian grains, ingratiates himself with the people of the neighborhood, courteously answers all their questions, distributes well-arranged and skillfully written literature, printed in all the different languages spoken in the western states, gives useful information and advice about places in which to settle, and carries on his campaign right up to the point of inducing the American farmers to sell their land at the high prices prevailing and getting them to load their household effects, machinery and live stock on special trains headed for the Canadian west. This work goes on continuously, but with special activity during the idle winter months and is carried on in hundreds of places, even as far south as Missouri, from which there is a tremendous movement of exceptionally well-to-do native Americans this spring.

"The Canadian Pacific, Grand Trunk Pacific, Canadian Northern and other roads supplement the work of the immigration department with special agents who arrange for the necessary transportation. The government recognizes that the American settler is the real backbone of the Canadian west,

and in spite of the fact that an occasional politician voices alarm at the Yankee invasion, the government is applying its very best energies to promoting the movement.

"For the most part the settlers make new communities of their own, each male adult in many instances taking up a quarter-section of 160 acres of free land and buying as much more as he can at $10, $20 or $30 an acre with the proceeds of the sales of their Iowa, Minnesota, Oklahoma, Kansas, Nebraska, Ohio and Missouri farms which they have sold for from $100 to $200 an acre. Much travel and observation in the Prairie provinces disclosed the fact that the average American settler takes the oath of allegiance and becomes a British subject at the earliest possible moment. They like the Canadian form of government and their children are growing up as good Canadians."

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association in presenting statistical bulletin No. 119A, giving a summary of car surpluses and shortages by groups from January 18, 1911, to May 23, 1912, says:

"The total surpluses on May 23, 1912, was 123,683 cars; on May 9, 1912, was 136,776 cars; and on May 24, 1911, was 168,233 cars. Compared with the preceding period there is a decrease in the total surplus of 13,093 cars, of which 12,444 are coal cars, indicating greater activity in coal and ore traffic. There is a net increase in box car surplus of 2,672 cars, which is general throughout the country except in groups 2 (New York, New Jersey, Delaware, Maryland and eastern Pennsylvania), 5 (Kentucky, Tennesse, Mississippi, Alabama, Georgia and Florida) and 7 (Montana, Wyoming and Nebraska), where slight decreases are shown.

"The total shortage on May 23, 1912, was 7,482 cars; on May 9, 1912, was 6,678 cars; and on May 24, 1911, was 835 cars. Compared with the preceding period there is an increase in the total shortage of 804 cars. The shortage in box car and miscellaneous equipment decreased 376 and 400 cars respectively, but an increase of 1,416 cars in coal car equipment is shown, chiefly in groups 2 (as above) and 4 (the Virginias and Carolinas). Compared with the same date of 1911 there is a decrease in the total surplus of 44,550 cars, of which 27,897 is in box, 3,688 in flat, 2,145 in coal and 10,280 in miscellaneous cars."

The accompanying table gives car surplus and shortage figures by groups for the last period covered in the report, and the diagram shows total bi-weekly surpluses and shortages from 1907 to 1912.

Revenues and Expenses of Steam Roads.

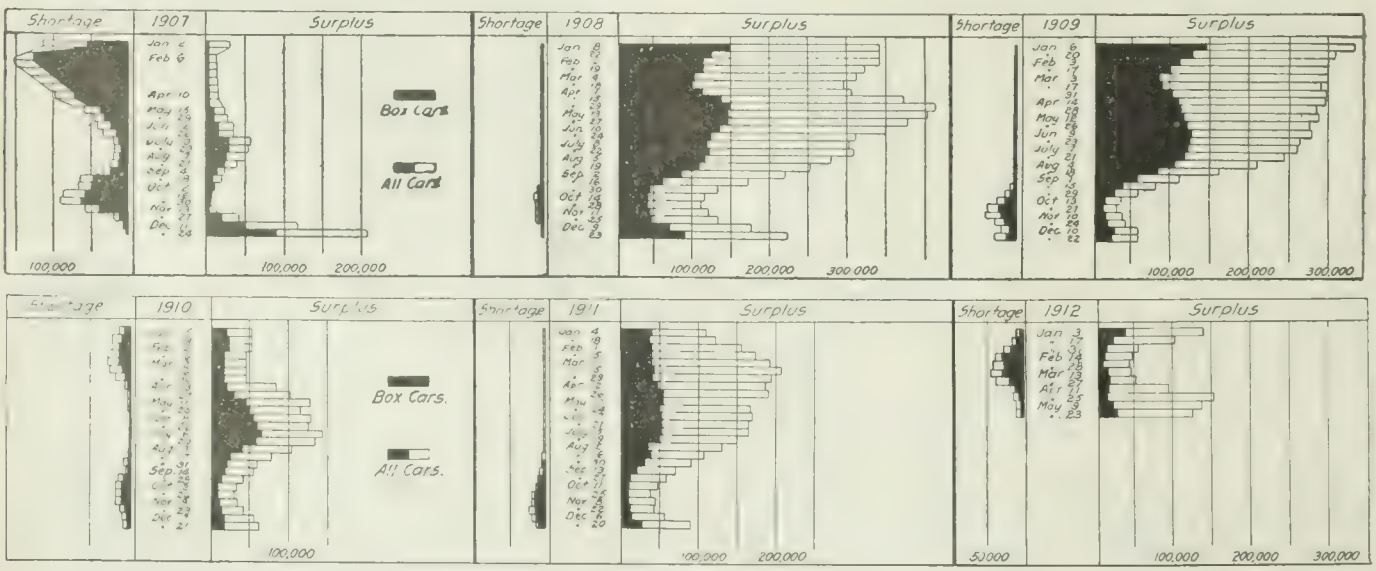
Bulletin No. 33 of the Bureau of Railway Economics gives a summary of earnings and expenses in March. The railways whose returns are included in this bulletin operate 218,488 miles of line, or nearly 90 per cent. of all the steam railway mileage in the United States. The total operating revenues for the month of March, 1912, amounted to $230,563,885. Compared with March, 1911, the total operating revenues of these railways show an increase of $12,661,901. These total operating revenues per mile of line amounted to $1,055 in March, 1912, and $1,016 in March, 1911, an increase for 1912 of $39, or 3.9 per cent. This increase was the resultant of an increase of 6.3 per cent. in the freight revenue together with slight increases in other transportation and non-transportation revenue on the one hand, and a decrease of 3.8 per cent. in passenger revenue on the other hand.

Operating expenses amounted to $163,705,773. This was $12,152,394 more than for March, 1911. These operating expenses per mile of line amounted to $749 in March, 1912, and $707 in March, 1911, an increase for 1912 of $43 per mile, or 6.0 per cent. In the cost per mile of maintaining equipment there was an in-

Car Surpluses and Shortages.

Date.	No. of roads.	Surpluses Box.	Flat.	Coal gondola and hopper.	Other kinds.	Total.	Shortages Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1. May 23, 1912	7	322	338	1,993	205	2,858	162	120	197	0	479
" 2. " 23, 1912	23	1,468	89	33,537	1,609	36,703	47	15	684	53	799
" 3. " 23, 1912	25	3,438	120	17,986	2,805	24,349	19	250	20	202	491
" 4.— " 23, 1912	10	2,217	20	434	1,234	3,905	1,215	440	1,273	5	2,933
" 5.— " 23, 1912	15	1,480	10	4,905	1,622	8,017	13	166	125	0	304
" 6.— " 23, 1912	25	4,222	363	3,499	4,275	12,359	121	24	325	6	476
" 7.— " 23, 1912	4	216	34	442	548	1,240	60	0	25	0	85
" 8.— " 23, 1912	18	3,560	401	5,551	2,738	12,250	0	100	0	0	100
" 9.— " 23, 1912	10	702	178	362	1,442	2,684	100	0	0	0	100
" 10.— " 23, 1912	20	5,622	2,429	2,353	8,370	18,774	8	0	0	7	15
" 11.— " 23, 1912	6	51	71	6	416	544	1,173	503	0	24	1,700
Total	163	23,298	4,053	71,068	25,264	123,683	2,918	1,618	2,649	297	7,482

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages in 1907 to 1912.

crease compared with March, 1911, of 9.1 per cent; in the cost per mile of conducting transportation an increase of 8.1 per cent.; and in traffic expenses per mile an increase of 5.0 per cent.; while in the cost per mile of maintaining way and structures there was a decrease of 2.6 per cent.; and in general expenses per mile a decrease of 3.4 per cent.

Net operating revenue amounted to $66,858,112. This was $509,507 more than for March, 1911. This increase was due to the increase in mileage in 1912. Thus net operating revenue per mile of line amounted to $306 in March, 1912, and $309 in March, 1911, a decrease for 1912 of $3 per mile, or 1.1 per cent. The net operating revenue for each mile of line for each day in March, 1912, averaged $9.87, and for March, 1911, $9.98.

Taxes for the month of March amounted to $9,576,575, or $44 per mile, an increase of 8.0 per cent. over March, 1911.

The operating ratio for March, that is, the per cent. of total operating revenues which was absorbed in operating expenses, was 71.0 per cent., which is comparable with 73.7 per cent. in February, 1912, and 69.6 per cent. in March, 1911.

The eastern group of railways show an increase in total operating revenues per mile of line as compared with March, 1911, of 9.8 per cent., and the southern group an increase of 2.4 per cent.; the western group shows a decrease of 1.7 per cent. Operating expenses per mile increased 8.8 per cent. on the eastern railways as compared with March, 1911, 8.0 per cent. on the Southern railways, and 2.3 per cent. on the western railways. In the eastern group net operating revenue per mile increased 12.2 per cent. as compared with March, 1911; in the southern group it decreased 8.9 per cent., and in the western group it decreased 10.4 per cent. The increase in taxes per mile compared with March, 1911, was 8.2 per cent. in the eastern group, was negligible in the southern group, and was 10.7 per cent. in the western group.

Comparison of the returns for the nine months of the fiscal year 1912 with those of the corresponding months of the fiscal year 1911 shows a decrease in total operating revenues per mile of 0.4 per cent., a decrease in operating expenses per mile of 0.1 per cent., and a decrease in net operating revenue per mile of 0.9 per cent. This net operating revenue per mile of the eastern group of railways increased 7.7 per cent. as compared with the corresponding period for 1911, that of the southern group decreased 7.2 per cent., and that of the western group decreased 5.9 per cent.

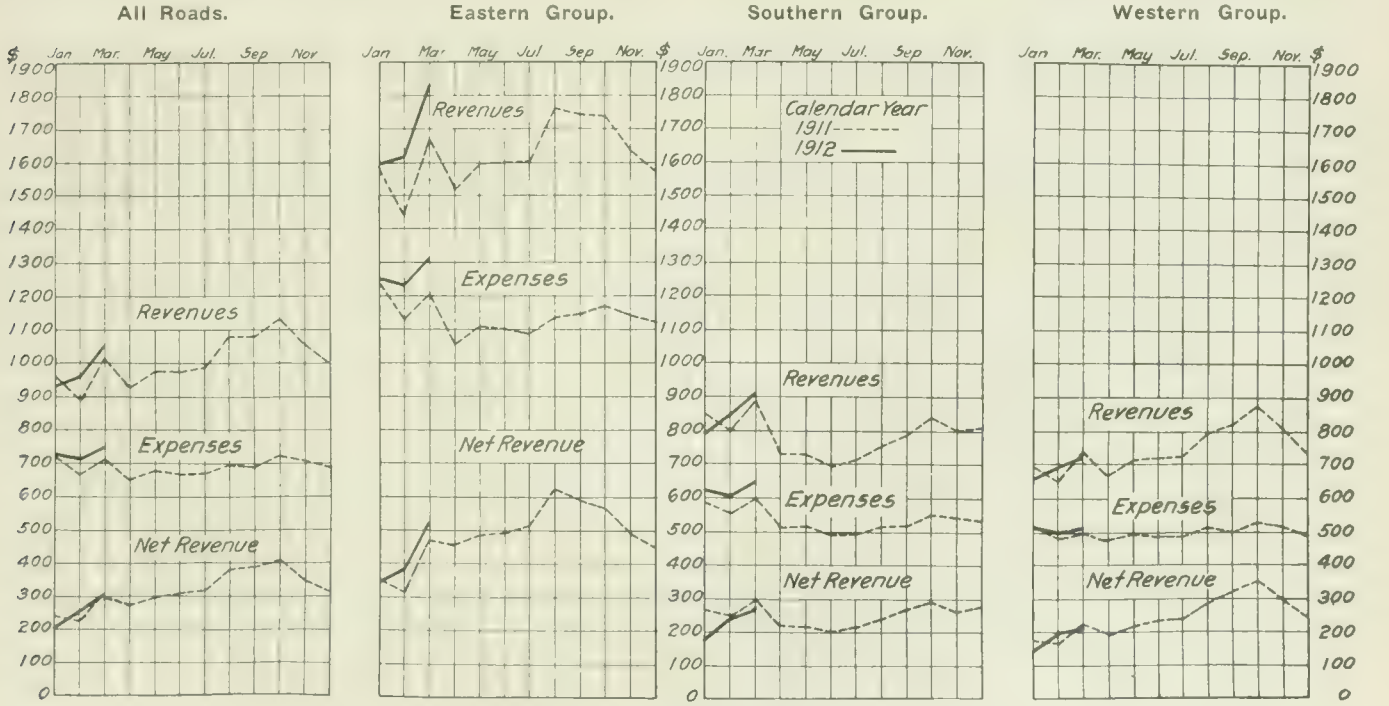
The accompanying diagram shows the average earnings and expenses per mile of road of the railways reporting. The dots on the vertical lines are alone of significance, since the figures are not cumulative, and the lines connecting the dots have no significance.

Per cent of total operating revenue.	March, 1912.	March, 1911.	Fiscal year ended June 30, 1911.	Fiscal year ended June 30, 1910.	Calendar year ended Dec. 31, 1911.	Calendar year ended Dec. 31, 1910.
Maintenance of way and structures	10.6	11.3	12.5	12.7	12.7	13.3
Maintenance of equipment.	16.9	16.1	14.9	14.5	15.5	15.3
Traffic expenses	2.1	2.1	2.1	2.0	2.1	2.1
Transportation expenses	38.9	37.4	34.2	32.2	35.4	34.7
General expenses	2.5	2.7	2.4	2.3	2.6	2.4
Total operating expenses	71.0	69.6	66.1	63.7	68.3	67.8

New York City Subway Contract.

Comptroller Prendergast has sent a recommendation to the Board of Estimate that consent be given to the award and proposed contract between the O'Rourke Engineering Construction Company and the city, for the construction of Section 2A of the Lexington avenue subway, which extends along Broadway, from Walker street to Howard street; and that corporate stock to the extent of $912,351 be issued to pay the amount of the contract.

The Board of Estimate will also consider a recommendation of the Public Service Commission, at its meeting on Friday, for establishing eight new routes and general plans of construction for additional rapid transit railways in the boroughs of Brooklyn, Manhattan, Bronx and Queens, as recommended by the Public Service Commission and approved by Mayor Gaynor.



Monthly Revenues and Expenses Per Mile in 1911 and 1912.

INTERSTATE COMMERCE COMMISSION.

The commission has suspended the advances in rates on malt from Minneapolis, Minn., to Kansas City, Mo. The advances ranged from 2.5 cents to 3.75 cents per 100 lbs.

The commission has postponed from January 1, 1911, to July 1, 1912, the effective date of its order requiring uniform system of accounts of operating expenses of water carriers.

The commission has suspended the tariff of the southwestern lines which eliminates certain points in western Texas from the application of the so-called Texas common point rates on interstate traffic. The advances which have been suspended apply to nearly all commodities and range from two to 11 cents per 100 lbs.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF APRIL, 1912.

Name of road	Mileage operated at end of period.	Operating revenues: Freight.	Passenger.	Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Atlanta, Birmingham & Atlantic	96	$[illegible]	$4,487	$27,793	$31,817	$54,514	$16,696	$1,0846	$12,762	$236,635	$20,658	.....	$15,700	$4,958	—$4,680
Atlantic & St. Lawrence	165	7,760	30,540	139,665	16,386	19,854	4,229	83,909	3,732	128,110	11,555	.....	6,659	4,896	7,922
Atlantic Coast Line	4,453	1,168,00	7[illegible]	3,193,171	388,643	463,901	46,708	1,056,276	84,227	2,039,755	1,159,436	.....	130,001	1,029,436	91,285
Baltimore & Ohio Chicago Term.	22	[illegible]	883	125,204	13,573	17,427	745	61,579	3,816	97,090	28,114	$926	20,925	8,115	—1,548
Bangor & Aroostook	[illegible]	96,886	[illegible]	270,357	28,811	31,422	3,099	96,454	12,004	171,790	104,537	.....	10,575	93,962	—4,392
Bessemer & Lake Erie	94	541,063	834	573,096	87,876	129,005	7,807	126,388	9,896	330,972	243,024	.....	9,000	234, 24	134,303
Buffalo & Susquehanna R. R.	76	88,[illegible]	883	111,13	24,881	18,157	1,571	30,470	5,991	81,029	9,316	.....	2,600	11,916	—37,761
Buffalo & Susquehanna	81	14,162	7,665	23,438	6,939	21,588	492	15,787	2,839	47,526	- 23,603	—11	1,400	25,014	— 10,009
Buffalo, Rochester & Pittsburg	[illegible]	469,067	83,169	577,284	87,059	125,089	10,392	221,145	16,753	460,431	112,353	- 449	17,000	94,904	—29,563
Canadian Pacific Lines in Me.	[illegible]	1,[illegible]8	6,667	201,783	19,454	21,999	2,395	103,269	7,794	154,211	47,542	.....	7,000	40,542	—11,676
Carolina, Clinchfield & Ohio	[illegible]	176,736	10,436	196,96	16,455	22,917	6,953	39,715	7,471	93,511	96,785	.....	8,000	88,785	37,441
Carolina, Clinchfield & Ohio of S. C.	18	14 10	1,[illegible]8	18,738	881	78	999	2,824	429	5,181	10,542	.....	500	10,042	3,929
Central of New Jersey	677	1,044,557	410,067	1,537,177	208,647	310,766	27,341	673,929	61,573	1,302,251	234,926	- 43,229	132,111	59,586	—868,765
Central New England	22	49,360	[illegible]67	91,462	34,538	16,099	1,259	73,767	3,629	139,292	152,170	—46	9,000	143,124	33,982
Charleston & Western Carolina	131	113,912	9,[illegible]38	177,594	33,103	28,648	3,053	70,599	8,227	141,130	36,464	.....	5,000	31,464	—7,249
Chicago & Alton	1,0[illegible]	569,293	306,510	956,[illegible]44	113,049	133,007	37,393	421,867	27,795	734,111	222,133	- 2,524	43,500	176,109	—160,280
Chicago & Eastern Illinois	1,[illegible]75	637,512	[illegible]3,490	968,564	61,854	146,491	30,161	429,532	39,675	707,713	261,251	—10,291	37,500	213,460	98,438
Chicago & Northwestern	[illegible],[illegible]18	5,676,801	1,421,6[illegible]3	5,6[illegible],744	610,011	732,125	107,660	2,501,183	120,313	4,061,292	1,620,480	15,142	305,000	1,330,592	249,008
Chicago, Burlington & Quincy	8,054	4,[illegible]3, 13	1,563,403	6,7[illegible]6,130	1,594,591	916,541	1,0,146	2,363,215	194,552	5,189,045	1,537,085	—18,149	265,013	1,253,923	—171,487
Chicago Great Western	1,496	717,1.8	24,[illegible]97	1,0[illegible],578	133,673	146,177	45,812	488,950	32,331	841,943	171,635	1,039	35,090	135,506	- 50,426
Chicago, Peoria & St. Louis	358	96,016	24,856	128,[illegible]55	2,76[illegible]	33,057	7,166	66,407	5,357	131,949	—3,594	.. ....	4,300	— 7,894	- 4,988
Chicago, Rock Island & Gulf	1770	156,[illegible]3	43,[illegible]8	218,09[illegible]	33,[illegible]8	34,085	11,103	9,[illegible]63	8,690	170,939	47,963	- 336	8,122	39,505	37,293
Chicago, Rock Island & Pac.	7,36[illegible]	3,0[illegible],34	1,30[illegible],4	4,6[illegible]8,21	[illegible]58,174	584,548	155,679	2,066,468	133,833	3,492,692	1,163,539	—18,196	225,574	919,769	132,491
Chicago, St. Paul, Minneapolis & O.	1,744	760,[illegible]77	3[illegible]	1,1[illegible]681	88,365	148,515	27,437	514,651	34,688	813 656	356,095	- 719	63,629	292,647	27,232
Cincinnati, Hamilton & Dayton	1,013	50[illegible],609	113,703	702,748	71,[illegible]3	139,000	18,669	322,215	17,474	568,681	134 067	.....	24,893	109,174	—2,813
Colorado Midland	338	[illegible]9,053	10,[illegible]	1[illegible],071	[illegible]4,463	25,463	9,166	59,507	5,370	123,869	2,702	—1,637	8,000	— 7,435	—12,002
Cumberland Valley	161	20[illegible]95	50[illegible]10	63[illegible]49	44,776	33,877	5,059	82,727	7,033	173,472	90,177	158	5,612	84,407	26,020
Delaware & Hudson Co. & R. R. Dept.	884[illegible]	870,560	208,915	1,136,[illegible]91	[illegible]53,341	[illegible]22,338	24,979	592,632	50,194	1,045,484	90,807	- 5,269	49,000	36,538	—595,528
Delaware, Lackawanna & Western	[illegible]50[illegible]	1,364,3[illegible]7	580,887	2,140,994	479,974	543,244	63,171	800,614	63,558	1,950,561	190,343	35,134	168,940	56,537	—972,627
Detroit & Mackinac	33[illegible]	[illegible]4,114	2[illegible]14	1[illegible]7,009	14,769	19,548	3,126	35,562	2,668	75,673	51,333	191	8,250	42,892	27,360
Detroit, Grand Haven & Milwaukee	191	11[illegible]000	41,090	175,[illegible]5	17,441	22,763	4,722	100,532	4,076	149,534	25,991	131	2,880	22,990	7,617
Duluth & Iron Range	[illegible]00[illegible]	13,[illegible]56	21,501	164,837	46,480	37,479	769	66,488	9,[illegible]63	160,479	4,358	—3,252	6,572	5,466	—44,775
El Paso & Southwestern Co.	90[illegible]	[illegible]88,464	7[illegible],832	668,941	74,936	90,085	11,908	177,068	21,954	375,951	292,990	—1,117	22,238	269,635	66,674
Elgin, Joliet & Eastern	[illegible]41[illegible]	[illegible]48,[illegible]93	10	[illegible]1,[illegible]12	86,363	161,187	4,351	267,490	16,794	536,185	375,827	.....	23,650	352,177	119,995
Fort Worth & Denver City	454	[illegible]5,861	94,607	3[illegible],06	48,542	70,019	6,279	126,753	13,990	265,583	74,423	- 774	10,633	63,016	- 71,950
Grand Rapids & Indiana	580[illegible]	3,0[illegible]89	117,07[illegible]	45,[illegible]34	56,099	77,344	9,410	209,103	16,049	370,005	89,729	842	23,365	65,522	30,543
Grand Trunk Western	847	389,000	161,000	581,[illegible]65	49,795	69,449	16,326	241,811	12,802	360,183	191,482	—3,499	31,635	156,348	82,094
Gulf & Ship Island	3[illegible]3	1[illegible],[illegible]81	7,060	161,981	19,830	28,570	2,192	48,187	8,838	108,017	53,914	.....	5,290	48,624	5,695
Gulf, Colorado & Santa Fe	1,3[illegible]2	[illegible]53,344	00[illegible]80	[illegible]16,387	108,935	146,237	23,910	417,378	32,654	729,114	87,273	.....	42,928	44,345	13,606
Illinois Central	4,7[illegible]5	2,0[illegible],382	[illegible]60,561	4,[illegible]3,854	638,378	1,105,764	110,746	1,863,088	123,090	3,841,066	372,788	17,373	209,633	145,782	—672,274
Kansas City Southern	[illegible]2	[illegible]1,175	1[illegible],42[illegible]	709,50[illegible]	83,700	92,852	26,929	269,001	29,700	501,185	208,320	.....	30,160	178,160	[illegible]22,298
Long Island	3[illegible]2	266,018	51[illegible],615	814,037	125,474	113,533	14,310	386,257	23,633	663,207	150,830	37,778	56,450	132,158	[illegible]39,069
Louisiana & Arkansas	[illegible]55	11[illegible],561	15,856	133,174	19,509	18,382	2,370	36,741	4,438	81,440	51,734	.....	4,233	47,501	16,266
Louisville, Henderson & St. Louis	200	63,075	29,971	100,007	21,993	14,163	4,294	38,545	2,620	81,615	18,392	—67	3,000	15,325	7,660
Maine Central	1,[illegible]22	538,451	[illegible]35,373	8[illegible],570	123,547	130,299	8,259	327,570	26,253	615,928	207,642	- 6,305	42,897	158,440	—26,152
Midland Valley	373[illegible]	69,732	34,078	110,882	22,455	14,533	2,249	34,514	5,483	79,234	31,648	6,753	5,785	32,436	- 6,249
Minneapolis & St. Louis	1,586	484,107	126,8[illegible]	651,417	88,928	97,655	18,879	289,965	21,798	517,225	134,192	5	27,150	107,047	—286
Monongahela	65	122,059	2,361	135,777	19,995	11,521	325	24,869	1,898	58,608	67,169	.....	2,000	65,169	18,140
Nevada Northern	165	125,685	12,968	141,757	16,326	15,707	362	29,305	3,789	65,489	76,268	.....	5,723	70,545	19,647
New York Central & Hudson River	3,59[illegible]	4,575,517	2,481,[illegible]55	7,990,917	1,212,318	1,634,791	204,450	3,342,654	198,311	6,592,524	1,398,393	—15,515	462,795	920,083	—966,252
New York, Chicago & St. Louis	5[illegible]2	[illegible]76,457	101,990	91,[illegible]087	101,039	107,741	47,969	421,072	19,531	697,352	214,735	- 2,532	32,000	180,203	22,674
New York, New Haven & Hartford	0[illegible]5	[illegible],748,[illegible]7	2,170,641	5,451,477	555,431	694,949	25,758	2,148,421	163,421	3,587,980	1,863,497	109,320	330,000	1,642,817	13,628
New York, Philadelphia & Norfolk	11[illegible]	[illegible]23,978	37,596	[illegible]84,133	25,287	52,035	3,708	113,742	12,448	207,160	76,963	.....	7,900	69,063	18,604
Norfolk Southern	608	[illegible]31,453	63,105	317,709	[illegible]8,331	31,478	5,011	96,636	13,815	185,271	129,938	992	7,500	121,446	20,207
Northern Central	473[illegible]	669,053	180,754	91,330	139,198	199,835	15,583	488,070	24,602	867,288	45,042	- 79	36,176	8,787	197,605
Northern Pacific	6,03[illegible]	3,685,[illegible]24	1,177,678	5,[illegible]1,48	671,341	651,601	109,806	1,705,888	91,339	3,229,975	1,971,673	4,445	321,148	1,654,970	1,287
Oregon Short Line	1,76[illegible]	1,259,[illegible]06	356,045	1,[illegible]5,[illegible]05	[illegible]71,340	135,129	[illegible]7,476	401,979	35,894	871,818	853,387	—1,698	57,000	794,689	199,110
Oregon-Washington R. R. & Nav. Co.	1,[illegible]0[illegible]	[illegible]871,193	366,994	1,3[illegible]9,99	186,859	146,996	44,731	494,149	48,266	921,001	405,928	—6,322	70,822	328,784	—140,214
Pennsylvania Co.	1,760[illegible]	2,889,[illegible]58	721,817	4,0[illegible],487	700,018	857,491	84,788	1,616,702	95,516	3,354,515	666,972	5,733	217,005	444,234	- 612,363
Pennsylvania *Railroad*	4,018[illegible]	9,619,669	2,76[illegible],503	13,[illegible]91,528	1,526,794	2,699,486	205,081	4,877,876	336,511	9,644,748	3,646,980	—89,287	564,472	2,993,221	—350,220
Pere Marquette	2,330[illegible]	956,413	303,711	1,380,[illegible]51	162,076	258,847	30,911	662,805	33,000	1,147,639	233,612	4,098	51,882	184,828	49,423
Philadelphia, Baltimore & Washington	713	806,[illegible]06	646,031	1,6[illegible],070	[illegible]23,665	274,396	30,874	692,159	40,838	1,261,932	359,038	.....	49,268	309,770	— 45,688
Pittsburgh, Cincinnati, Chic. & St. Louis	1,16[illegible]2	2,314,[illegible]13	617,[illegible]30	3,[illegible]81,405	420,789	639,684	66,170	1,282,718	71,730	2,481,091	800,314	- 734	130,001	669,579	—155,468
Pittsburgh, Shawmut & Northern	[illegible]78[illegible]	60,107	9,108	71,326	17,281	20,429	1 068	[illegible]9,569	4,[illegible]30	72,577	—1,251	.....	1,565	—2,816	—25,400
Rutland	468	149,143	9[illegible],159	[illegible]77,640	30,643	54,879	7,538	107,075	6 097	206,232	71,408	.....	11,932	59,476	—2,364
St. Joseph & Grand Island	319	91,651	28,084	131,549	[illegible]7,483	33,136	4,502	57,500	5,159	127,780	3,769	816	6,396	—1,811	—3,778
St. Louis Merchants' Bridge Terminal	9	.....	360	116,[illegible]30	[illegible]2,[illegible]27	4,948	539	73,396	5,516	106,626	9,894	.....	5,600	4,294	- 599
St. Louis, San Francisco & Texas	244	81,542	24,169	112,281	18,202	11,415	2,234	52,590	5,365	89,806	22,475	.....	1,217	21,258	35,445

[1] Operated in previous period 4,469; [2] 637; [3] 705; [4] 573; [5] 236; [6] 631; [7] 1,035, [8] 7,744; [9] 9,091; [10] 471; [11] 7,549; [12] 819; [13] 930; [14] 360; [15] 191; [16] 832; [17] 587; [18] 307; [19] 1,537; [20] 4,576; [21] 395; [22] 1,180; [23] 324; [24] 3,591; [25] 2,040; [26] 469; [27] 6,029; [28] 1,646; [29] 1,737; 1,416, [31] 3,977; [32] 2,334; [33] 1,468; [34] 240. —Indicates Deficits, Losses and Decreases.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF APRIL, 1912 (CONTINUED).

Name of road	Mileage operated at end of period.	Operating revenues: Freight.	Passenger.	Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
San Antonio & Aransas Pass	707	$334,815	$80,287	$338,419	$71,076	$49,832	$6,857	$157,575	$10,115	$295,455	$42,964	.....	$12,000	$30,964	$57,188
Southern	7,090[1]	3,835,089	1,[illegible]8 6	5,570,111	781,444	877,933	151,653	1,946,842	168,343	3,896,215	1,673,896	$18,945	205,524	1,487,317	130,521
Syracuse, Binghamton & New York	81	86,644	31,094	122,[illegible]	15,739	13,808	2,867	42,587	2,818	77,819	21,426	.....	6,820	14,606	16,733
Terminal R. R. Ass'n of St. Louis	356	[illegible]	245	187,[illegible]	42,518	19,371	751	81,329	6,682	150,651	36,878	10,941	26,000	21,819	—26,076
Toledo, St. Louis & Western	451	80,5[illegible]6	25,[illegible]5	994,873	25,111	23,886	7,787	104,157	8,546	169,487	125,386	.....	16,750	108,636	25,165
Trinity & Brazos Valley	163	141,[illegible]94	34,705	194,376	53,088	25,024	8,787	90,060	9,868	186,827	2,501	.....	3,500	6,001	3,004
Union Pacific	3,567[5]	2,651,[illegible]3	744,[illegible]43	3,789,6[illegible]3	540,030	519,394	90,553	1,171,909	113,715	2,435,601	1,354,032	5,858	167,665	1,180,499	—130,758
Union R. R. of Baltimore	9	97,870	21,002	130,638	8,153	.....	862	5,422	2,752	17,189	103,449	.....	5,414	98,035	2,457
Union R. R. of Pennsylvania	31	. .	. .	322,163	47,986	74,531	106	126,271	2,480	251,374	70,789	2,208	4,750	68,247	50,336
Vandalia	817	406,359	187,315	672,224	100,353	176,237	24,538	317,137	19,031	637,296	34,928	.....	28,687	6,241	—112,953
West Jersey & Seashore	356[6]	157,631	301,221	484,042	72,304	67,050	14,078	199,094	12,669	366,045	117,997	2,121	29,902	85,974	—45,936
Western Maryland	543	531,[illegible]44	68,082	620,[illegible]76	61,538	80,133	9,026	248,237	13,839	412,763	207,943	- 3	21,000	186,940	—35,728
Yazoo & Mississippi Valley	1,37[illegible]	885,861	134,599	568,913	108,562	112,749	16,042	303,425	26,777	657,555	88,642	1,001	36,917	124,558	- 286,803
TEN MONTHS OF FISCAL YEAR, 1912.															
Atlanta, Birmingham & Atlantic	662	$2,076,624	$553,034	$2,781,614	$393,467	$473,708	$168,134	$1,080,753	$114,296	$2,130,358	$651,256	.....	$142,100	$509,156	$23,978
Atlantic & St. Lawrence	167	904,859	267,185	1,[illegible]88,864	276,733	214,196	44,324	670,078	35,614	1,240,945	47,919	. . . .	66,587	18,668	34,190
Atlantic Coast Line	4,543[1]	18,808,974	7,165,[illegible]28	28,037,117	3,628,570	4,095,245	458,765	9,622,153	733,238	8,537,971	9,499,146	.....	1,101,000	8,398,146	—257,760
Baltimore & Ohio Chicago Terminal	77	.....	2[illegible],843	1,[illegible]88,436	229,651	177,735	8,787	600,603	47,964	1,064,740	223,696	$8,573	184,782	47,487	24,346
Bangor & Aroostook	628[2]	2,180,487	534,870	2,868,305	436,310	323,418	39,498	898,910	114,238	1,812,374	1,055,931	....	97,200	958,731	49,452
Bessemer & Lake Erie	304[3]	1,002,469	285,000	1,384,469	642,273	1,300,918	82,419	1,681,768	102,326	3,809,704	2,574,765	.. ....	103,474	2,471,291	607,259
Buffalo & Susquehanna R. R.	265	1,304,728	88,810	1,468,197	285,192	281,596	15,204	560,241	63,273	1,206,436	256,761	. . . .	26,000	230,761	—14,877
Buffalo & Susquehanna Ry.	91	396,299	89,995	506,965	78,343	265,010	5,015	234,492	24,972	607,842	- 100,877	385	14,000	- 115,262	—36,538
Buffalo, Rochester & Pittsburgh	572[3]	6,662,824	88[illegible],275	7,765,868	958,873	1,504,789	98,875	2,599,242	170,089	5,331,868	2,434,000	498	170,000	2,264,498	—237,931
Canadian Pacific Lines in Maine	233	808,866	309,751	1,197,495	208,862	176,889	51,130	589,427	46,279	1,072,587	124,908	.....	70,000	54,908	- 6,371
Carolina, Clinchfield & Ohio	238[5]	1,[illegible]0,296	1[illegible],503	1,783,556	122,748	213,769	56,419	356,034	75,911	825,482	958,074	2,276	78,000	882,350	317,499
Carolina, Clinchfield & Ohio of S. C.	18	100,588	15,196	118,896	7,079	901	9,682	26,509	4,588	48,759	69,637	.....	5,000	64,637	22,552
Central of New Jersey	677	16[illegible],27,409	4,519,565	21,711,[illegible]5	2,114,417	3,134,[illegible]0	301,039	6,621,771	426,715	12,598,562	9,112,563	62,472	1,161,624	8,031,411	282,710
Central New England	377	1,491,764	280,017	2,014,896	400,664	226,329	12,726	783,003	28,402	1,451,124	1,463,702	4,721	90,000	1,368,981	417,349
Charleston & Western Carolina	341	1,[illegible]76,583	304,[illegible]00	1,66[illegible],684	301,743	243,057	29,776	623,809	46,516	1,245,901	416,783	..... .	50,000	366,783	125,046
Chicago & Alton	1,026[7]	7,980,503	3,435,891	12,346,914	1,593,[illegible]02	2,371,812	397,731	4,634,483	326,572	9,312,800	3,034,114	—31,341	378,000	2,624,773	364,884
Chicago & Eastern Illinois	1,275	9,554,649	2,445,621	12,073,502	1,319,414	2,475,580	299,988	4,898,384	407,711	9,401,027	3,572,475	—25,803	360,593	3,186,079	—486,760
Chicago & Northwestern	7,951[8]	38,560,452	16,364,467	61,037,911	7,511,924	8,221,997	1,137,951	26,024,019	1,236,090	44,131,981	16,908,930	—29,333	2,810,000	14,066,597	—1,509,915
Chicago, Burlington & Quincy	9,074[9]	49,013,538	17,613,531	73,188,166	8,917,897	12,333,490	1,276,291	24,303,320	1,891,310	48,722,308	24,465,858	- 110,352	2,653,052	21,702,454	—957,302
Chicago Great Western	1,496	7,447,133	2,402,992	10,089,950	1,203,398	1,612,307	469,218	4,667,888	346,418	8,299,229	2,390,721	—1,736	334,928	2,054,057	305,848
Chicago, Peoria & St. Louis	255	1,070,262	285,149	1,429,953	191,759	286,630	72,602	655,557	59,417	1,265,965	163,988	.....	43,000	120,988	29,132
Chicago, Rock Island & Gulf	477[10]	1,740,070	516,382	2,435,501	286,353	339,228	100,892	866,034	82,429	1,575,466	850,035	2,457	68,439	779,139	- 15,574
Chicago, Rock Island & Pacific	7,565[11]	32,932,083	15,027,065	51,311,788	7,066,701	6,883,314	1,574,863	21,359,852	1,420,030	38,298,760	13,012,528	- 162,471	2,217,330	10,632,727	- -2,019,582
Chicago, St. Paul, Minneapolis & Omaha	1,744	7,963,585	3,821,854	12,688,044	1,395,[illegible]6	1,541,355	267,444	5,381,524	310,236	8,896,185	3,791,859	—188	650,804	3,140,867	1,105,019
Cincinnati, Hamilton & Dayton	1,015	5,985,677	1,355,827	8,[illegible]21,158	847,329	1,416,736	193,288	3,502,341	187,195	6,146,889	2,074,269	.....	343,093	1,731,176	304,578
Colorado Midland	338	1,195,382	219,080	1,557,957	199,026	291,871	73,028	681,585	53,797	1,299,257	258,700	—4,371	80,000	174,329	57,854
Cumberland Valley	162	1,815,924	549,705	2,481,771	426,660	321,970	45,734	815,813	76,659	1,686,836	794,935	3,449	58,938	739,446	—113,882
Delaware & Hudson Co. & R. R. Dept.	854[12]	14,471,617	2,512,231	17,544,138	1,341,000	2,506,722	224,893	6,248,030	468,618	10,789,263	6,754,865	565	496,598	6,258,832	122,945
Delaware, Lackawanna & Western	959[13]	21,631,544	6,[illegible]74,280	29,834,315	3,500,[illegible]3	5,059,491	658,743	9,222,243	644,577	19,085,577	10,748,738	353,293	1,676,760	9,425,271	—1,364,385
Detroit & Mackinac	358[14]	687,[illegible]96	380,[illegible]8	1,09[illegible]03	162,[illegible]0	178,406	24,806	336,978	31,045	734,155	295,548	1,147	84,969	211,735	22,717
Detroit, Grand Haven & Milwaukee	191	1,11[illegible]406	517,[illegible]78	1,877,750	210,847	258,370	64,349	1,004,333	44,968	1,582,867	294,883	577	28,709	265,507	34,571
Duluth & Iron Range	200[15]	4,613,[illegible]12	296,063	4,923,988	697,575	501,796	8,424	1,032,515	110,983	2,351,293	2,572,645	1,670	235,229	2,339,086	517,250
El Paso & Southwestern Co.	902	5,134,579	801,186	6,[illegible]49,643	790,477	862,976	121,783	1,743,377	228,810	3,747,423	2,502,219	—18,120	233,362	2,250,737	54,051
Elgin, Joliet & Eastern	84[illegible][16]	7,991,[illegible]47	46	8,455,895	768,044	1,514,233	42,054	2,536,296	160,219	5,020,846	3,435,049	. . . .	207,593	3,227,456	1,247,533
Fort Worth & Denver City	484	2,[illegible]70,937	1,[illegible]5,274	4,[illegible]26,986	402,042	672,587	68,909	1,396,434	139,772	2,679,744	1,447,242	—6,153	114,008	1,327,081	256,829
Grand Rapids & Indiana	586[17]	3,576,301	1,445,055	4,347,767	470,936	722,043	110,829	1,875,667	148,559	3,328,034	1,019,733	2,390	230,946	786,397	164,371
Grand Trunk Western	347	3,464,564	1,761,[illegible]60	5,563,879	537,201	800,824	188,024	2,329,467	136,458	3,991,974	1,571,405	—14,146	316,351	1,240,908	242,028
Gulf & Ship Island	308[18]	1,190,554	339,945	1,663,669	217,376	297,656	23,821	486,598	84,209	1,109,610	552,059	.....	47,616	504,443	- 40,692
Gulf, Colorado & Santa Fe	1,597[19]	7,301,804	2,470,637	10,377,741	1,676,455	1,580,177	264,545	4,096,743	328,848	7,946,768	2,430,973	. . . .	389,576	2,041,397	79,094
Illinois Central	4,755[20]	31,153,478	11,[illegible]5,850	48,503,060	6,454,534	11,664,988	1,186,497	19,733,[illegible]41	1,276,961	40,315,601	8,187,459	—91,086	2,24[illegible],172	5,850,198	6,561,717
Kansas City Southern	8[illegible]7	5,[illegible]61,740	1,335,636	7,741,206	894,318	1,094,706	267,958	2,777,502	308,003	5,272,487	2,468,719	. .	329,075	2,139,644	616,832
Long Island	399[21]	2,736,606	5,609,330	8,717,643	1,187,183	1,090,488	131,259	4,056,818	214,831	6,675,579	2,042,064	520,414	547,121	2,015,357	308,669
Louisiana & Arkansas	255	992,802	174,174	1,214,374	201,533	184,508	23,670	334,602	45,819	790,132	424,242	.....	36,933	387,309	36,710
Louisville, Henderson & St. Louis	300	670,167	337,143	1,024,615	230,338	137,736	43,121	316,973	29,503	807,671	216,944	2,663	30,000	189,607	41,134
Maine Central	1,[illegible]47	5,610,378	2,751,286	8,875,020	1,488,151	1,178,293	88,325	3,348,005	258,087	6,355,861	2,519,159	10,214	428,571	2,101,102	254,034
Midland Valley	373[22]	786,032	372,364	1,285,196	286,071	190,089	29,258	388,271	62,994	929,684	305,512	7,132	57,854	254,790	37,206
Minneapolis & St. Louis	1,586	4,763,076	1,432,988	6,611,225	803,489	985,336	181,775	2,996,470	212,648	5,179,718	1,431,507	—265	282,430	1,148,812	—624,645
Monongahela	65	1,[illegible]0,976	33,294	1,[illegible]0,088	146,484	92,984	3,356	228,856	19,278	490,958	608,130	.....	25,430	582,700	93,370
Nevada Northern	163	1,[illegible]79,613	111,476	1,[illegible]0,799	131,634	149,975	3,864	261,067	34,867	581,407	639,392	.....	51,059	588,333	- 9,824
New York Central & Hudson River	3,[illegible]72[23]	51,[illegible]00,590	26,[illegible]5,[illegible]54	86[illegible]52,417	11,[illegible]74,387	14,573,245	1,880,929	33,272,464	2,207,190	63,268,165	23,084,252	263,841	4,987,226	18,960,867	2,106,032
New York, Chicago & St. Louis	562	7,963,336	1,[illegible]74,160	9,[illegible]02,806	1,059,859	1,027,490	465,507	4,090,566	171,603	6,815,025	2,787,781	—18,404	329,125	2,440,252	265,430
New York, New Haven & Hartford	2,09[illegible][24]	26,[illegible]36,272	22,[illegible]19,346	53,[illegible]3,453	5,373,903	6,433,152	312,851	20,992,759	1,608,969	34,720,634	18,903,819	1,161,050	3,200,000	16,863,869	1,186,906
New York, Philadelphia & Norfolk	112	2,159,414	375,972	2,738,200	276,745	489,176	40,001	1,096,077	123,152	2,025,151	713,049	.....	76,600	636,449	- 28,891

[1] Operated in previous period. [2] 7,039. [3] 34. [4] 3,473. [5] 353. [6] 4,496. [7] 627. [8] 205. [9] 573. [10] 236. [11] 631. [12] 1,025. [13] 8,744. [14] 9,091. [15] 471. [16] 7,549. [17] 819. [18] 930. [19] 360. [20] 191. [21] 832. [22] 587. [23] 307. [24] 1,537. [25] 4,567. [26] 395. [27] 1,180. [28] 324. [29] 3,541. [30] 1,040.

- Indicates Deficits, Losses and Decreases.

Commissioner Clark will conduct the first hearing of the Interstate Commerce Commission on rates, regulations and practices of railways in Alaska at Skagway on July 18, when testimony will be heard in the case of the Humboldt Steamship Company versus the White Pass & Yukon.

The commission has suspended the advanced rates on flaxseed from Minneapolis, Minn., and other points to Chicago and other destinations from June 1 to September 28. The rates were advanced from 7½ cents per 100 lbs. from Minneapolis to Chicago to 10 cents per 100 lbs.

Special Examiner Lyons conducted a series of hearings at Kansas City on May 24 and 25, Minneapolis on May 27-28, and Chicago on May 29 and 31, for the purpose of obtaining testimony of shippers who are protesting against changes in Western Classification No. 51 which has been suspended by the commission.

Commissioner Clark held a hearing at Chicago on May 25 on the complaint of Morris & Company, Chicago, against an advance in the switching rates as applied to carload shipments of ice in the Chicago district from $4 to $6 a car. The railway contended that this was a temporary arrangement made in connection with the establishment of the new reciprocal switching tariff and that it was expected the matter would be satisfactorily adjusted.

The commission has issued an order which permits telegraph and cable companies to destroy after one year all original telegraph and cable messages transmitted at public tariff rates, but this permission does not apply to messages sent at reduced rates or to messages sent free. The companies are required to file with the commission a copy of the resolution of its board of directors designating an executive officer to have general supervision of the destruction of accounts, records and memoranda.

Commissioner E. E. Clark held a hearing in Chicago on May 27 and 28 in an investigation by the commission into the complaints of coal operators against the rules of the Illinois Central for establishing mine ratings as a basis for car distribution. J. M. Daly, general superintendent of transportation of the Illinois Central, who was the principal witness for the railway, gave a history of the various rules which have been tried since 1907 and declared that the present rules, which have been suspended, provide the most equitable plan thus far suggested. The rules provide that mine ratings shall be based on the tonnage shipped by each mine from January 1 to September 30, the period of full car supply, plus 50 per cent. in the case of local mines and 60 per cent. in the case of junction mines to provide for the expansion of business during the winter months. After having tried several plans based on the physical capacity, a set of rules, known as the "operators' rules," also based on capacity, was adopted at a meeting in St. Louis in January, 1911, at which all of the operators were represented and had a voice in the making of the rules. In the fall, during the period of the strike of the mechanical forces on the Illinois Central, there were many complaints regarding the operation of the rules. Another meeting was held on December 2, at which it was decided that the rules would be annulled and the obligation of establishing rules was again imposed on the railway. On February 9 the rules now objected to were put in effect but were suspended by the Illinois railway commission and the old rules were restored until April 1, the close of the mining season. The operators appeared to favor a system of mine ratings based on physical capacity instead of on actual shipments.

Complaint Dismissed.

Southern Illinois Millers' Association v. Louisville & Nashville et al. Opinion by Chairman Prouty:

The commission found that the rates on flour and other grain products from mills in southern Illinois to the Atlantic seaboard were not unreasonable, although they were greater than the rates from St. Louis to the Atlantic seaboard, which is a greater distance. The commission also found that these rates did not violate the fourth section, which prohibits the rate from an intermediate point from being greater than that from the more distant point, because they were proportional rates; nor were the rates unduly discriminatory against the mills of southern Illinois in favor of the mills at St. Louis. The commission recommended that the defendants should permit milling-in-transit on all lines by which this traffic can move from St. Louis to eastern destinations at a stop-over charge not exceeding ½c. per 100 lbs. No formal order was made, as the matter of milling-in-transit was not included in the complaint, although the facts were brought out in the testimony and were discussed in the argument. The complaint was dismissed. (23 I. C. C., 672.)

Rate on Lumber from Kansas City to Des Moines Reduced.

Wheeler Lumber, Bridge & Supply Co. v. St. Louis, Iron Mountain & Southern et al. Opinion by the commission:

The rate on lumber from Kansas City to Des Moines should not be higher than from St. Louis to Des Moines, and is therefore reduced from 11½ cents per 100 lbs. to 9½ cents. (23 I. C. C., 514.)

Not a Mixed Carload Shipment.

Reno Wholesale Liquor Store, Inc., v. Southern Pacific. Opinion by the commission:

There is a rate on mixed carload shipments of wine and brandy, but there is a rule in western classification providing that carload ratings will apply only on shipments received under one bill of lading. The complainant claims that the Southern Pacific's agent suggested that two bills of lading be issued for each carload shipment of mixed carloads of wine and brandy. Relying solely on this suggestion, shipment was made under separate bills of lading, thus depriving the shipments of the carload rate on mixed shipments. (23 I. C. C., 516.)

Wool Rate Reduced.

Traugott Schmidt & Sons v. Michigan Central et al. Opinion by Chairman Prouty:

Complaint alleges that rates on wool from Detroit to Boston, New York, and Philadelphia, and other eastern destinations are unreasonable *per se* and unduly discriminatory as compared with Chicago and St. Louis. The allegation of unreasonableness can not be sustained, but present rates do unduly discriminate against Detroit, whose rates on wool should not for the future exceed 78 per cent. of that contemporaneously in effect from Chicago. (23 I. C. C., 684).

Rates on Light-End Distillate Reduced.

National Refining Co. v. Missouri, Kansas & Texas et al. Opinion by the commission:

The complaint is made against a charge for light-end distillate at the same rate that is made for refined oil. This distillate is one of the two commodities resulting from a skimming process through which crude oil is put. The crude oil is distilled just far enough to separate the light from the heavier oil, the light part forming about one-quarter of the total oil. It was this light part that was shipped, and testimony tended to show that it had no commercial value except for refining purposes. It sold, however, for more than the crude oil from which it was abstracted. From this light oil gasolene, naphtha and other products are made, and since a rate of 36 cents is charged on the light-end distillate, which was classified as refined oil, and a few months later a commodity rate of 17 cents was made on gasolene, naphtha and other products, it is evident that entirely too high a rate was charged on the light-end distillate. Reparation is awarded. (23 I. C. C., 527.)

Private Cars Not Charged Demurrage.

Central Commercial Co. v. Gulf & Ship Island et al. Opinion by the commission:

The complainant ordered its private tank car sent from a point in Mississippi, on the Illinois Central, to Kola, on the Gulf & Ship Island. The Gulf & Ship Island moved the car from Jackson, Miss., its connection with the Illinois Central, to Kola and there placed it on a siding of the Kola Lumber Company. The Kola Lumber Company took it up into the woods and placed it on a siding owned by the Leaf River Turpentine Company. The complainant owns half of the stock of the Leaf River Turpentine Company. The car remained there from some time in December to some time in March, and was then loaded and forwarded to the Gulf & Ship Island, and the Gulf & Ship Island charged $1 a day for demurrage during the time the car was held on the private siding of the Leaf River Turpentine Com-

pany. The commission holds that the placing by the Gulf & Ship Island of the car on the siding of the Kola Lumber Company was not for loading, and that it was removed to a private siding by the owner within the 48 hours free time, therefore, no demurrage should be charged. (23 I. C. C., 532.)

Mileage Rates Approved on Packing House Products.

In re suspension of advances in rates on packing house products from Wichita, Kan., to points in Louisiana. Opinion by Chairman Prouty:

In 22 I. C. C., 160 the commission approved a mileage scale of rates on packing house products from Wichita to various points of consumption in Arkansas and that part of Louisiana west of the Mississippi. The railways filed schedules in accordance with these suggestions, but packers at Wichita complained because they involved substantial advances from Wichita with no corresponding advances from Kansas City and St. Louis. The commisison has no authority to compel the advance in rates for the purpose of removing discriminations. It cannot, therefore readjust the rates on the basis suggested without the cooperation of the carriers. All the principal railways were represented at the hearing and were unanimous that some scheme for equalizing rates on packing house products and raising certain rates that were too low should be adopted, and on the filing of the tariffs in accordance with the suggestions of the commission the suspension of the advanced rates will be removed. (23 I. C. C., 652.)

Western Live Stock Rates Reduced.

Corporation Commission of Oklahoma v. Atchison, Topeka & Santa Fe et al. Opinion by Chairman Prouty.

Upon applications by the Cattle Raisers' Association of Texas and by Oklahoma City, Fort Worth and Wichita, for modifications of the conclusions of 22 I. C. C., 160, the following conclusions were reached: The commission declined to modify the mileage scale for the movement of live stock originally prescribed. In regard to the allowance of 2½ cents for additional line hauls, the commission decided that this allowance should hold so far as short distances were concerned, but that they should not apply to distances greater than 500 miles. The former rate of 38 cents to Oklahoma City from El Paso should be continued as a proportional rate applicable to the movement of live stock which has already come into El Paso by rail, and that the mileage scale should be confined exclusively to the local movement from El Paso. In a great majority of instances, carriers should establish through routes and joint rates via all reasonable available direct lines. In any case they fail to establish such route and rate, any complaining party may call the attention of the commission to that particular instance by filing a petition which will thereupon be served upon the defendants and the case disposed of after investigation. Rates on stock cattle ought not to exceed 75 per cent. of the rates prescribed for the movement of beef cattle. Rates into Oklahoma City and from that point to Kansas City are in most instances higher than the rates to Kansas City, and that ought to be so since it seldom happens that the direct line from the point of origin to Kansas City is through the Oklahoma market. Fort Worth pays the Texas commission scale while Oklahoma City must pay the interstate rate established by the mileage scale. Since the interstate rates exceed those of the Texas commission, it is undoubtedly true that packing houses at Oklahoma City suffer a disadvantage to some extent in this particular. While it would be desirable if the same scale of live stock rates applied both to Fort Worth and Oklahoma City from points in Texas, still the discrimination resulting from the difference between the Texas scale and the interstate rates cannot be pronounced undue, and any change would result in other discriminations. The "Southeastern territory," to which Fort Worth was given an advantage of 3 cents per hundred pounds on fresh meats and packing house products, was clearly defined. The rate from Wichita to the "Southeastern territory" should not be advanced unless that from Kansas City was also increased by a corresponding amount, which cannot apparently be done. While still of the opinion that rates from both Kansas City and Wichita to Memphis and the surrounding territory ought to exceed that from Oklahoma City by 2½ cents per hundred pounds, the commission did not require carriers from Wichita to increase the differential to that amount, but leaves in effect the present adjustment. The question of rates on green salted hides, fertilizer and fertilizing material to certain points from Oklahoma City was postponed until further investigation. For the future, rates of 17 cents on packing house products and 26 cents on fresh meats from Oklahoma City to Kansas City were prescribed, and 21 cents on packing house products and 32½ cents on fresh meats from Fort Worth to Kansas City. Southern carriers may very properly meet from both Oklahoma City and Fort Worth via Memphis and Vicksburg the rates established via St. Louis to New York and other eastern territory. The commission has recently granted its dispensation under the fourth section, permitting them to meet these rates and to maintain at the same time higher rates to intermediate territory; but the commission could not recognize the force of the contention that the rate itself should be established through these gateways. The commission dismissed all the petitions of Wichita for modifications of its previous report, except the one relating to less than carload rates. The commission found that carriers should publish tariffs according less than carload rates or pedler-car service; that the rate upon packing house products should be 130 per cent. and upon fresh meats 150 per cent. of the carload rate; and that a minimum may be required equivalent to the earnings on 10,000 lbs. of fresh meat to the most distant point. Refrigeration should be provided or paid for by the shipper in addition to the above rates. No general order can be made covering this situation, which must be dealt with in piecemeal. In those respects in which the supplemental report modifies, adds to or interprets the original report, the commission will rely upon the carriers to observe the suggestions made. An order will be issued requiring carriers to maintain the rates found reasonable from Oklahoma City and Fort Worth to Kansas City. (23 I. C. C., 656.)

STATE COMMISSIONS.

W. L. Derr, inspector for the New York Commission, Second district, has resigned. See Elections and Appointments.

E. H. Hogueland, secretary of the Kansas Public Utilities Commission, has been appointed rate clerk to the commission, effective June 15. The secretary of the commission has a salary of $1,800 and the rate clerk $4,000 a year. Mr. Hogueland succeeds E. E. Smythe, resigned. Mr. Hogueland was at one time traveling freight agent of the Atchison, Topeka & Santa Fe and was later assistant to the attorney of the old State Board of Railway Commissioners of Kansas.

The Public Service Commission of Maryland has ordered the railways with terminals at Baltimore to put into effect at Baltimore a flat charge for switching as follows: Yard switching (from one track to another in the same yard), $1. Connecting line switching (two-road switching), when for line movement, $3; when for local movement, $6. Intermediate switching (three-road switching), when for line movement, $4; when for local movement, $7.50. Industrial switching (between industries on the same road), $5. The commission also defines the Baltimore switching limits.

The New York Public Service Commission has been asked by the Delaware, Lackawanna & Western and other railways for a rehearing on the order made by the commission reducing rates on milk and cream. A rehearing is asked on the ground that the commission improperly placed the burden of proof as to the reasonableness of the increased rates put in effect by the railways on the railway companies, whereas the increased rates should have been presumed reasonable and the burden of proof that they were unreasonable placed on the complainants. A rehearing is also asked on the ground that since the order was made the railways have been obliged to increase wages, which increased expense should be met through an increase in revenue.

COURT NEWS.

The petition of the Atlantic Coast Line, appealing from an order of the Interstate Commerce Commission which prescribed certain rail and water rates on boots and shoes from Boston and New York to Atlanta, was dismissed on motion of the railway by the Commerce Court on June 4. The commission reduced the rates.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

W. W. Cameron has been appointed vice-president of the Texas Central, with office at Waco, Tex.

L. P. Ecker, auditor of the Hocking Valley, at Columbus, Ohio, has been appointed auditor of the Kanawha & Michigan, with office at Charleston, W. Va.

R. L. Porter, auditor of the Wheeling & Lake Erie, at Cleveland, Ohio, has been appointed auditor of the Chicago & Western Indiana, with office at Chicago, succeeding M. J. Murphy, resigned.

Thomas B. Pryor has been appointed general attorney of the St. Louis, Iron Mountain & Southern, with office at Fort Smith, Ark., succeeding Lovick P. Miles, resigned to engage in the private practice of law at Memphis, Tenn.

L. K. Luff, auditor of disbursements of the Rock Island Lines, with office at Chicago, has been appointed auditor of traffic of the Delaware & Hudson, with office at Albany, N. Y., succeeding to the duties of J. B. Brownell, assistant general auditor.

F. J. Brunner has been appointed auditor for the receiver of the Wabash-Pittsburg Terminal and the West Side Belt, succeeding F. B. Brown, resigned to go to another company, and W. S. Reed has been appointed freight claim clerk, both with offices at Pittsburgh, Pa.

Joseph M. Bryson, general solicitor of the Missouri, Kansas & Texas at St. Louis, Mo., has been appointed general counsel, with office at St. Louis, succeeding James Hagerman, resigned, and the office of general solicitor has been abolished. As has been announced in these columns, Mr. Hagerman has been made consulting counsel.

Frank Barr, vice-president of the Boston & Maine, has been retired under the pension rules of the company, and the jurisdiction of H. J. Horn, vice-president of the New York, New Haven & Hartford, has been extended over the operating department of the Boston & Maine, succeeding Mr. Barr. Mr. Barr began railway work on March 1, 1869, as freight clerk and telegraph operator on the Worcester & Nashua now a part of the Boston & Maine. From June, 1873, to November, 1892, he was general agent of the same road, and in November, 1892, was appointed superintendent of the Worcester, Nashua & Portland division of the Boston & Maine, at Nashua, N. H. He was promoted to assistant general manager in December, 1896, remaining in that position until July, 1903, when he was elected third vice-president and general manager of the same road, and at the time of his retirement he was vice-president in charge of the operating department.



Frank Barr.

John W. Nokely, assistant secretary and assistant treasurer of the Chesapeake & Ohio, at New York, has been appointed general auditor of the Chesapeake & Ohio and the Chesapeake & Ohio of Indiana, with office at Richmond, Va. F. D. Hodgson, auditor of miscellaneous accounts, at Richmond, has been appointed auditor of the Hocking Valley, with office at Columbus, Ohio, succeeding L. P. Ecker, resigned to go to the Kanawha & Michigan.

LeRoy Kramer, assistant to the second vice-president of the Rock Island Lines at Chicago, having resigned to become assistant to the president of the Pullman Company; N. D. Ballantine, superintendent of car service of the Rock Island Lines at Chicago, has been appointed assistant to second vice-president, giving special attention to transportation matters; and H. G. Clark, trainmaster at El Reno, Okla., and formerly district engineer of the Third district of the system at El Reno, has been appointed assistant to second vice-president, giving special attention to all matters pertaining to maintenance of way and structures; both with office at Chicago.

Noten D. Ballantine, who has been promoted from superintendent of car service of the Rock Island Lines to assistant to second vice-president, giving special attention to transportation matters, with office at Chicago, was born March 12, 1872, at Booneville, Mo. He began railway work in 1886 as messenger in the telegraph department of the Kansas City, Fort Scott & Memphis, now part of the Frisco system, and except for the year 1892, he was with that road until 1896, having been consecutively clerk, operator, stenographer and electrician. During 1892 he was ticket agent of the Manitou & Pikes Peak Railway, and from 1896 to October, 1898, he was auditor of the Manitou & Pikes Peak. On the latter date he went with the Kansas City, Pittsburg & Gulf, as secretary to the general manager; from July, 1899, to September, 1903, he was superintendent of telegraph; and from September, 1903, until January 1, 1906, he was superintendent of transportation of the Kansas City Southern, successor to the K. C. P. & G. On the latter date he went to the Chicago, Rock Island & Pacific as superintendent of car service, from which position he has just been promoted.



N. D. Ballantine.

Operating Officers.

C. O. Johnson has been appointed superintendent of dining car service of the Missouri, Kansas & Texas.

W. I. Stine has been appointed superintendent of car service of the Missouri Pacific-Iron Mountain system, with office at St. Louis, Mo.

Fred M. Jones has been appointed assistant superintendent of the St. Louis division of the Illinois Central, with office at Carbondale, Ill.

W. Carswell, assistant superintendent of the Great Northern at Whitefish, Mont., has been appointed trainmaster, with office at Havre, Mont.

J. A. Glasford, assistant yardmaster of the Canadian Pacific at Toronto, Ont., has been appointed superintendent of the terminal at Winnipeg, Man.

F. A. Morgan has been appointed superintendent of the new St. Louis division of the Illinois Traction System, with headquarters at St. Louis, Mo.

N. J. Abram has been appointed assistant superintendent of transportation of the Chicago, Burlington & Quincy, with office at Chicago, a new postion.

J. R. Pickering has been appointed acting superintendent of car service of the Rock Island Lines, with office at Chicago, succeeding N. D. Ballantine, promoted.

S. E. Burkhead, trainmaster of the Texas & Pacific, at Marshall, Tex., has been appointed superintendent of terminals, with office at Fort Worth, Tex., succeeding R. E. Boswell, deceased.

E. H. Barnes, chief engineer of the Grand Rapids & Indiana at Grand Rapids, Mich., has been appointed also assistant to the general manager, with office at Grand Rapids, succeeding W. B. Stimson, deceased.

W. C. Hurst, formerly superintendent of the Cincinnati, Hamilton & Dayton, at Dayton, Ohio, has been appointed general superintendent of the Chicago, Peoria & St. Louis, with office at Springfield, Ill., succeeding C. R. Wescott, resigned to engage in other business.

William L. Derr, who has been steam railway inspector for the New York Public Service Commission, Second district, since June, 1909, has been appointed superintendent of the Western division of the Chicago Great Western, with office at Clarion, Iowa, succeeding F. R. Blunt, resigned.

F. J. DeGrief, chief despatcher of the Lake Erie & Western at Lafayette, Ind., has been appointed trainmaster of the Peoria division of that road, with office at Lafayette; this position, which was abolished about three years ago, was created again early in May. Edward Harty succeeds Mr. DeGrief.

P. F. Weisbrod, trainmaster on the Alberta division of the Canadian Pacific at Macleod, Alberta, has been appointed superintendent of the Saskatchewan division, with office at Moose Jaw, Sask., and W. S. Hall succeeds Mr. Weisbrod. R. Sinclair, master of bridges and buildings at Cranbrook, B. C., has been appointed trainmaster at Field, B. C., succeeding A. W. G. Clark, assigned to other duties.

John B. Hammill, passenger trainmaster of the Boston & Albany, at Boston, Mass., has been appointed superintendent of the Boston division, with office at Boston, succeeding Philip Morrison, deceased, and his former position has been abolished. Franklin A. O'Brien, who has been chief clerk to Mr. Hammill, has been promoted to the new position of crew despatcher, with headquarters at South Station, Boston, and he will be in charge of the assignment of crews and the distribution of passenger train equipment between Boston and Albany.

E. L. Desjardins has been appointed assistant superintendent of the Montreal and Ste. Flavie district of the Intercolonial Railway, with headquarters at Riviere du Loup, Que.; L. S. Brown has been appointed assistant superintendent of the Moncton and Ste. Flavie district, with headquarters at Newcastle, N. B.; R. Colclough has been appointed assistant superintendent of the Halifax and St. John district, with headquarters at Moncton, N. B., and W. A. Fitch has been appointed assistant superintendent of the Sydney and Oxford district, with headquarters at Sydney, N. S.

Albert Earl Clift, who has been appointed general superintendent of the Northern and Western lines of the Illinois Central, with office at Chicago, as has been announced in these columns, was born October 15, 1868, at Urbana, Ill. In December, 1888, he began railway work as a brakeman on the Illinois Central, and he has been with that road ever since, except for the period from April 14, 1892, to February 19, 1893, part of which time he was a conductor on the Cleveland, Cincinnati, Chicago & St. Louis. On the Illinois Central he was consecutively conductor, engine foreman of the Champaign district, yardmaster of the Champaign yards, conductor on the Chicago district, passenger conductor on the Chicago division, acting trainmaster of the Chicago district, and in February, 1903, he was made trainmaster of the Chicago district, with office at Kankakee, Ill. He was promoted to superintendent of the Freeport division two years later and was transferred as superintendent of the St. Louis division to Carbondale, Ill., in January, 1907. On June 1, 1910, he was made general superintendent of the Southern Lines, with office at New Orleans, La., which position he was holding at the time of his recent appointment as general superintendent of the Northern and Western Lines.

Traffic Officers.

C. M. Bridge, commercial agent of the Illinois Traction System at St. Louis, Mo., has been appointed general agent, with office at St. Louis, and George V. Cardner succeeds Mr. Bridge.

J. A. Dickinson, traveling freight agent of the Southern Railway, at St. Louis, Mo., has been appointed commercial agent, with office at Los Angeles, Cal., and C. P. Hoy succeeds Mr. Dickinson, with office at St. Louis.

Arthur Fonda, chief clerk in the general freight department of the Gulf, Colorado & Santa Fe at Galveston, Tex., has been appointed general freight agent of the Texas City Terminal Company, with headquarters at Texas City, Tex.

W. Phillips, general freight agent of the Canadian Northern lines east of Port Arthur, Ont., and west of Ottawa, with office at Toronto, has been appointed European traffic manager, with office at London, England. He will also represent the Canadian Northern steamships. H. J. Cowie, European freight agent at London, England, has resigned.

Mark Plotnick has been appointed immigration and colonization agent of the joint immigration bureau of the St. Louis, Iron Mountain & Southern, the Texas & Pacific and the International & Great Northern, with office at St. Louis, Mo. D. C. Smith has been appointed joint general livestock agent of the International & Great Northern, with office at North Fort Worth, Tex.

R. H. Carmichael, general agent of the Galveston, Harrisburg & San Antonio, the Texas & New Orleans, the Houston & Texas Central, the Houston East & West Texas and the Houston & Shreveport, at Galveston, Tex., has been appointed general agent, with office at Houston, Tex., succeeding M. F. Smith, resigned to become general manager of the Aransas Pass Dock & Channel Company. W. R. Smith, division freight and passenger agent at Austin, Tex., succeeds Mr. Carmichael.

Engineering and Rolling Stock Officers.

J. R. Stephens, assistant chief engineer of the Missouri Pacific-Iron Mountain system at St. Louis, Mo., has been appointed chief engineer, with office at St. Louis, succeeding E. F. Mitchell, resigned.

E. T. Amback, signal engineer of the Cincinnati, Hamilton & Dayton, at Cincinnati, Ohio, has been appointed assistant signal engineer of that road and the Baltimore & Ohio Southwestern, with office at Cincinnati.

E. H. Raquet, chief chemist of the New York, New Haven & Hartford, at New Haven, Conn., has been appointed engineer of tests of the New York, New Haven & Hartford, the Boston & Maine, and the Central New England, with office at Boston, Mass.

J. Robertson, resident engineer of the Alberta division of the Canadian Pacific at Cranbrook, B. C., has been appointed resident engineer, with headquarters at Calgary, Alberta, succeeding T. J. Brown, who has been transferred to Cranbrook in place of Mr. Robertson.

G. Seaman, general roadmaster of the Halifax & Southwestern, at Bridgewater, N. S., has been appointed bridge and building master of the Canadian Northern Quebec, and the Quebec & Lake St. John, with office at Joliette, Que., succeeding L. P. McGee, assigned to other duties.

J. C. Morrison, road foreman of the Chicago, Burlington & Quincy at Lincoln, Neb., has been appointed master mechanic of the Omaha division, with office at Omaha, Neb., succeeding A. N. Willsie, who has been appointed chairman of the company's fuel committee at Chicago.

M. C. M. Hatch, engineer of tests of the New York, New Haven & Hartford, the Boston & Maine, and the Central New England, has been appointed superintendent of fuel service of the Delaware, Lackawanna & Western, with jurisdiction over all matters pertaining to fuel and fuel economies, with office at Scranton, Pa.

W. G. Rose, master mechanic of the Cincinnati, Hamilton & Dayton at Cincinnati, Ohio, has been appointed master mechanic of the Moorefield shops, near Indianapolis, Ind., succeeding W. C. Steers, resigned. Charles A. Gill, master mechanic of the Baltimore & Ohio Southwestern at Washington, Ind., has been transferred to Cincinnati, succeeding Mr. Rose, and J. J. Carey succeeds Mr. Gill.

J. A. Heaman, whose appointment as division engineer of the Grand Trunk Pacific, with office at Fitzhugh, Alta., was announced in the *Railway Age Gazette* of April 26, page 978, was born June 3, 1874, at Memphis, Tenn. He attended the public

schools and finished his education at Collegiate Institute, London, Ont., and at McGill University, Montreal, and in April, 1901, began railway work with the Grand Trunk as an instrument man on double track construction. He was with that road until May, 1905, having been made resident engineer on construction in April, 1902, resident engineer of maintenance in November, 1902, and assistant engineer of the Grand Trunk Pacific, in charge of location east of Winnipeg, in November, 1903. From May, 1905, until October, 1908, he was with the National Transcontinental Railway, first as assistant engineer in charge of location and construction, and later as assistant district engineer. He returned to the Grand Trunk Pacific in October, 1908, as assistant district engineer, was promoted to district engineer in June, 1910, and in April, 1911, was made office engineer, which position he held at the time of his promotion to division engineer at Fitzhugh.

OBITUARY.

Morris L. Sternberger, president of the Dayton, Lebanon & Cincinnati Railroad & Terminal Company, died at his home in Jackson, Ohio, on June 2, at the age of 51.

Charles F. Warren, general agent of the Atchison, Topeka & Santa Fe, with office at Salt Lake City, Utah, died at that place on May 23. He was 54 years old and had been with the Santa Fe at Salt Lake City since 1894.

Amos H. Merchant, who for 13 years was assistant general freight agent of the Freemont, Elkhorn & Missouri Valley, now a part of the Chicago & Northwestern, died on June 3 at Brockton, Mass. Mr. Merchant was born November 25, 1842, at Worcester, Mass., and began railway work in 1870.

Philip Morrison, division superintendent of the Boston & Albany, with office at Boston, Mass., died on May 30, at his home at Watertown, after an illness of several weeks. Mr. Morrison was one of the oldest officers in point of service on the Boston & Albany. He was born at Waltham, Mass., on December 11, 1855, and began railway work as a brakeman on June 27, 1872. He served as freight conductor, passenger conductor, assistant station master at Boston, and station master at that city. He was made a trainmaster in July, 1899, and was appointed assistant superintendent on February 1, 1904. Shortly afterward he was promoted to superintendent of the Boston division, which included the main line and all branches between Boston and Springfield.

David Holtz, formerly for over 30 years master of machinery of the Western Maryland, died on May 30, at Baltimore, Md. Mr. Holtz was born on November 15, 1842, at Baltimore, and began railway work in 1856. He was consecutively messenger boy, clerk, apprentice in machine shops and draftsman on the Baltimore & Ohio, and then for 15 months he was assistant engineer in the United States Navy. The following eight years he was chief draftsman of the Baltimore & Ohio, and for one year from September, 1873, was superintendent of rolling stock of the New York, Lake Erie & Western. In 1874 he returned to the Baltimore & Ohio as draftsman, and in November, 1876, was appointed master of machinery on the Western Maryland, from which position he resigned in June, 1907.

Fred Willis Stanyan, general manager of the Montpelier & Wells River, and the Barre Railroad, with office at Montpelier, Vt., died at his home at that place on May 23. Mr. Stanyan was born on September 13, 1859, at Wentworth, N. H., and graduated from Concord High School. He began railway work as a telegraph operator at Lakeport, N. H., and two years later went to Plymouth, N. H., in the train despatcher's office. A year later he was appointed clerk in the office of the superintendent of the Boston, Concord & Montreal, where he remained about two years. From 1881 to 1884 he was division freight agent of the Boston & Lowell. He then went to Fabyan, N. H., as general agent, which position he held about three years, and in 1888 he went to Barre, Vt., as acting superintendent and general freight and passenger agent. In 1891 he was appointed car agent of the Montpelier & Wells River, and in 1898 was appointed superintendent of that road, and about the same time was made general superintendent of the Barre Railroad. Since July 1, 1910, he was general manager of both these companies.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Canadian Pacific is said to be in the market for 250 locomotives. This item has not been confirmed.

The Erie has ordered 5 Pacific type locomotives from the Lima Locomotive & Machine Company. The cylinders will be 27 in. x 28 in.

The Chicago & Eastern Illinois has ordered 25 simple mikado locomotives from the American Locomotive Company, to be equipped with Schmidt superheaters. The cylinders will be 28 in. x 30 in.; the diameter of the driving wheels will be 63 in., and the total weight of engine and tender will be 471,000 lbs.

The St. Louis & San Francisco has ordered 40 simple consolidation locomotives from the American Locomotive Company, to be equipped with Schmidt superheaters and with speed recorders. The cylinders will be 26 in. x 30 in.; the diameter of the driving wheels will be 63 in., and the total weight of the engine and tender will be 396,000 lbs.

CAR BUILDING.

The Baltimore & Ohio is in the market for from 2,000 to 3,000 center sills for the reinforcement of freight cars.

The Canadian Pacific is said to be in the market for a large number of freight cars. This item has not been confirmed.

The Texas Midland has ordered two 70-ft. 100-passenger gasolene-electric motor cars from the General Electric Company.

The Pennsylvania Equipment Company, Philadelphia, Pa., is in the market for 20 second-hand 40 ft. flat cars of 80,000 lbs. capacity.

The St. Louis, Brownsville & Mexico has ordered two 70-ft. 100-passenger gasolene-electric motor cars from the General Electric Company.

The St. Louis Southwestern has ordered 10 all-steel 70 ft. baggage cars and 10 all-steel, 70 ft. combination baggage and mail cars from the American Car & Foundry Company.

The St. Louis & San Francisco, as mentioned in the *Railway Age Gazette* of May 10, has ordered 4,600 steel underframe coal cars from the American Car & Foundry Company, of which 2,800 are for the Chicago & Eastern Illinois and 1,800 for the Frisco. These cars will be of 50 tons capacity and will weigh 40,000 lbs. The inside measurements will be 41 ft. long, 9 ft. 2¼ in. wide and 4 ft. 4 in. high. The overall measurement will be 43 ft. 8⅜ in. long, 10 ft. wide and 8 ft. 3 in. high above the rails. Some of the special equipment is as follows:

Brakes—New York Air Brake Co.
Brake beams—Chicago Ry. Equipment Co.
Brake shoes—Streeter.
Brasses—Hewitt.
Couplers—Simplex.
Draft gear—Cardwell.
Journal boxes—McCord.
Side bearings—Woods.
Springs—Railway Steel-Spring Co.
Trucks—Scullin-Gallagher.

This company has also ordered 1,000 steel underframe box cars of 40 tons capacity, weighing 40,000 lbs. The inside measurements will be 40 ft. long, 8 ft. 6 in. wide and 8 ft. high. Some of the special equipment includes:

Brakes—New York Air Brake Co.
Brake beams—Chicago Ry. Equipment Co.
Brake shoes—Streeter.
Brasses—Hewitt.
Draft gear—Cardwell.
Springs—Railway Steel-Spring Co.

IRON AND STEEL.

The Missouri, Kansas & Texas has ordered 18,000 tons of rails from the United States Steel Corporation.

The Illinois Central has divided an order for 25,000 tons of rails between the Illinois Steel Company and the Tennessee Coal, Iron & Railroad Company.

The Western Maryland has ordered 2,700 tons of 90 lb. rails from the Bethlehem Steel Company, and 2,100 tons of 90 lb. rails from Carnegie Steel Company.

Supply Trade News.

The Watson-Stillman Company, New York, will soon open a branch office in Philadelphia, Pa.

The Pennsylvania Equipment Company, Philadelphia, is in the market for a 110-ton Vulcan steam shovel.

Benjamin Herman Davis, consulting engineer, particularly for railway bridge design, has moved his offices from the Metropolitan building, New York, to 17 Battery place, New York.

The Eastern Car Company has been organized by interests associated with the Nova Scotia Steel & Coal Company, with a capitalization of $250,000, to build a car-building plant at New Glasgow, N. S.

Robert M. Smith, for several years in charge of the railway department in the eastern territory of Burton W. Mudge & Company, Chicago, with office in New York, has been made sales manager, with office in Chicago.

The Rothbert Steel & Iron Company has been incorporated in Colorado, with a capital stock of $5,000,000, to build a steel plant at Denver or Pueblo. The incorporators are D. E. Rowe, H. L. Hamilton and R. H. Tetlow, Jr.

The McKeen Motor Car Company, Omaha, Neb., has recently shipped two 70-ft. motor cars, under their own power to Weatherford, Tex., for the Weatherford, Mineral Wells & Northwestern, for service between Weatherford and Mineral Wells.

Huntley H. Gilbert, who has been connected with George E. Molleson & Company, Chicago, has been appointed sales agent of the Pressed Steel Car Company, Pittsburgh, Pa., and the Western Steel Car & Foundry Company, Chicago, with headquarters at Chicago.

L. F. Philo has been made sales manager of the Buffalo, N. Y., office of the Western Electric Company, Chicago. The organization of that office is now so arranged that all matters arising in connection with relations with the customers may be handled directly by the Buffalo office.

The Strauss design of bascule bridge has recently been adopted by the Great Northern for a 200 ft. single leaf, double track bridge over the Salmon bay waterway at Seattle, Wash.; by the Northern Pacific for a 190 ft. single leaf, single track bridge at the same place; and by the Houston Belt & Terminal railway for a 116 ft. 6 in. single leaf bridge over Buffalo Bayou at Houston, Tex.

On May 27 the Continental & Commercial Trust & Savings Bank of Chicago filed a bill in the United States district court at Milwaukee against the Allis-Chalmers Company, Milwaukee, Wis., asking foreclosure of the $15,000,000 mortgage on which interest payments due January 1 are unpaid. The bank asked for the appointment of receivers for the property covered by the first mortgages.

The M-C-B Company has been organized under the laws of Illinois to make and deal in railway supplies, with Walter E. Marvel, formerly of the Detroit Seamless Steel Tubes Company, as president. It will have offices at 1334 McCormick building, Chicago. The Russell Car & Snow Plow Company, Ridgway, Pa., has appointed the M-C-B Company its exclusive agent in western territory.

Jacobs & Davies, consulting engineers, New York, have opened an office at 263 St. James street, Montreal, Que., under the management of Paul Seurot, their Canadian representative. This firm has specialized in subaqueous tunnel construction and among other work, built the tunnels under the Hudson river for the extension of the Pennsylvania Railroad into New York City, and also the Hudson & Manhattan tunnels at New York.

Chairman E. H. Gary of the United States Steel Corporation, New York, has announced that it has been decided to continue the contemplated work at the Duluth plant by finishing the blast furnace, open hearth furnaces and wire mills, at a cost of about $6,000,000, in addition to the $4,000,000 which has already been invested in the improvements at Duluth. The work is expected to be completed in 1913.

The Western Electric Company, Chicago, the General Electric Company, Schenectady, N. Y., and the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., will in all probability make record earnings this year. The Western Electric Company would have to do $69,000,000 gross, or only $3,000,000 better than last year, to exceed the previous high-water mark reached in 1906. The surprising increase in April gross of 17 per cent. is a most hopeful sign for big orders during the 12 months to December 31 next. The General Electric Company will break all previous totals in its 1912 gross. Orders for the first four months of this year have been at the rate of over $78,000,000 for the full year, which compares with a previous high in 1910 of $71,182,000. If the entire General Electric organization be included, comprising as it now does the Sprague and Fort Wayne companies and the National Electric Lamp system, a gross for 1912 of $92,000,000 is in sight. Of course, the proper method of comparison is with the smaller figures. On that basis gross sales are running 12 per cent. in excess of any previous record. The Westinghouse Electric & Manufacturing Company has also had a splendid run of business in March and April. April orders were better than any previous April in three years, with orders billed approaching $3,520,000, or at the rate of $42,000,000 gross per annum. This compares with shipments billed out of factories of about $31,000,000 during the fiscal year to March 31 last and orders received of about $30,000,000. In other words, if Westinghouse Electric holds the splendid improvement of March and April it will do a gross this year of over $40,000,000, and in any event has every reason to hope for sales equaling the previous mark of $38,119,000 established during the 1911 year. In their 1911 year these three big companies shipped a total of about $167,000,000 of electrical apparatus and supplies. It seems probable that 1912 will witness gross sales delivered to buyers of between $180,000,000 and $185,000,000. This is a prospective gain of over 15 per cent—*Abstracted from an article in the Wall Street Journal.*

LeRoy Kramer, assistant to the second vice-president of the Rock Island Lines at Chicago, has been appointed assistant to the president of the Pullman Company, Chicago, with office in that city. Mr. Kramer was born August 19, 1875, at Wichita, Kan., and received a high school education. He began railway work in 1897 with the St. Louis & San Francisco, and remained with the Frisco Lines until December, 1909. He was clerk and stenographer, and acted in all the different capacities in the superintendent's office, and was then consecutively chief clerk to the general superintendent of transportation, chief clerk to the general manager, chief clerk to the second vice-president, assistant to the second vice-president, and division superintendent first of the Kansas and later of the Central division. In December, 1909, he left the Frisco Lines to become assistant to the vice-president in charge of purchases of the Rock Island Lines, and from June, 1910, until June 1, 1912, the date of his present appointment, he was in the operating department of the Rock Island Lines, his title having been assistant to the second vice-president.



LeRoy Kramer.

TRADE PUBLICATIONS.

SECTIONAL STEEL BUILDINGS.—The Ruby Manufacturing Company, Chicago, has issued a new illustrated folder describing its line of sectional, portable fireproof steel buildings for a large variety of uses, including garages, boathouses, contractors' buildings, bunk houses, tool houses, engine houses, handcar houses and power plant buildings. These buildings contain no combustible material of any kind, the frames being built of heavy steel angles on the truss principle, designed for permanent stability and durability.

Railway Construction.

New Incorporations, Surveys, Etc.

Artesian Belt.—The property of this company was acquired on May 26, by the European Contract Syndicate, Limited. This line is to be the connecting link to San Antonio, Tex., of the projected San Antonio, Rockport & Mexican, which will give San Antonio another line to the Gulf coast and into Mexican territory. The San Antonio, Rockport & Mexican is projected from San Antonio via Crowther and Rockport, to Harbor Island, also from Crowther to a point on the Rio Grande, in all 337 miles. The contract for building the line was let in April. It is expected that the section from San Antonio to Crowther will be in operation by August, if the site for a terminal in San Antonio is granted. J. P. Jackson, chief engineer, Macdona, Tex.

Batesville & Northeastern.—An officer writes that this company will soon have $120,000 to build a section of this line. The projected route is from Batesville, Ark., northeast to a point on the St. Louis & San Francisco, about 60 miles. V. Y. Cook, president, Batesville. (March 15, p. 524).

Birmingham & Southeastern.—This company, which operates a line from Union Springs, Ala., north to Fort Davis, 7½ miles, is building an extension northwest to Milstead, 20 miles. The company recently secured the rights and property of the Tallassee & Montgomery on condition that they would build 40 miles north to Tallassee during the next four years. W. M. Blount, president, Union Springs. (May 5, p. 1084).

Boston & Maine.—The Concord & Montreal is planning to carry out work on a number of additions and betterments, including a new electric line to the summit of Mount Washington, N. H., about 13 miles. It is expected that the work will be finished in about two years. B. A. Kimball, president. (See an item in General News, May 17, p. 1126, also see Concord & Montreal under Railway Financial News.)

See New York, New Haven & Hartford.

Canadian Pacific.—Work is to be started at once, it is said, on an extension of the Esquimalt & Nanaimo from McBride Junction, B. C., to Courtenay. A contract has been let for grading the first ten miles, and for the necessary bridge work to Culliton Bros., Spokane, Wash. The line between McBride Junction and Courtenay, 60 miles, has been surveyed for some time.

Carolina, Clinchfield & Ohio.—An officer writes that the extension to be built from Dante, Va., north to Elkhorn City, Ky., will cross Sandy Ridge through a mile and a half tunnel, and the route continues down the McClure and Russell forks of the Big Sandy, 35 miles, to a connection with the Chesapeake & Ohio at Elkhorn City. The line adopted has a 1 per cent. grade against southbound traffic, and 10 per cent. maximum curvature. It passes through a very rough country, necessitating the construction of 21 tunnels. Work is to be started at once, and it is expected will be finished in 1913. As previously noted in these columns, the contract to build the extension will be given to the Rinehart & Dennis Company, Charlottesville, Va. Ward Crosby, chief engineer, Johnson City, Tenn.

Chesapeake & Ohio.—An officer writes regarding the report that a line is to be built from Lee Hall, Va., southeast to Yorktown, about 10 miles, that this extension has been under consideration, but nothing definite has yet been done. F. I. Cabell, chief engineer, Richmond, Va.

Chicago, Milwaukee & Puget Sound.—According to press reports, contracts are to be let at once to build 140 miles to the wheat producing district of Montana. The new line is to be built through territory heretofore controlled by the Great Northern, and will cost over $6,000,000. It is expected to be finished in time to handle the 1913 wheat product of the Judith Basin country and the valleys north of Lewistown, Mont. E. O. Reeder, chief engineer, Seattle, Wash. (May 17, p. 1139.)

Cincinnati, New Orleans & Texas Pacific.—The construction of 29 miles of double-track between Erlanger, Ky., and Williamstown, has been authorized. When this work is completed, there will be 30 miles of continuous double-track from Ludlow to Williamstown. C. Dougherty, chief engineer, Cincinnati, Ohio.

Concord & Montreal.—See Boston & Maine.

Elberton & Eastern.—Financial arrangements are said to have been made to build from Tignall, Ga., in Wilkes county, to Lincolnton. Preliminary surveys are to be made at once. The company was organized last year with $500,000 capital, and with office at Elberton, to build about 50 miles from Elberton south via Washington, thence east to Lincolnton. W. O. Jones, president.

El Paso & Southwestern.—According to press reports work is to be started by July on a branch from Lewis Springs, Ariz., west to Fort Huachuca, about 15 miles. Surveys are now being made. H. J. Simmons, general manager, El Paso, Tex.

Esquimalt & Nanaimo.—See Canadian Pacific.

Fernley & Lassen.—See Southern Pacific.

Grand Trunk.—A bill before the Massachusetts legislature provides for an extension of the main line of the Central Vermont from some point near White River Junction, Vt., across New Hampshire via Nashua to Boston, Mass. It provides also for an extension to Boston from a point on the Palmer-Providence line (Southern New England) now under construction. Permission is also asked to build a line from the Palmer-Providence line at Douglas, Mass., north to Worcester. As previously noted in these columns, the Southern New England Railroad Corporation, is building from Palmer, Mass., southeast via Brimfield, Fiskdale, Sturbridge, Southbridge, Dudley, Webster, Douglas, Uxbridge and Millville, to the Massachusetts-Rhode Island state line at Woonsocket, R. I., 58 miles, and from Woonsocket the Southern New England Railway is building via Manville, Albion, Ashton, Berkeley, Lonsdale, Central Falls and Pawtucket to Providence, about 25 miles. Contracts have been given for grading, bridges and culverts to John Marsch, Chicago, for the Massachusetts work, and to the O'Brien Construction Company, New York, for the Rhode Island work.

Hudson Bay Railway.—According to press reports, contracts for an additional 65-mile section of the line to Hudson Bay was let recently. Contracts for the final 200 miles will be let within two weeks, and it will be definitely determined in the near future whether Port Nelson, on Hudson Bay, or to Fort Churchill, will be the terminal of the line. (March 8, p. 453.)

Hutchinson & Western Interurban.—An officer writes that it has not yet been determined when bids will be asked to build from Larned, Kan., east via Pawnee Rock, Hudson, Peoca Creek, Huntsville and Pekin, to Hutchinson, 73 miles. A branch is to be built from this line north to Great Bend from a point northwest of Hudson, about 12 miles. There will be 1,800 lineal feet of pile bridges and three stations. B. E. Giles, president; C. F. Bunte, vice-president; W. A. Knorr, secretary and treasurer, and F. P. Roehr, general manager, Hutchinson.

Kansas City, Mexico & Orient.—See an item regarding this road under Railway Financial News.

Lehigh & New England.—An officer writes, regarding the reports that a new line is to be built from Tamaqua, Pa., through Coaldale to Lansford, that the company has no intention of building such a line. The Tamaqua extension, under construction for a year and a half, from Danielsville west to Tamaqua, 32 miles, is about completed. At Tamaqua connection is to be made with the Panther Creek Railroad, owned by the Lehigh Coal & Navigation Company. F. W. Gilcreast, chief engineer, Mauch Chunk, Pa.

Lexington & Eastern.—See Louisville & Nashville.

Louisville & Nashville.—According to press reports, this company will build a 26-mile line from Winchester, Ky., southeast to Irvine, and a connection between Bettyville and Athol, to connect with the extension of the Lexington & Eastern to the Eastern Kentucky coal fields now nearing completion. It is also reported that the company plans to build 30 miles of line to a connection with the Carolina, Clinchfield & Ohio and the Chesapeake & Ohio. W. H. Courtenay, chief engineer, Louisville, Ky.

Maine Central.—An officer writes that under the name of the Sandy River & Rangeley Lakes, a three-mile line is to be

built from Sanders station, in Madrid, Maine, east to Mt. Abraham township. Joseph Sacco has the contract. The work involves handling about 3,000 cu. yds. a mile. The maximum grades will be 4 per cent., and maximum curvature 12 deg. The line is being built to haul lumber and pulpwood.

An officer writes that the company has under consideration the question of building an extension from Kineo station, Maine, north via Seboomook to the northern end of Chesuncook lake, 47 miles. There will be about 25,000 cu. yds. of cut and fill work a mile. The maximum grades will be 1 per cent., and maximum curvature 6 deg. The plans include eight steel bridges aggregating 550 lineal feet. The line will probably not be built. T. L. Dunn, chief engineer, Portland.

MEMPHIS & PENSACOLA.—Surveys will be finished this month from Memphis, Tenn., southeast to Pensacola, Fla., and it is expected that construction work will be started this coming fall. The company was organized to build an air-line between Memphis and Pensacola, 370 miles. C. D. Smith & Co., Memphis, may be addressed.

NEWTON, KANSAS & NEBRASKA.—Incorporated in Kansas, to build from Newton, Kan., north via Canton, Roxbury and Salina, or Abilene. T. H. McManus, president, J. T. Axtell, vice-president, Newton; R. Glass, secretary, Canton; and W. Spillman, treasurer, Roxbury.

NEW YORK, NEW HAVEN & HARTFORD.—According to press reports, the Boston & Maine, which has trackage rights over the Central Vermont on two short sections along the Vermont-New Hampshire boundary, has definitely decided to build new connecting links on these sections and to cancel the present trackage agreement with the Central Vermont. This step has been under consideration for some time. The Boston & Maine has given a contract to Holbrook, Cabot & Rollins to build on the New Hampshire side of the Connecticut river from Hinsdale, N. H., to Brattleboro, Vt., 10 miles. The line will enter Brattleboro over a bridge. It is proposed also to double-track the Ashuelot branch from South Vernon, Mass., north on about 2½ miles, to a point where the new line begins. The total estimated cost of these improvements will be $2,000,000. A petition has been filed with the Public Service Commission of New Hampshire for a charter under the name of the Sullivan County Railroad to build from Windsor, Vt., north to White River Junction.

The directors have appropriated funds to build the new line of the Boston & Maine from Hinsdale, N. H., to Brattleboro, Vt., also for a new freight yard at Ipswich, Mass.

NEW YORK, WESTCHESTER & BOSTON.—See description of this line on page 1229.

PARIS & MOUNT PLEASANT.—This company is selling $600,000 bonds. The company has 53 miles of main line between Paris, Tex., and Mt. Pleasant, 24 miles of which are in operation from Paris to Bogota, and 29 miles under construction between Bogota and Mt. Pleasant are to be finished by October of this year. The extension to Mt. Pleasant will pass through a large hardwood timber belt, and will form a connection between five main lines. H. P. Mobberly, chief engineer, Paris.

See an item under Railway Financial News.

ST. JOHN & QUEBEC.—An officer writes that contracts have been let to build from Rothesay, N. B., to Centerville, to the following contractors: To James H. Corbett & Sons, Kittanning, Pa.; to the Quebec Contracting Company, Fredericton, N. B.; and to Kennedy & McDonald, Woodstock. The plans call for building from Rothesay on the Intercolonial, nine miles east of St. John, N. B., thence crossing the Kennebecasis and St. John rivers and following the south bank of the St. John river via Gagetown, Fredericton, Woodstock, Centerville and Andover, then crossing the St. John river to Grand Falls, about 207 miles. North of Fredericton the grades will not exceed 1 per cent. South of that place they will be .4 per cent. southbound and .6 per cent. northbound, the curvature not to exceed 7 deg. Work on half of the mileage will be heavy, and involves handling an average of 20,000 cu. yds. a mile. About 30 per cent. of this will be rock-work. There will be a number of steel spans varying in length from 40 ft. to 150 ft. each. Bridges will be built over the two crossings of the St. John and the Kennebecasis rivers and a tunnel about 2,000 ft. long. The line is being built through a good farming section, and the company expects to develop a traffic in lumber and pulpwood. When completed the line will be operated by the Intercolonial. A. R. Gould, president, Presque Isle, Maine; R. Thompson, Fredericton, N. B. (See St. John Valley, May 24, p. 1181).

SAN ANTONIO, ROCKPORT & MEXICAN.—See Artisan Belt.

SANDY RIVER & RANGELEY LAKES.—See Maine Central.

SULLIVAN COUNTY RAILROAD.—See New York, New Haven & Hartford.

SOUTHERN NEW ENGLAND RAILROAD CORPORATION.—See Grand Trunk.

SOUTHERN NEW ENGLAND RAILWAY.—See Grand Trunk.

SOUTHERN PACIFIC.—An officer writes that under the name of the Fernley & Lassen work is now under way from Fernley, Cal., northeast to Susanville, about 130 miles. The Utah Construction Company, Ogden, Utah, has the contract. The line is to be built to carry lumber and agricultural products. W. Hood, chief engineer, San Francisco, Cal.

TALLASSEE & MONTGOMERY.—See Birmingham & Southeastern.

WASHINGTON ROADS (Electric).—A French syndicate will build a number of electric lines in the Kittitas valley, Wash. The first section to be built will be from Cle Elum, Wash., northwest to Roslyn, about five miles, and it is expected that track-laying on this section will be started soon. Surveys are nearing completion between Cle Elum and Ellensburg, about 25 miles. Connection is to be made with the Chicago, Milwaukee & Puget Sound at Cle Elum, and it is understood that this company is back of the project. A Rozinsky, Tacoma, represents the French syndicate.

RAILWAY STRUCTURES.

CLEVELAND, O.—It is reported that the Pennsylvania Lines have prepared plans for a new office building, 25 ft. x 40 ft., and a machine shop, 65 ft. x 70 ft.

DENVER, COLO.—It is reported that the Union Pacific is planning to spend $200,000 on improvements and new machinery for its Denver shops.

EAST WACO, TEX.—The Missouri, Kansas & Texas has let contracts for grading and filling preliminary to erecting a roundhouse and making other terminal improvements estimated to cost $300,000.

IPSWICH, MASS.—See New York, New Haven & Hartford under Railway Construction.

LARNED, KAN.—See Hutchinson & Western Interurban under Railway Construction.

NORTH BRADDOCK, PA.—The Pennsylvania Railroad will construct three underpasses at North Braddock, at a cost of about $175,000. The work will probably be carried out by the company's forces.

OTTAWA, ONT.—The time for receiving bids for the construction of a station and other buildings on the Transcontinental (Grand Trunk Pacific) has been extended up to noon, June 14. P. E. Ryan, secretary, Ottawa.

QUEBEC, QUE.—M. P. & J. T. Davis, contractors, Quebec, have the contract for the structural work in connection with the Quebec bridge, and are making preparations for sinking the caisson required for the south pier, the caisson for the north pier having been put in place last year. The Dominion Iron & Steel Company has the contract, it is said, for the super-structure of the bridge.

ST. JOHN, N. B.—See St. John & Quebec under Railway Construction.

VANCOUVER, B. C.—Bids are wanted by MacKenzie-Mann & Company, Limited, Metropolitan building, Vancouver, up to noon of July 8, for the sub-structures and super-structures of 10 bridges, to be built over the Fraser, the Thompson and the North Thompson rivers, on the section of the Canadian Northern Pacific, between Port Mann, B. C., and Yellowhead Pass.

WESTWEGO, TEX.—The Texas & Pacific has announced plans for the reconstruction of its Westwego yards at an estimated expenditure of $50,000, and eventually the construction of a roundhouse and shops.

Railway Financial News.

Birmingham & Southeastern.—This company on May 3 acquired the control of the Tallassee & Montgomery. The Tallassee & Montgomery owns from Tallassee, Ala., to Milstead, 6 miles.

Boston & Providence.—Governor Foss, on May 31, signed the bill authorizing this company, a subsidiary of the New York, New Haven & Hartford, to issue $8,000,000 bonds previously mentioned in these columns.

Chicago & Alton.—It is proposed to substitute for the present improvement and equipment mortgage an issue of $20,000,000 6 per cent. bonds to be secured by a general mortgage. The present issue will be $4,500,000, which has already been underwritten. The proceeds will be used for grade reductions, terminal enlargements and other improvements and betterments.

Chicago, Milwaukee & St. Paul.—Of the $35,000,000 4½ per cent. convertible bonds recently issued all except about $1,050,000 have been subscribed for by stockholders at par. The balance will be taken by the underwriters.

Cincinnati, New Orleans & Texas Pacific.—A semi-annual dividend of 3 per cent. and an extra dividend of 2½ per cent. have been declared on the common stock. In 1911 5½ per cent. was paid, plus an extra dividend of 2½ per cent. From 1907 to 1910, inclusive, 5 per cent. was paid.

Denver, Laramie & Northwestern.—W. D. Moore, of Wichita, Kan., J. E. McCarthy, of Enid, Okla., Peter Mangold, of Bennington, Neb., and Isaac Schockey, of Abilene, Kan., have been elected directors, succeeding T. C. Henry, D. M. Rothwilder, H. B. Patton and F. N. Briggs, resigned.

F. A. Bridge, second vice-president and holder of $1,207,496 of the bonds, has made application to the district court for a receiver for the company. Bridge claims the company is being mismanaged.

Kansas City, Mexico & Orient.—The greater part of the 50-year first mortgage 4 per cent. bonds held by the trustees, of the 6 per cent. 5-year sterling notes as collateral security, have been deposited by the trustees with the reorganization committee, and the holders of the sterling notes who have not yet given their consent to the deposit of the collateral, are asked to do so without delay. The deposit of the collateral will not affect the position of the sterling notes as a direct obligation of the company.

Judge Pollock on May 31 authorized the receivers to receive a bonus of $20,000 from a land company of Fort Stockton, Tex., for the extension of the line from Granada, Tex., to Fort Stockton, 32 miles, which is to be built. The receivers will meet at Kansas City, Mo., on June 7 to sell $1,000,000 receivers' certificates.

New York State Railways.—The stockholders of this subsidiary of the New York Central & Hudson River have authorized the issuance of a new mortgage to secure the issue of $50,000,000 50-year 4½ per cent. bonds previously mentioned in these columns.

Paris & Mount Pleasant.—Peabody, Houghteling & Co., Chicago, are offering at par and interest $600,000 first mortgage sinking fund 6 per cent. bonds of July 1, 1912-1932, redeemable on or after July 1, 1915, at 105. These bonds will be secured by a first mortgage on all the property now or hereafter owned. The total amount authorized is $2,000,000, of which $1,400,000 is reserved for future construction, subject, however, to the approval of Peabody, Houghteling & Co. This road runs from Paris, Tex., to Bogart, 24 miles, and is under construction from Bogata to Mount Pleasant, 29 miles.

Pere Marquette.—Judge Angell, of the United States District Court, on May 29 granted permission to issue $3,500,000 receivers' certificates of which $1,800,000 will take care of the outstanding equipment obligations, and $1,700,000 will be for new equipment and improvements. These certificates will be payable in not exceeding three years. They will bear 5 per cent. interest and will be redeemable on any interest date with a premium of 1 per cent. They will be bought by J. P. Morgan & Co., New York. They will be made a lien on all the property of the Pere Marquette, subordinate to under-lying mortgages except the consolidated mortgage of 1901, and prior to all other liens on the property. Judge Angell also granted permission to pay the interest on the Chicago & West Michigan bonds out of earnings. This permission had previously been refused because of the opposition of Receiver Blair, who objected on the ground that the equipment obligations should be taken care of first. When permission was received to issue the receivers' certificates, Mr. Blair withdrew his objection and joined Receivers Erb and Waters in the petition to the court to reverse the decision regarding the payment of the interests on the Chicago & West Michigan bonds. The indebtedness for which no provision has been made amounts to $24,306,000, as follows: Refunding 4 per cent. bonds of 1905, $10,106,000; 5 year 6 per cent. notes, dated March 1, 1911, and secured by a deposit of the improvement and refunding bonds of the same date, $8,000,000; loan of $1,200,000 made in February, 1912, and due June 28, 1912, secured by deposit of $1,364,000 par value general mortgage bonds of the Cincinnati, Hamilton & Dayton, and by $1,200,000 Pere Marquette improvement and general refunding bonds; 6 per cent. debenture bonds due July 1, 1912, $5,000,000.

Reading Company.—Daniel Willard has been elected a director, succeeding Oscar G. Murray, resigned.

St. Louis & San Francisco.—The court of appeals at Albany, N. Y., on June 4 decided against this company a case involving the issue of refunding bonds. The action was taken by the St. Louis & San Francisco against the Guaranty Trust Co., New York. The railway company gave to the defendant as trustee, a refunding mortgage on its property to secure an issue of $85,000,000 bonds to mature in 1951, the proceeds to be used to retire underlying bonds for improvements and for additions and betterments. Of this amount, $59,000,000 was authorized to retire underlying bonds, and about $46,000,000 have been so issued, the remainder being held in reserve to be exchanged for underlying bonds at or before maturity. It was found that $1,997,000 bonds will mature later than the refunding bonds, and the railway company asked that this sum be made available for use in providing additional rolling stock as it would not be needed for refunding purposes. The trust company refused, saying that it could not deliver the bonds except for refunding purposes. Judge Gray in his opinion said that the terms of the mortgage are not unreasonable and the plaintiff should be held strictly to its engagements. The language of the mortgage, when properly interpreted, clearly shows that no portion of the refunding bonds which were reserved to take up the outstanding underlying bonds could be used for general corporate purposes until all of the underlying bonds had been retired.

Seaboard Air Line.—Plans are said to be under way to deposit the stock of the Seaboard Air Line Railway in the hands of a voting trust, to be headed by Frank A. Vanderlip, president of the National City Bank, New York; S. Davies Warfield, who represents the Baltimore shareholders, and A. H. Wiggin president of the Chase National Bank, New York. The voting trust will last at least one year, and probably three. It is also proposed to begin dividend payments on the preferred shares. Seaboard Air Line has outstanding $37,019,000 common and $23,894,000 preferred stock.

Tallassee & Montgomery.—See Birmingham & Southeastern.

Wabash.—The Appellate Division of the Supreme Court on May 31 decided that valid defenses were interposed by the directors of the Wabash in a suit by James Pollitz as a stockholder, to set aside as fraudulent an issue of $10,000,000 common stock of the Wabash which was traded for $10,000,000 common stock of the Wabash-Pittsburgh Terminal Company, claimed to be without value. The Wabash was not insolvent at the time the suit was brought; but the terminal company was, and in suing for $10,000,000 damages in behalf of the stockholders, Mr. Pollitz charged that the defendant directors engineered the scheme in order to put through a deal to get $10,000,000 Wabash stock and $33,400,000 of the terminal company bonds for $20,000,000. The defenses upheld by the Appellate Division are that the transaction was ratified by a majority vote of the stockholders when it was read to the stockholders in the annual report of the Wabash, and that 79 per cent. of the stockholders and 73 per cent. of the bondholders voted to approve it.

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IN passenger service the weight of coaches, sleepers and all other cars, excepting baggage and express cars, is practically constant, and the brake power is usually over 100 per cent. of the car weight, but in freight service this power is 75 to 80 per cent. of the light weight of the car, or only about 15 per cent. of the total weight of car and lading. It has been thought desirable for a long time to increase the brake power when freight cars are loaded with a heavy tonnage, and the extensive use of 50-ton ore and coal cars has stimulated the effort to produce a practical brake which will accomplish this purpose. Such a brake, known as the light and loaded equipment brake, is now in successful use on a number of western lines, where heavy mountain grades have made it essential for safe operation. The experience with the brake in such places has demonstrated that it possesses incidental advantages which render it a desirable equipment for all lines where a heavy traffic in coarse commodities is hauled, not only in solid trains of 50-ton cars, but when such cars are mixed with lighter loads. By the use of this new brake equipment the operation of heavy trains on the level is made smoother and safer, and it is probable that these advantages will lead to its introduction on lines in mineral districts where grades are light.

FOR some time the principal interest in published articles on car wheels has centered in the steel wheel, and little has been said as to the merits of the chilled cast iron wheel. The communication regarding cast iron wheels, which we publish on another page, will, therefore, be read with in-

terest. The figures showing the very large number of cast wheels in service, and the low cost of the wheels per car per year indicate the vast benefits the railways have obtained from the use of this wheel and the important contribution it has made toward the low cost of freight transportation in this country. Although its limitations as to car capacity have been frequently announced, the cast iron wheel continues to render good service under the heaviest freight equipment, and the makers do not hesitate to recommend it for the highest capacity cars thus far contemplated. The principal limiting feature is the flange, which for obvious reasons has not increased with the comparatively small increase in other dimensions, and the plea of the wheel makers for a larger space between main and guard rails so that thicker flanges can be used, is one which should be seriously considered by railway managers.

THE first convention of the Master Car Builders' Association to be held at Saratoga was in 1884 and the next in 1892. It was held in the same place for five successive years, 1900 to 1904 inclusive. The first one held in Atlantic City was in 1906, and since that time it has been the accepted place, so that the present meeting is the seventh to be held here. At the meeting twenty years ago in Saratoga, the total membership reported was 298, and the number of cars represented was 1,071,219. The president, John Kirby, the "grand old man" who is still with us, announced that 150,000 freight cars were then equipped with automatic couplers. The Fox pressed steel truck was then such a novelty that special attention was called to its merits. In referring to the rules of interchange, Mr. Kirby said, "I hope no very radical changes will be made in these rules. They have been in operation long enough to demonstrate that the less intricate they can be made the more useful they will be to those who have to do with the interchange of cars. Lop off only such excrescences as tend more to perplex than to enlighten." The reports read at this meeting included one on cast wheels in which the advantages of the contracting chill were explained, and one on wheel tests made at the Sacramento shops of the Southern Pacific in 1891. These tests were made with a view of determining the cause of the frequent cracking of wheel plates on mountain grades, and they led to the use of the rim heating test in the cast iron wheel specification. At this meeting the first complete specification for automatic couplers was presented; it included the limit gages and required that couplers must endure a pulling test of not less than 100,000 lbs. and under the drop they must stand three blows from 10 ft. and two blows from 15 ft. A brief report on freight car truck frames considered the relative advantages of swinging and rigid bolsters; a majority of replies to the circular favored the rigid type.

IMPROVED BRAKE METHODS

THE remarkable improvements which have been made in air brake mechanism and brake methods in the past three years have not yet received prominent notice, chiefly for the reason that they have not been applied to any large extent, and some of them remain to be thoroughly tested in a service which will properly represent general practice. These improvements are the results of the severe demands which are made on the brake apparatus by the increase in the weight of cars, the increase in the speed of trains and the heavier brake shoe pressure which such service requires. Progress in the development of most railway appliances is the result of undue wear or the breaking down of structures which are too weak for the increasing loads placed on them, and air brake improvements are following a similar course.

The increase in the weight of passenger equipment continued gradually until it was found that the best stop which could be made by existing brake equipment was considerably longer than that made in previous years with lighter equipment. The improvements in the brake apparatus found necessary to meet this condition have considerably increased the ratio of brake power to car weight and the brake shoe pressure, and this in turn has increased the wear of brake shoes to such an extent that methods are now sought to economize in brake shoe expense.

The extent to which the ratio of brake power to car weight must be increased with various wheel loads in order that the stop may be made in 1,000 to 1,200 ft. is shown in Fig. 1 in our report of the annual meeting of the Air Brake Association. (RAILWAY AGE GAZETTE, May 17, page 1093.) In Fig. 2 on the same page is shown the relative braking power required for cars of different weights to produce the same retarding force, or length of stop. These diagrams are worthy of careful study, as they reveal the brake necessities of modern passenger service, and show at once that present methods now in general use are not equal to the requirements. They are from a paper by R. C. Augur on Friction and Wear of Brake Shoes as Affected by the Wheel Load or Car Weight, which is an admirable presentation of the present day brake problem so far as it is affected by brake shoe conditions. The author's study of the accumulated results of brake tests and brake shoe tests convinces him that the present method of proportioning braking power on passenger cars to 90 per cent. of the weight, based on a brake cylinder pressure of 60 lbs., is no longer tenable and must become obsolete in the near future. In order to operate fast passenger trains with smoothness and safety it is necessary to adopt a sliding scale for proportioning braking power, and it is proposed where 90 per cent. is assumed as satisfactory brake power for cars having a wheel load below 6,000 lbs. that for every 100 lbs. increase in wheel load in excess of 6,000 lbs. an addition of one per cent. braking power should be made.

The efficiency of the brake depends largely on the coefficient of friction of the brake shoe, in fact, they may be regarded as identical, and as an average for passenger car conditions this coefficient is only about 12 per cent. Brake power should, therefore, be proportioned in accordance with the laws of brake shoe friction and in order to allow for the decrease of the coefficient with heavy brake beam pressures, increasingly higher percentages of brake power should be used as the weight of cars is increased. A study of the tests made on the M. C. B. brake shoe testing machine, as reported in the 1911 M. C. B. proceedings, shows that the work in stopping from a speed of 60 miles per hour is 2.25 times that in stopping from 40 miles per hour, and the actual amount of metal worn from the shoes on a 90,000 lb. car at a 60-mile stop is 2.5 times as much as from a 40-mile stop, while with a 120,000 lbs. car it is 3.2 times as much. This is an indication of the rapid wear of brake shoes under present conditions of brake equipment, in spite of the steady effort and intelligent work that has been done in improving the quality of the brake shoe metal.

It is possible that brake shoe pressures now found necessary for efficient braking are higher than good practice would dictate, and it is desirable to make improvements in other directions, as lower pressure would result in a higher coefficient of friction and a lower rate of wear. At the recent meeting of the Air Brake Association the advantages of clasp brakes, where two shoes are used for each wheel, were demonstrated, and the practice as now employed by the Philadelphia and Reading on four-wheel and six-wheel trucks was explained. By this method a sufficient retarding effect is obtained with moderate brake shoe pressures, and less wear and lower temperatures for the shoe and wheel. The new all-steel suburban cars for the New York, Westchester & Boston are also equipped with clasp brakes.

Announcements.

PROGRAM OF THE WEEK.

MASTER CAR BUILDERS' CONVENTION.

WEDNESDAY, JUNE 12.

Prayer	9.30 A. M. to 9.35 A. M.
Address by the president	9.35 A. M. to 10.30 A. M.
Reading of the minutes of the last meeting	10.30 A. M. to 10.35 A. M.
Report of the secretary and treasurer	10.35 A. M. to 10.50 A. M.
Assessment and announcement of annual dues; appointment of committees on correspondence, resolutions, obituaries, etc.	10.50 A. M. to 11.00 A. M.
Election of auditing committee	11.00 A. M. to 11.05 A. M.
Unfinished business	11.05 A. M. to 11.10 A. M.
New business	11.10 A. M. to 11.20 A. M.
Discussion of reports on:	
Nominations	11.20 A. M. to 11.30 A. M.
Revision of Constitution	11.30 A. M. to 11.45 A. M.
Revision of Standards and Recommended Practice	11.45 A. M. to 12.00 M.
Train Brake and Signal Equipment	12.00 M. to 12.30 P. M.
Brake Shoe Equipment	12.30 P. M. to 1.00 P. M.
Car Wheels	1.00 P. M. to 1.30 P. M.

THURSDAY, JUNE 13.

Discussion of reports on:	
Safety Appliances	9.30 A. M. to 10.00 A. M.
Rules of Interchange / Prices for Labor and Materials.	10.00 A. M. to 10.30 A. M.
Rules for Loading Material	10.30 A. M. to 10.45 A. M.
Damage to Freight Equipment by Unloading Machines	10.45 A. M. to 11.00 A. M.
Overhead Inspection	11.00 A. M. to 11.15 A. M.
Coupler and Draft Equipment	11.15 A. M. to 12.15 P. M.
Car Trucks	12.15 P. M. to 12.30 P. M.
Springs for Car Trucks	12.30 P. M. to 1.00 P. M.
Consolidtion	1.00 P. M. to 1.10 P. M.
Train Lighting and Equipment	1.10 P. M. to 1.30 P. M.

FRIDAY, JUNE 14.

Individual paper, Car Shop Apprentices, I. S. Downing, M. C. B., L. S. & M. S.	9.30 A. M. to 10.00 A. M.
Discussion of reports on:	
Train Pipe and Connections for Steam Heat	10.00 A. M. to 10.30 A. M.
Tank Cars	10.30 A. M. to 11.00 A. M.
Specifications for Tests of Steel Truck Sides and Bolsters	11.00 A. M. to 11.30 A. M.
Capacity Marking of Cars	11.30 A. M. to 11.45 A. M.
Lettering Cars	11.45 A. M. to 12.00 M.
Unfinished business; reports of committees on correspondence, resolutions and such other committees as may be named during the convention	12.00 M. to 12.15 P. M.
Election of officers	12.15 P. M. to 1.30 P. M.

Adjournment.

ENTERTAINMENT.

WEDNESDAY, JUNE 12.

Orchestra Concert, 10.30 A. M.—Entrance Hall, Million Dollar Pier.

Orchestra Concert, 3.30 P. M.—Entrance Hall, Million Dollar Pier.

Social Gathering and Informal Dance, 9.00 P. M.—Blenheim Exchange, Marlborough-Blenheim Hotel.

THURSDAY, JUNE 13.

Orchestra Concert, 10.30 A. M.—Entrance Hall, Million Dollar Pier.

Orchestra Concert, 3.30 P. M.—Entrance Hall, Million Dollar Pier.

Informal Dance, 9.30 P. M.—Entrance Hall, Million Dollar Pier.

FRIDAY, JUNE 14.

Orchestra Concert, 10.30 A. M.—Entrance Hall, Million Dollar Pier.

Orchestra Concert, 3.30 P. M.—Entrance Hall, Million Dollar Pier.

Musicale, 9.00 P. M.—Entrance Hall, Million Dollar Pier.

SATURDAY, JUNE 15.

Orchestra Concert, 10.30 A. M.—Entrance Hall, Milion Dollar Pier.

Base Ball Parade, 2.00 P. M.—Million Dollar Pier to special trolley cars.

Base Ball Game, 3.00 P. M.—East v. West, Pennsylvania Railroad Company's Inlet Park Base Ball Grounds. Free trolley cars for those wearing the official badge.

SUNDAY, JUNE 16.

Concert, 11.00 A. M.—Marlborough-Blenheim Hotel Orchestra, Leo Sachs, musical director: Largo (*Handel*); Two Intermezzi from the Opera, The Jewels of the Madonna (*Wolf-Ferrari*); Andante Cantabille from the String Quartet (*Tschaikowski*); Serenade (*Drdla*); Suite (*Kate Vannah*); (a) Dawn (b) Sleepy Baby; Fantasie, La Boheme (*Buccini*), Violin Solo; Andante from the Concerto (*Bruch*), Michael Benner; Ave Maria (*Gounod*).

CONCERT, 8.45 P. M.—Overture, Tannhauser (*Wagner*), Violin Solo; Faust Fantasie (*Wieniwski*), Michael Benner; Fantasie Samson et Delila (*Saint-Saens*), Cello Solo; Tartantalla (*Popper*), Leo Sachs; The Lost Hope (*Gottschalk*), Piano Solo; Polonais (*Liszt*), Henry Gruhler; Hungarian Rhapsody No. 2 (*Liszt*).

M. C. B. ASSOCIATION OFFICERS, 1911-1912.

President, A. Stewart, G. S. M. P. & E., Southern Ry.; first vice-president, D. F. Crawford, G. S. M. P., Penna. Lines; second vice-president, C. E. Fuller, A. G. M., Union Pacific; third vice-president, M K. Barnum, G. S. M. P., Illinois Central; treasurer, John S. Lentz, M. C. B., Lehigh Valley; secretary, Joseph W. Taylor, Chicago. Executive members, J. D. Harris, Baltimore, Md.; Henry Bartlett, G. S. M. D., Boston & Maine; C. A. Seley, M. E., C. R. I. & P.; F. W. Brazier, S. R. S., N. Y. C. & H. R.; C. A. Schroyer, S. C. D., C. & N. W.; Alex. Kearney, A. S. M. P., Norfolk & Western.

STANDING COMMITTEES.

Arbitration.—J. J. Hennessey (chairman), M. C. B., C. M. & St. P.; T. W. Demarest, S. M. P., Penna. Lines; J. S. Lentz, M. C. B., Lehigh Valley; E. D. Bronner, S. M. P., Mich. Cent.; M. K. Barnum, G. S. M. P., Illinois Central.

Revision of Standards and Recommended Practice.—T. H. Goodnow (chairman), M. C. B., Armour Car Lines; W. E. Dunham, supervisor M. P., C. & N. W.; W. H. V. Rosing, asst. to V. P., St. L. & S. F.; C. E. Fuller, A. G. M., Union Pacific; T. M. Ramsdell, M. C. B., Ches. & Ohio; O. C. Cromwell, M. E., Balto. & Ohio R. R.

Train Brake and Signal Equipment.—R. B. Kendig (chairman), G. M. E., N. Y. C. Lines; T. L. Burton, gen. inspr., C. R. R. of N. J.; B. P. Flory, S. M. P., N. Y. O. & W.; E. W. Pratt, A. S. M. P., C. & N. W.; R. K. Reading, S. M. P., Penna. Lines.

Brake Shoe Equipment.—Chas. H. Benjamin (chairman), Purdue University; C. D. Young, eng. tests., Penna. R. R.; R. B. Kendig, G. M. E., N. Y. C. Lines, New York City.

Coupler and Draft Equipment.—R. L. Kleine (chairman), C. C. I.; G. W. Wildin, M. S., N. Y. N. H. & H.; F. W. Brazier, S. R. S., N. Y. C. & H. R.; F. H. Stark, Supt., Pittsburgh Coal

Co.; H. La Rue, M. C. B., C. R. I. & P.; H. L. Trimyer, M.C. B., S. A. L.; J. F. Devoy, A. S. M. P., C. M. & St. P.

Rules for Loading Materials.—A. Kearney (chairman), A. S. M. P., N. & W.; R. E. Smith, G. S. M. P., A. C. L.; C. H. Osborne, A. S. C. D., C. & N. W.; L. H. Turner, S. M. P., P. & L. E.; W. F. Kiesel, Asst. Mech. Engr., Penna.

Car Wheels.—Wm. Garstang (chairman), S. M. P., C. C. C. & St. L.; W. C. A. Henry, S. M. P., Penna. Lines; A. E. Manchester, S. M. P., C. M. & St. P.; R. W. Burnett, G. M. C. B., Can. Pac.; R. L. Ettenger, C. M. E., Southern Ry.; J. A. Pilcher, M. E., N. & W.; O. C. Cromwell, M. E., B. & O. R. R.

Safety Appliances.—A. Stewart (chairman), G. S. M. P. & E., Southern Ry.; A. La Mar, M. M. I., Penna. Lines; C. B. Young, M. E., C. B. & Q.; H. Bartlett, G. S. M. P., B. & M.; T. M. Ramsdell, M. C. B., C. & O.; M. K. Barnum, G. S. M. P., Ill. Cent.; W. O Thompson, M. C. B., N. Y. C. & H. R.

SPECIAL COMMITTEES.

1. Car Trucks: A. S. Vogt (chairman), M. E. Penna.; C. A. Seley, M. E., C. R. I. & P.; J. J. Tatum, S. F. C. D., B. & O.; G. A. Hancock, G. S. M. P., St. L. & S. F.; F. P. Pfahler, M. E., Wheeling & Lake Erie; N. L. Friese, G. F. C. D., N. & W.

2. Prices for Labor and Material: F. H. Clark (chairman), G. S. M. P., B. & O.; G. E. Carson, D. M. C. B., N. Y. C. & H. R.; C. F. Thiele, G. C. I., P. C. C. & St. L.; Ira Everett, G. F. C. R., Lehigh Valley; B. Julien, G. C. F., Union Pacific; S. T. Park, S. M. P., C. & E. I.; H. E. Passmore, M. M., T. & O. C.

3. Springs for Freight Car Trucks: W. F. Kiesel (chairman), Asst. Mech. Engr., Penna.; T. A. Lawes, M. E., N. Y. C. & St. L.; J. R. Onderdonk, Engr. Tests, B. & O.; J. Haines, S. M. P., Southern Ry.

4. Consolidation: F. H. Clark (chairman), G. S. M. P., B. & O.; W. A. Nettleton; C. A. Schroyer, S. C. D., C. & N. W.

5. Train Lighting and Equipment: T. R. Cook (chairman), M. M., Penna. Lines; C. A. Brandt, M. E., C. C. C. & St. L.; Ward Barnum, elec. engr., L. & N.; J. H. Davis, elec. engr., B. & O.; E. A. Benson, M. S., Pullman Co.; D. J. Cartwright, elec. engr., Lehigh Valley; E. W. Jansen, elec. engr., Illinois Central.

6. Train Pipe and Connections for Steam Heat: I. S. Downing (chairman), M. C. B., L. S. & M. S.; C. A. Schroyer, S. C. D., C. & N. W.; T. H. Russum, S. P. C. D., B. & O.; J. J. Ewing, M. E., C. & O.; W. C. Arp, S. M. P., Vandalia R. R., Terre Haute, Ind.

7. Nominations: A. W. Gibbs (chairman), C. M. E., Penna. Lines; C. A. Seley, M. E., C. R. I. & P.; W. H. Lewis, S. M. P., N. & W.; J. F. Walsh, G. S. M. P., Ches. & Ohio; H. H. Vaughan, asst. to V.-P., Can. Pac.

8. Arrangements: A. Stewart, G. S. M. P. & E., Southern Railway.

9. Tank Cars: A. W. Gibbs (chairman), C. M. E., Penna. Lines; Thomas Beaghan, Jr., M. C. B., Union Tank Line; J. W. Fogg, M. M., B. & O., Chicago Ter. Ry.; S. K. Dickerson, A. S. M. P., L. S. & M. S.; C. E. Chambers, S. M. P., C. R. R. of N. J.; E. J. Searles, asst. to G. S., B. & O; Wm. Schlafge, G. M. S., Erie.

10. Specifications for Tests of Steel Truck Sides and Bolsters for Cars of 80,000, 100,000 and 150,000 Pounds Capacity: E. C. Schmidt (chairman), University of Illinois; J. S. Sheafe, engr. tests, Illinois Central; C. D Young, engr. tests, Penna.

11. Capacity Marking of Cars: C. E. Fuller (chairman), A. G. M., Union Pacific; M. K. Barnum, G. S. M. P., Ill. Central; A. W. Gibbs, C. M. E., Penna. Lines; F. H. Clark, G. S. M. P., B. & O.; F. W. Brazier, S. R. S., N. Y. C. & H. R.

12. Revision of Constitution: D. F. Crawford (chairman), G. S. M. P., Penna. Lines; C. A. Seley, M. E., C. R. I. & P.; A. Kearney, A. S. M. P., N. & W.

13. Lettering Cars: D. F. Crawford (chairman), G. S. M. P., Penna. Lines; F. H. Clark, G. S. M. P., B. & O.; W. A. Nettleton; F. A. Torrey, G. S. M. P., C. B. & Q.; D. R. MacBain, S. M. P., L. S. & M. S.

BATHING ACCOMMODATIONS.

Accommodations for bathing may be had by all members and guests of the conventions wearing the official badges at the following rates, including suits:

Reed's Baths (Boardwalk under Hotel Dennis)—25 and 50 cents per person.

Brighton Casino (With indoor swimming pool)—50 cents per person.

Free admission to the Brighton Casino (including concert, reading and writing rooms) will be given to members and guests wearing official badges.

These rates apply only to those wearing the official badge.

WEAR YOUR OFFICIAL BADGE.

As all members and guests of the associations are not known to the entertainment committee, who must use due diligence to insure their protection and privileges, they will greatly assist in this work by wearing their official badges at all times during the conventions.

COMPLAINTS.

The committee of arrangements, A. Stewart, H. T. Bentley and B. E. D. Stafford, will be glad to undertake to adjust all complaints of any nature during the convention. Communications should be sent to the office of the secretary of the Railway Supply Manufacturers' Association, Million Dollar Pier.

STENOGRAPHIC SERVICE.

Two Edison business phonographs have been installed in Booths 625 and 627 (near Convention Hall), where they may be used without charge by railway and supply men. The machines will be in the hands of competent operators, and all are cordially requested to make liberal use of them in handling correspondence.

ROLLING CHAIRS.

The Shill Rolling Chair Company has been officially authorized to rent rolling chairs for the use of the members and guests wearing official badges of the conventions. Coupons will be issued in books of 10 and 20 coupons, each coupon 25 cents. The purchaser will be allowed a discount of 20 per cent from the face value of each book purchased, and the coupon will be accepted by the chair company for use of chair at face value. These coupons will be good both day and evening.

Rental Rates for Chairs.—One or two persons, 50 cents per hour. Three persons, 75 cents per hour. After the first hour, half-hour fractions will be charged. Special trips, hotel to pier, pier to hotel, or hotel to hotel, 25 cents per person, when the station manager is notified in advance and the trip made direct without stops. Double chairs, with attendant, from 9 a. m. to 6 p. m., $2.50 per day. Double chairs, with attendant, from 9 a. m. to 12 midnight, $4 per day. When the chair is engaged by the hour, the time to return to the original station is included.

All chairs must be engaged at the following stations, at which the coupon books may be procured. Ostend Hotel, Shelburne Hotel, Dennis Hotel, Berkley Cafe, Chalfonte Hotel, N. Carolina Ave., Bothwell Hotel, Seaside Ave., Gladstone Hotel, Marlborough Hotel, Traymore Hotel, Princess Hotel, Haddon Hall, Pennsylvania Ave., Islesworth Hotel, Rudolph Hotel, Million Dollar Pier, Blenheim Hotel, Brighton Hotel, 1239 Boardwalk, Strand Hotel, Virginia Ave., St. Charles Hotel and Royal Palace Hotel.

TELEPHONES ON THE PIER.

A Bell telephone will be placed between each two exhibit booths on the pier. These are available for free local service for exhibitors. Long-distance calls can also be made from these stations.

GOLF.

The Country Club of Atlantic City extends the privilege of its club house to all members and guests during their stay, and admission to the grounds will be by official badge. It also extends the privilege of the links for a charge of $1.00 per day, and tickets may be obtained from the steward at the club. The club is located at Northfield and may be reached at half-hour intervals by the Shore Fast Line Electric, leaving from the Boardwalk and Virginia avenue, also by the Atlantic City & Suburban Traction Company, leaving from Florida avenue and the Boardwalk. The running time is about 20 minutes.

U. S. MAIL.

Mail, addressed care of Secretary's Office, Million Dollar Pier, will be taken care of and distributed when called for at that office.

RAILWAY SUPPLYMEN'S MEETING.

The annual meeting of the Railway Supply Manufacturers' Association will be held in the convention hall on Young's New Million Dollar Pier, Saturday, June 15, at 10.30 a. m. District meetings for the election of the executive committee members will be held on Friday, June 14, between 10 a. m. and 12 noon, in the office of the executive committee, which adjoins the enrollment booth at the pier entrance.

ENROLLMENT.

The registration booth at the entrance to the pier was opened yesterday morning. This morning it will be opened at 8 30, and it is urged members of the association register as early as possible.

Members of the Master Car Builders' Association are required to pay $1.00 for each badge for themselves or for their guests. Members of the Master Mechanics' Association will be registered this week only as guests of the M. C. B. Association, and will be required to pay $1.00 for each badge.

The M. M. registration begins at 7.30 P. M. Saturday, and from this time on no charge will be made for M. M. badges.

To facilitate the registration of members, ladies and guests of the Railway Supply Manufacturers' Association, members will first go to the treasurer, who is at one end of the enrollment booth, and receive a card showing that dues and fees for additional badges have been paid. If not already paid, the treasurer will receive payment at this time. The member will then fill out the card and present it at the enrollment booth, where the card will serve as an order on the enrollment committee for the badge or badges.

THE BALL GAME.

The annual ball game will take place at the Inlet Park ball grounds on Saturday afternoon. The captain of the Western team is Harry S. Hammond, Pressed Steel Car Company, Pittsburgh, Pa., and the captain of the Eastern team is T. P. O'Brian, O. M. Edwards Company, New York City. The managers in charge of the game are G. W. Wildin, New York, New Haven & Hartford, New Haven, Conn., and F. M. Nellis, Westinghouse Air Brake Company, Boston, Mass.

The rules governing eligibility for players are the same as last year. They are as follows:

(1) Teams to be composed of 12 men in uniforms—8 railway supply men, 4 railway men.

(2) Supply men must be in the sales department, or those who call on railways or car companies and solicit business.

(3) No one who is in the shop end alone shall be allowed to play.

(4) No one to be allowed to play who comes to Atlantic City for the base ball game alone. He must be in attendance as a representative of a supply company and registered as such.

(5) Railway men to play must be members of either the M. M. or M. C. B. Association. Men working in the shops cannot play.

(6) Members' names and occupations, firm and railway names included, to be submitted to Philip J. Mitchell, chairman of the entertainment committee.

(7) If for any reason a change in team is necessary, names shall be submitted to and passed upon by the managers, Messrs. Wildin and Nellis, as well as to Mr. Mitchell.

(8) No player shall be eligible who has not been employed as salesman for at least one year by a railway supply company, or who has not been a member of the M. M. or M. C. B. Association for at least one year.

(9) No variation from these rules will be permitted.

(10) Pittsburgh, Pa., will be in the western territory, and Buffalo, N. Y., in the eastern.

THE FRIDAY EVENING ENTERTAINMENT.

The musicale, which is to be given on the pier on Friday evening will begin at 9.00 o'clock. It will last about an hour, and, judging from the program which the committee has provided, it will prove a decidedly attractive means of getting people together at the pier.

THE DANCES.

The informal dance to be held to-night at the Marlborough-Blenheim and the dance at the pier to-morrow night are intended to be really informal. That is, evening dress is by no means obligatory, and it is expected that those who attend will wear evening or day clothes according to which is most convenient.

TAXICAB AND GARAGE SERVICE.

The C. J. Sedlag Company, with main office at Tennessee and Atlantic avenues, has contracted to provide taxicabs for members and guests wearing official badges, at the following rates: For each person hauled, within the city limits, 25 cents per person; hourly rate, for one to five people, $3 per hour. Taxicabs are to be available at the Marlborough-Blenheim hotel, Million Dollar Pier and at the stations of the taxicab company. Garage service for private machines will be provided by this company at the following rates: 75 cents per day without service; $1.50 per day with service; $7 per week with service.

INVITATION TO ARMY AND NAVY.

The Railway Supply Manufacturers' Association has extended a special invitation to the Secretary of War and the Secretary of Navy inviting them, or any others under their jurisdiction, to attend and inspect this year's exhibit. It is not learned yet whether any from either department will be present.

A RAILWAY PLANK FOR BOTH POLITICAL PLATFORMS.

The conventions to be held in Atlantic City this week and next are not the only important conventions that are scheduled for early dates, and the Railway Business Association is moving to get the two great political parties to insert in the platforms that will be adopted railway planks that will tend to cause a less restrictive policy of railway regulation and thereby stimulate the development of transportation facilities. The association has issued bulletin No. 11 entitled, "Duty of the Political Parties to the Shippers," and is asking shippers to sign the following petition and forward it to the office of the association at 2 Rector street, New York City:

"The undersigned shippers and receivers of freight, in our own interest, respectfully urge the national conventions of the political parties to declare a policy toward railways which, while emphasizing the necessity for their regulation to prevent discrimination and excessive charges; to safeguard life and to promote the convenience and comfort of the public, will:

"Give careful heed to the promotion of their prosperity and growth.

"Ascertain in considering enactments compelling expenditures that they possess the resources to meet such outlays without injury to efficient service;

"Provide that in all adjustments of rates ample revenue shall be insured them to meet existing obligations and to attract capital for necessary improvements and extensions."

Shippers attending the conventions—and there are many railway supply men attending who are very large shippers—may sign the petition by calling at the RAILWAY AGE GAZETTE booth. The wording of the petition indicates the nature of the planks that the association is trying to get adopted.

The association in its bulletin presents the following argument for the policy that it advocates:

"The national party conventions soon to meet will adopt in their platforms what they regard as the most important policies of government for the well-being of the country. Such policies will be designed to comprehend the whole range of the public needs and to insure prosperity and progress to the whole people. To these policies each party will pledge itself, and will be expected, in event of success at the polls in November, to shape legislation and administration during the next four years in accordance therewith.

"Among the subjects hitherto considered in the party platforms has been that of railway regulation. This subject will, without doubt, be dealt with again in 1912. It is the purpose of this bulletin to direct the attention of the parties to a phase of that subject involving momentous consequences to the national welfare, twice urged upon congress by the Interstate Commerce Commission, and never yet acted upon—namely, the inadequate supply of railway facilities and the difficulty of dealing with it under regulation as now established. The difficuly lies in the absence of any connection between rate regulation, railway revenues and the demands made upon the railways for service and outlays.

Consumers as well as shippers, farmers as well as manufacturers and their employees, will suffer if facilities are not developed in advance of requirements. Traffic has grown faster than facilities. These cannot be increased by act of legislature or by decrees of courts or commissions.

The political parties would probably be reluctant and, in our judgment, would be unwise in attempting to define within a platform declaration a specific solution. The question is one for thorough investigation and interchange of views.

In the way deemed appropriate to each, the government fosters water transportation, agriculture, forestry, mining, manufactures and foreign trade. The railways need a systematic consideration of their revenues as bearing on their ability to obtain capital and provide track, locomotives and cars. The time has come when rail transportation should be recognized as an industry which the government should encourage as well as regulate.

In the past emphasis has been laid by the parties upon the prevention and discriminations and excessive charges by the railways and the promotion of the public safety. In reiterating these policies, as they should, the parties should place alongside them the promotion of railway development and of carrying capacity as a policy of equal importance and of vital necessity.

The Interstate Commerce Commission said in 1906:

"The inability of shippers to procure cars for the movement of their traffic is the subject of numerous and grievous complaints, which come to the commission from all parts of the country. In some cases it is simply a lack of cars, in others insufficient tracks and motive power, in still others wholly inadequate freight yards and terminal facilities."

In the same report the commission said:

"Broadly speaking, the regulating power of the congress has not been exercised to control the physical operation of interstate railroads—aside from the safety appliance requirements—either as respects the movement of trains or the supply of equipment. To what extent the delegation of authority to the commission to deal with a situation of this kind would be likely to prove of practical value is a question of great difficulty. The commission is not prepared to recommend a definite scheme of legislative relief; but we are amply warranted in bringing the matter to the attention of the congress in this general way and to ask that it receive early and careful consideration."

In 1907 the commission said:

"The general question of the provision of adequate transportation facilities unquestionably merits serious consideration by the congress. The ability of the carriers to transport traffic measures the profitable production of this vast country, with its 90,000,000 of people, abundant capital and practically unlimited resources. Manifestly, it is an economic waste for the farm, the mine or the factory to put labor and capital into the production of commodities which cannot be transported to market with reasonable dispatch. If the present output cannot, in many instances, be transported except after ruinous delays, it is not reasonable to presume that capital will readily seek investment in new undertakings."

The cry for relief to the shippers is as insistent now as in 1906. The danger of congestion of traffic through the inability of the railways to furnish the requisite facilities is as great a menace, probably greater, to the growth and prosperity of our country in the year 1912 than ever before.

It should be frankly stated that the condition of railway finances which was the cause of inadequate growth in facilities in 1906 was not the result of the attitude of the Interstate Commerce Commission in regulating rates. The effective regulation of interstate rates was not authorized until after the car shortage of 1906 and 1907, discussed by the commission in its reports for those years. The largest factor up to that time contributing to the situation as it then existed was the action of the railways themselves in the period of disastrous competition.

The commission since 1910 has been clothed, not only with authority to reduce rates, either upon their own motion or upon complaint, but to suspend proposed advances when tariffs proposing advanced rates are filed with the commission.

A very large body of rates aggregating many millions of revenue have been reduced by order of the commission, many proposed advances have been denied, and the result has been a weakening of revenue supplemental to the impairment which because of increasing costs and rigid rates would have taken place without such decrees. The denial in 1911 of the general advances asked for, although involving comparatively small amounts and on some accounts not disadvantageous to the roads, served to intensify feeling among investors that the regulatory apparatus of the country was operating in the

direction of skimping railway revenues, and the course of miscellaneous decisions since that time has added to this conviction.

The opposite conviction, namely, that the regulatory apparatus will operate in the direction of permitting adequate railway revenues, can only be carried home to investors by a definite and formal declaration that this is to be the policy of the government and systematically enforced.

Most of the rate cases brought before the commission at present do not have as their primary purpose the reduction of rates, but are controversies between communities, individuals or commodities as to the relation of one rate to another.

What is here discussed has no bearing whatever on any general advance in rates. So far as the Railway Business Association is informed no such advance is under consideration. If every schedule in the United States were to be raised to-morrow this would in no way touch the question which is here offered for public discussion. What is urged is that the method of regulating rates should be sufficiently flexible to conform to the needs of industry and to the requirements of the carriers and to insure their fullest efficiency.

The Interstate Commerce Commission has the power of influencing, through rate regulation, what net revenue carriers, or any of them, shall earn. There can be no doubt that in the exercise of this power the commission will be strongly and properly influenced by an evidence of public approval of a policy which shall permit the railroads to accumulate resources and to anticipate the growth of traffic. This approval can best be demonstrated to the commission by a platform declaration by the political parties in convention assembled.

Where discriminations between communities, commodities or individuals are alleged to exist and the rates in themselves are not found to be unreasonable, an opportunity should be offered to the carriers by suggestion on the part of the commission permitting readjustment without compelling a reduction in the aggregate earnings.

What was the "great difficulty" which confronted the Interstate Commerce Commission in 1906 in formulating "a definite scheme of legislative relief" for car shortage and other inadequacies of railway facilities? This great difficulty, although not defined, must have been the fact that every additional car or locomotive, every mile of additional track, every enlargement of terminals provided by the railways must be paid for by them out of money that they could either earn or borrow. Whatever the commission might ascertain by investigation to be the absolute requirement of the shippers in augmented transportation facilities; however many hundreds of millions of dollars the commission might decree must be spent by the railways properly to serve the shippers, their ascertainment and resultant order would be futile, if the railways did not possess the money wherewith to make the investment, or could not persuade investors seeking safe and profitable investment to lend them the money upon such security as they had to offer. They understood, of course, that no government appropriation goes with an edict compelling railway expenditure.

The present chairman of the Interstate Commerce Commission, the Hon. Charles A. Prouty, thoroughly understands this, as is shown by the following extract from an address delivered by him in 1909 at Yale University:

"While we can provide by legislation the sort of cars which a railroad shall use and the rates which it shall impose, we cannot by legislation force one single dollar of private capital into railway investment against its will."

It is clearly recognized by shippers, railway managers and other high authorities that there is acute urgency as well as permanent necessity for dealing vigorously with the subject. Business bodies in resolutions and journals and magazines in editorials are directing attention to the danger and calling for a solution.

The railway managers are vividly alive to their unpreparedness, but they are confronted by a situation of great perplexity. The difficulty is financial and presents itself in two phases.

First, investors are reluctant to take securities on terms which the managers deem prudent. This impairment of borrowing credit is the result of several conditions. The most important of these is the low level of a great body of rates brought about during the period of extreme completion. Then in the face of this influence tending to keep revenues depressed, expenses have increased through a continuous upward movement in wages, a large augmentation in taxes, enormous additions to fixed charges for investments in non-revenue producing improvements made under legislative compulsion or pressure of communities in the direction of safety of the public and of employees and the comfort of passengers, and a substantial increase in operating expenses due to compulsory shortening of hours and labor and other causes incident to regulation. The security, moreover, which railroads are now able to offer is no longer to so great an extent as formerly unincumbered property. New money must be raised by issue of junior liens or of stock. Purchasers of junior liens require a higher rate to compensate for the less solid security, while purchasers of stock scrutinize the surplus in order to determine whether an addition to the outstanding stock will be likely to result in a decrease in the rate of dividend.

Second, the rate now demanded by investors involves a larger obligation dollar for dollar in the form of returns on the new securities sold. The railway managers face the question whether or not they can pay the interest which they would have to promise or the dividends which they would practically have to predict. It is upon their personal assurance as administrators that securities will be taken if at all. A grave doubt necessarily disturbs their minds as to future ability to pay such return. No other condition of mind is possible to them since they have no way of knowing what rates they will be permitted to charge and hence what income they will have, and no way of forecasting what draughts will be made upon their resources by Congressional and state enactments.

"OU SONT LES FLEURS D'ANTAN?"

[The following is what the one-time poet laureate of the mechanical conventions anticipated would be the result of the revision and curtailment of the entertainment features of the conventions. Whether he is a prophet as well as poet only time will tell.—Editor.]

Atlantic City days have come, the hottest of the year,
With Panamas and negligees, of talk, and baths and beer;
Sculped in the sand along the beach the "Lion of Lucerne"
Basks in the glare of southern sun and frizzles to a turn;
The "automobile party," the bust of one T. R.,
And painted adlets scattered round soon tell us where we are.

And Old Vienna's classic shades (but shades is not the word)
And "classic" should be "classy" (at least that's what I've heard);
The "closing sales" along the walk, that, lo! these many years
Have found no end of goods nor dearth of sacrificial tears;
These and the music—save the name!—that dins on every side,
Enforce the thought that Boardwalk life is at its highest tide.

And now M. M.'s and M. C. B.'s are strolling on the walk,
When not in Young's Greek Temple for annual fest of talk;
And salesman—order-taker—and industrial chevalier
Have taken up their annual stand, the Million Dollar Pier.
And roller chairs of one-coon power roll softly on the boards,

While Boniface and Bacchus' squires rake in their annual hoards.

But where the "buds," the tender "buds," that always used to come
To bloom in glory at the shore though dad was "on the bum?"
Away, like birds of last year's nest, the snows of yester year;
(Poor Daddy pays his own hotel, his fare, and—yes—his beer);
Yet may we ask in musing mood, as beach and walk we scan,
"Where are the flowers of yester year? Où sont les fleurs d'antan?"

And Daddy buys his badges, too, and pungles up the shot
For roller chairs, unless, mayhap, he'd "rather walk than not;"
He gets along without a band, a ball each week, a show;
And if he wants to take a bath, signs tell him where to go.
Bath tickets are not floating round—he knows it isn't right,
He'd better follow grandpa's plan and wait till "Sad'day night."

For Papa's conscience took a whirl, and though he likes to roam,
He's rather glad to foot the bills and be man at home;
Conventions do not last alway, and when he buys supplies
He'd rather feel his hands unbound, no bandage on his eyes.
The other fellow 'll have to cut:—"Why, Mr. S. M. P.,
Don't you recall that time last June you took a bath on me?"

And yet, I can't imagine it, it's been so—well, not so—
Since entertainments came the rage so many years ago;
I'm almost glad I am not there, I shouldn't feel at home,
And might not have the mind to do as Romans do in Rome.
And so I'll end this mingled wail and muse, as I began:—
"Where are the flowers of yester year? Où sont les fleurs d'antan?"

— F. W. LANE.

The exact situation of the railway from Kiukiang to Nanchang, the capital of Kiangsi province, China, is doubtful. The line was surveyed in 1905, but actual construction work did not commence until 1908. In April, 1910, the Chinese customs commissioner reported that the chief engineer had declared the first section of 32 miles so near completion that there was no reason why it should not have been opened that summer. At that time all the grading was finished, track had been laid for 6 miles, and most of the bridges were completed. However, financial troubles, which have interfered with the progress of the work from the beginning, set in during the summer and the work was greatly retarded. The rails and fittings for this road were manufactured by the Hanyang Iron & Steel Works at Hankow. The bridge steel, cars, locomotives, and considerable other material are from the United States. The staff, until very recently at least, was entirely Japanese. The line passes through exceptionally easy country for railway building, but involves the construction of several notable bridges, among them being a seven-span bridge about three and a half miles from Kiukiang and an 800 ft. truss bridge 50 miles from Kiukiang. The road taps an exceptionally rich country, from which great quantities of tea and other agricultural products are exported. Between comparatively low cost and prospective unusual earning power, the immediate financial success of the enterprise is expected, but the difficulty of securing the necessary capital from native sources, is likely to embarrass the management for some time.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.

There has been much speculation as to the usefulness of the officers and executive committee of the Railway Supply Manufacturers' Association, now that they have been interstatecommercecommissionized; but one has only to walk from the pier entrance to the Greek Temple to learn that they have hardly had time to get into very much mischief.

And as to the other features of the convention, those who know the able chairman of the respective committees in charge of the details of the supplymen's end, know that nothing has been left undone that will make for the comfort and pleasure of the members and guests of the three associations.



B. E. D. STAFFORD,
President.

On the page opposite appear likenesses of eight members of the executive committee. Two faces are missing—Lanahan and Reilly. Unfortunately some folks still have false notions about modesty when it comes to facing a camera; hence the necessity for an apology by the editor.

The president of the association is B. E. D. Stafford, general manager of the Flannery Bolt Company, Pittsburgh, Pa. "Staff" is one of the best fellows in the world and a methodically hard worker. To him, more than to any one other man, does the association owe a debt of gratitude for the success of the exhibit section. In 1910, as chairman of the exhibit committee, he gave the subject much time and attention; and last year as vice-president of the association, and again this year as its president, the respective chairmen of the exhibit committee have been helped materially by Mr. Stafford's experience and keen perception. Mr. Stafford is a practical shop man—he can lay out a shop and run the machinery; but he appears at his best as an expert on staybolts and staybolt iron. For the last 12 years he has devoted most of his time and energy to that business; and nearly eight of those 12 years have been spent in perfecting and selling the Tate bolt.



SAMUEL G. ALLEN,
Vice-President.

Samuel G. Allen, vice-president, was born at Warren, Pa., in 1870, and graduated in law from Pennsylvania State College in 1891. He practiced from that time until May, 1900, when he was made general manager of the Franklin Air Compressor Company. One year later that concern was sold to the Chicago Penumatic Tool Company and Mr. Allen and J. S. Coffin organized the Franklin Railway Supply Company, Franklin, Pa., with Mr. Coffin as president and Mr. Allen as vice-president,



E. L. ADREON.



ALBERT C. ASHTON.



W. W. ROSSER.



CHARLES P. STORRS,
Chairman, Finance Committee.



J. WILL JOHNSON,
Chairman, Exhibit Committee.



E. H. WALKER,
Chairman, Badge Committee.



LUCIAN C. BROWN.



J. R. BLAKESLEE.



GEORGE L. MORTON.

Members of the Executive Committee of the Railway Supply Manufacturers' Association.

which positions both now hold. In 1909 the company moved to New York. Mr. Allen is also secretary and treasurer of the American Arch Company, treasurer of the Locomotive Superheater Company and vice-president of the General Equipment Company, all of New York City, and secretary of the executive committee of the American Brake Shoe & Foundry Company of Mahwah, N. J.

The biographies of the treasurer, Herbert I. Lord, and secretary, John D. Conway, appeared in *The Daily*, of June 14, 1911, page 1344.

The seven geographical districts are represented on the executive committees as follows: First District (New England states and Canada), one member—Albert C. Ashton, Ashton Valve Company, Boston, Mass. Second District (New York and New Jersey), three members — Charles P. Storrs, Storrs Mica Company, Owego, N. Y.; E. H. Walker, Standard Coupler Company, New York and Lucien C. Brown, United Equipment Company, New York. Third District (Pennsylvania) two members — Frank J. Lanahan, Fort Pitt Malleable Iron Company, Pittsburgh, Pa., and George N. Riley, National Tube Company, Pittsburgh, Pa. Fourth District (Ohio, Indiana, Michigan), two members—H. I. Lord, Detroit Lubricator Company, Detroit, Mich., and J. R. Blakeslee, Ajax Manufacturing Company, Cleveland, Ohio. Fifth District (Illinois, Wisconsin, Iowa and Minnesota), Two members—W. W. Rosser, The T. H. Symington Company, Chicago, and J. Will Johnson, Pyle-National Electric Headlight Company, Chicago. Sixth District (Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Kentucky and Tennessee), one member—George L. Morton, Galena-Signal Oil Company, Atlanta, Ga. Seventh District (states west of the Mississippi River including Louisiana, but excepting Iowa and Minnesota), one member—E. L. Adreon, American Brake Company, St. Louis, Mo.



HERBERT I. LORD,
Treasurer.



J. D. CONWAY,
Secretary.

With each annual meeting four members of the executive committee retire and their successors are elected for three-year terms. Messrs. Adreon, Ashton, Lord and Storrs will retire at the close of this convention.

B. E. D. Stafford, president, and Samuel G. Allen, vice-president, are members ex-officio.

The several committees in charge of the details of the plans of the executive committee are made up as follows:

Entertainment Committee.

Philip J. Mitchell, (chairman), Philip S. Justice & Company, Philadelphia, Pa.; Ross F. Hayes, Curtain Supply Company, New York; W. J. Walsh, Galena-Signal Oil Company, Chicago; H. E. Oesterreich, Wendall & McDuffie Company, New York; Leonard J. Hibbard, L. J. Hibbard & Company, New York; J. C. Younglove, H. W. Johns-Manville Company, Chicago; Thomas Farmer, Jr., Consolidated Car Heating Company, New York; E. S. Toothe, Nathan Manufacturing Company, New York; Charles P. Williams, Chicago Railway Equipment Company, New York; C. A. Dunkelberg, S. F. Bowser & Company, Ft. Wayne, Ind.; Edwin H. Janes, Talmage Manufacturing Company, Cleveland, Ohio; H. A. Nealley, Joseph Dixon Crucible Company, Boston, Mass.; George R. Carr, Dearborn Drug & Chemical Company, Chicago; Herbert Green, Burton W. Mudge & Company, Chicago; C. W. Wardell, Welsbach Company, Gloucester, N. J.; L. B. Sherman, Railway Age Gazette, Chicago; William S. Furry, Ohio Injector Company, Chicago; Fred M. Nellis, Westinghouse Air Brake Company, Boston, Mass.; J. P. Landreth, Garlock Packing Company, Chicago; Harry S. Hammond, Pressed Steel Car Company, Pittsburgh, Pa; E. F. Chaffee, O. M. Edwards Company, Syracuse, N. Y.; J. D. McClintock, Wm. Sellers & Company, Inc., Philadelphia, Pa.; T. W. Illingworth, Midvale Steel Company, New York; W. K. Krepps, Crucible Steel Company of America, Pittsburgh, Pa., and Roger J. Faure, Commercial Acetylene Company, New York.



PHILIP J. MITCHELL,
Chairman, Entertainment Committee.

The sub-committees of the entertainment committee are:

Door.—In charge of entrance at all entertainments. Messrs. Williams (chairman), Green, Furry, Janes and McClintock.

M. C. B. Social Gathering and Informal Dance.—Wednesday evening, June 12, at the Marlborough-Blenheim. Messrs. Walsh (chairman), Farmer, Williams, Younglove, Furry, Green and Janes.

M. C. B. Dance.—On pier, Thursday evening, June 13. Messrs. Younglove (chairman), Hayes, Hibbard, Dunkelberg, Wardell, Sherman, Nellis, Illingworth and Krepps.

Musical Evening.—On pier, Friday, June 14. Messrs. Hibbard (chairman), Oesterreich, Toothe, Farmer, Sherman and Illingworth.

Base Ball.—Saturday afternoon, June 15. Messrs. George. W. Wildin and F. M. Nellis (managers), and Messrs. Hibbard, Hammond, Carr, Landreth and Chaffee.

M. M. Social Gathering and Informal Dance.—Monday evening, June 17, at the Marlborough-Blenheim. Messrs. Dunkelberg (chairman), Nellis, Wardell, Hayes, Carr, Sherman, Landreth and McClintock.

M. M. Dance.—On pier, Tuesday evening, June 18. Messrs. Farmer, Jr. (chairman), Toothe, Walsh, Oesterreich, Hammond, Nealley, Chaffee and Faure.

Introduction Committee.—To promote sociability at all dances. Messrs. Carr (chairman), Dunkelberg, Sherman, Nealley, Toothe, Hayes and Krepps.

Ushers' Committee.—In charge of seating of guests and distribution of programmes at entertainments and dances. Messrs.

Wardell (chairman), Younglove, Walsh, Oesterreich, Wardell, Nealley, Chaffee and Faure.

Enrollment Committee.

O. F. Ostby (chairman), Commercial Acetylene Company, New York; H. B. Darlington, Union Spring & Mfg. Company, Pittsburgh, Pa.; C. S. Woodruff, Lowe Brothers Company, Chicago; W. S. Hammond, Jr., Consolidated Car Heating Company, Chicago; M. S. Simpson, Pressed Steel Car Company Pittsburgh, Pa.; C. B. Yardley, Jr., Jenkins Brothers, New York; E. Bjerregaard, Official Railway Guide, New York; H. G. Newman, Johns-Manville Company, New York; J. G. Mowry, Patton Paint Company, New York; H. J. Jefferson, United & Globe Rubber Mfg. Company, Pittsburgh, Pa.; F. E. Beal, Magnus Metal Company, Atlanta, Ga; Simon J. Dolan, American Car & Foundry Company, St. Louis, Mo.; Harold A. Brown, Pocket List of Railroad Officials, New York; R. T. Hodgkins, Yale & Towne Mfg. Company New York and J. A. Warful, Oxweld Acetylene Company, Pittsburgh, Pa.



OSCAR F. OSTBY,
Chairman, Enrollment Committee.

Finance Committee.

Charles P. Storrs (chairman), Storrs Mica Company, Owego, N. Y.; Albert C. Ashton, Ashton Valve Company, Boston, Mass., and George N. Riley, National Tube Company, Pittsburgh, Pa.

Exhibit Committee.

J. Will Johnson (chairman), Pyle National Electric Headlight Company, Chicago; E. H. Walker, Standard Coupler Company, New York; J. R. Blakeslee, Ajax Manufacturing Company, Cleveland, Ohio, and Frank J. Lanahan, Fort Pitt Malleable Iron Company, Pittsburgh, Pa.

Badge Committee.

E. H. Walker (chairman), Standard Coupler Company, New York; Samuel G. Allen, Franklin Railway Supply Company, New York, and L. C. Brown, United Equipment Company, New York.



The result of the discrimination of the badge committee is shown herewith. The badges for the ordinary supplymen are royal blue; while those for the ladies who accompany them are white. Light-blue badges mean that the ladies who wear them are guests of members of the M. C. B. and M. M. associations. The special complimentary badges for men are red, and those for the ladies, yellow.

The holders of licenses for dealing in salt in China have decided, with government permission, to build a railway from Icheng, near the Yangtze river, to Taichow, with a branch between Icheng and the salt depot at Shiherwei, on the Yangtze river, all in the province of Kiangsu. This line will cross the Grand Canal at Kwachow and pass up the eastern bank of the canal as far as Yangchow, a good-sized city, whence it will go to Taichow via Hsiennumiao.

THE CHILLED IRON CAR WHEEL.

CHICAGO, May 31, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Reference to the Interstate Commerce Commission report for the year ended June 30, 1910, will show that there were 2,133,531 freight cars in service, and classification of this equipment as to capacities shows:

			Per cent.
244,013 freight cars	10,000 lbs. to 50,000 lbs. capacity (inc.)		11.5
865,495 freight cars	60,000 lbs. to 70,000 lbs. capacity (inc.)		40.5
641,022 freight cars	80,000 lbs. to 90,000 lbs. capacity (inc.)		30.1
382,930 freight cars	100,000 lbs. to 110,000 lbs. capacity (inc.)		17.9
71 freight cars over	110,000 lbs. capacity		....
Total, 2,133,531			100.0

The character of the equipment was as follows:

	Per cent.
90[illegible],577 box cars	42.3
153,919 flat cars	7.2
77,834 stock cars	3.6
818,089 coal cars	38.3
7,434 tank cars	.4
30,918 refrigerator cars	1.5
78,410 other cars	3.7
Total, 2,133,531	100.0

As it takes eight wheels to equip a car, it is evident that there were 17,068,248 wheels in service under freight equipment alone. Ninety-five per cent. of the wheels used under freight equipment are chilled iron wheels. Therefore, there are over 16,000,000 chilled iron car wheels in service in the United States. This figure does not include hundreds of thousands of chilled iron wheels which are used under passenger cars, locomotive tenders and on private car lines. It will thus be seen that the commerce of the country is practically dependent upon the chilled iron car wheel. The chilled iron car wheel may be defined to be a body of metal scientifically moulded in which the iron structure in every part of the wheel is admirably suited to its purpose, viz., hard tread, soft plates, soft hub.

The tread or running surface is as hard as the hardest steel, and because of this hardness it becomes polished in service, and this reduces the friction between the wheel and the rail. The plates are soft, thus insuring the necessary structure to carry heavy loads and resist temperature stresses due to brake application. The hub is soft, so that the wheel may be easily machined for axle fit. There is no known metal that possesses the graded hardness of structure of the chilled iron car wheel.

The Master Car Builders' Association specifies three classes of wheels for cars of different capacities, as follows: Six hundred and twenty-five lb. wheel for 60,000 lb. cars; 675 lb. wheel for 80,000 lb. cars and 725 lb. wheel for 100,000 lb. cars. As the capacities of the cars have increased, the wheels have been increased in weight, but not in proportion to the increase in car capacity and other parts of the car; for instance, the 625 lb. wheel carries a 60,000 lb. car and the 725 lb. wheel carries a 100,000 lb. car; the increase in car capacity has been 66⅔ per cent., and in the weight of the wheel 16 per cent. The 550 lb. axle carries a 60,000 lb. car and the 870 lb. axle carries a 100,000 lb. car.; the increase in the weight of the axle is 58 per cent. The body of the car weighs 23,000 lbs. for a 60,000 lb. car, and 32,900 lbs. for a 100,000 lb. car; the increase in the car body being 43 per cent.

It will be noted that the capacity of the car has been increased 66⅔ per cent. While the weight of the axle has increased 58 per cent., that of the car body 43 per cent., and that of the car wheel only 16 per cent., proving that the weight of the wheel has not increased in the same ratio that increases have been made in the other parts of the car.

The tendency of the railways is to increase the capacity of the car beyond 100,000 lbs., and while axles have been designed for 140,000 lb. cars, no wheel has been specified by the Master Car Builders' Association for this service. Still, the chilled iron car wheel makers are placing in service wheels to carry this load, and even loads of greater capacities. Its use under tenders of 10,000 gal. capacity and ore cars of 150,000 lb. capac-

ity proves conclusively that there is scarcely a limitation to the chilled iron wheel, and it is standard because of its safety, economy and adaptability.

As long as cars increase in capacity, all parts of the wheel should be strengthened proportionately, and in the process of evolution, from cars of 10,000 lb. to cars of 100,000 lb. capacity, metal has been added to all parts of the wheel with the exception of the flange, because of the recognized limits of track clearance.

From the earliest period of railroading the frog and guard rail clearance has been a minimum of 1¾ in., although many roads throughout the country use a minimum of 1⅞ in. and 2 in. clearance. The weight of the wheel has increased from 525 lbs. to 725 lbs., of the rail from 50 lbs. to 100 lbs., and practically the same flange is used today as was used under cars of 20,000 lb. capacity.

The important service that the chilled iron wheel is rendering is performed at a minimum cost. A chilled iron car wheel is sold in the market for an approximate differential of $3.50. The net cost to the railway is the difference between the selling price and the old wheel which is taken as part payment for the new wheel, amounting to approximately $3.50 per wheel. These wheels are guaranteed for a certain period, and in case the wheel does not give the service for which it is guaranteed, the loss comes on the manufacturer.

Under some conditions of service a 625 lb. wheel is guaranteed for six years minimum service, a 675 lb. for five years, and a 725 lb. for four years.

The average life of the various classes of wheels will approximate as follows: Twelve years for a 625 lb. ordinary freight car wheel, 10 years for a 675 lb. wheel, and 8 years for a 725 lb. wheel.

Assuming that a 625 lb. wheel only fulfills its guarantee, the cost per wheel per year, based upon the $3.50 differential, is 58⅓ cents, and the cost of 8 wheels per car is $4.66 per year. If this expense is based on the average life of 12 years for a 625 lb. wheel, the cost per car per day would be approximately $2.33.

It is stated that about 85 per cent. of the repairs to freight cars are due to shocks consequent on coupling, etc., thus damaging bolsters, draft-gears and other parts of the car. Analysis of the cost of the repairs of freight cars will show that the wheel expense is insignificant compared to the repairs for other parts of the car.

If any other wheel is substituted for the standard chilled iron wheel, it must be demonstrated by competitive tests: first, that it is more economical per ton mile; second, that it is better adapted to the service, for which it is intended, and third, that it must be safer.

Then it must be borne in mind that an added cost of $10 per wheel would involve an expenditure of $80 per car, and the interest on this investment at 5 per cent. would be $4 per car per year, which is more than the renewal cost of the standard chilled iron car wheel, and on this basis it would amount ultimately to an additional investment to the railways of $160,000,000 for freight car wheels alone.

The Association of Manufacturers of Chilled Car Wheels represents a capacity of 20,000 chilled iron car wheels per day. Its members are spending time and money investigating the important service conditions, and they are paying the most careful attention to improved foundry methods, selection of material and physical tests in order to bring their product up to the very highest standard. Statistics show that with the rapid increase in car load and capacity there has been a decrease in wheel failures. Years of experience have proved that the chilled iron car wheel will meet any condition of service no matter what load is imposed on it, and the railways receive a greater return per unit of investment from the chilled iron car wheel than from any other car wheel known.

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS.

By George W. Lyndon.

M. C. B. REGISTRATION.

Averill, E. A., American Engineer, Traymore.
Barnum, Morgan K., Ill. Cent., Dennis.
Baron, Jacob, Kentucky & Ind. Terminal, Young's.
Borrowdale, J. M., Ill. Cent., Brighton.
Boutet, H, all lines Cincinnati, Chalfonte.
Boyer, Chas. E., Penna. R. R., Runnymede.
Brazier, F. W., N. Y. C. & H. R. R. R., Marlborough-Blenheim.
Burnett, R. W., Canadian Pacific Ry., Marlborough-Blenheim.
Bussing, G. H., Buffalo & Susquehanna, New Orleans Great Northern, Haddon Hall.
Calkins, A. E., New York Central, Young's.
Caton, S. W., Western Maryland R. R., Monticello.
Chamberlain, Eugene, New York Central Lines, Marlborough-Blenheim.
Chamberlain, J. T., Young's.
Chandler, R. D., N. Y. C. & H. R. R., Lexington.
Coleman, J., Grand Trunk Ry., Dennis.
Conniff, P., B. & O. R. R., Lexington.
Copany, Alfred, Grand Trunk Ry., Young's.
Corinth, A. B., A. C. L. R. R. Co., Shelburne.
Covert, M. F., Swift Car Lines, Traymore.
Crawford, D. F., Penna. Lines, Brighton.
Crone, S. A., Dennis.
Cyr, J. W., C. B. & Q. Lines East, Traymore.
Darrach, E. H., Inter-State Car Co., Young's.
Dawson, L. L., Ft. Worth & Denv. City Ry., Brighton.
DeVoy, J. F., Chicago, Milwaukee & St. Paul Ry., Shelburne.
Dooley, W. H., Queen & Crescent, Dennis.
Downing, I. S., L. S. & M. S. Ry., Traymore.
Dunham, W. E., Chicago & Northwestern Ry., Young's.
Dunlap, W. H., Louisville & Nashville R. R., Westminister.
Everett, Ira, L. V. D. R., Dennis.
Finley, J. B., South Pacific of Mexico & Sonori Ry., Chelsea.
Flory, B. P., N. Y., Ontario & Western Ry., Marlborough-Blenheim.
Fogg, J. W., B. & O., Chgo. Ter. R. R., Chalfonte.
Forsyth, Wm., Ry. Age & Gazette, Marlborough-Blenheim.
Gaines, F. F., Central of Georgia Ry., Dennis.
Gainey, J., Queen & Crescent.
Giles, C. F., L. & N. R. R. Co., Chalfonte.
Gommerman, W. K., B. & O.
Gorrell, W. T., Phila. & Reading Ry., Monticello.
Gossett, C. E., Minneapolis & St. Louis R. R., Dennis.
Gould, Jos. E., Norfolk Southern Ry., Dennis.
Green, Herbert, Brighton.
Grieves, E. W., Galena Oil Co., Marlborough-Blenheim.
Hedgcock, E. S., L. & N. R. R. Co., Chalfonte.
Hendry, John, Grand Trunk Ry. System, Traymore.
Hennessey, J. J., C. M. & T. P. Ry., Chalfonte.
Hills, H. S., Louisville & Atlantic R. R., 11 Mt. Vernon Ave.
Hodgson, John L., Grand Trunk Ry., Traymore.
Hogsett, J. W., Am. Line Fort Worth & Dallas, Texas, Lexington.
Johnson, J. O., Southern Ry., Sterling.
Joughins, G. R., Intercolonial Ry., Chalfonte.
Kalbaugh, I. N., Coal & Coke Ry., Haddon Hall.
Kearney, A., N. & W. Ry., Shelburne.
Kellogg, W. L., Pere Marquette R. R., Haddon Hall.
Kinter, D. H., Monongahela R. R., Watkins.
Lentz, John S., Lehigh Valley R. R., Dennis.
McCarthy, M. J., C. C. C. & St. L., Marlborough-Blenheim.
McCuen, J. P., C. N. & T. P. Ry., Dennis.
McFeatters, F. R., Union R. R., St. Charles.
McGrath, J. T., Chicago & Alton Rv., Marlborough-Blenheim.
McRae, J. A., Michigan Central, Chalfonte.
Miller, R. S., N. Y. C. & St. L. R. R., Marlborough-Blenheim.
Montgomery, Hugh, Bangor & Aroostook R. R., Dennis.
Parks, O. J., Penna. Lines, Traymore.
Passmore, H. E., Toledo & Ohio Central Rv., Chalfonte.
Peiffer, Charles E., Buffalo, Rochester & Pittsburgh Rv., Dennis.
Peterson, A. F., Cold Blast Trans. Co., Haddon Hall.
Portner, W. H., Q-C.
Pratt, E. W., Chgo & Northwestern Rv., Marlborough-Blenheim.
Ramage, J. C., Southern Rv., New Berkley.
Ramsdell, T. M., C. & O. Rv., Chalfonte.
Rockfellow, W. E., N. Y. C. & H. R. R. R., Pennhurst.
Rollings, E. O., L. & N. R. R., Westminister.
Russum, T. H., B. & O. R. R., Dennis.
Savanson, Chas. N., A. T. & S. F., Dennis.
Schrover, C. A., Chicago & N. W. Ry., Young's.
Schultz, F. C., Chicago Car Interchange Bureau, Traymore.
Searles, F. I., B. & O. R. R., Marlborough-Blenheim.
Seddon, C. W., Duluth Missabe & Northern Ry., Traymore.
Seidel, G. W., Rock Island Lines, Traymore.
Seley, C. A., Chicago, Rock Island & Pacific Rv., Chalfonte.
Sitterly, W. H., Penna. R. R. Co., Traymore.

Smith, R D., Boston & Albany R. R., Dennis.
Smith, Willard A., The Railway Review, Dennis.
Stark, F. H., Pitts. Coal Co., Chalfonte.
Stewart, Alexander, Southern Ry., Marlborough-Blenheim.
Street, Clement F., Mechanical Engineer, Marlborough-Blenheim.
Taylor, Joe, Sec. M. C. B. Association, Marlborough-Blenheim.
Thiele, Chas. F., P. C. C. & St. L. Ry., Dennis.
Thomas, W. J., Panama Canal, 803 Atlantic Ave.
Thompson, W. O., N. Y. C. & H. R. R., Marlborough-Blenheim.
Tinker, J. H., C. & E. I. R. R., Strand.
Tollerton, W J., Rock Island Lines, Marlborough-Blenheim.
Treleaven, Thos. A., Grand Trunk Ry., Traymore.
Walsh, J. F., C. & O., Marlborough-Blenheim.
White, A. M., Colo. Midland Ry., Traymore.
Wildin, G. W., N. Y. N. H. & H. R. R., Chalfonte.
Wilson, R. D., P. & R. R. R., Monticello.
Wood, L. L., C. & E. I., Young's.
Wright, R. V., Chalfonte.
Wymer, C. J., C. & W. I. R. R. Belt Ry., Traymore.
Young, C. B., C. B. & Q. R. R. Co., Traymore
Young, C. F.

M. C. B. GUESTS.

Alexander, G. H., N. Y. C. Lines.
Allman, W. N., B. & O. R. R., Kenderton.
Beahn, Peter, Penna. R. R., Motley Dean Cottage.
Carey, W. S., Penna. Lines West, Runnell.
Clark, W. S., N. Y. C., De Ville.
Conard, G. P.
Crane, W. F., Bangor & Aroostook, Dennis.
Eddy, W. J., Rock Island R. R., Young's.
Eich, H. C., Ill. Central, Haddon Hall.
Flannagan, Harry, Great Northern Ry. Co., Dennis.
Fletcher, G. A., Traymore.
Gossett, Chas., Jr., Dennis.
Griffith, H. W., Traymore
Hawk, R. R., Cold Blast Transportation Co., Haddon Hall.
Hayes, H. B., Ala. Great Southern, Dennis.
Hutchinson, F. E., Chicago R. & Pac. R. R., Dennis.
Lentz, George, Borton.
Litchfield, J. E., B. & O., Kenderton.
Moore, Ralph P., Duluth & Iron Range R. R. Co., Traymore.
Parker, A. McC., Marlborough-Blenheim.
Quigley, Jos., C. N. O. & T. P. Ry., Dennis.
Robertson, E. J., M. St. P. & S. S. M., Dennis.
Smith, L. K., Wabash.
Staley, P. C., Penna. R. R., Lexington.
Stears, W. C., C. H. & D., New England.
Telford, A., C. N. O. & T. P., Marlborough-Blenheim.
Telford, Master Elliott A., C. N. O. & T. P., Marlborough-Blenheim.
Thomas, Earl B., Panama, 803 Atlantic Ave.
White, F. H., Duluth, Missabe & Northern Ry., Traymore.
Yates, L. L., Pacific Fruit Express Co., Chalfonte.

THE SPECIAL TRAIN FROM CHICAGO.

The M. C. B. and M. M. special train from the West over the Pennsylvania road arrived in Atlantic City yesterday at 2.14 p. m., exactly on time. The equipment consisted of a buffet car, two dining cars and 12 Pullman sleeping cars. The train was in charge of E. K. Bixby, district passenger agent of the Pennsylvania Lines at Chicago. All on board enjoyed the trip. Among the passengers were the following: 235—

J. J. Acker, General Car Foreman C. R. I. & P., Horton, Kan.; W. L. Allison, Franklin Railway Supply Company, Chicago; Hugh S. Adams, Chicago; F. R. Angell, National Malleable Castings Company, Chicago; H. P. Bayley, Pyle-National Electric Headlight Company, Chicago; L. W. Barker, Locomotive Improvement Company, Clinton, Iowa; W. E. Ballentine, Willard Storage Battery Company, Chicago; M. K. Barnum, General Superintendent Motive Power I. C. R. R., Chicago; T. Broom Belfield, Philadelphia; R. L. Brown, National Block Washer Company, Chicago; C. L. Brown, Manning-Maxwell & Moore, Chicago; Geo. H. Bryant, Thomas Prosser & Son, Chicago; W. M. Boughton, Chicago; W. L. Bean, Jacobs-Shupert Company, San Francisco; M. C. Beymer, American Arch Company, Chicago; W. A. Bennett, Griffin Wheel Company, Chicago; J. M. Borrowdale, Superintendent Car Department I. C. R. R., Chicago; W. W. Breckenridge, Mechanical Expert, Galena-Signal Oil Co., Duluth, Minn.; M. F. Covert, Swift Refrigerator Transportation Company, Chicago; W. H. C. Carhart, Illinois Steel Company, Chicago; Mrs. W. H. C. Carhart, Chicago; J. W. Cyr, Superintendent Motive Power, C., B. & Q. R. R., Chicago; Miss Florence Caird, National Boiler Washing Company, Chicago; J. F. Comee, Camel Company, Chicago; E. E. Cook, Railway Journal, Chicago; Geo. R. Carr, Dearborn Drug & Chemical Works, Chicago; R. P. Cooley, Chicago Car Heating Company, Chicago; Geo. T. Cooke, Chicago Car Heating Company, Atlanta; Geo. Condon, A. T. & S. F. Ry., Topeka, Kan.; J. F. DeVoy, Assistant Superintendent M. P., C. M. & St. P., Milwaukee, Wis.; P. J. Duffy, Carpen Appliance Exhibit Building, Chicago; H. E. Daniels, West Disinfecting Company, Chicago; Chas. W. Dake, Consulting Engineer, Chicago; W. E. Dunham, Supervisor M. P. & M. C. & N. W. Ry., Winona, Minn.; W. W. Darrides, Camel Company, Chicago; F. T. De Long, Chicago Railway Equipment Company, Chicago; J. J. Dale, Celfor Tool Company, Chicago; L. L. Dawson, Superintendent Motive Power, Childress, Tex.; W. J. Eddy, Inspector Tools and Machinery, C. R. I. & P., Chicago; Fred. M. Egolf, Curtain Supply Company, Chicago; P. M. Elliott, Camel Company, Chicago; Mrs. P. M. Elliott, Chicago; Henry C. Eich, Master Mechanic I. C., Burnside, Ill.; Harry F. Finney, Independent Pneumatic Tool Company, Chicago; P. J. Ford, Crerar-Adams & Company, Chicago; Mrs. P. J. Ford, Chicago; Harry Flannagan, Great Northern, St. Paul, Minn.; Frank W. Furry, Ohio Injector Company, Chicago; William S. Furry, Ohio Injector Company, Chicago; Chas. Gaspar, National Malleable Castings Company, Chicago; T. P. Gaskins, Gilford S. Wood, Chicago; C. E. Gossett, General Master Mechanic, Cedar Lake Shops, Minneapolis, Minn.; A. S. Goble, Baldwin Locomotive Works, Chicago; E. H. Gold, Chicago Car Heating Company, Chicago; C. A. Hardy, Crane & Foundry Equipment Company, Chicago; P. B. Harrison, Chicago Railway Equipment Company, Chicago; Oscar C. Hayward, Tousey Varnish Company, Chicago; R. R. Hawk, C. B. T. Company, Chicago; J. W. Hathaway, Union Draft Gear Company, Chicago; J. J. Hennessy, M. C. B., C. M. & St. P., Milwaukee; E. R. Hibbard, Grip Nut Company,. Chicago; E. W. Hodgkins, Chicago; Lee P. Hynes, Railway Utility Company, Chicago; P. C. Jacobs, H. W. Johns-Manville Company, Chicago; Emery E. Jett, M. C. B., Morris & Co., U. S. Yards, Chicago; Frank J. Johnson, Car Manufacturers, Chicago; L. F. Jordan, The Texas Company, Chicago; W. L. Kellogg, Superintendent M. P. Pere Marquette, Detroit, Mich.; Henry H. Kerr, Westinghouse, Church, Kerr & Company, Chicago; J. H. Kuhns, Republic Rubber Company, Chicago; E. B. Leigh, Chicago Railway Equipment Company, Chicago; Edwin F. Leigh, Chicago Railway Equipment Company, Chicago; John M. Lammedee, Railway & Engineering Review, Chicago; A. V. Manchester, Galena-Signal Oil Company, St. Paul; R. S. Mitchell, International Correspondence Schools, Chicago; W. N. Mitchell, International Correspondence Schools, Chicago; J. D. Murray, Mining Phosphate, Christmas Island; W. E. Magraw, The Railway List Company, Chicago; O. W. Middleton, Railway Master Mechanic, Chicago; W. S. Mellen, Heath & Milligan Manufacturing Company, Chicago; J. L. McGrath, Superintendent Rolling Stock C. & A., Bloomington, Ill.; Geo. McDonald, Dist. Car Inspector, C. R. I. & P., Kansas City, Kan.; Thomas O'Malley, O'Malley-Beare Valve Company, Chicago; Edward O'Malley, O'Malley-Beare Valve Company, Chicago; Ralph P. Moore, Purchasing Agent Duluth & Iron Range, Duluth, Minn.; C. J. Nash, Universal Draft Gear Attachment Company, Chicago; Wm. J. Pine, Railway Utility Company, Chicago; E. W. Pratt, Assistant Superintendent M. P. & Machinery, C. & N. W., Chicago; Mrs. E. W. Pratt, Chicago; B. Pratt, New York Air Brake Company, Chicago; L. R. Phillips, Nat'l Tube Company, Chicago; Mrs. L. R. Phillips, Chicago; Geo. H. Porter, Western Elec. Company, Chicago; J. D. Purcell, Dearborn Drug & Chem. Works, Chicago; F. H. Quail, Karpen Appliances Exhibit Bldg., Chicago; N. F. Rehm, Railway Supply Index-Catalogue, Chicago; J. T. Ross, Adams & West-

lake Company, Chicago; John J. Ross, U. S. Metal & Manufacturing Company, Chicago; E. J. Robertson, Superintendent Car Department, Minneapolis; Mrs. E. J. Robertson, Minneapolis; Harold A. Smith, Railway & Engineering Review, Chicago; Willard A. Smith, The Railway Review, Chicago; F. B. Smith, Bullard Machine Tool Company, Chicago; H. N. Scott, Griffin Wheel Company, Chicago; C. W. Seddon, Superintendent Motive Power and Cars, D. M. & N., Proctor, Minn.; F. C. Schultz, Chief Interchange Inspector, Chicago; Robert T. Scott, Independent Pneumatic Tool Company, Chicago; W. T. Sears, M. M., C. H. & D., Indianapolis; Edward C. Schmidt, University of Illinois, Urbana, Ill.; W. T. Simpson, S. F. Bowser & Company, Chicago; C. A. Seley, Master Mechanic, C. R. I. & P., Chicago; W. J. Schlachs, McCord & Company, Chicago; W. E. Sharp, Grip Nut Company, Chicago; Charles N. Swanson, Superintendent Car Shops, A. P. & S. F., Topeka, Kan.; John Tonge, Hotel Dennis, Minneapolis; H. A. Varney, National Boiler Washing Company, Chicago; E. V. Van Patten, Murphy Varnish Company, Chicago; G. N. Van Sweringen, Chicago Railway Equipment Company, Chicago; Arthur Wyman, Chicago Railway Equipment Company, Chicago; Mrs. Arthur Wyman, Chicago; D. O. Ward, Clinch Nut Company, Chicago; A. M. White, Foreman Car Department, Colorado City, Colo.; Ed. Wilhelm, Boss Nut Company, Chicago; Edward Wray, Railway Electric Engineer, Chicago; W. White, National Boiler Washing Company, Chicago; Mrs. W. White, Chicago; Charles J. Wymer, General Car Foreman Belt Railway, Chicago; W. G. Willcoxson, Grip Nut Company, Chicago; Harry S. Whitehair, McCord & Company, Chicago, A. C. Woods, Union Spring & Manufacturing Company, Chicago, F. H. White, Purchasing Agent, D. M. & N., Duluth, Minn.; L. L. Yates, Superintendent Car Department, P. F. E. Company, Los Angeles, Cal.; C. B. Young, Mechanical Engineer, C., B. & Q., Chicago; Mrs. C. B. Young, Chicago.

During 1910 more or less complete surveys were made for the line from Sinyang, on the Peking-Hankow line in the southern portion of Honan province, China, to Fungyang, one of the principal points on the Tientsin line in Anhwei province. This line is projected by the board of communications at Peking, but no announcement has been made as to when the work will be pushed to completion. No work has been done, other than surveys.

STEEL UNDERFRAME TANK CAR.

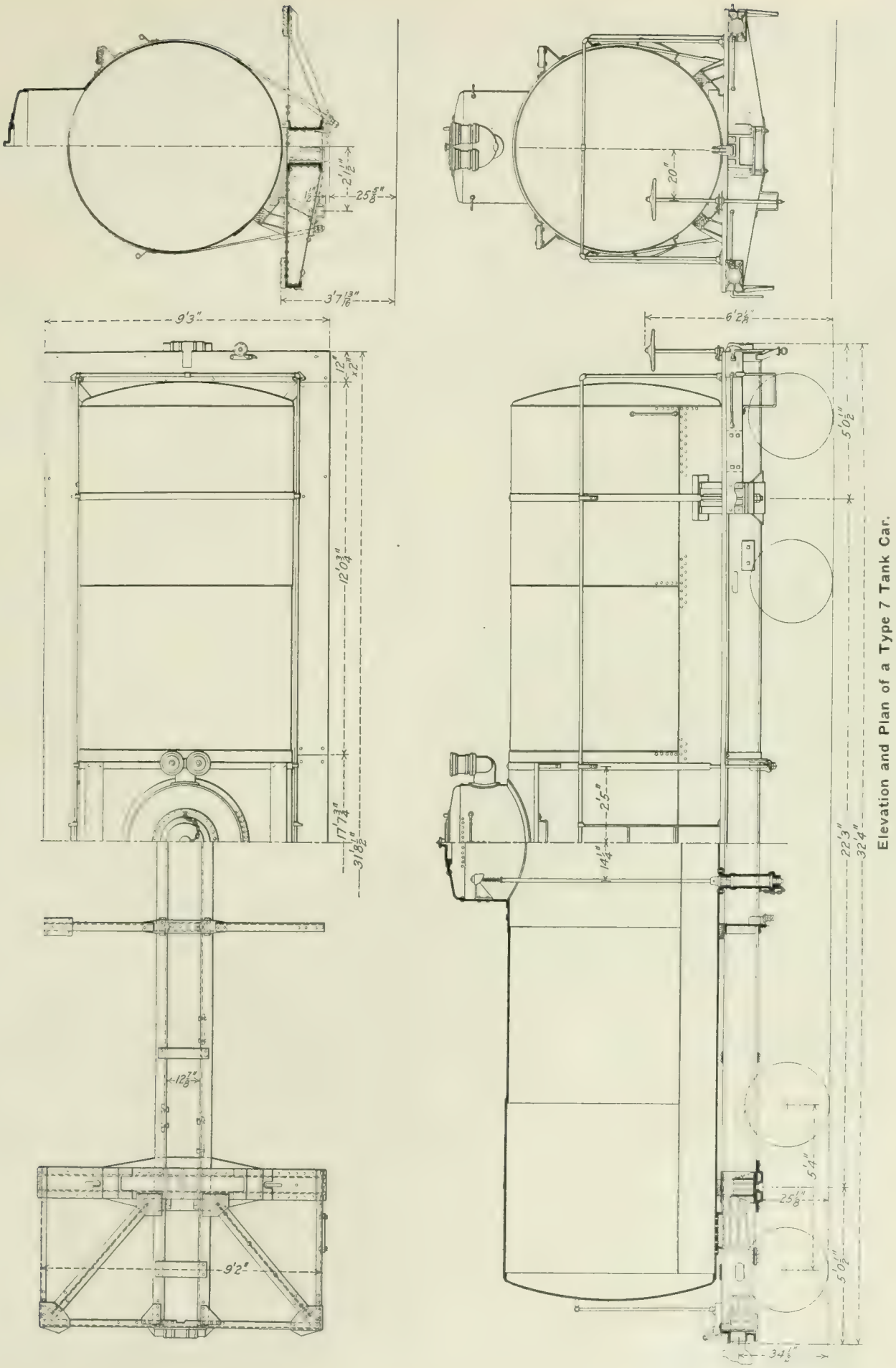
The American Car & Foundry Company, New York, has recently made some new designs of steel underframe tank cars, which are called the type 7 tank cars. These cars are designed to meet the present requirements of the M. C. B. Association, as well as of the Interstate Commerce Commission. The special feature is that of the tank anchor blocks, which are of cast steel and are riveted to the tank immediately ahead of the bolster, fitting tightly between an extension of the cast steel bolster center filler and the back of the friction block of the draft gear. In this way the tank is prevented from shifting and the expansion of the tank and underframe are duly allowed for. With this construction the buffing strains are considerably reduced.

The cars are equipped with the standard friction type of draft gear and the drawbar pull is nearly on a line with the center line of the center sills. The end platforms consist of 2-in. x 2-in. southern pine plank bolted to the sills. Low runways of southern pine are placed on each side of the car, securely bolted to the runway braces, the body bolsters and the side sills. They are provided with a ¾-in. iron pipe hand rail extending entirely around the tank. The dome may be reached on each side of the car by a ladder which extends from the runway to the hand rail, immediately above which is a dome step supported by brackets riveted to the tank bands.

The underframe is the American Car & Foundry standard and consists of 6-in. channel side sills extending from the end sill to the bolster. The center sill is made of two 13-in. steel channels, each having a sectional area of 15 sq. in. and extend the full length of car, being tied together between the bolster and the center of the car by ½-in. top and bottom tie plates. In addition to these tie plates the center sill channels are tied together and stiffened by two cross bearers which act as the running board supports. They consist of top and bottom members passing respectively over and under



Type 7 Tank Car.



Elevation and Plan of a Type 7 Tank Car.

the center sill with pressed steel diaphragms fitting in between them. The end sills are 5-16 in. pressed diaphragms connected to the side sills by malleable iron push pole pockets and to the center sill by cast steel striking plates, pressed steel knees and gussets. The body bolster consists of two ⅜-in. pressed steel web plates which are reinforced on the top by a 12-in. x ½-in. plate and on the bottom by a 20½-in. x ⅜-in. plate. The center plates are cast steel and are riveted to the bolster. Forged side bearings are bolted to the bolster so that the clearance may be adjusted and are reinforced at this point by forged struts extending up between the webs of the bolster. On top of the bolster and riveted to the cover plate and flange of the web is placed a malleable iron cradle to which are bolted the oak liner blocks that support the tank.

The car is equipped with automatic freight car air and hand brakes. They are mounted on standard freight car trucks and have an unusually low center of gravity. The American Car & Foundry Company is prepared to furnish tank cars of this type of from 6,000 to 12,500 gallons and of 6,000, 8,000 and 10,000 lbs. capacity.

THE NEW YORK SPECIAL TRAIN.

A special train on the Central of New Jersey brought a party for the conventions from New York City yesterday afternoon. The train consisted of a baggage car and four parlor cars. It left New York at 3.40 p. m. and arrived in Atlantic City at 6.45 p. m. Among those who came on it were the following:

Fred Atwater, Columbia Nut & Bolt Company; Henry Bartlett, M. S., Boston & Maine; W. M. Perrine, wife and son, M. M., C. R. R. of N. J.; W. A. Best; H. F. Birkel, New York Air Brake Company; Geo. L. Bourne and wife, Locomotive Superheater Company; E. G. Buchanan, Carbon Steel Company; J. H. Burwell; F. W. Chaffee and wife, General Car Inspector, N. Y. C. & H. R.; C. E. Chambers, wife and daughter, S. M. P., C. R. R. of N. J.; J. S. Chambers and wife, S. M. P., A. C. L.; J. H. Clark, wife and daughter, S. M. P., Staten Island Rapid Transit; G. G. Davis, General Foreman Car Department, C. C. C. & St. L.; W. Eckels, Standard Coupler Company; R. D. Gallagher, Jr., Standard Coupler Company; Wm. J. Grinden, Grinden Art Metal Company; W. H. Hall, Chief Inspector, C. R. R. of N. J.; Karl A. Heine, Pittsburgh Spring & Steel Company; Wm. T. Henry, New York Air Brake Company; L. J. Hibbard, R. B. Steele, R. P. Orcutt, Churchhill Clark, C. Truesdale, L. J. Hibbard Company; John M. High, Pantasote Company; S. Hoffman and wife, Locomotive Superheater Company; D. P. Lamoreux, Beaver Dam Malleable Iron Company; J. W. Marden and wife, Superintendent Car Department (retired); B. & M.; P. P. Mirtz and wife, Mechanical Engineer, L. S. & M. S. Ry.; O. H. Morgan, Chicago Varnish Company; John P. Neff and wife, American Arch Company; Fred. L. Olds, Chicago Varnish Company; O. H. Reynolds, wife and sister, Wm. Jessop & Sons; George W. Rink and wife, Mechanical Engineer, C. R. R. of N. J.; E. J. Ronan, Gold Car Heating & Lighting Company; E. T. Sawyer, Commercial Acetylene Company; F. H. Smith, Gold Car Heating & Lighting Company; Harry D. Vought and wife, Miss Mary Evelyn Dorrler, Secretary N. Y. R. R. Club; R. H. Weatherly and wife, The Pilliod Company; F. M. Whyte, New York Air Brake Company.

PRESSURE ON JOURNAL-BEARING WEDGES.

To the Editor of the Daily Railway Age Gazette:

The accompanying table, prepared in our office, illustrates the effect of different widths of wedges in different sizes of journal boxes.

The wedge, due to its crowned surface, has theoretically, a line contact with the ceiling of the box, which makes necessary a comparison of the load per lineal inch width of the wedge.

You will note there is 1600 lbs. per lineal inch on the 20-ton wedge, which is 4 5 in. wide, and 2115 lbs. on the 30-ton wedge, which is 4.875 in. wide. If the width of the 30-ton wedge is correct for that load, the 20-ton wedge should be 3.41 in. wide instead of 4.5 in.; or, if the width of the 20-ton wedge is correct, the width of the 30-ton wedge should be 6.45 in. Again there is 2450 lbs. per lineal inch on the 40-ton wedge, which is 5.625 in. wide. Assuming this to be correct, the 30-ton wedge instead of being 4.875 in. wide would have to be 4.2 in. wide, and the 20-ton would have to be 2.94 in. wide instead of 4.5 in, or if the 20-ton wedge is correct, the 40-ton wedge would have to be 8.63 in. wide, and if the 30-ton wedge is correct, the 40-ton wedge would have to be 6.54 in. wide. In each case the widths of the wedges used, are underlined, the 20, 30, 40 and 50 tons being M. C. B. standard capacities. The three different widths of wedges of the 70-ton are various designs now being used.

The point we wish to bring out is that the load has been increased from 1600 lbs. to 3398 lbs. per lineal inch on wedges. There has been considerable trouble with the 50-ton wedges, with a load of 2800 lbs. per lineal inch, seating in the top of the boxes. In fact, one railway has gone to the extreme of attempting to put a steel insert at this point in grey iron boxes to increase the length of time the wedges in 5½ in. x 10

Cap. of Car Lbs.	Weight of Car Less Wheels & Axles	Weight on Journal Car Loaded	Size Journal	Dimensions of Brass in Contact	Projected Area Brass Sq. In.	Load Per Sq. In. on Brass	Width of Wedge	Load Per Lineal Inch on Wedge	WIDTH OF WEDGES						
									20-Ton	30-Ton	40-Ton	50-Ton	70-Ton		
													B. & O. Penn	Harriman	McCord Std.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	20	360	4.5"	[illegible]	4.5"	3.41"	2.94"	2.57"	2.18"	[illegible]	2.72"
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	24	429	4.875"	[illegible]	6.45"	4.875"	4.2"	3.68"	3.26"	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2450	8.63"	6.54"	5.625"	4.94"	[illegible]	4.06"	5.21"
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	44	327	6.125"	2800	10.7"	8.1"	6.98"	6.125"	5.41"	5.03"	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	49½	455	[illegible]	3157	14.06"	10.63	9.2"	8.03"	7.125"	[illegible]	8.500"
[illegible]	[illegible]	[illegible]	Harriman	[illegible]	49½	455	6.625"	3398	14.06"	10.63"	9.2"	8.03"	7.125"	6.625"	8.500"
70	[illegible]	[illegible]	M. C. B. Std.	[illegible]	49½	455	8.500"	2647	14.06"	10.63"	9.2"	8.03"	7.125"	6.625"	8.500"

Note—Underlined figures show present M. C. B. width of wedge, and widths of wedges shown in same column indicate what the width would be if same proportionate bearing were given to the other sizes.

in. boxes are adjustable. We have never heard of any wedges seating trouble in the 40-ton boxes, from which it is fair to assume that some place between the loading per lineal inch of the 40- and 50-ton boxes should be determined on and that loading used on journal boxes of future design.

You will note, if we assume the 40-ton wedge is correctly loaded, the wedge in 6 in. x 11 in. boxes would have to be 9.2 in. wide instead of 6.625 in. and 7.125 in. as in the two present designs. We have assumed a load of 2647 lbs. per lineal inch in designing the wedge 8.5 in. wide.

McCord & Company.

FOREIGN RAILWAY NOTES.

Of the 5,404 miles of railway actually in operation in China, 2,433 miles are in what may be termed the Manchurian division. About two-thirds of the roads operated are Japanese and Russian. In this portion of China, railway construction has been hastened in recent years for a number of reasons. The general aspect of the railway situation in Manchuria has changed comparatively little in the past year. The Kirin-Hoiryong line was held in abeyance until the completion of the Kirin-Changchun line. During 1910 work was continued with little interruption, and on the whole it has been successful. The line is constructed by Chinese and Japanese interests, each furnishing half the capital; but the railway will have comparatively little traffic until the Hoiryong extension via Kirin and Omoso to the Chientao district and the banks of the Tumen is built. A branch line will run from there to the port of Hungchun, and Japanese owners of connecting lines plan to connect with their harbor of Chyongjin in northern Korea. During 1910 surveys of the Kalgan-Suiyuan-Kweihuangcheng line were made under the direction of the Chinese government and work is being carried on rapidly. The railway is to open up a part of China now practically unknown to the outside world. It is promised that the road will be running as far as Tienchen this summer. It is planned to extend the line to Urga and Kiahtka and it may therefore form a link between Peking and the Trans-Siberian railway, which will reduce the transit period between Europe and the Chinese capital by about two days.

The construction of small lines and connectors of the larger lines in the central portion of China seems to be almost entirely suspended. The reason in almost every case appears to be a lack of funds on the part of the Chinese promoters and an unwillingness to place loans abroad. Thus, in the case of the proposed line from Nanking or Wuhu to the sea at Ningpo by way of Hangchow, a company was formed at Wuhu some years ago with the title Anhwei Railway Company, for the purpose of constructing a line from Wuhu to the town of Kwangtechou, near the frontier of Chekiang province. Work was commenced in 1906. Up to date all that has been accomplished is the construction of the embankment as far as the village of Wanchih, some 30 miles from Wuhu, and the construction of two or three single-track bridges in that section. The site of the future terminus, on the foreign settlement at Wuhu, has not even been filled in. A few trolley lines and dumping wagons, with some piles of sleepers, are the only indication that railway construction is, or has been, in progress. No machinery, rolling stock, or other requisites of a railway have been imported, and so far as known, none has been ordered. The progress made in 1910 is represented by the dumping of several thousand cubic yards of filling on the site of the terminus at Wuhu. As regards the future, more activity is promised, owing to the return to China of Lord Li Ching-fang, formerly Chinese minister in London. Lord Li was one of the original promoters of this line.

Conventionalities.

"Bureau of Information" sounds good; but where, oh where can it be?

The dynamometer car used in making all of the tests was in charge of Isaac Simpson.

J. P. McCuen, former superintendent of motive power of the Queen & Crescent, is in Atlantic City renewing friendships among many of his former co-workers.

The familiar and always welcomed presence of Franklin P. Stoy, for many years mayor of Atlantic City, will be missed this year. Mayor Stoy passed away July 22, 1911.

We are dee-lighted to see that prince of industry, A. C. Moore, general manager of the Safety Car Heating & Lighting Company. Mr. Moore looks well and natty, as usual.

J. A. Middleton, vice-president of the Lehigh Valley in charge of operation, is at the Marlborough-Blenheim with his family. He expects to go back to New York on Saturday.

William Miller, who was to have served on the entertainment committee, found at the last moment that, owing to the pressure of business, he would be unable to attend the conventions this year.

Beau Brummel and his artistic successors have all got to take their hats off to Frank T. Hyndman, of oil storage fame. The Nile green tie with amethyst cross bars which he affects is the last sartorial word.

One of the early callers at the office of *The Daily* was Stephen C. Mason, of the McConway & Torley Company. In his haste to get away, however, he forgot to leave a cigar for the editor.

Mr. and Mrs. Robert Alter arrived on Sunday evening and are stopping at the Hotel Dennis. Mr. Alter is connected with the American Tool Works and has recently been given charge of the export business, with the title of European manager.

Among the first to get here were Mr. and Mrs. D. C. Noble. As usual, they are staying at the Marlborough-Blenheim. Mr. Noble was recently confined to his home for some weeks by a severe attack of bronchitis; but no one would suspect it to look at him now.

One of those who will be missed by visitors to the office of *The Daily* is John N. Reynolds, western manager. In point of years of attendance at these annual gatherings, Mr. Reynolds is one of the "old guard." This would have made his thirty-seventh year.

Once again it is our pleasure to record Scott Blewett as among the first to arrive. Mrs. Blewett is with him and they are staying at the Marlborough-Blenheim. The glad hand as extended by Mr. Blewett certainly makes one feel that life is well worth living.

H. S. Hayden, who, with Mrs. Hayden, is staying at Chalfonte, has not led quite as strenuous a life during the last year as has his co-worker, Mr. Evans; but he, too, has resolved to devote some of his time to enjoying the air and pleasures that Atlantic City and the convention afford.

The year 1911 chronicled the death of Fred. A. Casey, of the Ashton Valve Company. Mr. Casey was the efficient chairman of the executive committee of the railway supply men for the conventions of 1900-01. Many of those who attend the conventions this year will speak in loving memory of genial Fred Casey.

Hats off! to Albert Waycot. He surely must have been a popular officer of the Supply Men's Association; for

according to the official program of entertainment and general information booklet, Mr. Waycot was president of the Supply organization "1889-1900," a period of eleven years.

Through the process of elimination, often practiced at political and other conventions, Heap Big Chief Johnson was deposed as head of the entertainment committee. But you can't down Johnson. He has reappeared this year in a dual capacity—a member of the executive committee and chairman of the exhibit committee.

J. Alexander Brown tried to force an entrance to the pier on Tuesday morning by flashing a badge that he wore at the International Railway Congress in Switzerland in 1910. It didn't work, however, because the doorman mistook the badge for an advertising dodge of a concern that makes adhesive plaster and kindred articles.

One of the early arrivals, and a welcome one, was E. S. Hedgcock, a member of both associations. Mr. Hedgcock is assistant to the superintendent of machinery of the Louisville & Nashville, at Louisville. Mrs. Hedgcock and daughter, Miss Mary Hedgcock, are with Mr. Hedgcock. They are stopping at the Chalfonte.

J. W. Fogg, master mechanic of the B. & O., Chicago Terminal, arrived Sunday in advance of even the "advance guard" of railway men. He was accompanied by Mrs. Fogg and is stopping at the Chalfonte. Mr. Fogg says he does not relish the separation, even for a short time, from his little daughter, who was born just before the convention last year.

W. F. Walsh, air brake inspector of the Chespeake & Ohio, will attnd the meeting of the Master Mechanics' Association. Mr. Walsh has been in charge of the extensive series of tests that have been made with the new locomotives of the Mallet, Mountain and Mikado types, which have given such splendid results in sustained capacity.

Mr. and Mrs. J. F. Deems arrived at the Marlborough-Blenheim on Monday afternoon. They motored down from New York. Mr. Deems was president of the Master Mechanics' Association in 1906, but this year, as president of the Ward Equipment Company, he again appears in the ranks of the supply-men, after an interval of ten years. His appearance clearly indicates that he finds his new work very agreeable.

A. Stewart, president of the Master Car Builders' Association and general superintendent motive power and equipment of the Southern Railway, reports a busy year on that road. The peach crop, which was practically a failure last year, promises to be exceptionally heavy this year. It will be necessary to move it within the next six weeks or two months, so that there will be a more or less heavy tax on the equipment during that period.

Ambrose Swasey, of The Warner & Swasey Company, with Mrs. Swasey, is staying at the Marlborough-Blenheim. Mr. Swasey entertained the members and guests of the American Society of Mechanical Engineers at dinner at the Union Club, Cleveland, on Thursday evening of last week. He will leave Atlantic City on Monday to attend a meeting of the nominating committee of the American Society of Mechanical Engineers in New York.

Our care-free friend, Harry W. Finnell, report says, is an entrant for national golf honors in the amateur championship to be held this summer on the Wheaton links, at Chicago. His many friends hope he will be among the leaders when the final scores are announced. And well may their expectations be attained to the highest pitch; for Harry, in recent practice, drove a golf ball so far and so true that friction has arisen between the United States army and navy, the navy wanting him as a dreadnaught and the army for a coast defense.

C. A. Schroyer, superintendent car department of the Chicago & Northwestern, appeared at the registration desk bright and early yesterday and was granted a special dispensation in order that he might have the privilege of paying his dollar and getting his button. Some delay was experienced in getting the secretary's records from the express office; and, except in the case of a few of the notables, such as Mr. Schroyer, the opening of the registration of railway men was delayed.

"Meet Me at the Fountain" may (?) prove a popular phrase on the pier this year, provided the management will live up to the efforts of the artist who sketched the "ice water" sign over the new sanitary dispensary of liquid refreshments. Just now its temperature, together with its proximity to the fish tanks, are apt to make one suspicious of its source. However, sanitation is sure desirable at any cost; so don't get peeved if you get your nose wet when first you try, but cultivate the art of sipping gracefully from the crest of the sparkling bubble.

J. F. Walsh, general superintendent of motive power of the Chesapeake & Ohio, arrived on Monday, accompanied by Mrs. Walsh and Miss Mary Walsh. They are stopping at the Marlborough-Blenheim. Mr. Walsh has a Mikado type locomotive which he is willing to match against all comers. It is hauling trains of 110 and 112 cars weighing 7,740 tons at speeds up to 15 miles an hour on 0.3 per cent. grades. If anyone has a non-articulated locomotive that is doing better than this in freight service, or better than the mountain type in passenger service, Mr. Walsh would be glad to compare notes with him.

Mr. and Mrs. R. J. Evans are staying at Chalfonte. It is Mr. Evans' idea to dilute business with a liberal percentage of pleasure. During the last year and a half Mr. Evans has had two narrow escapes from death. The first was an accident to his automobile on the road between Franklin, Pa., and Chautauqua, N. Y., when he was thrown out and injured severely. In the other accident he was thrown from a railway inspection car and badly bruised and cut on the face and head. To prove his staying qualities, he fooled everyone by getting well; and by way of diversion he planned and supervised the building of a new asbestos plant.

Charles F. Giles, superintendent of machinery of the Louisville & Nashville, Louisville, Ky., who has not attended the conventions since the gatherings at Lakewood, New York, in 1893, arrived Tuesday and registered at the Chalfonte. He is accompanied by Mrs. Giles and daughter, Miss Margaret Giles. These are the first M. C. B. and M. M. conventions attended by Mrs. Giles and Miss Giles. Mr. Giles is a member of both the M. C. B. and M. M. Associations and his presence at the meetings will be very welcome. Five Pacific type locomotives, designed and built at the Louisville shops under Mr. Giles' direction, have recently been placed in service. These locomotives are equipped with superheaters and brick arches and are being used on the heavy high-speed passenger trains with exceptionally good results. The Louisville & Nashville is building at its own shops all of its motive power and rolling stock, including the steel underframes for passenger coaches.

"Mine Host" Albert T. Bell, of Chalfonte, well known to conventionites, and who labored successfully with other prominent business men of Atlantic City to bring the M. C. B. and M. M. gatherings here in 1906 and subsequent years, has had two eventful experiences during the past year. On July 5 he occupied the passenger's seat with aviator Harry Atwood in an aeroplane flight along the ocean-front of Atlantic City. It was a most successful flight in spite of a twenty-five mile wind. In making the landing on the beach opposite the Brighton Casino the large audience was thrilled by witnessing a five-hundred foot volplane of the machine to a safe landing at the water's edge. "Mine Host" Charles D. White, of the Marlborough-Blenheim, shared also in the honors of the day by making a

flight with birdman Atwood. Mr. Bell's other experience was his taking a leading part in the rescue from the ocean off Atlantic City of Melvin Vaniman and crew in the dirigible airship "Akron."

David Holtz, for more than 30 years master of machinery of the Western Maryland, was for many years a familiar figure at these conventions. His death on May 30 last was not wholly unexpected, because he had been seriously ill for some weeks; but the end was sudden. He was bright and hopeful to the last, and had been looking forward to again meeting his old associates. Mr. Holtz was made of the kind of timber that was used to build the foundation of this country. He was well educated, and worked his way up from the bottom. At the outbreak of the civil war Mr. Holtz enlisted in the Union Navy as a marine engineer and served under Admiral Farragut through the four years' conflict. He took part in the battle of Mobile Bay and the siege of Fort Fisher. Physically, Mr. Holtz was slight and wiry; but his mind was broad and his disposition sweet and retired. His home life was a model for simplicity and happiness and those of us who were privileged to know his wife and daughters will at once recall the happy group of four who enjoyed every minute of their time at these annual gatherings. The two Misses Holtz and a son survive.

Toil has its compensations. Some of them are unique. A. W. Whitford got on the ground early last week with his two accordion-pleated baby fireboxes and proceeded to pose them. One of the boxes tips the beam at eight tons and the other at ten. No wonder, then, that A. W. exhibited external signs of nervousness when, at the fag end of a day, he put a jack under his favorite, the ten-tonner, and after working the lever a number of times noticed that the firebox didn't "hist." A few more strokes at the lever and it was observed from a perspective inspection that the floor had become sway backed. At four o'clock the following morning Contractor Lane found Whitford under the pier with one arm over a stringer and the rest of his anatomy coiled around a steel pile, assiduously examining the accordion pleats on the underside of the flooring. After some questioning it was learned that the early visit, all alone, was planned with the deliberation to learn whether a wireless "firebox at the bottom of the Atlantic" would have to be sent home if that jack handle was given another pull. Right here Conway emerged from behind another pile and a consultation followed. The result was that all three went above and, after some modifications of *modus operandi*, the obstreperous boiler plate was positioned. To add to the difficulty of the work, it was necessary to install the exhibit on a slanting floor and the finished effect is a little off perpendicular. It would be the "unkindest cut" if someone unacquainted with all these facts noticed aloud in the presence of the erectors that the front end seemed to have settled a little. We trust this publicity will restrain any such words.

The Chinese government, under the administration of Tang Shao Yi in the railway and communications department, planned a complete system of railways, connecting the various commercial centers of the empire. This plan included the construction of one or more railways from the present Peking railway system to connect with the Trans-Siberian railway near Lake Baikal or farther west, and thus cut off about two days in the journey from Europe to Peking and points south; a railway into Mongolia, another into Tibet, and still another into Kokonor. Tang Shao Yi urged the construction of the system across Shansi and Shensi, the system parallel to the Yangtze river, the connection between the Yangtze and Yunnan rivers, the Canton-Hankow line. Though these railways are still a matter of the future, it is highly probable that they will be built as quickly as circumstances will permit.

The Exhibit.

The Parkesburg Iron Company, Parkesburg, Pa., is erecting an addition, 175 ft. long, to its tube mill building, making the total dimensions 85 ft. x 800 ft. This enlargement was necessary to enable the furnaces to operate at full capacity.

The Pilliod Company, New York, last January increased the capacity of its works at Swanton, Ohio, so that, although it could previously only make 15 gears a month by working full time, in April it was able to ship 68 gears by working 13 hours a day, and in May, 65 gears. Plans are now under way to double the present capacity.

The Storrs Mica Company, Owego, N. Y., in addition to its mica headlight chimneys and lantern globes, is showing a new type of hose clamp, which is made in two pieces and is therefore easily removed from old hose without damage. This clamp is capable of repeated use, and it is claimed that a decided economy results from its use. The Storrs company has been made the general sales agent of this clamp.

The Ralston Steel Car Company, Columbus, Ohio, has been rebuilding its plant and making large additions. This work has almost been completed. The main shop has been remodelled, enlarged and equipped with new machinery. The building is now of all steel construction with asbestos corrugated roof, improved ventilators, skylights and other facilities. Additional traveling cranes, electric hoists, etc., have been installed in various departments, and the capacity of the shops has been increased so that 40 freight cars a day can now be turned out. This company, in addition to freight cars of all classes, makes steel underframes for cars and also furnishes miscellaneous parts for all kinds of repairs.

LOCOMOTIVE SUPERHEATER PROGRESS.

During the interval between the conventions of 1910 and 1911 the number of locomotives using highly superheated steam increased from about 6000 in all countries to approximately 9000. About 1000 of this increase was on American railways, which practically doubled the number in service in this country. The past year has shown an increase in the total number of superheaters in service in all countries of over 4000, making the total number in service at the present time between 13,000 and 14,000. Of this number over 2000 were applied to American locomotives, thus repeating the history of the previous year by adding 100 per cent to the number of locomotives equipped with superheaters in this country.

A notable feature in this increase in the number of superheaters applied to locomotives in the past year has been that the fire tube type has been adopted practically unanimously and of the fire tube type the top header design has been used to the almost total exclusion of all other designs. The probable reason for this practice is that the top header fire tube type superheater adapts itself most perfectly to the conditions and to best meet the requirements of simplicity in construction and design, accessibility for the maintenance parts of the locomotive adjacent to it, efficiency in operation, continuity of service and low maintenance costs. This design of superheater consists of an integral header located in the upper part of the smokebox, where it in no way obstructs the front end or interferes with the maintenance of the boiler flues. It is designed to reduce the wire-drawing effect of the steam to the minimum and the arrangement of superheater pipes in the large boiler flues is such that they are easily accessible and removable, and so constructed that the unequal expansion caused by the difference in temperature as the steam passes through them will be taken care of. A set

of superheater flues is located in the upper part of the boiler where the temperature is highest and the tendency toward clogging is least. This design of superheater furnishes steam continuously at a temperature from 600 to 650 deg. F., while the engine is working.

The remarkable progress that has been made in the application of highly superheated steam to locomotives in this country is shown by the following list of the users of the fire tube type of superheater.

Statement of superheaters ordered from the Locomotive Superheater Company up to June 1, 1912. "In service" includes all superheater equipment delivered to railways. "Under construction" includes all superheaters on order and not delivered:

Railway.	Superheater Locomotives In Service.	Under Construction.	Total.
Algoma Central & Hudson Bay	10	5	15
Algoma & Eastern	..	2	2
Ann Arbor	2	3	5
Atchison, Topeka & Santa Fe	5	50	55
Atlanta, Birmingham & Atlantic	..	10	10
Atlantic Coast Line	..	20	20
Baldwin Locomotive Works	..	50	50
Baltimore & Ohio	72	5	77
Bingham & Garfield	3	1	4
Boston & Albany	11	..	11
Boston & Maine	1	..	1
Buenos Ayres	2	..	2
Buffalo, Rochester & Pittsburgh	12	1	13
Canadian Northern	116	..	116
Canadian Pacific	947	133	1,080
Central of Brazil	10	..	10
Central of Georgia	6	..	6
Central of New England	..	15	15
Central of New Jersey	1	..	1
Central Pacific	..	8	8
Charleston & Western Carolina	..	2	2
Cheseapeake & Ohio	30	49	79
Chicago & Alton	30	..	30
Chicago & Eastern Illinois	10	..	10
Chicago & North Western	165	5	170
Chicago, Burlington & Quincy	4	..	4
Chicago Great Western	4	10	14
Chicago, Indianapolis & Louisville	11	19	30
Chicago, Indiana & Southern	8	6	14
Chicago, Milwaukee & St. Paul	37	140	177
Chicago, Rock Island & Pacific	50	50	100
Chicago, St. Paul, Minneapolis & Omaha	18	..	18
Chicago, Terre Haute & Southeastern	..	5	5
Cincinnati, New Orleans & Texas Pacific	5	..	5
Cleveland, Cincinnati, Chicago & St. Louis	104	36	140
Cuba Railroad	13	..	13
Cumberland Valley	1	1	2
Delaware & Hudson	9	12	21
Delaware, Lackawanna & Western	6	25	31
Duluth, South Shore & Atlantic	2	..	2
Duluth, Winnipeg & Pacific	10	..	10
Elgin, Joliet & Eastern	..	1	1
El Paso & Southwestern	20	..	20
Erie Railroad	46	..	46
Florida East Coast	5	..	5
Grand Trunk	9	..	9
Grand Trunk Pacific	40	..	40
Great Northern	22	..	22
Hocking Valley	..	7	7
Illinois Central	126	..	126
Imperial Government Railway of Japan	36	..	36
Imperial Pekin-Kalgan	..	2	2
Imperial Taiwan Railway of Formosa	..	3	3
Intercolonial Railway	5	..	5
Kanawha & Michigan	10	..	10
Kansas City Southern	20	..	20
Lake Erie & Western	8	7	15
Lake Shore & Michigan Southern	173	61	234
Lehigh Valley	1	22	23
Louisville & Nashville	13	25	38
Maine Central	9	..	9
Manila Railway	..	10	10
Michigan Central	35	30	65
Minneapolis, St. Paul & Sault Ste Marie	37	5	42
Missouri, Kansas & Texas	7	..	7
Missouri, Oklahoma & Gulf	..	5	5
Missouri Pacific	65	15	80
Mobile & Ohio	6	4	10
New Orleans, Mobile & Chicago	..	12	12
New York Central	360	85	445
New York, Chicago & St. Louis	4	..	4
New York, New Haven & Hartford	21	..	21
New York, Philadelphia & Norfolk	1	..	1
New Zealand Government	14	..	14
Norfolk & Western	27	31	58
Northern Pacific	99	..	99
Oregon Short Line	..	30	30
Oregon, Washington R. R. & Navigation Co.	..	15	15
Pacific Railway	3	..	3
Pennsylvania	80	37	117
Pennsylvania Lines West	28	..	28
Peoria & Eastern	..	10	10
Pere Marquette	30	..	30
Philadelphia & Reading	1	..	1
Philadelphia, Baltimore & Washington	..	1	1
Pittsburgh & Lake Erie	5	6	11
Purdue University	1	..	1
Rutland Railroad	6	5	11
St. Louis & Hannibal	..	1	1
St. Louis & San Francisco	33	..	33
St. Louis & Southwestern	..	18	18
Seaboard Air Line	2	..	2
Southern Railway	60	5	65
Southern Pacific	..	57	57
South African Government Railway	16	..	16
Temiskaming & Northern Ontario	..	4	4
Terminal Railways of St. Louis	..	15	15
Toledo & Ohio Central	1	11	12
Toronto, Hamilton & Buffalo	3	4	7
Union Pacific	..	40	40
Vandalia	4	..	4
Virginian	9	5	14
Virginia & Southwestern	7	..	7
Wabash, Pittsburgh Terminal	1	..	1
Western Maryland	1	24	25
Western Railway of Havana	2	..	2
Total	3,226	1,279	4,505

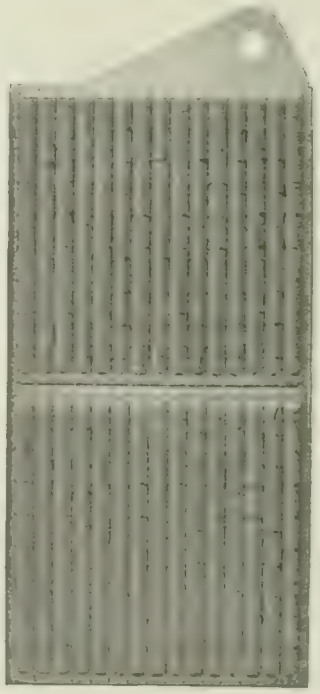
EDISON STORAGE BATTERY FOR TRAIN LIGHTING.

The statement has been made by the Edison Storage Battery Company, Orange, N. J., that at least ten years of service should be obtained from the storage batteries in car lighting service, with little or no depreciation in capacity. These batteries are compact, requiring a comparatively small amount of space; are free from chemicals and electrical troubles and are practically indestructible.

The old type storage battery, with which all car-lighting men are familiar, consists of lead plates immersed in sulphuric acid. The Edison Storage Battery plates consist of nickelled steel frames with the active material enclosed in perforated nickelled steel tubes and pockets, instead of being formed on the surface of the plates. The active materials are nickel hydrate and metallic iron. The elec-



Positive Electrode Tube.



One of the Positive Electrodes.

trolyte is a solution of 21 per cent. potassium hydrate with a small amount of lithium hydrate. The elements are placed in a nickelled steel container.

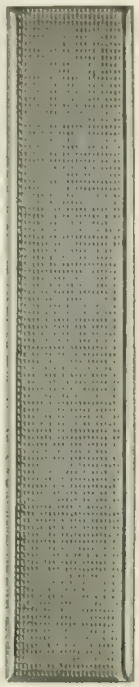
The positive or nickel plate consists of thirty perforated steel tubes in two rows, heavily nickel-plated, filled with alternate layers of nickel hydroxide and exceedingly thin flakes of pure metallic nickel. The tube is formed from a perforated ribbon of nickel-plated steel, and has a lapped spiral seam. This tube, after being filled with active material, is reinforced with eight seamless steel rings which prevent the tube expanding away from and breaking contact with its contents. The tubes after being flanged at both ends are clamped into perfect contact with a steel frame or grid, made of cold-rolled steel, heavily nickel-plated.

The negative or iron plate consists of a grid of cold-

rolled steel, nickel-plated, holding a number of rectangular pockets filled with powdered iron oxide. These pockets are stamped from a ribbon of very finely perforated nickelled steel. After the pockets are filled, they are inserted in a grid and subjected to great pressure between dies which corrugate their surfaces, and force them into integral contact with the grid.



One of the Negative Electrodes.

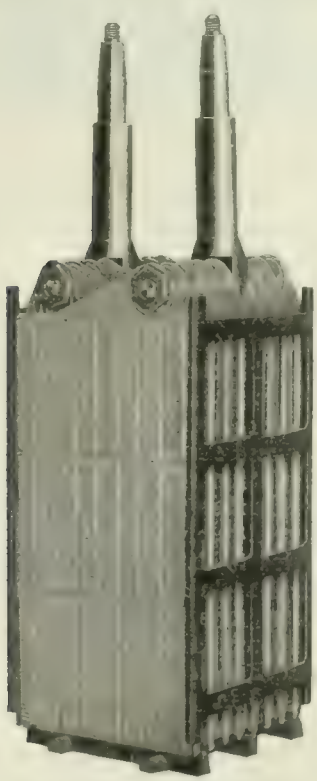


Pocket for Negative Electrode.

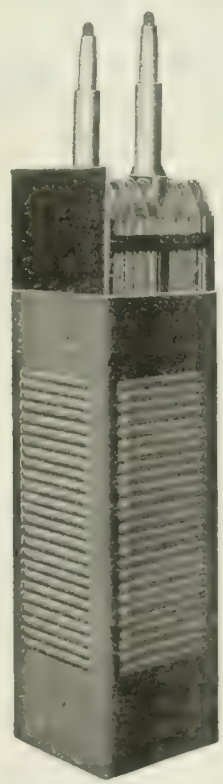
The method of insulating the plates from each other, and from the steel container is illustrated. After the plates have been assembled into a complete element, narrow strips of specially treated hard rubber are inserted between them, thereby separating them and insulating them from each other. These correspond to the wood and rubber separators used in lead batteries, but unlike them are not injured by the electrolyte and need never be renewed. The end insulator is provided with grooves that take the edges of the plates and insulate the complete element from the steel container. At the sides of the element, that is, between the outside negative plates and the container, are inserted smooth sheets of hard rubber. At the bottom the element rests upon a hard ruber rack or bridge, insulating the plates from the bottom of the container. This bridge is shallow, providing very little sediment space, such provision being unnecessary in the Edison cell because active material is not precipitated from the plates.

The container or jar is made from cold-rolled sheet-steel of fine quality, welded at the seams by the autogenous method, making leakage or breakage from severe vibration impossible. The walls of the container are corrugated so as to give maximum strength with minimum weight. The steel is heavily nickelled as a protection against rust. As an additional protection, the cell is dipped in a compound which gives it a tough, yet flexible, insulating coating. The bottom of the container is also of cold-rolled steel. Containers for car lighting cells are made three inches higher than those for vehicle service, giving greater capacity for electrolyte.

The cover is of the same quality nickelled sheet-steel. Mounted on the top, and situated between the two terminals, is the gas vent and filling aperture combined. This consists of a seat, a hemispherical valve, and a top actuated by a spring to remain fully open for filling, or closed for operating, as desired. The valve is so arranged that as the gas pressure in the cell rises sufficiently to raise it, the escaping gas flows by and out under the spring actuated



Edison Storage Battery as Assembled Before Placing in Container.



Contents of Edison Storage Battery Container Partly Lifted.



Edison Storage Battery Cell.

top. It is evident that gases from within the cell can get out, but impurities, air, etc., from without cannot get into the cell.

The method of assembling plates on steel connector rods with steel spacing washers, all being attached to the terminal post, is shown in one of the illustrations. The posts are turned up from steel bar stock, the top of the terminal being tapered and ground to an exact fit with the terminal lug. The tip of the post is threaded to take a nut which holds down the lug. The terminal posts are effectually insulated from the cover by means of hard rubber washers and bushings. A soft rubber washer, used for packing to prevent the solution from creeping, also serves as an insulator. This packing washer is held down by a heavy hard rubber gasket threaded into a pocket on the cell cover. The rubber gasket at the positive pole is red in color while that at the negative pole is black. The positive pole is further distinguished by a plus mark stamped into the steel cover.

The terminal lug is a drop forging of steel, bored and reamed and ground to a taper, to fit the tapered top of the terminal post. The connecting link between the two lugs is of copper. The copper link is swedged into the lug forgings, making a perfect and permanent contact. These links are made in various lengths to suit the spacing of the different size cells. After the swedging, the link with its lugs is given a heavy coating of nickel. Car-lighting men will appreciate the Edison method of connecting and disconnecting cells. No cutting of lead straps is necessary, nor is there any lead burning to be done. Remove the side slats, unscrew two nuts and lift the cell out of the set.

The electrolyte does not vary in density as does the acid electrolyte in a lead battery, nor is the capacity of the Edison battery affected by slight variations. Frequent specific gravity readings are, therefore, unnecessary. For convenience a special cell filler has been designed which rings a bell when the electrolyte has reached the proper height in the container.

There is no acid used in the Edison cell, and consequently no acid fumes are given off, nor is there any corrosion.

The cells are assembled in wooden trays with pressed steel cradles suspended from the sides. The flange on the bottom of each cell fits into a groove in the cradle, and a pressed steel "hold-down" at the top keeps it rigidly in position. The tray is designed with an air space beneath the steel cradles, making the grounding of cells impossible, unless a great amount of dirt is allowed to accumulate. The weight of a single tray with 3 cells for car lighting, 300 ampere hours capacity, is only about 100 lbs.

The average discharge voltage of the Edison cell is 1.24 volts at the eight hour rate of discharge. The standard number of cells is therefore, 25 for 30-volt equipments, and 50 for 60-volt equipments.

COMPOSITE GONDOLA CAR.

The New York Central Lines have recently received 1,000 composite gondola cars from the Pressed Steel Car Company, Pittsburgh, Pa., which are designed to handle pipe and structural steel. They are 46 ft. long and are constructed to carry a 110,000 lb., uniformly distributed load, with a possibility of a 10 per cent. overload. With these cars it is possible to load two tiers of 22 ft. pipe, whereas with old 40 ft. and 42 ft. cars but one tier could be loaded. The cars are equipped with drop ends, in case it should be desired to load material of more than 46 ft. in length, and are made strong enough to carry ⅔ of the rated capacity concentrated over a space 10 ft. long at the center of the car.

The underframes are of the built-up type with two center sills 30 in. deep at the center and 12 in. deep over the bolsters, and two side sills 26 in. deep at the center and 10 in. deep over the bolsters. The center sills are made of ⅜ in. thick steel plates and each sill is reinforced at the bottom with two 4 in. x 3½ in. x ½ in. angles, and at the top by one 3½ in. x 3 in. x ⅜ in. angle, the two sills being tied together by a cover plate 7/16 in. thick by 21¼ in. wide. The center sills run continuously through the body bolsters, and the draft sills, which are made of ⅜ in. pressed steel are spliced to them immediately in front of the bolster. The side sills are made of 5/16 in. steel plates and are reinforced at the top and bottom by a 4 in. x 3½ in. x ½ in. angle. They extend from end to end of the car and are connected to the end sills by means of pressed steel sub-side sills. The end sills are made of 10-in. channels with a 7/16 in. pressed steel angle cover plate riveted to the top flange.



46-Ft. Composite Gondola Car.

The body bolster is made of pressed steel diaphragms placed back to back with a top cover plate of ½ in. steel, 16 in. wide and a bottom cover plate of ½ in., steel 14 in. wide securely riveted to the flanges. The ends of the body bolster are fastened to the side sills with two 6 in. x 3½ in. x ⅜ in. angles. There are two cross bearers near the center of the car, made up of ¼ in. pressed steel plates, flanged on all sides, with a ⅜ in. top cover plate 10 in. wide passing through the web of the center sills immediately under the top reinforcing angles, and a bottom cover plate of the same size passing under the center sills and riveted to the flanges of the diaphragms and center sill bottom angles. In addition to the cross bearers there are 8 sets of floor supports made of ¼ in. pressed steel extending between the center and side sills.

The floor is made of 2½ in. yellow pine, tongued and grooved, and the sides of 3 in. yellow pine capped with a 3 in. x 3 in. x ¼ in. protection angle, and held by twelve 5/16 in. pressed steel stakes on each side and a double corner post of ⅝ in. steel at each corner, which also forms a stop for the end gate. Each side of the car is also fitted with 9 pairs of outside stake pockets. The ends of the car are constructed of 3½ in. x 10 in. yellow pine boards bound together in the shape of gates which fold backward flat upon the floor of the car.

The sill steps, hand holds and all safety appliances are strictly in accordance with the Interstate Commerce Commission requirements. The cars are equipped with the Westinghouse HC-10-12 air brakes, tandem spring draft gear, cast steel 5 in. x 7 in. shank couplers, ball bearing center plates and side bearings and 5½ in. x 10 in. trucks with cast steel side frames.

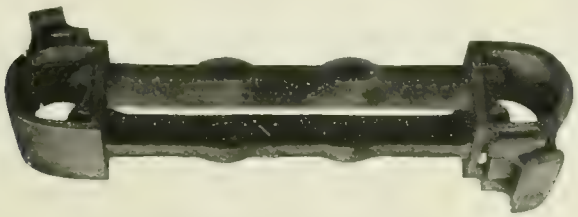
The general dimensions are as follows:

Length inside of car	46 ft.
Width inside of car	8 ft. 9 in.
Height inside of car	7 ft. 6¼ in.
Length over end sills	47 ft. 9 in.
Width over all	10 ft. 0 in.
Height from top of rail to top of floor	3 ft. 10⅞ in.
Height from top of rail to top of sides	6 ft. 5⅛ in.
Distance from center to center of trucks	37 ft. 3 in.
Cubic capacity { level full	1,015 cu. ft.
Cubic capacity { 10 in. average heap	1,350 cu. ft.
Weight of car body	30,200 lbs.
Weight of trucks	15,800 lbs.
Total dead weight	46,000 lbs.
Maximum load uniformly distributed	121,000 lbs.

DUPLEX BRAKE BEAM STRUT.

The new brake beam strut, here illustrated, is a one-piece casting designed to permit the use of the brake beam for either right or left hand in emergencies and avoid the objections that have been raised to the reversible strut which is made up of several parts.

The many advantages of being able to use a beam as either right or left hand are obvious. Another good feature of this strut is that it is provided with two lever pin holes. As these

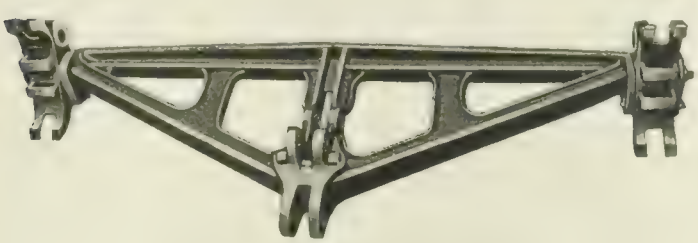


Duplex Brake Beam Strut.

holes wear in the line of pull, the life of the brake beam may be increased by reversing the strut, and so allowing the use of the second and unworn pin hole. This strut surrounds the brake beam tension member and in this way makes it safer. The beams equipped with these struts, as made by the Chicago Railway Equipment Company, are provided to take the Creco sliding third point support and the struts are designed to clamp about the beam compression member in several different ways to suit the requirements of service.

VULCAN CAST STEEL BRAKE BEAM.

A prominent feature of the exhibit of the American Steel Foundries, Chicago, is the Vulcan cast steel brake beam and the Sampson bolster. The Vulcan beam is made of a one-piece steel casting and is intended for use with a high speed brake



Vulcan Cast Steel Brake Beam.

in connection with P. C. or L. N. air brake apparatus. The deflection of this beam under heavy loads is very small, and, owing to the construction, the deflection at the end of years of service will be no greater than when new, as there are no loose parts about the beam to wear out or break.

FORSYTH RADIAL YOKE CONNECTION.

The Forsyth "Radial" Yoke Connection is designed, not merely for a simple and durable connection between the draft gear and the drawbar, and one that can be used with any standard draft gear and drawbar, but to eliminate destructive side strains by allowing both the drawbar and yoke plenty of side clearance on curves. Heretofore the chief objection to a

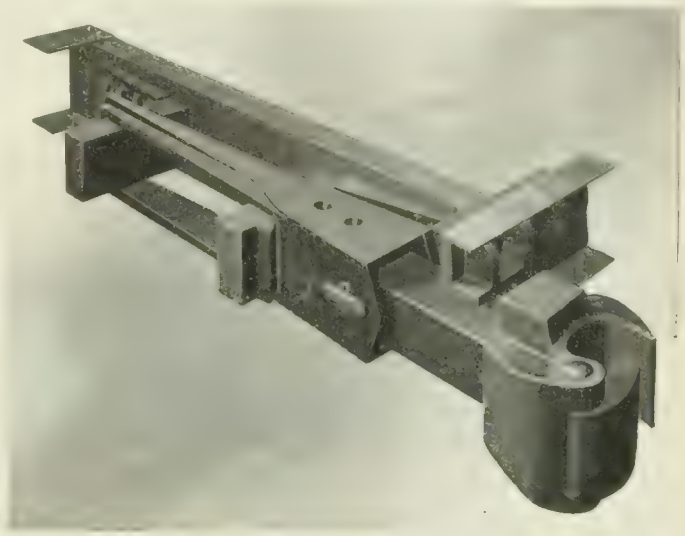


Fig. 1—Forsyth Radial Yoke.

yoke, or strap connection, has been the shearing of yoke rivets. It is manifestly unjust to condemn a yoke because of the occasional failure of the *means of connection* between it and the drawbar, when such failures can be practically eliminated. It has been customary to maintain the old wrought iron yoke, with uniform width throughout its length, substantially on the center line of the gear by bringing up the follower stops, or

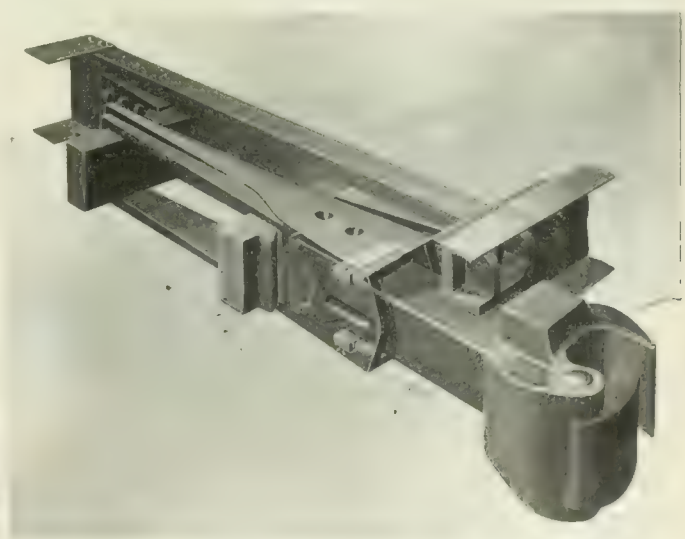


Fig. 2—Forsyth Radial Yoke, Arranged with Key Attachment to Coupler.

draft lugs, within a short distance, say ½ inch, of the lateral edges of the yoke. Under these conditions, it is evident that when the drawbar allows a slightly increased side travel, the yoke first strikes against one of the follower stops, and then becomes actually bound between the diagonally opposite follower stops. The drawbar and yoke are now to each other like the blades of a shear, and further movement of the drawbar to one side can only have the effect of transmitting enormous

shearing strains to the yoke rivets. These stresses, rather than those of draft, have caused the failure of the yoke rivets in the past. Proof of this can be found by examining cars in service, on which it will frequently be noted that—even where the inwardly turned lips at the front end of the yoke are at right angles to the drawbar and in good condition, and also engage the shoulders of the drawbar butt—the rivets are nevertheless found to be loose or sheared.

Under buffing stresses or on curves it must be evident that greater clearance is needed between the inner end of the yoke and the rear follower stops, or draft lugs, than is required between the drawbar butt and the front follower stops. In order to meet this condition, the Forsyth yoke is tapered horizontally



Fig. 3—Forsyth Radial Yoke in Central Position.

toward its inner end, with a corresponding increase in the vertical thickness to preserve a uniform cross sectional area and maintain a uniform strength throughout.

In the Forsyth yoke, Fig. 1, there is provided immediately back of the drawbar butt a vertical member cast in one piece with the yoke, which member has a convex face adapted to bear against the outer face of the front follower. The rear vertical wall of the yoke is also provided with a corresponding convex face, designed to bear against the outer face of the rear follower. It will be noted that the outer faces of the followers are provided with inclined bearing surfaces, which engage the convex bearing surfaces of the yoke. When the drawbar and yoke are drawn to one side on a curve, and then released, the

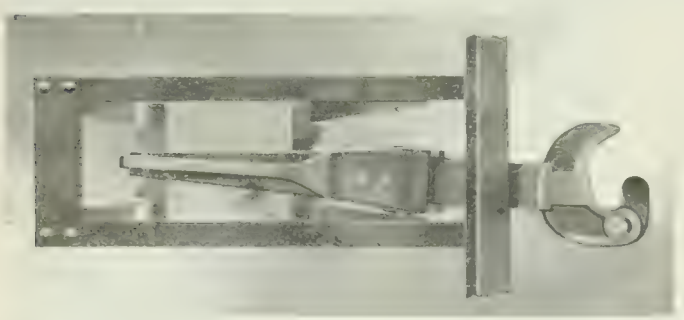


Fig. 4—Forsyth Radial Yoke on Curve.

spring of the draft gear will thrust the followers outward, causing the convex faces of the yoke to slide down the concave faces of the followers, and thereby return the drawbar and yoke to an automatic coupling position. There is sufficient play allowed to effect coupling on curves, but the radial device will always return the drawbar on straight track sufficiently close to the center of the track to permit automatic coupling.

The rounded bearing surfaces also prevent the canting of the followers on curves, and the consequent side distortion of the draft gear. Heretofore, where the rocking has taken place between flat surfaces (as between the flat ends of the drawbar and the flat face of the front follower), canting of the followers has taken place and the draft gear has been unevenly worn and injured. Another point of merit in the Forsyth radial yoke, in connection with the front bearing at the inner end of the drawbar, is that this bearing acts as a stop member to prevent end displacement of the gear and followers when the drawbar is removed. Heretofore, when replacing an old drawbar, it has been necessary to re-assemble the gear within the yoke under tension.

The Forsyth radial yoke connection may be attached to the drawbar butt by means of the ordinary yoke rivets or by keys. The latter, as shown in Figs. 1 and 2, may be a central one, adapted for insertion through a corresponding slot in the drawbar; or, if the drawbar is not provided with a center slot, top and bottom keys can be used, as shown in Fig. 2. These afford a greater area of contact to withstand the shocks than the center key, as they bear clear across the shoulders of the drawbar butt, as well as against corresponding shoulders on the top and bottom walls of the yoke. The yokes can be furnished to take a 9⅛-inch, or any other height of drawbar butt.

In general freight car construction working within ⅛ in. to ¼ in. is usually acceptable, and, therefore, it must be evident that when the gear goes solid against a front or rear abutment, it is practically impossible for the ends of the keys to strike the ends of the slots at the same time. On curves it is impossible, as, in the latter case, the keys are no longer at right angles to the sills, and, therefore, could only strike the ends of the slots on one side, affording the gear a weak stop bearing, in addition to cutting down the travel.

The chamber at the forward end of the Forsyth yoke is made sufficiently large to allow for variations in the drawbar butt, without permitting undue or objectionable lost motion at this point.

The cost of the radial yoke and followers is moderate, especially when it is considered that they take the place of the ordinary wrought iron yoke and flat followers and that they include a centering device for both the yoke and drawbar. The drawbar of a freight car should be allowed a side clearance of at least 2 in. on each side at the carry iron. After a clearance of 1 in., automatic coupling is made more certain by the use of a centering device, otherwise the guard arms and knuckles will frequently pass by each other. A drawbar centering device for freight equipment (wherein the yoke or other means of attachment should swing with the drawbar on curves) must center both the drawbar and the yoke. In the case of passenger cars, however, where the drawbar is pivoted to the yoke, a centering device located at the carry iron, for centering the drawbar only, is sufficient.

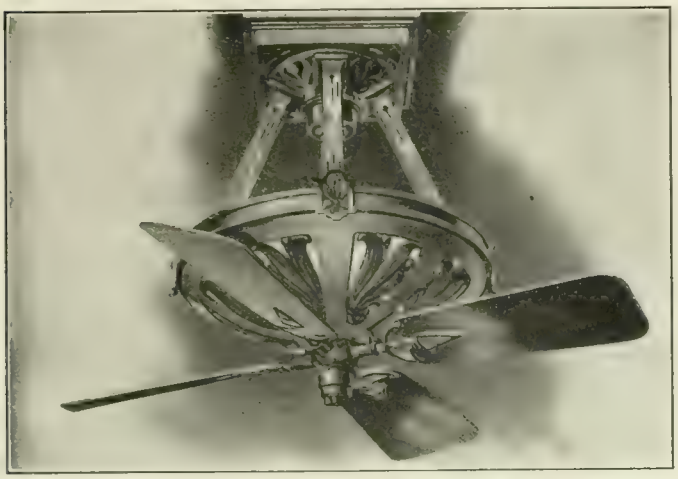
Figs. 3 and 4 show the drawbar and radial yoke on straight and curved tracks respectively. The radial yoke has been proved out by years of service. It is manufactured by Forsyth Brothers Company, of Chicago.

ELECTRIC FIXTURE COMBINING INDIRECT LIGHTING AND PADDLE FANS.

The Frisco Lines have recently installed a rather unique arrangement of fans and lighting fixtures on several new club-cafe cars. In considering the use of electric indirect lighting and electric paddle fans, it was found undesirable to install separate fixtures for each of these systems, owing to the resulting crowded appearance of the car ceiling. Several suggestions were considered to overcome this difficulty, and The Safety Car Heating & Lighting Company, New York, was asked to submit a suitable fixture. As a result, the fixture illustrated herewith was finally accepted and installed, in which both the indirect lighting and the paddle fans are combined. This arrangement is a novel one, and from the illustration it will be seen that the effect is not displeasing.

A motor is installed in each of the fixtures, and is located above the ceiling base of the fixture between the ceiling and the roof of the car. A flexible shaft connects the motor with the paddle fans and compensates for any unevenness in the headlining of the car or the vibration of the fixture.

Contained in the art glass bowl, are four mirror reflectors, designed to direct the maximum rays of the electric lamps at the proper angle to the ceiling. It is obvious that to obtain the best efficiency the ceilings must have a light color. If the paddle fans are not required, they can be removed and stored away, until they are again needed.



Electric Fixture Combining Indirect Lighting and Paddle Fan.

Indirect lighting has been successfully developed by The Safety Car Heating & Lighting Company, and this fixture is another development along this line. A duplicate of the fixture without the paddle fans is exhibited by this company at its booth, and although no provision has been made to demonstrate the effectiveness of the lighting from it, an opportunity is afforded for those interested to gain an idea of the appearance of such a lamp.

LIST OF EXHIBITORS.

Notwithstanding the fact that 7,400 sq. ft. additional exhibit space was available this year as compared with last year, between 75 and 100 applicants for space could not be accommodated, and applications are still coming in. There are 262 exhibitors this year, using a total of 83,507 sq. ft. of space, as against 245 exhibitors, with 76,110 sq. ft. of space, in 1911, and 228 exhibitors, with 71,453 sq. ft. of space, in 1910. The average numbers of square feet to the exhibitor during this period were 313, 310 and 319, respectively. It is reasonably certain that if one-third more space were available for exhibits it would all be used.

The increased space this year was obtained by an extension of 4,860 sq. ft. on Machinery Hall, and by adding a new steel and wood arched structure to the Hotel Men's Annex, giving it a total of 11,283 sq. ft., an increase of 2,537 sq. ft. Some improvements have also been made in the Convention Hall. The decorations are more profuse, but otherwise similar to preceding years.

The Railway Supply Manufacturers' Association this year has installed, with the aid of the local electric light company, the generating set supplying power for the pier. New boilers were installed, and it is expected that ample power can be furnished for every need.

Acme Supply Company, Chicago Ill.—Vestibule diaphragms; vestibule curtains; diaphragm attachments; weatherproof windows; interior car curtains; steel doors; steel ladders; Chanarch car flooring; weatherproof window posts. Represented by H. H. Schroyer, T. K. Dunbar and C. R. Jamison. Space 572, 573.

Ajax Manufacturing Company, The, Cleveland, Ohio.—Ajax scrap reclaiming rolls and forgings produced on Ajax forging machines. Represented by John R. Blakeslee, A. L. Guilford and J. A. Murray. Space 113, 115, 117.

Alcohol Heating & Lighting Company, Chicago Ill.—Alcohol heater refrigerator car; models alcohol heater car; several types of alcohol portable stove. Represented by Herbert Green

terials used in manufacture of feralun; feralun heat resistant castings. Test plates showing comparison of feralun and iron. Fire door liner; grate bar; feralun abrasion resistant castings; section of ash or sand conveying pipe; sections of wearing plates; mounted section spiral conveyor. Photographs. Feralun anti-slip thread surfaces' devices. Represented by J. P. Warfle. Space 634.

American Arch Company, New York, N. Y.—Model of a locomotive boiler equipped with the American Security Arch; various types of locomotive fire brick. Represented by Le Grand Parish, J. P. Neff, Geo. Magstaff and John Nicholson, Space 412, 414.

American Balance Valve Company, The, Jersey Shore, Pa.—Wilson-Stevens valve gear with Jack Wilson high pressure internal admition slide valve. Walcheart valve gear with semi-plug piston valve. Full size semi-plug piston valves for superheat and saturated steam. Models of semi-plug piston valves; Jack Wilson valves for superheat and saturated steam and American balance slide valves. Represented by J. T. Wilson, Frank Trunp and C. C. Young. Space 383.

American Brake Company, The, St. Louis, Mo.—Westinghouse booth. Represented by E. L. Adreon and R. E. Adreon. Space 19, 21, 23, 25, 27, 29.

American Brake Shoe & Foundry Company, Mahwah, New Jersey.—Brake shoes for locomotives; passenger and freight equipment and electric railway equipment. Brake heads and keys. Represented by F. W. Sargent, W. S. McGowan, W. G. Pearce, J. B. Terbell, F. L. Gordon, J. S. Thompson, E. L. Janes, E. B. Smith, George Law, J. V. Hogan, R. M. Brower, J. R. Haywood and R. E. Holt. Space 416.

American Brass Company, The, Coe Brass Company Branch, Ansonia, Conn.—Extruded and pressed brass shapes for car trimmings. Represented by Chas. E. Van Riper, Wm. H. Rippere, R. S. Wildman and Wm. W. Cotter. Space 518.

American Car and Foundry Company, New York, N. Y.—Reception booth. Represented by B. M. Carr, C. A. Liddle, Scott H. Blewett, S. M. Dolan, L. W. Martin, Wm. C. Dickerman, John McE. Ames, A. E. Ostrander, C. D. Eaton and E. H. Fisher. Space 619.

American Infusion Steel Process Company, New York, N. Y.—A process for converting a low grade steel into a high grade steel. Represented by W. C. Whyte, A. J. Thompson, R. C. Longenecker and V. J. Thompson. Space 172.

American Locomotive Company, New York, N. Y.—Reception booth. Represented by H. F. Ball, G. M. Basford, J. D. Sawyer, C. J. Donahue, W. L. Reid, W. P. Steele, H. B. Hunt, J. E. Dixon and C. M. Muchnic.

American Mason Safety Tread Company, Boston, Mass.—Mason safety treads, lead filled; Empire safety treads, carborundum filled; Stanwood treads, for car steps; Karbolith composition flooring. Represented by Henry C. King, L. H. Myrick and R. C. Davison. Space 609.

American Nut & Bolt Fastener Company, Pittsburgh, Pa.—Bartley nut and bolt fasteners, Bartley self-locking nut and bolt fasteners. Represented by Edwin M. White, Christopher Murphy, Robert Spencer and Jos. R. Royston. Space 310.

American Pulley Company, Philadelphia, Pa.—Axle pulley for electric lighting on steam railroad cars. Represented by Morris W. Rudderow. Space 401.

American Roll Gold Leaf Company, Providence, R. I.—Roll gold leaf; roll aluminum leaf and gold florentine metal leaf. Represented by T. J. Lawler, C. H. Bowers and C. E. Smith. Space 631.

American Steel Foundries, Chicago, Ill.—Cast steel products: Vulcan cast steel side frames; Vulcan cast steel brake beams; Samson bolster; Simplex couplers; Hercules and Ajax brake beams; Susemihl roller side bearings; Davis wheels; springs and miscellaneous castings. Represented by R. P. Lamont, Geo. E. Scott, R. H. Ripley, W. J. Lynch, J. C. Davis, T. D. Kelley, J. V. Bell, G. F. Slaughter, W. Ross Gravener, Geo. C. Murray, Theodore Cook, P. J. Kalman, D. T. Harris, J. W. Dalman, A. R. Brunker, W. A. Blanchard, A. S. Crozier, T. H. Hopkirk, W. M. Rogovine, R. E. Janney, Geo. G. Floyd, F. B. Ernst and Louis E. Jones. Spaces 185, 186.

American Tool Work Company, Cincinnati, Ohio.—One 24" x 12' geared head lathe driven by 15 H. P. General Electric motor; one 16" x 8' relieving lathe driven by Crocker-Wheeler motor; one 2' geared radial drill driven by 3 H. P. Westinghouse motor; one 3' sensitive radiator driven by 2½ H. P., G. E. motor; one 6' plain radial driven by 20 H. P. Westinghouse motor; one 16" shaper with a universal table and vise; one 24" shaper driven by 7½ H. P. Reliance motor. Numerous details of machines shown. Represented by Robert S. Alter, C. K. Cairns, Herman Schatz and Edward Conners. Spaces 103, 105, 107, 109, 111.

American Vanadium Company, Pittsburgh, Pa.—Vanadium steel, iron, brass and bronze locomotive parts; vanadium steel forgings and castings, vanadium tool steels, vanadium ores and vanadium alloys. Represented by J. J. Flannery, W. A. Bonitz,

D. B. Browne, C. L. Hastings, W. J. Bird, P. A. Bevan and G. L. Norris. Space 211.

American Packing Company, Philadelphia, Pa.—Packing and mechanical rubber goods. Represented by L. F. Adams, G. A. Morrison, E. C. Adams, W. F. Haggett, J. D. Maguire, H. M. Green, J. F. Edmonds, C. M. Barnes and B. J. Miller. Space 378.

Automatic Ventilator Company, New York, N. Y.—Miniature working models of the "Automatic" car ventilator, models of several types of self-acting intake-and-exhaust car ventilators, including those meeting requirements of the postal department, as per recent specifications for railway postal cars. Represented by George H. Ford, Frank A. Barbey and Wm. J. Fleming, Jr. Space 329.

Baker Brothers, Toledo, Ohio.—One 1 in. by 6 in. Automatic Drilling Machine for rapid manufacturing production. Represented by Geo. E. Hallenbeck, H. M. Chilcote and W. W. Elliott. Space 140.

Baker Car Heater Company, W. C., Detroit, Mich.—One No. 9 steel shell fire proof heater, one No. 1-C hot water heater, one No. 3-P forced ventilation hot air heater, one No. 3-K electric forced ventilation hot air heater. Represented by E. J. Smith, D. W. Smith and H. S. Williams. Space 214.

Baldwin Locomotive Works, Philadelphia, Pa.—Pneumatic power reverse gear for locomotives. Represented by S. M. Vauclain, C. Greenough and A. S. Goble. Space 300.

Barco Brass & Joint Company, Chicago, Ill.—Barco Flexible Joints for steam, air, oil and water; engine-tender steam, air and oil connections; round-house blower sets. One complete engine tender flexible joint equipment, including steam line, train line, signal line and tender brakes so arranged as to show every angle of movement required by the engine and tender. Represented by F. N. Bard and E. S. Nelson. Space 374.

Baush Machine Tool Company, Springfield, Mass.—One hydro-pneumatic radial drill in operation; General Electric Co. automatic air compressor furnishing air. Represented by C. K. Lassiter, F. E. Becorselski, J. A. Eden and Chas. A. Smith. Space 119.

Berry Brothers, Limited, Detroit, Mich.—Varnish panels, varnish gums, shellacs, japans, locomotive block, jacket enamels, front end finishes, railway varnishes. Represented by J. S. Stevenson, D. W. H. Moreland, John S. Wilson, F. W. Grebe and Walter Page. Space 364, 366.

Best, W. N., New York, N. Y.—Oil burners, oil furnaces, oil regulating cocks. Represented by W. N. Best. Space 308.

Best Manufacturing Company, Pittsburgh, Pa.—Best gate valves, iron, steel and brass, globe valves, flanged fittings, flanges, bends and pipe joints, flexible joints, stand pipes, Gulland stand pipe valves. Represented by H. W. Evans, C. W. Bergen, C. E. Hague and George Best. Space 380.

Bethlehem Steel Company, South Bethlehem, Pa.—Tool steels; Bethlehem structural steel shops; standard high speed steel tools developed by Taylor-White; drop forgings; steel, iron and brass castings; staybolt iron; alternating stress testing machines in operation; Bristol critical point furnace in operation; staybolt vibratory machine in operation; metallographic instruments in operation; vail sections; forged steel hydraulic jacks. Represented by W. C. Cutler, Geo. W. Costello, J. M. Price, John Moran and Hugh Lennon. Space 37.

Bettendorf Axle Company, Bettendorf, Iowa.—One single center sill, 50-ton capacity, 40'-0" underframe with trucks as furnished for the Harriman lines box cars. One double center sill 40-ton capacity, 40'-0", box car underframe. One assembled truck which will be used for demonstrating the ease with which the Bettendorf truck can be dismantled and assembled. One variable load brake truck. Represented by J. W. Bettendorf, M. Bettendorf, J. H. Bendixen, G. N. Caleb, F. K. Shults, A. F. Macpherson, E. E. Silk, W. G. Ransom, C. G. Stolpe and J. L. Goddard. Space 200.

Blackall, R. H., Pittsburgh, Pa.—H-R ratchet brake lever for both freight and passenger cars. Improved lindstrom hand brake lever for both freight and passenger cars. Represented by R. H. Blackall. Space 614.

Boss Nut Company, Chicago, Ill.—Boss nut locks. Represented by J. T. Benedict, J. A. MacLean and Ed. Wilhelm. Space 368, 369.

Bowser & Company, Inc., S. F., Ft. Wayne, Ind.—Standard self measuring oil pumps; one tank and oil pump combined; one paint oil outfit; one power pump; one automatic registering measure; one automobile filling station; one oil filteration and circulating. Represented by C. A. Dunkelberg, W. T. Simpson, Edward Barnes and F. T. Hyndman. Space 30.

Brown Automatic Connector Company, Chattanoooga, Tenn.—Brown automatic air, steam and signal connector; for use in railway passenger service; and air and signal connector, for use in freight service. Represented by M. A. Brown and A. L. Kirkpatrick. Space 306.

Brunix Manufacturing Company, Philadelphia, Pa.—Journal box packing; wiping cloths. Represented by W. B. Howard. Space 212.

Buckeye Steel Castings Company, The, Columbus, Ohio.—Complete cast steel 70-ton truck, truck bolsters, side frames, key connected yoke, journal boxes and couplers. Represented by S. P. Bush, J. C. Whitridge, Geo. Groobey, Geo. T. Johnson, V. H. Thomas and C. B. Goodspeed. Space 603, 605.

Buffalo Brake Beam Company, New York, N. Y.—High speed passenger brake beams. Automatically adjustable brake heads, truss and solid brake beams for all classes of cars, locomotives and electric equipment. Represented by S. A. Crone, Edwin Strassburger, Thomas E. Carliss, Roland C. Fraser, O. W. Meissner and C. E. Barrett. Space 606.

Bullard Machine Tool Company, The, Bridgeport, Conn.—One 42" vertical turret lathe, in operation, driven by Westinghouse motor. Represented by S. H. Bullard, J. W. Bray, K. H. Snider, F. B. Smith and W. B. Price. Space 125, 127.

Buyers' Index Company, Chicago, Ill.—Railway supply index-catalogue and purchasing agents' buying list. Represented by N. F. Rehm, H. E. Frame and Alex Smith. Space 628.

Cambria Steel Company, Johnstown, Pa.—Cambria special axles; "Coffin Process" axles; 100% rail joints; Morrison guard rails. Represented by J. Leonard Reflogle, Ralph V. Sage, W. S. Ottinger, L. B. Morris, E. H. Bankard, Jr., M. G. Baker. Space 506, 508.

Camel Company, Chicago, Ill.—Models of improved Security car doors; Camel I-beam carlines. Represented by P. M. Elliott, J. M. Hopkins, W. W. Darrow and J. F. Comee. Space 565.

Carborundum Company, The Niagara Falls, N. Y.—Carborundum and Aloxite wheels, Aloxite cloth, garnet paper and carborundum safety devices. Represented by C. C. Schumaker, W. W. Sanderson, C. C. Lathrop, R. H. Hogg, J. F. Hanlon and R. S. Marvin. Space 149, 151.

Carey & Company, Philip, Cincinnati, Ohio.—Asbestos and magnesia material for railway use. Represented by D. R. Warfield. Space 564.

Carnegie Steel Company, Pittsburgh, Pa.—Solid rolled steel wheels for passenger train, locomotive and freight car service; slick gear blank and cut gear for motors; bent Carnegie toughened freight car axle; vanadium steel locomotive spring, axle and test pieces; steel sheet piling; concrete reinforcement bars; nickel-plated sections structural, rail and bar mill shapes; transparencies illustrating process of steel manufacture. Represented by John C. Neale, W. G. Clyde, R. B. Woodworth, H. W. Maxson, N. B. Trist, T. W. Williams, Frank Spencer, V. S. Yarnall, G. F. Goddard, K. E. Porter, C. B. Friday, John Hornbrook, W. N. Jeffress, C. F. W. Rys, I. W. Jenks, Lee Bowman, L. C. Bihler and Charles Orchard. Space 418, 546, 547.

Carter Iron Company, Pittsburgh, Pa.—Chain iron; chains; staybolts and engine bolts; physical tests of the raw material. Represented by H. H. Carter and Henry Gilg. Space 36.

Chase & Company, L. C., Boston, Mass.—Car seat coverings. Goat brand plain mohair plush, frieze plush, friezette and Chase leather. Represented by W. P. Underhill and H. C. Hopewell. Space 10.

Chicago Car Door Company, Chicago, Ill.—Car doors, safety brackets. Represented by J. L. Mallory and H. M. Perry. Space 539.

Chicago Car Heating Company, Chicago, Ill.—Vapor system car heating devices; steam hose couplers; steam valves. Represented by Egbert H. Gold, Edward A. Schreiber, B. A. Keeler, F. F. Coggin, G. T. Cooke, R. P. Cooley, E. E. Smith, Jos. Vogel and J. E. Buker. Space 218, 220, 222, 224, 226.

Chicago Pneumatic Tool Company, Chicago, Ill.—Pneumatic and electric tools. Represented by C. E. Walker, J. C. Campbell, M. O'Connor, T. G. Smallwood, J. W. McCabe, W. F. Delaney, C. B. Coates, E. Aplin, A. C. Andresen, Thos. Aldcorn, W. O. Duntley, G. A. Rees and J. F. Duntley. Space 618.

Chicago Railway Equipment Company, Chicago, Ill.—Brake beams of the "PC" Creco, "EL" Creco, Diamond Special, Diamond, Drexel, National Hollow, Kewanee, Reliance, Sterlingworth, Ninety-six, Monarch, and special types. Monitor bolsters; Creco roller side bearings; brake slack adjuster; journal box and lid; automatically adjustable brake head; removable leg brake head; Creco sliding third point support and safety device; reversible and duplex brake beam struths. Represented by E. B. Leigh, Arthur Wyman, F. T. De Long, Raymond H. Pilson, G. N. VanSweringen, C. P. Williams, Edwin F. Leigh, Ralph M. Wiggin, Chas. A. Maher and C. H. Williams, Jr. Space 635.

Chicago Steel Car Company, Chicago, Ill.—Model of steel underframe and two styles of friction draft gears. Represented by H. C. Priebe. Space 520.

Chicago Varnish Company, Chicago, Ill.—Finished panels showing "Ce-Ve" process of painting cars. Represented by George

S. Bigelow, F. L. Olds, Fred J. Gundrum, Jr., and R. K. Buckman, Jr. Space 576, 577.

Chisholm & Moore Manufacturing Company, The, Cleveland, Ohio.—Chain hoists, I-beam trolleys. Represented by H. E. Dickerman. Space 158.

Coe Manufacturing Company, W. H., Providence, R. I.—Coe's ribbon gold leaf and Coe's gilding wheels. Represented by Benjamin A. Smith, E. J. Arlein and S. H. Swallow. Space 633.

Collins Metallic Packing Company, Philadelphia, Pa.—Working model of locomotive driver wheel flange lubricators. Represented by J. George Wholey.

Colonial Steel Company, Pittsburgh, Pa.—Illuminated photographs showing the manufacturing of steel; samples of different tools made from Colonial steel; samples of various alloys used in making steel. Represented by Chas. M. Brown and E. P. Fitzgerald. Space 367.

Commercial Acetylene Company, The, New York, N. Y.—Railroad car lighting by acetylene: Locomotive headlighting by acetylene, signal lighting by acetylene, marker, gauge and cab lights by acetylene; buoy lantern with sun valve and flasher, commercial acetylene tanks for oxy-acetylene welding, commercial acetylene tank cut open showing asbestos packing. Represented by Oscar F. Ostby, Harry G. Doran and Roger J. Faure. Space 339.

Commonwealth Steel Company, St. Louis, Mo.—Photographs, drawings and catalogues showing the followings devices: Combined platforms and double body bolsters for passenger train cars, upright end frame in conjunction with combined double body bolster and platform, double body bolster, four and six-wheel trucks for passenger-train cars, needle beams, end sills, truck center bolsters, truck center frames, locomotive pilot beams, Davis driving wheels, engine and tender trucks, tender bumpers, tender frames, Commonwealth transom draft gear, separable body bolsters, flory carry iron and striking plate. Represented by H. M. Pflager, Geo. E. Howard, Boone V. H. Johnson and Blake C. Howard. Space 313, 315.

Consolidated Car-Heating Company, New York, N. Y.—Pressure traps, vapor traps, steam couplers, end valves, admission valves, Thermostat, electric heaters, switches, resistances. Represented by Cornell S. Hawley, C. C. Nuckols, Thomas Farmer, Jr., W. S. Hammond, Jr., Butler Keys and H. L. Hawley. Space 582, 583.

Consolidated Railway Electric Lighting & Equipment Company, New York, N. Y.—Axle light equipment complete, new type "L" regulator with type "D" dynamo demonstrating while running under all conditions of train speed and lamp load. Represented by P. Kennedy, J. L. Watson, L. J. Kennedy, Thomas L. Mount, D. N. Balderston and J. A. Misland. Space 614.

Crane Company, Chicago, Ill.—Crane locomotive safety valves, special railroad fittings, quick opening locomotive blower valves, locomotive blow-off valves, locomotive cab valves, automatic stop and check valves, special valves for creosote wood preserving plants, steel valves and fittings for superheated steam, Crane tilt steam traps, hydraulic valves, special assortment of brass globe and angle valves for railroad service, gate valves. Represented by F. D. Fenn and G. S. Turner. Space 586, 588.

Crosby Steam Gage & Valve Company, Boston, Mass.—Special locomotive steam gauges; improved locomotive pop-valves; the Lanza continuous diagram appliance for indicators; the number 2 fluid pressure scales for testing gauges up to 30,000 pounds; hydraulic press recorder with continuous chart; air pump throttle valve. Represented by M. D. Johnson and Philip Johnson. Space 630.

Crucible Steel Company of America, Pittsburgh, Pa.—Steel products. Represented by F. Baskerfield, J. T. Stafford and W. K. Krepps. Space 636.

Curtain Supply Company, Chicago, Ill.—Ring No. 88 fixtures, "Rex" all metal rollers, curtain materials, friction rollers, vestibule curtain rollers, reinforced vestibule curtain rollers, steel vestibule curtain rollers, steel sash balance, "CSCO" diaphragms, opening pleat diaphragms, No. 6 roller bearing hook, No. 10 automatic release handles, No. 10 automatic vestibule curtain release handles. Represented by W. H. Forsyth, R. F. Hayes, S. W. Midgley, Geo. E. Fox and F. M. Egolf. Space 638.

Damascus Brake Beam Company, The, Cleveland, Ohio.—High speed passenger beams; freight beams of both solid and truss type; adjustable brake heads; forged steel fulcrums; freight car ladders. Represented by Albert Waycott and W. H. Winterrowd. Space 602.

Davis Boring Tool Company, St. Louis, Mo.—Full line of the Davis expansion boring tools. Represented by E. E. Davis, J. W. McKeen, Harry Marsh and Walter E. Moberley. Space 150.

Davis-Bournonville Company, New York, N. Y.—Oxy-acetylene welding and cutting apparatus; complete welding and cutting equipment; acetylene and oxygen generating and compressing plants. Represented by Augustine Davis, W. R. Noxon, H. L. Adams, Wm. W. Barnes, Wm. Joyce, Louis Shepard, W. C. Buckman and Alex. Blaser. Space, pier end, 1, 2.

Davis Solid Truss Brake Beam Company, Wilmington, Del.—Davis solid truss brake beams; solid steel brake shoe backs; Universal air brake combined auxiliary reservoir and cylinder; brake beam deflectometer and special appliance for testing brake beams; interlocking metal ladders for freight cars; rolling center support for brake beams. Represented by Nathan H. Davis and Thomas C. Davis. Space 500, 502, 504.

Dearborn Drug and Chemical Works, Chicago, Ill.—Reception Booth. Represented by Robert F. Carr, George R. Carr, Grant W. Spear, J. D. Purcell and H. G. McConnaughy. Space 6, 8.

Deforest Sheet & Tin Plate Company, Niles, Ohio.—Lohmannized products and Deforest convolute reinforcement. Represented by Edward D. Thompson and Wade A. Taylor. Space 325.

Detroit Lubricator Company, Detroit, Mich.—No. 0 one feed Bullseye Locomotive Lubricators, No. 5 one feed, No. 11 two feed, No. 22 three feed, No. 22 sectional, No. 32 four feed, No. 42 five feed, No. 52 six feed, No. 62 seven feed, No. 72 eight feed. Half pint air brake lubricator; flange lubricator; one, two, three and four feed air cylinder lubricator, complete with emergency and throttle valve and check valve connection. "T," steam chest plugs, angle and straight; locomotive road cup; locomotive guide cup; Pendry throttle valve; boiler valve; mechanical force feed oiler for motors on section cars. Complete line of all models, sizes and finishes of stationary accessories. Represented by F. W. Hodges, H. I. Lord, A. D. Howard and Geo. Cage. Space 637.

Dickinson, Paul, Incorporated, Chicago, Ill.—Dickinson cast iron smoke jacks; cast iron adjustable chimneys; Æolus ventilators in galvanized iron and copper; drawings of standard round house construction. Represented by A. J. Filkins and J. A. Meaden. Space 213.

Dieter Nut Company, New York, N. Y.—Lock nuts. Space 4.

Dixon Crucible Company, Jos., Jersey City, N. J.—Graphite products for railway use, including lubricating graphite, graphite paint, locomotive front end preparations, graphite crucibles and general railway supplies. Represented by L. H. Snyder, H. A. Nealley, H. W. Chase, John Tucker and William Houston. Space 24.

Dressel Railway Lamp Works, New York, N. Y.—High candle power headlights; combination oil and electric engine lamps; tail lamps; platform marker lamps; automatic caboose lamps; electric, acetylene and oil gage lamps; cab card holders. Represented by F. W. Dressel, Robert Black, H. S. Hoskinson, E. W. Hodgkins, P. P. Claiborne, F. Dressel and F. W. Edmunds. Spaces 384, 385.

Duff Manufacturing Company, The, Pittsburgh, Pa.—Barrett track jacks and automatic lowering jacks; Duff ball bearing screw jacks and the Duff-Bethlehem forged steel hydraulic jacks. Represented by Edw. A. Johnson and Carl A. Methfessel. Space 584, 585.

Duntley Pneumatic Tool Company, Chicago, Ill.—Chippers; riveters and air drills. Represented by J. W. Duntley, Harry Keller and P. H. Gilleland. Space 152.

Dupont de Nemours Powder Company, E. I., Wilmington, Del.—"Fabricoid," an artificial leather for coach curtains and seats. Represented by C. Hallock Silkman and H. W. Wivel. Space 331.

Durbin Automatic Train Pipe Connector Company, St. Louis, Mo.—Automatic air and steam hose coupling and train telephone system. Automatic safety car coupler. Represented by V. S. Durbin, J. F. Blackburn, A. H. Burchard and J. F. Durbin. Space 309, 311.

Eagle Glass & Manufacturing Company, Wellsburg, W. Va.—Locomotive oil cans; bench oilers; shop torches; locomotive torches; locomotive tallow pots; tank buckets; supply cans; grease and dope buckets; cement buckets; wrecking torches, etc. Represented by J. L. Fusner and S. O. Paull. Space 600.

E. D. E. Company, Chicago, Ill.—Insulation for refrigerator cars, passenger cars and ice houses; ventilator for refrigerator car; grain door; track insulation for steam and electric roads; car stopper; thermometer well for refrigerator car. Represented by Frank M. Gilmore. Space 11.

Edison Storage Battery Company, Orange, N. J.—Five exhibition boards showing the assembly and parts of the various sized cells made by this company; car lighting battery equipment; short circuit test on a fully charged Edison battery. Represented by W. G. Bee, R. Bachman, H. G. Thompson, T. V. McGinnis and O. R. Hildebrand. Spaces 625, 627.

Edwards Company, The O. M., Syracuse, N. Y.—Window fixtures; extension platform trap doors; all metal shade rollers; all metal sash balances; padlocks. Represented by O. M.

Edwards, C. H. Rockwell, E. F. Chaffe, W. C. Bradbury, T. P. O'Brian and Roy T. Axe. Space 521, 523.

Electric Controller and Manufacturing Company, Cleveland, Ohio.—Lifting magnet in operation; automatic motor-starters in operation; float switches and pressure gauges; automatic machine tool controllers in operation; type Q electric brakes; crane controllers; circuit breakers; magnetic switches; protective panels. Represented by R. G. Widdows, C. S. Dauler, W. C. Jackson and E. C. Ryan. Space 178.

Electric Storage Battery Company, Philadelphia, Pa.—Storage batteries for car lighting, signal, automobile and ignition service. Represented by H. E. Hunt, D. P. Orcutt, Frank Kalas and J. R. Williams. Space 401.

Emery Pneumatic Lubricator Company, The, St. Louis, Mo.—Emery brake cylinder lubricant; Emery pneumatic lubricators for air brake equipment on locomotive and passenger cars. Represented by E. A. Emery, N. J. McAloney and Alex. Steiner. Space 626.

Enterprise Railway Equipment Company, Chicago, Ill.—Side dump hopper car; bottom dump ore car; bottom dump coal and coke car; side and center dump ballast car; center dump hopper coal car; bottom dump duplex hopper coal car. All 50-ton capacity. Represented by Argyle Campbell. Space on exhibit track.

Fairbanks Company, The, New York, N. Y.—Railroad track scales; platform scales; valves; dart unions and flangers. Represented by L. B. Mann, F. Mattern and F. Boraeson. Space 525.

Fairbanks-Morse & Company, Chicago, Ill.—Sectionalized No. 32 gasoline section motor car. Represented by A. A. Taylor, E. M. Fisher, C. T. Fugitt, W. W. Adams and F. H. Douglas. Space 584, 585.

Flannery Bolt Company, Pittsburgh, Penna.—Tate flexible staybolts; Tate adjustable crown stays; tools for applying Tate staybolts; "F. B. C." arch bar nut locks. Represented by J. Rogers Flannery, Jas. J. Flannery, Wm. M. Wilson, B. E. D. Stafford, Thos. R. Davis and Geo. E. Howard. Space 540, 542.

Forged Steel Wheel Company, New York, N. Y.—Forged Steel wheels. Represented by J. M. Hanson, J. B. Brady, R. L. Gordon, Wm. Libkemann, J. P. Rapp, H. G. Macdonald, J. E. Bradley, E. S. Keith and Howard Carlton. Space 28.

Forsyth Brothers Company, Chicago, Ill.—Various metal formations, including unit-sections for sides of cars; metal sash and doors; sash attachments and safety deck sash ratchets; cast steel yokes, with key connection, also drawbar radical and centering devices; high capacity buffing device and draft gears. Represented by George H. Forsyth, A. H. Sisson, Wm. Wampler and E. S. Taylor. Space 601, 545.

Ft. Pitt Malleable Iron Company, Pittsburgh, Pa.—Malleable iron castings. Represented by Frank J. Lanahan. Space 629.

Foster Company, The Walter H., New York, N. Y.—General selling agents for machine tools. Represented by Walter H. Foster and Herbert R. Kenah. Space 119-121.

Franklin Manufacturing Company, The, Franklin, Pa.—Franklin 85 per cent. magnesia boiler lagging and coverings and cements; asbestos supplies of all natures for railroad use; Franklin asbestos lumber smoke jacks. Asbestos "Carline." cotton and wool waste; perfection journal box packing; asbestos shingles, sheathing and corrugated. Represented by R. J. Evans, H. S. Hayden, L. B. Melville, E. R. Rayburn and H. S. Hayward. Space 26.

Franklin Railway Supply Company, New York, N. Y.—Franklin automatic fire door; grate shaker; flexible joint, between cars; water joint; flexible metallic roof. Represented by J. S. Coffin, S. G. Allen, R. G. Colburn, W. L. Allison, C. L. Winey, W. H. Coyle and J. L. Mohun. Space 412, 414.

Frost Railway Supply Company, The, Detroit, Mich.—Harvey friction spring gears; Detroit Metal Weather Strip. Represented by Harry W. Frost, George L. Harvey and George A. Cooper. Space 558.

Galena-Signal Oil Company, Franklin, Pa.—Reception Booth. Represented by E. H. Baker, W. A. Trubee, Geo. L. Morton, Wm. Holmes, W. J. Walsh, J. E. Hall, B. H. Grundy, C. C. Steinbrenner, E. V. Sedgwick, H. Hillyer, W. E. Augur, W. W. Breckenridge, W. E. Brumble, J. W. Bunn, J. A. Graham, E. W. Grieves, G. E. McVicar, W. E. Maher, A. V. Manchester, R. F. Menefee, C. G. Melvin, L. H. Palmer, W. O. Taylor, W. J. Vance and A. B. Wright. Space 38.

Garlock Packing Company, The, Palmyra, N. Y.—Throttle and air pump packings; superheat sheet packing; special packings for accumulators, compressors and general shop purposes. Represented by H. N. Winner, J. P. Landreth, T. P. Dunham, J. F. Franey and C. W. Brennan. Space 510.

General Electric Company, Schenectady, N. Y.—Motors, air compressor, controllers; rheostats; breast drills; steam and air flow meters; battery truck crane; ozonator; soldering irons; fans; headlights; arc lamps; 5 K. W. Curtis turbine; mercury arc rectifiers; cloth and steel pinions; ammeters; railway signal volt ammeter; cable display cabinet. Represented by J. G. Barry, C. E. Barry, W. B. Potter, A. W. Jones, J. W. Ham, C. D. Knight, Frank Rhea, R. E. Wooley, C. Fair, L. W. Shugg, R. A. Lewis, W. J. Clark, C. C. Pierce, W. O. Kellogg, C. A. Raymond, A. I. Totten, H. Schroeder and A. L. Broe. Space 350 to 363.

General Railway Supply Company, Chicago, Ill.—Working models of railway passenger car devices. Metallic (steel) sheathing; National steel trap doors; Perfection sash balances; Resisto insulation; Imperial car window screens; Flexolith composition flooring; National vestibule curtain catches; Eclipse deck sash ratchets; National standard roofing. Represented by H. U. Morton, W. L. Conwell, F. L. Wells, W. S. Humes and J. F. Oelerich. Space 570, 571.

Gilbert & Barker Manufacturing Company, Springfield, Mass.—Storage tanks with measuring and non-measuring pumps for the storage of lubricating and heavy paint oils; portable gasolene tanks for garages; underground storage tanks with measuring and non-measuring pumps for public and private garages; and specialties used in the handling of gasolene and oils. Represented by H. C. Worrall. Space.

Gold Car Heating & Lighting Company, New York, N. Y.—Gold's combination pressure and vapor system; straight vapor system; thermostatic temperature regulator; new ideal pressure regulator; cyclone ventilators; heat storage system for refrigerator cars; wedge lock steam hose couplers; electric heaters. Represented by Edward E. Gold, E. B. Wilson, A. B. Strange, F. A. Purdy, W. H. Stocks, A. D. Stuver, J. M. Stayman, George F. Ivers, F. H. Smith, E. J. Ronan, J. O. Brumbaugh, A. E. Robbins and F. O. Bailey. Space 301, 303, 305.

Goldschmidt Thermit Company, New York, N. Y.—Thermit of various kinds and appliances; metals and alloys produced by the alumino-thermic process; specimen pipe welds and apparatus for making same; motion pictures and transparencies to show the operations done by the Thermit process. Represented by Dr. Hans Goldschmidt, Wm. C. Cuntz, W. R. Hulbert, H. S. Mann, H. D. Kelley and J. G. McCarty. Space 333, 335.

Gould Coupler Company, New York, N. Y.—Gould "Simplex" system of electric train lighting. "Z" type of couplers—standard and special; "Z" type tender couplers; locomotive spring buffer; Gould friction striking plate buffer; friction draft gear; top and bottom operative passenger couplers; Gould "Z" type truck bolsters; malleable iron journal boxes; Gould truck side frame. Represented by F. P. Huntley, Geo. G. Milne, Dr. C. W. Gould, Clarence E. Rood, Geo. S. Berger and W. F. Richards. Space 574, 575.

Gould & Eberhardt, Newark, N. J.—One 24" new high power type, Eberhardt's patent doube triple quick stroke shaper arranged with adjustable speed motor, with automatic electrical starting and braking device One sectional frame and inside gearing of 16" shaper showing the interior construction. Represented by Fred L. Eberhardt, H. Ezra Eberhardt, Secretary and Chas. L. Cameron. Space 137.

Greene, Tweed & Company, New York, N. Y.—Palmetto packing, round and square, for high steam pressures; Palmetto packing, twist, for small globe valves, etc.; Palmetto packing in sets for railroad service; Manhattan packing for low steam and hydraulic pressures. Favorite reversible ratchet wrench. Represented by F. E. Ransley and L. J. Van De Wall. Space 590.

Greenlaw Manufacturing Company, The, Boston, Mass.—Flexible metallic hose for steam, air or oil between engine and tender, or between cars for steam and air. Flexible joints for roundhouse work and for car heating at terminals or car yards. Represented by H. A. Royce, W. A. Greenlaw and A. L. Greenlaw. Space 316, 318.

Griffin Wheel Company, Chicago, Ill.—Car wheels. Represented by C. P. Dennett, C. K. Knickerbocker, H. N. Sc tt, W. A. Bennett and A. A. Hale. Spaces 165, 167.

Grinden Art Metal Company, Brooklyn, N. Y.—Holow steel car doors; cold drawn steel mouldings. Represented by Wm. J. Grinden and Frank V. Grinden. Space 308.

Grip Nut Company, Chicago, Ill.—Grip nuts; monogram ladder fastenings; grip nut angle wrenches; grip holding nuts and metal dust guards. Represented by E. R. Hibbard, J. W. Hibbard, W. E. Sharp, W. G. Willcoxson, DeF. Lillis, Clifford Beaumont and Ben. Klein. Space 556, 557.

Halcomb Steel Company, Syracuse, N. Y.—Samples of crucible and electric welded steels; specimens of chrome vanadium steel. Represented by Dr. John Mathews, Thomas J. Moore, Thomas J. Moore, Jr., and Elmer Titus. Space 323.

Hale & Kilburn Company, Philadelphia, Pa.—Improved "Walkover" car seats, parlor car chairs, reclining chairs for cars, steel

car interior finish, steel doors for all kinds of steel cars, steel mouldings and car fittings. Represented by V. von Schlegell, R. H. Pilson, C. W. Laskay, J. G. Bower, I. Lubersky, A. F. Old, F. C. Edson and F. F. Robb. Space 408, 410.

Hammett, H. G., Troy, N. Y.—Trojan metallic packing; Trojan bell ringers; Trojan grinding compound; triple valve bushing rollers. Represented by H. G. Hammett, E. C. Sawyer and A. O. Van Dervort. Space 365.

Harringston, Son & Company, Inc., Edwin, Philadelphia, Pa.—Hand power traveling crane, geared and plain travelers on lower flange of I-beam, peerless spur geared hoist, improved screw hoist. Represented by W. J. Somerset, A. M. Harrington and Roger Sherron. Space 143, 145.

Hartshorn Company, Stewart, Newark, N. J.—Spring rollers for car curtains, vestibules and sash balances. Represented by B. E. Bushnell. Space

Hewitt, H. H., New York, N. Y.—One car truck, transom type, full size; one car truck, bolster type, full size; one engine tender truck, full size; also quarter-size models—one car truck, transom type; one car truck, bolster type; one engine tender truck, one six-wheel passenger truck. Represented by H. H. Hewitt, M. S. Paine, S. J. Sill and C. M. Bower. Space 179, 181, 183.

Heywood Brothers and Wakefield Company, Wakefield, Mass.—Seats for railway coaches, including new type of pressed steel armrest, also seats for interurban and city cars. Represented by Bertram Berry, Scot Wade, C. W. H. Frederick and E. C. Lang. Space 624.

Higley Machine Company, New York, N. Y.—No. 25 (28-in. blade) Higley cold metal saw. Represented by C. H. Hamersly. Space 147.

Home Rubber Company, Trenton, N. J.—Rubber Mechanical Goods. Represented by A. R. Foley. Space 375.

Hubbard & Company, Pittsburgh, Pa.—Railroad track tools, track shovels, locomotive scoops, pole line hardware, Pierce insulator pins and brackets, standard and special washers, steel stampings. Represented by John W. Hubbard, John J. Brooks and R. L. Mason. Space 402.

Hunt Company, C. W., West New Brighton, N. Y.—Coal handling machinery, motion picture of cargo cranes, P. R. R. at Greenville, N. J.; automatic railway model, industrial railway, train of cars; coaling station model, gravity bucket conveyor model, hoisting and transmission rope, photos of coal-handling plants and machinery. Represented by A. C. Summers, J. Day Flack, J. P. Mewshaw and R. E. Boller. Spaces 169, 171, 173, 175.

Hunt-Spiller Manufacturing Corporation, South Boston, Mass.—Eccentrics, straps, driving boxes, shoes and wedges, crosshead shoes, guides, superheater headers, false valve seats, side rod bushings, cylinder packing, cylinder bushings, pistons, piston valve cages, piston valve packing, air pump cylinder bushings and packing, knuckle pin bushings. Represented by W. B. Leach, Frederick Parker, J. G. Platt, V. W. Ellet and J. M. Monroe. Space 560, 561.

Illinois Steel Company, Chicago, Ill.—With Carnegie Steel Company. Spaces 418, 546, 547.

Independent Pneumatic Tool Company, Chicago, Ill.—Thor pistol corner motors, air grinders, a new two-piece long stroke ton air drills, pneumatic hammers, stay bolt drivers, close-riveting hammer, electric drills. Represented by James B. Brady, W. O. Jacquette, John D. Hurley, F. W. Buchanan, R. S. Cooper, George A. Gallinger, R. T. Scott, J. J. Keefe, J. P. Bourke, T. J. Carroll, H. F. Finney, W. R. Gummere, H. H. Hendricks, W. A. Johnson, G. J. Lynch, F. J. Passino, V. W. Robinson, C. B. Ross and Geo. C. Wilson. Space 587, 589.

Industrial Requirements Company, Philadelphia, Pa.—Leather material. Represented by E. Boyd Weitzel. Space 142.

International Oxygen Company, New York, N. Y.—I. O. C. system generators for producing pure oxygen and hydrogen; Victor oxyhydrogen torches; Eyeosee oxy-acetylene torches; Holder pressure acetylene generators; I. O. C. oxygen, hydrogen and acetylene regulating and reducing valves. Represented by E. W. Irwin, H. L. Barnitz, A. A. Heller and I. H. Levin. Space 307.

Jacobs-Shupert U. S. Fire Box Company, The, Coatesville, Pa.—One Jacobs-Shupert fire box and back end complete with straight side sheets. One Jacobs-Shupert fire box and back end complete of the "O. G." type of side sheets. One Jacobs-Shupert fire box (inside shell only). Throat sheets fire box setcions, stay sheets, etc., in their various stages of development. Samples of special flanging work. Represented by A. F. Huston, C. L. Huston, W. H. Hamilton, P. R. Baker, Mr. Goodfellow, C. Ducas, A. W. Whitford and C. H. Coleman. Space 180, 182.

Jenkins Bros., New York, N. Y.—Brass, iron and steel valves of all types for power plants, railroad shops and equipment, heating and water systems. Sheet packing, pump valves and other mechanical rubber goods for railroad work. Represented by B. J. Neely, C. B. Yardley, Jr., and Alfred Engle. Space 610, 612.

Jerguson Gage & Valve Company, Boston, Mass.—Locomotive gages. Represented by Geo. L. Huntress. Space 327.

Jessop & Sons, Incorporated, William, New York, N. Y.—Specimens of Jessop's crucible steel; various grades and manufactured articles made from same. Represented by John E. Sandmeyer, O. H. Reynolds, E. M. Britton and T. S. Hanna.

Johns-Manville Company, H. W., New York, N. Y.—Refrigerator and steel passenger car insulation; waterproofing and mastic samples; electrical materials; air pump packings; Vitribestus pipe coverings; high and low pressure pipe coverings; train pipe coverings; wool felt roofing; car roofing; asbestos roofing; throttle and steam hammer packings; Transite asbestos shingles; smoke jack; ebony asbestos wood; ventilators; fire resisting cements; asbestos car sill covering; friction tapes and splicing compounds; packings; gaskets; diaphragm canopy covers; locomotive laggings; indurated fibre conduit for electric wiring; Sanitor toilet seats. Represented by J. E. Meek, G. A. Nicol, C. W. Gearhart, J. H. Trent, F. J. Horne, J. C. Younglove, H. G. Newman, C. E. Murphy, P. C. Jacobs and G. Christenson. Space 580, 581.

Joliet Railway Supply Company, Chicago, Ill.—"Huntoon brake beams," standard M. C. B. No. 1 and No. 2 freight beams; standard passenger and tender beams and beams for "high speed" and P. C. air brake equipment. Perry roller side bearings for passenger, freight and interurban cars and locomotives. Perry-Hartman self-centering anti-friction radial truck. Represented by E. A. Laughlin, A. G. Bancroft, Jos. D. Granville and Jos. F. Leonard. Space 541, 543.

Jones & Laughlin Steel Company, Pittsburgh, Pa.—Open hearth and Bessemer steel, rounds, flats, squares, hexagons, bars, plates, etc. Steel sheet piling; power transmission machinery; cold rolled teel shafting; concrete reinforcing bars; chains; steel wire nails; tinplate; barbed wire; various wire products, including screw stock, railroad spikes, light rails and connections. Structural steel, beams, angles, channels. Represented by J. K. Barker, C. S. Bradley, G. C. Fogwell, Robert Geddis, Roland Gerry, T. C. Ham, H. F. Holloway, R. M. Kilgore, A. B. Marble, George B. Mitchell, W. T. Mossman, A. C. Pollock and Frank S. Slocum. Space 407.

Joyce-Cridland Company, The, Dayton, Ohio.—Jacks. Represented by Geo. M. Llewellyn, Chas. D. Derby, P. J. Ford and W. Irving Clark. Space 524, 526.

Keyoke Railway Equipment Company, Chicago, Ill.—Space 321.

Keystone Drop Forge Works, Chester, Pa.—Keystone connecting links; Keystone safety shackle hooks. A full line of standard and special drop forgings. Represented by Geo. H. Berlin, Chas. F. H. MacLaughlin and Wm. J. McDevitt. Space 512.

Keystone Lubricating Company, Philadelphia, Pa.—Keystone locomotive journal box; various densities; Keystone grease. Represented by A. C. Buzby, H. A. Buzby, W. F. Buzby, W. E. Harrington, T. O. Organ, C. A. Hopper and J. T. Butler. Space 154, 156.

Knight Pneumatic Sander Company, Huntington, Ind.—Sanders for locomotives and interurban equipment. Represented by R. G. Mitchell and Daniel Shaeff. Space 632.

Landis Machine Company, Waynesboro, Penna.—1½" double head motor driven bolt cutter; 2" double head motor driven bolt cutter with lead screw; automatic die heads for turret lathes and screw machine; solid adjustable die heads for screw machines; pipe die heads for pipe threading machines; different styles and types of dies; samples of threaded product. Represented by H. L. Fisher, Ira D. Grove, Carl F. Meyer and J. W. Willis. Space 123.

Lehon Company, The, Chicago, Ill.—Roofing and insulating papers. Represented by Thomas Lehon. Space 18.

Locomotive Improvement Company, The, Clinton, Iowa.—Full sized driving box, showing Markel's removable driving box, brass and lateral motion plates; model showing flangeless shoes and wedges; models showing solid head rod, front and back ends; drawing of rod, full sized. Represented by L. W. Barker and E. J. Fuller. Space 13.

Locomotive Superheater Company, New York, N. Y.—Model of Schmidt top header type superheater. Model showing method of setting superheater flues in boiler. Model of superheater unit. Represented by Simon Hoffmann, George L. Bourne, Gilbert E. Ryder and William Boughton. Space 412, 414.

Lucas Machine Tool Company, Cleveland, Ohio.—No. 33 "Precision horizontal boring, drilling and milling machine. Represented by W. L. Cheney and J. A. Leighton, Jr. Space 106.

Lunkenheimer Company, The, Cincinnati, Ohio.—Regrinding, renewo, ferrenewo, globe, angle and cross valves; iron body, puddled semi-steel, crucible cast steel globe angle and cross valves; non-return boiler stop valves; victor gate valves; pop

valves; lubricators, stop cocks, etc. Represented by Lane Thompson and Elmer Ritter. Space 532, 534.

McConway & Torley Company, The, Pittsburgh, Pa.—Buhoup flexible truck; Buhoup 3-stem passenger coupler; Pitt passenger coupler; Janney passenger coupler; Penn freight-coupler, with overhead and underneath release; steel castings. Represented by Stephen C. Mason, E. M. Grove, H. C. Buhoup and I. H. Milliken. Space 501, 503, 505.

McCord & Company, Chicago, Ill.—McCord malleable iron and vanadium cast iron journal boxes for freight, passenger and engine tender equipment; draft gear; spring dampener; force feed locomotive lubricator in operation. Represented by Morrill Dunn, J. A. Lamon, W. J. Schlacks, R. L. McIntosh, H. E. Creer, A. C. McCord and H. S. Whitehair. Spaces 511-513.

McCord Manufacturing Company, Chicago, Ill.—Universal window fixtures, consisting of flexible weather stripping; metal weather stripping; gravity wedging sash locks and racks; two new types of locks; sash balances; deck sash ratchets; copper insulated adjustable sash; sash lifts; McCord Universal air hose protector; drawn metal mouldings. Represented by Benjamin S. McClellan and Robert A. Flum. Space 507, 509.

McCuen, J. P., Cincinnati, Ohio.—Car Couplers. Represented by J. P. McCuen. Space 182.

McGraw Publishing Company, New York, N. Y.—Copies of Electric Railway Journal, Electric Railway Dictionary, Electric Railway Directory, Electric Railway Manual, Electrical World Engineering Record. Views of offices and printing plant. Represented by Hugh M. Wilson, D. T. Pierce, Henry W. Blake, Walter Jackson, Frank Kingsley, C. A. Babtiste, W. K. Beard, Harold Rudd and Joseph A. Kucera. Space 7.

Main Belting Company, Philadelphia, Pa.—A specially constructed and treated belt for car lighting purposes. Represented by W. E. Fawcett and O. K. West. Space 188.

Manning, Maxwell & Moore, Inc., New York, N. Y.—Will be representative Hendey lathes, shapers, milling machines, Gridley automatic machines, Cincinnati gear cutters and crank planers, Reed engine lathes, National heading machines; also a comprehensive exhibit embracing Hancock locomotive inspirators, check valves, steam valves and hose strainers, Consolidated locomotive pop safety valves and Ashcroft steam gauges. Represented by Frank P. Smith, James B. Brady, P. M. Brotherhood, Kester Barr, Robert A. Bole, W. H. McIntyre, J. N. Derby, H. P. Eilers, L. H. Mesker, M. A. Sherritt, Joseph H. Bush, John J. Faas, Charles L. Brown, A. J. Babcock, Thos. Stephens, W. H. Williston, F. C. Blanchard and B. T. Williston. Space 108 to 132.

Manufacturers' Exhibit of Railway Supplies, Chicago, Ill.—Represented by W. N. Mitchell and R. S. Mitchell. Space 527.

Massachusetts Mohair Plush Company, Boston, Mass.—Car seats of various manufacturers. Samples of all qualities of plain and figured plushes. Represented by W. W. Melcher. Space 22.

Mid-Western Car Supply Company, Chicago, Ill.—Steel underframe in combination with body and truck bolster; Anderson friction draft gear; Mid-Western key yoke attachment, and spring and friction buffer block on exhibit track. Anderson friction draft gear type "A" and "B." Represented by J. E. Forsyth, Geo. E. Pratt and A. L. Jacobs. Space 328.

Midvale Steel Company, The, Philadelphia, Pa.—One 33" steel tired wheel, bolted type of fastening, rolled steel center; one 33" steel tired wheel, bolted type of fastening, cast iron spoke center; one 33" rolled steel freight wheel; one 36" rolled steel coach wheel; one-heat treated driving axle. Represented by H. M. Doomer, D. Vincent Foster, Guilliam Aertsen, Ernest Harrah, T. W. Illingworth, A. E. Goodhue, Chas. Tietze, Col. Thompson, J. Bradley Patterson and W. S. Edger. Space 640.

Milburn Company, The Alexander, Baltimore, Md.—Milburn standard oxy-acetylene welding and cutting outfit complete, especially adapted to steam railroad practice. The steam acetylene generator headlight, a device utilizing waste steam, lighting the headlight by acetylene gas. Milburn lamps, portable acetylene construction, wrecking and inspection lights. Represented by C. R. Pollard, Jr., W. M. McCauley and Fredk. M. Maley. Space 208, 210.

Moran Flexible Steam Joint Company, Louisville, Ky.—Flexible joints for steam, air, gas and liquid automatic barrel fillers. Represented by Thomas W. Moran and C. H. Jenkins. Space 207.

Mudge & Company, Burton W., Chicago, Ill.—Garland car ventilators; Garland refrigerator car door fastener. Represented by Burton W. Mudge Herbert Green, Robert M. Smith and George W. Bende. Space 400.

Murphy Equipment Company, New York, N. Y.—Forged truck frame. Space on exhibit track.

Nathan Manufacturing Company, New York, N. Y.—Injectors; lubricators; boiler washer and tester; steam fire extinguisher; Klinger water gauges; Hart blower valves; Hart globe and angle valves. Represented by Alfred Nathan, Edward S. Toothe, J. C. Currie, Otto Best, Chas. R. Kearns, J. S. Seeley, L. Kassander, N. W. Anthony and Edward Laterman. Space 578, 579.

National Boiler Washing Company, Chicago, Ill.—Boiler washouts systems. Represented by W. W. White. Space 4.

National Lock Washer Company, The, Newark, N. J.—National lock washers; car curtains; curtain fixtures; sash locks; sash balances. Represented by F. B. Archibald, R. L. Brown, W. C. Dodd, J. H. Horn and D. Hoyt. Space 533, 535.

National Malleable Castings Company, The, Cleveland, Ohio.—Couplers; brake staff mechanism; malleable iron castings. Represented by F. R. Angell, T. Aishton, C. A. Bieder, W. E. Coffin, C. Gasper, R. T. Hatch, H. D. Hammond, J. H. Jaschka, C. L. Johnston, G. V. Martin, J. H. Merrill, Benj. Nields, Jr., R. H. Pilson, J. H. Slawson, J. A. Slater, L. S. Wright, G. F. Wilhelmy and E. O. Warner. Space 613, 615.

National Tube Company, Shelby Steel Tube Company, Pittsburgh, Pa.—Hot-rolled locomotive tubes; superheated tubes; Kewanee unions; N. T. C. regrinding valves. Represented by G. N. Riley, P. J. Conrath, O. H. Kelly, J. T. Goodwin, J. A. Dillon, J. O. Ramsey, L. R. Cummings, J. G. Bateman, W. S. Bitting, J. E. Fleming, J. J. Kennedy, B. F. Bart.

Nelite Work of General Electric Company, Cleveland, Ohio.—Complete line of lighting units for all types of car lighting service and lighting units for all classes of industrial and shop lighting, office, station, waiting-room and platform lighting. Represented by Arthur J. Sweet, L. C. Doane and N. B. Hazeltine. Space 337.

Newhall Engineering Company, George M., Philadelphia, Pa.—Photographs of wrecking, locomotive and transfer cranes, pile drivers, etc., built by Industrial Works, Bay City, Michigan. Photographs of electric overhead traveling cranes built by Case Crane Company, Columbus, Ohio. Represented by David Newhall, Morton L. Newhall, A. F. Baumgarten, William L. Brown and William Waring. Space 386, 387.

Newton Machine Tool Works, Philadelphia, Pa.—Internal cutting, cold saw cutting-off machine. Represented by H. W. Champion, N. P. Lloyd and H. W. Brown. Space 139, 141.

New York Air Brake Company, The, New York, N. Y.—Exhibition rack representing the electro-pneumatic brake equipment for a locomotive and ten cars. This includes a steam driven generator from which the current is obtained. A new triple valve for freight service is shown in section. Represented by H. F. Bickel, W. T. Henry, C. E. Leach, B. J. Minnier, B. Pratt and F. M. Whyte. Space 330 to 338.

Nickel Chrome Chilled Car Wheel Company, Pittsburgh, Pa.—Two 33-inch nickelized chilled car wheels. Represented by Robert C. Totten and Stephen D. Barnett. Space 519.

Niles-Bement-Pond Company, New York, N. Y.—Niles new model car wheel borer, Pond reversing motor drive planer. Represented by James K. Cullen, George F. Mills, Charles L. Lyle, J. T. McMurray and Edward L. Leeds. Space 100.

Norton Company, Worcester, Mass.—Complete display of Norton grinding wheels from the small wheels for internal grinding, a fraction of an inch in diameter, to the large, heavy coarse wheels used for grinding steel and iron castings, wheels, axles, etc. An attractive collection of photographs of the Norton car axle grinding machine. Medical exhibit. Represented by E. W. Dodge, Carl F. Dietz, Geo. W. Thomson and Geo. S. Welker. Space 144, 146.

Norton Grinding Company, Worcester, Mass.—Car axles and car wheels ground on the Norton grinding machine. Grinding machines and parts equipped with protecting devices. Represented by C. O. Smith, Charles H. Norton and H. N. Cudworth. Space 144, 146.

Norton, Inc., A., Boston, Mass.—Various types of jacks. Space 607.

O'Malley-Beare Valve Company, Chicago, Ill.—Multi-plate valves and parts. Represented by Edward O'Malley and Thomas O'Malley. Space 218.

Oxweld Acetylene Company, Chicago, Ill.—Oxy-acetylene and oxy-hydric welding apparatus in operation cutting metal twenty-four inches thick. A demonstration of the welding of a complete set of boiler tubes into the flue sheet. Represented by W. J. Knapp, G. E. Kershaw, W. J. Fritz, C. B. Moore and J. A. Warfel. Space in the Acetylene Annex, 3-4 Pier End.

Pantasote Company, The, New York, N. Y.—Pantasote car curtains and upholstery. Agosote headlinings and interior trims for passenger cars. Represented by John M. High, W. A. Lake and A. S. Barrows. Space 404, 406.

Parkesburg Iron Company, The, Parkesburg, Pa.—Charcoal iron boiler tubes. Represented by H. A. Beale, Jr., W. H. S. Bate-

man, C. L. Humpton, H. C. Hunter, J. A. Kinkead, L. P. Mercer, J. H. Smythe and George Thomas, 3d. Space 388.

Parsons Engineering Company, Wilmington, Del.—Parsons system of combustion applied to a locomotive fire box. Full size steel model made in section. Space 514.

Pease Company, The C. F., Chicago, Ill.—The Pease peerless blue printer with automatic washing and drying machine; Pease peerless direct blue line equipment; Simplex blue print paper coating machine; motor driven trimming table. All in operation. Represented by C. F. Pease, P. M. Morgan, T. K. Murney and J. J. Newlin. Space 170.

Pennsylvania Flexible Metallic Tubing Company, New York, N. Y.—Metal hose and flexible metallic tubing for conveying air, steam, water, gas and oil; flexible copper hose for connecting locomotive to boiler washing line. Also blower connection to locomotive. Represented by J. M. Odenheimer, C. A. Meyer and B. C. Willis. Space 312, 314.

Pilliod Company, The, Swanton, Ohio.—Model of Baker locomotive valve gear. Represented by R. H. Weatherly, F. S. Wilcoxen, K. J. Eklund, R. G. Graham, R. F. Darby, C. M. Jennelle and F. E. Pilliod. Space 562, 563.

Pittsburgh Steel Foundry Company, Pittsburgh, Pa.—Two cast steel truck side frames interlocking into cast steel journal boxes with an interlocking cast steel spring plank. Represented by H. V. Seth, O. S. Pulliam and John Allison. Space 611.

Pneumatic Jack Company, Inc., Louisville, Ky.—Tandem cylinder pneumatic jacks; car and roundhouse jacks; locomotive jacks standard and special journal jacks. Represented by L. J. Dittmar and J. S. Leake. Space 376.

Pocket List of Railroad Officials, The, New York, N. Y.—Pocket List of Railroad Officials. Represented by J. Alexander Brown, Harold A. Brown and Chas. L. Dinsmore. Space 7.

Pressed Steel Car Company, New York, N. Y.—Photographs of product in booth. Represented by J. C. Anderson, L. O. Cameron, O. C. Gayley, H. S. Hammond, C. A. Lindstrom, J. F. MacEnulty, J. H. Mitchell, C. E. Postlethwaite, N. S. Reeder, J. H. Regan, M. S. Simpson, J. S. Turner and W. H. Wilkinson. Space 620.

Pyle-National Electric Headlight Company, Chicago Ill.—Pyle-National latest type "E" electric turbo generator set for locomotive electric headlights. Represented by R. C. Vilas, H. P. Bayley, M. A. Ross, I. Will Johnson, C. P. McGinnis and Chas. W. Drake. Space 537.

Pyrene Manufacturing Company, New York, N. Y.—Pyrene fire extinguisher in three styles enameled, brass and nickel plated Represented by E. M. Davidson, George H. Peterson and Thomas Areson. Space 201.

Quigley Furnace & Foundry Company, Springfield, Mass.—Drawings of the Quigley furnaces. Represented by C. K. Lasseter, W. S. Quigley and W. G. Ferguson. Space 121.

Railway Age Gazette, New York, N. Y.—Publishers of the Railway Age Gazette, American Engineer and Railway Journal, Signal Engineer, Daily Railway Age Gazette and books on the subject of steam transportation. Represented by E. A. Simmons, L. B. Sherman, Samuel O. Dunn, Bradford Boardman, C. R. Mills, Henry Lee, Roy V. Wright, William Forsyth, R. E. Thayer, F. S. Dinsmore, W. E. Hooper, E. S. Faust, W. W. Newcomb, A. E. Hooven, T. F. Crossman, F. H. Thompson, E. A. Averill, W. D. Horton, K. G. Cloud and Miss Gegen. Space 1.

Railway Electrical Engineer, Chicago, Ill.—Railway publication. Represented by Edward Wray. Spaces 625-627.

Railway List Company, The, Chicago, Ill.—Railway Master Mechanic, Monthly Official Railway List; Railway Engineering and Maintenance of Way. Represented by William E. Magraw, Chas. S. Myers, L. F. Wilson J. M. Crowe and O. W. Middleton. Space 35.

Railway Materials Company, Chicago, Ill.—Steel back brake shoes and Ferguson shop furnaces. Represented by T. B. Cram, E. C. Folsom, Geo. Hoeffle, C. M. Mendenhall, J. F. Schurch and W. M. Simpson. Space 559.

Railway Utility Company, Chicago, Ill.—Exhaust ventilators; intake ventilator and air washer; gas lamp jack; oil lamp jack; thermostatic control of car heating with steam, electricity and hot water systems; steam hose couplers; locomotive equipment with flexible metallic joints; automatic freight car door locks; electric vacuum car cleaners. Represented by Wm. J. Pine, Lee P. Hynes, E. J. Magerstadt, J. P. Gallagher, C. A. Luckey and E. R. Field. Space 617.

Railway & Engineering Review, Chicago, Ill. Railway newspapers. Represented by Willard A. Smith, P. G. Stevens and Harold A. Smith. Spaces 12-14.

Ralston Steel Car Company, Columbus, Ohio.—Steel car on exhibit track. Represented by Jas. S. Ralston, A. A. McAdam, W. T. Sheldon and F. E. Symons Space on exhibit track.

Reliance Electric and Engineering Company, Cleveland, Ohio.—Reliance adjustable speed motors; Oesterlein motor-driven milling machine; D. C. & A. C. constant speed motors; motor headstocks for woodworking lathes. Represented by H. M. Hitchcock, D. G. Darling, A. W. Ray, E. A. Lewis and S. C. Potter. Space 134, 136.

Remy Electric Company, Anderson, Ind.—The American Electric Headlight. Represented by T. B. Arnold, G. V. Bain, H. W. Griffith and L. A. Darling. Space 205.

Restein Company, Clement, Philadelphia, Pa.—Locomotive air pump packing; throttle steam packing; locomotive steam way packing; steam hammer packing; hand hole and man hole gaskets; tender hose; steam hose; flexible metallic connections for between engine and tender. Represented by H. O. Fettinger, Norman B. Miller and W. J. Cromie. Space 16.

Richmond Staybolt Drilling Machine Manufacturing Company, Richmond, Va.—A staybolt drilling machine. Represented by E. W. Fishburne. Space 138.

Robinson Coupler Company, The, Washington, D. C.—The Robinson automatic air and steam hose connector. Represented by Clinton M. Smith. Space 32.

Rochester Germicide Company, Rochester, N. Y.—Disinfectants; perfection drinking fountains; liquid soap and urns; sanitary paper towels; sanitary supplies. Represented by C. S. Whitman. Space 382.

Rubberset Company, Newark, N. J.—General line of Rubberset paint brushes and products of the Rubberset Company. Represented by A. L. Holtzman. Space 536.

Safety Car Heating and Lighting Company, New York, N. Y.—Pintsch car lighting system; safety electric axle dynamo lighting system; thermo jet car heating system; Pintsch and electric car lighting fixtures; steam traps, valves, etc.; indirect lighting fixtures; hot water car heating system. Represented by R. M. Dixon, J. A. Dixon, A. C. Moore, J. S. Henry, Geo. E. Hulse, E. E. Allbee, Wm. L. Garland, Chas. B. Adams, J. G. Van Winkle, Wm. St. John, Geo. H. Chadwell, M. F. Elliott, R. H. Harvey, A. B. Mills, R. C. Shaal, L. Schepmoes, J. M. Towne and W. I. Thompson. Space, platform on pier.

Sargent Company, Chicago, Ill.—E. S. E. blow-off valve; ironclad water glass protector; "Klinger" reflex gauges; E. S. E. water glass cock; Osborne valves. Represented by Frank G. Dunbar and George H. Sargent. Space 529.

Scarrett-Comstock Furniture Company, St. Louis, Mo.—Coach seats; reclining chairs for coaches. Space 20.

Scullin-Gallagher Iron & Steel Company, St. Louis, Mo.—Six-wheel passenger car truck frame; two complete trucks showing types of truck side frames with divided journal box; double body bolster. Represented by Frank L. Norton, G. L. L. Davis, H. H. Waldron, R. A. Dugan and L. A. Shepard. Spaces 153 to 159.

Sellers & Company, Wm., Incorporated, Philadelphia, Pa.—Locomotive injectors and accessories; drivers as used upon face plates, and turret rest, of extra high power locomotive driving wheel lathe; drivers as used upon face plates, and turret rest, of extra high power car wheel lathe; hangers, couplings, bearings, for the transmission of power. Represented by Strickland L. Kneass, John D. McClintock, Charles T. Wilson, Clinton B. Conger and Walter W. Storm. Space 623.

Shelby Steel Tube Company.—In space 548 with the National Tube Company.

Simplex Railway Appliance Company, Chicago, Ill.—In space 185, 186 with American Steel Foundries.

Sinclair Company, Angus, New York, N. Y.—Railway newspapers. Represented by Angus Sinclair. Space 33.

Sprague Electric Works of the General Electric Company, New York, N. Y.—Steel armored air brake hose; steel armored car heating hose; steel armored hose for shop use; steel armored hose fittings; flexible steel conduit; Greenfielduct rigid conduit; flexible steel armored cable; outlet boxes and conduit fittings; electric fans and electric hoists. Represented by A. E. Braddell, F. W. Hall, H. H. Hornsby, C. Johnson and H. W. Uhl. Space 379, 381.

Standard Car Truck Company, Chicago Ill.—One full-size flat car equipped with roller bearing lateral and radical motion trucks. Barber roller center plate. Represented by J. C. Barber, F. L. Barber and James T. Milne. Space on exhibit track.

Standard Coupler Company, New York, N. Y.—Standard steel platforms; couplers; Sessions-Standard friction draft gears. Represented by Geo. A. Post, A. P. Dennis, E. H. Walker, R. D. Gallagher, Jr., and Geo. A. Post., Jr. Space 31.

Standard Roller Bearing Company, Philadelphia, Pa.—Roller bearing car journal boxes, assembled and dis-assembled; steel balls; journal roller bearings; agricultural roller bearings; roller motor bearings; standard taper roller bearings; roller thrust bearings; ball thrust bearings; grooved ball end thrust bearings; annular ball bearings and special anti-friction bearings. Represented by R. S. Woodward, F. M. Germane, Charles H. Machen, J. G. Cooley and M. G. Sperzel. Space 304.

Standard Steel Car Company, New York, N. Y.—Represented by J. M. Hanson, J. B. Brady, Wm. Libkeman, R. L. Gordon, H. G. Macdonald, J. P. Rapp, J. E. Bradley, E. S. Keith and Howard Carlton. Space 28.

Steel Specialties Company, Boston, Mass.—Worth wedge washer or nut safe-guard. Represented by A. L. Cole and J. W. Dana. Space 184.

Storrs Mica Company, Owego, N. Y.—Samples mica headlight chimneys and mica lantern globes; also samples Thompson indestructible hose clamp for use on air brake, air signal, steam and locomotive feed water house. Represented by A. P. Storrs and Charles P. Storrs. Space 591.

Street, Clement F., Schenectady, N. Y.—One Street locomotive stoker. Represented by Clement F. Street, T. R. Brown, N. M. Lower and Chas. F. Gernert. Space 403, 405.

Symington Company, The T. H., Baltimore, Md.—Symington journal boxes, Farlow draft gear. Represented by T. H. Symington, C. J. Symington, W. W. Rosser, E. H. Symington, I. O. Wright, B. S. Johnson, T. C. de Rossett, M. K. Kimberly, A. H. Weston and D. F. Mallory. Space 568, 569.

Tabor Manufacturing Company, The, Philadelphia, Pa.—Inserted tooth saws. Represented by H. W. Brown and Wm. J. Knoz. Space 139, 141.

Templeton, Kenly & Company, L't'd, Chicago, Ill.—Coach, locomotive and truck jack. Represented by W. B. Templeton and Arthur C. Lewis. Space 621.

Topping Brothers, New York, N. Y.—Ball bearing jacks, high speed jacks; pillow blocks; "Perfect" universal joints; spring winders. Represented by William E. Hansen and Charles L. Crabb. Space 608.

Transportation Utilities Company, New York, N. Y.—Vestibule diaphragms, curtains, diaphragm attachments, weather-proof windows, interior car curtains, steel doors and ladders, Chanarch car flooring, weather-proof window posts. Represented by W. L. Conwell and H. B. Chamberlain. Space 572, 573.

Tyler Company, The W. S., Cleveland, Ohio.—Draftac spark arrester netting; square mesh spark arrester meeting; copper, brass, galvanized, iron and steel wire cloth for car work; testing sieves. Represented by M. P. Reynolds, W. P. Cahall and L. D. Winters. Space 531.

Union Draft Gear Company, Chicago, Ill.—Cardwell friction draft gears, small drop demonstrating machine. Represented by J. R. Cardwell, L. T. Canfield, W. G. Krauser, J. E. Tarelton and J. W. Hathaway. Space 409.

Union Spring & Manufacturing Company, Pittsburgh, Pa.—Coil and elliptic springs; pressed steel box lids; steel castings; Kensington all steel journal boxes; pressed steel spring plates; cast steel journal box. Represented by A. M. McCrea, L. G. Woods, H. B. Darlington, Chas. S. Foller, A. C. Woods, T. B. Arnold, W. F. LaBonta and H. F. Ayres. Space 528, 530.

Universal Draft Gear Attachment Company, Chicago, Ill.—Cast steel draft arms; twin spring draft gear; cast steel keyed type drawbar yokes; cast steel riveted type drawbar yokes. Represented by C. J. Nash and C. C. Kinsman. Space 34.

United States Light & Heating Company, The.—New York, N. Y.—Axle light equipment, stationary and vehicle batteries, electric starters for gasoline trucks and vehicles; complete assortment of parts and partly assembled apparatus. Represented by W. P. Hawley, D. W. Pye, I. Allen Smith, W. L. Bliss, A. W. Donop, L. S. Cunny, J. A. White, William Bauer, C. W. Bradford and W. G. Davis. Space 320 to 326.

U. S. Metal & Manufacturing Company, New York, N. Y.—Reception Booth. Represented by B. A. Hegeman, Jr., Chas. C. Castle, E. D. Hillman, F. C. Dunham, H. A. Hegeman, J. J. Ross and H. K. Porter. Space 622.

United States Metallic Packing Company, The, Philadelphia, Pa.—United States metallic piston rod, valve stem, and air pump rod packings for locomotives, of both King and Multiangular type; Leach pneumatic track sander; Gollmar pneumatic bell ringer; indestructible oil cup, etc. Represented by Morris B. Brewster, C. B. Ford, Elliott Gurtiss, John S. Mace, Harry M. Wey and C. L. Mellor. Space 517.

United States Metal Products Company, New York, N. Y.—Steel doors, trim and sash for steel coaches; car seats. Represented by S. A. Walker. Space 176.

Valentine & Company, New York, N. Y.—"Valspar," a waterproof varnish; their system of car painting. Represented by Langdon P. Valentine, Lawson V. Pulsifer, I. H. Munford and J. E. Ham. Space 522.

Van Dorn & Dutton Company, The, Cleveland, Ohio.—Hard service portable electrically operated drills and reamers. Represented by Franklin Schneider, F. W. Sinram, A. K. Baxter and A. N. Frecker. Spaces 133, 135.

Virginia Equipment Company, Toledo, Ohio.—Dust guards. Represented by Lacy Y. Williams and Grafton A. Dodd. Space 377.

Vixen Tool Company, Philadelphia, Pa.—Vixen files and rail planers. Represented by Walter D. Craft and H. Rawcliffe. Spaces 164, 166.

Ward Equipment Company, New York, N. Y.—Car heating apparatus; passenger car ventilators; yard plugs and car receptacles for charging storage batteries on electrically lighted cars; Ward steam couplers; end train pipe valves; Unotherms; improved car heating material of all kinds. New equipment for locomotives using exhaust steam from the air brake pump for heating passenger trains. Represented by George B. Culver, J. F. Deems, Peter Fink, Charles E. Lowell, Rolland B. Lowther, C. F. McCuen, Lewis B. Rhodes, Lewis B. Rhodes, Jr., E. C. Post, Walter B. Van Beuren, John E. Ward and A. L. Whipple. Spaces 550, 551.

Warner & Swasey Company, The, Cleveland, Ohio.—One No. 3A universal hollow hexagon turret lathe bar capacity 3¼" chucking capacity 15". Represented by R. G. Buyer, C. J. Stilwell and F. B. Castle, demonstrator. Spaces 161, 163.

Watson-Stillman Company, New York, N. Y.—Space 538.

Welsbach Company, Gloucester, N. J.—Incandescent gas lamps and mantles for railway stations, shops, etc. Represented by Townsend Stites, Alphonso Mason, Chas. W. Wardell, Fred. N. Hamerstrom, Thomas J. Litle, Jr. and Elmer L. Knoedler. Spaces 40, 42.

West Disinfecting Company, New York, N. Y.—Disinfectants and disinfecting appliances; West liquid soap dispensers and Beau Brummell liquid soap; fumigating apparatus; paper towels; Pipe Klen-Zo. Represented by Mr. Geo. L. Lord and Mr. H. E. Daniels. Space 516.

Western Railway Equipment Company, St. Louis, Mo.—Models of Acme automatic brake adjuster; Western sill and carline pockets; steel carline; brake jaws; pipe clamps; interchangeable bearing and wedge. Represented by Louis A. Hoerr, Sterling Campbell and R. L. Langtion. Space 370 to 373.

Western Steel Car & Foundry Company, New York, N. Y.—Photographs in booth. Space 620.

Westinghouse Air Brake Company, Pittsburgh, Pa.—Reception Booth. Represented by A. L. Humphrey, E. A. Craig, Robert Burgess, T. L. Burton, Jos. R. Ellicott, F. V. Green, Chas. R. Ellicott, S. J. Kidder, F. M. Nellis, C. J. Olmstead, R. P. Noble, E. L. Andreon and C. P. Cass. Space 19, 21, 23, 25, 27, 29.

Westinghouse, Church, Kerr & Company, New York, N. Y.—Plans and photographs showing the design and construction of machine shops, erecting shops, boiler shops, locomotive and freight car blacksmith shops, stripping shops, planing mills, foundries, power plants, storehouses, roundhouses, etc., with which Westinghouse, Church, Kerr & Company have been connected as engineers or constructors. Represented by R. C. Barnard, E. R. Cate, H. S. Clark, W. G. Clark, T. N. Gilmore, S. E. Junkins, H. R. Kent, H. H. Kerr and C. M. Vail. Space 19 to 29.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.—Reception Booth. Represented by Chas. Robbins, F. H. Herzsch A. G. Popcke, W. H. Patterson, H. C. Mode, R. E. S. Geare, R. F. Moon, W. H. Easton and F. W. Harrison. Space 19, 21, 23, 25, 27, 29.

Westinghouse Machine Company The, East Pittsburgh, Pa.—Reception Booth. Represented by E. H. Sniffin, L. L. Brinsmade, H. A. Rapelye and W. B. Brew. Space 19, 21, 23, 25, 27, 29.

Wheel Truing Brake Shoe Company, Detroit Mich.—Abrasive brake shoes. Represented by J. M. Griffin. Space 515.

Williams Company, Inc., G. H. Cleveland, Ohio.—Buckets for Steam Shovels. Represented by G. H. Williams. Space 177.

Wilmarth & Morman Company, Grand Rapids, Mich.—Surface grinders; wet tool grinders; lathe center grinders; New Yankee drill grinders; cutter and reamer grinders; loose pulleys. Represented by Chas. E. Meech, B. C. Saunders and C. H. Slaughter. Space 160, 162.

Wilson Remover Company, New York, N. Y.—Varnish and paint removers; methods of removing paints from wood and metal by spraying and vacuum cleaning. Represented by J. MacNaull Wilson and J. Whitney Wilson. Spaces 202, 204, 206.

Wood, Guilford S., Chicago, Ill.—Wood's flexible nipple end air hose protector; the Monogram train pipe bracket; standard improved all steel warehouse truck. Represented by Guilford S. Wood and D. F. Jennings. Space 604.

Yale & Towne Manufacturing Company, The, New York, N. Y.—Chain blocks; electric hoists; trolleys; special hoisting devices; padlocks; signal padlocks; indicator padlocks; dining car locks; Yale checks; Blount checks; station hardware; latches; deadlocks; mono locks. Represented by R. T. Hodgkins, W. A. Hall, A. W. Patterson, Jr., D. A. Wright, F. A. Mavcumber, J. F. Stoldt and H. H. Ricketts. Space 129, 131.

Zug Iron & Steel Company, Pittsburgh, Pa.—Stayholt and engine bolt iron; forging iron; chains for steam shovels. Represented by John H. McCloy. Space 209.

Railway Age Gazette

DAILY EDITION

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ONE matter was touched upon by President Stewart yesterday morning that will have to receive attention, and the strange part of it is that the necessity for that attention has not been so forced to the front by the experience of the railways during the past year, as to call out action by the executive committee in advance of the convention. It is the influence of the safety appliance act on interchange. As the law stands there is a penalty attached to the running of cars stencilled with "United States Safety Appliances," unless they are properly equipped. And, further, it is required that all cars passing through the shops for general repairs, whether of home or foreign roads, must be equipped with safety appliances. As President Stewart said, it is quite impossible to inspect all cars for standard safety appliances at interchange points, and therefore, a heavy provision should be incorporated in the rules of interchange for collecting any pieces, that may be imposed on the operating road, from the owner. Again, there should be a regular set of charges formulated for the application of the safety appliances. Both of these points should be comparatively easy of adjustment, and should and probably will receive the prompt attention that they deserve.

THE constitution of the Master Car Builders' Association which was adopted in June, 1909, has been found generally satisfactory, and the only important change suggested by the Committee on Revision relates to the ballot for officers. The nomination of three persons as candidates for president and six persons as candidates for vice-presidents was found to be cumbersome, and took too much time. The change recommended by the committee was regarded as almost too radical, and objection was made to a printed ballot which contained only one name each for president and vice-presidents. Mr. Vaughn's amendment, which was adopted, provides that the ballot may be something like that used by the American Society of Mechanical Engineers where a group of, say, 20 members may nominate a special ticket which shall be printed on the regular ballot. This overcome the objection to the writing of independent names on the regular ballot, as a scattering vote of this kind usually has no force. It was pointed out incidentally in the discussion that on the regular ticket for new members of the executive committee of the Master Car Builders' Association, nominated by the nominating committee, not one master car builder is included, all being motive power officers who had their practical training in locomotive shops. This is certainly a good argument for presenting an opportunity for an independent vote for the officers of the Master Car Builders' Association.

THE report on brake shoes was a report of "progress" without there being any progress to report. It contains certain recommendations for future investigation that the executive committee of the M. C. B. Association did not see fit to make an appropriation for during the past year. These consisted of tests at high pressures (12,000 to 18,000 lbs.), at speeds somewhat below the maximum at which work has been done. It is undoubtedly important that this work should be done; valuable information would be obtained by it. If the best braking work is to be done, it is necessary to be fully acquainted with the sliding scale of the coefficient of friction and know all of its vagaries in its relation to pressures and speeds which were first suggested by the Galton-Westinghouse experiments of a generation ago. We know far more than Col. Galton did, but when all is said and done there is one little point of frictional resistance that places the limit on the efficiency and the rate of retardation producable by any brake shoe in actual service. This is the area of contact between the wheel and the rail, and no brake shoe resistance should exceed the resistance at this point. It is in this that the work on the testing machine differs from that on the road. Excessive pressures of 18,000 or 20,000 lbs. may be used to advantage on the machine; the rate of retardation may be very rapid and the length of stop as measured by the number of rotations of the wheel may be very short, with a correspondingly brief interval of time. But this is far from proving that the same length of stop can be duplicated with a car or train upon the track. The coefficient of friction may be high for the high pressure and speed—too high, in fact, to be useable. And, so, while it is desirable that we should know what may be accomplished in the laboratory with these excessive pressures, it does not

seem probable, from what has already been done, that they will be available for work on the road.

WHILE there is general dissatisfaction and complaint as to the poor quality and short life of air-brake hose, there has been "little doing" by the Master Car Builders' Association in the making of a thorough investigation of modern methods of manufacturing rubber so that a proper specification can be prepared. The present specification has not been revised, except the label, since 1905, and it could be improved in several respects, not only as to the quality of rubber required, but as to the tests and inspection. A revision of this specification was suggested in the President's address, and it is so recommended in the report of the committee on Train Brake and Signal Equipment. The present specification puts a premium on softness, and it does not state the proper relation between the strength and stretch of the material which is necessary to secure the desired quality of rubber. The soft compound, even if made of fine Para rubber and sulphur, is not the best for air-brake hose, and a stronger material with a firmer texture is required. Rubber having the desired quality should possess a higher tensile strength and higher elongation than is required by the present specification. The manufacture and testing of rubber has developed considerably since 1905. The maximum tensile strength now required is 400 lbs. per square inch, and this should be increased to 800 or 1,000 lbs. for the inner tube, with a stretch to properly balance such strength. The strength and stretch test for the cover need not be quite as severe as that for the inner tube. As there is some variation in the thickness of rubber in different parts of the circumference, the average of at least 12 measurements by micrometer should be used in obtaining the area for stretch and tensile strength. In the stretch test the tube sample should be under a stress of 400 lbs. for ten minutes and the cover should be placed under a stress of at least 300 lbs. Samples should be tested at a uniform temperature of 70 deg. F., and the testing machine should work at a uniform speed of 20 in. per minute. A minimum strength of 800 lbs. per square inch, with an ultimate elongation at the breaking point of 9 in., could be easily obtained at a price no higher than that now paid for the soft and weak rubber which present specifications admit and which has shown a decided tendency to deteriorate very rapidly.

IF freight cars are to be kept in a proper condition to transport material without danger of damaging it, and at the same time are to be maintained at a minimum cost, it is not only necessary that they should be properly designed and built, but that repairs should be made promptly and systematically. While it is practically impossible to keep track of the exact condition of each individual car, it is possible to keep the average condition of the equipment at a high point by placing certain regulations in force and seeing that they are lived up to. For instance, one road which is notable because of the low cost of maintenance of freight cars does not have any special trouble with a type of car roof, which is giving one of its neighbors a great deal of trouble, simply because each car repair point on the system is ordered to renail a certain number of these roofs every month. Even if similar regulations concerning other parts of the car were not in force, the moral influence of this one, if properly enforced, would necessarily have a considerable effect on the proper upkeep of the rest of the cars. A small and comparatively unimportant defect soon grows to serious proportions if not promptly attended to, but the car repair forces over the system will not realize the importance of this unless the management takes active steps to show that it is not only in sympathy with the right way of doing things, but that it intends to insist upon its being followed.

CAR WHEELS.

THERE are many points in the excellent report on Car Wheels that should receive the careful consideration, not only of the members of the Master Car Builders' Association and railway men generally, but of all those who are interested in the development of the steel wheel and the improvement of the cast iron one. Very early in the report, for example, there is the reason for refraining to offer a standard specification for solid steel wheels, because "the art of manufacturing solid steel wheels is yet in a process of development." In marked contrast to this conservative position, is the action of the Society for Testing Materials, which is shown in the two appendices, where the process of manufacture, as well as the product, is hedged in as though everything pertaining thereto had been so thoroughly completed that nothing more remained to be done in the way of experimentation, and the last word had been said, it being merely necessary now to protect the buyer from the unscrupulous manufacturer. This position of conservatism is, however, quite characteristic of the Master Car Builders' Association. It is holding off more and more from chemical analyses, and matters that may control methods of manufacture and simply asks for results, leaving manufacturers to attain those results, which are mechanical, in any way that may seem best. Surely, this is a sane and sensible method of proceeding.

Again, the committee touches gingerly on a point that has been under consideration for a number of years, but regarding which nothing has, as yet, been done. It is recognized that all metals, and especially all wheels, whether they be of cast iron or of solid steel, are subjected to internal stresses inherent in the method of manufacture, but of whose character or magnitude we know nothing. The matter was upon the point of being subjected to a critical investigation and analysis a number of years ago, but was stopped by commercial changes, and so has not been touched. It is practically certain, however, that something will be done during the coming year in the way of determining what these internal stresses are both in magnitude and direction, and it was this that the committee probably had in mind when it framed the paragraph to which allusion is made. Whether the committee will carry on any investigation itself is not hinted, but it is to be hoped that it will. That any method of inspection can be developed that will detect and measure these stresses without the destruction of the wheel is doubtful, but if it could be done, it would be of incalculable benefit to every user and maker of car wheels in the country.

A broader and more far-reaching problem is that of increasing the strength of the cast iron wheel flange by increasing its thickness, and here the committee acknowledges its helplessness. To add metal here involves frog and crossing clearances, over which the association has no jurisdiction and which can only be done with the co-operation of American Railway Engineering Association and the approval of the American Railway Association. It may involve such large expenditures for changes as to be impracticable, and the best to be expected in this direction for some time to come will be repeated reports of progress, when, in many cases, no progress has been made.

Another point on which nothing has been done, is in the design and specification of a wheel for a car of 140,000 lbs. capacity. In view of the criticisms that have been made of the cast iron wheel for cars of 100,000 lbs. capacity, it rather takes one's breath away to think of adding 40 per cent. to the nominal capacity and probably 30 per cent. to the actual wheel loads that have already caused so much anxiety.

Whether that anxiety is needless or not, need not be discussed here. Evidently the manufacturers will not fail to try to furnish a wheel suitable for high capacity cars, and it will be interesting to know what manner of wheel this will be that will carry a wheel-on-rail pressure of 25,000 lbs. or more.

The recommendations for the specifications governing solid steel wheels, are concise, to the point, and bear on the physical operating conditions of the wheel, without, in any way, dictating methods to the manufacturer.

The report is really a thorough and comprehensive statement of the last word to date on the car wheel question, and in its very conciseness and conservative attitude on the subject shows how fully the committee realizes the magnitude of the problem with which it has to deal and how conscientiously and painstakingly it has handled it.

COUPLER SIDE CLEARANCE.

THREE years ago tests were made and reported to the association by the coupler committee, which indicated that, so far as the train resistance or effect on the car structure was concerned, there was no advantage of a coupler side clearance greater than 2½ in. at the drawbar carrier iron on all steel cars over 40 ft. in length. The recommendation of the committee that the standard of the association be changed to read "The total side clearance of the coupler to be 2½ in." was carried on letter ballot by 1501 to 245 votes, and this now stands as the standard. This standard previous to 1909 read "Not less than 2½ in." The committee wished this to be changed because of the liability of the couplers not mating if quarter side clearance was allowed.

In spite of these tests and the vote on the letter ballot there are now many cars being built with coupler side clearance of 4 in. This spacing is standard on at least one of the largest systems, which has probably as few sharp curves as any road in the eastern section of the country. Cars with this clearance have been in use in large numbers all over the country for several years, and no trouble appears to have been caused with the couplers not mating, although no special centering device is used. It seems that the draft gear holds the coupler head sufficiently near the center to overcome any serious trouble with coupling.

When this subject was being discussed on the floor of the convention in 1907-8 the feature of flange wear was the principal point advanced in favor of increased side clearance. The tests, however, showed that there was but little difference in the train resistance with the various clearances from 1 in. to 5 in. This would indicate but small difference in flange friction. The features of loose and broken yoke rivets, broken knuckles and knuckle pivot pins and broken guard arms were not considered in the test, although the side pressures obtained were not excessive and seemed to indicate little danger in this respect. They did show, as would be expected, that the larger clearances gave the smaller pressures. There is little doubt but what the trouble with loose and broken parts of couplers are, to some extent, caused by strains due to a lever action around the carrier iron. Even though this may not seem to be excessive, if it can be reduced without introducing other difficulties it would seem advisable to do so. What it can be is proved by the many cars now running with 4 in. clearance.

The only real difficulty to be expected would be with the couplers getting off center. While with some arrangements of yokes and draft gear this might occur, devices are available which will insure the coupler head remaining practically at the center when free.

In view of these conditions it would seem more sensible to return to the old wording of the standards, viz.: "The total side clearance of the coupler to be not less than 2½ in."

Announcements.

TO-DAY'S PROGRAM.

M. C. B. ASSOCIATION.

Discussion of reports on:

Safety Appliances	9.30 to 10.00
Rules of Interchange Prices for Labor and Materials	10.00 to 10.30
Rules for Loading Material	10.30 to 10.45
Damage to Freight Equipment by Unloading Machines	10.45 to 11.00
Overhead Inspection	11.00 to 11.15
Coupler and Draft Equipment	11.15 to 12.15
Car Trucks	12.15 to 12.30
Springs for Car Trucks	12.30 to 1.00
Consolidation	1.00 to 1.10
Train Lighting and Equipment	1.10 to 1.30

ENTERTAINMENTS.

Orchestra Concert, 10.30 A. M.—Entrance Hall, Million Dollar Pier.

Orchestra Concert, 3.30 P. M.—Entrance Hall, Million Dollar Pier.

Informal Dance, 9.30 P. M.—Entrance Hall, Million Dollar Pier.

SUPPLY ASSOCIATION ELECTION.

The Executive Committee of the Railway Supply Manufacturers' Association has named the hours between 10 A. M. and 12 M., Friday, June 14, 1912, for the election of four members of the executive committee for terms of three years to fill the places of members whose terms expire on September 1, 1912.

This election will be held in the office of the executive committee, up-town side of the Million Dollar Pier, next to the enrollment booth. Ballot boxes will be open between the above named hours to receive votes for members of the Executive Committee from the following districts:

First district, New England States and Canada.—One member in place of Albert C. Ashton, Ashton Valve Company, Boston, Mass.

Second district, New York and New Jersey.—One member in place of Charles P. Storrs, Storrs Mica Co., Owego, N. Y.

Fourth district, Ohio, Indiana and Michigan.—One member in place of H. I. Lord, Detroit Lubricator Co., Detroit, Mich.

Seventh District, States west of the Mississippi River, including Louisiana, but excepting Iowa and Minnesota,—One member in place of E. L. Adreon, American Brake Co., St. Louis, Mo.

Election will be by ballot. A separate ballot box will be provided for each of the above districts. Official blank ballots will be provided. Ballots may be cast at any time between 10 A. M. and 12 M.

One vote only may be cast by each member, corporation, co-partnership or individual belonging to the association, same to be cast only by the properly accredited delegate of such member.

Each voting delegate shall deposit his ballot in the ballot box marked for the district within which the home office of his company is located. Every voting delegate should see that the person for whom he votes for executive member is a resident of the district in which the vote is cast, and is a representative of a member of the association.

ENTERTAINMENT COMMITTEE MEETINGS.

The entertainment committee meets at 10.00 o'clock each morning on the balcony over the enrollment booth. Every member of the committee is busy, but these meetings are an important factor in the work of the committee, and it is urged that members report for them promptly. They last only a half hour or so.

M. C. B. DANCE TO-NIGHT.

The informal dance at the pier to-night will begin at 9.30.

The executive committee of the M. C. B. Association has selected the following dance committee to act with the sub-committee of the entertainment committee of the Railway Supply Manufacturers' Association: C. D. Young (Penna. R. R.), R. L. Kleine (Penna. R. R.), T. H. Goodnow (Armour Car Lines), E. J. Searles (B. & O.), H. L. Trimyer (S. A. L.), Alexander Kearney (N. & W.). These committeemen will please report to Chairman Mitchell of the entertainment committee. The members of the latter committee who act as a sub-committee for the dance to-night are Messrs. Younglove (chairman), Hayes, Hibbard, Dunkelberg, Wardell, Sherman, Nellis, Illingworth and Krepps.

ATTENTION, BALL PLAYERS!

All candidates for the western team please meet at the Enrollment Committee's booth at 10.30 o'clock this (Thursday) morning.

Proceedings.

The first session of the forty-sixth annual meeting of the Master Car Builders' Association was held in the Greek Temple, on Young's Million Dollar Pier, Atlantic City, N. J., on Wednesday, June 12, 1912.

The president, A. Stewart (So. Ry.), called the meeting to order at 9.40 o'clock. The Rev. Dr. Newton W. Caldwell invoked the Divine blessing. Mayor Bacharach, of Atlantic City, welcomed the Association to the city. J. J. Hennessey (C. M. & St. P.), replied to the address of Mayor Bacharach.

ADDRESS OF PRESIDENT STEWART.

We are assembled this morning to conduct the business assigned for consideration at this, our forty-sixth annual convention of the Masters Car Builders' Association, and it gives me great pleasure to welcome you.

The meetings of the Association, which have now been held for forty-six consecutive years, have contributed more than the work of any other organization toward making it possible for the vast railway interests in this country to carry on their interchange of business. We are meeting again this year, with the approval of our respective companies, to further perfect our rules, and, if possible, to revise them in a manner that will still further reduce our cost of maintenance and clarify matters that have not been understood alike by all of our members; also to devise the best possible manner of complying with new legislation affecting the construction, maintenance and handling of equipment in interchange.

Much earnest work has been done by the committees on the various subjects up for consideration by this convention, but on account of the range of subjects listed for consideration, upon which reports are to be presented and discussed, it is deemed neither practicable nor desirable in this address to discuss in detail or to analyze the general work of the committees as represented by their reports.



A. STEWART,
President, M. C. B. Association.

On account of the personnel of the various committees and the earnest efforts that have been expended in the preparation of their reports, the amount of work that has been accomplished is not only creditable, but the Association is to be congratulated upon the excellence and quality of the work as reflected by these reports.

A very important matter that has not been assigned to any committee, and of such vital importance that action should be taken, relates to the interchange of equipment as effected by the recent Safety Appliance Acts. We have nearly a year's experience working under the new order of things and questions have been raised that can only be answered with the approval of this Association and I urge the necessity for action. We are required to change the safety appliances to standard on both system and foreign cars going through the shops for general repairs, and we should have a rule for charging the car owner with a portion of this expense. It is my understanding that we are now subject to a penalty for handling cars marked "U. S. Safety Appliances," if the cars so marked are not in accordance with the law. To inspect all cars received with safety appliance defects, including location, is obviously out of the question and we should have a rule that will relieve the receiving line for penalty defects and material, location or manner of application, when cars have been stencilled as complying with the law.

Cars that have been fitted with the special 12 in. coupler to give the required end clearance should be so stencilled for protection to the owners and for the information of the inspectors.

We should consider a rule for a fair basis of interchange where it affects the removal or turning of steel wheels under freight equipment, and a proper charge for wooden cars which have been reinforced by continuous metal draft sills.

The question of changing the present M. C. B. specifications for air brake hose has been brought to my attention, and a committee should be appointed to take up this matter and report what changes are necessary.

All of the members are earnestly requested to bring up the matters affecting interchange in which they are interested, in the hope that we may be able to promulgate rules so clear that they will be understood and accepted by all without the necessity of such frequent recourse to the Arbitration Committee.

It should be our earnest endeavor to promote to the fullest extent the harmonious relations that have hitherto existed between the Interstate Commerce Commission and its representatives and this Association, and in this connection I want to call your attention to the fact that the last convention took notice of the work of the Conference Committee, composed of members of this Association, that had to do with adjustment of the relation of the railways to the government with regard to safety appliances. That committee has been continued as a sub-committee of the Special Committee on the Relations of Railway Operation to Legislation, and during the last year represented the railways in a conference with the post office department on the standardization of postal car construction and equipment. This work has not been entirely completed, although specifications have been agreed upon, approved and issued by the post office department, covering construction of steel and steel underframe full postal cars and the equipment for all classes of mail cars. The work of this committee has illustrated the value of co-operation as between the railways and the different branches of the federal government in formation of regulating legislation, and I want to say that a great credit is due to the committee and especially to the chairman of that committee for the very able manner in which the subject has been cared for.

The hours to be devoted to our daily sessions are so arranged that time may be conveniently devoted to the sights and delights of this great seaside resort, but we should not be unmindful of the fact that we are here principally to attend to business, and, therefore, I respectfully urge that each attendant, aside from his prompt and regular attendance on the daily session, should take full advantage of the special opportunity to inspect and study the latest improvements in equipment and appliances as exemplified in the exhibit of the Railway Supply Manufacturers' Association. Never have the supply compa-



D. F. CRAWFORD,
First Vice-President, M. C. B. Association.



C. E. FULLER,
Second Vice-President, M. C. B. Association.

nies appeared before us with such an extensive exhibit, this year's exhibit even surpassing the high standard of excellence of former years.

At the close of the forty-six years' existence of our Association, it is gratifying to note not only the general progress that has been made by reason of the solution of the problems that have been presented, but also the general influence for good accomplished by the Association in the practical railway world.

To the members of the railroad press represented here I desire, in behalf of the Association, to express our appreciation of their enterprise and assistance in the past as well as at this meeting.

As the close of my service as President of this Association is near at hand, I desire to thank you for the honor you have conferred upon me in electing me to the position that I am so soon to relinquish, and I desire to further acknowledge my appreciation for the hearty coöperation I have received on all sides in my efforts to satisfactorily administer the affairs of the Association.



MORGAN K. BARNUM,
Third Vice-President, M. C. B. Association.



J. S. LENTZ.
Treasurer, M. C. B. Association.

ASSOCIATION BUSINESS.

Secretary Taylor then presented his report which showed that the active membership in June, 1911, was 422. Since that time there has been transeferred to representative membership, 7; dropped out of railway service, 7; resigned, 6; deaths, 3; transferred to life membership, 2; transferred from representative membership, 4; new members, 42; making a total of representative membership, 397; associate membership, 14; life members, 20, and a grand total membership of 874.

The secretary stated that during the year, 38 railways and private car lines had signified their desire to become subscribers to the rules of interchange, governing freight cars; and 7 railways had advised of their acceptance of the code of rules governing the interchange of passenger equipment. The report of the cars represented in the Association compared with last year is as follows: June, 1912, 2,959,397; June, 1911, 2,464,530, which is an increase of 494,867 cars.

The report of the treasurer showed that the receipts from dues of members was $12,307, and from sales of rules of interchange, proceedings, etc., $5,496.82, making a total of $17,803.82. The total expenses were $17,793.82. The amount of unpaid dues amounts to $988. The balance in treasury June 12, 1912, was $627.91.

The report of the secretary and treasurer was referred to an auditing committee, made up of E. W. Pratt (C. & N.), T. H. Goodnow (L. S. & M. S.), and F. F. Gaines (C. of G.). The dues for the current year were fixed at $4 as heretofore.

REVISION OF CONSTITUTION.

Previous to the adoption of the present Constitution, June, 1909, a nominating committee presented a verbal report to the convention at the first day's session, and the election called at the third day's session was by *viva voce*. It was felt by some of the members that this method did not offer the best opportunity for the membership to express their preference as to officers of the Association, and, therefore, when the Constitution was changed provision was made for the so-called secret ballot. It has developed in the election since the adoption of the Constitution that this method is not entirely satisfactory, requiring considerable time.

The committee has given consideration to the methods employed by the various technical associations for nominating and electing officers, and submit herewith the changes in the Constitution which it would suggest, as well as sample forms of ballots to be used.

In the proposed method each member has an opportunity to vote for the membership of the nominating committee and at the same time has opportunity to vote for any other member than those named by the nominating committee if he may desire to do so.

The committee would suggest, in order that this method, if approved, may be used at the Convention of 1913, that the subject be referred to letter ballot in January, 1913. It is

impossible, under the present Constitution, to change the method before the date mentioned.

The changes in the Constitution, submitted by the committee, are as follows:

Article 7, Committee on Nominations, section 1 to be changed to read as follows:

"SECTION 1. It shall be the duty of the Committee on Nominations to offer to the convention the name of one member as a candidate for each of the following offices: President, First Vice-President, Second Vice-President, Third Vice-President and Treasurer, and the names of three members as candidates for Executive members. Each person so named shall be either an active or representative member of the Association."

Article 9 to be added to by a second section as follows:

"SECTION 2. Printed ballots for use in the election of officers, Executive members, the Committee on Nominations, and for Associate and Life Membership, to be of the form appended hereto."

The ballot for president, for first vice-president, for second vice-president, for third vice-president, for treasurer and the one for executive members, contain just the number of names to be voted for, with one blank space. The following instructions accompany this ballot:

"To vote in favor of all the names on this ballot leave it as it is unmarked. To vote against a nominee draw a line through his name. If you wish to vote for another eligible person write his name under the one marked out. The names printed are those of the candidates proposed by the nominating committee."

The ballot for the Committee on Nominations is composed of ten names with instructions to vote for five. A blank space is also left for any additional name. The following instructions accompany this ballot:

"To vote against a nominee draw a line through his name. If you wish to vote for another eligible person write his name under the one marked out. The names printed are those of the candidates proposed by the executive committee."

In the case of the ballot for life and associate membership, the instructions are to leave all names unmarked that are to be voted for and draw a line through the name of the one to be voted against.

The report is signed by D. F. Crawford (Penna.), chairman; C. A. Seley (C. R. I. & P.), and A. Kearney (N. & W.).

C. A. Seley (C. R. I. & P.), presented the report of the committee and added the following, which was suggested in the meeting of the executive committee last evening, and seemed to meet with approval. "Instead of having all members of the Association participate in voting on a letter ballot, that only representative members shall vote on matters submitted on letter ballot for adoption as standard, and on other subjects connected with the matter of standards.

The committee would, therefore, submit a further change of Section 1, Article II. The second sentence reads as follows: 'Such proposition shall then be submitted to the Association for discussion, after which a vote shall be taken to decide whether the proposition shall be submitted for decision by letter ballot to all members entitled to vote.'

"The proposed change is to make it read: 'Such proposition shall then be submitted to the Association for discussion, after which a vote shall be taken to decide whether the proposition shall be submitted for decision by letter ballot to all the representative members.'"



J. W. TAYLOR,
Secretary, M. C. B. Association.

DISCUSSION.

H. H. Vaughan (C. P.): I do not know that it is a matter of very great importance, as long as this association is entirely willing to trust the election of officers to its nomination committee, but I do think if we are going to have printed ballots, some method should be introduced for admitting the name of any other proposed officers to these printed ballots. Some section of the membership may wish to propose candidates other than those recommended by the committee on nominations. The effect of the proposed amendment as it now reads is to

make it a rather closed proposition, and I think that provision should be made for the addition on the printed ballot of the names of any other members that the executive committee, on the request of a certain number of members, see fit to have added to the ballot, so that candidates other than those proposed by the committee on nominations could be introduced and there would be a proper opportunity for having the names of such candidates considered in the election. Where a written ballot is in vogue, it is not so important, but where you put out a printed ballot, should not there be some method of having the names printed in as an alternative ticket, if an alternative ticket is desired to be put up by a certain number of the members?

F. F. Gaines (C. of Ga.): While I believe we all understand from Mr. Seley's remarks, concerning the recommendation of the committee on revision of constitution in regard to representative members voting, I want to make it clear that it is intended that the members shall have the privilege of voting according to the number of cars in the matter of standards.

Mr. Seley: I think it would be very difficult for the nominating committee to handle the matter exactly as Mr. Vaughan stated, unless there was considerable latitude. Here is a proposed form. Here is a name that is printed on the form, which is the name reported by the committee on nominations. Here is a blank under that name, and the instruction, "if you wish to vote for any eligible person, write his name under the one marked out." Now, if the committee on nominations should, under the advice of a certain number of members, present more than one name, it would be a departure from the method intended. Just how that would be handled I do not know. I am not sufficiently familiar with the subject, but it would seem, as far as the requirements of our election of officers are concerned that this simple method here ought to provide sufficient needs to meet all conditions. I think the politics of the case could be amply covered.

F. W. Brazier (N. Y. C. & H. R.): Last year I called the attention of the meeting to the large amount of red tape that was involved in the election of our officers. This is not a political organization, and I want to say, as one of the past presidents, I feel perfectly satisfied with the old way of electing the officers of this association when I look at the list of past presidents of the association, and, in my opinion, this matter of going into red tape in the election of our officers is uncalled for and unnecessary.

Now, with the greatest respect to the committee on nominations, I wish to point out one feature regarding the members who are proposed for election on the executive committee. There is not one car man on the committee. The car men are not all dead, and they are not going to die, and I think we should have some blank spaces so that if we want to put in a few of the car builders, we can do so, and have the car department represented on the executive committee of the Master Car Builders' Association.

Mr. Vaughan: What I desire is to have the practice along the same lines as that pursued by the American Society of Mechanical Engineers. They have an arrangement by which the nominees of the committee on nominations are printed as such, but if any section of the membership desires to put up any other candidates for office, they have the privilege of doing so, and the name of such candidates are entered on the regular ballot which contains the names of the candidates proposed by the committee on nominations. This nomination of a candidate other than those nominated by the committee on nominations has to be signed by a certain number of members. As a matter of fact, under this arrangement I do not think there is any particular danger, but if you had a nominating committee which desired to do so, they could arrange matters so that it would be very difficult to get any other name on the ticket than the names of the particular candidates reported by the committee on nominations. I do not think we are in any danger from that practice, but I do not think it is wise to adopt a plan for the nomination of officers that does not make it possible for the members to propose candidates other than those presented by the committee on nominations on the same ballot with those candidates.

As to writing in the names of additional nominees, what does that amount to? It means you will have to organize a movement among the members to put on the names you want to add, and to get everybody to write in the same names. There is no reason why alternate candidates desired by some section of the membership should not be presented to the association on the regular ballot for selection by the members.

C. A. Schroyer (C. & N. W.): Would not it cover your point, Mr. Vaughan, if in this proposed change to Article 7, it should read that the committee on nominations shall offer to the convention the names of one or more persons to each office?

Mr. Vaughan: No, sir, I think it would be very much better if they did not. I agree with the improvement which has been made in respect to our nominations for officers in eliminating the placing of the nomination of 2 or 3 names of each office, and I feel that it is a great improvement and much simplifies matters to have only one candidate presented for each office, as the regular ticket presented by the committee on nominations; but I do think there should be a provision, whereby if we are to use printed ballots, any desired additions might be made to the nominees presented by the committee on nominations, such additional names as may be endorsed by a certain number of the members of the association to be printed on the ballots along with the regular nominees, and I believe that provision should be made to cover that point.

Mr. Schroyer: That would be done through the committee on nominations.

Mr. Vaughan: The executive committee or whoever gets out the ballots. Perhaps that would fall within the duty of the secretary, but the idea is where a certain number of members, say 20 representative members ask to have an alternate name placed on the list of nominees, that the name of such alternate candidate shall be printed on the ballot as well as the others. I will make it as an amendment.

The Secretary: What is the number of men who should propose another set of officers, in order to have the additional set of officers printed on the ballot, to have their names entered on the ballot?

Mr. Vaughan: I should say where 20 members desire to propose a name of any member for any office in place of one or more of the names suggested by the nominating committee, that the secretary shall place that member's name on the printed ballot, making a statement in connection with such name that it has been proposed by a certain number of members. I make that as an amendment.

M. K. Barnum (I. C.): I second the amendment.

Mr. Seley: As a member of the committee of revision of the constitution, I will accept that as an amendment to Section 1, Article 7.

A. Kearney (N. & W.): As a member of the committee of revision of the constitution, that is acceptable to me.

The President: A majority of the committee accept the amendment. The question is now on the report of the committee as amended.

Mr. Seley: I also ask to have that motion include the revision of the committee to Sec. 1, Article 11, as regards letter ballot.

Mr. Schroyer: I make that as a motion, that that also be included. (The motion was carried.)

The report of the committee was then adopted.

REVISION OF STANDARDS AND RECOMMENDED PRACTICE.

After due consideration of present standards and recommended practice of the Association, together with replies from members to the circular of inquiry, and requests involving standards presented by the Secretary, the committee reports as follows:

STANDARDS.

Journal Boxes and Details.

Page 523, Sheets M. C. B. 7 and 9.

2. A member suggests that the wedge for the 5 in. by 9 in. journal box be changed in design to provide for increased end-bearing surface against stop lugs.

The committee approves this recommendation.

Journal Boxes for Passenger Cars.

Page 525, 5 in. by 9 in. Sheet M. C. B. 8-A. 4¼ in. by 8 in. Sheet M. C. B. 13.

3. The committee received the following communication from McCord & Company:

"On looking over the recent designs of passenger pedestal journal boxes I was very much impressed with the lack of consistency in the areas of the equalizer seats.

"A 3¾ in. by 7 in. journal has an area of 26¼ sq. in., the equalizer seat is 3⅝ in. by 6½ in., giving it an area of 23½ sq. in.

"The area of the 4¼ in. by 8 in. journal is 34 sq. in. The equalizer seat is 3½ in. by 6¼ in., giving 21⅞ sq. in. of bearing surface.

"The area of the 5½ in. by 10 in. journal is 56 sq. in., and the equalizer seat as designed at present is 3½ in. by 6 in., giving it also 21 sq. in. of equalizer bearing surface.

"The 3¾ in. by 7 in. box is not illustrated in the proceedings, so I do not know where these dimensions have been obtained, but the 4¼ in. by 8 in. and the 5 in. by 9 in. are M. C. B. Standard.

"The 5½ in. by 10 in. has not been passed upon by the Association, but the railways seem to be inclining toward 3½ in. by

6 in. for the equalizer seat. It seems to be only reasonable that the equalizer seat area should be in direct proportion to the journal area.

"In following up the service given by these boxes it is evident that the equalizer seat area on the 5 in. by 9 in. box is not sufficient. The boxes seem to wear out in the equalizer seat before they do in the pedestal channels, and the object should be to have them both wear out at the same time."

The committee refers this to the committee on car trucks.

Passenger Car Journal Box and Contained Parts.

Page 525, Sheet M. C. B. 8-A.

4. A member calls attention to the mouth of the 5 in. by 9 in. passenger journal box not conforming with that of the 5 in. by 9 in. freight box.

The committee instructs the Secretary to make the necessary correction.

5½ in. by 10 in. Journal Box and Details.

Page 524, Sheets M. C. B. 10 and 12.

5. A member suggests that the wedge for the 5½ in. by 10 in. be changed in design to provide for increased end bearing surface against stop lugs.

The committee approves this recommendation.

Dust Guards.

Page 533, M. C. B. Sheet 15.

8. The committee received the following communication from McCord & Company:

"I beg to call your attention to some inconsistencies in freight



T. H. GOODNOW,

Chairman, Committee on Revision of Standards and Recommended Practice.

and passenger journal-box designs, so far as the M. C. B. standard dust guards and the dust-guard slots and the holes in the dust-guard walls of the M. C. B. boxes are concerned." A drawing was enclosed showing the clearances of the dust-guard seat on the axle and the box and the dust guard on the box in various positions. The committee referred this to the committee on car trucks.

Distance Between the Backs of the Flanges of Car Wheels.

Page 535, Sheet M. C. B. 16.

10. A member suggests adding paragraph as follows:

"In 1909 the minimum distance permissible between the backs of flanges at base line of tread was fixed at 4 ft. 5 3-32 in." Omitting the words "Modified 1909" from the third paragraph.

The committee concurs in this recommendation.

Brake Head and Shoe.

Page 541, Sheet M. C. B. 17.

13. A member calls attention that the location of the lugs from the vertical dimension line are not correct when the head is developed from the radial center line as located, as indicated by sketch accompanying.

The committee concurs in this correction.

Air-Brakes—General Arrangement and Details.

Pages 545 and 546, Sheet M. C. B. 18.

14. A member suggests that inasmuch as the capacity of the brakes must equal 70 per cent. of the light weight of car, this does not state at what cylinder pressure the percentage is based on, calling attention to the latest recommendation of the air-brake companies that this is to be on a cylinder pressure of 50 lbs. per sq. in.

The committee does not concur in this recommendation.

Automatic Coupler.

Pages 622 to 625, Sheet M. C. B. 23.

17. A member renews a suggestion that was presented during the 1910 Convention, in which was recommended to the committee on standards and recommended practice, the addition of an 8½ in. coupler butt, for the reason that the 6½ in. coupler butt was designed to be used with the 6¼ in. by 8 in. draft springs, allowing ¼ in. clearance.

Again the 9⅛ in. butt was designed to accommodate certain friction draft gears, requiring that width within the yoke. This recommendation was submitted to letter ballot and rejected, the vote being 1,191 yes and 614 no, the necessary votes for adoption being 1,203, or within 12 votes of carrying the recommendation.

Inasmuch as there are thousands of cars equipped with the M. C. B. class *G* springs, the 6½ in. butt is not sufficient in depth, and not being good practice to use liners between the butt and yoke ends (the diameter of class *G* springs being 8 in.), and, furthermore, this spring can not be used with the 9⅛ in. butt as the clearance is too great, also the spring would not be central. Therefore, this member believes the matter should again be submitted to the M. C. B. committee with a view of urging the adoption of the 8½ in. butt as standard.

The committee does not approve of this recommendation, inasmuch as it was voted upon and lost by letter ballot in 1910, the main objection being that it increases the number of standards that must be carried in stock for repairs.

Automatic Coupler.

Page 627, Sheet M. C. B. 23.

18. A member suggests to amend the specifications for M. C. B. couplers so as to admit as an M. C. B. standard couplers having the underneath uncoupling arrangement, calling attention to paragraph 4 on page 627.

The committee refers this to the coupler committee.

Pages 622 to 624, Sheet M. C. B. 23.

19. A member suggests that reference be made in the text to the authority for the temporary coupler having 12¼ in. head.

The committee concurs and advises that this will be taken care of in the 1912 Proceedings, on authority of result of the special letter ballot.

Signal Lamp Socket.

Page 639, Sheet M. C. B. 26.

20. Through the secretary the following communication from the American Railway Association was received:

"With the introduction of steel cars for passenger train service, it is found that the method of mounting the brackets for carrying the markers of trains is becoming mechanically so uncertain and irregular as to seriously interfere with the proper display of markers as protective signals.

"There is apparently no system governing the mounting of these signals, some being placed upon the corners of the roof, some high up and others about midway of the corner posts of the cars; while the castings used for the sockets on the cars and the brackets of the lamps are frequently rough, and so crudely fitted that the lamps can not be accurately sighted.

"There is found to be a variation in the angle of the axis of the bracket with the center line of the car. The western roads use an angle of 45 deg., while the Pennsylvania Railroad and many others of the eastern lines use an angle of 14 deg. 10 min.

"The lamp manufacturers, in their endeavor to make lamps suitable for the different styles of brackets on the cars, notch out the lamp holder so that it may be set accurately to an angle of 45 deg. They then with the notches subdivide the arc into three sections of 15 deg. each, which arrangement does not fit the Pennsylvania angle of 14 deg. 10 min. by a variation of 50 min. With the increasing high power of marker lamps it becomes more important than ever to have them set accurately in position to effectively perform their primary function of rear protection, and the sighting of a marker attached to the rear of a train is just as important as the proper sighting of a block signal or a train-order signal.

"In the matter of the safe operation of trains at night the efficient use of the train markers is of such vital importance that it should receive most careful attention, and I would suggest that the committee on transportation take up this subject,

and arrange for standard specifications for the attachment of the markers to all classes of cars in both passenger and freight train service."

The committee recommends locating socket at a 45 deg. angle, located on the corner post, and approximately 9 ft. 6 in. from the rail to the bottom of the slot of socket.

Siding, Flooring, Roofing and Lining.

Page 639, Sheet M. C. B. 26.

23. A member calls attention to the fact that with the present standard for tongue and groove in siding, roofing, lining and flooring it is impossible to drive up and make a tight joint on the face side, and suggests that it be cut back 1-32 in. on the under shoulder tongue edge.

The committee concurs in this recommendation.

Splicing of Steel Center Sills.

Page 643, Sheet M. C. B. 28.

28. A member calls attention to the second paragraph and the following paragraph, which refer to Fig. *A* and *B* for method of splicing center sills, in that the cuts on Sheet M. C. B. 28, showing the splicing of steel center sills, give the length of the reinforced plates as 14½ in. The length of the protruding end, while not given, is presumed to be 8 in. The text specifies two joints to be reinforced by plates on both sides to be not less than twice the length of the protruding end; therefore, the reinforced plate, shown on this cut, should be at least 16 in. instead of 14½ in.

The committee concurs with the suggestion, but recommends changing the text, paragraph two, to show 7 inch projection, instead of 8 in., so as to conform to the figures in cuts *A* and *B*.

Pamphlets, Catalogues, Specifications, Etc.

Page 649

29. A member writes as follows:

"I recently had the matter of standard size for specification and letter-head paper to consider in connection with some Government boiler reports, and comparing these with the Master Car Builders' standards as adopted, I notice there are a great variety of sizes used.

"The M. C. B. size for specifications and letter-heads is 8¼ in. by 10¾ in. I find we ourselves use Form 82, size 8⅜ in. by 11 in. This is padded. The Government uses a demy letter-head, 8 in. by 10½ in. Printer's letter-head size is 8½ in. by 11 in. As the M. C. B. specification does not seem to agree with anything that I have to do with, I am writing for information and ask why it should differ from that used by the Government."

The committee recommends the adoption of the Government's standard, 8 in. by 10½ in.

RECOMMENDED PRACTICE.

Box Car Side Door and End Door Fixtures.

Page 736, Sheet M. C. B.—F.

33. A member calls attention to the door-hasp staple plate as shown in details 16 in. long, while on door as 5⅜ in., the 17-in. length being rejected by letter ballot in 1911.

The committee agrees that it was an error in showing this as 16 in., in view of its rejection, but at the same time renews its recommendation to the Association for the 16-in. style, with four bolts.

Box Car Doors.

Sheets M. C. B.—F and F-1.

34. A member suggests advancing Sheet M. C. B.—F, showing box car outside hung door, and Sheet M. C. B—F-1, showing box car flush side door, to standard.

The committee concurs in this recommendation.

Marking of Freight Cars.

Page 641, Sheet M. C. B.—G.

35. A member suggests that this sheet be changed to show three stars following the stenciling of weight of car. This to correctly indicate the final light weight of car.

The committee would recommend that paragraph B, of M. C. B. Rule 30, as follows:

"Wooden and steel underframe cars one year old should be reweighed and restenciled, the weight to be followed by one star; cars two years old should be again weighed and stenciled, the weight to be followed by two stars; cars three or more years old should be again weighed and stenciled, the weight to be followed by three stars, which will indicate final weight." be incorporated in the text as a Recommended Practice, and the star indication added to Sheet M. C. B.—G.

36. A member calls attention to the minimum height of 1 ft. 10½ in. from center line of coupler to bottom of number, being insufficient to properly locate lettering on steel underframe gondola cars, and suggests that this be made 1 ft. 5 in.

The committee concurs in this recommendation.

Cast-iron Wheels.

Page 538, Sheets M. C. B.—N, O and P.

38. A member calls attention that the seventh paragraph should be changed so as to include the modified form of wheel gage, Proceedings 1909 and 1911.

The committee agrees that the wording should be changed, omitting the date reference and to read as follows:

"The thickness of the flange shall be regulated by the maximum and minimum flange thickness gages adopted by the M. C. B. Association."

Lumber Specifications.

Pages 742 to 787.

40. A member calls attention to the lumber specifications, raising question as regards their intent with special reference to allowable defects, taking into consideration the length of piece. For instance, in purchasing siding lengths of from 5 ft. to 18 ft., with the specifications as they stand, would the same number of defects be allowed in a 5-ft. piece as in an 18-ft?

This was referred to a member of the committee having in hand the lumber specifications, with advice to the effect that it was the intention of the committee that the allowable defects laid down in the specifications were for standard lengths of lumber, and the committee concurs in this opinion.

Classification of Cars.

Page 733.

41. A member suggests designations for certain kinds of refrigerator and ventilator cars, which have been described by the Railroad Refrigerator Service Association, as follows:

Symbol.	Kind of Car.	Description.
RS	Standard Refrigerator.	Equipped with insulation, ice tanks and ventilating devices.
RA	Meat and Provision Refrigerator.	Equipped with insulation and brine ice tanks without ventilating devices.
RB	Beer and Ice Refrigerator.	Body and doors equipped with insulation, having no ice tanks or ventilating devices.
VS	Standard Ventilator.	Equipped with insulation, including insulated side, end and top openings, and ventilating devices without ice tanks.
VA	Vegetable Ventilator.	Equipped with insulation, but having common box car end and side doors which afford no protection against heat or cold.

This is also suggested by the Association of Transportation and Car Accounting Officers.

The committee concurs in this recommendation.

NEW SUBJECTS.

43. In accordance with action of this Association, 1911 convention, with respect to the establishment of a maximum standard or limiting height for the running-board of a standard dimension box car—

The committee, after careful consideration of this, believes that this is governed by the height of the brake staff as referred to on page 564 of the 1911 Proceedings, which fixes this at 14 ft., and with this in mind and the clearances for the brake wheel as established by the United States Safety Appliance Standards, determines the maximum height of running-board for the various construction of roof, and, therefore, does not concur in the suggestion.

44. The arbitration committee suggested that a committee be appointed to show the location and design for repair and defect card boards on steel cars, and which was referred to this committee by the executive committee, and included in our circular of inquiry, M. C. B. 14, under date of December 11, 1911.

The committee received only two responses, and with the information at hand there was not sufficient data as to the various styles of steel cars to enable a report at this time, and the matter is, therefore, referred to the Association for further instructions.

The report is signed by:—T. H. Goodnow (Armour Lines), chairman; C. E. Fuller (U. P.); W. H. V. Rosing (St. L. & S. F.); W. E. Dunham (C. & N. W.); S. M. Hindman (Penna.); O. C. Cromwell (B. & O.) and T. M. Ramsdell (C. & O.).

DISCUSSION.

F. F. Gaines (C. of Ga.): Mr. President, with all due respect ot the committee on standards, referring to paragraph 17, I think there is an excellent argument for re-submission, owing to the reason that the committee assigns for turning this down, the fact that we have already too many standards. As a matter of fact, the 8½ in. coupler butt has been used all over the country, and I would like to move the adoption of an

amendment that we resubmit this question again. I think it is high time that was made one of our standards. (The motion was seconded.)

Mr. Schroyer: Mr. President, I am opposed to that motion for the reason that it will require us to carry in stock a certain $1.50 bar to replace a $1.25 spring.

R. L. Kleine (Penna.): Mr. President, We are using the 8-in. spring and using them successfully. I hope the motion will not prevail for the reason that if we have the 8½-in. butt, it means the Pennsylvania would have to carry in stock in couplers four times what we have now. That not only applies to the 7-in. shank but also will apply to the 5-in. by 5-in. shank.

Mr. Schroyer: Mr. President, I am opposed to that motion for the reason that when we have standard butts of 6½ in. or 9¼ in., there is no reason why anybody should go to the 8½ in. butts, because they can follow either one or the other.

H. LaRue (C. R. I. & P.): In the committee's report they refer to the fact of having either to make a new yoke or make some repairs.

Mr. Kleine: I might say you could use an 8-in. butt with an 8-in. spring and hardly tell the difference.

J. J. Hennessey (C. M. & St. P.): I feel if you use an 8½-in. butt where a 9⅛-in. spring is used, it is necessary to change the yoke. You can't get your rivets in; if you spread, you put it out of line. While I am not strongly in favor of adopting another standard, I believe it is well to be considered in this convention. (The motion was put and lost.)

Mr. Hennessey: On page 2, they show a 5 in. by 9 in. journal box and details. I would like to ask the committee if they meant to put a gib on the top and take out the rocking part of the wedge?

Mr. Goodnow: Simply to increase it.

Mr. Hennessey: But you destroy the rocking motion?

Mr. Goodnow: No; it is 1/32 in. below. And that was not so much for the rocking motion as it was to allow, in removing the wedge, that much clearance in taking it out of the box.

Mr. Schroyer: I look at this in this way, that the rocking motion of the wedge is entirely destroyed by the use of that lug unless there is a recess in the top of the box. Suppose you do that, you increase the difficulty in removing the wedge, because the box must be jacked up that much higher. Another thing, the increased bearing of that wedge amounts to a very little, because the lateral motion of the car is absorbed at the end of the axle, so a strain on this is not unduly severe.

C. F. Thiele (P. C. C. & St. L.): I think with the 1/32 in. below the dip of the wedge, it will not be necessary to jack the box any higher.

Mr. Brazier: I want to congratulate the committee on their work—I think they have done very excellent work—and I move that the report be accepted. But I want to call attention to paragraph 35, "Marking of Freight Cars." That is what we all delay in doing. In the past ten years, 10,478 odd points have been stencilled. Furthermore, I want to congratulate the committee, referring to their recommendation in paragraph 41, "Classification of Cars," and referring to standard refrigerator cars. They have always claimed they did not have meat hooks or everything in it; and I think this is a good thing.

Mr. LaRue: I would like to call attention to paragraph 20, "Signal Lamp Socket." It has been the understanding, I believe, of the manager of the Rock Island for the past four or five years that the bracket should be over on the letterboard; and we have worked to that end. I dislike very much at this time, when markers are being used as signal expressions, that these should be put down on the corner posts as low as that. I think that the 45 deg. angle is correct.

Mr. Schroyer: I am glad to see the report of this committee, for it coincides with the Northwestern and shows we have done right; and the Pullman got it from the Northwestern, and the Pennsylvania got it from the Pullman. I think the report is all right and the Rock Island all wrong.

Mr. Kleine: I suggest this question be referred back to the committee for further investigation, and that investigation also adopt gages for both signs and lamp brackets.

D. E. Fitzgerald (M. P. & St. L.): The question of the location of these lamp brackets came up on the Frisco about two months ago, and is now under discussion, and the fact that the American Railway Association has brought it up suggests that it is of considerable importance. A great number of our engineers have suggested that there is a tendency at night to cloud the view of the lamp in that location; and there is the same tendency where you have it on observation cars; and I think before it is decided to locate it definitely on the corner posts, we ought to give the proposition of safety considerable consideration. For instance, on a wreck that occurred several months ago, it was said if the lamps had been located a little higher, the engineer could have seen them, but on account of dip in the track, he could not see the tail ends; and they were located on the corner posts.

Mr. Kleine: The recommendation they wish to make at this time is that the socket should be located on a 45 deg. angle. Now, that depends on the radius of the angle, as to how close that socket will come to the side of the car. The lens can be adjusted only by individual roads. On the open platform cars you may carry them up, on the vestibule cars down on the corners. In some roads you can only get a partial lens; other roads require a full lens. If you can give a dimension from the side of the car to the lens socket, then the lamp brackets can fit.

Mr. Goodnow: This recommendation came from the secretary of the American Railway Association to us to do this; so we took it from that, that they had not established one; otherwise it would not have been referred to us.

Mr. Seley: I think particularly the remarks of Mr. Fitzgerald emphasize the fact, and I would be in favor of further conferring with the Committee on Transportation of the American Railway Association advising them that the discussion of the matter in this convention had brought out the fact that there were two locations in general use, one approximately, 9 ft. 6 in. from the rail on the corner post, and also as stated by Mr. LaRue; and I would let them say whether two locations would be permissible, or which of the two would be advisable as to transportation.

It was moved and seconded that the report of the committee be received and the recommendations concurred in, with the exception of the lamp brackets and sockets.

Mr. Vaughan: On the question of New Subjects, section 43, which reads: "In accordance with action of this association, 1911 convention, with respect to the establishment of a maximum standard or limiting height for the running board of a standard dimension box car"—that is a subject in which we are very much interested, and I will put the clearances as stated by the committee, but we find that the height would only be limited to 13 ft. 10⅝ in. Now this subject to us, and I think to all roads, is an important one from the fact that we have in Canada legislation in connection with the height of clearances which is demanded, and I understand some of the bills have been introduced in the United States, and we feel that it is impracticable to discuss the construction of cars of more than standard height. That is a matter that rests as a rule outside of the car department. But one thing we can do and that is to fix the maximum height or standard dimension box cars. I think there is no objection to taking a limited height of 13 ft. 6 in. on the running board of standard box cars. As nearly as we can ascertain, there are only about 30,000 cars in the United States and Canada which exceed this limit. It seems to me just as reasonable for this association to fix a limited height for the running board of a car, as it has been in the past to fix the height of eaves, etc. But if we can establish a limited height that constructors would work to in their cars, there would be some hope of keeping this running board height down to a certain limit. The difference may not appear very great, but if it amounts in practice to nearly 6 in. in construction of bridges and in structures of that sort, it is important, and the amount of that kind of work that has been going on in Canada and the United States in recent years has been considerable. We are very much interested in seeing some action taken by this association that will put this matter in such shape that we can show the standard of the running board shall not exceed a figure to be determined by the committee on standards, which we hope they can make 13ft. 6 in. for a standard dimension box car.

Mr. Goodnow: In answer to Mr. Vaughan, I might say in considering this, one of the questions that came up in the committee's mind was the question of the longitudinal running board, coming up in connection with the outside metal roof, which naturally increased the height of the car at the eaves, and affected the height of the box car at that point. The committee felt that as we are limited now by the height of the brake wheel and the clearance of the brake wheel under the United States appliances standards, to go any further would be tying it down pretty tight. I should say you could not take the benefit of half an inch or an inch especially with outside metal roofs and the additional running-board that is required with that roof.

Mr. Vaughan: I should say there is no reason why the outside metal-roof designer should not be kept down to designing to the limit. It is the height of the running board that is involved in this question. If we are going to vote on the motion now, I would wish to make a motion that the report on the running board be referred back to the committee on standards.

The motion was seconded.

The report of the committee was then accepted.

TRAIN BRAKE AND SIGNAL EQUIPMENT.

The following subjects were referred to the committee for investigation and report:

STANDARDS FOR AIR BRAKES ON FREIGHT CARS.

This refers to item 12 of the 1911 report of the committee on standards. It was suggested that the double hand-brake arrangements shown on Sheet M. C. B. 18 do not conform to requirements of Interstate Commerce Commission and should be made

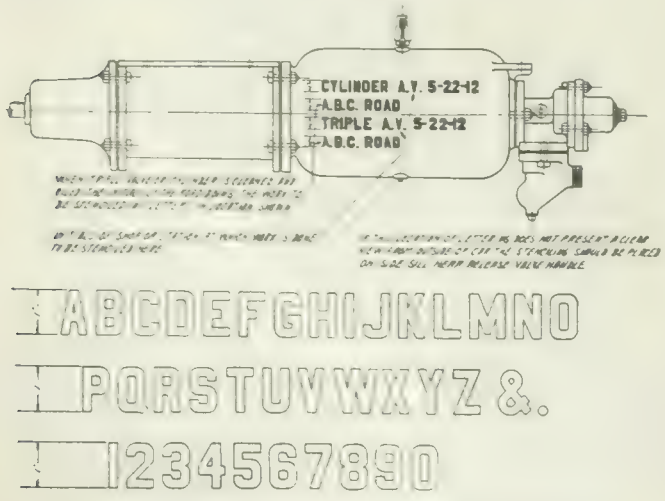


R. B. KENDIG,
Chairman, Committee on Train Brake and Signal Equipment.

to work with the air. The committee has revised Sheet 18 as suggested, showing the addition of a hand-brake lever connected to the cylinder lever with a chain in a manner that gives the same hand-brake power at each end of the car as that given by the single hand-brake arrangement. On account of the crowded condition of M. C. B. Sheet 18, the details had to be rearranged.

[illegible] FOR [illegible] BRAKE GEAR.

This refers to item 48 of the 1911 report of the committee on standards. The committee has revised Sheets *J*, *K* and *L* to conform to the safety appliance standards. The revision contemplates a minimum of changes on old equipment. The cylinder is reversed, bringing the push rod at the opposite end from that previously shown; the cylinder lever is chain-connected to one end of the hand-brake lever. On new equipment the use of the floating lever fulcrum connection and chain may be discontinued and a fulcrum similar to that shown for the intermediate lever. Sheet *J*, can be substituted for these details on either of the 3 Sheets *J*, *K* or *L*. The hand-brake power is to be multiplied by means of a floating chain sheave on the hand-brake connection rod.



Method of Marking Cleaned Brake Apparatus.

MARKING BRAKE APPARATUS.

The arbitration committee suggests that the stenciling should be illustrated in the rules, and directed that the committee submit a drawing showing how this should be done. The committee has prepared that shown in the accompanying illustration for this purpose. In order to condense the stenciling as much as possible, the words "cleaned and oiled," and "tested," have been omitted, as their significance is well known by all concerned.

CLEANING OF TRIPLE VALVES.

This subject was introduced at the convention by G. W. Wilden last year. Since that time Mr. Wilden has reported to the committee 66 specific cases between December, 1909, and June, 1911, where triples on N. Y. N. H. & H cars were cleaned and tested more frequently than that required by the rules, involving an average cost of 81 cents per cleaning. The committee, after investigating this subject, has no recommendations to make other than the proper stenciling and information required on the repair card as provided for in the rules of interchange.

M. C. B. HOSE LABEL.

The arbitration committee referred to this committee the advisability of adopting and having copyrighted a characteristic badge or label for M. C. B. hose, which should be of such form and in such location as to be readily observable by the inspector without going between the cars, and permission to use such label to be given the manufacturers only on their request. The committee finds that a copyright, such as suggested can not be obtained by the Association, which is a non-incorporated body, but has prepared a drawing showing that portion of the standard label marked "M. C. B.," extended so as to completely encircle the hose. This would make the label distinctive and readily observable without the necessity of going between the cars. If the proposed change in label were adopted by the Association, the committee would further recommend that Rule 58 in the rules of interchange be modified to read: "On and after September 1, 1914, delivering line responsible for hose not so labeled."

SIGNAL-HOSE COUPLING.

The executive committee referred to this committee the following communication from a member:

"There have been several cases where the efficiency of the air-brake system on passenger trains has been considerably reduced on account of the signal hose being coupled to the air-brake hose. When the signal-hose couplers are new it is very difficult to cause them to couple with the coupling on the air-brake hose, but when they become worn it is possible to make an imperfect coupling with ease."

The committee would recommend as a solution of this difficulty the adoption of a signal-hose coupling which would be exactly the same size and have exactly the same contour lines as the brake-hose coupling proposed to the convention last year and adopted by letter ballot, except that in its coupling feature the position of coupling lug and arm be reversed, making a left-hand coupling for the signal-hose. Such a coupling could not be imperfectly coupled with the brake-hose coupling. The gaskets or rings would be the same, and there would need be no experimenting with the coupling or contour lines.

AIR-BRAKE HOSE.

The committee has had called to its attention the desirability of improving the air-brake hose conditions. The specification for air-brake hose has been in use since 1905, and does not appear to produce a satisfactory hose. It would seem desirable to have this subject investigated by a special committee, giving attention to a revision of the specification requiring more severe stretching, pressure, unwinding and unwrapping tests, and also attention to the mounting of hose so as to produce a tight fit on the nipple.

The report is signed by:—R. B. Kendig (N. Y. C. Lines), chairman; R. K. Reading (Penna.); B. P. Flory (N. Y. O & W.), and E. W. Pratt (C. & N. W.).

The printed report of the committee, as presented to the meeting was revised by Mr. Pratt in the following particulars: The second item was amended to read as follows:

"Report of committee on standards, item 48 of 1911 proceedings, that sheets M. C. B., *J*, *K*, and *L* be referred to the committee on train brake and signal equipment for revision to conform to the safety-appliance standards, which provide that the hand brake shall operate in harmony with the power brake. The committee has revised sheets *J*, *K* and *L* as instructed. The revision contemplates a minimum of changes on old equipment. The cylinder is reversed, bringing the push rod at opposite end from that previously shown; cylinder lever is chain-connected to one end of the hand-brake lever. The

use of the floating lever fulcrum connection and chain may be discontinued, and cylinder and floating lever connection (B-C 2-A), and intermediate and truck lever connection (B-C 7-A) made in one piece, thereby eliminating five parts: B-C 5-A, B-C 4-A, B-L 2-A, B-C 3-A and B-L 3-A, as shown on sheet J."

The third item is corrected to read as follows:

The arbitration committee suggested that the stenciling should be illustrated in the rules, and directed that the committee submit drawing showing how this should be done. The committee has prepared for this purpose an illustration as shown. In order to condense the stenciling as much as possible, the words 'cleaned and oiled,' and 'tested,' have been omitted, as their significance is well known by all concerned.

"If the stencil reference to the cylinder and the stencil referring to the triple valve be made in separate pieces, this will be found convenient in avoiding the raised letters formerly cast on the auxiliary reservoirs."

In the item on M. C. B. hose label, the date at the end of the paragraph was corrected to the year 1915, the last sentence corrected reading as follows: "If the proposed change in label were adopted by the association, the committee would further recommend that Rule 58 be modified to read: 'On and after September 1, 1915, delivering line responsible for hose not so labelled.'"

At the end of the item on signal hose coupling, is added the following:

"(Samples of these couplings will be placed on the rostrum before the convention is over.)"

DISCUSSION.

I. S. Downing (L. S. & M. S.): In regard to the suggestions of the committee, they are all right, but we have experienced a great many times where an air line was defective, and we have coupled on to the signal line and thus kept the air on the train. If this was changed so it would be impossible to do this, we could not use the signal line unless we have a large pipe on the signal line and standard hose the same as the air hose. It has saved us a great many delays, especially in the middle of the night.

T. L. Burton: That question was brought to the attention of the committee when making the recommendations and was given careful consideration. The committee believe the objections raised could be easily met by carrying in the baggage car a reducing screw that could be put on to the end of the hose and inserted either into the signal pipe or the brake pipe, or, if necessary, a combination fitting that would couple up either brake or signal with a reducing screw; and, after the most careful consideration, the committee did not believe carrying this fitting in the baggage car was more objectionable than the failure arising through improperly coupled hose. There are two questions to be considered, one of safety, and one of carrying this special fitting.

It was moved and seconded that the report be accepted and referred to letter ballot.

Mr. Pratt: I hope the members will consider when voting on this matter, that which has been last under discussion. It is very handy to make a wrong coupling in order to save a moment or two on trains, specially made up, where a change in the order of the cars is a serious handicap; but it is a very much more serious matter when you are going into an "open draw," with a false coupling made unintentionally, and where, as Mr. Burton has suggested, there are other ways that will overcome this dangerous proposition, it is well to consider them.

The motion of acceptance was carried.

TESTS OF BRAKE SHOES.

As has been the case for the past two years, this committee has considered the subject of brake-beam standards as well as that of testing brake shoes.

Brake Shoes.

In its report of last year, the committee made the following recommendation:

"1. That some further work be undertaken by the Association for the purpose of connecting the results obtained under high brake-shoe pressures with those upon which the Association's specifications are based."

This recommendation was referred to the executive committee. Previous to 1911, the tests on brake shoes had been confined to pressures of 2,808, 4,152, 6,840 and 12,000 lbs., and to speeds of 20, 40 and 65 m. p. h. The tests made by the committee last year at a speed of 80 m. p. h. and at pressures of 12,000, 14,000, 16,000, 18,000 and 20,000 lbs. established new standards for high-pressure and high-speed service.

In order to complete the series and to furnish data for high-pressure specifications, it is desirable that some further tests of an intermediate character should be made on the shoes tested last year. The committee accordingly recommended for this year's program tests on these same shoes at a speed of 65 m. p. h. and at pressures of 12,000, 14,000, 16,000 and 18,000 lbs. The pressure of 20,000 lbs. is not included, since the results obtained last year show that no practical advantage attends the use of pressures higher than 18,000 lbs.

The committee further recommended that from the data thus obtained, specifications should be prepared covering the use of shoes in heavy passenger work. For various reasons, the executive committee of the Association did not find it expedient to appropriate money this year for these experiments and accordingly no work has been done.

In view of what has been said above, the committee feels that further tests should be made to complete the series and render available for the purposes of the Association the high-pressure work already done.

Weight of Fly-wheel on Brake-shoe Testing Machine.

During the discussion of the report of the brake shoe committee at the last convention, T. L. Burton (C. of N. J.), raised a question as to the desirability of varying the weight of the fly-wheel on the testing machine so as to correspond to the brake-shoe pressure and thus keeping the per cent. of braking power practically the same in the different tests. After some discussion, the question was referred to this committee for consideration.

The committee has considered the question and sees no



C. H. BENJAMIN,

Chairman, Committee on Brake Shoe Equipment.

good reason for making the change referred to. The fly-wheel of the machine was originally designed to store kinetic energy equivalent to that apportioned to one wheel of a 60,000-lb. capacity freight car. Fortunately, this corresponds very nearly to the energy per wheel of a modern 12-wheel passenger coach weighing 145,000 lbs.

In testing a brake shoe under these conditions, the method adopted is the same that would be used in testing a freight car or passenger coach of the above weights at different speeds and brake-shoe pressures. The only effect of increasing the mass of the fly-wheel would be to lengthen the time of stopping and to heat the shoe to a higher temperature. This has the effect on some shoes of increasing the mean coefficient of friction and on others of decreasing it. The committee does not feel that this would have any bearing on the question of the proper brake-shoe pressure to use under service conditions.

Recommendations.

In concluding this part of the report, the committee would make the following recommendations: That further tests be made on the shoes tested last year to connect the results with those previously obtained. These tests to be made at a speed of 65 m. p. h. and at pressures varying from 12,000 to 18,000 lbs.

Brake Beams.

Changes in Drawings.

The committee would recommend some minor changes in

the drawings of brake head and beam as shown on Sheet M. C. B. 17 and 17-A.

1. That the drawing of brake head on Sheet M. C. B. 17 be so changed as to show the hanger hole straight with a radius of $\frac{3}{8}$ in. at each end, to accommodate the straight hanger with filleted corners.

2. That the drawing of brake-beam gage as shown in Sheet M. C. B. 17-A be so changed as to show an opening of $3\frac{1}{2}$ in. instead of $3\frac{5}{8}$ in. in order to make the drawing conform to the text of the specification as decided by letter ballot in 1907 (see Proceedings for 1907, p. 545).

Length of Brake Beam.

In view of the present uncertainty and misunderstanding as to the standard allowances for length of brake beam, the committee would recommend the adoption of the following interpretation:

That the specifications as to length of brake beams, adopted by letter ballot in 1907, shown on page 558 of the Proceedings, be interpreted as follows:

All brake beams shall be $60\frac{1}{4}$ in. in length from center to center of brake head, with a maximum allowable spacing of $60\frac{3}{8}$ in. and a minimum of $60\frac{1}{8}$ in.; this spacing to be measured by gaging inside of the brake head key lugs. On Sheet M. C. B. 17, the drawing of brake head shall be so changed as to show the hanger hole straight with $\frac{3}{8}$ in. radius at the end.

Width of Slots in Brake Head.

The committee would recommend that the brake-head gage shown in Sheet M. C. B. No. 17 should be used for gaging the slots in the head with $1\frac{9}{16}$ in. as the minimum and $1\frac{11}{16}$ in. as the maximum width.

Brake Beam Gage.

The committee would submit the drawing of a brake-beam gage shown in Sheet 17-A (Fig. 1), of this report for consideration and trial by members of the Association, with a view of adopting such gage as recommended practice to take the place of the present gage now shown on Sheet M. C. B. 17-A. The proposed gage determines the following dimensions and adjustments: Limiting outline of brake beam; length of beam; proper alignment of the heads in relation to each other; proper location of pin hole and center of strut, and angle of lever fulcrum.

Standard Brake Beam.

The committee would also submit the drawing of a No. 2 standard brake beam shown in Sheet 17-B (Fig. 2), of this report for consideration and trial by members of the Association, with a view of adopting such beam as Recommended Practice for No. 2 M. C. B. brake beams. The committee understands that this beam can be made without incurring liability for patent infringement for any valid and existing patent. This brake beam meets all the requirements of the Association so far as existing standards are concerned as to dimensions and also meets the physical tests required. The results of tests made at the testing laboratory of the Pennsylvania Railroad Company at Altoona, Pa., on such a beam are shown in Table 1.

DREXEL BEAM.			AJAX BEAM.		
Load.	Deflection.	Set.	Load.	Deflection.	Set.
500	.000	....	500	.000	....
6,000	.026	.000	6,000	.027	.000
6,500	.028	.000	6,500	.029	.000
7,500	.033	.000	7,500	.034	.000
12,000	.052	.000	12,000	.055	.000
15,000	.064	.002	15,000	.068	.000
500	.000	....	17,000	.079	.001
15,000	.062	.000	19,000	.085	.003
17,000	.068	.000	21,000	.097	.005
19,000	.075	.000	23,000	.104	.006
21,000	.083	.002	25,000	.113	.007
23,000	.094	.005	27,000	.126	.010
25,000	.103	.009	29,000	.136	.014
27,000	.116	.028	31,000	.155	.026
29,000	.147	.048	33,000	.190	.060
31,000	.182	.064	35,000	.389	.234
33,000	.236	.112	37,000	.520	.360
35,000	.450	.305	39,000	.900	.847
37,000	.335	.385	40,400	....	....
39,000	.934	.676	....	....	....
41,200	....	....	....	....	....
Bent through center. Weight, 91 lbs.			Bent through center. Weight, 95 lbs.		

TABLE 1.—RESULT OF TEST OF DREXEL AND AJAX BEAMS PENN. R. R. LABORATORY, ALTOONA, PA.

It is the feeling of the committee that the time is ripe for consideration of a standard beam which shall meet the present requirements and specifications.

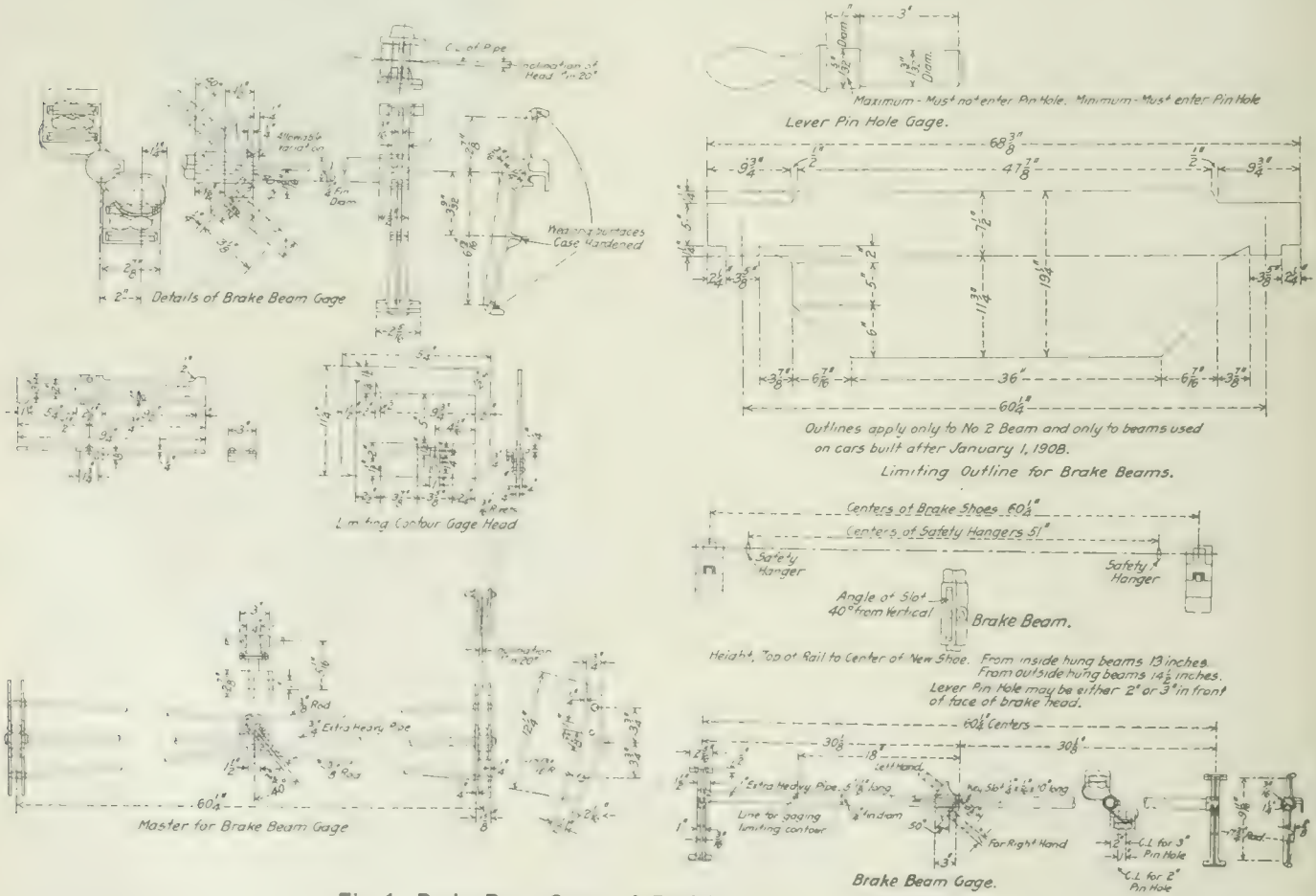


Fig. 1—Brake Beam Gages; A Revision of M. C. B. Sheet 17-A.

Numbering Brake Beams.

It is recommended that in order to designate an M. C. B. brake beam, it be required that the letters "M. C. B." and the numerals "No. 1" or "No. 2," as the case may be, be cast, forged or stamped on the fulcrum. It is further recommended that after January 1, 1913, this be cast on the fulcrum, if the fulcrum be a casting, or forged on the fulcrum if the fulcrum be a forging.

New M. C. B. Association Sheets.

In accordance with what has been said before, the committee would submit new M. C. B. Association Sheet No. 17 to be substituted for the existing M. C. B. Sheet No. 17. The new sheet contains the standard brake head, shoe, key and gages for same in accordance with the last ballot of the Association. The gage for head also shows the maximum and minimum lines for gaging the top and bottom of slot opening, with 1 9/16 in. as the minimum and 1 11/16 in. as the maximum width. One dimension has been added to the brake head, which is the width of the slot corresponding to the width of the slot in shoe, or 1⅝ in.

The committee would submit M. C. B. Association Sheet No. 17-A, (Fig. 1), to be substituted for the present M. C. B. Sheet No. 17-A. This sheet contains the standard brake beam, brake-beam gage, pin-hole gage and standard limiting outline for brake beams. The diagram of angle of slot in strut, position of brake heads, together with the pin-hole gage, has been reproduced from the present M. C. B. Association Sheet No. 17-A. The limiting outline for brake beams has been modified in accordance with that shown on page 470, adopted in 1911 by the Association as the new limiting outline for brake beams, and there has been substituted a new brake-beam gage to take the place of the old gage shown on this sheet, in accordance with suggestions of the committee, for the approval of the Association. The committee would substitute a new sheet known as M. C. B. Association Sheet No. 17-B. (Fig. 2), which shows a proposed No. 2 standard brake beam with details, standard channel, strut and key-way gages for both the 2-in. and 3-in. pin-hole dimensions in front of brake head. This is the brake beam referred to in the preceding paragraph and is one which will meet all the requirements of the Association so far as existing standards are concerned, and will also meet the physical test required.

The report is signed by:—C. H. Benjamin, (Purdue Univ.), chairman; C. D. Young, (Penna.), and R. B. Kendig, (N. Y. C.).

DISCUSSION.

M. K. Barnum (I. C.): The road with which I am connected has made quite an investigation of the brake shoes that come to our scrap pile, and we have found a great many are worn on the flat of the face, and that a great many have the outside edge of the shoe overlapping the rim from half to an inch to an inch, and the only conclusion we can draw is that the brake beam is too long by about ½ in., and our observations indicate that this overlapping of the rim tends to shorten the efficiency, to shorten the life of the shoe, and tends to brake the wheel unequally. I would therefore prefer the paragraph with regard to the length of the brake beam to be changed, to make the standard length 59¾ in.; a maximum of 59⅞ in.; and a minimum of 59⅝ in.

F. F. Gaines (C. of Ga.): My experience entirely coincides with that of Mr. Barnum. I went into this thing some 8 or 10 years ago, and I found the shoes overhung on one side, and ruined the brake beam, and started the flange on the opposite beam, and I think the 59⅝ in. is very much better than 60¼ in.

C. D. Young (Penna.): I would like to say this subject was gone into at the time the 60¼ in. was established by the 1906 committee, and they presented diagrams showing the relative location of the shoe on the wheel, and I would think it would be a mistake to adopt this dimension offhand without giving the committee an opportunity to determine what other troubles may arise from a closer dimension than 60¼ in. I am inclined to

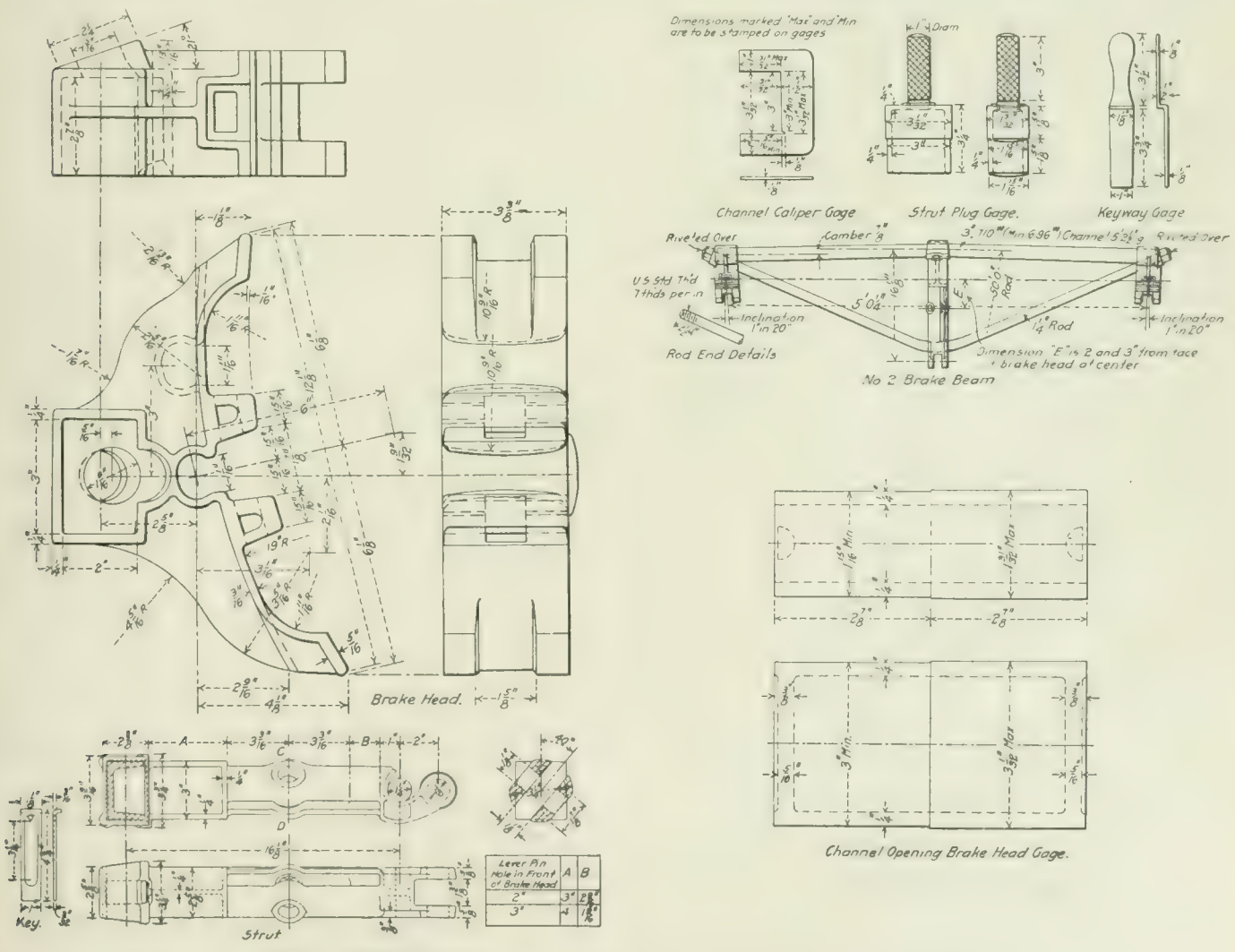


Fig. 2—Standard Brake Beam to be Adopted as Recommended Practice.

believe we will have very high flange wear due to the shoes crowding the fillet of the wheel if we close in the 60¼ in. dimension, and I would suggest that the subject be referred back to the committee for further consideration.

In view of the fact that the committee on brake beams investigated this subject at one time and we have had this practice in vogue for 5 years, I think it would be hasty to adopt a new dimension in view of the work that has gone before, and I would make an amendment that the subject of the dimension of 59¾ in. as the nominal length spacing of brake beam be referred to the committee on brake beams for further consideration, and report next year.

L. C. Ord (C. P.): The Air-Brake Association, I understand, have a committee on this subject, which has made a recommendation of 60 in. for the length of the beam and I ask if it would not be well to have that committee co-operate with this committee in investigating this subject, in order to determine the standard length?

Mr. Young: I think I may speak for the committee that they will be glad to co-operate with the committee of the Air-Brake Association in order to have the dimension made proper.

Mr. Gaines: I tried out that dimension by placing several beams with the old dimension, and with the shorter dimension on tenders, and followed the matter up by inspecting the brake beams regularly, and we found that we had less flange wear and brake shoe wear, and the thing worked much more evenly, with the shorter dimension than with the standard dimension.

C. A. Seley (C. R. I. & P.): I think that we should adopt the second portion of this report with the exception named. I would like to say just a few words about the new association brake beam. I am very much interested and gratified to note the progress in the matter of establishing a standard, but I am also persuaded that we are not ready to adopt this beam as recommended practice at this time.

Although the date of this report is April 18, indicating proper activity on the part of the committee, it was not in our hands for analysis until within the past week. Furthermore, I know that if this is adopted, that you make the new standard beam 15,000 lb. beam for No. 2, instead of 12,000 lb. beam, in fact, a 17,000 lb. beam, if you take the indication of the first part of the test, which is within the range of a No. 2 beam test.

In the short time I have had to look over the report of the committee, I am of the opinion that possibly it would pay us to spend a little more time in the analysis and working out of this standard beam.

There are a number of dimensions one way and another which make this beam a pretty fine haired one to manufacture, and I think that costs with us are regulated by the number of points which we have got to tie and possibly a little more investigation might develop the fact that some of these points are tied a little too closely. Just as an illustration of what I mean, I notice, for instance, in the No. 2 brake beam the radius of the compression member. Now, I believe that the ordinary method of assembling these beams is not to curve them before they are put in, but to make the curve in assembling the beam, and some captious inspector might find out it was not exactly 50-in. radius, and make an objection, and I think there is one measurement that might be eliminated, and possibly on further study of the design, we might be able to do something more in that line, and while I do not wish to be an obstructionist or discourage the adoption of a standard beam I think these points should have consideration.

I would, therefore, move that in accepting the report of the committee, and submitting it to letter ballot, that the matter of the new standard beam be referred back to the committee for further consideration with the idea that not only the committee, but the members of the association can have a better chance to check over and study the report of the committee.

Mr. Young: By reference of the report back to the committee, I presume that Mr. Seley is simply asking for time to ascertain whether the construction as here offered is a suitable one. So far as the detailed points which he raises are concerned, I might say that the beam is made in accordance with this drawing and with a 50-ft. radius of the compression member, the inclination of one in twenty of the head comes out exactly, and it is impossible to build a beam in accordance with the requirements of the association and with that inclination without giving the beam ⅞-in. camber, which is virtually the same as making it the 50-ft. radius.

I believe that the association should go slow in the case of any recommended practice design, and it may be good policy to defer any action, but I do not quite see what the committee can do. They have done their work, they have presented the drawings, and presented the results of tests, and they offered the beam as recommended practice. If the beam is found wanting, when adopted in recommended practice, it is a very simple matter for us to change it or eliminate such dimensions with regard to which elimination may be desirable.

I overlooked, previously, one point which Mr. Seley brought up, namely, that the tests show we have a 15,000-lb. beam. That is true. We have also tested beams similar to these, in our laboratory, and for the information of the members, I will say that some of the beams test 15,000 lbs.; in other words, we do not construct a beam which would be so close to the rejection limit that it would be handicapped under our specification, by rejection in re-testing, and the beam, in the opinion of the committee, is amply strong to meet the specified requirements, and if constructed in accordance with the drawing, no such difficulty will exist, and it is intended to be a 12,000-lb. beam.

Mr. Seley's motion was put and lost.

The President: Now, we will take a vote on the original motion, *i. e.*, to accept the committee's report and refer it to letter ballot, with the exception of the length of brake beam. The motion was carried.

CAR WHEELS.

At the convention in June, 1911, a number of recommendations were made relating to questions of standardizing solid steel and steel-tired wheels for freight and passenger cars. These subjects, together with other matters pertaining to the chilled cast-iron wheels were referred by the executive committee to this committee for action and recommendation. The subjects are briefly outlined as follows:

Prepare specifications and physical test for cast steel, rolled steel, forged and rolled steel, and forged steel wheels. Prepare drawings showing principal dimensions of cast steel, rolled steel, forged and rolled steel, and forged steel wheels. Prepare drawings showing a standard method of fastening for built-up steel-tired wheels. Prepare drawings showing proposed M. C. B. standard gage for measuring the thickness of service metal of solid steel and steel-tired wheels. Consider any changes or corrections necessary in specifications for chilled cast-iron wheels.

The most important work was the subject of specifications, dimensions and tolerances for solid forged and rolled, rolled or cast steel wheels for freight and passenger car service.

The committee requested the various makers of solid steel and steel-tired wheels to submit drawings and specifications for steel wheels now in service; also requested similar information from railways using steel wheels.

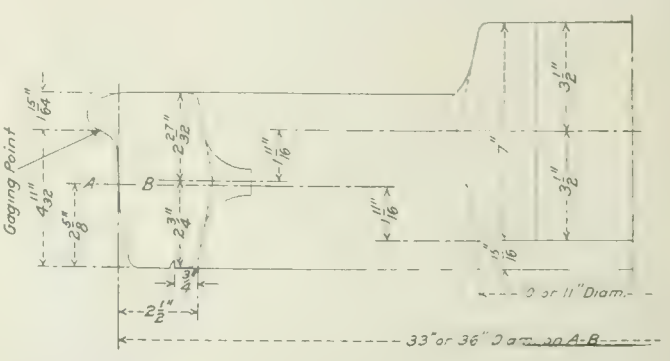
Realizing the advisability of coöperation between railways and the makers of steel wheels, the committee addressed the manufacturers suggesting a joint conference at Pittsburgh, Pa., December 8, 1911.

The proposed work of the committee was explained to them and met with general approval. It was brought out at this meeting that the present tendency pointed toward a number of different designs and specifications, instead of adopting as few standards as possible.

The committee was advised that a committee representing the wheel manufacturers and the American Society for Testing Materials was working jointly on designs and specifications for steel wheels. Specifications were prepared by this committee for freight and passenger wheels, copies of which were furnished to the M. C. B. committee. After reviewing them, the committee recommended a few changes in regard to tolerances, and the revised specifications will appear as an appendix to this report.

There are a number of questions relating to the chemical and physical properties of carbon and alloy steel, and method of treating and handling the steel in its process of manufacturing that are now being investigated.

On this account, the committee has thought it unwise to recommend a standard specification at this time, governing the



Fg. 1—Solid Steel Wheel for 4¼ in. x 8 in., 5 in x 9 in., and 5½ in. x 10 in. Axles.

quality of the material or the method of manufacturing solid steel wheels, and has only recommended the adoption of a specification governing the maximum variations that will be allowed in the fabrication of new wheels. This is shown in recommendation No. 1.

It will be noticed that only one specification has been recommended which applies to both passenger and freight car wheels. Attention is also called to the fact that the question of specifications for cast-steel, one-run wheels has not been considered at this time.

The committee submits as its second recommendation, drawings of 33-in. and 36-in. solid steel wheels for freight and passenger service, as shown in Figs. 1 and 2. As there is some

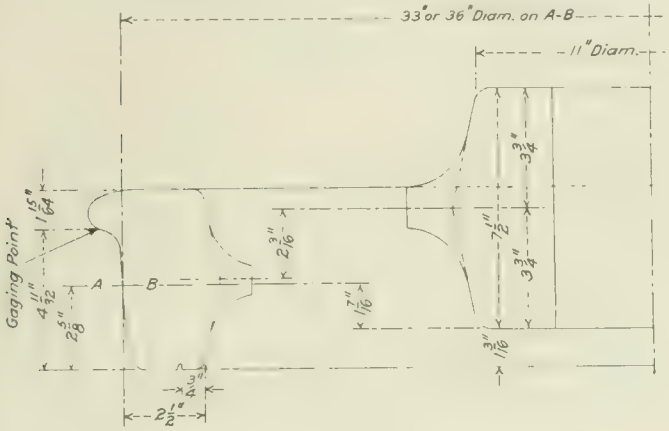


Fig. 2—Solid Steel Wheels for 6 in. x 11 in. Axles.

difference in opinion as to the correct shape of the plate of the wheels, this has not been shown, and no mention as to thickness of plate and its tolerance is made in the proposed specification.

It will also be noticed that two different hub diameters—10 in. and 11 in.—are recommended for wheels used on axles up to and including 5½ in. by 10 in., the use of either diameter to be optional with the purchaser.

On account of the necessity of allowing 1/16 in. tolerance below the specified thickness of flange due to inaccuracy in fabrication, the committee suggests as its third recommendation that the thickness of flange be increased, making the rim 5 19/32 in. wide instead of 5½ in., which is the present standard. This will make the contour of the tread and the flange of steel and steel-tired wheels same as the chilled cast-iron wheels, and the same mounting and check gages can be used.

Attention is called to the drawings showing the various gages that will be required in connection with the inspection of solid steel and steel-tired wheels.

In regard to the question of tire fastenings for steel-tired wheels, the committee has found that at the present time there are a great number of different methods used, and after careful consideration of this subject with the manufacturer of steel-tired wheels, it was suggested that a tire held by shrinkage and bolts be adopted as recommended practice as shown in Fig. 8.

This type of fastening, in the opinion of the committee, has the greatest merits of any in use, and is not covered by patents leaving it open for any manufacturer to produce. With this type of fastening cast-iron or cast-steel spoke or solid centers can be used.

In regard to the question of determining a proper physical test for the purpose of detecting internal strains in solid steel wheels, the committee, after due consideration of this subject, feels that it will be necessary to make further investigations and experiments before submitting a recommendation, and suggests that this will be a part of the committee's work for next year.

In reference to chilled cast-iron wheels, the committee has received from the Association of Manufacturers of Chilled Car Wheels several suggestions, which are as follows:

1. Drawing for chilled cast-iron wheels for cars of 140,000 lbs. capacity.

2. Increase thickness of flange 3/32 in. at base line, and compensate for this increase by mounting the wheels 3/16 in. farther apart, and change the mounting gage to suit.

3. Revision of weights of wheels for cars of 80,000 lbs. capacity.

4. Revision of paragraph in wheel specification relative to overweight at the manufacturer's expense.

5. Revision of M. C. B. wheel specification to include wheels for cars of 140,000 lbs. capacity.

6. Confine rejections on account of failure of test wheels to wheels represented by same tape size only.

7. Establish maximum breaking power as well as gross load for each design of wheel.

8. Revision of M. C. B. Rule 70 to specify weight at which freight should be worn hollow.

9. Revise the M. C. B. standard drawings for cast-iron wheels to show the standard size core. Also revise the standard wheel specification to the effect that overweight of wheels above the normal (due to hub core smaller than the standard) should be paid for by the purchaser.

The committee has carefully considered these recommendations and does not feel justified in recommending more than three of the changes at this time.

The question of increasing the thickness of the flange and mounting the wheels 3/16 in. farther apart is a matter which this committee can not pass upon or recommend.

In regard to the question of design and specification for a chilled cast-iron wheel for cars of 140,000 lbs. capacity, the committee has taken no action on this subject at this time.

In regard to the question of raising the weight for the 80,000 lb. capacity wheel, the committee has not found any good reasons for a change.

In reference to the suggestion relating to the overweight of wheels at the manufacturer's expense which is brought about by the clause in paragraph 9 of the present wheel specification, which reads: "All excess weight over the maximum given to be the expense of the manufacturer." The committee has carefully considered this matter and recommends that paragraph 9 in the present wheel specification be changed as shown by the committee's recommendations.

In regard to suggestion No. 6, your attention is called to the present specification, which states that two wheels picked at random from each one hundred wheels be tested, and if these wheels fail to pass any of the specified tests, the entire lot of 100 wheels represented by this test will be rejected.

It is asserted that the rejection of 100 wheels because the chill in either extreme tape size is unsatisfactory causes many good wheels to be rejected and works a hardship on the manufacturers.

The committee has carefully considered this matter, and a change in the specification is recommended, as shown in the committee's recommendations.

In regard to the question of establishing maximum breaking power as well as gross load for each design of wheels, this question was brought up and referred to in the recommendations of last year and had particular reference to the failures of cast-iron wheels used under cars of heavy tare weight, such as refrigerator cars.

The committee has considered this question again, and upon investigation found that the trouble experienced has been largely due to the fact that too light capacity wheels, as well as axles, are being used under refrigerator cars and cars with a marked capacity of 60,000 lbs. The majority of these cars have a tare weight of 40,000 to 47,000 lbs., bringing the total weight of the car and lading up to 117,000 lbs.

If the proper size axles, or 5 in. by 9 in., are used on these cars with a corresponding weight of wheels, it is the opinion of the committee that the trouble experienced with these cars will be eliminated, and the committee would again recommend that car owners and members of this Association give this subject careful consideration in purchasing new equipment or making renewals to old cars.

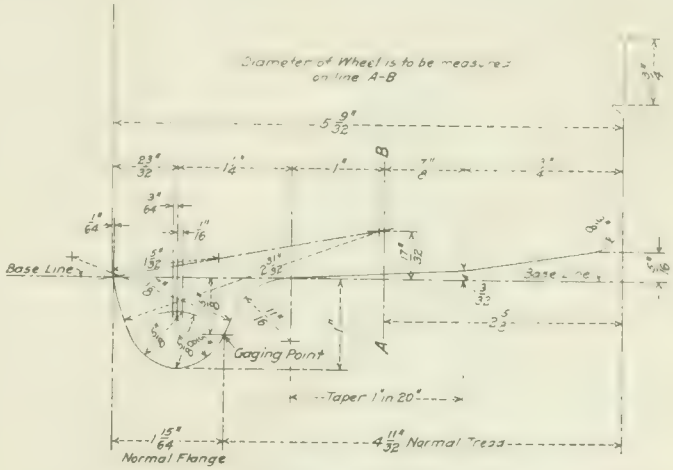


Fig. 3—Wheel Tread and Flange for Steel and Steel Tired Wheels.

RECOMMENDATIONS.

Recommendation No. 1.

The proposed specification governing the dimensions and tolerances for solid wrought-steel wheels for freight and passenger car service are as follows:

1. Wheels should be furnished rough bored and with faced hubs and have a contour of tread and flange as rolled or machined according to M. C. B. Recommended Practice (Fig 3). They should conform to dimensions specified within the following tolerances:

2. *Height of Flange.*—The height of flanges should not be more than 1/8 in. over and must not be under that specified, or 1 in.

3. *Thickness of Flange.*—The thickness of flange shall not vary more than 1/16 in. over or under that specified.

4. *Thickness of Rim.*—The thickness of rim to be measured between the limit of wear groove and the top of the tread at the point where it joins the fillet at throat of flange. The thickness must not be less than 1¾ in., but may exceed this amount.

5. *Width of Rim.*—The width of rim shall not be more than 1/8 in. less, nor more than 1/8 in. over that specified.

6. *Limit of Wear Groove.*—The limit of wear groove to be located as shown in Fig. 3.

7. *Diameter of Bore.*—The diameter of rough bore shall not vary more than 1/16 in. above or below that specified. When not specified the rough bore shall be ¼ in. less in diameter than the finished bore subject to the above limitations.

8. *Hub Diameter.*—The hub diameter may be either 10 in. or 11 in. in diameter as specified, with a maximum variation of 1/8 in. above or below. The thickness of the wall of the finished bored hub shall not vary more than 3/8 in. at any two points on the same wheel.

9. *Hub Length.*—The length of hub shall not vary more than 1/8 in. over or under that specified.

10. *Depressions of Hub.*—The depression of the hub must be made so that the distance from the outside face of the hub to the line *AB* shall not exceed 1 11/16 in. for wheels used on 5½ in. by 10 in. axles and under, and 1 7/16 in. for wheels used on 6 in. by 11 in. axles.

11. *Black Spots on Hub.*—Black spots will be allowed within 2 in. of the face of the hub but must not be of such depth that they will not bore out and give clear metal at finished size of bore.

12. *Eccentricity of Bore.*—The eccentricity between the tread at its center line and the rough bore shall not exceed 3/64 in.

13. *Block Marks on Thread.*—The maximum height of block marks must not be greater than 1/64 in.

14. *Rotundity.*—All wheels shall be gaged with a ring gage made of 3 in. by ½ in. material, and the opening between the gage and tread at any one point shall not exceed 1/16 in

15. *Plane.*—Wheel shall be gaged with a ring gage placed concentric and perpendicular to the axis of the wheel. All points on the back of the rim equidistant from the center shall be within a variation of 1/16 in. from the plane of the gage when so placed.

16. *Tape Sizes.*—Wheels shall not vary more than five tapes under nor nine tapes over the size called for.

17. *Mating.*—The tape sizes shall be marked in plain figures on each wheel. Wheels must be mated to tape sizes and shipped in pairs.

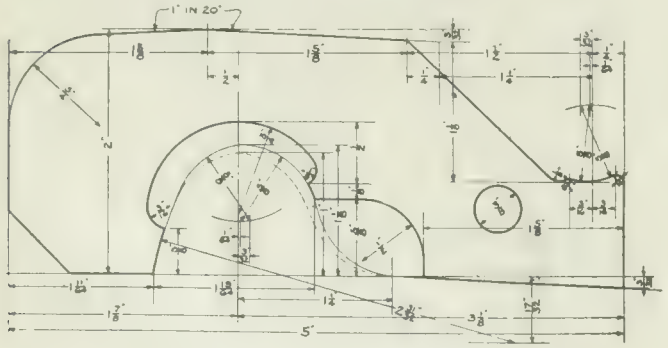


Fig. 4—Maximum Flange Gage for Solid Steel Wheels.

18. *Gage.*—Gages and tape used shall be M. C. B. standard as follows:

M. C. B. Standard wheel circumference measure, Sheet 16-A.
Maximum flange thickness gage, Fig. 4.
Minimum flange thickness gage, Fig. 5.
M. C. B. recommended plane gage, Fig. 6.
M. C. B. recommended gage for measuring service metal, Fig. 7.

19. *Branding.*—Wheels shall be stamped with date, heat number, maker's serial number and brand, also purchaser's name and serial number, if specified. The branding is to be done according to M. C. B. recommended practice.

20. *Inspection.*—The inspector representing the purchaser shall have free entry at all times, while his contract is being executed, to all portions of the manufacturer's plant. All reasonable facilities and necessary gages shall be afforded the inspector by the manufacturer to satisfy him that the wheels are being furnished in accordance with the specifications. All tests and inspection shall be made at the place of manufacture prior to shipment and free of cost to the purchaser. The purchaser shall have the right to make tests to govern the acceptance or rejection in their own test room or elsewhere as may be decided by the purchaser.

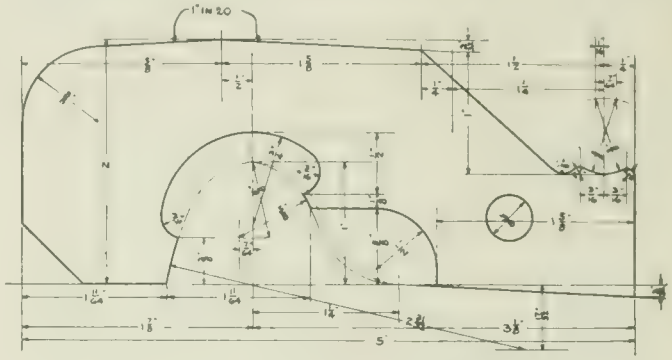


Fig. 5—Minimum Flange Gage for Solid Steel Wheels.

Samples of rejected material must be preserved at the laboratory of the purchaser for one month from the date of test report. In case of dissatisfaction with the results of the tests, the manufacturer must make claim for a rehearing (should he desire to do so) within that time. Tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the mill.

Recommendation No. 2.

It is recommended that the size and dimensions for solid steel wheels for freight and passenger cars be adopted as shown on the following drawings:

33-in. and 36-in. solid steel wheels for 4¼ in. by 8 in., 5 in. by 9 in. and 5½ in. by 10 in. axle, Fig. 1.

33-in. and 36-in. solid steel wheel for 6 in. by 11 in. axle, Fig. 2.

Recommendation No. 3.

It is recommended that the thickness of flange for steel and steel-tired wheels be increased 3/32 in., making the contour to the base line same as the cast-iron wheels, as shown in Fig. 3, herewith, and it is recommended that this cut be shown as Fig. 5 on Sheet *C*, M. C. B. Recommended Practice in place of the present cut.

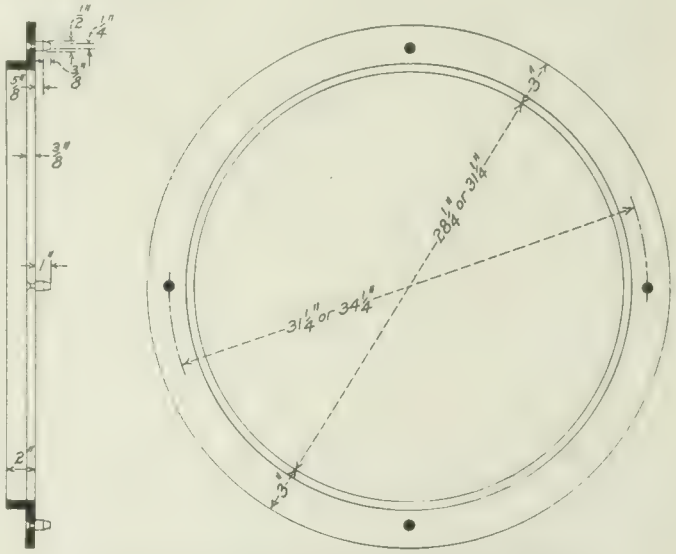


Fig. 6—Plane Gage for Solid Steel Wheels.

Recommendation No. 4.

As it is found desirable to have a gage for measuring the thickness and height of flanges as well as throat radius of steel wheels, it is recommended that the present maximum and minimum flange thickness gage shown on M. C. B. Sheet 16 be changed and made similar to that shown in Figs. 4 and 5. This will give a maximum and minimum flange thickness gage that is the same for either cast-iron, solid steel and steel-tired wheels, and also a maximum and minimum height and throat radius for steel wheels.

Recommendation No. 5.

It is recommended that a rotundity gage be adopted for the purpose of measuring the maximum distance that wheels are out of round, which shall be 3 in. wide and ½ in. thick.

Recommendation No. 6.

It is recommended that a plane gage for the purpose of measuring how much wheels are out of plane be adopted, as shown in Fig 6.

Recommendation No. 7.

It is recommended that a gage be adopted for the purpose of measuring the thickness of the rim above the limit of wear groove, as shown in Fig. 7. With this gage it is possible to measure direct the amount of metal necessary to remove to restore the tread to M. C. B. contour. It is also possible to measure direct the amount of service metal remaining above the condemning limit after the tread is restored to M. C. B. contour.

Recommendation No. 8.

It is recommended that a standard fastening for all steel-tired wheels be adopted, as shown in Fig. 8.

Recommendation No. 9.

It is recommended that a standard method of branding all steel wheels be adopted, as previously described.

The following changes in the present specifications for cast-iron wheels are recommended:

Recommendation No. 10.

The sixth clause under paragraph No. 4 reads as follows:

"Should the test wheel stand the given number of blows without breaking in two or more pieces, the inspector will then subject the other wheel to the following test."

It is recommended that this sentence be changed to the following:

"Should the test wheel stand the given number of blows without breaking in two or more pieces, the drop test will be satisfied and the inspector will then subject the other wheel to the following test."

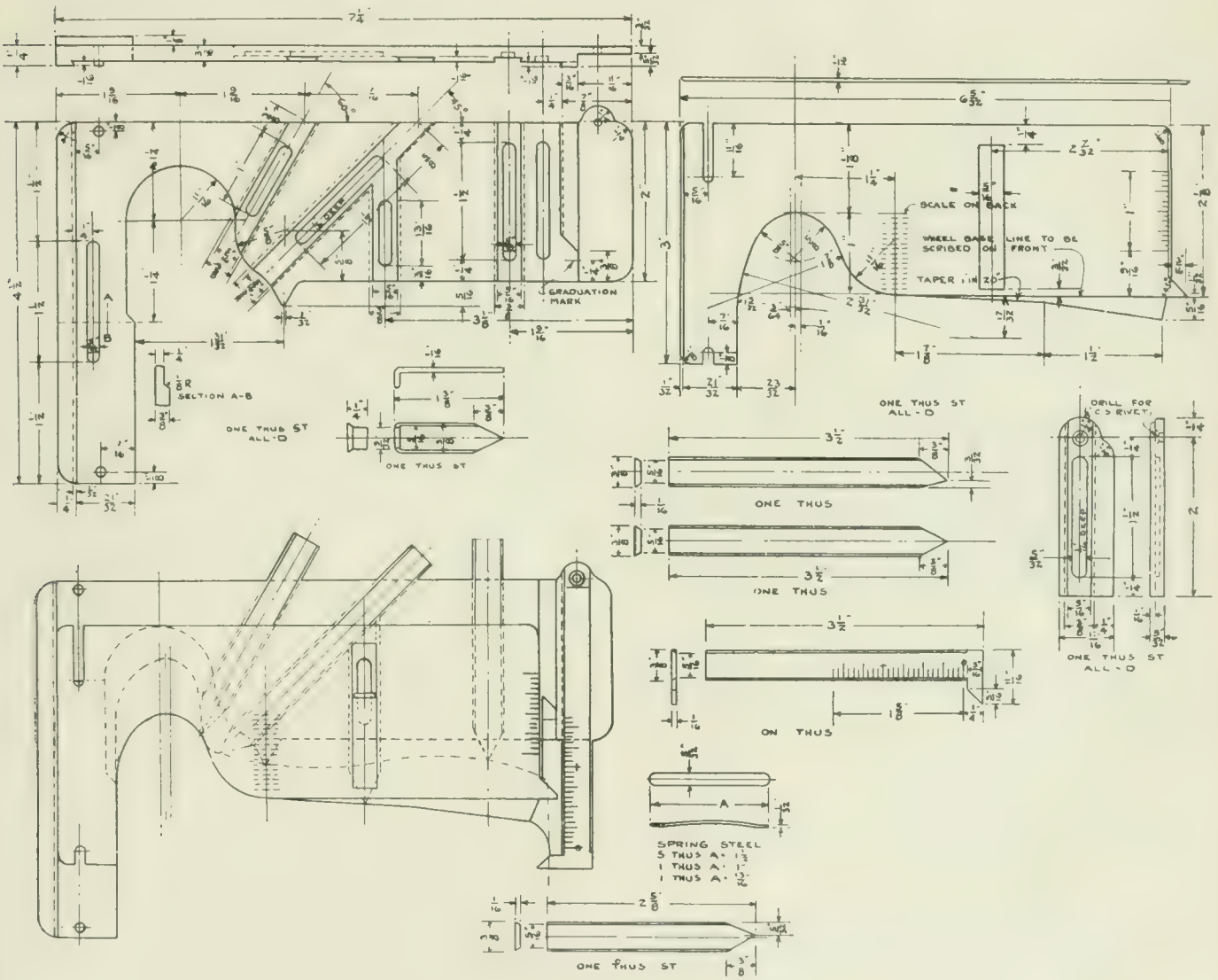


Fig. 7—Contour Gage for Steel Wheels.

Recommendation No. 11.

The last sentence in the seventh clause of paragraph No. 4 now reads as follows:

"If the wheel is found broken in pieces, or if any crack in the plate extends through or into the tread, the 100 wheels represented by the test will be rejected."

It is recommended that this sentence be changed to the following:

"If the wheel is found broken in pieces, or if any crack in the plate extends through or into the tread, all wheels of the same tape size as the broken wheel will be rejected."

Recommendation No. 12.

It is recommended that paragraph No. 9, of the present specification, be changed to the following:

"Individual wheels will not be accepted which:

"(1) Do not conform to standard design and measurements.
"(2) Are under minimum weight.
"(3) Have physical defects described in Section 2.

"If in any lot of 100 wheels submitted to test, the test wheel fails to meet the requirements of the drop, chill, or thermal test, then all of the wheels in tape number and weight corresponding to the test wheel will be rejected. In case the rejection is for high chill, weak breaking strength, or failure in the thermal test, the test will be continued in the next higher number of tape size, or if the rejection is for low chill, the test will be continued in the next lower number tape size.

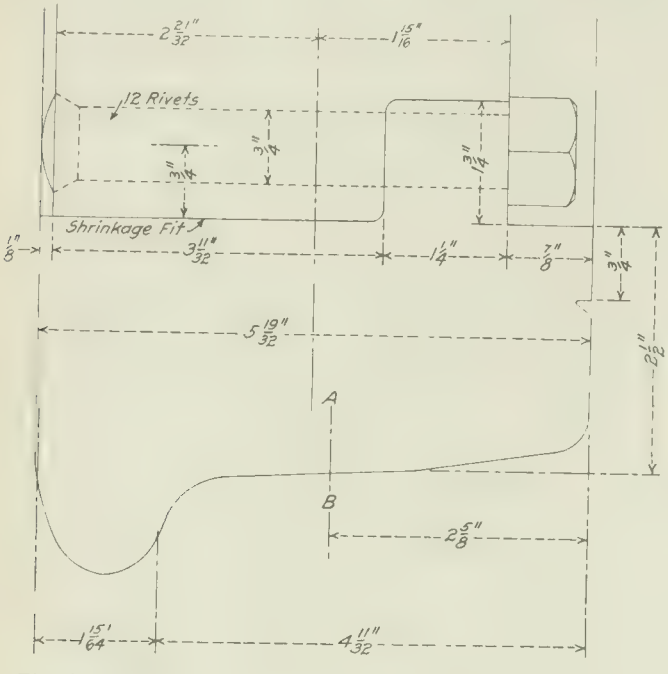


Fig. 8—Proposed Tire Fastening for Steel Tired Wheels.

"In any shipment where the average weight of wheels is above the maximum weight of wheels the excess weight to be at the expense of the manufacturer.

"In case wheels ordered with cores smaller in diameter than the standard, the additional weight should be considered as an addition to the normal weight and paid for by the purchaser."

Recommendation No. 13.

It is recommended that the letters *A B* be added to the measuring line 2⅝ in. from the outside rim of the wheel to the drawing of the 625-lb. cast-iron wheel M. C. B. Sheet *N*, of the 675-lb. cast-iron wheel M. C. B. Sheet *O*, and the 725-lb. cast-iron wheel M. C. B. Sheet *P*.

Recommendation No. 14.

It is recommended that the following clause be added to the Code of Rules for the Interchange of Traffic:

"Rule 76A. Height of flange.—If the height of flange is 1½ in. or greater."

Recommendation No. 15.

It is recommended that the standard size of cores for cast-iron wheels be shown on the drawings of same as follows:

M. C. B. Sheet *M* Recommended Practice, for cast-iron wheels for 60,000-lb. cars. Add the following clause:

"Standard core 5¼ in. diameter."

M. C. B. Sheet *O* Recommended Practice, for cast-iron wheels for 80,000-lb. cars. Add the following clause:

"Standard core 6 in. in diameter."

M. C. B. Sheet *P* Recommended Practice, for cast-iron wheels for 100,000-lb. cars. Add the following clause:

"Standard core 6½ in. in diameter."

The above notations to be placed under the dimensions of the finished bore.

The report is signed by:—Wm. Garstang (C. C. C. & St. L.), chairman; W. C. A. Henry (Penna.); A. F. Manchester (C. M. & St. P.); R. W. Burnett (C. P.); R. L. Ettenger (So. Ry.); O. C. Cromwell (B. & O.) and J. A. Pilcher (N. & W.).

APPENDIX.

An appendix follows showing a portion of what the American Society for Testing Materials has drawn up as proposed standard specifications for forged and rolled, forged, or rolled solid carbon steel wheels for engine truck, tender, freight and passenger service.

A.—Manufacture.

1. *Process.*—The steel shall be made by the open-hearth process.

2. *Discard.*—The ingots from which the blanks are made shall have sufficient discard to insure freedom from injurious piping and undue segregation.

B.—Chemical Properties and Tests.

3. *Chemical Composition.*—The steel shall conform to the following requirements as to chemical composition:

	Acid.	Basic.
Carbon	0.60 to 0.80	0.65 to 0.85 per cent.
Manganese	0.55 to 0.8	55 to 0.80 per cent.
Silicon	0.15 to 0.35	0.10 to 0.30 per cent.
Phosphorus	not over 0.05	not over 0.05 per cent.
Sulphur	not over 0.05	not over 0.05 per cent.

4. *Chemical Analysis.*—To determine whether the material conforms to the requirements as to chemical composition specified in Section 3, an analysis shall be made from a test ingot taken during the pouring of each melt. A copy of this analysis shall be given to the purchaser or his representative.

A check analysis may be made by the purchaser from one wheel representing each melt, and this analysis shall conform to the requirements specified in Section 3. A sample may be taken from any one point in the plate; or two samples may be taken, in which case they shall be on radii at right angles to each other. Samples shall not be taken in such a way as to impair the usefulness of the wheel. Drillings for analysis shall be taken by boring entirely through the sample parallel to the axis of the wheel; they shall be clean and free from scale, oil and other foreign substances. All drillings from any one wheel shall be thoroughly mixed together.

Mr. Garstang presented the report and at its conclusion said:

Since this report was written, we find there are some roads using a 38-in. diameter wheel in passenger service. If you will refer to recommendation No. 2, of the committee's report, you will notice that the committee only recommends two standard wheels, one 33 in. in diameter, and one 36 in. in diameter; and those dimensions are to cover both passenger and freight service. In view of the fact that several roads use a 38-in. wheel, as standard, I feel, as a member of the committee, that we should have included a 38-in. wheel, and with the consent of the association, the wheel committee would be very glad to submit a drawing of a 38-in. wheel provided with the necessary dimensions and give it a classification.

I have spoken to some of the members of the standing committee on car wheels, and they agree to this, and we can furnish a drawing of the 38-in. wheel with the necessary dimensions, and exhibit the classification to the secretary in time to be printed with the proceedings if the association will agree to it.

The President: If there are no objections, the committee may submit drawings for 38-in. wheel.

DISCUSSION.

H. LaRue (C. R. I. & P.): I would like to see a drawing made of the lettering to be used on the wheel as mentioned in recommendation No. 9. I do not think we should allow the manufacturer to use anything but a standard figure and letter.

The President: Is that satisfactory to you, Mr. Garstang?

Mr. Garstang: Yes. You would like that to be presented and be a part of the committee's report?

The President: Part of the wheel committee's report.

Mr. Hennessey: I move that the report of the standing committee on car wheels be accepted and approved with the thanks of this association

The Secretary: I ask Mr. Hennessey if his motion is intended to mean that the report of the standing committee on car wheels be received, and the recommendations contained in the report be submitted to letter ballot.

C. D. Young (Penna.): In Fig. 8, showing the contour of steel-tired wheels and the method of fastening them to the center, I would like to say a word. We have had some experiences with this method of fastening, and feel it is about the best which can be used, but on investigation of some of the cars under which we have steel-tired wheels, in which this method of fastening has been used, we have found detail fractures have started through the bolt hole wall on account of the lack of metal between the bolt hole and the inner diameter of the tire,

Referring to this illustration you will see that the dimension is ⅛in. If the workmen in the shop are not very careful in drilling out the 12 ¾-in. holes through the tire, they may encroach upon that ⅛ in. and you have no material between the bolt hole and the inner wall of the tire. I do not believe it would add anything at all to the weight of the wheel in arbitration to increase the 1¼ in. dimension to 1⅜ in. and that would give ¼ in. of material between the edge of the bolt hole and

the inner diameter. In view of the fact that we have had wheels fail, due to detail fractures starting in this location, I would like to offer Mr. Garstang the suggestion of increasing that dimension from 1¼ in. to 1⅜ in.

Mr. Garstang: It is a matter of opinion and experience. If the sentiments of the members of the association are that this change should be made, we will be glad to make the change.

I. S. Downing (L. S. & M. S.): We had the same experience as referred to by Mr. Young with this style of wheel and we had one serious wreck on account of wheel failure, on account of the bolt holes being bored too close to the inside walls.

Mr. Garstang: I think one of the good features of this design is the amount of flat bearing surface that you have got between the center and the tire; that is, the tire largely depends on shrinking. The bolt that you put in is simply to hold the tire in case of the failure of the bearing. While it may be beneficial to increase that distance at that point, I cannot figure out how.

Mr. LaRue: I would like to ask the chairman of the wheel committee if he has heard any objection to the dropping of the contour of the throat of the wheel to 5/16-in. on the outside. I believe there has been some trouble under certain conditions. I would like to ask if anybody else has had any trouble in this respect?

Mr. Young: In answer to Mr. Garstang, the increase of that dimension will not affect in any way the bearing of the tire on the center. It merely affects the lug which is a part of the tire to which the retaining bolts are secured. If, in the drilling of these holes, any error takes place, we practically have a drilled hole at the inner wall of the tire which will start a detailed fracture through that bolt hole. We have had that experience.

The President: Are there any members who can answer Mr. LaRue in regard to trouble with the dropping of the contour of the wheel?

D. E. Fitzgerald (St. L. & S.): We have had two wrecks on our lines where the change in the contour has been advanced for the reason of the derailment on the theory that where the rails are a little wide gage, the sharp contour has a tendency to form a wedging motion, and that causes the flange on the other side to crowd and climb on the rail. That is particularly true of new cast wheels, where the flange is rough, and the flange is shallower than formerly, and I have also heard it advanced in the case of steel-tired wheels.

L. C. Ord (C. P.): I ask Mr. Young if he will explain just what trouble these detailed fractures caused. It should be bone in mind that the addition of metal to the tire to the ¼-in. dimension, would mean an increase of metal which would have to be paid for on all tires in service, and would not be warranted unless the detailed fractures to which Mr. Young refers are relatively important. I cannot see how the fractures can occur if the tire is properly secured to the center. I would also ask if the error in drilling would mean an error on one hole or on all the holes in the center, as that is practically what would have to happen to appreciably weaken the fastening. I also cannot see how a detail fracture in the holes could occur unless the tire were loose and working on the center.

Mr. Young: Some of these failures which have come up from this cause, have been due to a thin wall there, detail fractures having taken place. Where the hole has been supported by sufficient material between the inner edge and the bolt hole, the detail fractures have not started. The driving fit of the bolt probably tends to spread that metal a little bit, it is only ⅛ in. by 1¼ in., and you can see there is not very much strength there to hold up the driving fit of a bolt.

Mr. Garstang: In answer to the gentleman who has just spoken, I would say, that has the full backing up of the center, and it is supposed that that lug has the same shrinkage as the balance of the tire, and if it has, you practically have solid metal; and, personally, I do not believe it would make any difference if it was only 1/16 in. thick at that point.

The President: Gentlemen, you have heard Mr. Hennessey's motion that the report of the standing committee on car wheels be received and the recommendations contained in the report submitted to letter ballot.

The motion was carried.

Telegraphic advices from Brussels announce the removal of the discrimination which has existed against American lubricating oils in connection with public tenders for supplies for the Belgian state railways. The specifications for supplies have in the past called for Russian oils, thus preventing American oils from competing. The action of the Belgian government follows representations on the subject of American lubricating oils made by the United States government.—*Consular Report.*

HONORARY AND ASSOCIATE M. C. B. MEMBERSHIP.

Harry Coulter, inspector of the Philadelphia, Baltimore & Washington, made application yesterday to become an honorary member of the M. C. B. Association. Mr. Coulter, having been a member since 1891, being a period of 21 years, is eligible to election to such membership, and the convention will vote on his application on Friday.

It will also ballot on Friday for the election, as an associate member, of Prof. Edward C. Schmidt, of the University of Illinois. Professor Schmidt made his application last year, and in accordance with the rules of the association action was deferred until this year.

TRANSPORTATION FOR RETURN RAILWAY TRIPS.

Through Secretary Taylor, the Pennsylvania has notified the railway members of the M. C. B. and M. M. associations wishing transportation home over the lines of the Pennsylvania Railroad or the Pennsylvania Lines West, that such transportation will be provided if they hand their names to Secretary Taylor. Owing to the requirements of the law, this transportation must be limited to bona fide railway officials, and cannot include members of belt lines, or car lines or switching roads operated by industries.

The Central of New Jersey offers the same courtesy to those members of the two associations who wish to return over the Central of New Jersey or the Reading. A special train of parlor cars for New York will leave Atlantic City at 2.30 o'clock on Wednesday afternoon, June 19.

"PAPA WILL NOT DANCE TO-NIGHT."

[In order that the following may not be taken by the censors of the conventions as historic verity, we hasten to explain that it is what the ex-poet laureate of the mechanical conventions imagined in Chicago would happen in Atlantic City as a result of the abolition of the grand balls, one of which, under the unexpurgated programme, would have occurred to-night.—Editor.]

Slowly Jersey's sun was setting (it sits 'round all day),
Making all the land an oven, hot enough to scorch marsh hay;
And its rays had raised some blisters on a man and maiden fair;
He was mopping off his forehead, she was fixing her back hair;
She with bowed head, sad and thoughtful; he with face serene and bright,
Struggling to keep back the gurgle, "Papa will not dance to-night."

"Papa," Bessie's white lips faltered, pointing to Young's new pier,
With its strings of incandescent, tinting wavelets far and near.
"There's a fellow on the Boardwalk, one who wants to waltz with me,
And there isn't any music; it's so tiresome, don't you see?"
Papa kept his features solemn, but his eyes grew strangely bright
As he murmured through his whiskers, "Papa will not dance to-night."

"Bessie," calmly spoke her papa—and his accents made her sad,
Though he had some little trouble not to show that he was glad—
"Every year until the present I've put on my evening togs,
Hung around till nearly daylight, like the bumps upon the logs;

I have done my duty reg'lar, tried to do just what was right,
But I tell you I am tickled; Papa will not dance to-night."

Mad her eyes and sad her features, red and freckled was her nose,
But she said in self-communion, "Wonder why I brought my clothes?"
She had read Joe Taylor's programme and had felt inclined to scoff.
"At the present year's conventions neither grand ball will come off,
And there won't be any music—(dough therefor is not in sight);"
But she muttered through her ivories, "Bessie's going to dance to-night."

Hied she to the Hotel Rudolf, rode up to an upper floor,
Decked herself in gorgeous raiment, though she knew her dad was poor,
And their rooms were near the skyline; (this year Daddy paid the shot,
And he couldn't stand the Marlborough—last year could as well as not);
Then she rollered down the Boardwalk, whispering in the evening light—
"Curses on their stingy programme—Bessie's going to dance to-night!"

She has reached the Marlborough-Blenheim, dodging through the roller chairs,
Found a little crowd assembled standing round in groups and pairs,
And the orchestra beginning—she had heard the strains before—
But the old man ducked his coco and slid out another door.
Shall she follow him? Not any. Flashed her eyes with sudden light—
"Let him go and get real woozy! Bessie's going to dance to-night!"

In she sailed and caught a partner. (It is possible he thought
He had asked her for the favor—but, no matter, he was caught).
Then she waltzed and two-stepped gaily, while the old man, down the hall,
Met a friend and guessed a high one was the grandest kind of ball.
And they chuckled as they ordered—guessed the present plan was right:
"Lets the old guys have a show in—papas do not dance to-night."

It was o'er. The strings stopped playing and the maiden rode once more
In a wheel chair up the Boardwalk (thought her pa had gone before);
And she felt a glow of pleasure, notwithstanding weary feet,
That she'd had the dance she wanted and had managed it so "neat,"
Notwithstanding the committee had determined to "run light,"
And she murmured to her mirror, "Bessie had her dance to-night."

In the early hours came Papa; thanks to roller chairs and guide,
He had run the Boardwalk safely, nor fell off on either side;
Through the door Bess tells her story; asked how he'd enjoyed his eve;
(Didn't know where he was going, though she thought she saw him leave).
Papa chucked a silly chuckle as he fumbled with the light,
And replied to Bessie's query, "Papa dijn't dansh t'night."

—F. W. Lane.

BALL GAME RESULTS IN PAST YEARS.

This will be the tenth year in which the ball game has been an annual feature of the conventions. The games in 1908 and 1909 were between the railway men and the supply men, and in the former the supply men won, 25 to 19; in the latter, the railway men, 14 to 12. In all the other years the battles have been between East and West, and the following have been the scores:

	East.	West.
1903	11	5
1904	7	11
1905	18	17
1906	7	17
1907	1	23
1910	15	0
1911	15	1

It will be seen that the East has won four times and the West three times in the seven years. The only year when the score was close was 1905, when it was 18 to 17.

NORFOLK & WESTERN STEEL CAR ORDER.

The Norfolk & Western has ordered 10 steel postal, 8 combination baggage and mail and 6 combination baggage and express cars from the Pressed Steel Car Company, Pittsburgh, Pa., and 35 steel coaches and 5 combination passenger and baggage cars from the Harlan & Hollingsworth Corporation, Wilmington, Del. This is the first order for all-steel cars ever placed by the Norfolk & Western.

MAJOR SYMINGTON.

Major W. Stuart Symington, father of the "Symington boys" so well known to many of us here at Atlantic City, died suddenly early on Sunday evening. He had been playing golf and was on his way from the Elkridge Kennels to his home in Baltimore when he was stricken with apoplexy.

Major Symington was 73 years old, but carried his years lightly. To his seven sons he was more like an elder brother. He enjoyed nothing better than attending these annual conventions and keeping in touch with the friends of associates of his sons.

The following editorial, from *The Sun,* of Baltimore, headed "The Loss of a Man," is a fitting tribute to Major Symington:

"Each era has its special pattern and fashion in the matter of gentlemen, and, though we have made great progress in most directions, we cannot but feel, when we record the death of such a man as Major W. Stuart Symington, that the old pattern and fashion was one of peculiar beauty and nobility, and one which with unfeigned regret we see vanishing forever. Major Symington was one of the last of the splendid type of a former generation of Marylanders who combined the outward courtliness and consideration of a more gracious and graceful period with the brave and generous qualities that appeal to the heart and the imagination in every age. It was a rare creation, whose roots went back to an even older civilization than its own, and drew heroic inspiration from a day of knightly ideals and traditions. It was men of this kind, intense, unswerving, unchanging in their loyalty, in their convictions, in their devotion to a cause or principle once espoused, that made splendid the pages of English history and fiction; it was men of the same uncompromising kind that made the Maryland Line famous in the Revolution; it was men like him who put Maryland

again in the front rank of battle during the Civil War and made Gettysburg a glorious disaster to the Confederacy. We bid these survivors of a day that is dead farewell with genuine regret as they pass away, one by one, and cherish the hope that if we of this generation cannot be altogether as they were, we may not lose entirely the inward grace that made them so kindly and attractive, nor the burning zeal and undoubting faith that sometimes made even their errors seem better than other men's cold-blooded truths.

"Major Symington was a good citizen as well as a brave soldier and a true gentleman. He was loved, respected and admired even by those who differed from him radically on every subject, and his passing is a loss not only to his associates and friends, but to the city and State, which is poorer by the death of one true man than by the destruction of much material treasure."

INVITATION TO MASTER STEAM AND HOT WATER FITTERS' ASSOCIATION.

The Master Steam and Hot Water Fitters' Association of the United States held their convention yesterday at Atlantic City. A special invitation to attend the convention and partake of all the privileges of the pier was extended to the association by the Railway Supply Manufacturers' Association.

THE DANCE LAST NIGHT.

The social gathering in the Blenheim exchange last evening was followed by an informal dance in the solarium. It was the evening on which the reception to officers of the M. C. B. Association and their wives has been given in past years, and the number participating in the dancing was about as large as on the evening of the first day of the conventions in past years.

MRS. FULLER SERIOUSLY ILL.

The following letter from C. E. Fuller, assistant general manager of the Union Pacific, second vice-president of the Master Car Builders' Association, and past president of the Master Mechanics' Association, was read at the opening session of the M. C. B. Association yesterday:

At Chicago, June 9, 1912.

My Dear Mr. Stewart:

Owing to the serious illness of Mrs. Fuller, who is now in the Michael Reese Hospital at Chicago, I feel my first duty is to her, which will prevent my attending and taking part in the meeting of the M. C. B. Association at Atlantic City this year. Will you please explain to the members of the association the reason for my non-attendance.

Wishing for the association one of the best meetings it has ever had, I remain,

Yours very truly,

C. E. FULLER.

The association, by unanimous vote, extended its sympathy to Mr. Fuller.

Mr. Fuller will be seriously missed from the meeting this year, and the Daily unites with Mr. Fuller's many friends in wishing Mrs. Fuller a speedy and thorough recovery.

The railway from Hangchow, China, to Ningpo, will be 120 miles long and will have a gage of 4 ft. 8½ in. The concession was granted to a British and Chinese corporation. Construction work was started at Ningpo, but had to be abandoned on account of financial difficulties.

M. C. B. REGISTRATION.

Acker, Chas. L., Toledo Terminal, Lexington.
Alter, William, Central R. R. of N. J., Edison.
Andrews, S. B., Seaboard Air Line Ry., Dennis.
Anthony, F. S., Texas & Pacific, Traymore.
Arp, W. C., Vandalia, Marlborough-Blenheim.
Ayers, A. R., N. Y. C., Lines West, Marlborough-Blenheim.
Barnes, P. H., Balto. & Ohio R. R., Pennhurst.
Barrett, R. W., Norfolk & Southern Ry., Arlington.
Bartlett, Henry, Boston & Maine R. R., Brighton.
Beaghen, Thos., Union Tank Line, Chelsea.
Beattie, J. A., McKeesport Connecting R. R., Seaside.
Beaumont, H. A., B. & O. R. R., Young's.
Bentley, W. F., B. & O. R. R., Shelburne.
Billinahm, R. A., Pittsburgh, Shaw & Nor. R. R., Lexington.
Bottomly, Edw. S., Lexington.
Brandt, C. A., C. C. C. & St. L. Ry., Marlborough-Blenheim.
Brown, M. G., Gulf & Ship Island R. R., Haddon Hall.
Bundy, C. L., D. L. & W. R. R., Lexington.
Burch, J. J., N. & W., Seaside.
Callahan, J. P., E. J. & E., Edison.
Carmer, J. R., P. B. & W. R R., Haddon Hall.
Carr, W. K., Norfolk & Western Ry., Dennis.
Carroll, J. T., Baltimore & Ohio R. R., Marlborough-Blenheim.
Carson, G. E., N. Y. C. & H. R. R. R., Traymore.
Case, S. T., N. Y. C. & H. R. R. R., Pennhurst.
Chaffee, F. W., N. Y. C. & H. R. R. R., Dennis.
Chambers, C. E., Cent. R. R. of N. J., Dennis.
Chambers, J. S., Coast Line R. R., Marlborough-Blenheim.
Clark, F. H., B. & O. R. R., B. & O. S. W. R. R., Marlborough-Blenheim.
Clark, J. H., Staten Is. Rapid Transit Ry., Marlborough-Blenheim.
Clark, J. J., Tennessee Central R. R.
Cleaver, F. C., Rutland R. R., Marlborough-Blenheim.
Contant, M. R., Ulster & Dela. R. R., Shelburne.
Cook, G. R., Penna. Lines West, Brighton.
Courson, J. F., Brighton.
Craig, Andrew, B. & M. R. R., Young's.
Craig, James, B. & M. R. R., Young's.
Cromwell, O. C., B. & O. R. R., Marlborough-Blenheim.
Curran, J. W., B. & O. S. W. & C. H. & D., Haddon Hall.
Davis, Geo. G., C. C. C. & St. L. Ry., Dunlop.
Davis, Jas., Penna. R. R., Chalfonte.
Davis, M. J., Penna. R. R., Chalfonte.
Demarest, H. N., Penna. R. R., Young's.
Dickerson, S. K., L. S. & M. S. Ry., Marlborough-Blenheim.
Dickinson, F. W., Bessemer & Lake Erie R. R., Monticello.
Eberle, Wm. F., Penna. R. R., Chalfonte.
Eell, E., Norris & Co., Chalfonte.
Elmer, Wm., Penna. R. R. (B. & A. V. Div.), Chalfonte.
England, Robt. H., Central Ry. of Oregon, Marlborough-Blenheim.
Ettinger, R. L., Southern Ry. Co., Dennis.
Fitzgerald, D. E., St. Louis & San Francisco, Haddon Hall.
Fowler, G. L., Dennis.
Friese, N. L., Norfolk & West Ry., Seaside.
Fritts, J. C., Dela. Lack & Western R. R. Co., Traymore.
Fryer, C. V., N. Y. O. & W. R. R., Traymore.
Garstang, Wm., C. C. C. & St. L. Ry., Marlborough-Blenheim.
Goodnow, T. H., Armour Car Lines, Marlborough-Blenheim.
Graburn, A. L., Can. Northern Ry., Traymore.
Graham, Chas E., Central R. R. of Oregon, Marlborough-Blenheim.
Gray, B. H., Orleans, Mobile & Chicago, St. Charles.
Hainen, J., Southern Ry., Dennis.
Hall, W. H., C. R. R. of N. J., Hotel Arlington.
Hamilton, Tabor, Cumberland Valley R. R., Chalfonte.
Harris Wells, N. Y. N. H. & H. R. R., Chester Inn.
Hartman, F. B., Southern Ry., Arlington.
Hayes, A. C., New York Central Lines, Pennhurst.
Henry, W. C. A., Penna. Lines West, Dennis.
Horrigan, John, Elgin, Joliet & Eastern Ry., Traymore.
Jackson, O. S., Chicago, Terre Haute & Southwestern Ry., Young's.
James, J. M., Penna. R. R. (West Penna. Div.), Marlborough-Blenheim.
Justus, I. J., St. J. C. & H. R. R. R., Pennhurst.
Kantmann, A. G., Nashville, Chattanooga & St. Louis, Runnymede.
Keavy, C. O., Penna. R. R., Haddon Hall.
Kent, F. S., Penna. R. R., Marlborough-Blenheim.
Kiessel, W. F., Penna. R. R., Chelsea.
Kinn, A., N. Y. O. & W. Ry., Lexington.
Kleine, R. L., Penna. R. R., Dennis.
Kneass, S. L., Wm. Sellers & Co., Chalfonte.
Knight, W. E., Cuba R. R., Traymore.

La Rue, H., C. R. I. & P. Ry., Traymore.
Lewis, W. H., Norfolk & Western Ry., Marlborough-Blenheim.
Lovell, Alfred, Traymore.
Lynn, Samuel, P. & L. E. R. R. Pennhurst.
MacBain, D. R., L. S. & M. S. Ry., Marlborough-Blenheim.
Marden, J. W., Shelburne.
Malott, F. W., Northern Pacific Ry., Chalfonte.
McCully, B. N., N. Y. Philada & Norfolk Ry., Haddon Hall.
McElvaine, C. L., Penna. R. R. Co., Brighton.
McKinsey, C. R., Phila. Balt. & Wash. Ry., Runnymede.
McNulty, F. M., Monongahela Connecting R. R., Chalfonte.
Mercur, R. E., Westmoreland Coal Co., Traymore.
Millar, E. T., B. & M. R. R., Young's.
Miller, E. A., N. Y. C. & St. L. R. R., Traymore.
Miller, E. B., B. & O. R. R., Baltimore House.
Miller, Wm., Erie R. R., Chester Inn.
Milliken, Jas., Phila. Balt. & Ohio Ry., Brighton.
Milton, J. H., Chicago Terminal C. R. I. & P., Rudolf.
Minick, Eli, Lehigh Valley R. R., 12 Michigan Ave.
Mirtz, P. P., L. S. & M. S. Ry., Traymore.
Moore, B. R., Duluth & Iron Range R. R., Traymore.
Morse, C. S., Wheeling & Lake Erie R. R., Traymore.
Munroe, J. T., Erie R. R., Chester Inn.
New, W. E., Kansas City Terminal Ry.
O'Brien, J. J., St. Louis Merchants Bridge Term. Ry., Watkins.
O'Donnell, T. J., N. Y. Car Shops, Pennhurst.
Onderdonk, J. R., B. & O. R. R., Marlborough-Blenheim.
Ord, L. C., Canadian Pacific Ry., Arlington.
Perine, D. M., Penna. R. R. (New Jersey Div.), Traymore.
Pfafflin, Louis, Indianapolis Union Ry., Biscayne.
Phillips, C., N. O. & N. E. R. R., V. S. & P. Ry., Brighton.
Pilcher, John A., Norfolk & Western Ry., Brighton.
Poole, A. J., Seaboard Air Line Ry., Marlborough-Blenheim.
Putnam, C. H., Atlanta & Birmingham & Atlantic Ry., Young's.
Rande, H. G., Newburgh & South Shore Ry., Monticello.
Rasbridge, R. B., Philada. & Reading Ry., Dennis.
Richards, C. F., Lehigh & Hudson.
Riddell, J. C., Marietta, Columbus & Cleveland R. R., Iroquois.
Rink, Geo. W., Cent. R. R. of N. J., Dennis.
Robider, W. J., Central of Georgia Ry., Chelsea.
Robins, S. P., Can. Pacific Ry., Pennhurst.
Roope, Thos., Chg. Bur. & Quincy Ry. (West), Traymore.
Ross, D. C., Mich. Central R. R., Brighton.
Rourk, W. H., Pere Marquette R. R., Lexington.
Rumney, T., Chicago, Rock Island & Pac. Ry., Brighton.
Schmidt, E. C., Univ. of Ill., Haddon Hall.
Schmoll, G. A., Balto. & Ohio R. R., Traymore.
Schrader, J. R., N. Y. C. & H. R. R. R., Young's.
Seifert S. P., Norfolk & Western.
Senger, J. W., Lake Shore & Mich. S. Ry., Lexington.
Sheafe, J. S., Illinois Central R. R., Traymore.
Sisco, G. E., Southwest System, Penna., Haddon Hall.
Smart, G. E., Can. Pac. Ry., Arlington.
Smith, P. F., Penna. Lines (Central System), Brighton.
Staley, H. F., Caro, Clinchfield & Ohio Ry., Traymore.
Stark, James L., Hocking Valley R. R., Young's.
Sternberg, Adam S., Wabash R. R., Haddon Hall.
Sullivan, J. J., L. & N. R. R., Dunlop.
Summer, Eliot, Nor. Cent. R. R., Chalfonte.
Symons, W. E., Traymore.
Tatum, John J., B. & O. R. R. Co., Chelsea.
Thomas, H. T., Detroit & Mackinac Ry., Pennhurst.
Thomas, I. B., Penna. R. R., Chalfonte.
Thomas, J. J., Jr., M. & O. R. R. and Southern Ry. in Miss., Shelburne.
Thomas, N. H., Dennis.
Thomson, Samuel G., Phila. & Reading R. R., Lennox Apt.
Tonge, John, M. & St. L., Chalfonte.
Trimyer, H. L., Seaboard Air Line Ry., Marlborough-Blenheim.
Tritsch, C. M., Western Maryland R. R., Brighton.
Van Buskirk, H. C., Colorado & Southern Ry., Chalfonte.
Vaughn, H. H., Canadian Pacific Ry. Co., Marlborough-Blenheim.
Vittum, J. E., Arlington.
Wahlen, John, Montpelier & Wells River R. R., Lexington.
Waughop, Chas., Young's.
Wilson, Jas. W., Newberry Junction, Pa., Monticello.
Wyman, R. L., Lehigh & New England R. R., Pennhurst.
Yergy, J. P., Penna. R. R. Co., Chalfonte.
Young, Chas. D., Penna. R. R., Brighton.
Young, J. P., Mo. Pacific Ry., Dunlop.
Zweibel, C. A., Atlantic Coast Line R. R., Lexington.

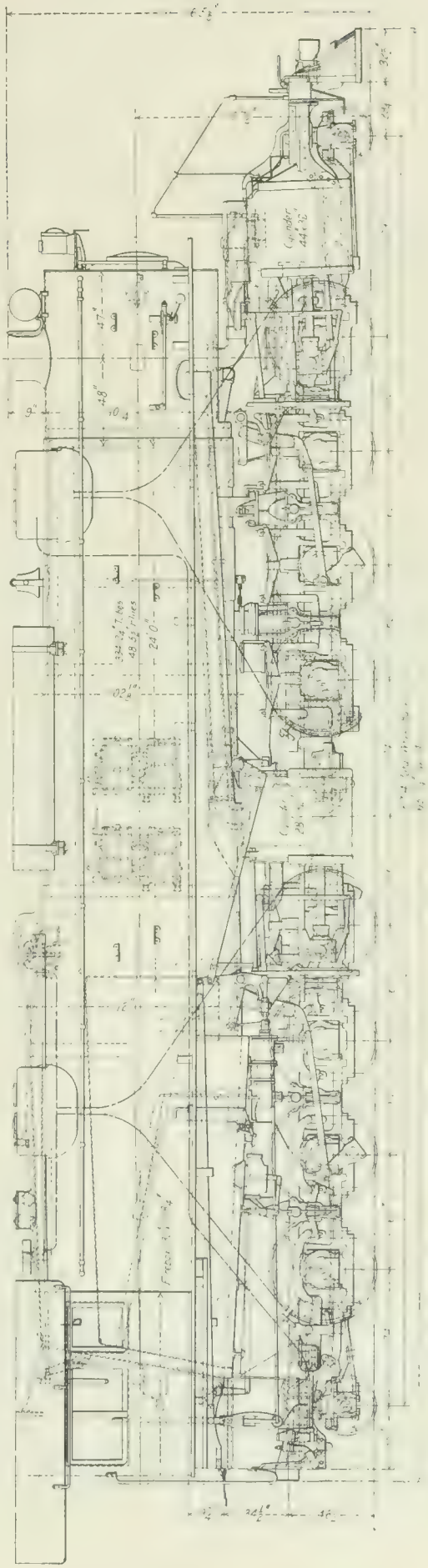
M. C. B. GUESTS.

Abbott, A. S., Frisco, Haddon Hall.
Acker, J. J., C. R. I. & P., Lexington.
Alquist, P., Pere Marquette, Lexington.
Alttvater, Chas. P., Penna. R. R., Elberon.
Arnold, A. E., N. Y. Central, Lexington.
Atkinson, C. R., Stenographer Gen. Supt. M. P., Penna R. R., Russell.
Baker, C. N., P. R. R.
Baley, W. W., N. Y. O. & W., Lexington.
Barba, C. E., P. R. R., Seaside.
Barrett, C. D., P. R. R.
Barry, Frank J., N. Y. O. & W. Ry., Lexington.
Bartram, S. L., N. Y. C., Roseda Apt.
Barwis, C. W., Penna. R. R., Princess.
Barwis, J, McC., Penna. R. R., LaBelle Inn.
Beamer, J. A., P. R. R., Chalfonte.
Berg, J. V., L. S. & M. S., Pennhurst.
Berry, A. O., Lake Erie & Western, Lexington.
Beyer, O. S. Jr., Rock Island Lines.
Beynes, Anton, J. J. Beynes Ry. Car Builders, Young's.
Blair, H. A., B. & O., Chetwoode.
Borell, Elmer A., Head Car Draftsman, Phila. & Reading Ry. Co., Albemarle.
Boring, T. J., Penna., Dennis.
Brubaker, H. H., Penna. R. R., Chalfonte.
Bunnell, F. O., Rock Island Lines, Chelsea.
Burns, R. C., P. R. R., Haddon Hall.
Busse, F. W., B. & O., Strand.
Butler, W. S., Ches. & Ohio R. R., Haddon Hall.
Byron, H. W., Penna. R. R., Chalfonte.
Cadwell, Dr. N. W., Atlantic City.
Carter, B. D., Virginian Ry., 2022 Pacific Ave.
Coates, H. T. Jr., Penna. R. R., Chalfonte.
Conlin, J., Marlborough-Blenheim.
Conner, J. F., Wash. Ter. Co.
Connors, J. M., Jr., B. & O., Chetwoode.
Cook, E. F., Union Tank Line, Chelsea.
Coulter, A. F., Union R. R., Channell.
Cromwell, E. G., B. & O., Pennhurst.
Davis, Jas. C., National Tube Co., Seaside.
Davis, W. H., N. Y. O. & W., Chalfonte.
Demarest, T. W., Penna. Lines, Brighton.
Derick, C. T., P. R. R., Iroquois.
Dildine, J. A., Penna. R. R., Dennis.
Donovan, A. G., Mgr., So. Western Mech. Co., Craig Hall.
Drawbaugh, E. L., Cumberland Valley R. R., Chalfonte.
Dyer, D. H., Norfolk & Western.
Effinger, W. P., Erie R. R., Melrose.
Egbers, J. F., Northern Pacific, Chalfonte.
Emory, J. B., M. M., Texarkana & Ft. Smith R. R., State Villa.
Ensign, J. T., Chief Insp. R. R. Dept., Interstate Commerce Co., Monticello.
Eppley, G. A., United Rwys. & Elec. Co., Isleworth.
Felton, H. E, Union Tank Line, Chelsea.
Finnegan, F. L., Chief Clerk, Ivanhoe & Carroll, Dunlop.
Fisher, W. J., Frisco, Haddon Hall.
Fitzsimmons, E. S., Erie, Chalfonte.
Fordney, Phillip, P. R. R.
Garcelou, H. I., B. & O., Chalfonte.
Gardner, G. C., Jr., Gen. Foreman of M. P., Penna., Marlborough-Blenheim.
Gilmore, W. A., B. & O., The Baltimore.
Ginder, Vivian, Soliciting Agent, Central States Dispatch, Young's.
Gray, C. B., Gen. For., P. R. R., Dennis.
Gruver, J. F., P. R. R.
Hafner, A. H., P. R. R., Seaside.
Hair, John, Special Inspector, B. & O. R. R., DeVille.
Hale, H. H., B. & O., S. W. & C., H. & D. R. R., Haddon Hall.
Hale, Ross H., B. & O., S. W. &. C., H. & D. R. R., Haddon Hall.
Harris, C. M., Washington Terminal Co., Traymore.
Hauser, Percy, Draftsman M. E. Office, P. R. R., Young's.
Heiser, W. F., C. & E. I., Strand.
Hessenbruch, T., P. & R., Haddon Hall.
Hill, Rufus, Penna. R. R.
Hippey, E. S., P. R. R., Iroquois.
Hodges, H. A., Long Island Ry., Shelbourne.
Holzner, J. F., K. & M., Haddon Hall.
Hull, D. K., General Foreman, B. & O.
Jenny, J., For. Car Repairs, Penna. R. R., Ellwood.
Kapp, J. B., Asst. M. M., P. R. R., Chatham.
Keller, J. W., P. R. R.
Kelley, O. J., B. & O. R. R., New Berkley.
Kellogg, D. R., Haddon Hall.
Kilpatrick, J. B., Chic., R. I. & Pacific, Traymore.
Klingensmith, W. H., Foreman Blacksmith Shop, Penna. R. R., Ellwood.
Koch, Geo. B., For. Test Dept., P. R. R., Traymore.
Kraber, Luther B., P. R. R.

Kuhn, W. T., T. H. & B., Young's.
Kuier, H. G., P. R. R.
Lee, F. H., B. & O., Chetwoode.
Lide, C. D., Carolina & North West R. R.
Lindsay, Samuel M., P. R. R.
Lucord, F. M., Am. R. R. Assoc., Dennis.
Mallory, C. E., Kingan Refrigerator Line, Traymore.
May, Walter, C. C. & St. L. R. R., Chalfonte.
Maupin, J. D., Trinity Brazas Valley R. R., Lexington.
McArthur, F. A., Frisco, Haddon Hall.
McDonald, Geo., C. R. I. & P. Ry., Lexington.
Merriman, M., Ch. Clk. S. M. P., Western Maryland R. R., Brighton.
Mervine, I. B., M. P. Clerk, P. R. R., Traymore.
Mullinix, S. W., C. R. I. & P. R. R., Dennis.
Munson, Chas., C. R. & I. C., Shelburne.
Murray, John D., General Manager, Cloustmas Island R. R., Chalfonte.
Neff, W. P., Car Insp., Penna. Ry., Bothwell.
New, Fred, Kansas City Terminal.
Norris, J. C., Cumberland Valley R. R., Chalfonte.
Orr, Wm. G., P. R. R., Dunlop.
Parker, Dr. Walter E., Michigan Central, Marlbrouogh Blenheim.
Payne, H. R., Union Tank Line, Young's.
Perrine, W. M., C. of Jersey, Pennhurst.
Phillips, C. C., Brighton.
Posten, D. W., P. R. R., Iroquois.
Prentice, W. H., P. C. C. & St. L. Ry., Star Cottage.
Reilley, Thos. E., Penna. R. R. Co., Chelsea.
Renner, C. W., P. R. R., Chalfonte.
Reynolds, O. H., Pennhurst.
Rhine, Geo. B., Foreman, Penna. R. R., Biscayne.
Rice, Edmund, Chief Clerk to Pur. Agent, Boston & Albany, Shelburne.
Rickard, E. S., Dist. Car Inspector, Rock Island, The Tracy.
Robb, J. W., Cudahy Packing Co., Dennis.
Robinson, G. P., U. S. Assistant Ch. Insp., Loco. Boilers, Absecon.
Rowland, E. T., P. R. R.
Sagsletter, W. H., M. M., Kansas City, Southern, Shelburne.
Schuyler, A. J., Virginian Ry.
Sheen, John, A. & W. P. & W., Lexington.
Sindall, G. E. M., P. R. R., Westminster.
Singleton, C. W., Penna. R. R., Radnor.
Smith, A. E., Union Tank Line, Chelsea.
Smith, E. W., P. R. R., The Princess.
Smith, J. A. B., U. S. Navy, 106 N. Vermont Ave.
Stanton, E., Norfolk & Portsmouth Belt Line, 2022 Pacific Ave.
Stewart, A. F., Traymore.
Stoll, W. J., L. S. & M. S., Pennhurst.
Strattan, R. T., P. R. R., Seaside.
Sweeley, E. H., Long Island, Shelburne.
Taylor, F. C., West Jersey & Seashore R. R., Bothwell.
Thomas, W. H., Dennis.
Trace, A. A., Chief M. C. B. Clerk, Erie R. R., Colwyn.
VanBlarcum, C. B., B. & O., Eberon.
Van Blunt, Geo. E., Penna. R. R., Iroquois.
Vaught, Harry D., Marlborough-Blenheim.
Walker, Tuttle C., Evening Union, Penna. & Bdwk.
Walsh, Charles E., West. Ch. Clerk, Pur. Agt., Penna Lines, Haddon Hall.
Warnoch, H. R., Monongahela R. R., Francis.
Wilt, W. L., Penna. Co., Dennis.

MOST POWERFUL LOCOMOTIVE IN THE WORLD.

A locomotive with a firebox large enough to easily admit a 6 in. x 10 in. four wheeled tank locomotive, as is shown in the accompanying illustration is impressive even in these days of record breaking machines of all kinds. The boiler shown is one of four built by the American Locomotive Company and applied to Mallet locomotives of the 2-8-8-2 type for the Virginian Railway. This boiler measures 100 in. in diameter at the front end and 112 in. at the connection with the firebox. The area of the firebox inside of the sheets at the mud ring is 108 in. x 173 in. This however is not all grate area as the Gaines type of combustion chamber has been applied. The firebox including the combustion chamber, has a total heating surface of 410 sq. ft. The tubes are 24 ft. long and give a heating surface of 6,350 sq. ft., making a total evaporative surface of 6,760 sq.



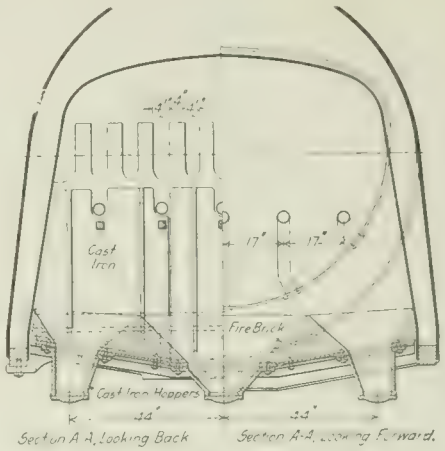
Most Powerful Locomotive in the World; Designed for Pusher Service on the Virginian; Maximum Tractive Effort, Compound, 115,000 Lbs.; Simple, 138,000 Lbs.

ft., or more than any other locomotive ever built. When it is further considered that a Schmidt superheater has 1,310 sq. ft., the comparative size of the boiler can be fully appreciated. The actual grate area is 99 sq. ft.

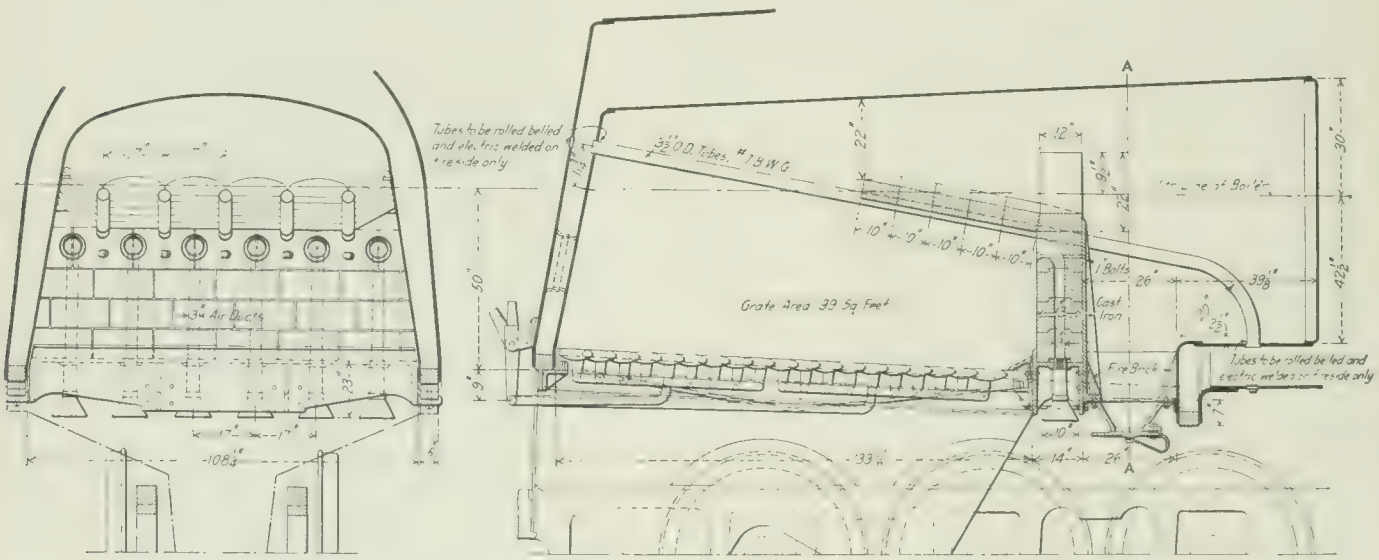
The boiler is not the only impressive feature of this locomotive. As will be seen by reference to the general elevation, the height from the rail to the top of the stack is 16 ft. 5½ in., the low pressure cylinders are 44 in. in diameter and the maximum width over cylinders is 144 in., all of which are larger than the measurements of the same points on any other locomotive.

These locomotives have been built for pusher service on a 2.07 per cent. grade between Elmore and Clarks Gap, West Virginia, a distance of 14 miles. Two of them as pushers with one of the older Mallets leading, are expected to allow an increase in train tonnage from 3,340 to 4,230 tons. The former tonnage is now obtained by using a Mallet road engine with two larger Mallets pushing and is the maximum that can be taken over this grade. The remainder of the division is such that a tonnage of 4,230 tons can be carried by the older type of Mallet road engines.

tions. This is a combination of a Gaines fire brick wall with a Security brick arch supported by tubes which curve and



Section of Firebox Showing Mixing Fingers on Top of Fire Brick Wall.



Firebox of Virginian Mallets Showing Combination of Gaines Fire Brick Wall with a Security Brick Arch.

In addition to the size of the locomotives, the point of the greatest interest is probably found in the firebox arrangement which is clearly shown in one of the illustra-

enter the bottom of the combustion chamber. Mixing fingers are formed as an extension of the top of the fire brick wall and form a further aid to combustion beside tending



Largest Locomotive Boiler; Built by the American Locomotive Company for the Virginian Railway.

to force the flame up against the crown sheet at this point.

Vanadium steel has been extensively used for those parts subjected to the greatest strain. This includes frames, crossheads, tires, springs, main driving axles, main crank pins and piston spiders. The cylinders and valve chamber bushings are constructed of Vanadium cast iron. Some of the more important dimensions are given in the following table:—

Tractive effort, compound	115,000 lbs.
Tractive effort, simple	138,000 lbs.
Weight in working order (estimated)	540,000 lbs.
Weight on drivers (estimated)	479,200 lbs.
Diameter of driving wheels	56 in.
Steam pressure	200 lbs.
Tubes, number and outside diameter	334 - 2¼ in.
Flues, number and outside diameter	48—5½ in.
Tender, water capacity	12,000 gal.
Tender, coal capacity	15 ton.

FOREIGN RAILWAY NOTES.

The Peking-Hankow Railway, the northern section of the great trunk line north and south through China, in which American interests were once involved and which represents the most important railway element in the country, has been in operation for about five years. All authorities seem to agree that, though it reports a profit of about $1,680,000 per year, it is deteriorating very rapidly in physical upkeep. The Chinese railway authorities claim that this deterioration is due largely to the fact that the foreign interests which formerly owned it knew it was to be transferred to the Chinese and neglected it, with the result that now its upkeep is more difficult and expensive than it should be. The railway's accounts do not show a proper allowance for deterioration, and the showing of a profit is more or less a matter of unscientific bookkeeping, the impairment of the railway plant resulting, in fact, in dividends being paid from the railway's capital. The general opinion is that a financial reorganization will be necessary to put the railway upon a safe and satisfactory basis. That this reorganization is coming seems beyond doubt and is only a matter of time. It is almost certain to lead to very important developments in the reorganization of railways in this portion of China generally, and will have a marked influence upon the course of Chinese railroading for years to come.

A notable feature of the railway situation in China is the comparatively rapid development of the desire for railways tributary to the lines already constructed; that is, an appreciation of the need, in the development of local industries, of close and convenient connections with the trunk systems. This is particularly noticeable along the coast above the Yangtze river, where a number of Chinese cities have shown a desire to secure connections with the Pukow railway and the Peking-Hankow railway, and between these railways and the Grand Canal. Several cities, notably Chinkiang, are commencing to appreciate the fact that they must have railway connections at once or their present position in the trade of the country will be lost. Local industries, like the salt industry in Kiangsu province and various mines in portions of the country to the north, are demanding and are gradually securing railway facilities. A number of these small lines are projected for connecting the existing lines and for serving them with many branches and connections. Among the new enterprises are the projected lines to connect the Tientsin-Pukow system with the Grand Canal, and cross lines at the Shangtung-Kiangsu border from Lintscheng to Taierchuang to take the place of the projected Hantschuan-Ihsien line; the Kaomi-Ichow line to connect the German neutral territory with southern Shantung; and the Kaifong-Haichow line, furnishing an outlet at the seaboard for the east and west line through Honan and projected all the way to the Russian border.

Conventionalities.

Someone has suggested that "interstatecommercecommissionized" should be Fletcherized.

Lost—One Bureau of Information. Finder will please return to the president of the Railway Supply Manufacturers' Association.

D. F. Crawford, general superintendent motive power of the Pennsylvania Lines West, had to leave Atlantic City Tuesday morning for an inspection trip. He expects to return on Sunday.

F. W. Brazier, superintendent of rolling stock of the New York Central & Hudson River, has just returned from an inspection trip over the system. He was one of the first to arrive Tuesday.

Robert P. Lamont, president of the American Steel Foundries, registered at the Marlborough-Blenheim, Wednesday morning, and attended the opening exercises of the M. C. B. convention.

Joseph Bromley and A. F. Duffey, inspectors of the Interstate Commerce Commission, are in attendance at the convention and have spent considerable time in looking over the exhibits.

M. K. Barnum, general superintendent of motor power of the Illinois Central, expects a record of 60 heavy repairs to locomotives on the system this month. He came down on the special from Chicago Tuesday.

Postlethwaite hadn't been on the pier five minutes before he got into a dispute, the reason for which was not clear to onlookers. It is suspected that Wilkinson, who stood close by, was in some way concerned.

The work assigned to the Bureau of Information has been turned over to the Enrollment Committee. Those who seek information concerning convention affairs will be accommodated at the office of the enrollment committee.

Edward B. Leigh, president, and Arthur Wyman, assistant to the president of the Chicago Railway Equipment Company, lost no time after their arrival Tuesday afternoon on the Pennsylvania special in greeting those already on the ground.

H. M. Estabrook was elected president of the Barney & Smith Car Company last week, in place of A. M. Kittridge, who resigned on April 17. Mr. Estabrook entered the employ of the company as a clerk, less than 27 years ago.

Harry U. Morton, vice president of the General Railway Supply Company, and Harry H. Schroyer, president of the Acme Supply Company, arrived from Chicago via New York on Tuesday. They will make the Strand their headquarters.

At the time of going to press A. J. Stevens, who was last week elected vice-president and general manager of the Barney & Smith Car Company, was expected to reach Atlantic City this morning. He will stop at the Marlborough-Blenheim.

Mrs. W. H. Coyle, wife of the assistant to the vice-president of the Franklin Railway Supply Company, spent Saturday and Sunday at Atlantic City, returning to New York on Monday. She will return at the end of the week and remain during the Master Mechanics' Convention.

Mr. and Mrs. Albert C. Ashton and Mother Ashton are staying at the Marlborough-Blenheim. This is the first time in five years that these two members of Mr. Ashton's family have been here with him. Mother Ashton has been coming to these conventions on and off for the last 33 years.

T. Dunbar had a bag of pretzels thrown in his lap on the Boardwalk by some mysterious person on which was the

message, "Feed these to the chickens." Being at a loss as to what particular breed relishes that kind of food, he desires to consult with some of the Boardwalk fanciers present.

R. B. Kendig, general mechanical engineer of the New York Central & Hudson River, was a little late in reaching Atlantic City because of the arrival of a 10 lb. boy about a week ago. This is No. 5, and the second boy. The youngster is said to resemble his mother.

Odds on Saturday's ball game have been sidetracked by the betting on a game of golf scheduled for Friday. E. H. Bankard and D. F. Mallory are to play J. L. Replogle and E. H. Bankard, Jr. The odds favor Bankard, Sr., and Mallory; but, judging from certain "inside information," somebody's going to get fooled.

D. F. Crawford, general superintendent of motive power of the Pennsylvania Lines West of Pittsburgh, arrived Tuesday He is enthusiastic about the results which are being obtained from the use of the mechanical stoker on his road, 75 of which are now in service. In a recent test one of these stokers on a Pacific type locomotive fired 9400 lbs. of coal an hour for two consecutive hours.

As M. H. Haig has not yet arrived, anyone wishing to investigate the subject of flange lubrication is referred to R. D. Smith, superintendent of motive power of the Boston & Albany. He applied a lubricator to a passenger locomotive and discovered that thereafter it refused the services of a pusher provided to help the train up one of the bad grades in the Berkshires.

Friends of W. E. Dunham, supervisor of motive power and machinery of the Chicago & North Western at Winona, Minn., had some difficulty in recognizing him Tuesday until he invested in a new hat. A distinct gain in weight, coupled with the soft felt hat, changed his appearance entirely. Apparently, life in the Northwest is agreeing with him. He is quite enthusiastic over the application of superheaters to switch engines.

George Wildin, mechanical superintendent of the New Haven, is booming the baseball game for Saturday. After trying hard to locate Hammond, the captain of the Western team, he remarked: "It will be just as well for all of them if they stay away; for we are going to give them an awful licking." His friends are thinking of presenting him with a all-steel bat; but even this may meet the same fate as the hickory one last year.

F. H. Stark, superintendent of the Montour Railroad and the Pittsburgh & Moon Run, says that it is extremely hard to get common labor in the Pittsburgh district because of the activity of the mills and manufacturing industries and the extensive public improvements which are being made. A great many foreigners, believing that business conditions would remain quiet this year, returned to their native lands, and this has aggravated the condition.

J. J. Hennessey, master car builder of the Chicago, Milwaukee & St. Paul, gave convincing proof of his Irish descent in the convention hall yesterday. The following is taken from the stenographic minutes: "I notice that the mayor of the city said he was not a handsome man—I agree with him. (Laughter and applause.) But I overheard a little conversation last night on the Boardwalk that flattered me very much. Two gentlemen were walking along the Boardwalk, both practically as white-headed as I am, and certainly their judgment must be good. One said to the other: 'There is a certain lady here who is the most handsome woman that has ever attended the Master Car Builders' Convention.' The other man looked at his friend and said: 'Sir, if she is the one handsomest lady that ever attended the Master Car Builders' Convention, she is the handsomest lady in the world.'" (Applause and laughter.)

The Exhibit.

The Gold Car Heating & Lighting Company, New York, has brought out a thermostatic temperature regulator for heating railway cars. This regulator automatically controls the steam admitted to radiating pipes by the temperature of car.

Through the courtesy of the Jacobs-Shupert U. S. Firebox Company, New York, the Twentieth Century coupler is being exhibited in space 180-182. This coupler, which has just been developed and has not yet been placed on the market, is of the side operating type, consists of only three pieces and is said to be foolproof. It is in charge of W. A. Palmer, formerly with the Queen & Crescent.

Arthur Haller, of the American Locomotive Company, New York, arrived on the pier Tuesday morning very much out of breath, owing to his exertions in carrying a photograph of the boiler for the Virginian Mallet, the largest locomotive boiler ever built. It measures 112 in. in diam., and is equipped with a combination of the Gaines combustion chamber and Security brick arch. This photograph will be on exhibition during the convention.

GAS-ELECTRIC MOTOR CAR

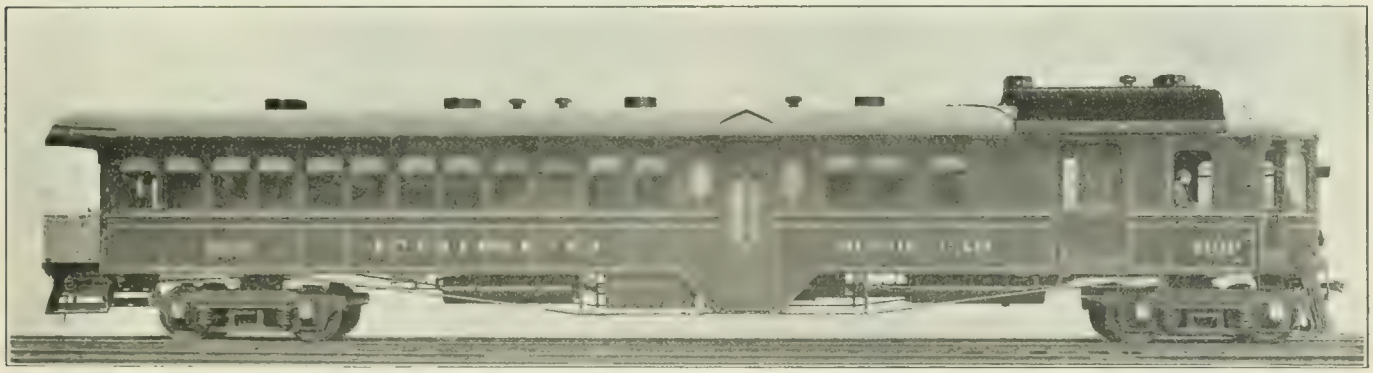
Gas-electric cars are now in successful operation on a number of railways in this country, being especially efficient on rapid transit interurban lines. Branch lines are sometimes operated at a loss by steam due to the small amount of travel, and this same traffic condition usually does not warrant the initial expense of complete electrification. In this province, the gas-electric car is proving its ability to reduce operating expenses. The gas-electric car is essentially a locomotive and car combined in one unit. In developing these cars, the General Electric Company, Shenectady, N. Y., has effected many improvements that contribute to simplicity, ease of control and resultant safety in operation. The motive power centers in the engine, generator and the motors. Several standard styles of car bodies have been established to meet the various requirements and a wide range of types can be furnished in response to demands for special arrangements of seating, smoking, mail and baggage compartments. But one motorman and one conductor are required to operate the car.

They are of all-steel constructon, with the exception of the interior finish. The frame consists of steel I-beams and channels, strongly cross-braced, and steel plates form the outside sheathing. The underfloor of the car is of wood, sheathed with sheet iron on the lower side; while between this and the floor proper a heavy felt lining is inserted; the car sides are also interlined with felt. Cars having center entrances are built with the turtle back design of steel roof and rear; they may be provided with an observation platform and rear entrance, or both rear and center entrances. In general, the interior trim is of mahogany and the ceiling is sheathed with composite board. The windows are fitted with plate glass; the seats are made long enough to accommodate three persons; they are covered with friezette plush in the passenger compartment and with genuine Spanish leather in the smoking room, and the entire car is lighted with attractive electric incandescent fixtures.

The generating unit is located above the floor line of the cab, free from dust and dirt and under immediate observation of the engineer. It consists of an 8-cylinder, 4-cycle gas engine of the V type, direct connected to a 600-volt, commutating pole electric generator, designed to meet the special conditions the service demands. The engine is started by

compressed air taken from the main reservoirs of the air brake system which are built with surplus capacity for this purpose. The main air compressor is driven from the crank shaft of the main engine, and is fitted with an automatic governor which maintains a constant pressure. The engine can rotate at normal speed, irrespective of the speed of the car. An auxiliary equipment is also provided, consisting of a 2-cylinder 4-cycle gas engine direct connected to a single cylinder air compressor and lighting generator. The function of this set is to supply an initial charge of air for starting the main engine and to deliver power for lighting the car. This set is started by hand.

The control is simple, substantial and similar to that of any standard electric trolley car. Mounted on the axles of the forward truck are two GE-205, 600-volt, box frame, oil-lubricated commutating pole railway motors of 100 h. p. each. The voltage is governed by varying the strength of the generator field, which is accomplished by the movement of a single handle on the controller, and the resultant speed changes of the motors produce a smooth and rapid acceleration without rheostatic power losses or gear changes. Separate handles are provided for throttling the engine and for reversing the car.



Gas-Electric Motor Car for the 'Frisco.

The latter is accomplished instantly by changing the motor connections in the usual manner, without stopping the engine, which always rotates in the same direction. This allows the cars to be stopped quickly independent of the brakes in an emergency. All the levers are located within convenient reach of the operator. The radiators are placed on the roof and the circulation for cooling the engine is maintained by the thermo-siphon system.

The trucks are of the swing bolster type with elliptic bolster springs and coil equalizer springs. The bearings, treads and flanges of the wheels and axles conform to the standards of the M. C. B. Association. The brake equipment includes hand brakes in addition to the combined straight and automatic air brakes. The headlight consists of a 50 candlepower Mazda incandescent lamp and reflector. A hot water heater, coal fired, is installed for heating the car. To prevent freezing in cold weather when the car is lying idle, the heater circulation may be connected to the engine cooling system. A 150 gallon gasolene tank for the power supply is suspended under the car. While the car is running the gasolene is pumped automatically by the engine, and by a hand pump when idle. The car illustrated is in service on the Frisco system, over whose lines a total of seventeen of these seventy-foot gas-electric cars will soon be in operation. Among other roads using these cars are the Southern Railway; Minneapolis, St. Paul, Rochester & Dubuque; Bangor & Aroostock; Buffalo, Rochester & Pittsburgh; Canadian Northern; New York, Westchester & Boston; Delaware & Hudson; Missouri Pacific; Pittsburgh & Lake Erie; Missouri & Northern; Arkansas, and the Chicago, Rock Island & Pacific.

NEW IGNITER FOR MOTOR CARS.

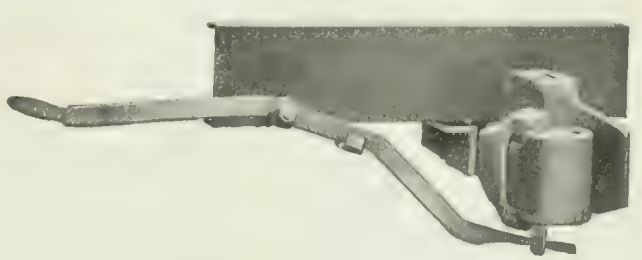
A novel ignition system, which requires no batteries or magneto, has recently been adopted by Fairbanks, Morse & Company for use on section motor cars. The igniter for each cylinder is made up of two permanent magnets each passing through a wire coil. These are located parallel to each other and a bar armature, held in place across the ends by a strong spring, makes them a horseshoe magnet. At the opposite end is another cross bar which makes but instantaneous contact. By means of an eccentric on the crank shaft, which operates a trip latch on the igniter, the first armature is displaced from its seat on the magnet at the same instant that the second makes its contact. This reverses the flow of current through the magnet until the first armature is reseated by the spring. As it strikes its permanent seat a spark is produced between the points of the spark plug.

The igniter is enclosed in a dust and water proof case, and requires only as many wires as there are cylinders on the engines, a secondary wire running from each spark plug to its igniter. The simplicity of this ignition is apparent. The spark coil, batteries and commutator are all eliminated, together with all complications in wiring.

An exhibit of this ignition system can be inspected at the Fairbanks-Morse space, No. 584, where a complete sectionalized motor car is exhibited. This shows the engine in operation and how the spark is obtained in the engine cylinders with the new igniter.

PENN FREIGHT COUPLER.

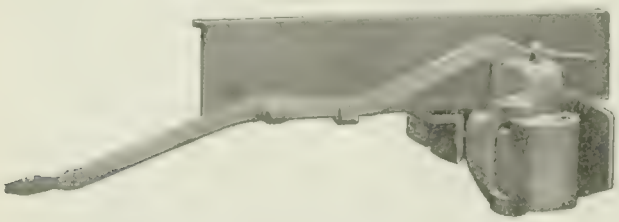
The Penn freight coupler exhibited by The McConway & Torley Co., spaces 501, 503, 505, is adapted for both overhead and underneath release. No change in the detail parts



Penn Freight Coupler with Underneath Release.

of the coupler is required to make the change from the overhead release to the underneath release; the lifter of the locking block is simply reversed from the upper side of the coupler and inserted from the lower side. When used as an

overhead release the lifter pulls the lock up by the operation of the overhead lever, and when applied underneath, it pushes the lock up by the operation of the underneath release lever. In addition to this feature, the coupler has 5



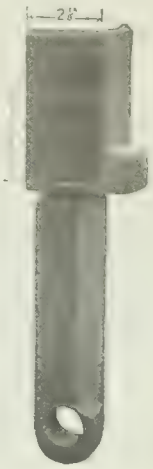
Penn Freight Coupler with Overhead Release.

sq. in. of bearing surface between the lock and the knuckle, which is more than one square inch in excess of the M. C. B. recommended practice.

The coupler also has a lock-set, and an efficient knuckle



For Overhead Release.



For Underneath Release.

opener, which pushes the knuckle open to its fullest range of movement from either a fully closed position or from any partially closed position.

BARBER 50-TON STEEL FLAT CAR.

The Standard Car Truck Company, Chicago, has a new type of flat car in the track exhibit, which was designed and thoroughly tested out in service by the mechanical department on one of the large trunk lines. The car is designed for 100,000 lbs. capacity and carries the load on two main steel girder sills of a special form. These are spaced apart with center lines directly over the center lines of the truck side frames, which are above the center lines of the journals.

The radial and lateral travel of the truck is provided for in the well-known Barber anti-friction truck devices, which are applied between the underside of the main body girders and the top of the truck springs, and all of which rest and are supported centrally in the steel truck side frames. All details are carefully designed to meet railway requirements in case of repairs or renewal of parts.

The load instead of being carried on two center plates, now the common practice, is carried on four steel bearings applied to the outer ends of the truck bolsters. The present center plates are entirely eliminated in the construction, the load being transferred directly in and over the truck frames which provide solid construction with free radial and lateral travel of



Barber Side Bearing Truck.

the bolster, sufficient to lessen the blows and wear between the wheel flange and the rail. This construction removes the load from the center of the truck and body bolster to the truck side frames direct and increases the freedom for curving the truck fully 40 per cent., as compared with the present common standard center plates.

The truck side frames are of I-beam drop girder shape, preferably of cast steel. The truck springs are spaced in pairs, each side supported on a seat cast solid with the truck frames. The truck bolsters are rolled or cast steel I-beam shaped with the web of the beam placed horizontal. The center pivot in place of the center plate provides for and takes care of the buffing shocks. There is no vertical load on this center pivot. The roller caps are of malleable iron and are secured to the under side of the bolster. The radial roller seats of cast steel are secured on the upper side of the bolster.



Barber 50-Ton Steel Flat Car with Side Bearing Truck.

The radial roller cap is also of steel. The three parts of the radial device are so arranged that they are interlocked into one member with freedom to move with the curving of the truck or car body.

The company has had several cars and trucks of a similar design in the roughest kind of service for from two to four years, some of which have made 50,000 miles and are still running with the original wheels, journal bearings and other parts, and without expense for repairs. The car and truck are designed to provide minimum weight and cost of maintenance and to reduce wheel flange wear and train resistance.

WALKER & BENNETT SIMPLIFIED CAR SEATS.

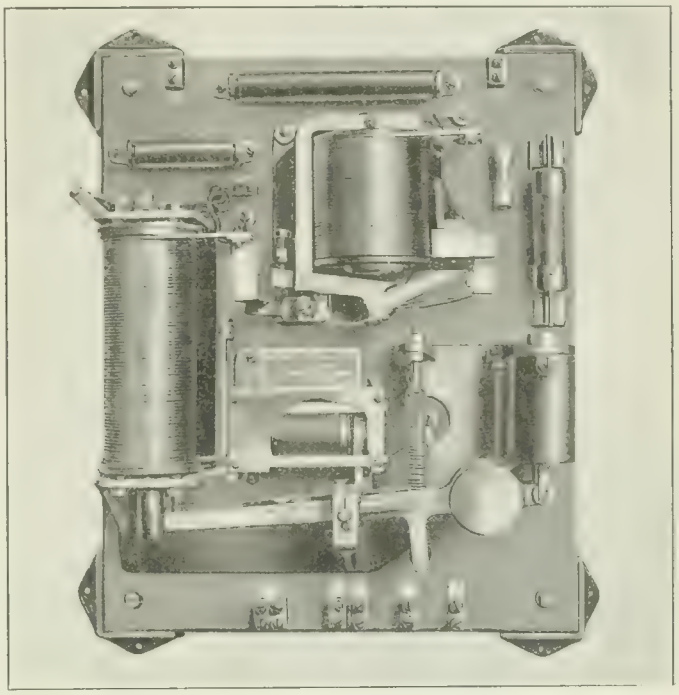
The Walker & Bennett Simplified car seats, made and shown by the United States Metal Products Company, New York, embrace many new ideas in car seat construction, including pressed steel pedestals, arm rests of several new designs, end plates, etc. The pedestals and the arm-rests, are so constructed that they are apparently in one piece, joined in such manner that the seams cannot be seen, and presenting a smooth surface. The construction of these pieces is such that minimum weight is obtained with maximum strength. The new fastening of the seat to the pedestal is strong and simple, and made possible by the use of the original Walker & Bennett round tubular connecting rods. The arm-rests and aisle end-plates are made intact and consequently the arm-rests are secure. The finish of the arm-rests is in imitation of mahogany.

SAFETY TYPE F REGULATOR.

The method of controlling an axle lighting dynamo by means of a carbon resistance in series with the field circuit was first introduced by the Safety Car Heating & Lighting Company, New York, and has been demonstrated to be the only method of control which will fulfill the exacting conditions of car lighting service. The Safety type D regulator has proved its efficiency in actual service and has successfully met all the requirements. In the endeavor to perfect the type D regulator the type F regulator has been developed. The operation is essentially the same as the type D; that is, the generator is completely protected against overload, batteries can never be overcharged, and at the same time, when the batteries are empty, they can be charged in the minimum length of time. This result is accomplished with two pieces of apparatus on the regulator instead of three as on the type D.

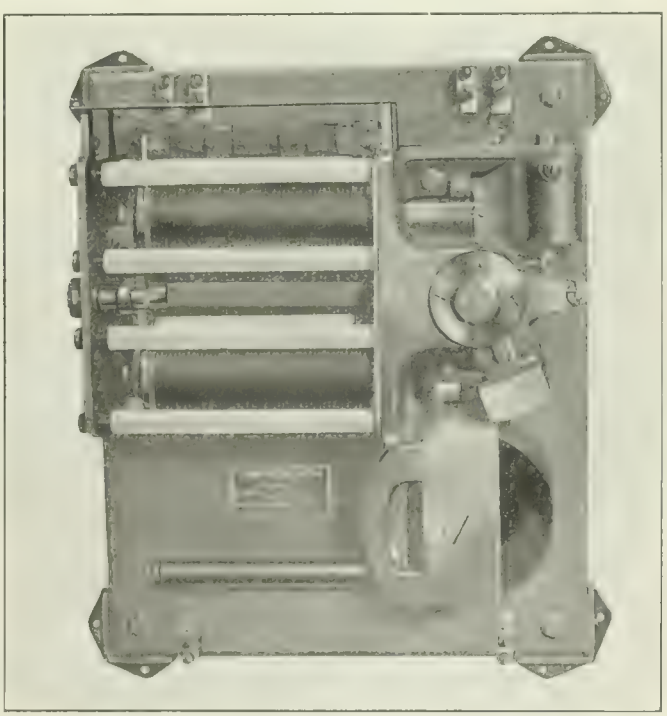
The control of lamp voltage has been the most difficult feature in connection with axle light equipments and experience has shown that a carbon pile resistance in series with the lamps is the only satisfactory method for accomplishing accurate regulation. In order to emphasize the importance of accurate lamp regulation, it should be noted that if the voltage delivered to an electric lamp drops 3 per cent. below normal, the available candle power of the lamp drops 10 per cent.; if the voltage drops 5 per cent., the candle power drops 18 per cent. If the voltage on the lamps is 3 per cent. above normal, the life of the lamp is reduced 33 per cent., and if the voltage is 5 per cent. above normal, the life is reduced 50 per cent. It has been the aim in the design of lamp regulators to accomplish the closest possible lamp regulation with the fewest number of parts. The type D lamp regulator has demonstrated in service that it is possible to satisfactorily regulate the lamp voltage by using a carbon pile resistance in series with the lamps, an electro magnet regulating the pressure upon this carbon pile and a control apparatus controlling the strength of the electro magnet and causing it to respond to variations in lamp voltage. The type F lamp regulator is a perfected type D, the same regulation being accomplished without a means of control exterior to the lamp regulator proper. The actuating magnet is connected directly across the lamps; the regulator is so carefully designed and built that it will respond to the smallest variations in lamp voltage.

Type F Dynamo Regulator. The dynamo regulator consists



Safety Company Type F Dynamo Regulator.

of two pieces of apparatus, the field regulator and the main switch. The main switch is of the closed magnetic circuit form with a hinged armature carrying a heavy laminated copper contact, the whole being of the design that is universally used in circuit breakers and other switch apparatus. The field



Safety Company Type F Lamp Regulator.

regulator consists of two coils, a series coil carrying the total generator output, and a voltage coil, connected directly across the generator, and subject at all times to generator voltage. The plungers of these two coils, acting through independent

levers, vary the pressure on the field resistance carbons, giving the proper field current strength to regulate the generator output for all conditions of speed and battery charge. The voltage coil prevents the voltage impressed on the battery rising above 40 volts and the series coil prevents the total current given out by the generator rising above its desired output.

Experience has demonstrated that if a lead battery has impressed across its terminals the voltage of 2.5 per cell, it will automatically take a charge best suited to its needs; that is, the charge will start at a high rate and will automatically taper to nerly zero as the battery becomes full, corresponding to a stop charge. If the battery is entirely empty and, more particularly, if there is a considerable lighting load, the current demand upon the generator will be in excess of its safe capacity; therefore, it is necessary to prevent the generator being overloaded under any conditions. With the type F regulator the generator gives its full rated capacity at all times, if it can be used, charges the battery in the shortest possible time, and protects the battery from overcharge.

Type F Lamp Regulator.—The type F lamp regulator consists of two carbon pile resistances connected in series with the lamps. The carbons are compressed by a coil spring, which is connected by a link, acting through a toggle mechanism to the armature of the actuating magnet. The pull of the spring is opposed by the pull of the electro magnet. The coil of this magnet is connected directly across the lamp mains. The pull of the spring is adjusted so that it will balance the pull of the magnet throughout its stroke when the lamp voltage is of the desired value. Mechanical friction and hysteresis are eliminated by careful design and the use of the proper materials.

If the lamp voltage is increased, the pull of the electro magnet is increased and the pressure upon the carbons is reduced; their resistance is thereby increased until the lamp voltage is again normal. If the lamp voltage is reduced, the opposite action takes place, the magnet being weakened and the carbons more tightly compressed, reducing their resistance and bringing the lamp voltage back to normal.

The type F lamp regulator is a simple piece of apparatus and, consisting as it does of only a carbon pile in series with the lamps and a magnet connected across the lamp, there is nothing to get out of order. The operation is simple and most reliable, because the voltage regulation depends only upon the balance between a magnet pull and a spring pull, without the use of any control apparatus such as carbon pile controls, buzzers or vibrators.

COMBINATION STEEL UNDERFRAME AND TRUCK BOLSTER FOR FREIGHT CAR.

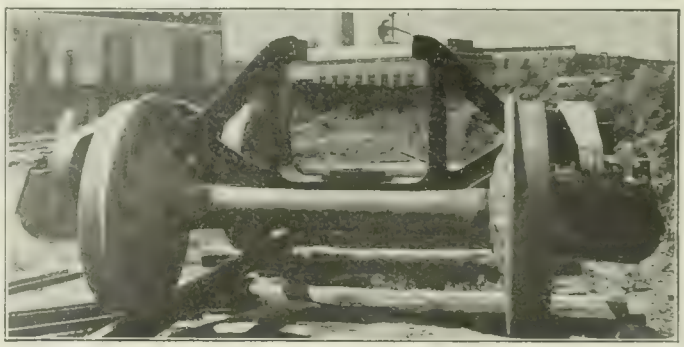
The Mid-Western Car Supply Company, Chicago, has in the track exhibit a sample car illustrating a novel design for steel freight cars. The combination body and truck bolster presents an important improvement in the design of the steel underframe. This design as applied to the steel underframe freight equipment results in a saving in weight. The reduced first cost and that of maintenance are also important advantages over present designs.

The combination body and truck bolster has only two parts, the body proper and the pivot cap. These are of cast steel and the truck center plate is cast integral with the bolster body. The illustration shows this bolster with the cap removed. The center sill may be the single I-beam type or it can be made of channels, which have the cast steel body center plate extending between and securely riveted to them. The center plate sill spreaders have pivot pin extensions about 5 in. outside diameter, centrally located at top and bottom and engaging the pivot cap on top, and a cored hole in the center of the bolster bearing at the bottom. The centers of the pivot pins are connected by a cored passage and the hole is filled with oil and waste to provide lubrication for the center bearing. The underframe of the car to which the combination bolsters are applied has four cross ties, which, in addition to end sills and cross bearers, transmit the load to the center bearing. Normally the load of the car will rest centrally on the center bearings, but when the car is rounding on curves at speed, the centrifugal force will throw the center of gravity to one side and the pivot pins will then take the side force and perform the same office as the side bearings on ordinary equipment.

On a curve the car proper is guided laterally by the pivot pins and swings on center bearings, independent of the truck and bolster. In removing the truck from the car body it is only necessary to unscrew the bolts that secure the pivot cap to the bolster, jack up the car, and proceed in the usual manner.

The advantages claimed for the combination bolsters are: Increased strength. The design of the underframe is such that all the members can be made proportional to the known forces to which the car is subjected in service. The elimination of a large number of details simplifies the design and thereby makes it possible to accurately trace the forces and determine the exact amount of metal needed for a given load.

A steel underframe having the combination bolster will weigh considerably less than the average ordinary steel underframe, the strength in each case being the same. Not only is the weight of two bolsters eliminated, but a large number of pieces



Combination Steel Underframe and Bolster with Center Pivot Cap Removed.

and members necessary in the ordinary underframe are done away with.

The first cost of the underframe having the combination bolster will be much lower than the ordinary underframe, and maintenance cost will be reduced to a minimum.

Side bearing friction will be eliminated. This is a large factor as it is estimated from dynamometer tests that a total of about 2 per cent. of the pulling force from the locomotive is lost in side bearing friction. There is also a loss of power, due to the effort to overcome the added resistance caused by flange friction.

The inside height of box cars is increased. The floor line of the car can be located some 12 in. lower on cars having the combination bolster and the standard drawbar height may be retained. This increases the cubic capacity and, therefore, the loading capacity of many kinds of merchandise cars which are now restricted as to inside height by tunnel clearance and height of trucks.

The point of application of the load of cars having combination bolsters is only 19 in. above the top of the rail, which is much lower than in ordinary cars. The possibility of derailment is reduced, and this is an important factor in high capacity cars, especially in fast freight service.

The car is equipped with the Anderson friction draft gear, type A, having the double yoke attachment, which carries the gear, eliminating the draft bolts, nuts and straps. The Mid-Western Car Supply Company's buffing device located within the buffer or striking plate casting is used, and works in unison with the draft gear.

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A CONTRACTOR bidding on railway work is frequently confronted with the necessity of accepting very undesirable conditions in his contract in order to receive equal consideration with other firms that are willing to take work on almost any basis; firms who hope to evade as much of the contract as possible and get the work finished "some way." The conditions which are complained of in the article published elsewhere in this issue are not defensible on the grounds that they safeguard the company's interest and secure better work, for in most cases blanket clauses, exorbitant demands, ambiguous specifications and incompetent inspection, invite deceit, trickery, and continual controversy on the part of the contractor, and as the engineer in charge must realize the injustice of such conditions, he comes to expect that the contractor will slight some of the requirements and often unconsciously allows unsatisfactory work to pass. No contractor should place a bid on work at a price below the actual cost of doing the work and an engineer should never consent to let a contract at such a price, as trouble is almost inevitable and poor work must be expected. The reliable contractors in business today are no more and no less honest than railway engineers. If they could take contracts under clear, concise specifications which would demand only reasonable perfection of work and could know that the work would be inspected by capable, experienced men, they could afford to place lower bids because the large risks incident to the carrying out of a contract under certain conditions would be removed. The suggestions made by Mr. Greensfelder that controversies between contractor and engineer should be settled by reference to a board of arbitration may deserve consideration, but there should be little cause for complaint on the part of the contractor if an engineer who maintains a judicial attitude is given the sole power of arbitration. No one can know the conditions as well as the engineer, and no one is so well qualified to distinguish between the letter and the spirit of the specifications. He must maintain an attitude of helpfulness and refrain from unwarranted criticism to get the best results from any good contractor. The growing tendency for contractors to employ trained engineers should improve the relations between engineer and contractor, for, as they understand each other better they cannot but realize, on the one hand, that it pays to prepare good specifications, inspect the work competently and pay promptly and fully, and on the other hand, that nothing is gained by evasion of contracts and petty controversies over methods and materials.

THE three decisions rendered by the Supreme Court of the United States last week reversing decisions rendered by the Commerce Court, give a hard blow to the prestige of the latter. We believe that the Supreme Court has as yet decided only four cases that have been appealed to it from the Commerce Court, and that it has reversed it in every one. The conclusion will inevitably be drawn that these developments tend to justify the criticisms of the Commerce Court that have been made by the Interstate Commerce Commission. However, the implication of the commission's criticisms has been that the court was unduly favorable to the railways; and, whether significant or not, it is an interesting fact that in two of the four cases in which the Supreme Court has overruled the Commerce Court, the decisions of the latter were favorable to shippers, and the reversals are unfavorable to shippers. While the decisions of the Supreme Court do not tend to uphold the commission's view that the Commerce Court has been pro-railway, they do seem to uphold the commission's view that the Commerce Court has been encroaching on the functions that Congress delegated to the commission. The decisions of the Supreme Court have heartened those in Congress who have been seeking legislation to abolish the Commerce Court. But are the decisions of the Supreme Court an argument for such action? They show at least that the Commerce Court is not very dangerous from any point of view, because they show that the Supreme Court is just as sure to overrule it when it thinks it is wrong as it ever was to overrule the circuit courts or the commission; and, of course, every decision of the highest court establishes a precedent which will in future bind the lower courts, whether district courts, the circuit courts of appeals or the Commerce Court. From the railway point of view it is probably a matter of small consequence whether the Commerce Court shall be retained or destroyed. For railways and shippers it is a convenience to have all appeals from the Interstate Commerce Commission go to a single tribunal, both because its decisions are more apt to be consistent than those of a number of

courts, and because under the present arrangement litigation is expedited more than it was under the former one. If, on the other hand, the Commerce Court is not going to show itself a more expert tribunal than the other federal courts in passing on commerce cases, one of the strongest arguments for its creation and retention will be nullified. The decisions are even more interesting from the political than from the business standpoint. They are not only a blow to the prestige of the Commerce Court, but also one to that of President Taft, who was chiefly instrumental in securing its creation. However, President Taft has also appointed a clear majority of the present Supreme Court, which seems to have some bearing on the matter, regardless of one's point of view.

OUR esteemed contemporary, the Syracuse (N. Y.) *Post-Standard*, says, "Why news of accidents should be regarded by newspapers as more interesting than other information about the operation of railways, strikes the *Railway Age Gazette* as mysterious." The *Post-Standard* does us injustice. We did not say that this struck us as mysterious. We merely said that it impresses railway officers as being significant of the attitude of the newspapers. There is mighty little about the attitude of the newspapers that strikes the *Railway Age Gazette* as mysterious, simply because it has on its staff men who have served for years both in the news departments and on the editorial pages of some of the largest metropolitan newspapers in this country. Nor does the fact that newspapers should want to print news about railway accidents seem to us blameworthy. As the *Post-Standard* says, the news of a wreck has human interest. It is also a matter of public moment. And so long as the truth is told about accidents no one can justly complain, regardless of how fully it is told. The *Railway Age Gazette* always has contended that railways should give to the press the facts about accidents just as soon as they get them, and without reservation. We have always believed that falsification by railway men in the long run did the railways harm. We have also believed, however—strange as it may seem—that when the newspapers are given the facts about accidents or any other railway matter they should publish the facts, and nothing but the facts. Is there anything worse in railway men lying to the newspapers about accidents than there is in the newspapers lying to their readers about them? It is not *that* the newspapers print news about accidents or other railway affairs, but *the way* they often print it that it is frequently open to criticism. We have searched the ninth commandment and have been unable to find wherein it makes any exception either of the bearing of false witness by newspapers or the bearing of false witness against any kind of a neighbor, even though a railway. Mind you, we are not implying that most newspapers falsify regarding accidents or anything else pertaining to railways. But since we are on the subject, we had just as well set down the cold, incontrovertible fact that some newspapers do lie about them, and do so deliberately, habitually and shamelessly. The same thing is true of some magazines and magazine writers. A consistent policy of falsification can only be the result of premeditation. It is not an unheard of thing for a railway man to give an interview or deliver a speech, and read in some of the newspapers the next morning a report which makes him say exactly the opposite of what he did say. If certain newspapers were responsible in damages for all of the carefully-planned butting collisions, with the truth that occur in their columns, to the extent that the railways are responsible for the accidents that happen on their lines, a single issue would throw them into irretrievable bankruptcy. It is this sort of thing that makes many railway men reluctant to give out news or interviews about accidents or anything else pertaining to the railway business. However, regardless of the conduct of the disreputable and scrupulously untruthful minority of newspapers, we hold to the opinion that the more news of all kinds, good and bad, that railway men give to the newspapers the better it will be for the railways. The number of facts about the railways that reflect credit on their managements is so much greater than the number of facts about them that reflect discredit on their managements that the more frank railway men are with the press, the more certain they are to secure fair treatment from the great majority of decent newspapers, and neither a policy of candor nor one of suppression will get them fair treatment from the other kind.

THE TAP LINE CASES.

THE vitally important duty of correcting and preventing unfair discriminations the Interstate Commerce Commission has been performing in recent years with a courage, energy and ability that merit the warmest commendation. No better example of its work along this line has been afforded than its investigations and reports regarding the payment of allowances by trunk lines to tap lines. One must read the commission's reports before he can appreciate how difficult a task it is to determine when a trunk line railway may be justified in giving an industrial railway a division of a through rate, or in paying it for the rendering of a switching service. And after it has been decided that the industrial railway should be paid something it is almost equally hard to determine how much that something should be.

It was at one time quite generally assumed that any industrial railway which was organized as a separate railway corporation could legally be paid by a trunk line for switching the goods of those who owned it to the trunk line. The commission in its report shows clearly that this is not so, and why it is not so. It has been contended that any railway that holds itself out as a common carrier is entitled to share in through rates. But the commission shows by unanswerable logic that it is not the holding out as a common carrier, but the actually being one that counts. It has been contended that where there is identity of ownership between an industrial concern and an industrial railway any payment by the trunk line to the industrial railway is a rebate. The commission clearly shows, however, that the fact of identity of ownership is not conclusive, but that the decisive point is whether the payment of the trunk line to the industrial railway is so made, or is of such amount, as to enable the industrial concern, in effect, to ship its goods for less than the published tariff. It is not the payment of an allowance to an industrial railway, or even to the industrial concern that owns the industrial railway, for the rendering of a real service, that is unlawful, but the payment of it in such circumstances or in such amount as to make it partially or wholly a refund from the published rate for no service at all or for a service which has not cost as much to render as the refund amounts to.

At the stage which the tap line matter has now reached the question of whether any particular allowance is or is not lawful becomes almost, if not quite, solely one of fact. To ascertain the facts as to any particular tap line requires the most thorough investigation. After the facts have been ascertained the determination of what allowance, if any, should be permitted to be made requires the exercise of sound judgment. In many cases the commission has indicated that the payment of allowances should be stopped entirely, in many others it has ordered them substantially reduced. One of the important effects of its findings will be to increase railway revenues. Commissioner Harlan estimated that the total payments of railways to tap lines have amounted to from $50,000,000 to $60,000,000 a year. If all the unfair discriminations shall be corrected by no means all of this amount will be saved to the roads, as some of the allowances would not be abolished, and many others will only be reduced. The abolition or reduction of only those that

have been improper will, however, substantially increase railway revenues. Complaint often has been made that the interstate commerce law gives the commission authority, when it finds an adjustment of rates unfairly discriminatory, only to correct the discrimination by reducing the higher rates. This is a just complaint. When, however, the discrimination actually amounts to rebating the effect of its abolition is to benefit the roads by increasing their net revenues, and certainly there is no better way, from the standpoint of the railways and the public or the majority of shippers, for railway net earnings to be increased than by the reduction or abolition of unfair discrimination. There still are a good many unfair discriminations, but the combined efforts of the commission, of the shippers who are injured by them, and of the railways are steadily reducing the number.

One of the interesting and not unimportant results of the tap line inquiry and order will be the withdrawal of free railway transportation from officers of industrial railways who also are officers of the industrial concerns owning the tap lines. The exchange of transportation by tap lines and trunk lines has been an obvious abuse, the "exchange" being merely nominal because while the officers of the tap lines have made plenty of use of their transportation on the trunk lines the officers of trunk lines have, of course, made practically no use of their transportation on the tap lines. When the officer of the tap line has been an officer also of an industrial concern the effect of the giving of free transportation to him has been perfectly plain.

CANADIAN RAILWAY POLICY AND ITS RESULTS.

IT is well known that it is the policy of the Canadian government to encourage railway construction, and that this policy has been manifested by the granting of large subsidies. It is probable, however, that few realize the amount of the government aid that has been given, not only in the form of direct cash payments, but in land grants and guarantees of bonds.

The latest figures on this subject have been compiled in the "Railway Statistics of the Dominion of Canada for the year ending June 30, 1911," issued by the Department of Railways and Canals. Up to the close of the fiscal year 1911 $148,217,071.75 in subsidies had been given by the Dominion government; $35,919,360.16 by the provincial governments, and $18,042,823.60 by municipalities. In each case the greater part of these amounts has been in the form of direct cash subsidies. The total for the Dominion includes $79,695,164.62 in cash subsidies, $25,576,533.33 in loans, $37,785,319.97, representing the cost of lines handed over to the Canadian Pacific, and $5,160,053.83 paid to the Quebec government. Cash subsidies given by the provinces have amounted to $32,869,330.16, and by the municipalities to $12,798,824.98, the other grants including loans and subscriptions to shares.

Land grants to the railways have amounted to 55,256,429 acres, of which 32,004,486 acres have been given by the Dominion, and the remainder by the provinces of Quebec, British Columbia, New Brunswick and Nova Scotia. Both the Dominion and the various provincial governments have given material assistance to railway enterprise by guaranteeing the interest on bonds, and in some instances by guaranteeing the principal also. The total amount of such guarantees by the Dominion is $52,439,865, representing assistance to the Canadian Northern and the Grand Trunk Pacific. The guarantees by the provinces include $20,899,660 by Manitoba, $25,743,000 by Alberta, $11,999,000 by Saskatchewan, $7,860,000 by Ontario, $23,196,832 by British Columbia, $700,000 by New Brunswick, $476,000 by Quebec, and $5,022,000 by Nova Scotia.

It is not surprising that such a liberal policy of aid, coupled with a policy of regulation much less drastic than that now obtaining in the United States, is causing rapid progress in new construction in Canada, which presents a marked contrast to the conditions in this country, where railway building has about stopped. In 1907 the mileage reported in operation in Canada was 22,452. In 1910 it was 24,731, an increase of 10 per cent. In the same years the railway mileage of the United States, as reported by the Interstate Commerce Commission increased from 229,951 to 240,458, a gain of but 4 per cent. In 1911 the mileage officially reported as under operation in Canada was 25,400 miles, an increase of more than 13 per cent. over 1907. The corresponding total for the United States is not yet available. However, the increase in operated mileage by no means tells the whole story. The official figures show that on June 30, 1911, there was under construction, or in actual operation but officially regarded as still under construction, no less than 11,633.47 miles in the Dominion. Of this total 6,222.63 miles was graded or being graded, on 3,833.34 miles track was laid or was being laid, and 1,577.50 miles was in operation. If all of this mileage should be in operation on June 30, 1912, the operated mileage of the Dominion would amount to 37,033.47 miles, an increase since 1907 of 14,581.47 miles, or 64.5 per cent. In the United States the railway mileage built in 1911, according to the reports compiled by the *Railway Age Gazette*, was 3,066.

The provinces in Canada where the greatest amount of railway construction has been going on are the western provinces of Manitoba, Saskatchewan, Alberta and British Columbia. In 1911 the total railway mileage in operation in these provinces was 9,973, having increased 23 per cent. since 1907, when the total was 8,108. In the states in this country directly adjacent to those provinces, Minnesota, North Dakota, Montana, Idaho and Washington, the total mileage increased from 21,070 in 1907 to 24,131 in 1910, or 14.5 per cent., and in the calendar year 1911, according to our annual statistics, the new construction in these states amounted to but 606 miles. The official Canadian statistics show that in the four western Canadian provinces alone 7,178 miles of new line was under construction at the close of the fiscal year 1911, which exceeds by about 3,000 miles the entire new mileage added to the railways of Minnesota, North Dakota, Montana, Idaho and Washington since 1907.

Canada has adopted the kind of a policy that is most conducive to the rapid railway construction which is needed to bring about the fullest development of its great resources. It is true that railways in this country were accorded far more liberal treatment than at present during that stage of their history which more nearly corresponds to the present period of Canadian railway history, and were given financial aid as well as moral and legislative support; but the government aid to railways in this country was never on such a scale as it is in Canada.

The railways of the United States do not now ask to be subsidized. They merely ask that railway regulation be such as not to drive investors out of the railway field. If the United States were not still in need of additional railway development, not only in the way of new lines, but also of additional tracks, terminals and equipment to keep pace with the increasing requirements of commerce and the growing demand for safer operation, the reasons for the difference between the railway policy of Canada and of this country might be more apparent. Instead of trying to restrict returns on railway investment to a maximum, as is done in this country, our northern neighbors guarantee a minimum return on a large part of the investment. Instead of obliging railway investors to take both the ordinary risks of investment and the risks of unintelligent and often unfair regulation, they refrain from improving the risks of unfair regulation and share with the investors the ordinary risks of investment. As long as the striking differences between the railway policies of the two countries obtain, the striking difference between the figures regarding their rates of railway development doubtless will continue.

NEW BOOKS.

Valuation of Public Utility Properties. By Henry Floy, consulting engineer. 390 pages, 6½ in. x 9½ in. Bound in cloth. Published by the McGraw-Hill Book Company, 239 West 39th street, New York. Price, $5, net.

Probably it is not stating the facts too strongly to say that Mr. Floy's book should be in the hands of every person in any degree concerned with the valuation of public utilities, whether they be connected with public utilities, or with regulating commissions, or be merely students of the subject of public regulation of public utilities. It is a book for the practical man as well as for the student. The making of valuations is considered at once from the standpoint of the economist, the lawyer, the engineer and the accountant. We are told how from the economic standpoint they ought to be made, how from the legal standpoint they must be made, and how the accountant and the engineer should proceed to meet the requirements of both law and economics. Mr. Floy is an engineer, but his writings disclose a thorough familiarity with the economic discussions and the decisions of the court in reference to his subject. The book is replete with examples of valuations that actually have been made and the methods pursued, and several of the instances referred to are those of valuations of steam railways. For example, in the last chapter the scheme adopted in valuing the Northern Pacific in the state of Washington is described.

Structural Design: Vol. I: Elements of Structural Design. By Horace R. Thayer, assistant professor of structural design, Carnegie Technical Schools. Published by D. Van Nostrand & Co., New York 6 in. x 9 in. 221 pages. Illustrated. Cloth binding. Price, $2.00.

This new volume on structural design has been prepared primarily as a text book for use in technical schools, and the author has tried in the light of his experience as a teacher, and in practical work, to include elementary structural subjects so concisely that they can be covered in the time usually allotted in such schools. The book presupposes a knowledge of mechanics, stresses and the mathematics on which they depend. The volume is divided into five chapters: Materials, Commercial Shapes, Wooden Structures, Fabrication of Structural Steel and The Engineering Department. It is intended to follow this volume with a second one on the design of simple structures, covering plate girders, viaducts, truss bridges, mill buildings, office buildings and standpipes, and a third on the design of advanced structures, covering cantilever, movable and suspension bridges and arches. The methods of presentation seem to be well adapted to the needs of students and by eliminating tables and other data usually included in handbooks, the volume is made to cover a wide range of subjects.

The Modern Locomotive. By C. Edgar Allen. 175 pages, 4¾ in. x 6½ in. Flexible cloth. University Press, Cambridge, England; for sale by G. P. Putnam's Sons, New York. Price, 40 cents.

The treatment of the modern locomotive in this little volume is confined almost entirely to European practice, and it relates largely to locomotive performance rather than to its design and construction. The author has succeeded in presenting an interesting and authoritative account of locomotive performance, although it is necessarily limited and concise. It is not intended for the specialist, but rather for that numerous class which has some knowledge of mechanics and science, and finds the locomotive an interesting machine. To such readers the work is admirably adapted. After a brief account of the development of the British locomotive, considerable space is devoted to combustion, steam generation, superheating, compounding, boiler improvements and the utilization of steam. There is an excellent chapter on counter-balancing and stability, and one on performance and speed. Though the price of the volume is only 40 cents, it contains more information on the locomotive than many of the popular treatises published in this country which are larger and cost several times as much.

Letters to the Editor.

THE RAILWAY LABOR SITUATION.

Montreal, May 27, 1912.

To the Editor of the Railway Age Gazette:

I have been reading with interest your editorials dealing with this subject. In your issue of March 1, page 367, you refer to the question of labor saving devices, and their effect on the number of men employed. There is an example in that connection that I would have been glad to have seen you use. There is no trade in which labor-saving devices have been more largely introduced than that of boiler making and repairing, yet there has never been a time since boilers were first used when boiler makers were so hard to get, and naturally so highly paid. Indeed, the condition is such that if it were not for these labor-saving devices I do not see how we could today go on using boilers. This may be ploughing old ground, yet we have not fully learned the lesson, as witness the efforts still made to resist the introduction of such devices.

But "whom the Gods would destroy they first make mad"; and that we are mad today who that thinks can doubt? Once we got away from the first principle of reward in proportion to value of service rendered we traveled fast on the road that leads to destruction. The first cry of him who considers himself the underdog has always been a protest against special privileges to classes. And because there was considerable truth in the charge that certain classes had special privileges, this cry became a strong weapon in the hands of those who felt they were denied even their actual rights, to say nothing of special privileges. Making use of this weapon has, since the middle ages, steadily advanced its lines of attack against the stronghold of special privileges, until that condition, as it had existed, practically ceased to exist.

This was, and is, the general condition today. But in the railway world there had grown up a specially privileged class from the ranks of labor itself that is infinitely worse than the hereditary specially privileged classes that labor as a whole fought against for so many years. The reasons why this specially privileged class is worse than the old are many. The old, when it existed at all, was a passive force, and really robbed no one in particular. The new is an aggressive force that first robs directly its fellow laborer, and indirectly the whole of society. I refer here to the train crew, meaning all men on trains, but more particularly the engine driver, conductor and brakemen.

It would seem that the transplanting of the Anglo-Saxon race from the older countries to the continent of America wrought a subtle change in the working of its brain cells. We see this in scores of things, but I want to call attention to it in connection with the subject in hand. In the older country, for instance, for many years we had been accustomed to stage coaches and the stage coach driver, but no one dreamed of regarding the driver as a hero of romance, except perhaps the boy at the age when he was undecided as to whether he would be a clown in a circus or go out and fight Indians. But when the stage coach came into use in America we all fell down and worshipped at the feet of the man who held the reins and whip. He might be, and generally was, an ignorant, overbearing creature of the genus "tough," who had neither brains nor training to fit him for anything but the lowest form of manual labor, and he was far too lazy to do that, but we worshipped him just the same. Why? I confess I have failed to learn the cause. The answer that "he took his life in his hand every hour in the day in our service" will not do, for accompanying the driver was a man who acted as conductor and guard. He it was who really looked after the interest of his employer and the public. And it was he who occupied the post of danger, as it was considered the proper thing to shoot him first, and then tell the driver what to do next, which he did, being in no danger whatever while

he did it. But we gave the better man small credit. On the other hand, when the driver, "old Hank" something or other, pulled into the next stopping place and reported the guard killed, the express, mail and passengers all robbed, but *he* perfectly safe in person and property, we cheered him as a hero, the only hero.

This would not be a matter of importance, looking back at it today after the stage coach driver has passed away with the cowboy, the gun man, and other picturesque characters, if it were not for the fact that the idea evolved through some mental twist has been carried into the railway world, and has here, in an otherwise prosaic, hard-working, work-a-day world, been the means of creating the specially privileged class to whom I refer. The railway itself was a new thing, the locomotive engine a thing of mystery, and, naturally, he who controlled it was a hero of romance in the eyes of all the boys and girls of all ages. Then there was the autocrat in blue who actually had the power to let you ride behind the thing of mystery. Don't we all remember what a proud day that was when we were permitted to call either of these exalted ones by their first names, how we envied those who could, before the privilege was ours also? This mental attitude brought forth the "railway story" wherein the hero, "Bill," stuck to his engine, and died with hand on throttle, while his fellow hero in blue saved the beautiful maiden in the first class car.

Now, it is always right to give credit where credit is due, and the locomotive enginemen and conductors have, generally speaking, done their duty, the duty for which they were trained, as well as men in other walks of life. No better and no worse. There have been heroes among them, and there have been the other kind. There have been men of good judgment, and men of poor judgment. But the public gave them with halo of romance, and I am not sure but that it was perfectly natural that they should take advantage of it, as they have, to raise themselves into a privileged class, so far as reward for services rendered is concerned. They were enabled to do this owing to the peculiar position occupied by the railway, and the peculiar nature of their work. The railway once placed in operation cannot stop the running of its trains without throwing the business of the whole country out of joint, and it is generally bound under heavy penalties to keep them running. All these forces conspired to give these men their opportunity to secure greater reward in proportion to value of service rendered than other men received, greater than the economic conditions of the country warrant them in receiving. The result of course is, that other men must receive less than a proper reward to make things balance. The manifest unfairness of this is very plain when we analyze the matter. In all properly regulated lines of human effort the reward for services rendered is governed by two well defined rules, the value of the service to the individual receiving it, and the cost to the individual rendering the service of acquiring the ability to render the service. This is very well illustrated by the reply of the great eye specialist to the man who complained of the price charged for an operation that took fifteen minutes to perform. He said, "It is true that was a small matter, occupying but a few minutes, but it cost me five years of my time and money, and other people about a peck of such eyes as yours for me to acquire the skill to do the job right for you."

We recognize the fundamental principle there, and when we apply it to the case we are considering we see at once how untenable in reason is the position in the railway world of the men who make up the train crews. To begin with, they do not have to possess particular ability, aptitude, or education to fill the positions they do, and the necessary training they receive while drawing a living wage. There is neither time nor money outlay on their part, and the period of training may be much shorter than that required to make an efficient car inspector, machinist, boiler maker, shop foreman, accountant, chief clerk, carpenter, blacksmith, etc.; yet all of these must work all day, every day, to secure, in many cases, less than half the amount claimed by the trainman for working, on an average, one-half of each day; and even that time is put in by the trainmen on labor less trying than that in the cases cited. It is not a question of the actual amount received, but the fact that they receive far too much in proportion to the value of services rendered compared with other people, or their fellow employees. I have mentioned the men with trades, the skilled men, who receive less than half what the trainmen receive. But there are many others, men of skill and experience, who are *never* off duty, day or night; men who must work hard and must plan largely for the future in the interest of their employer; the roadmaster, the trainmaster, the division engineer, the master of bridges and buildings, the general foreman, the general car foreman, the storekeepers, the freight agents, and many others; men whom it has taken years to train, who are responsible for the work they have done six months ago, a year ago, as they are responsible for what they do today. All of these must work for less reward than the service rendered by them is worth that the privileged class may receive more than its service is worth.

Up to the present time the railway company and the mass of the railway employees have been the sufferers through this condition, but the time has now come when the general public must shoulder the burden, as, to meet the ever increasing demands of this special privilege class, railway earnings must be increased In other words, rates, both passenger and freight, must be raised. There is no other thing in the world today that touches the pocket of everyone so directly and so quickly as an increase in railway rates. We may not all travel, but we must eat, and have things to wear. Those of us who travel must pay twice.

It has been much the fashion for many to back up or give a moral support to these men in their demands. They have been, in the eye of the ignorant public, the railway men, the romantic side of the undertaking. Well, the day has come when we must each pay the price of admission to see our hero. And while viewing him we can have the satisfaction of knowing that we have, through our own foolishness, made it possible for him to make us pay.

OBSERVER.

A line is proposed from Somerset, East South Africa, to connect with the Western main line near Hutchinson. It was stated that the line would be about 160 miles long, and that it would greatly develop agricultural resources. A considerable amount of irrigation work is now under way in this district.

The privately owned light steam railways in different parts of Kiushu Island, Japan, now in operation report good earnings, and they are rapidly developing the sections through which they run. The Shimabara Railway in Nagasaki prefecture and the Dai Nippon and the Kikuchi railways in Kumamoto prefecture are extending their lines, while one new line is under construction and charters have been granted to six new companies to build light steam railways in Kumamoto, which embraces the principal agricultural district of the island. In Oita prefecture four companies have received charters to build light railways and in Kagoshima prefecture one charter has been granted. Work has not yet begun on these lines, however.

The concession of the Vladikavkaz railway, Russia, which expired in 1911, has been renewed for 15 years. This line traverses the north Caucasus from Baku to Novorossisk and Rostoff-on-Don, and it is the outlet for this rich agricultural district. With the renewal of the concession the railway company is to effect improvements. At Novorossisk the docking will be extended, and a new elevator is being built which will hold, it is estimated, 60,000 tons of grain. The railway already has at Novorossisk what is claimed to be one of the largest elevators in the world. The improvements at that port will afford housing for an enormous quantity of grain and alleviate such inconvenience as attended the large crops of 1910, when great quantities of grain were stored in the open and covered with tarpaulins.

A NEW TYPE OF STEEL PASSENGER CAR.

Details of the Suburban Cars of the New York, Westchester & Boston, Embodying a Simplified Steel Body-Frame.

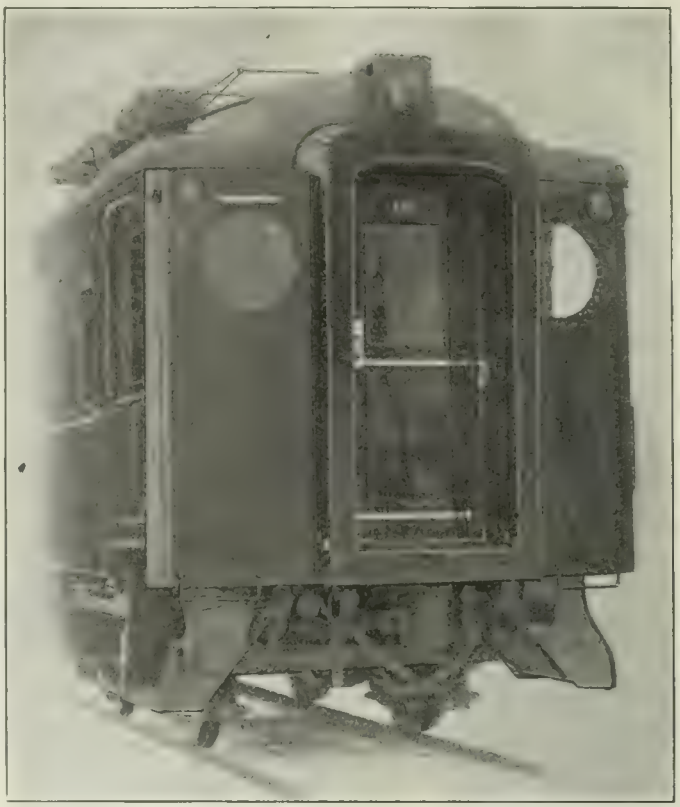
The introduction of steel into the structure of railway cars has gradually developed methods of design departing more and more from those established by long practice with wood as the principal material of construction. The general plan pursued in the design of wooden passenger cars has been to give the underframe sufficient strength to carry the superstructure and its load, the superstructure serving simply to shelter the passengers from the elements and provide for their comfort, but not contributing in any way to the strength or the shock-resisting capacity of the car. With the increased use of steel there has been a growing tendency to develop more strength in the side frame and to lighten the underframe. The most recent advance in this direction is embodied in the all-steel cars designed by the firm of L. B. Stillwell for the New York, Westchester & Boston. The Westchester cars are full steam road size, the chief general data being as follows:

Length over coupler faces	72 ft.
Length over end sills	61 ft. 4½ in.
Length, center to center of trucks	47 ft. 7½ in.
Seating capacity without center doors	86
Seating capacity with center doors	78
Weight of car body and trucks	81,500 lbs.
Weight of electric equipment, including two 175 h. p., a. c. motors	37,500 lbs.

The initial equipment of the road will consist of 28 passenger coaches and two combination passenger and baggage cars. They have full vestibuled platforms and are provided with side doors at the middle and the ends. The station platforms are on a level with the car floor, but to provide for emergencies and also to permit the cars to be used on the Harlem River branch of the New York, New Haven & Hartford, which has low station platforms, there is a trap door and a flight of three steps at each end platform. The Westchester car is designed for service in trains of eight or more cars, and is capable of withstanding shocks incident to main line service, either steam or electric.

General Design.—The full height of the side of the car has been utilized to develop strength. The side plate and letter board form a compression member, and the side sill the tension member of a girder. These are connected by the usual window posts or piers, and all are framed together to form a truss that fully develops the strength of each member. This method of framing was used in the construction of the cars designed by the same firm for the Hudson & Manhattan, but the structure itself was quite different, in that it was built up of standard rolled shapes. Recent progress in the art of working metals has made it possible to substitute pressed steel forms of great strength and light weight for the rolled steel shapes and by taking advantage of these improvements in the manufacturing methods, an entirely new and greatly simplified method of car construction has been evolved.

The distinctive feature of this new system is the pressed unit-



Vestibule of All-Steel Suburban Car.

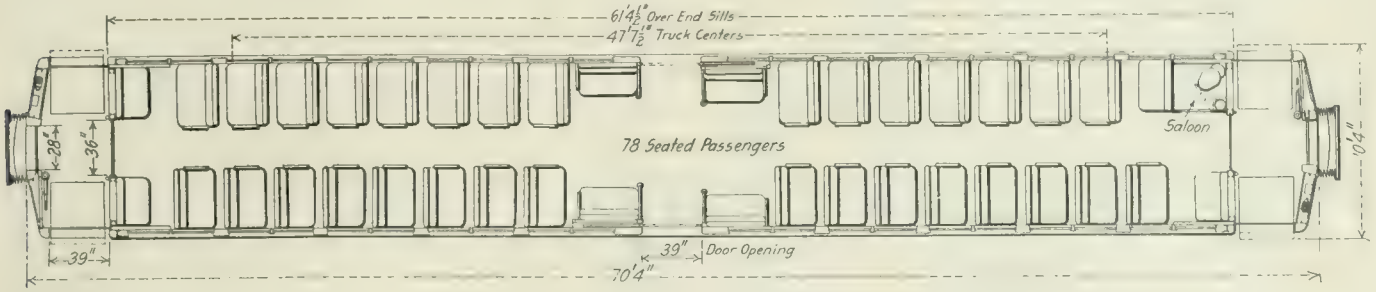
panel side-truss. Each unit includes a main post, diagonal braces, letter board and side plate channel, all pressed from one sheet of steel, thus eliminating all riveted joints between these various elements. Probably the most striking feature of the Westchester car design is the practically uniform distribution of the shock-resisting members throughout the structure, which insures a maximum degree of protection to the passenger in case of collision or derailment.



All-Steel Suburban Electric Car for the New York, Westchester & Boston.

Underframe.—The center sill is supported at each main post by cross bearers spaced about 5 ft. 6 in. on centers, thus making it

possible to use a comparatively light and shallow center sill of uniform section, and yet obtain sufficient strength to withstand the shocks and strains of buffing and draft, as well as those of collision. The center sill is made up of two 8 in. 16¼ lb., channels, 14 in. on centers, and is provided with a ⅜ in. top cover plate and a 1/16 in. bottom cover plate, the enclosed space be-



Plan of Center Side Door Steel Passenger Car; New York, Westchester & Boston.

ing utilized to convey air for ventilating the motors. The cross bearers maintain the sill in rigid alinement, so that all buffing stresses are absorbed by longitudinal compression rather than by flexure.

The uniform depth of sill not only reduces the weight, but leaves an unobstructed area beneath the car floor for the installation of air brake equipment and electrical control apparatus, when used. Wherever there is any possibility of equipping a road for electric motive power within the lifetime of the car, this arrangement of underframe and vestibule is important, since it not only provides space for application of the electrical apparatus, but also facilitates the maintenance thereof.

Side Frame.—The side frame of the Westchester car consists of 12 pressed unit panels securely riveted together and forming one continuous truss. The panels are pressed and flanged from ¼ in. sheet steel. At the top they are riveted together with splice plates and butt welded, and at the bottom they are riveted to the side sill. The side sill is a 7 in., 9¾ lb., channel. Channel-shaped main posts of pressed steel are riveted to the side frame members. They are bent over to form part of the roof and are



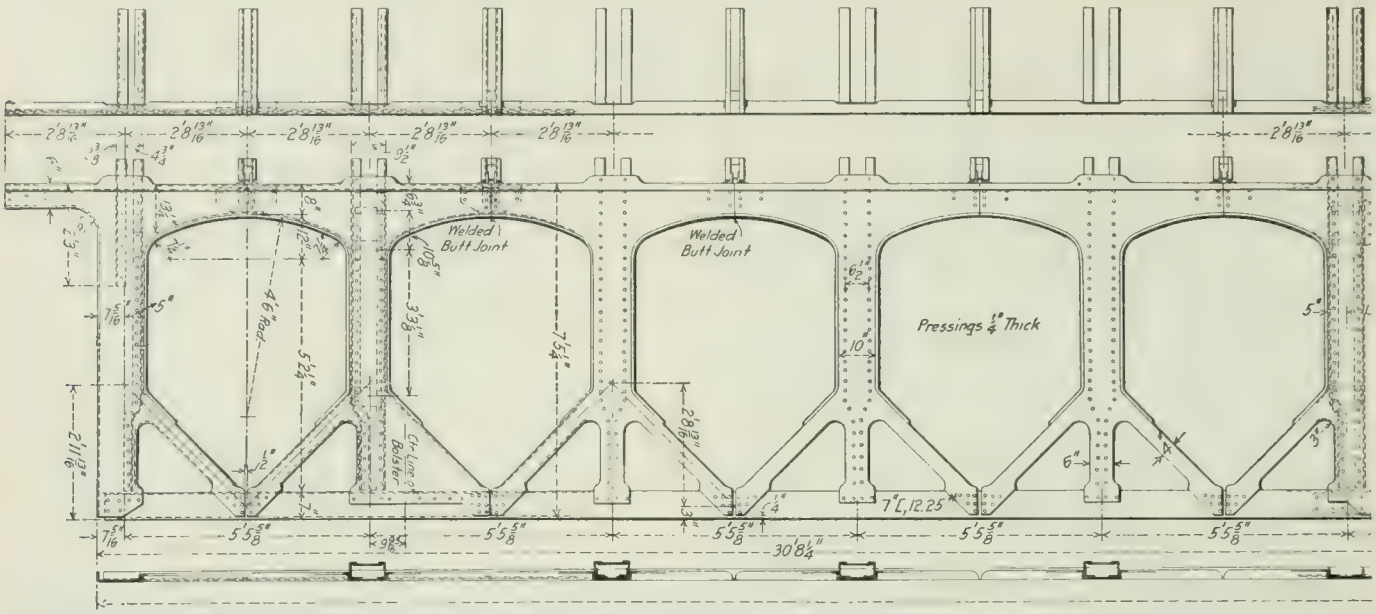
Framing of All-Steel Suburban Car, Showing the Extent to Which Pressed Steel Shapes Are Used.

riveted to the bottom of the deck sill. This method of framing to the deck sill has the effect of an enormous flange and offers great resistance to lateral flexure.

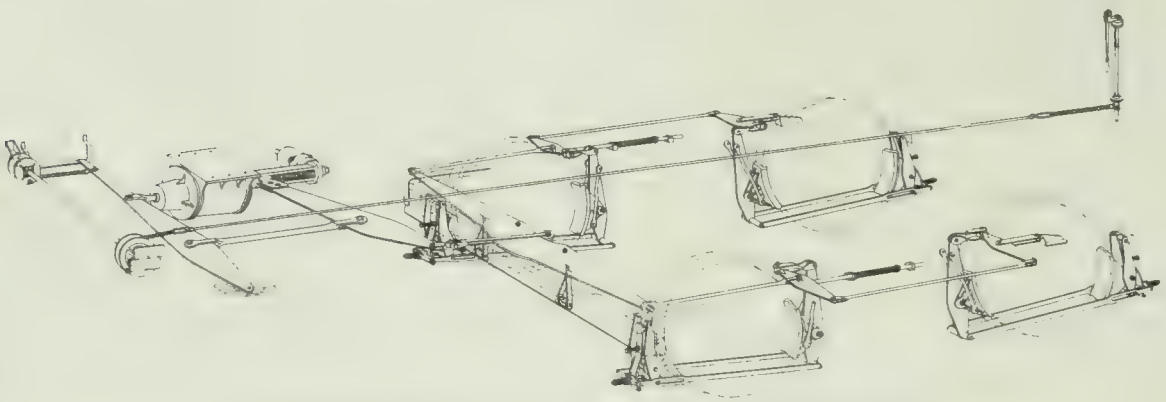
This type of framing construction utilizes the properties of the steel to full advantage, providing a side girder more than twice as deep as that on the type of car where the load is carried by side girders below the windows. It also weighs much less.

Roof Frame.—Considerable strength has been developed in the roof. The framework is made up of pressed steel carlines, bent in arch form, and riveted to the deck sills, which in turn are riveted to the ends of the window posts as above described.

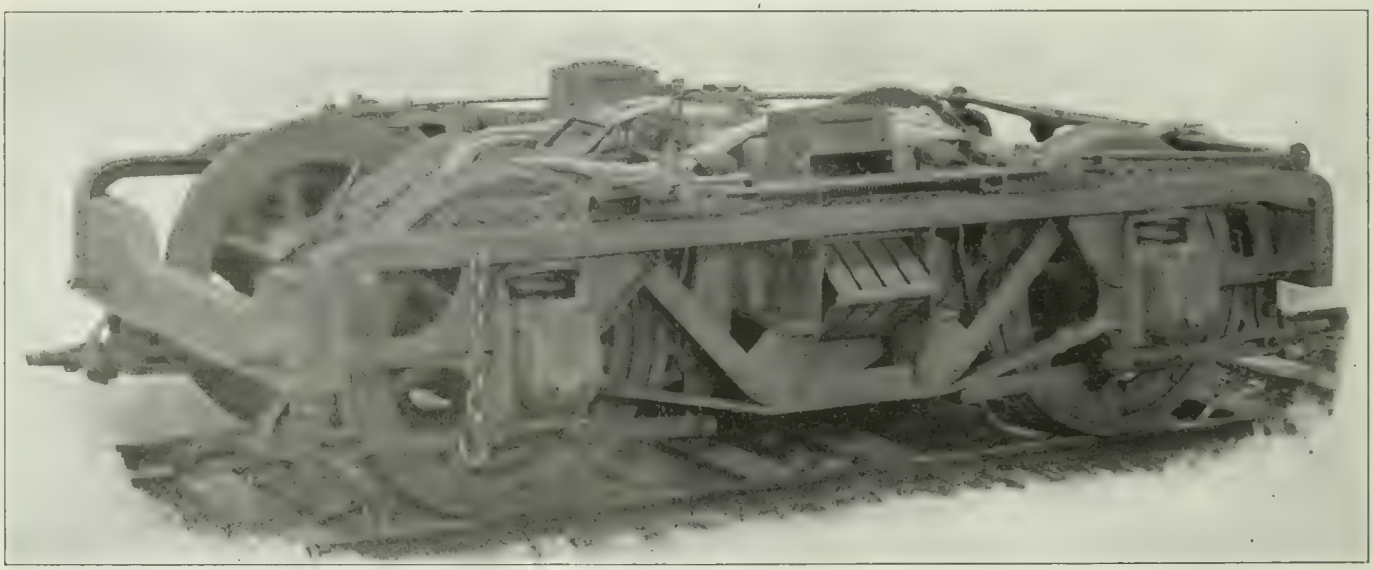
Sheathing.—Below the belt-rail the Westchester car is sheathed with 1/16 in. steel plates riveted to the belt-rail and side sill. The posts above the belt-rails are not sheathed. Joints in the



Elevation of Side Frame of Steel Passenger Car Showing Arrangement of Pressed Steel Units.



Clasp Brake for Motor Truck as Used on Westchester Cars.



Motor Truck for Westchester All-Steel Suburban Cars.

side sheets are covered with ⅛ in. battens, and all joints are made absolutely water tight. The roof sheathing consists of 1/16 in. steel plates extending in one piece from side plate to side plate. The sheets are lapped across the carlines, securely riveted and then welded by the oxy-acetylene process to form a water tight joint. The hoods are pressed from two sheets and riveted together in the middle.

Heat Insulation and Lining.—One of the disadvantages of steel for car construction is its high heat conductivity which often makes it disagreeable for passengers in extremely cold weather, the car radiating heat so rapidly as to create the impression of a draft of cold air. To avoid this the entire roof and space below the windows of the Westchester cars is lined with a ¾ in layer of special insulating material faced and bound with fireproof burlap and held securely in place by short steel pins welded to the sheathing and uniformly distributed over the surface. The entire interior of the car above the floor is lined with fire-resisting Agasote, secured in place by drawn steel molding. The underside of the floor is lined with ¼ in. Agasote insulation glued to No. 24 galvanized sheet steel, which is riveted to the flooring.

Sanitation.—The interior finish is especially designed to promote cleanliness. Sharp edges, projecting corners and crevices which form lodging places for dust and dirt are systematically eliminated. The floor is of Karbolith, and all joints with vertical surfaces are filleted to a 1 in. radius to facilitate cleaning. The seats are of the Walk-over type. They have all-steel frames and are covered with Pantasote. The actual seating capacity of the car is 86, but the side doors displace four seats, thus reducing the seating capacity to 78 passengers.

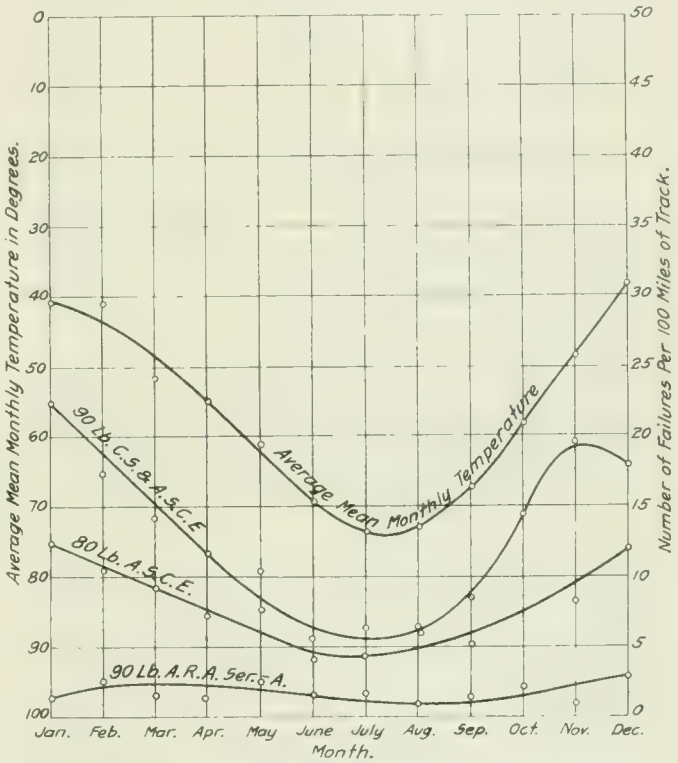
Draft Gear.—The draft gears and couplers conform to the standards of heavy steam railway passenger car practice Diaphragm vestibules are used in connection with platform buffers. The coupler is attached by a pivot pin to a friction draft gear consisting of 28 plates having a capacity of 175,000 lbs., the draft gear being carried in a pressed steel housing riveted to the center sills just back of the end sills. The buffer plate is on a level with the platform floor and is backed up by a Forsyth buffing device mounted within the center sill. This gear comprises two large helical springs and friction spring leaves with a capacity of 250,000 lbs., so that the total draft gear and buffing device capacity is 425,000 lbs. when completely closed.

Brake Rigging.—The weight of the rotating parts of the motor, the high speed of operation and the frequent station stops, constitute a service that would require about 34,000 lbs. pressure with one ordinary brake shoe per wheel. This value is in excess of that which is considered good practice, and it was necessary to use two shoes per wheel and to develop a special brake rigging to meet these conditions. The foundation brake gear and brake rigging are shown in one of the illustrations. There is an independent foundation brake gear and brake cylinder for each truck. One control valve regulates the air pressure in the two cylinders. This arrangement of foundation brake gear minimizes the weight, leaves the underframe clear for electrical control apparatus, facilitates prompt release of the brakes without heavy release springs and provides for an effective hand brake. It also provides for easy and rapid adjustment for the wear of the brake shoes.

Trucks.—The trucks were also designed by the firm of L. B. Stillwell to meet the special requirements of high-speed, heavy suburban railway service. They are simple in design and in actual service have proved to be extremely easy riding. The side frames are of the arch bar type with cast steel pedestals enclosing triple-coil journal box springs. The top arch bar is a Z-bar, and the inverted arch bar is a heavy angle securely riveted to the back of the top flange of the arch bar over the journal boxes. The transoms are pressed steel channels and are attached to the side frames by large cast steel gussets. The bolster is of the box type, made of pressed steel, is 14 in. wide and rests on quadruple elliptic springs.

RELATION OF TEMPERATURE AND SECTION TO RAIL FAILURES.

In plotting up the rail failures on the Harriman Lines for the past three years with respect to temperature, the results gained with the 90-lb. A. R. A. section, series A, were found to be very interesting. A glance at the accompanying curves will show how differently this rail has behaved from the 90 lb. and 80 lb. A. S. C. E. sections. It will be seen that the breakages of rails of those designs and weights correspond very closely to the temperature changes, being low in June and July and



Rail Failures Per Hundred Miles of Track; Harriman Lines.

very high in December, January and February. On the other hand, the A. R. A. section shows very few more breakages in January and February than in the warmer months. As this data covers a period of three years, and is compiled from failures occurring on all of the Harriman lines, it may be assumed that the showing is quite reliable. The data given is for rail failures per 100 miles of track and the average mean temperatures on all the associated Harriman Lines during the calendar years 1909, 1910 and 1911.

Smyrna, Asia, Minor, has communication with the interior of the country by two railway lines: The Smyrna-Cassaba railway, running eastward, for 324 miles, with branches of about 60 miles; and the Smyrna-Aidin railway, running 234 miles due east in the southern section of Asia Minor, with branches amounting to 87 miles. Both these railways have started a further extension of their respective lines and work is in progress.

The report of the operation of the Transcaucasian railway, Russia, which connects Batum with Baku on the Caspian sea, 558 miles, shows for first eight months of 1911 the following figures: Number of trains run, 112,500; number of passengers carried, 5,639,325; by express, 39,700 tons; by freight, 2,217,383 tons; 795,379 tons of railway material belonging to the line were carried. The revenue derived from the passengers and freight amounted to $9,983,042, an increase of $754,900 over the corresponding period for 1910. The expenditure of the railway during the same period amounted to $3,321,595, an increase of $730,630 over the corresponding period of 1910.

RAILWAY TELEGRAPH SUPERINTENDENTS.

Annual Meeting in New York; Experiences with Telephones and Selectors; Management of Offices and Maintenance of Lines.

The thirty-first annual convention of the Association of Railway Telegraph Superintendents was held at the Waldorf-Astoria hotel, New York, June 4, 5 and 6, President G. A. Cellar, of Pittsburgh, Pa., in the chair. There was a large attendance of members, and also many ladies, wives and daughters of members.

The reports of the secretary, treasurer and executive committee showed the association to be in a sound financial condition, and increasing in membership. There are 105 active members and 64 associate.

E. C. Keenan, chairman, read the report of the committee on wire crossings. The committee had held several meetings and drafted part of the specifications, but was unable to get them completed for submission at this meeting. The proposed specifications refer to the construction and maintenance of aerial electric wires crossing railway rights of way, etc.

The report of the committee on high tension wire crossing was read, and on the recommendation of President Cellar section 18 was amended, with respect to the insulation of guy wires.

E. P. Griffith, chairman of the committee on the delivery of telegrams on trains, reported progress and the committee was continued. Mr. Griffith also made the final report of the Turner Monument Fund Committee. He briefly reviewed the history of the movement and referred to the dedication on May 2.

The committee on miscellaneous matters, E. A. Chenery, chairman, recommended clearing the ground of grass within a radius of 5 ft. or more around telegraph poles. L. M. Jones, chairman of the committee on Standardization of Rules governing the handling of train orders by telephone, reported progress, and the committee was continued.

In the afternoon the paper of R. E. Chetwood, engineer of construction of the Western Union Telegraph Company, on "Construction Materials and Methods," was read in abstract by the author, and brought out a long and interesting discussion, which was participated in by Messrs. W. J. Camp, M. H. Clapp, J. C. Hubbard, Charles Selden, G. A. Dornberg, C. S. Rhoads, M. C. Allen and others. The Canadian Pacific uses nothing but tile conduit for underground service. Double cross-arms are required by the Canadian Railway Commisison at crossings.

A paper on the handling of supplies by W. G. Higgins (Western Union) was read in abstract by the author and discussed by E. A. Chenery, W. F. Williams and others.

William Maver, Jr., read an interesting paper on polarized sounders, and showed an instrument in operation.

SECOND DAY.

On Wednesday the meeting was addressed by Belvidere Brooks, general manager of the Western Union, and Angus S. Hibbard, of the American Telephone and Telegraph Company. Mr. Hibbard said that there were now over 300 joint telegraph and telephone offices in small towns, and very satisfactory service was being rendered. By this arrangement 24-hour telegraph service is given where it would not pay to keep telegraph offices open continuously.

A paper on the telegraph and telephone facilities of the St. Louis terminal was read by F. E. Bentley, superintendent of telegraph of the Terminal Railroad Association. Extracts from this paper will be found below.

A paper on The Use of the Main Line Relay in Telephone Selector Operation, was read by W. W. Ryder, general superintendent of telegraph of the New York Central Lines, Chicago. An abridgment of this paper will be found below. A lengthy discussion was participated in by W. E. Harkness, V. T. Kissinger, Wm. Bennett, G. K. Heyer, W. L. Cook, W. J. Camp and L. M. Jones. These gentlemen related their experiences with main line relays in connection with the operation of selectors, and pointed out the advantages and disadvantages of the method.

W. N. Fashbaugh, traffic engineer of the Western Union, read a paper on Telegraph Traffic. An abridgment of this paper will be found below.

On Thursday a paper on "What the Telephone Has Done for the Santa Fe," was read by L. M. Jones of that road. An abridgment of this paper will be found below. It was discussed by Messrs. Selden, Wilbur, Camp, Ryder and Van Akin. G. M. Yorke (Western Union) read a paper on the maintenance of telegraph lines, and it was discussed by Messrs. Chenery, Beck, Kissinger, Clapp, Dornberg, Allen, Camp, Keenan and Ross. Extracts from Mr. Yorke's paper will be found below.

J. F. Caskey (Lehigh Valley) presented a paper on the use of the portable telephone in railway service. The discussion of Mr. Caskey's paper was participated in by J. B. Sheldon, W. W. Ryder, W. J. Camp, S. L. Van Akin, Jr., W. C. Walstrum, J. J. Ross, C. A. Parker, Charles Selden and E. A. Chenery. The speakers gave interesting facts regarding the use of portable telephones on their respective lines, and much information of value was brought out. Following the discussion on Mr. Caskey's paper, a paper on telegraph line maintenanec was read by W. S. Melton of the Queen and Crescent Route, and was discussed by Messrs. Ross and Howe.

A communication was read from James Kent (Canadian Pacific), giving an account of an interesting experience in the use of dry batteries at Sudbury, Ont., during a flood which submerged the storage battery. Dry batteries were pressed into service to supply energy for the operation of several circuits, including duplexes and quadruplexes, with very satisfactory results.

A meeting of the executive committee was then held, after which the following named officers were elected: President, J. B. Sheldon (Union Pacific), Omaha, Nebr.; vice-president, William Bennett (C. & N. W.); second vice-president, A. B. Taylor (N. Y. C. & H. R.); secretary and treasurer, P. W. Drew (M. St. P. & S. S. M.), Chicago. St. Louis was selected as the place of the next annual convention, and May 20, 1913, was fixed as the date.

USE OF MAIN LINE RELAYS WITH TELEPHONE SELECTORS.

By W. W. Ryder (N. Y. C. Lines).

In the early development of the selector in telephone train despatching work, a main line relay was used to receive the signals, the selector mechanism being operated off the local points of the relay. Later several types of selectors were brought out in which the signaling current directly actuated the step-up mechanism. While this arrangement reduced the number of parts in the selector and its cost as well, it also reduced its effectiveness. The moving parts of the directly operated selector have a greater inertia than the light armature of the relay, and a much greater current is required to satisfactorily operate it; then, too, the margin of operation was considerably lessened, varying with the different types.

Comparing two circuits, one equipped with selectors of the relay type with local step-up operation, and the other with those of the directly operated type, the new selectors were found not nearly as satisfactory as the older type, this being particularly noticeable when there was a considerable change in the volume of signaling current by reason of offices cutting out at night and in again in the morning, the operating range of the selectors not being wide enough to work successfully on the varying current.

This trouble was so serious it became necessary to issue instructions that offices must not cut out when closing for the night. As this trouble had not been experienced with the older selectors, it was evident the cure lay in the introduction of a sensitive relay in the circuit. Accordingly arrangements were made with the manufacturers of two different types of selectors to furnish some of their apparatus equipped with relays, and the operation in every instance has been greatly improved; in fact, the change has been so marked it has been decided on all New York Central lines west of Buffalo to replace all those not so equipped with main line relay selectors. This involves some additional expense, but this expense is clearly justified—by reason of greatly improved service, and greater economy of operation. The direct operating selectors require at least six milliamperes per selector, effectively distributed. The local battery selector is operated through the medium of a very sensitive high wound (4,700 to 7,000 ohms) main line relay, with very light armature, has only a light retractile spring tension, and requires only four milliamperes. It will operate without readjustment on from one-half milliampere to 18 milliamperes, thus insuring satisfactory operation under practically all conditions.

This lessened current requirement means cutting the voltage of the signal battery in half at least, with all the naturally attendant benefits of lessened leakage, etc., while the widened margin of operations means less failures, thus avoiding many trips of the inspectors for the purpose of adjusting selectors reported as failing to operate. It also means longer circuits, and more stations can be successfully operated than is otherwise possible.

It is true with the relay selector the local battery is required to do double duty, that is, to operate the selector mechanism as well as to furnish current for operating the vibrating bell. This increases battery consumption in the local circuit to some extent, figures showing the average life now to be five instead of seven months. But, this no where near offsets the saving through reduction in main signaling battery.

Reducing the signal battery has made it possible to do away with retardation coils and expensive high voltage condensers at the despatcher's terminal. It also lessens the original installation cost, has practically eliminated trouble of breaking down condensers, and has minimized possible injury to despatchers.

One of our despatcher's circuits 183 miles long has 26 stations equipped with a direct-operated type of selector. This circuit requires 398 volts, and a current of 310 milliamperes. A paralleling circuit between the same points used for message service has 43 stations equipped with relay selectors. This circuit requires 150 volts and a current of 172 milliamperes. Thus the latter circuit with 17 more stations is actually worked with 248 volts and 138 milliamperes less than is required to operate the despatcher's line. Not only this but the general service has been infinitely better, and this through a period of about one year.

Another pair of circuits 143 miles long show similar results. The despatcher's line has 30 offices equipped with old selectors, and requires 350 volts and 320 milliamperes of current. The message circuit with 32 offices equipped with relay selectors is worked with 135 volts and 135 milliamperes, a reduction of 215 volts and 185 milliamperes.

THE TELEPHONE ON THE SANTA FE.

By L. M. Jones, Superintendent of Telegraph.

The only objection which has been brought to my notice is the one due to the use of the headband receiver, which it is necessary for the despatcher to wear constantly for eight hours daily. The pressure of the band and its weight, with that of the receiver, in time becomes annoying. The hard rubber shell of the receiver cap makes a heavy pressure upon parts of the ear; the soft rubber cushion, if used, relieves this trouble to a considerable extent, but in warm weather causes considerable perspiration and consequent uncomfortable feeling. Here, it seems to me, is the largest field for improvement. We should have a transmitter sufficiently powerful to permit placing a receiver in such a position that the despatcher may hear by placing his ear near it, and in this way avoid the necessity for the use of the headband receiver. We have all noticed operators along the line wearing the receiver headband while engaged on other work, which is done for the purpose of keeping in touch with train movements. In this, we must admit an advantage in favor of the telegraph.

The advantages of the telephone are great. The first, and one that is noticeable as soon as a circuit is placed in service, is the time saved in calling offices. A weather report may be secured from 20 offices in less than five minutes. By telegraph it would probably take 20 minutes and be closed with possibly one-fourth of the offices failing to respond. It is not unusual for the despatcher to be called upon by a relay or Western Union office to ring an office for which they have a rush message and are unable to raise the office promptly by telegraph, and this he can do with practically no effort.

In transmitting orders, the speed is regulated by the despatcher who writes the order in his book at the time it is sent. While some time is saved in transmission, probably 25 per cent., by far the greatest saving is made in repeating. An order may be repeated in approximately one-fourth the time required for telegraph repetition. The consensus of opinion is that the telephone increases the efficiency of the train despatcher at least 25 per cent.; some insist that 50 per cent. is nearer correct. In some cases it may be possible to lengthen districts and possibly get along with fewer despatchers.

Under the telegraph system, the despatcher copies the order in his book as it is first repeated, sending the order out without a written copy. By the telephone system, the order is written in his book as it is transmitted, so that the repetition is checked against his book copy, rather than his memory; this is a factor of safety.

In cases of washouts or broken rails the despatcher looks at his clock and notes a train may be very near the last station. Instead of calling desperately and hoping he may have the good fortune to find the operator on hand, it is only necessary to make one turn of the wrist and a bell is ringing which will bring the operator if within a block of the office. This conserves the strength of the despatcher and relieves him of an immense nervous strain; in fact, the benefits and safeguards are so numerous that this one is only mentioned as an example. Without a doubt many wrecks in the past could have been prevented. . . .

When derailments occur, the conductor comes to the nearest telephone and talks with the despatcher and tells him of the exact conditions. As an example, a train with 50 cars cut off an engine and started in on a spur to pick up two cars. A rail was broken, derailing a large engine. Conductor reported to the despatcher as follows: "In heading in on spur 'B' rail broke; engine is on ground; our train is on main line. Send an engine to pull us on; she must come from the east and first pull the 50 cars back to 'C' and place on siding; this will clear the main line. Have section men working now and soon as we are rerailed everything will be clear"—all of which took about a minute. That conductor probably would have spent a long time preparing a suitable written message.

By talking with agents, the despatcher saves many messages daily which it would otherwise be necessary to send regarding cars required for loading, etc.; in fact a conservative estimate would place the saving at an amount at least equal to one operator in each division office.

We have a fast mail train which arrives at destination on the dot 29 days out of 30, but to secure this result it must leave the terminal on time, regardless of its connection from the west. However, if the connection from the west is over an hour late, it misses the regular train and is run through, making an extra train for over 500 miles. This is what happened recently: Train from the west was 50 minutes late; general superintendent's office asked trick despatcher about this train, to which he replied: "Fifty minutes late, 12 cars, no extra stops, two cars to pick up at 'K,' big crowd to get on at 'W'; will probably make schedule."

Instructions were then given as follows: "Maintain schedule if possible; if unable to do this will have to run two sections east. Find out from conductor at first stop if people in the two special cars are equipped to prepare their own food; if not will be necessary to carry diner east." Despatcher secured the information, rung general superintendent's bell and advised him a little later, everything was lined up and train would make the connections, all of which consumed very little time.

One of our greatest benefits, so far as an actual saving of money is concerned, is by the use of portable sets. From those furnished work trains, extra gangs distributing, laying and picking up rail, etc., between stations, as compared with the old method, it is estimated that the same number of men in a gang will be able to do one-third more work.

The telephone circuit is not affected by fogs, while the telegraph is often rendered inoperative where lines parallel the coast. With the telephone, no adjustments due to weather conditions are required.

From everywhere you hear harmony emphasized. Instead of the contention for circuit and discord between the despatchers and operators, the despatcher is brought in much closer touch with the operators and agents. All petty quarrels, such as frequently occur by telegraph, are entirely eliminated for the reason that they are usually due to a misunderstanding. It is so easy to explain such things fully by telephone that they are in this way obviated; in fact, they are one happy family.

At first, despatchers, except those having trouble due to operators' paralysis, are almost to a man opposed to the use of the telephone. After using it a short time, however, they consider it a hardship to have to go back to the telegraph even for an hour or so in an emergency. In giving an opinion, one despatcher says: "With the inauguration of the telephone the company made another rapid stride toward perfecting its service. The benefits from a safety standpoint are unparalleled in the history of train despatching." About a year ago our despatchers were given an increase in salary. In acknowledging receipt, one said he really felt ashamed to take the money for the reason that never in his 20 years' experience had he found his work so easy This he attributed to telephone train despatching and the use of oil burning engines. One division operator suggests that the telephone not only conserves the time and temper of the despatcher, but that it may be an important factor in determining the final destiny of the ordinary despatcher in the Great Hereafter!

ST. LOUIS TERMINAL TELEGRAPHS AND TELEPHONES.

By F. E. Bentley.

At St. Louis union station the main telegraph office on the fifth floor is equipped with 76 telegraph wires, all but six looped from Western Union main office; also four telephone circuits. Twenty-three telegraph wires and three telephone circuits are exclusively despatchers' line; the remaining 53 telegraph wires and one telephone line used for message work are cut onto eight sextette-instrument tables.

All of the 76 telegraph wires are cut from the regular switchboard to another one improvised of Dean telephone jacks—eight strips of ten jacks each. A monitor operator at the jack-switchboard, using plug and cord on telegraph instrument, plugs in on each telegraph wire at intervals of ten to 20 minutes, answers calls, has an operator in the room get the message if one is available, otherwise takes it himself; gets off any miscellaneous rush messages, and helps out the chief operator, besides keeping a record of the condition in which he finds each wire—quiet, busy or open. If quiet, he announces his presence by saying I I UD, thus giving any office on that wire a chance to get him.

Telegraph and telephone message circuits on the eight tables are divided into districts, each operator working six or eight, and these operators also record the condition of the wires at less regular intervals, and likewise announce their presence at quiet wires.

As each operator is credited with the number of messages he handles, a daily average service account being kept and filed for their inspection, they are careful to record every message sent and received. This spurs the operators to handle all the messages they can, and with the wire-condition record and miscellaneous notations on the call sheets, makes a complete supervisory record that is seldom assailed successfully.

When a line office has an equipment order to send, he says "coach" and our operator makes the required number of copies—eight or ten, on typewriter at one writing and direct from the wire, thus saving delay and work. "Coach" manifolds of tissue blanks are kept set up and handy for operators' use. Stock and time freight reports are handled in a similar way.

This office is different from the ordinary railway relay office in that a scattering few messages are handled on numerous wires, instead of a great number of messages on a few wires. The telegraph arrangement has remained practically unchanged since first installed when the union station was opened in 1894, excepting that train wires were taken off the table in 1904, operators devoting all their time to working and watching message wires. The telephone circuits were added during the past two years.

At the train order office in the midway passenger conductors of 23 roads register, call for mail, messages and orders, and leave reports, which are usually sent to the main office through pneumatic tube for wire transmission. One operator handles train orders for those roads which use that office, and another operator gets hourly bulletins of incoming trains, making ten copies at one writing, distributes them to the various departments, and see that the bulletin board is posted and changed.

An inbound train sheet record is made, so that any inaccurate figure given by a road despatcher may be corrected after the train strikes Terminal rails and before it reaches union station.

A daily average of about 2,500 messages, orders and reports are handled at these two offices, and nearly 400 telegrams between local offices which have no direct telegraph connection.

Should not telegraph and telephone offices, both commercial and railway, at large passenger terminals be combined and centrally located on or near the track level?

Two private branch exchanges at union station and 32 private lines between various points, with over 400 telephones, are used in terminal telephone service, handling a daily average of about 12,000 connections.

One private branch exchange is connected by junction circuits with eight of the other 15 railway private branch exchanges in St. Louis, as well as by trunk lines with the St. Louis main exchange. Telephone facilities over the entire terminal property have been a lively and growing proposition for the past 15 years. As the different departments feel the need of additional telephones, instruments are placed here and there, subject of course to the eagle eye of the management as to expense. . . . In very noisy places—shops, engine houses, etc., where the 6 in. gong could not be heard—we use air whistles connected by a trigger device to the telephone bell box. Telautographs—electrical writing machines—are used to very good advantage, both at union station and Washington avenue new station, where train announcements must be displayed for some time and a permanent record is desired. One transmitter at the principal interlocking tower, union station, sends simultaneously to six receiving machines itemized reports of trains arriving, trains departing, cars set into the station, etc. Another transmitter in the telegraph office nearest Washington avenue station writes on two receivers in the station all reports of how inbound trains will arrive and the time that outbound trains pass the first towers on each route, the Eads and the Merchants.

MAINTENANCE OF TELEGRAPH LINES.

By G. M. Yorke (W. U.)

Results that ought to follow from good original construction may gradually be vitiated by inadequate attention to the inevitable

small recurring sources of trouble, such as leaning poles, loose ties, and loose or broken insulators; by alteration in construction, such as the insertion of cable; by unheeded changes in surrounding conditions, such as the construction, dangerously near, of high tension lines, the erection of buildings, and the washing out of embankments, and by lack of systematic replacements of decayed, rusted or worn-out parts. A principal penalty for not paying enough attention to the prompt correction of small defects is an unnecessarily large number of what are very significantly known as "troubles." If we can establish a system which makes an increase or decrease in the number of troubles in a given section of line conspicuous, which makes comparison unavoidable between one section and another, and which makes this exhibit not only to the superiors but also to the men who actually do the work and know that they are responsible for the results, and who see every time they clear a trouble the relation between cause and effect, we shall take an important step in the direction of keeping the number of troubles down to a reasonable minimum.

This is the object of the system now being put into effect by the telegraph company for "counting, recording and reporting line troubles," giving data which will fix the responsibility for excessive delays in clearing line troubles and any unnecessary expense connected therewith; also data from which a detail monthly analysis of line and cable troubles and their causes can be made, as well as comparison per mile, etc., will give a basis on which to compare the efficiency of the districts and direct future repair work; will show data from which the troubles per mile and the average time to clear can be determined. Based on the troubles per mile of wire and the average time to clear a trouble, it will be possible to establish a friendly rivalry between districts and between section linemen by issuing a monthly statement showing the rating of the various districts in the division and the rating of the section linemen in a district or in the division.

A high degree of efficiency in clearing troubles on line wires requires close co-operation between the wire chiefs and section linemen. The test rooms are rapidly being equipped with suitable apparatus for testing and locating troubles in line wires. Troubles per mile of wire on No. 9 B. & S. gage copper wires should be the standard by which to judge iron wires; and when the condition of iron wires becomes such that the number of troubles per mile of wire exceeds those on copper wires, the iron wires should be renewed.

As a result of the maintenance of systems described, great improvement may be expected. As a result of such methods one telephone company doing a large toll line business, while doubling its wire mileage in eight years, and working all the time under practically the same construction specifications, made a steady reduction in the total number of line troubles. At the end of the period the troubles per mile of wire were less than half what they were at the beginning.

TELEGRAPH TRAFFIC.

By W. N. Eashbaugh, Jr.

We are trying to insure accuracy, speed and economy. There is no doubt that the principal cause of errors is the lack of experience or inattention on the part of the operators. In our larger offices throughout the country, we have detailed a supervisor, whose duty it is to cut in on the various circuits for short intervals, noting the manner in which the operators work the wires. At repeater stations, the repeater attendants call to the attention of the terminal offices any apparent imperfection in the work of the operators engaged on the circuits.

The traffic supervisors in our larger offices are required to exercise great care in assignments; operators of mediocre ability will not be assigned to the working of circuits beyond their capabilities. Inspections are regularly made of a proportion of the received messages. All the operators knowing that their work is liable to be under observation and subject to criticism at any time exercise greater care, and the result has been a marked improvement. A number of years ago, delays ranging from 30 minutes to an hour in the handling of messages at our larger offices were not uncommon, but there have been numerous recent instances where we have sent messages from different points in the south and southwest destined to London and Liverpool, to which the answers have been received in three minutes.

We are striving for a regularity of time, so that from experience, the patron can be reasonably well assured that within a certain time a telegram will reach the addressee. In the delivery of messages in the past, large numbers of messages were sent out at one time by a single messenger. We are now sending out not more than three messages at a time during the business hours of the day. Upon return to the office the messenger delivery sheets are inspected to see whether the deliveries have been accomplished within the proper time and further to see whether the boy has returned promptly to the office. We are making progress in handling messages to and from patrons by telephone. The number of messages handled in this manner has been steadily growing for the past year until, at our principal offices the aggregate has reached a monthly total of over one million; there is no doubt that this will be greatly increased.

A record, called a circuit load report, is prepared monthly by all of the principal offices and shows the total number of messages of the different classes which may be filed each half hour for each circuit. From this record we are able to estimate the circuit requirements. A speed of service report has also been instituted in the principal offices covering the movement of the traffic on all of the circuits. This report shows by minute intervals up to 15 minutes, and by five minute intervals up to one hour, the percentage of the traffic handled on each of the circuits. Instances can be cited where two years ago but 5 per cent. of the traffic was being handled within five minutes and 42 per cent. within ten minutes, which have now been raised to 50 per cent. and 60 per cent. within five and 90 per cent. and 95 per cent. within ten minutes.

Definite time intervals have been set for the various steps. For example, the time allowance on branch office circuits was placed at five minutes; on trunk circuits, ten minutes; on way circuits, 15 minutes. Offices must be prepared to furnish a satisfactory explanation of any delays in excess of the standard time. Other time intervals were established.

Economy is subordinate to accuracy and speed, but it is necessary that we consider it; chief operators can waste considerable sums of money in operators' wages if they are not constantly on the alert to see that the assignment of their operating force is regulated from hour to hour. The circuit load report is of great assistance here. We have also individual records showing the average number of messages handled per operator per hour, which are compiled in some of the larger offices to show the average per hour in certain sections of the office, and in the office as a whole.

In a recent month compared with the previous year, with an increase of 13 per cent. in the volume of traffic handled there was a decrease of 6 per cent. in the average cost per message notwithstanding an improvement in the speed of handling and the further consideration that in the same month of the previous year we were not handling day letters.

We have recently issued instructions to all of the independent Western Union relay offices that if working with another independent office, they should stop at the end of the message and clear any railway office that may have offered them business. In this way it is hoped that the movement of business from the railway offices will be expedited, as the railway operators will not have to watch the wires and wait for an opportunity to send their messages.

Inspections are so infrequent that we do not keep informed of the character of the service at joint offices, W. U. and railway. We should have some system of regular inspections. I believe it is essential that the inspections be made by an employee of the railway, reporting to the railway superintendent of telegraph.

THE RETIREMENT OF JAMES J. HILL.

James J. Hill on the first of July will retire from the chairmanship of the Great Northern. By this step he gives up the last official position, except that of director, that he held on any American railway. That Mr. Hill, with his large holdings in railways, his keen interest in everything pertaining to transportation, and a mind and body yet very vigorous for a man almost 74 years old, will cease to be a potent factor in railways affairs is not conceivable. Indeed, he has already indicated that he expects to continue to have a voice in them. He is succeeded as chairman of the Great Northern by his son, Louis W. Hill, who has been president of that railway. "Both myself and my son will remain on deck subject to call," said Mr. Hill in an interview a short time ago. "We will both be members of the executive committee." However, the change doubtless means that Mr. Hill has decided to cease to be the active head of the great railway system which he has built up, and thereby give himself more leisure for other things. Unlike most men who in recent years have had large financial interests in railways, but in this respect like his great rival, Mr. Harriman, Mr. Hill has been an active railway executive. And it has been rather as a railway executive than as a railway financier that he has made a deep and lasting impression on railway transportation in this country. He is one of those titans of intellect and energy of which no generation of mankind produces many, and some none at all. He has displayed something more than great ability. We moderns are rather chary of attributing genius to any man; but if America in modern times has produced any men to whom real genius can properly be attributed, Mr. Hill is one of them. There are railways with lower grades than the Great Northern. But his was the first pioneer road built with low grades. There are roads which handle a greater tonnage per train. But Mr. Hill's name will always be associated with the history of the economies effected by the railways of the United States through the remarkable increases in tonnage per train which were made after the revival of business beginning in 1897 and prior to the panic of 1907. Other roads besides the Great Northern have been built into undeveloped territory. But to Mr. Hill alone of modern American railway men has been given the popular title of "empire builder," and this mainly because he not only built a railway into an undeveloped territory, but also did more than anybody else to get population into that territory, and then taught the population how to utilize the resources of the territory. Without any literary training, in his speeches, his magazine articles and his book, "Highways of Progress," he has been not only seer, philosopher and economist, but has developed a remarkable faculty for saying what he has to say lucidly and effectively.



James J. Hill.

Mr. Hill has long been an object of keen popular interest, not only because of the great success he has achieved in material affairs, but because of the very human qualities that he always displayed. As good a rough and ready fighter as ever lived, he has neither given nor taken quarter in his many financial battles, and yet, as a private individual, he has always been the soul of generosity. At times possessing the suavity of a diplomat, on other occasions he has shown a most violent temper, and has always been autocratic and impatient of restraint. No business man of prominence has thought more, or said more wise, piquant and caustic things. But, while he can be garrulous enough when he wants to be, he has never said anything about his plans for the future that was of any value as indicating his intentions to opponents who might particularly desire to know of them.

One of his most notable traits has been his extreme simplicity of manner and habit. He has a model farm of his own near St. Paul, which has produced many prize-winners, and formerly spent much of his time on it, driving into his office in the city each day. He frequently travels entirely alone between St. Paul and New York, stopping over a day at the Burlington offices in Chicago, and almost invariably walks regardless of the weather to and from the station, probably seldom recognized in his almost shabby attire with his faded old umbrella.

James Jerome Hill was born on a farm near Guelph, Ont., on September 16, 1838, of Scotch-Irish parents. Under the hard work of the farm he grew up sturdy and healthy. Between 7 and 14 he received a good schooling at Rockwood Academy, near his home, where he developed a marked aptitude for reading and study. His father's death when he was 14, made it necessary for him to go to work as a clerk in the village store, where, it is said, his first wage was $1 per week. In 1856, when 18, he set out for California, but within the year found himself on the steamboat docks at St. Paul, where he got employment as a shipping clerk.

He thus became identified, from his first arrival in the northwest, with transportation there; and he also from the first manifested the keenest interest in all that pertained to commerce and agriculture. In 1865 he became St. Paul agent for the Northwestern Packet Company, operating steamboats on the Mississippi river, and two years later, local agent for the St. Paul & Pacific railway, which operated a line about 10 miles long between the St. Paul wharf and St. Anthony's Falls, built soon after his arrival in that region. Through his work around the docks he had also become familiar with the products and requirements of the territory, and through his friendship and later business partnership with Norman Kitson, who maintained an ox-cart and sledge service to Winnipeg, Mr. Hill very early became acquainted with the conditions of the country farther northwest, to which he made several trips with or for Kitson. While working on the docks he had built up a business of his own of supplying fuel to the boats. This he later developed between

1869 and 1875 as head of the firm of Hill, Griggs & Company, and afterward of the Northwestern Fuel Company. During this time he brought the first boat load of eastern coal to St. Paul from near Peoria, Ill., via the Illinois and Mississippi rivers.

In 1870, with Kitson as partner, he organized the Red River Transportation Company and built two boats. These, in connection with a stage route, established the first through service between St. Paul and Winnipeg. While serving as agent of the railway it fell to his lot to pilot the scientists Louis and Alexander Agassiz, on a trip through the Red river and Lake Superior country, during which he learned something of the mineral wealth of the region, which later led to his extensive investments in mineral lands.

When Mr. Hill first went to St. Paul there was no agriculture north of that point. On his many trips to Winnipeg, on foot or horseback, in ox-carts, on sledges, and later by boat, in all seasons, he became thoroughly acquainted with the character of the country and convinced that the Red river valley could be made to grow wheat in abundance. At the same time he became more and more interested in the vast and almost unexplored territory further west. Meanwhile the St. Paul & Pacific had been extended as far as the Red river, but—under a management that was far more interested in the profits to be made by milking the Dutch bondholders than in its future as a railway—it had deteriorated into the proverbial streak of rust, and in 1873 became bankrupt. This was Mr. Hill's opportunity to carry out some of his ideas that had long been germinating for the development of the country. With Kitson he organized a syndicate to take over the property. Through Donald Alexander Smith, later Lord Strathcona, then agent of the Hudson Bay Company at Winnipeg, they enlisted the support of Smith's cousin, George Stephen, manager of the Bank of Montreal. After an appraisal of the property by a committee representing the Dutch owners they bought the control of the railway at about 40 per cent. of the par value of its securities. It is said the purchase actually required very little cash, being made on option, and paid for out of the proceeds of a bond issue, leaving control of the stock in the hands of the syndicate.

The road was reorganized in 1879 as the St. Paul, Minneapolis & Manitoba. Mr. Hill became general manager and George Stephen president. Mr. Hill was then about 40 years of age. But the years he had spent up to that time in gaining, by constant study and unceasing investigation and observation, a thorough knowledge of commercial and agricultural conditions, had served as the best possible preparation for the work he now undertook. In addition to possessing probably greater knowledge of the conditions of the northwest than any other man, with the possible exception of his partner Kitson, and to having far-seeing confidence in the possibilities of the country, he had the advantage of becoming interested in this neglected railway at the strategic moment. The vast tide of immigration from the East was beginning to turn strongly toward the northwest, and instead of being content merely to take advantage of the opportunity for present profit which the conditions presented he had the public spirt and the foresight to build for the distant future. He adopted a policy of reconstructing and extending the road, of attracting settlers to the country and of making rates that would encourage agriculture. He sent to England for fine cattle and horses, which were distributed among the farmers on easy terms of payment, furnished them with good seed, and in every way possible aided them to become firmly and prosperously established. Finding difficulty in persuading eastern capitalists to venture their money in his project he was often obliged to secure the necessary capital from abroad.

As the name of his road indicated, his attention was first directed toward opening a rail route through the Red river valley. The spring of 1880 witnessed a great boom in Winnipeg; and the line was rapidly extended to that point. He was one of the first to foresee the great future of the Canadian northwest as a wheat-growing country, and with his Canadian associates was greatly interested in Canadian railway building, being a member of the original syndicate which in 1880 undertook, in consideration of a large government subsidy both of money and of land, to build the Canadian Pacific from Montreal to Vancouver in 10 years. He had not, however, lost his interest in the great country lying immediately west of Minnesota, and in 1883 he definitely adopted this as the territory in which his energies were to be expended. He had continued to be the dominating spirit in the St. Paul, Minneapolis and Manitoba, and in 1882 was elected vice-president. In 1883 he was made president and gave up the last of his holdings in the Canadian Pacific, relinquishing to his associates, Donald Smith and George Stephen, the honor of the execution of that project.

He immediately had surveys made to the Missouri river, extended the line to Minot, N. D., and in 1884 definitely mapped out a route through Montana. In 1887 the line reached Great Falls, Mont., and was then extended 100 miles more to Helena. In 1890 the road was leased to the Great Northern, which Mr. Hill had organized in 1889, and of which he became president, and the road was completed to Seattle in 1893. In spite of the difficulty of raising funds for a line paralleling both the Northern Pacific to the south, which had been completed to Portland in 1883, and the Canadian Pacific, which was completed in 1888, a noteworthy fact in this connection is that the Great Northern was built without a dollar of cash government aid, and the original land grant of 3,675,000 acres was far less than the amounts received by other transcontinental lines.

Long before the road was completed Mr. Hill had sent agents to Sweden and other European countries to induce immigration to the territory traversed. This policy increased traffic while the low grades and lack of curvature which he had insisted upon from the first made possible a low cost of operation that soon produced a strong contrast in the financial results of the Great Northern and the earlier Northern Pacific. The latter became bankrupt, and in 1896 the Hill-Morgan interests secured control of it, as Mr. Hill said, in place of double-tracking the Great Northern. While pushing the main line to the Pacific coast Mr. Hill threw out branch lines as feeders in all directions. By 1900 the Great Northern system had 5,441 miles of operated line, and the Northern Pacific 5,203 miles.

Mr. Hill was now supreme in his own territory. But to the south of him the Harriman interests were building up another vast system. The two occasionally came into conflict in the border territory. The need for a controlled connection to the East had become imperative to both. Thus ensued the rapid flow of events which led up to the famous Northern Securities decision four years later.

During the fall of 1900 the Harriman interests bought some eight or nine millions of stock of the Chicago, Burlington & Quincy. Hill and Morgan had been trying to secure the Chicago, Milwaukee & St. Paul, but without success. Early in December, 1900, or January, 1901, after the Harriman interests had been similarly unsuccessful in acquiring any considerable amount of Burlington, the Hill interests opened negotiations with the executive committee of the board of directors of the Burlington for the purchase of its entire capital stock. These appear to have become known to the Harriman interests, who forthwith demanded an opportunity to share on equal terms with the Great Northern and Northern Pacific in the acquisition of the Burlington. The request was refused. In April, 1901, the Great Northern and Northern Pacific became joint owners of the road, paying in collateral joint 4 per cent. bonds $200 per share for the $108,000,000 par value of Burlington stock.

The Harriman interests then began to buy large blocks of Northern Pacific in the open market with a view to obtaining control of it. In the efforts of the Morgan-Hill interests to

recover the stock the price of Northern Pacific, which in 1896 had been as low as 25 cents, was forced up on May 9, 1901, to $1,000 a share. When the "show-down" came after that memorable conflict it was found that the Harriman interests had acquired $78,000,000 out of the total of $155,000,000 of the Northern Pacific stock. The capitalization of the Northern Pacific was divided into $80,000,000 of common and $75,000,000 of preferred. The Union Pacific interests held $37,000,000 of common and $41,000,000 of preferred, being a majority of the total, but not of the common stock. At the annual meeting in October the Harriman party could control the election of the board, but in January the preferred could be retired, leaving the Hill party in control of the common, a course which was subsequently followed. During the time which must elapse before the annual meeting this situation led to a compromise. J. P. Morgan was chosen to select a new board for the Northern Pacific in which every important interest should be represented.

It had long been the ambition of Mr. Hill and his associates to form a holding company for both the Great Northern and Northern Pacific which should perpetuate their policy and at the same time treat all stockholders alike. Now, with the active co-operation of the Harriman interests, and to promote permanent harmony, the work resulting in the Northern Securities Company was begun. A long search was made through the state corporation laws for a suitable charter, and on November 13, 1901, the company was incorporated under the laws of New Jersey. Slightly more than 96 per cent. of the Northern Pacific stock, including the Union Pacific holdings, and about 76 per cent. of the stock of the Great Northern, was exchanged for the stock of the Northern Securities Company on the basis of $115 per share for the former and $180 for the latter, the capitalization of the Securities Company at $400,000,000 being approximately equivalent to the agreed valuation of the constituent companies. Mr. Hill was made president, and the board of 15 directors was composed of six representatives of the Northern Pacific, four of the Great Northern, three of the Union Pacific and two unclassified.

Opposition to the Securities arrangement manifested itself immediately. Governor Van Sant of Minnesota called a conference of the governors of states directly affected, and Washington and Minnesota brought suit in the United States Circuit court for the dissolution of the merger. In March, 1902, the federal government also filed suit in the Circuit Court at St. Paul against the combination as in violation of the Sherman anti-trust law, of which the state anti-trust law was an exact counterpart. While the state suit was decided in favor of the company, the government suit resulted in a decision of the Circuit Court enjoining the Securities Company from voting the stock of the railway companies and from paying dividends on its own stock. On appeal the Supreme Court of the United States, by 5 votes to 4, on March 14, 1904, held the holding company illegal.

"The railways are still there," said Mr. Hill. "I have made my mark on the surface of the earth and they can't wipe it out."

So far as forcing the three railways into competition with each other was concerned, the decision had no practical effect. It did, however, restore to Mr. Hill and his associates the control of Northern Pacific which had been gained by Harriman in 1901. After the court had ordered the dissolution of the company the directors formulated a plan for the pro-rata distribution of the securities held by it which would have given the Harriman interests a large amount of Great Northern stock in place of the Northern Pacific which had been put into it. Harriman naturally preferred his Northern Pacific, and went into court to get it. After a long period of litigation the Supreme Court decided in favor of the original plan of pro-rata distribution, which left the Hill party in control of both roads, with about 25 per cent. of the stock of each, while Harriman held about 20 per cent., and the rest remained in the hands of the public.

In testifying before the Stanley committee during its investigation of the Steel Corporation last February, Mr. Hill said that the Securities Company was formed at a time when he was in "a very tight place."

"I had to raise in three months about $90,000,000," he said. "If I did not those properties would have been welded in with the Union and Southern Pacific and a bigger combination than ever was made in the country would have been the result."

While building up his railway system, and at the same time building up traffic for it by promoting the increase of agriculture in its territory, Mr. Hill was also building up auxiliary traffic producers by establishing steamship service on the Great Lakes and on the Pacific. It was his ambition to have a great world route across America to the Orient in competition with the Cape Horn route or the Suez canal. This purpose he once explained in a speech which illustrates his ideas of the development of the Northwest. He said:

"Our population is doubling every thirty years. At this rate, during the next 30 years we may grow to 150,000,000. What shall we do with this population? At the most not over one-third can be employed in manufactures, railroading, trades and the professions. The bulk of the remaining 100,000,000 must go to the land. The great increase will be in the valleys of the Ohio, Mississippi, Missouri and westward—the fertile prairies of the great central West and beyond, wherever irrigation is possible. Now, then, what will these 100,000,000 on the lands of the West produce? They will produce the three great staples of traffic—food, fuel and shelter, but food in the main.

"Now cross the Pacific and what do we find? Millions of people, and what can they buy? What can a man who earns a shilling a day—and that is the average wage of the Orient—buy of us? He will buy only what he is compelled to buy to sustain life. The principal demand will be for food—just the products which the present coming population of America's great central and western zone is prepared to furnish. The great traffic proposition is to carry our goods to the Orient, and bring theirs in return. The question is, Will this traffic go by the Pacific or by the Suez and Cape Horn? I hope that America will handle it, and by the Pacific. Geography and nature demand it and trade cannot resist them."

It was in pursuance of this idea that in 1909 the Colorado & Southern was added to the Burlington system and work was at once started on the construction of connecting lines for the purpose of opening a direct route from Galveston to Puget Sound, by which the cotton of the south might be transported to the Orient.

A recent development of the Hill system has been the construction of the Spokane, Portland & Seattle along the north bank of the Columbia river from Spokane to Portland, an example of unusually high class railway construction, which is owned jointly by the Northern Pacific and Great Northern. Mr. Hill has also invaded the Harriman territory by the building of the Oregon Trunk railway up the Des Chutes canyon in competition with the Des Chutes railway, built by the Harriman interests. On account of its direction and the heavy character of its construction it has been often stated that the Oregon Trunk represents the beginning of a line south into San Francisco, but this has been denied by Mr. Hill.

In April, 1907, Mr. Hill, then nearly 69 years of age, retired as president of the Great Northern and was elected chairman of the board of directors. He was succeded by his son Louis W. Hill, who had been trained to assume the management of the road, and who had been first vice-president since 1903.

In no other way has Mr. Hill made his influence more potent than in his aid to the development of agriculture. Familiar with every detail of farming himself, he has made it the business of his life to help the farmer to help himself. He has aided in the establishment of agricultural colleges, has given thousands of boys an opportunity to obtain an agricultural education, and has awarded innumerable prizes for agricultural products, while hiring the best experts to teach the farmers of his territory the principles of scientific agriculture on model farms. For years he has traveled over the country preaching the doctrine of "back to the land," and the necessity of encouraging the intensive development of agriculture by irrigation and by soil culture.

"Men without land," he has said, "are a mob, and land without men is a wilderness."

He has sent agents to study the trade of the Orient and to create a market in the east for the food products of this country, even going so far as to publish literature in the Oriental languages on the uses of flour in the effort to replace the rice diet of the Orient with American bread.

One of his cardinal principles of life was illustrated in his testimony before the Stanley committee regarding the deals involving the ore properties leased to the Steel Corporation. The ore was bought originally, he said, for the purpose of controlling its transportation for the railway, and because of the doubtful legality of direct ownership of the ore lands by the Great Northern he had purchased it individually, and turned it over to the Lake Superior Company, Limited, in trust for the benefit of the stockholders of the railway. The property, estimated to contain about 400,000,000 tons, was later transferred to the Great Northern Ore Company, which leased it to the Steel Corporation and an ore certificate was given to the holder of each share of Great Northern. Mr. Hill was repaid the purchase price and 5 per cent. interest while the investment was outstanding, from the profits from the ore lands, and the stockholders received their interest absolutely without cost.

"I could have kept it myself or given it to the poor," said Mr. Hill." "I always had a rule that if I could make money for myself in a transaction connected with the company I could make it for the stockholders, and that has been the rule of our company from the beginning. I have worked for the company for 33 years and the shareholders have relied on me, and everyone of them has had just the same salary as I have."

Philosophic, paternal and altruistic, Mr. Hill in his speeches and interviews has been an interesting public figure for years, and while the paternalism of some of his most pessimistic warnings has occasionally been resented, his statements have always commanded the highest respect. No other living American has so often accurately and publicly predicted the turn business affairs were going to take. Both speeches and interviews have always been brimful of statistics, but reinforced and enlivened with the whimsical humor and "ginger" of his own personality, which have been especially efficient in expressing his contempt for the intelligence of the average lawmaker on business subjects.

"You might just as well try to set a broken army by statute as to change the laws of commerce by legislative enactment," he often said. Any proposal of government ownership of railways was sure to arouse his caustic comment. Testifying before the Minnesota railway commission in 1907 he said he would be only too willing to have the United States take over his road and run it, but that if the government should go into the railway business it would be nothing short of a lottery and the country would soon find it had an elephant on its hands.

"Then," he continued, "it would be compelled to engage in another lottery to get rid of the elephant." . . . "If the government had charge of all the railways in the country Congress would be kept busy making appropriations night and day, and the districts with poor representation and sparse population would be left in the lurch. This would mean that the districts in question would go to seed as far as the railways were concerned and that the railways would get rusty, figuratively speaking, and become less and less valuable."

While some of the greatest railway men in the country have received their training under Mr. Hill, contact with the rougher side of his personality or the attraction of higher salaries has caused many of them to transfer their allegiance to other roads. "He expects everything to be done yesterday," has been often said of him. Although he was supposed to have retired from active office several years ago, he has never given up his close attention to details, as many a man has discovered to his sorrow, and promotions and dismissals on the Great Northern have often come with the suddenness of lightning. A story is told of a stenographer who had been rapidly promoted to the head of a department when he was "fired" within a week for unfitness for the position. "Why didn't you retain him in his former position as assistant where he was doing well?" Mr. Hill was asked. "I will have no failures in my business," he replied.

Another story is told of a high official whom Mr. Hill had taken away from another road at a big salary, but who offended him by expecting too long a vacation. He was allowed the vacation without objection, but when he returned from Europe he found another man in his job. Another official is said to have received his first intimation that he was not making good by finding his desk out in the hall on his arrival at the office one morning. On the other hand, hard task master though he is, he has always given unstinted loyalty and unlimited opportunity to those who in his judgment have made good.

Mr. Hill has three sons, all of whom have been trained to take an active part in their father's business enterprises, Louis W. Hill, who succeeded him as president of the Great Northern, and who now takes his place as chairman of the board; James N., vice-president of the Northern Pacific, and Walter J., who has been connected with the management of the ore properties.

Louis W. Hill was born at St. Paul on May 19, 1872. After his graduation from Yale University in 1893 he entered the service of the Great Northern, and after holding various positions was made first vice-president in 1903. In 1907 he succeeded his father as president. It is understood that he is relinquishing that office in order to be able to devote more attention to the management of the Hill properties as a whole, particularly the extensive ore properties, and that he will retain an active interest in the railway properties.

In constitution, in energy, in ability and in many personal qualities, Mr. Hill has inherited much from his father. Trained for railway work, his administration of the Great Northern has been very successful; and the change now taking place doubtless will make him an important factor in the business and transportation affairs of the country.

A CONTRACTOR'S VIEWS ON RAILWAY CONTRACTING.*

In earlier years, when single-track roads followed contours, rights of way were donated and bonuses offered, contractors had to be pioneers rather than financiers, and had to watch mountain passes and Indians rather than economies of method. The chief engineer was then a pathfinder and his contractor a sturdy pathmaker. Respect for each other and mutual confidence were engendered by common hardships and deeds of prowess.

With the increase of population, the demands of competition and of economy in operation brought double tracking, grade reduction, building of immense yards, terminal facilities, freight houses, union stations, and heavier bridges. These problems, growing in difficulty and magnitude, called for engineers of technical training as well as experience. So the contractor has necessarily been forced to improve his methods, devise labor-saving machinery, broaden the material markets and create an organization to direct his work. As the duties of both engineer and contractor increased, they saw less of each other. Correspondence took the place of verbal messages, accompanied by elaborate plans instead of sketches, detailed specifications instead of directions, voluminous contracts instead of memorandums, and inspectors instead of line riders. Crude and perhaps awkward as were the arrangements in those days, the pendulum has now swung too far in the other direction.

From a commercial standpoint contracting, like any other business, consists of securing the contract, executing the work and securing payment. In securing contracts, personality plays a large part. No one cares to bind himself, or take the responsibility for binding his corporation, with an individual or organi-

*From a paper read before the St. Louis Railway Club by A. P. Greensfelder, secretary of the Fruin-Colnan Contracting Co., April 12, 1912, including also some of the discussion following the reading of the paper.

zation of which he does not approve. Their business principles, their capacity and faithfulness of performance are factors to be considered, but even deeper is the satisfaction of relying upon those who take personal pride in their duties. It is only natural and proper that parties of repute and character are more favorably considered than others. Until recently it was usually thought desirable to contract with the lowest bidder, irrespective of his character and responsibility, and enforce performance, if necessary, through the courts. But experience has abundantly demonstrated that it is not worth while to do business in any form with those you do not respect.

Inspection of construction work, like inspection of the products of other industries, is conducive to better quality. The main contention of the contractor is for good inspection by experienced persons as against cheap inspection by young and unqualified parties.

The financial element of contracting is necessarily an important one and involves many problems. Recently a number of states have withdrawn the protection of contributory negligence, risk of employment and fellow servant laws and are insisting upon workmen's compensation acts, old age pensions, and insurance against sickness and non-employment. These new features, together with the agitation for eight hours of work and a fixed minimum wage, bring new burdens which to be equitable, must be uniform and definite.

A bond of some surety or bonding company for fulfillment of contract on the part of the contractor, or a certified check accompanying bids insuring signing of contracts, is frequently required. It would occasionally be just as proper for the owner also to give bond insuring timely delivery of site, non-interference with the plan of work and prompt payment of amounts due.

Contracts usually require as liquidated damages a time forfeit without offering a bonus, interest on retained percentages and deferred balances, or recompense for delays caused by the owner without reference to administration or organization expenses of the contractor.

The owner usually retains the right to speed up the work or finish uncompleted work at the expense of the contractor without stating a rate of expected progress, but retains at the same time the privilege to reduce unit quantities or stop the work without recognition of preliminary or plant expense of the contractor.

Division of authority or separation of parts of work necessary to the whole through lack of control of the contractor is usually an irritating and expensive cause of delay. This condition arises where the owner thinks he can save money by reserving or letting separately various parts of a job without recognition of interest losses on investment due to inevitable friction and delays.

The selection of sub-bidders has usually to be confirmed by the owner, without any agreement to pay the difference in the cost of sub-bids to the contractor. Changes of plans or specifications are arbitrary decisions often made by the engineer, without regard to the method or plant originally contemplated by the contractor in estimating the work. Responsibility for faulty designs, for unpractical or risky operations, are often placed on the contractor where he has absolutely no part in their inception. Where through lack of time or investigation on the part of the owner there is included a definite unit price for additional work, due to lack of experience of methods, this price may be very unfair under the actual conditions that arise. Where definite quantities are assured or where indefiniteness is reduced to a minimum such unit prices may be the only way to prevent unbalanced bidding, but in ordinary cases a proportion of some bid price of the contractor would be more equitable. One cent per cu. yd. per 100 ft. for excavation overhaul seemed to be standard the country over, without regard to haul by cart, wagon or train.

Losses to either contractor or owner, often both, are caused by lack of clear, concise specifications. Only too frequently specifications are hewn out of ancient ones, without eliminating clauses which have no bearing on the case in hand or adapting them to suit modern methods and materials. Blanket clauses are only too common, endeavoring to place upon the contractor sole responsibility for unforeseen conditions. A contractor is no more responsible for acts of providence, unusual necessities of traffic, underground conditions, and the like, than the owner, and should not be asked to assume their entire burden. Improper or insufficient borings only make proper classifications of excavated materials the more essential. Similarly the natural slopes of the materials encountered decide the logical lines for determination of quantities to be allowed.

The throwing of responsibility for correctness of plans and dimensions, or verification of same with the actual conditions, upon the contractor is a plain shirking of duty. The responsibility for "imperfect" work should not rest solely upon the contractor if such work has satisfied the inspector. "Imperfect" is only a relative term, and the owner must have confidence in the judgment or integrity of his inspector. It is only proper, too, that the cost of investigation of quality should be borne by the owner, if on examination the work is pronounced good.

If the engineer reserves the sole power of arbiter he indicates at once an attitude of unfairness. A clause should be inserted to allow both parties to choose an arbiter, and if the two appointees cannot agree, let them choose a third. The cost of such arbitrations should be borne equally by both parties.

DISCUSSION.

O. F. Harting (Term. R. R. Ass'n of St. Louis): Some of these unfair clauses have been in use since time immemorial, and will probably continue to be used until there is a radical change in our present system of contracting. If cutthroat competition between contractors were eliminated, or even mitigated to a certain extent, by the formation of large corporations bordering on monopolies, the contractor, while still the servant, would be an independent one. Such trusts, or near-monopolies, should be so well equipped with capital, experts and machinery of all kinds, and preferably with factories and mills for manufacturing and producing tools, building materials, etc., that they could perform their work economically, expeditiously and satisfactorily. With a reputation along these lines, the services of these contracting trusts would be in such demand that they would be in a position to claim a voice in the drafting of the contract and specifications.

Richard Morey (Morey-Faulhaber Construction Company) made six suggestions for getting low bids from good contractors; namely, (1) give detailed information as to all work, dimensions, quantities, classes of materials; (2) ask for bids on as many units as can be used; (3) rewrite contracts and specifications, cutting out obsolete matter; (4) recognize responsibility of contractor in connection with requirements for the bond and the retained percentage; (5) have good inspectors, at least as intelligent as contractors' foremen; (6) give full quantities on the monthly estimates, also see that payments are made promptly.

E. C. Finley (Manufacturers' Ry.): The contention of the contractor is for competent and experienced inspection. The contention of the owner should be in the same direction. It seems to have become almost common practice to put young men of little or no experience on the job as inspectors, keeping the more experienced men in the office. The situation should be the reverse, especially when the inspector is not in close touch with his superior. While these young men are usually educated, honest and loyal, they lack the one thing so necessary to proper judgment, experience. No engineer, in writing specifications, can anticipate all the conditions that may arise during a piece of construction. Young inspectors, through their loyalty and honesty, but without experience, sometimes force contractors to do work at a much greater cost to the contractor and of less value to the owner, in order to carry out the letter of the specifications.

ELECTRIFICATION OF RAILWAY TERMINALS.*

An Outline of the Investigation Being Made at Chicago and Discussion of the Proposed Change of Power.

BY W. F. M. GOSS,
Dean and Director, College of Engineering, University of Illinois.

A proposition involving the complete electrification of steam railway terminals in any considerable city constitutes a problem which touches closely the comfort and welfare of the community involved. It is conceivable that through electrification the beauty and cleanliness of a city may be so affected as to stimulate greatly its prosperity and growth, and it is conceivable also that through electrification a burden of financial responsibility may be created which will place severe limitations upon its commercial and industrial development. The problem in all its technical and business aspects is one of so many ramifications that few men can hope completely to comprehend it. It presents factors, however, which are both fundamental and sufficiently simple to admit of easy discussion, and it is to some of these that I propose giving brief attention.

The city of Chicago presents at the present time an area of 194 square miles, which is cut up by 2,600 miles of railway track. The Committee of Investigation on Smoke Abatement and Electrification of Railway Terminals of the Chicago Association of Commerce, in the study of its problem under the immediate direction of Horace G. Burt, has thought it wise to add certain areas so as to include outlying transportation lines correlated with those within the city limits. The area thus defined, which is known to the committee as Zone B, embraces 235 square miles and contains about 4,000 miles of railway track. It is estimated that 60 per cent. of this track mileage is in yards, sidings, freight and passenger terminals and industrial tracks.

A map of the city of Chicago shows its railway yards to be spotted over its entire area. Many citizens of Chicago in contemplating such a map have difficulty in escaping a tinge of feeling that all this territory occupied by the railways, extending as it does like a web over the city, is held as a result of some process of usurpation; that the railways are where they are and as they are as a result of a process which in some way has been unfair to the other property holders of Chicago, and he is inclined to resent the railway ownership. Now, the fact is that, considering the matter in the large, there can be no justification for any such feeling. The railways came to Chicago and built out from Chicago when the city was comparatively small. They did not buy residence property and raze buildings for the purpose of constructing freight yards, but they went outside of the limits of the town where cheaper land could be had and built their freight yards, and nobody complained because they did it. In course of time, however, the city expanded, and the railway yards, which originally were outside of the city, became surrounded by improved property. We may, therefore, enter upon the present discussion with a distinct understanding that the tracks which spread over the city are where they are because the people of the city have needed the service they render.

The people of Chicago, on the other hand, if content to live in the midst of railway yards, are inclined to be somewhat particular as to what is permitted to go on in those yards. It goes without saying that Chicago must meet and solve many problems which for her are acute, but which in slower-going towns are less pressing. The suppression of smoke and the elimination of dust and dirt and of unnecessary noise are all matters to which she is bound to give most serious attention, and it is in the consciousness of this fact that she is demanding the electrification of railway terminals.

RAILWAYS MAKE ONLY PART OF SMOKE.

If it were true that the electrification of Chicago railway terminals would at once banish smoke from the atmosphere of the city, certain important unknowns in the general problem would be eliminated, but it happens that there are in Chicago other smoke and dust-making agencies besides the 1,600 locomotives which are required to operate its railways, and the percentage of the whole that is contributed by its locomotives is not known. Statistics show that within the city are 17,000 steam boilers served by nearly 10,000 stacks. Thousands upon thousands of domestic fires warm and otherwise serve the homes of this city, and these are not all smokeless. Even the motor cars of Chicago add their quota of smoke, and the wasting of their tires their quota of dirt. It may be that the railways' proportion is, after all, not large, and that the complete abolition of this portion through electrification, or otherwise, would result in but little change in the atmospheric conditions above this city. This is one of the phases of the general problem to which the Committee of the Association of Commerce, to which I have already referred, has properly directed its attention. The committee first of all is seeking to determine the necessity for electrification. In its pursuit of this question it is making a study of the effect of smoke upon the health and convenience of people, and as measured in the loss and damage it occasions to property. It is making a survey of the actual atmospheric conditions of the city. Its experts have developed a commercial laboratory on wheels which is capable of taking up its position in a series of predetermined stations for the purpose of determining at each station the chemical composition of the atmosphere, the extent of pollution by dust, and, so far as practicable, the composition of dust collected. By this process it hopes to be able to determine what it is that constitutes atmospheric pollution in the city of Chicago. In its effort to determine the source from which this pollution originates, it is making a careful statistical study of the fuel consumed by the locomotives of railways, in the metallurigcal furnaces of industries, in gas works, in power plants, on steam vessels, and in the domestic fires of the city. Along with this study of fuel consumption there is being made a study of visible smoke and of dust particles as discharged from the top of stacks over hundreds of typical fires of each of these classes. In this thorough manner an effort is being made to determine the amount of smoke and the amount of solid particles discharged as a result of the consumption of a unit quantity of coal in all the various classes of service in which coal is employed within the zone embraced by the committee's study. So perfectly have the plans been laid, and so scientifically are they being developed that it is easily possible to foresee an accurate determination of a percentage of the total pollution which is chargeable to railway operation. It is, therefore, fair to assume that a large and unknown factor which at present appears in the general problem of smoke suppression and the electrification of Chicago railway terminals will soon be evaluated. If it should appear as a result of this investigation that the atmospheric conditions of Chicago would be materially improved by the prohibition of the steam locomotive within the city limits, the people of Chicago will be justified in desiring most strenuously such a consummation.

An approach to the next stage of the problem discloses very

*Abstract of an address before the City Club of Chicago on June 3, 1912. Dean Goss is a member of the Chicago Association of Commerce Committee of Investigation on Smoke Abatement and Electrification of Railway Terminals.

many possible avenues. There are many indications of an assumption on the part of the people that the only sure way to secure the elimination of locomotive smoke is through electrification. It apepars that the validity of this assumption has not been conceded by the railways. In the first place, the railway companies point to the fact that under the rigorous administration of the Chicago smoke department they have made great progress in reducing the smoke incident to the operation of existing locomotives. It has been stated that the smoke department estimates show that the railways within the last year have cut down the amount of smoke production fully one-half. Neither the department nor the railways admit that the limit of possible improvement has been reached. The railways also call attention to the fact that the steam locomotives of today are hand-fired; that it may be possible through the equipment of these locomotives with stokers practically to eliminate all smoke and greatly to reduce the amount of solid particles discharged from them. If it should appear after a thorough investigation that the railways are, relatively speaking, not large producers of smoke, and if it should appear that further reductions in the amount of smoke they produce are practical, the arguments to sustain a change would be materially weakened. As I have indicated, facts upon these points are likely soon to be forthcoming.

ELECTRIFICATION FOR SUBURBAN SERVICE.

The general problem of electrification presents two aspects, the characteristics of which are, to my mind, wholly different. These are, first, electrification as applied to suburban passenger traffic, and second, electrification as applied to all other traffic, including, of course, switching, through freight, and through passenger service.

The simpler phase of the problem is that which involves the suburban passenger traffic. Every detail which enters into this problem has been threshed out by extensive construction in many parts of the country. The experience which has been gained in the electrical operation of elevated railways in Chicago, in the electrical operation of the subways in New York and Boston, and in the extensive electric operation of interurban roads in many parts of the country, bears directly upon this aspect of the problem. Among the advantages which the public would derive from electrically operated suburban service in Chicago may be counted that of reduced atmospheric pollution, of cleaner cars, of freedom from inconveniences due to the presence of smoke and cinders, and probably also that of more frequent and more rapid service. The operating railway companies would find some gain in an increased capacity of existing track facilities, in the incidental advantages which would accrue from the maintenance of a more attractive and a more effective service, and in the anticipated gain in business which the improved service would in time attract. There are no real difficulties in bringing about such a change, except such as grow out of the fact that the railways are now equipped for steam operation. To electrify means that the existing steam operated railways which are earning dividends for their companies must practically be wiped out of existence, and new railways built and equipped to conform with other standards of practice must be supplied. Very little of that which is now possessed, excepting the track and track structures, and possibly, though not probably, the carbodies, could be of use under the new conditions. Everything electrical, such as power plants or their capitalized equivalent, transmission and distributing lines, new cars or trucks for cars and repair shops in which the new equipment can be kept in order, must be supplied. While I am not authorized to speak for the railways, I imagine that the difficulty is not that the cost of these things, so far as they apply to suburban service, is prohibitive, but that there is no immediate way by which existing revenues can be materially increased as the result of such a change, and because present-day directors and present-day stockholders are content with what they have. The considerations controlling the financial aspect of the matter are somewhat similar to those controlling the matter of track elevation. The progress of track elevation places heavy burdens on the railways affected, for which the immediate return is slight, but the work once accomplished raises the character of the railway establishment to a higher standard of construction, and permits its operating service to be gradually tuned up to higher stages of efficiency. The electrification of suburban service in Chicago, while hedged about by similar difficulties, would lead to similar beneficial results, and in the absence of a plan which might insure immediate and complete electrification, it is reasonable to expect the gradual development of suburban electrification.

COMPLETE ELECTRIFICATION OF DOUBTFUL ECONOMY.

The complete electrification of Chicago steam railway terminals constitutes a problem of far greater proportions. As already noted, such a development would, as set forth by Mr. Burt, spread over an area of 235 or more square miles, would need to deal with approximately 4,000 miles of track and perform a service which now involves the use of 1,673 steam locomotives apportioned as follows:

Service.	Number.	Per Cent.
To yard service	555	33
To through passenger service	367	22
To road freight train service	364	22
To suburban passenger service	208	12
To freight and passenger transfer service	179	11

If accomplished, it would give the public of Chicago the most marvelous railway terminal that the world has ever seen. The difficulties are not technical, but chiefly financial, and the problem of financing such an undertaking is not one which can be unceremoniously dumped on the railways, for the interests of the railways and of the community served by them are more or less identical, and neither can afford to ignore or injure the other. Probably no one knows the first cost of such an improvement, nor what its effect would be upon the earning capacity of the railways. Those who are especially qualified to speak on this subject are not talking. The Association of Commerce Committee, to which I have referred, will have all the facts later, but no figures have as yet been given out. By the end of another year the Association of Commerce committee will, it is hoped, be ready with an estimate based upon an extensive research which will be entitled to the confidence of all parties in interest. The public can well afford to reserve its judgment until the committee's work is completed.

Not only must the railways consider the charges incident to the first cost of electrification, but they must be prepared for some increased cost in operation. Contrary to a commonly expressed popular conception, the actual movement of a train of cars from one point to another upon the terminal railways of Chicago can probably not be accomplished more cheaply electrically than by steam. Again, in the through train service, the electric operation of Chicago terminals would not reduce cost. Under present conditions, through trains approaching Chicago from a distant division point are brought directly into the city by their steam locomotives. The electrification of the terminals would involve the withdrawal of the steam locomotives and the attachment of an electric locomotive at a terminal located at the boundary of the electrified zone. Assuming no electrification, the additional cost of fuel and of service of the steam locomotive crew for taking the train on to its Chicago terminal, as compared with the costs entailed where the locomotive gives up its train outside of the city, is so small as to be almost negligible, while with electrification each train must bear its share of the cost of the electric service which receives it at the boundary of the zone and takes it into the city terminal; that is, electrification would make two operating divisions where one now exists, and short divisions are expensive to operate. There are many other minor difficulties and there are also minor advantages which are revealed by an analytical study of the problem, but excepting in

the one matter of smoke and dirt elimination, the advantages in Chicago where there is no operation in tunnels, are all minor advantages.

WOULD THE MONEY BE BETTER EXPENDED FOR OTHER PURPOSES?

Since, therefore, complete electrification as an embellishment unsustained by other changes can yield little or no immediate return to the railways, numerous pertinent objections thereto naturally appear. For example, it may be urged that instead of being forced into such an expenditure, the railways should be encouraged to make investments in certain other directions which would be of commercial value to Chicago and at the same time return them a profit. They could improve the service between the outlying country and Chicago by supplying, where needed, double track instead of single track, they could fill in the long stretches of track which are now without automatic signals with devices which will better protect trains and give increased facility in handling them, and they could provide against car shortage by supplying new equipment. It is safe to say that all of Chicago's railways have pressing needs in one or all of these directions, and that some must continue in need because of their inability to finance a more generous program.

Not all of the forty railways entering Chicago are prosperous. It would be extremely difficult for some to secure the capital necessary for the complete electrification of their Chicago terminals by the sale of securities constituting a lien upon property extending out over the country and through other insistant cities. Compulsory electrification as a measure for immediate execution would add to their present embarrassment and could hardly fail to work to the ultimate disadvantage of the business interests of Chicago.

Here it will be well to note that no great scheme involving the electrification of steam-operated lines, has ever been voluntarily entered upon by a railway company merely for the purpose of raising the character of its service from the conditions of steam operation to those which become possible through electric operation. Where electrification has been undertaken there has always been some large business purpose of interest to the railway company, in the working out of which electrification has entered more or less as a detail.

It would seem that the city of Chicago, instead of insisting upon the complete and immediate electrification of its steam railway terminals as they now exist, would do well to study carefully in conjunction with the railways, perhaps through the instrumentality of a commission having large powers, the whole terminal problem. Such a commission could work out in a large way a development adequate to future needs. It could rearrange and simplify existing tracks, it could combine and extend existing terminal stations, it could consider every factor affecting the efficient movement of cars and the transfer of merchandise and passengers from railway terminals to destination. The working out of such plans might be expected to give not only increased facility, but also reduced cost in operation. Such a procedure, covering all of the transportation interests of Chicago, would constitute a stupendous undertaking, but nothing less can satisfy the real requirements of this great, rapidly-growing, modern city. The working out of any large scheme of terminal betterment, which can be justified as an economic measure, would at once provide an opening through which electrification as a detail could be, and probably would be, readily admitted.

The extension of the Smyrna-Aidin railway, Asia Minor, from Dinair, its terminus, to Egherdir is being rapidly completed. Unless adverse weather conditions and unforeseen engineering difficulties, are encountered, the line will be completed in 1912. This extension will tap the most fertile part of Asia Minor, and the exploitation of rich forests and mines existing in those regions will be thus made possible.

RAILWAY SIGNAL ASSOCIATION.

The June meeting of this association was held in New York City this week, beginning at 10 o'clock Wednesday morning, with President C. C. Anthony in the chair. In a short address Mr. Anthony called special attention to the instruction circular issued since the last meeting for the purpose of enabling the committees to avoid duplication of work; to the manual, which is now almost finished and ready for distribution; and to the new special committee on signaling requirements of electric railways, which was appointed since the March meeting (see lower part of page 114 in Proceedings of March meeting).

The first business was the report of committee No. 3, submitted by B. H. Mann. The voltage ranges set forth on page B-11 were discussed at considerable length, with the result that paragraph 1 was accepted—i. e., "30 and less"; paragraph 2 was revised to read "over 30 and including 175," and paragraphs 3, 4 and 5 were referred back to the committee. The report of sub-committee A, by W. H. Arkenburgh, was accepted with a few slight amendments. Following this the specifications for clay conduit and fiber conduit were submitted by A. R. Raymer and, with several suggestions and amendments were approved.

The report of committee No. 6, J. C. Mock, chairman, was presented at the afternoon session. Drawings No. 1084 and No. 1085 were approved. Drawings 1180, 1181, 1182 and 1185 were submitted as a progress report.

The two first named drawings are a pipe carrier, and the other four are of a cable post and a relay box including details and assembly.

Committee No. 5, on manual block then presented its report. L. R. Mann, Missouri Pacific, represented the committee. This report drew out considerable discussion, principally as to the manner in which it was drawn up. The sense of the meeting with respect to the drawings submitted was that they should, in the final report, represent only installations which members of the committee know to be in service, or such as the committee would recommend as standard practice. Several of the changes in the rules for the maintenance and operation of interlocking plants and block signals, which the committee had prepared, were voted unnecessary.

The committees on definitions, on mechanical interlocking, on electric railway signaling, on wires and cables, and on storage battery, presented their reports on Thursday.

The section of the proposed Pan American Railway which begins at Las Cruces, Porta Guatemala, and which will end at Ayutla, passing through Cuatepque, is now under construction. The grading work has been completed to Santa Joaquina, 12 miles. Rails have been laid to the Tallechos river, where a viaduct 580 ft. long is being built. It is expected that the track will soon be laid to Mile 15, only five miles from Coatepeque. The difficulties to be encountered on that five mile section will make it impossible to conclude the work before the end of the year. The remainder of the railway to the Mexican frontier does not offer any difficulties.

The Japanese government railways report increased earnings on all their lines in the western district. Several sections of branch lines were opened during 1911, and surveys for extensions are being made. The Oita branch line from Kokura, on the main line from Moji to Oita, on the northeast coast of Kiushu, was completed and the last section of 40 miles between Yanagigawa and Oita was opened to traffic on November 1, 1911. Construction of this section was commenced in April, 1908, and the total expenditure was $2,115,504, or about $53,136 per mile. There are 7 tunnels, with an aggregate of 5,189 ft., 100 bridges aggregating 5,810 ft., and 11 stations. As the various sections have been completed they have been opened to traffic, that to Beppu Hot Springs having been opened in July, 1911.

General News Section.

The magnificent new hotel and passenger station of the Grand Trunk at Ottawa, Ont., were opened for business June 1.

The names of 21 employees were added to the pension roll of the Rock Island Lines during the month of May, increasing the total number of pensioners to 134.

The Boston, Revere Beach & Lynn has increased the pay of its employees an average of about 5½ per cent. About 1,000 men will receive the benefit of the increase.

At a meeting in Indianapolis on June 4 a committee of seven railway officers was appointed to have authority over the settlement of disputes regarding the inspection of cars interchanged at Indianapolis.

The New York Central & Hudson River has leased to a real estate firm the block from Vanderbilt avenue to Madison avenue, Forty-second to Forty-third street, New York. The block will probably be used for an office building.

The Chicago & North Western is rock ballasting its roadbed from Central street, Evanston, to Chicago, including three tracks for a distance of 13 miles, for the purpose of eliminating annoyance to suburban passengers on account of dust.

Non-union freight handlers employed at the freight yards of the Chicago, Burlington & Quincy in Chicago, were attacked by strikers as they were leaving their work on June 8, and a riot ensued in which about 500 men were engaged, resulting in the death of one of the strikers and several serious injuries.

The educational bureau of the Union Pacific is planning a series of motion picture exhibitions showing correct and incorrect ways in which employees do things in different branches of the service. The pictures will be accompanied by explanatory lectures to be delivered before meetings of employees at division points all over the system.

The Merchants' Association, of New York City, having appointed a committee to investigate the prices of anthracite coal in the city, has sent a long letter to the presidents of the railways carrying anthracite coal, calling upon them to assist in the proposed investigation; and suggesting that the impartial investigation which is to be made by the association may be of benefit to the railways.

Lieut.-Col. George A. Zinn, of the United States Army engineering corps, held a hearing in Chicago on June 4 on complaints against the fixed bridge of the Chicago, Burlington & Quincy over the Illinois river at La Salle, Ill., which have been made by the Rivers and Lake Commission of Illinois and the Illinois Park Commission, as well as residents of several nearby towns, on the ground that the bridge is an obstruction to navigation.

According to an officer of the Western Union Telegraph Company, the Titanic tragedy produced the greatest volume of telegraphic communication of any single event in history. The day the Carpathia reached New York, Western Union wires handled 715,000 words [of press matter] compared with a previous high record for a single day of 433,000. That was when the last Republican national convention was in session. In addition to this 45,000 words were cabled to Europe.

The Chicago & North Western has compiled figures showing that the total number of arrivals and departures at its new Chicago passenger terminal during the first year since the station was opened on June 4, 1911, was 18,797,500, an average of 51,500 per day. During May, 1912, 47,215 persons were served in the lunch room and dining room, while the total for the year was 585,200. The volume of United States mail moving in and out of the terminal has averaged 150 tons a day.

The government has asked the Supreme Court to review a decision of the lower courts, in which it is held that a railway company that has leased all of its property to another company need not pay the federal corporation tax. The Mine Hill & Schuylkill Haven, which leased to the Philadelphia & Reading for 999 years all rights except that to be a corporation, convinced the lower court that it was not "carrying on or doing business" within the meaning of the corporation tax law.

A hearing in the Illinois Central car repair graft cases was held before Judge Sullivan in the municipal court at Chicago on Monday. Counsel for the defendants presented arguments to show that the indictments returned against the four officers of the road eighteen months ago should be quashed, on the ground that the railway had used the municipal court and the state's attorney's office as a collection agency to force the settlement of civil suits by the threat of criminal prosecution.

At Washington on Monday of this week the House Committee held a hearing on the bill presented in Congress by Mr. Martin, designed to provide for a further and more rigid limitation of the hours of service of railway telegraphers, signalmen, etc. Large numbers of railway officers and representatives of railway labor organizations were present at the hearing. General Manager W. T. Tyler, of the St. Louis & San Francisco, showed the great financial burden which would be imposed on his line if the proposed law were to be enacted.

The Senate has not only sustained the lower House of Congress in withholding appropriations from the commerce court for the ensuing year, but has taken favorable action on another amendment to the appropriation bill, designed to legislate the five judges of the court out of office. As the law now stands, these judges, on the abolition of the commerce court, would become judges of the circuit court, but this the Senate amendment is designed to forbid by limiting the number of circuit court judgeships. It is said that President Taft threatens to veto the appropriation bill if it is passed with these amendments.

By a strike of trainmen and motormen employed by the Boston Elevated last week Friday, the service of that company, both on the elevated and on the surface lines, was badly crippled, and for two or three days there was a good deal of violence in the streets, with some rioting. For two or three nights the surface car traffic was suspended entirely because of violence. A considerable number of men continued at work, and on Monday of this week the company claimed that it had enough new men to perform tolerably good service if granted police protection. As we go to press, it is reported that the State Board of Conciliation and Arbitration has secured a promise both from the company and from the representatives of the strikers to join in a conference which is expected to lead to a settlement.

Among the merit marks recorded in favor of employees of the Rock Island Lines recently, as reported in the *Rock Island Employees' Magazine,* are 10 for Conductor Cowdrey, of Oklahoma, for securing a passenger who had intended to take a rival line, and later for securing three and a half other passengers under similar circumstances. Conductor Martin was commended for securing six and a half passengers by notifying an agent in advance to have the tickets ready on the arrival of the train. The presence of "half" passengers in these cases makes one suspect that perhaps the conductor's diplomacy consisted partly in the judicious distribution of peanuts or candy. Fireman Delaney, of Missouri, received 10 merit marks for avoiding a serious delay by getting his train over the road with a scant supply of coal, and also for assisting in taking a pair of wheels from a car on a side track and putting them under the tender of his engine.

The Brooklyn Rapid Transit Company, Brooklyn, N. Y., is trying on its surface street railways in that city a "stepless car" similar to that which was recently put in use in Manhattan. All passengers board the car at a center side entrance. This opening is 6 ft. 6 in. wide. It provides an entrance aisle 33 in. wide and two aisles for exit 21 in. wide on either side. The center platform, which passengers reach upon entering, is only 14 in. above the top of the running rail. The conductor is seated at the entrance in charge of a fare recording device. After paying fare the passenger may step into the car toward either end. Both passengers and conductor signal the motorman to stop the car by pressing an electric push button. The signal for starting consists of small electric lamps placed in front of the motorman which are lighted only by the closing of all the doors. The conductor can stop the car quickly by operating a special valve within his reach.

Committees of conductors, of brakemen, and of firemen of the Pennsylvania Railroad who have been complaining to the general manager because of the arrangement entered into by the road for the operation of electric trains jointly with the Hudson & Manhattan, announce that they are going to call for a vote of their constituents to empower the leaders to declare a strike if such action shall be deemed necessary. The committees of the three brotherhoods took action separately, having been forbidden to act jointly by the Court of Common Pleas. The injunction of the court was issued on petition of John P. Hemphill, a member of the firemen's brotherhood, who alleged that the leaders of his organization had no legal right to participate in the joint conferences. He declared that the necessary two-thirds vote of the members of his brotherhood had not been secured. He also asked that the other brotherhoods be restrained from attempting to control, dictate to, or represent the firemen's brotherhood.

The Pennsylvania Railroad's Trees.

In the past ten years 4,615,227 trees have been planted by the Pennsylvania Railroad, and in 1911 alone 515,703 trees were transferred from the company's nursery at Morrisville to permanent places on railway property. The Morrisville nursery covers 36 acres. The present stock on hand is 2,296,833, of which 2,072,166 are forest trees, and 224,667 ornamental plants.

The conservative logging operations of the road were continued in 1911, two new plots being undertaken. The total area involved is about 1,500 acres, from which it is expected to cut 750,000 ft. of timber. Up to the end of last year the area which had been conservatively lumbered was 1,850 acres. The rejuvenation of this otherwise worthless forest land will add to the ultimate forest wealth of the state of Pennsylvania. It is not possible to find a market for small wood, so this kind of material is converted into charcoal; the total amount produced up to date being 215,000 bushels. The two tie and timber treating plants of the Company, one at Mt. Union and the other at Philadelphia, in 1911 treated 869,000 ties, 13,000,000 ft. of lumber and timber, and miscellaneous products equivalent to about 2,500,000 board feet.

Frisco Station Agents' Plan Extended.

The St. Louis & San Francisco has decided to extend to all divisions the plan of increasing the authority of the local station agent to cover the solicitation of traffic and the settlement of minor claims in his territory which was described in the *Railway Age Gazette* of February 16, page 278. The plan was first tried on the western division, beginning on January 1, and has proved so successful that after July 1 all division superintendents will be held responsible for securing traffic in their territory. The agents will also represent the industrial department locally, and station forces will be increased where necessary to enable them to handle the increased work.

Arbitrators Chosen.

The board of arbitration which is to settle the differences between the Eastern railways and their enginemen is announced to consist of the following: Daniel Willard, president Baltimore & Ohio; P. H. Morrissey, president of the Railroad Employees' and Investors' Association and formerly head of the Brotherhood of Railway Trainmen; Oscar S. Straus, former secretary of commerce and labor; Dr. Albert Shaw, editor of the *Review of Reviews;* Otto Eidlitz, president of the Building Trades Employers' Association; Charles R. Van Hise, president of the University of Wisconsin, and Frederick N. Judson, a lawyer, of St. Louis. Mr. Willard and Mr. Morrissey were named under the arbitration agreement reached between the railways and the enginemen, and were empowered to select the five remaining members of the board, but they could not agree and the task devolved on Commissioner Charles P. Neill, Judge M. A. Knapp and Chief Justice White of the Supreme Court. Mr. Straus was secretary of commerce and labor under President Roosevelt, ambassador to Turkey twice and a member of The Hague Court. Mr. Eidlitz is a leader in the New York Building Trades Employers' Association. Mr. Judson was a member of the Hadley securities commission.

First Aid to Anxious Passengers.

[Chicago Great Western circular to conductors, station agents and others.]

The most important part of your train is not the fine engine on the front end, the up-to-date Pullman on the rear end, nor even the fireman who shovels the coal that makes the steam, but the *passengers* aboard—the people who pay the bills. And this includes the traveler in the smoker, as well as the first-class passenger in the parlor car; each pays the price asked for the particular service rendered, and it is clearly up to the railway company to see that he gets that for which he pays.

Therefore, so far as you or the company are concerned, all are equal with respect to the comfort, convenience and *peace of mind* which they expect in exchange for the money paid for tickets. While some of them may be entitled to more comfort, elegance and convenience than others—on acount of paying more—all are entitled to an equal distribution of that which makes for peace of mind, the relieving of anxiety and dispelling of worry.

Unforeseen difficulties arise which cause delays to trains. At such times the timid passenger will be the first to grow anxious, worried and perhaps annoying in asking questions, which, if not answered politely, correctly and understandingly, will add to the worry and anxiety.

It is the wish of the management that in all cases of delays to passenger trains, conductors shall make it their business to see that their trainmen are properly informed of the circumstances, in order that passengers may be given reliable information as promptly as possible, to afford opportunity for changing previous arrangements for meeting friends or business appointments, if they see fit to do so. Be plain in your explanations; don't be technical. Should a passenger desire to send telegrams, assistance should be rendered in this respect; trainmen will offer to accept such messages, especially when trains are detained at points inaccessible to telegraph offices, and see that they are filed at the earliest possible moment.

Despatchers will see that conductors of delayed trains are promptly notified as to the probable time trains will reach terminals, and furnish any additional information for which conductors may ask. They will likewise notify station agents on request.

Station agents having passengers for delayed trains or patrons waiting for friends on such trains, will call on despatchers for particulars, when necessary; if the delay is a serious one, or, if a number of people are waiting, they will post bulletins or make loud verbal announcements in each of the waiting rooms.

We want it said of our road that our passengers are treated as our guests, and that we do not lose interest in them as soon as their money drops into our till.

We believe that a *satisfied passenger* is one of the best advertisements a railroad company can have. Help to make a walking advertisement of every passenger.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomaston, Boston, Mass.

AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York; next convention, September 12, Seattle, Wash.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Detroit, Mich.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENDS.—W. C. Cooder, Carew building, Cincinnati, Ohio; 3d Friday of March and September.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York. Convention, October 7-11, Chicago.

AMERICAN ELECTRICAL RAILWAY MANUFACTURERS' ASSOC.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York; annual, November 20, 1912, Chicago.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, Monadnock Block, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOC.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—M. H. Bray, N. Y. N. H. & H., New Haven, Conn. Convention, July 9, Chicago.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.
American Society of Mechanical Engineers. Calvin W. Rice, 29 W. 39th St., New York.
American Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.
Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.
Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago.
Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, October 21-25, Chicago.
Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago.
Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York. Convention, June 25-26, Bluff Point, N. Y.
Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.
Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.
Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.
Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.
Civil Engineers' Society of St. Paul.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.
Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.
Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.
Freight Claim Association.—Warren P. Taylor, Richmond, Va.
General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.
International Railway Congress.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.
International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago.
International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.
International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.
Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York. Convention, May, 1913, Chicago.
Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago.
Master Car and Locomotive Painters' Assoc. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass. Convention, September 10-13, Denver, Col.
National Railway Appliances Assoc.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.
New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.
New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.
Northern Railroad Club.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.
Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.
Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.
Railway Business Association.—Frank W. Noxon, 2 Rector St., New York; annual, November 20, 1912, New York.
Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.
Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.
Railway Gardening Association.—I. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.
Railway Industrial Association.—G. L. Stewart, St. L., S. W. Ry., St. Louis, Mo.
Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa. Convention, Oct. 8-11, Quebec.
Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio.
Railway Supply Manufacturers' Assoc.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.
Railway Tel. & Tel. Appliance Assoc.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.
Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.
Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling, Ill. September 10-13, Buffalo, N. Y.
St. Louis Railway Club.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.
Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.
Society of Railway Financial Officers.—C. Niquist, La Salle St. Station, Chicago.
Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.
Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.
Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.
Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.
Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.
Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.
Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.
Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.
Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.
Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; annual, Aug. 27-30, Chicago.
Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.
Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.
Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The Illinois Traction System has been admitted to the per diem rules agreement of the American Railway Association.

The railway commissioners of Canada are making an extensive investigation of the freight service of the principal railways of the Dominion, the commissioners having examined 1,500 complaints of delays from shippers which have been received by the Canadian Manufacturers' Association.

The Erie & Western Transportation Company, operating the Anchor Line of boats on the Great Lakes, announces the opening of its passenger season. Wireless telegraph apparatus has been installed on every steamship, and each will have sufficient life boats and rafts to care for all of the passengers and members of the crew.

The annual meeting of freight traffic officers of the Baltimore & Ohio was held this week at Toledo, Ohio, that city, by the acquisition of the Cincinnati, Hamilton & Dayton, becoming an important point on the Baltimore & Ohio system. Following the meeting the party inspected the railway terminals at Detroit, and also the facilities at the principal points on the C. H. & D., including Indianapolis. It is planned to close the sessions with a banquet at Cincinnati, Friday evening.

The Baltimore & Ohio has created a Bureau of Agriculture, the head of which will be James H. Stewart, of Morgantown, W. Va., with the title of Agricultural Agent. Mr. Stewart will work in co-operation with the industrial department of the road. He was formerly director of the agricultural experiment station of West Virginia, and has taken a prominent part in the great progress which the State of West Virginia has made in farming during the past fifteen years. The new bureau will continue and increase the work of the railway company in advising and helping the farmers along its lines.

The Cumberland Valley, operating 115 miles of line, reports that not a single passenger has been killed or *injured* as a result of a train accident on that road during the past five years; and the press agent thinks that this record is probably unique. During this time the number of passengers carried was 8,859,203; passenger mileage 162,425,602. The Long Island, another road controlled by the Pennsylvania, reports that no passenger has been killed in a train accident since June 1, 1893—19 years. During that time the number of passengers carried was 369,016,054 (to December 31, 1911); passenger mileage, 5,413,268,798. The great bulk of the passengers of the Long Island belong to the class called commuters, and the press agent observes, with reason, that "commuting" on the Long Island has been made as safe as modern science and engineering can make it. He also observes that the passenger mileage just mentioned is equal to more than one-third of the population of the entire world; a fact of mathematical interest, perhaps, yet one which probably will attract but little notice on the other side of the globe.

Transportation and Car Accounting Officers.

A summer meeting of the Association of Transportation and Car Accounting Officers will be held at the Hotel Champlain, Bluff Point, New York, June 25 and 26. Reports will be received from the following committees: Committee on Car Service; Committee on Office Methods and Accounting; Committee on Handling Railway Business Mail; Committee on Conducting Freight Transportation; Committee on Conducting Passenger Transportation; Committee on Joint Interchange and Inspection Bureaus, and Committee on Names. Officers and new members of the committees will be elected.

Freight Car Balance and Performance.

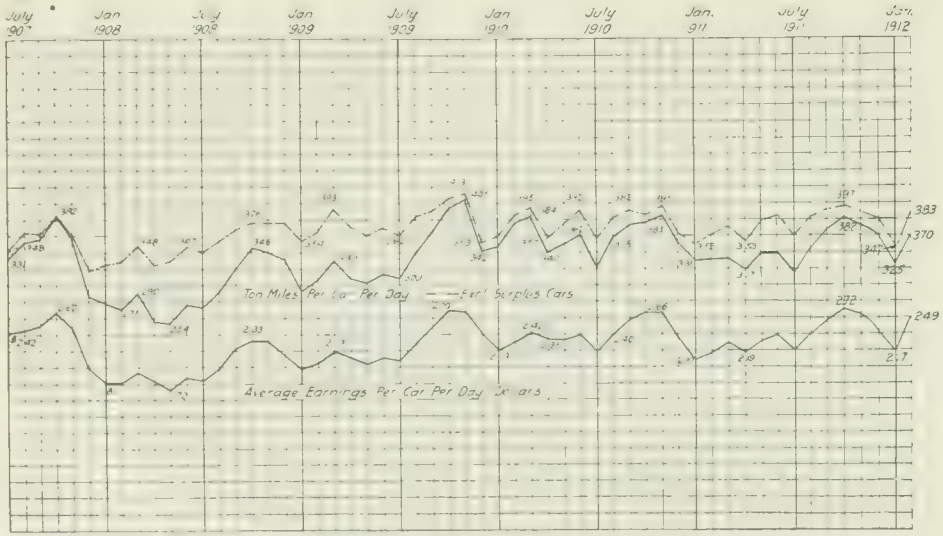
Arthur Hale, chairman of the committee on relations between railways of the American Railway Association, in presenting statistical bulletin No. 122, covering car balance and performance for February, 1912, says:

"The miles per car per day averaged 22.9, including surplus cars, compared with 20.4 in January and 22.6 in February, 1911. Ton miles per car per day increased from 325 in January to 370

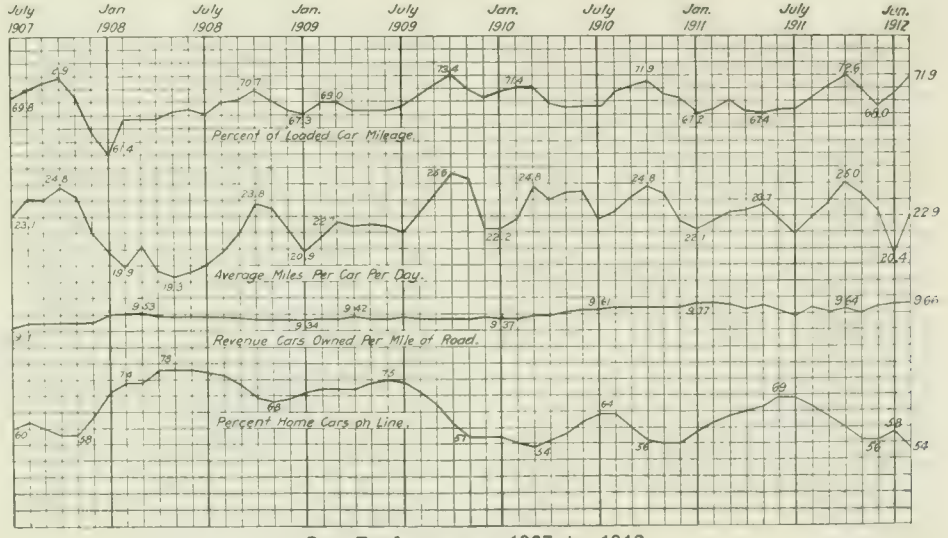
FREIGHT CAR BALANCE AND PERFORMANCE IN FEBRUARY, 1912.

	New England.	N. Y., N. J., Del., Md., Eastern Pa.	Ohio, Ind., Mich., Western Pa.	Va., W. Va., No. and So. Carolina.	Ky., Tenn., Miss., Ala., Ga., Fla.	Iowa, Ill., Wis., Minn.	Mont., Wyo., Neb., Dakotas.	Kan., Colo., Okla., Mo., Ark.	Texas, La., New Mex.	Ore., Idaho, Nev., Cal., Ariz.	Canadian Lines.	Grand Total.
Revenue freight cars owned	84,604	708,699	214,422	187,519	173,263	396,076	17,690	138,127	26,670	144,136	111,393	2,202,599
Average number of system cars on line	42,956	269,941	106,477	99,082	89,124	222,073	8,432	69,094	21,214	68,675	70,981	1,068,049
Railway-owned cars: Average foreign on line	47,248	184,730	110,085	69,079	81,672	168,780	14,456	60,084	27,698	57,397	49,243	870,472
Total Railway-owned cars on line	98,014	454,671	216,562	168,161	170,796	390,853	22,888	129,178	48,912	126,072	120,224	1,938,521
*Excess	5,600	*45,429*	2,140	*19,358*	*2,467*	*5,223*	5,198	*8,949*	22,242	*18,064*	8,831	*55,470*
Per cent. of cars on line to total owned:												
Home	51	54	50	53	52	56	48	50	79	43	64	54
Foreign	56	36	51	37	47	43	81	39	104	38	44	43
All railways	107	90	101	90	99	99	129	89	183	81	108	97
Private cars on line	4,712	31,355	11,903	4,397	8,071	15,348	1,217	7,105	3,522	12,165	3,700	103,495
Total, all cars on line	102,726	486,026	228,465	172,558	178,867	406,201	24,105	136,283	52,434	138,237	123,924	2,049,826
Per cent. of cars in shop	6.61	6.51	5.66	6.29	7.32	6.22	3.59	8.56	4.54	7.00	5.07	6.48
No. of freight engines owned	1,428	10,467	3,053	3,141	2,821	6,414	525	2,708	714	2,692	2,148	36,111
Average cars on line per freight engine owned	72	62	75	55	63	63	46	50	73	47	58	61
Total freight-car mileage	50,039,645	475,068,574	126,403,425	125,285,795	113,207,594	265,961,524	21,326,246	87,552,751	32,967,044	114,547,824	83,783,257	1,496,343,679
Average miles per car per day	16.9	23.4	19.1	25.0	21.8	22.9	31.1	23.4	20.9	28.6	23.3	22.9
Per cent. loaded mileage	74.4	08.6	74.1	69.1	74.9	72.9	76.8	71.8	67.0	72.9	83.0	71.9
Ton-miles of freight, including company freight	620,074,511	8,236,345,702	2,265,961,139	2,051,127,463	1,699,882,618	3,211,609,585	354,796,133	1,284,347,657	335,335,671	1,680,302,777	1,502,543,528	23,242,326,784
Average ton-miles, including company freight:												
Per car-mile	12.3	17.8	18.3	16.4	15.2	14.8	17.1	14.7	12.4	14.9	17.9	16.2
Per loaded car-mile	16.6	26.5	24.6	23.7	20.3	20.7	22.2	20.7	18.2	20.4	21.6	22.6
Per car per day	208	417	350	410	332	340	533	343	260	423	418	370
Gross freight earnings	$6,625,035	$47,180,935	$11,851,699	$12,313,011	$11,810,448	$27,266,894	$2,476,456	$10,863,009	$3,575,533	$16,682,816	$9,547,850	$160,194,286
Average daily earnings: Per car owned	$2.44	$2.42	$1.91	$2.26	$2.35	$2.37	$4.83	$2.61	$4.62	$3.55	$2.96	$2.51
Per railway car on line	2.29	2.67	1.89	2.52	2.38	2.41	3.73	2.90	2.52	4.58	2.74	2.62
All cars on line	2.20	2.49	1.79	2.46	2.28	2.31	3.54	2.75	2.35	4.18	2.66	2.49

*Deficiency in italics.



Car Earnings and Mileage, 1907 to 1912.



Car Performance, 1907 to 1912.

in February as compared with 330 in the month of February, 1911.

"The proportion of home cars on line decreased from 58 per cent. in January to 54 per cent. in February compared with 61 per cent. in February, 1911. The loaded mileage increased from 69.2 per cent. in January to 71.9 per cent. in February. This figure for February, 1911, was 67.8.

"There was an increase in the average earnings per car per day from $2.17 in January to $2.49 in February, compared with $2.17 in February, 1911."

The accompanying table gives car balance and performance in the month covered by the report, and the two diagrams show car earnings and car mileage and certain car performance figures monthly from July, 1907.

Demurrage Officers.

The American Association of Demurrage Officers held its annual meeting at San Francisco May 10 and 11. E. E. Mote, manager of the Pacific Car Demurrage Bureau, was elected president of the association for the ensuing year, and W. E. Backensto, Denver, Col., vice-president. A. G. Thomason, Old South Building, Boston, Mass., was re-elected secretary and treasurer. The time of the convention was devoted chiefly to a discussion of the changes proposed in the Uniform Code of Car Demurrage Rules, which rules have since received favorable action by the American Railway Association. The prevailing sentiment among the demurrage managers in regard to the rate per day to be charged on cars is in favtor of an increase over the rate now generally charged. Readers who have seen Mr. Mote's reports on the good results of a $3 rate in California will readily understand that the atmosphere of San Francisco was, no doubt, favorable to a decision of this kind by the meeting.

The association listened to an interesting address by Allan P. Matthew, of San Francisco, assistant attorney of the Western Pacific. Mr. Matthew was formerly secretary to Interstate Commerce Commissioner Lane, and thus is familiar with car service matters.

Hearing on Western Classification.

The hearing before Examiner Lyon and J. M. Jones, chief of the tariff bureau of the Interstate Commerce Commission, on objections to Western Classification No. 51, which was begun at Chicago on May 29, was continued to June 6, and a large number of witnesses representing shippers of various commodities affected were heard. Aside from the testimony as to specific items, which in most cases revealed a desire on the part of the shipper to have the classification adjusted to suit the convenience of his particular business, much of the testimony consisted of arguments for and against the adoption of such a rule as Rule 10 of the Official Classification, which permits the broad extension of carload rates to mixed carload shipments, in the West.

H. C. Barlow, traffic director of the Chicago Association of Commerce, declared that the opposition to such a rule was based entirely on selfish considerations, and favored mixed carloads in all territories as making for more economical transportation. H. G. Wilson, representing the Kansas City Commercial Club, and representatives of several western jobbers, contended that the mixed carload privilege would operate to the advantage of the big jobbers in Chicago and the East by enabling them to deal direct with the small dealers, thereby eliminating the smaller western jobber. A representative of the National Cash Register Company testified in favor of the mixed carload rule, as operating to the advantage of both carrier and shipper. The secretary of the Chicago Wholesale Grocers' Association stated that a canvass of 170 wholesale grocers had shown them almost unanimously in favor of rule 10, and advocated its adoption on the ground that the saving in transportation cost would ultimately work to the benefit of the consumer. W. J. Harper, representing the National Wholesale Druggists' Association, asked for additional mixtures on drug shipments. Thomas L. Wolf, rate clerk of the Illinois railway commission, presented a lengthy statement in favor of the adoption of a rule similar to rule 10, permitting mixtures on a favorable basis of rates open to all shippers alike as distinguished from the present practice of the Western Classification which permits mixtures at carload rates only when specifically provided for. He declared the extension of the mixing privilege to some shippers and not to others was discriminatory and that the Official Classification Rule 10, which applies to the entire carload the rating of the highest rated article in the shipment at the highest carload minimum weight, is a simple, direct, economical and practical way of arriving at a hating to be charged on articles in carload mixtures.

Frank B. Montgomery, traffic manager of the International Harvester Company, objected to some of the provisions governing minimum weights on agricultural implements, as provided in rule 6B, saying that smaller dealers would have difficulty in loading carloads up to the minimum weights named. A representative of the railway mail service appeared on behalf of the Postoffice Department to protest against the elimination of the mixture of mail sacks and pouches on the ground that it would mean an advance of 50 per cent. in the rate on 300 carloads of such freight shipped by the department in a year.

The state railway commissions represented by Clifford Thorne, chairman of the Iowa commission, presented a long list of amended rules to be substituted for those formulated by the classification committee. At the close of the hearing Mr. Thorne stated that in view of the action of the commission in granting a second suspension of the classification the work of the so-called "classification committee" representing 18 state commissions had been accomplished, and hereafter the state commissions will each present their cases individually.

Robert C. Fyfe, chairman of the Western Classification Committee, appeared on behalf of the committee to defend its work and to cross-examine the shippers' witnesses. W. D. Dickinson, general attorney of the Rock Island, also assisted in the cross-examination. Further hearings are to be held before Commissioner Clark at San Francisco on June 27 and at Seattle on July 8.

June Crop Report.

The June report of the condition of the growing crops, based upon the ratio of the average condition on June 1 shows as follows:

Spring Wheat—Acreage, 19,201,000, compared with 20,381,000 acres last year; condition, 95.8 per cent. of a normal, compared with 94.6 per cent. last year, and 93.8 per cent. the 10-year average; indicated yield per acre, 13.8 bus., compared with 9.4 bus. last year, and 13.4 bus. the five-year average; estimated total production, 265,000,000 bus., compared with 190,682,000 bus. last year.

Winter Wheat—Acreage 25,744,000, compared with 29,162,000 acres last year. Condition, 74.3 per cent. of a normal, compared with 80.4 per cent. last year, and 80.9 per cent. the 10-year average; indicated yield per acre, 14.1 bus., compared with 14.8 bus. last year, and 15.5 bus. the five-year average; estimated total production, 363,000,000 bus., compared with 430,656,000 bus. last year.

All Wheat—Indicated yield per acre, 14 bus., compared with 12.5 bus. last year, and 14.6 bus., the five-year average; estimated total production, 628,000,000 bus., compared with 621,338,000 bus. last year.

Oats—Acreage, 37,844,000; condition, 91.1 per cent. of a normal; estimated total production, 1,109,000,000 bus., compared with 922,298,000 bus. last year.

Barley—Acreage 7,574,000; condition, 91.1 per cent. of normal; indicated yield per acre, 25.2 bus.; estimated total production, 192,000,000 bus., compared with 160,240,000 bus. last year.

INTERSTATE COMMERCE COMMISSION.

The Interstate Commerce Commission has announced that hearings will be held before Examiner Prouty in the investigation of railway weighing practices at Grand Rapids on June 17, 18 and 19; at Detroit on June 20, 21 and 22; at Columbus on June 24, 25 and 26, and at Indianapolis on June 27.

The Western Fruit Jobbers' Association has complained to the commission against the rates on grapes from producing points in Illinois and Missouri to points in Kansas. They say that the roads advanced their rate on August 1, 1911, and that during the past year fruit growers have been losing money.

The commission has suspended the regulations governing the transportation of baggage, which were filed by nearly all the roads to become effective July 1. These regulations provided for an additional charge per inch for each piece of baggage more than 45 in. long, and for an additional charge for weight in excess of a present standard. Exceptions were made for immigrants' baggage.

It is announced that the commission will make a general investigation, on all the principal railways throughout the country, of allowances paid for the use of private cars (especially refrigerators) and the charges for icing; also minimum weights charged for commodities carried in refrigerator cars. Extensive investigation is to be made also into the reasonableness of rates on lumber from a great number of southwestern points.

Certain Class Rates Reduced.

Medford Traffic Bureau v. Southern Pacific. Opinion by Commissioner Lane:

Defendant's present class rates for the transportation of traffic in classes 1 to 4, inclusive, from Medford, Ore., to certain designated stations in California, found to be unreasonable, and lower maximum rates prescribed for the future.

No Jurisdiction Over K. C. Viaduct.

Kansas City, Mo., and Kansas City, Kan., v. Kansas City Viaduct & Terminal, et al. Opinion by Commissioner Clark:

Complainants seek an order requiring the establishment, or restoration, of routing for certain interstate electric passenger cars over a viaduct that is owned by a company that is not and never has been a carrier subject to the act. The Commission has no jurisdication of the company owning the viaduct, and no power to order the present routing changed as prayed. (24

All Rates from Oklahoma Into Texas Reduced.

Corporation Commission of Oklahoma v. Abilene & Southern, et al. Opinion by Commissioner Clements:

The complainants claim that all rates, both class and commodity, from points in Oklahoma to points in Texas are both unreasonable in themselves and unjust, as compared with rates from Texas into Oklahoma.

From 1907 to 1909 the same jobbing rates were effective from Oklahoma jobbing points into Texas on the first four classes as now apply from Texas into Oklahoma. Texas was divided in 1909 into eleven groups, and standard rates were applied from points in Oklahoma to these various groups in Texas. No change, however, was made in the so-called jobbers' rates from Texas into Oklahoma. There are various causes which have made the relation of these rates abnormal. It was partly on the theory that jobbers in Oklahoma got their goods at a lower cost than jobbers in Texas. It is doubtful, however, if this is now the case since the establishment of law water rates to Galveston.

The Rock Island acknowledges that the difference between northbound and southbound rates is unreasonable and proposes a schedule which it is willing to put into effect. The original complainant, also, proposes a schedule which amounts to reducing the rates from Oklahoma into Texas to the basis of the jobbers' rates now in effect northbound. The Oklahoma Traffic Association, also, proposes a set of rates which suggests the first-class rate of the Oklahoma jobbers' scale up to three hundred miles (which is now the northbound rate) with a slight reduction beyond. The scale differs from the complainants' proposed scale in that instead of selecting rates in intermountain territory for comparative purposes, certain southwestern class rates are used, namely, from Kansas City and St. Louis to representative points in the states of Oklahoma, Kansas, Arkansas and Texas.

The commission finds that class and commodity rates from Oklahoma into Texas are now unreasonable and discriminatory. Inasmuch, however, as a revision is asked on all classes on the basis of the jobbers' scale, the resulting adjustment would be somewhat low for application between these states. The different interests affected by a change in these rates had better get together and agree on a new schedule in accordance with the general views expressed by the commission; and, the commission will hold the case open until such a schedule of rates is suggested. It is the commission's view that a mileage scale should be used up to three hundred miles, and that groups should be used beyond that distance—if thought advisable—and that Oklahoma, as well as Texas, should be grouped. (I. C. C., 23, 688.)

Reparation Awarded.

Huntingdon Lumber Co. v. Illinois Central et al. Opinion by the commission:

The rate on wheat from Clinton, Ky., to Huntingdon, Tenn., reduced from 24 cents per 100 lbs. to 19 cents. (23 I. C. C., 507.)

Galveston Commercial Association et al. v. Galveston, Harrisburg & San Antonio Railway et al. Opinion by the commission:

A rate of 80 cents per 100 lbs. on bottles of wine, in less than carloads, shipped in cases from Galveston, Tex., to New Orleans, La., found unreasonable to the extent that it exceeds the rate contemporaneously maintained in the opposite direction. (23 I. C. C., 512.)

Complaint Dismissed.

Portsmouth Steel Co. v. Baltimore & Ohio et al. Opinion by the commission:

The rate on limestone from Martinsburg, W. Va., to Portsmouth, Ohio, was voluntarily reduced for the sole purpose of stimulating movement, and reparation is now asked on the former rate of $2.53 per ton. The commission does not find that this former rate was unreasonable. (23 I. C. C., 510.)

Incubators, K. D.

Texas Seed & Floral Co. v. New York, Chicago & St. Louis et al. Opinion by the commission:

Western classification provides fifth-class rate for incubators and brooders K. D. flat, boxed, minimum C. L. weight 30,000 lbs. The complainant shipped mixed carloads of brooders and incubators, the incubators being crated with the outside lamp and the legs removed and packed inside, and testimony shows that this is the extreme limit to which incubators can be knocked down. The complainants claim that the rule prescribing the rate on K. D. incubators is unreasonable and cannot be complied with, and that the charge made of second-class rate is unreasonable, and the commisison finds that fourth-class rate instead of second-class rate should have been charged and the western classification rule should be amended accordingly. (23 I. C. C., 504.)

STATE COMMISSIONS.

The Louisiana railway commission has announced a hearing on June 25 to consider a proposed order that wire screens made of fine mesh wire cloth shall be provided in the windows of all cars carrying passengers within the state. The commission will also at the same hearing consider a rule requiring all railways in the state to answer tracers within three days after filing.

The New York State Public Service Commission, Second district, has established a division of transportation, the chief of which is Charles R. Vanneman, heretofore one of the inspectors of steam railways. J. B. Stouder has been appointed inspector, in the place of Mr. Vanneman. No announcement has yet been made as to a successor to W. L. Derr, who has resigned to go to the Chicago Great Western.

The Maryland Public Service Commission has rejected the petition of the New York, Philadelphia & Norfolk for permission to issue $1,250,000 stock as a dividend to its shareholders. It was established to the satisfaction of the commission that, as claimed by the petitioner, there has been diverted from the surplus net earnings for betterments a sum in excess of the amount of the stock named in the petition. This money would have been available for dividends had it not been used thus. The commission holds that no security issues are permissible except directly for extensions or betterments or for the legal refunding of outstanding indebtedness.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF APRIL, 1912.

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses					Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance									
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.				
Alabama & Vicksburg	143	$59,194	$30,703	$109,224	$17,454	$26,946	$3,852	$48,864	$4,930	$102,046	$7,178	—$2,570	$4,200	$408	—$14,579
Alabama Great Southern	337	285,886	85,336	400,920	59,266	84,205	12,597	131,268	11,656	298,992	101,928	—1,056	13,735	87,137	34,251
Ann Arbor	256	121,479	36,038	170,810	20,359	22,219	3,898	75,918	7,567	129,961	40,849	3,765	13,986	30,628	15,647
Arizona Eastern	166	119,858	37,471	177,554	24,974	15,727	2,460	47,251	7,630	98,042	79,512	243	12,000	67,755	42,896
Atchison, Topeka & Santa Fe	8,001	5,201,346	1,947,635	7,916,994	810,304	1,173,497	158,640	2,354,398	152,108	4,648,947	3,268,047	.....	307,211	2,960,836	483,906
Atlanta & West Point	38	52,263	36,919	98,924	12,963	19,160	4,760	32,856	4,394	74,133	24,791	175	5,189	19,777	—1,965
Atlantic City	167	65,884	64,947	142,383	34,763	17,237	1,594	81,478	1,153	136,225	6,158	—3,851	7,000	—4,693	- 1,647
Baltimore & Ohio—System	4,643	6,017,888	1,116,418	7,589,078	799,338	1,320,998	161,207	2,725,932	162,262	5,169,737	2,419,341	—65,817	252,116	2,101,408	—25,528
Belt Ry. Co. of Chicago	9	.....	.....	232,547	14,452	27,071	452	95,330	4,127	141,432	91,115	.....	6,250	84,865	5,633
Boston & Maine	2,140	2,273,077	1,184,075	3,755,653	351,493	568,373	36,294	1,730,749	79,343	2,766,252	989,401	14,812	172,351	831,862	196,435
Central of Georgia	1,191	737,224	264,936	1,095,217	152,185	199,581	35,395	409,853	41,818	838,432	256,785	4,660	54,100	207,345	89,508
Central Vermont	411	249,141	70,357	347,195	20,124	61,784	7,656	172,786	8,255	270,605	76,590	165	12,200	64,555	14,590
Chesapeake & Ohio Lines	1,888	2,568,749	439,522	3,113,796	357,651	656,636	49,154	951,491	72,716	2,087,648	1,026,148	—4,480	84,750	936,918	251,609
Chicago & Erie	250	297,397	53,699	387,410	54,529	78,625	19,746	214,475	10,127	377,502	9,908	.....	4,250	5,658	—54,410
Chicago, Indiana & Southern	366	243,588	22,694	285,407	47,341	80,264	7,480	112,555	9,089	256,729	28,678	489	13,000	16,167	—17,643
Chicago, Indianapolis & Louisville	297	368,727	156,462	545,621	77,855	92,487	17,569	244,675	14,113	446,699	98,922	.....	23,914	75,008	—78,849
Chicago, Milwaukee & Puget Sound	1,663	1,170,179	213,758	1,415,568	105,305	168,841	39,390	435,645	26,421	775,602	639,666	4,493	75,787	568,372	221,654
Chicago, Milwaukee & St. Paul	7,111	3,53[illegible],901	1,439,604	5,054,242	716,324	911,391	115,764	2,402,711	92,742	4,238,932	815,310	—3,041	231,911	580,358	—478,339
Chicago, Terre Haute & Southeastern	477	84,446	18,779	106,664	21,414	25,070	2,877	36,501	6,873	92,735	13,929	—91	8,700	5,138	—36,619
Cincinnati, New Orleans & Texas Pacific	337	648,314	149,381	821,520	97,289	194,059	21,866	249,212	19,723	582,149	239,371	—94	21,800	217,477	66,850
Cincinnati Northern	45	93,608	4,602	114,008	21,286	22,276	2,553	48,108	3,592	97,815	16,193	.....	5,300	10,893	18,628
Cleveland, Cincinnati, Chic. & St. Louis	2,011	1,566,422	567,297	2,346,916	355,686	411,089	61,981	1,016,140	56,913	1,901,809	445,107	—3,963	95,000	346,144	—13,205
Colorado & Southern	1,023	900,773	83,324	1,028,005	91,311	129,145	10,652	197,998	21,790	450,896	177,109	—1,754	28,220	147,135	—3,211
Denver & Rio Grande	2,843	1,377,157	378,112	1,837,732	290,852	372,674	50,246	666,126	50,277	1,430,175	407,557	—3,221	75,000	329,336	—139,004
Denver, Northwestern & Pacific	18	68,392	13,431	84,665	16,540	16,699	5,901	32,535	5,496	77,171	7,494	.....	3,500	3,994	907
Detroit, Toledo & Ironton	441	97,983	10,780	118,269	27,455	10,903	2,609	70,205	5,254	116,426	1,843	—10	5,000	—3,167	—10,601
Duluth, Missabe & Northern	342	156,288	37,629	200,125	60,416	55,815	1,734	71,076	11,791	201,332	—1,207	—3,037	8,058	—12,302	—18,162
Duluth, South Shore & Atlantic	640	168,817	69,908	249,635	49,145	30,138	11,307	97,585	7,284	195,459	54,176	—1,822	18,000	34,354	—8,452
Erie	1,995	2,407,360	681,964	3,186,050	383,565	635,542	97,607	1,346,409	88,058	2,551,181	634,869	—10,532	90,284	534,053	—637,304
Florida East Coast	630	281,378	201,766	508,112	60,128	56,090	5,914	163,798	10,438	296,368	211,744	—700	15,500	195,544	—115,211
Galveston, Harrisburg & San Antonio	1,338	570,476	249,948	874,335	125,566	211,193	31,211	411,553	30,668	810,191	64,144	—5,314	34,322	24,508	—163,992
Georgia	307	179,814	70,980	268,652	28,513	48,305	13,494	134,293	8,126	232,731	35,921	.....	2,965	32,956	—12,921
Hocking Valley	353	251,909	64,910	349,455	46,360	74,958	8,215	154,069	16,350	299,952	49,503	.....	28,600	20,843	—116,284
Houston, East & West Texas	191	67,662	22,405	96,069	18,010	14,625	2,265	36,579	4,286	75,765	20,304	.....	4,011	16,293	—14,034
Houston & Texas Central	789	249,343	113,212	395,154	72,019	84,710	18,416	204,087	19,077	398,309	—3,155	- 1,593	19,382	—24,130	—70,982
Indiana Harbor Belt	95	.....	.....	229,253	23,264	23,553	1,551	105,317	6,103	159,788	69,465	1,700	5,460	65,705	13,464
International & Great Northern	1,160	510,375	164,664	733,760	118,880	112,776	25,827	365,201	31,600	654,284	79,476	—409	20,000	59,067	.....
Kanawha & Michigan	177	148,023	27,903	183,038	38,072	53,884	1,924	58,369	6,384	158,633	24,405	3	8,161	16,247	—47,932
Lake Erie & Western	886	309,901	64,889	414,989	71,705	84,517	11,328	181,120	11,088	359,758	55,231	.....	19,000	36,231	18,501
Lake Shore & Michigan Southern	1,751	716,342	849,976	4,044,474	472,467	758,538	65,822	1,459,620	90,215	2,846,662	1,197,812	—5,240	140,000	1,052,572	288,701
Louisiana Ry. & Navigation	381	100,495	18,808	129,463	30,344	13,420	5,715	55,674	6,499	111,652	17,811	.....	5,000	12,811	—16,943
Michigan Central	1,817	1,816,347	616,212	2,679,099	268,635	377,594	58,485	1,110,934	52,284	1,867,932	811,167	953	116,000	696,120	291,224
Missouri, Kansas & Texas	1,744	837,969	304,185	1,239,687	174,107	210,742	37,933	434,487	41,890	899,159	340,528	6,709	62,028	285,209	—48,126
Missouri, Kansas & Texas of Texas	1,346	397,018	246,697	691,042	96,838	85,571	24,607	446,246	34,294	687,556	3,486	—3,059	22,000	—21,573	16,212
Missouri Pacific	3,418	1,467,037	360,153	1,984,035	250,068	268,544	60,186	894,177	67,684	1,540,659	443,376	—5,310	98,600	339,466	175,942
Mobile & Ohio	1,114	503,725	101,415	656,452	115,433	103,945	36,177	300,321	32,271	588,147	68,305	—1,136	26,990	40,179	—182,752
Minneapolis, St. Paul & S. S. Marie	3,771	1,751,653	443,518	2,341,050	228,303	275,259	48,331	757,373	49,599	1,358,865	983,085	—2,928	130,756	849,401	563,029
Nashville, Chattanooga & St. Louis	1,380	778,512	220,152	1,073,713	154,350	202,705	35,415	389,123	29,960	811,553	262,160	—1,084	27,794	233,282	5,374
New Orleans, Texas & Mexico	277	96,738	14,687	121,243	22,631	16,313	3,306	57,063	1,143	100,456	20,787	.....	.....	20,787	—7,317
New York, Ontario & Western	566	232,626	95,181	355,773	96,071	113,613	13,515	207,204	16,031	446,434	— 90,661	—6,120	17,916	—114,697	—271,818
New York, Susquehanna & Western	152	92,041	45,498	165,704	10,518	19,280	1,559	84,952	3,940	130,249	45,455	—5,846	17,874	21,735	—101,532
Northwestern Pacific	407	94,813	138,642	252,866	54,172	39,647	3,588	99,950	9,470	206,827	46,039	.....	11,077	34,962	—1,852
Pecos & Northern Texas	479	162,041	41,530	215,396	22,489	43,428	2,797	76,670	7,399	152,783	62,613	.....	6,209	56,404	34,204
Peoria & Eastern	351	153,473	51,676	222,377	34,251	36,358	4,100	103,811	5,994	184,514	37,863	.....	9,800	28,063	25,654
Philadelphia & Reading	1,015	2,171,151	546,015	2,890,484	329,067	611,924	39,237	1,170,130	68,856	2,219,214	671,270	25,847	89,654	607,463	—862,661
Pittsburgh & Lake Erie	215	909,859	120,335	1,071,258	143,577	176,893	13,131	310,126	23,850	667,577	403,681	—1,130	31,000	371,551	—121,064
Port Reading	21	70,814	.....	73,577	8,798	177	30	29,730	81	38,816	34,761	4,575	3,800	35,536	—43,526
Richmond, Fredericksburg & Potomac	83	131,834	88,215	245,183	43,351	28,915	2,987	80,618	6,002	161,873	83,310	.....	1,094	82,216	—18,964
St. Louis & San Francisco	4,743	1,836,529	657,781	2,728,890	357,286	300,541	70,208	1,140,238	87,750	1,956,023	772,867	.....	158,712	614,155	—156,249
St. Louis, Brownsville & Mexico	510	180,713	54,388	250,419	20,097	16 428	2,140	81,285	7,936	127,886	122,533	.....	5,150	117,383	64,285
St. Louis, Iron Mountain & Southern	3,315	1,562,556	435,607	2,173,136	272,979	260,147	52,042	807,025	63,531	1,455,724	717,412	—7,502	118,315	591,595	—30,391
St. Louis Southwestern	91	409,416	81,843	567,772	83,317	113,547	26,108	164,354	33,695	421,021	146,751	—858	46,426	99,467	—43,400
St. Louis Southwestern of Texas	703	185,883	60,678	270,059	79,499	90,008	13,473	142,063	17,520	342,563	—72,504	—515	10,945	—83,964	26,704
San Pedro, Los Angeles & Salt Lake	1,116	502,188	243,719	791,323	76,184	183,655	30,732	283,087	19,757	593,365	197,958	—4,613	24,103	169,242	52,876
Seaboard Air Line	3,070	1,469,019	410,137	2,110,302	276,964	296,756	58,012	760,014	53,112	1,444,858	665,344	—3,633	80,000	581,711	28,307
Southern in Mississippi	281	85,350	17,381	57,525	28,001	8,605	2,133	34,072	4,454	77,265	—19,740	.....	4,218	—23,958	—12,281
Southern Kansas of Texas	115	138,507	17,759	160,573	8,887	27,904	1,820	50,568	3,648	92,827	67,746	.....	2,572	65,174	10,724
Southern Pacific Co.	6,281	4,248,855	2,550,465	7,336,935	727,390	917,705	215,724	2,099,181	186,242	4,146,242	3,190,693	—20,735	385,665	2,784,293	227,495
Sunset Railway	59	47,684	14,049	64,672	13,327	1,407	41	23,014	1,748	39,537	25,135	.....	3,390	21,745	.....
Tennessee Central	294	91,015	30,917	130,814	28,672	18,383	5,511	44,318	7,134	104,018	26,796	.....	4,211	22,585	—13,403

Operated in previous period [1] 355; [2] 7,550; [3] 4,434; [4] 2,243; [5] 2,232; [6] 341; [7] 2,005; [8] 246; [9] 1,979; [10] 1,173; [11] 2,556; [12] 317; [13] 612; [14] 583; [15] 350; [16] 113; [17] 176; [18] 1,663; [19] 1,805; [20] 1,737; [21] 1,348; [22] 3,921; [23] 3,764; [24] 1,255; [25] 264; [26] 546; [27] 376; [28] 296; [29] 1,022; [30] 4,732; [31] 501; [32] 3,313; [33] 797; [34] 1,105; [35] 3,046; [36] 6,187. — Indicates Deficits, Losses and Decreases.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF APRIL, 1912—(CONTINUED).

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total. inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.					
Texas & New Orleans	458	$190,870	$78,973	$289,815	$44,249	$65,631	$7,691	$123,794	$11,475	$252,840	$36,975	—$837	$12,487	$23,651	$11,843
Texas & Pacific	1,885	881,354	309,360	1,274,560	202,889	253,425	33,799	654,391	50,574	1,195,078	79,482	1,342	48,066	32,758	—6,659
Toledo & Ohio Central	441[37]	186,383	44,634	247,146	69,200	64,750	5,469	133,964	8,404	281,787	—34,641	—606	20,385	—55,632	—82,987
Toledo, Peoria & Western	248	49,642	33,791	89,168	15,747	24,959	7,307	38,057	3,280	84,350	4,818	.....	5,000	—182	—6,114
Ulster & Delaware	129	47,626	16,493	68,370	8,867	12,181	1,278	28,502	2,362	53,190	15,180	44	3,300	11,924	—12,227
Vicksburg, Shreveport & Pacific	171	56,691	24,754	94,517	32,095	20,587	3,249	34,831	4,785	95,547	- 1,030	—134	6,300	—7,464	—10,994
Virginia & Southwestern	240	125,466	11,180	139,658	18,306	29,924	1,864	38,979	4,135	93,208	46,450	.....	5,331	41,119	22,419
Virginian	475[38]	381,199	20,378	415,400	69,416	74,842	5,144	111,932	8,392	269,726	145,674	4,189	17,600	132,263	18,553
Wabash	2,515	1,372,224	512,580	2,071,120	467,516	468,294	82,492	1,028,031	66,689	2,113,022	—41,902	—3,852	71,655	—117,409	—441,795
Washington Southern	36	37,705	44,321	109,378	17,773	13,820	1,351	38,638	2,853	74,435	34,943	.....	3,245	31,698	—11,981
Western Pacific	935	326,217	97,729	443,843	74,256	35,711	31,246	172,537	24,346	338,096	105,747	—2,666	15,958	87,123	.....
Western Ry. of Alabama	133	58,864	38,737	107,531	20,430	21,148	5,404	38,426	7,150	92,558	14,973	—64	4,613	10,296	7,156
Wheeling & Lake Erie	457	299,836	45,246	380,003	53,902	120,451	7,338	168,995	14,177	364,863	15,140	3,695	29,609	—10,774	—136,836
TEN MONTHS OF FISCAL YEAR, 1912.															
Alabama & Vicksburg	143	$876,027	$406,184	$1,381,138	$204,599	$276,097	$37,605	$491,859	$51,148	$1,061,308	$319,830	—$8,196	$47,296	$264,338	—$124,025
Alabama Great Southern	309	2,684,279	971,043	3,985,012	462,071	867,231	113,150	1,246,337	98,042	2,786,831	1,198,181	—5,174	147,129	1,045,878	142,117
Ann Arbor	292	1,232,739	452,212	1,793,999	190,530	200,218	42,769	666,350	77,209	1,177,076	616,923	—2,794	139,855	474,274	80,123
Arizona Eastern	366[1]	1,238,765	338,386	1,671,555	239,291	129,075	23,156	444,020	65,809	901,351	770,204	1,865	102,509	669,560	258,413
Atchison, Topeka & Santa Fe	8,201[2]	48,892,617	19,242,658	74,453,602	11,195,467	11,528,399	1,649,810	22,385,370	1,583,987	48,343,033	26,110,569	.....	2,998,004	23,112,565	—1,876,981
Atlanta & West Point	93	577,700	398,292	1,075,244	122,890	205,517	48,012	330,185	46,787	753,391	321,853	858	51,891	270,820	—13,755
Atlantic City	167	660,533	970,477	1,717,817	269,071	157,325	23,319	861,398	12,368	1,303,481	414,336	—42,253	70,000	302,083	60,836
Baltimore & Ohio—System	4,433[3]	59,405,512	12,205,540	76,026,494	8,961,583	13,905,037	1,612,069	27,205,551	1,655,347	53,339,587	22,686,907	—544,938	2,455,594	19,686,375	1,430,581
Belt Ry. Co. of Chicago	21	.....	.....	2,221,699	137,620	254,764	5,776	882,179	53,436	1,333,775	887,924	.....	70,059	817,865	57,248
Boston & Maine	2,245[4]	22,237,735	13,101,794	38,159,392	4,919,260	5,406,612	380,775	17,892,140	852,600	29,451,387	8,708,005	160,052	1,742,162	7,125,895	534,549
Central of Georgia	1,915	7,763,999	3,144,528	11,987,280	1,497,101	2,115,287	340,794	4,077,049	383,789	8,414,020	3,573,260	55,053	509,156	3,120,057	17,073
Central Vermont	411	2,243,846	886,243	3,397,631	336,106	552,874	74,247	1,667,692	89,906	2,720,825	676,806	3,828	121,100	559,534	—57,135
Chesapeake & Ohio Lines	2,288[5]	22,826,346	4,546,305	28,569,610	3,273,822	5,739,930	508,793	8,758,565	639,114	18,920,244	9,649,366	3,051	847,567	8,804,850	559,996
Chicago & Erie	270	3,383,129	573,609	4,367,626	574,844	846,598	208,203	2,206,126	106,155	3,941,926	425,700	.....	146,788	278,912	—326,678
Chicago, Indiana & Southern	359[6]	2,982,203	248,601	3,360,452	460,966	782,139	76,214	1,245,230	85,459	2,650,008	710,444	2,366	127,098	585,712	174,652
Chicago, Indianapolis & Louisville	617	3,571,059	1,361,010	5,431,650	749,879	801,546	176,123	2,055,489	144,584	3,927,621	1,504,029	.....	232,381	1,271,648	—93,803
Chicago, Milwaukee & Puget Sound	2,059[7]	10,656,233	2,126,924	13,231,066	959,635	1,505,629	473,968	4,821,812	214,615	7,975,659	5,255,407	85,618	901,678	4,439,347	—350,962
Chicago, Milwaukee & St. Paul	7,511	35,983,456	11,544,941	52,859,122	6,880,822	8,128,352	1,070,279	22,769,042	961,813	39,810,308	13,048,814	- 183	2,404,044	10,644,587	—1,678,851
Chicago, Terre Haute & Southeastern	351	1,393,117	172,469	1,602,858	220,253	265,380	29,498	507,218	74,109	1,096,458	506,400	- 1,480	8,700	417,920	.....
Cincinnati, New Orleans & Texas Pacific	337	6,130,389	1,485,532	8,027,705	806,772	1,783,707	202,417	2,344,448	189,213	5,326,557	2,701,148	—5,510	218,000	2,477,638	79,439
Cincinnati Northern	245[8]	898,452	180,636	1,130,792	205,226	236,071	27,069	479,809	31,563	979,738	151,054	.....	56,291	94,763	—39,109
Cleveland, Cincinnati, Chic. & St. Louis	2,012[9]	17,189,131	6,377,553	25,742,006	2,847,034	4,228,427	736,367	10,467,964	544,822	18,824,614	6,917,392	—29,739	962,512	5,925,141	1,364,258
Colorado & Southern	1,075[10]	5,327,324	1,131,430	6,933,116	799,464	1,354,307	115,685	2,231,118	227,689	4,728,263	2,204,853	—12,179	268,521	1,924,153	—375,199
Denver & Rio Grande	2,545[11]	14,520,213	4,091,431	19,466,830	2,615,752	3,603,303	530,493	6,977,193	504,330	14,231,071	5,235,759	—20,655	751,600	4,464,104	—952,627
Denver, Northwestern & Pacific	215	722,526	248,137	1,015,346	145,864	164,658	26,781	369,061	36,265	742,629	272,717	.....	33,000	239,917	7,939
Detroit, Toledo & Ironton	441	1,265,100	136,927	1,507,474	291,744	178,708	27,364	744,658	54,140	1,296,614	210,860	—44	58,584	152,232	111,559
Duluth, Missabe & Northern	34.[12]	4,830,031	368,223	5,276,610	845,344	611,914	18,327	1,054,243	132,099	2,661,927	2,614,683	30,544	252,276	2,392,951	—1,945,587
Duluth, South Shore & Atlantic	624[13]	1,671,406	771,454	2,575,744	403,941	297,158	95,579	1,011,844	93,769	1,902,291	673,453	2,180	177,666	497,967	—70,638
Erie	1,995	30,053,658	7,404,704	40,573,582	4,449,262	7,084,022	942,159	14,242,918	894,334	27,612,695	12,960,887	—167,309	1,480,907	11,312,671	—1,094,295
Florida East Coast	630[14]	1,645,617	1,521,952	3,637,068	555,245	481,310	73,874	1,323,391	99,574	2,533,394	1,103,674	- 2,781	155,000	945,893	—327,496
Galveston, Harrisburg & San Antonio	1,338	6,066,302	2,472,035	9,026,452	1,118,301	1,666,809	331,590	3,587,420	280,768	6,984,888	2,041,564	—50,996	382,736	1,607,832	—726,526
Georgia	307	1,959,181	770,955	2,912,633	254,937	437,919	114,694	1,266,139	79,930	2,153,619	759,014	.....	27,013	732,001	42,134
Hocking Valley	353[15]	4,898,420	733,890	5,984,636	704,416	960,255	83,109	1,872,241	159,872	3,779,893	2,204,743	.....	358,479	1,846,264	70,315
Houston, East & West Texas	191	743,176	269,145	1,072,649	192,146	116,152	20,177	367,558	37,670	733,703	338,946	.....	42,566	296,380	—78,469
Houston & Texas Central	789	3,147,037	1,458,133	4,979,220	720,193	845,403	190,247	2,136,490	204,150	4,096,483	882,737	—13,735	220,749	648,253	—576,133
Indiana Harbor Belt	105[16]	.....	.....	2,195,651	249,299	242,457	27,756	997,130	73,661	1,590,303	605,348	25,060	43,897	586,511	303,723
International & Great Northern	1,160	5,174,580	1,398,054	7,018,607	774,641	834,190	175,992	2,794,463	235,039	4,814,325	2,204,282	—3,012	212,500	1,988,770	.....
Kanawha & Michigan	177[17]	2,211,475	287,313	2,552,363	315,361	460,050	22,030	771,964	66,238	1,635,643	916,720	—0	87,705	829,015	—124,903
Lake Erie & Western	886	3,653,216	754,102	4,667,115	662,213	824,584	123,792	1,865,042	109,948	3,585,579	1,081,536	.....	195,296	886,240	179,322
Lake Shore & Michigan Southern	1,775[18]	27,572,028	9,597,102	42,083,375	4,431,099	5,932,976	826,646	14,027,999	775,943	25,994,663	16,088,712	- 23,519	1,423,939	14,641,254	5,239,199
Louisiana Ry. & Navigation	351	1,216,673	227,726	1,556,523	251,679	144,634	60,764	616,883	66,504	1,140,464	416,059	.....	48,200	367,859	97,136
Michigan Central	1,817[19]	17,133,157	6,533,092	26,203,845	2,862,137	3,168,082	642,220	10,308,915	454,764	17,436,118	8,767,727	27,145	1,146,371	7,648,501	2,985,826
Missouri, Kansas & Texas	1,744[20]	9,377,514	3,591,342	13,829,782	1,716,289	2,044,565	357,743	4,601,690	415,361	9,135,648	4,694,134	—13,136	562,954	4,118,044	—222,478
Missouri, Kansas & Texas of Texas	1,346[21]	5,693,293	3,078,653	9,368,217	1,911,950	976,767	247,096	4,977,170	305,905	8,418,888	949,329	—11,131	265,974	672,224	—1,226,907
Missouri Pacific	3,918[22]	14,679,008	3,866,358	20,386,273	3,436,766	3,623,514	593,663	9,507,970	710,290	17,872,203	2,514,070	—37,391	882,794	1,593,885	—26,329
Mobile & Ohio	1,114	7,534,909	1,198,930	9,306,404	1,106,522	1,707,735	342,961	3,386,431	318,877	6,862,526	2,443,878	—9,700	256,390	2,177,788	—273,307
Minneapolis, St. Paul & S. S. Marie	3,770[23]	15,877,034	4,712,829	21,846,340	2,065,351	2,772,454	454,767	7,241,835	456,990	12,991,397	8,854,943	76,839	1,314,105	7,617,677	2,689,514
Nashville, Chattanooga & St. Louis	1,230[24]	7,011,317	2,442,406	10,161,867	1,497,276	1,880,025	381,924	3,749,998	261,941	7,771,164	2,390,703	—9,457	250,094	2,131,152	—211,065
New Orleans, Texas & Mexico	277[25]	1,021,015	185,308	1,285,974	255,170	153,615	38,416	569,273	68,148	1,084,622	201,352	.....	3,473	197,879	37,943
New York, Ontario & Western	566[26]	5,602,170	1,375,829	7,265,135	1,058,995	1,278,212	101,649	2,899,292	170,321	5,508,469	1,756,666	—16,318	179,167	1,561,181	437,409
New York, Susquehanna & Western	152	1,655,464	489,457	2,422,698	222,236	230,141	18,846	962,972	50,048	1,484,243	938,455	- 10,425	178,736	749,294	155,335
Northwestern Pacific	402[27]	1,135,707	1,518,745	2,870,724	499,658	401,154	33,253	1,056,871	96,361	2,087,297	783,427	.....	119,519	663,908	110,246
Pecos & Northern Texas	479[28]	1,294,095	334,161	1,712,981	225,110	347,675	26,194	600,819	56,996	1,256,794	456,187	.....	47,564	408,623	79,134
Peoria & Eastern	352	1,878,201	589,010	2,657,965	346,199	384,739	50,842	1,114,772	57,493	1,954,045	703,920	.....	97,403	606,517	13,051
Philadelphia & Reading	1,015[29]	29,981,387	5,748,234	37,399,361	3,230,317	6,897,462	409,096	12,353,799	665,408	23,556,082	13,843,279	275,773	900,344	13,218,708	59,237

‡ Figures shown here are for period September 16, 1911, to April 30, 1912.

Operated in previous period—[37] 444; [38] 474; [1] 355; [2] 7,550; [3] 4,434; [4] 2,243; [5] 2,232; [6] 341; [7] 2,005; [8] 246; [9] 1,979; [10] 1,173; [11] 2,556; [12] 317; [13] 612; [14] 585; [15] 350; [16] 113; [17] 176; [18] 1,663; [19] 1,805; [20] 1,737; [21] 1,348; [22] 3,921; [23] 3,764; [24] 1,255; [25] 264; [26] 546; [27] 376; [28] 296; [29] 1,022. — Indicates Deficits, Losses and Decreases.

REVENUES AND EXPENSES OF RAILWAYS.

TEN MONTHS OF FISCAL YEAR, 1912—(CONTINUED).

Name of road.	Mileage operated at end of period.	Operating revenues: Freight.	Passenger.	Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Pittsburgh & Lake Erie	215	$11,660,582	$1,272,318	$13,344,022	$1,453,242	$2,116,386	$128,534	$3,244,432	$237,240	$7,179,834	$6,164,188	$3,667	$301,389	$5,859,132	— $544,536
Port Reading	21	1,096,694	.....	1,110,523	80,706	1,636	308	347,372	1,074	431,096	679,427	45,137	38,000	686,564	—31,648
Richmond, Fredericksburg & Potomac	83	1,010,621	798,017	2,057,589	234,756	257,463	28,754	769,345	59,038	1,349,356	708,233	.....	10,940	697,293	—2,298
St. Louis & San Francisco	4,742[29]	21,612,362	9,148,816	33,222,969	3,928,068	4,285,635	885,990	12,122,502	984,338	22,206,533	11,016,436	.....	1,595,538	9,420,898	—374,882
St. Louis, Brownsville & Mexico	510[31]	1,232,926	591,910	1,976,801	389,455	140,515	32,780	695,340	74,678	1,332,768	644,033	.....	54,234	589,799	280,151
St. Louis, Iron Mountain & Southern	3,315[32]	18,390,102	5,091,800	25,220,340	3,911,858	3,464,726	535,842	8,350,191	710,484	16,973,101	8,247,239	—55,770	919,630	7,271,839	544,726
St. Louis Southwestern	912[33]	4,952,926	1,097,108	6,425,663	609,571	1,071,729	282,570	1,619,211	254,417	3,837,498	2,588,165	—9,367	237,339	2,341,459	—161,836
St. Louis Southwestern of Texas	703	2,597,650	842,469	3,692,209	578,812	828,111	123,806	1,506,001	175,317	3,212,047	480,162	—2,832	106,497	370,833	385,658
San Pedro, Los Angeles & Salt Lake	1,116[34]	4,425,217	2,451,056	7,349,199	1,114,132	1,709,846	316,820	2,828,561	173,315	6,142,474	1,206,725	—38,798	245,865	922,062	—103,469
Seaboard Air Line	3,070[35]	12,978,008	4,296,532	19,255,349	2,757,459	2,707,705	599,829	6,961,221	572,715	13,598,929	5,656,420	—16,965	757,000	4,882,455	—589,021
Southern in Mississippi	281	571,888	309,581	951,093	233,358	90,520	23,755	382,126	40,429	770,188	180,905	.....	47,848	133,057	—48,729
Southern Kansas of Texas	125	938,541	160,383	1,149,064	157,420	241,128	20,481	429,272	40,405	888,706	260,358	.....	26,044	234,314	—74,913
Southern Pacific Co.	6,281[36]	44,396,080	26,039,014	75,663,361	8,428,758	9,339,321	1,798,167	21,920,660	1,948,039	43,434,945	32,228,416	181,586	3,416,939	28,993,063	—617,636
Sunset Railway	59	55,720	19,159	78,741	15,920	1,652	46	29,132	2,205	48,955	29,786	.....	4,592	25,194	.....
Tennessee Central	294	864,008	324,773	1,265,262	234,924	178,665	53,540	473,023	80,773	1,020,925	244,337	.....	42,091	202,246	—179,884
Texas & New Orleans	458	2,132,157	852,184	3,181,956	522,917	720,703	81,789	1,296,545	105,799	2,727,753	454,203	—4,080	144,246	305,877	—208,737
Texas & Pacific	1,885	10,252,954	3,488,854	14,649,600	1,659,809	2,082,406	306,112	6,377,217	459,921	10,885,465	3,764,135	—32,051	618,447	3,113,637	376,906
Toledo & Ohio Central	441[37]	3,594,209	531,992	4,320,393	681,280	661,761	65,260	1,544,543	83,131	3,035,975	1,284,418	—8,230	205,272	1,070,916	—93,810
Toledo, Peoria & Western	248	639,675	373,657	1,074,017	165,340	241,796	23,196	412,606	33,962	876,900	197,117	.....	48,600	148,517	—13,758
Ulster & Delaware	129	525,521	302,905	871,742	118,363	115,386	13,861	361,674	24,940	634,224	237,518	784	33,000	205,302	—12,225
Vicksburg, Shreveport & Pacific	171	704,451	393,215	1,209,660	228,887	216,761	32,014	385,536	46,814	910,012	299,648	—1,644	67,971	230,033	—80,921
Virginia & Southwestern	240	1,277,418	134,937	1,446,962	174,156	294,726	18,324	420,483	38,110	945,799	501,163	.....	49,586	451,577	146,148
Virginian	475[38]	3,656,111	216,982	3,985,488	503,052	719,361	50,542	1,103,650	79,506	2,456,111	1,529,377	51,074	159,000	1,421,451	343,239
Wabash	2,515	15,931,173	5,813,472	23,646,100	2,924,702	4,296,263	780,908	10,060,157	722,792	18,784,822	4,861,278	—22,733	708,318	4,130,227	—1,650,931
Washington Southern	36	327,292	392,204	957,250	120,584	105,847	12,452	370,091	27,467	636,441	320,809	.....	32,449	288,360	—32,106
Western Pacific	935	3,292,764	905,386	4,340,422	808,651	402,664	281,270	1,815,292	232,341	3,540,218	800,204	—33,571	151,377	615,256	.....
Western Ry. of Alabama	133	682,682	413,845	1,191,555	193,657	220,356	53,722	343,296	61,530	872,561	318,994	62	46,124	272,932	37,464
Wheeling & Lake Erie	457	5,303,683	508,182	6,196,445	721,481	1,168,086	78,877	2,071,646	140,497	4,175,587	2,020,858	24,244	300,785	1,744,317	305,426

† Figures shown here are for period March 21 to April 30, 1912, inclusive.
Operated in previous period [30] 4,732; [31] 501; [32] 3,313; [33] 797; [34] 1,105; [35] 3,046; [36] 6,187; [37] 444; [38] 474. — Indicates Deficits, Losses and Decreases.

TEN MONTHS OF FISCAL YEAR, 1912—(CONTINUED FROM LAST WEEK).

Name of road.	Mileage operated at end of period.	Operating revenues: Freight.	Passenger.	Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Norfolk Southern	608	$1,782,303	$691,622	$2,680,688	$311,542	$321,450	$54,737	$877,377	$132,171	$1,697,277	$983,411	—$4,667	$75,000	$903,744	$23,862
Northern Central	473[26]	8,003,109	1,907,768	10,544,392	1,172,025	2,262,410	148,682	5,312,436	246,914	9,142,467	1,401,925	4,569	386,720	1,019,774	—96,483
Northern Pacific	6,032[27]	30,624,406	12,693,401	52,781,962	6,133,532	5,957,362	980,212	17,431,353	835,287	31,337,746	21,444,216	274,322	2,800,309	18,918,229	—314,023
Oregon Short Line	1,762[28]	12,424,906	3,808,779	17,302,746	1,977,215	1,672,739	281,622	4,272,659	356,187	8,560,422	8,742,324	—7,318	1,062,690	7,672,316	376,533
Oregon-Washington R. R. & Nav. Co.	1,920[29]	8,572,202	4,092,887	13,623,635	1,782,173	1,448,873	441,649	4,880,156	446,787	8,999,638	4,623,997	4,563	999,141	3,629,419	2,394,920
Pennsylvania Co.	1,760[30]	32,791,802	7,288,553	43,942,925	6,053,602	8,125,335	761,155	15,845,862	885,467	31,671,421	12,271,504	—24,264	1,953,687	10,293,553	—932,596
Pennsylvania Railroad	4,018[31]	98,627,772	28,321,604	135,932,836	15,345,179	27,214,324	1,860,394	50,559,708	3,446,443	98,426,048	37,506,788	—1,253,367	5,893,477	30,359,944	—389,799
Pere Marquette	2,330[32]	9,420,535	3,399,633	13,978,727	1,714,221	2,347,598	350,058	6,571,499	333,101	11,316,477	2,662,250	—48,572	562,324	2,051,354	35,094
Philadelphia, Baltimore & Washington	713	7,726,013	6,510,046	15,875,549	2,196,365	2,730,094	278,958	6,722,032	392,581	12,320,030	3,555,519	.....	501,258	3,054,261	—53,062
Pittsburgh, Cincinnati, Chic. & St. Louis	1,467[33]	23,521,519	6,624,861	33,829,209	4,400,724	6,325,201	677,117	12,369,316	667,017	24,439,975	9,389,234	—8,552	1,264,847	8,115,835	548,388
Pittsburgh, Shawmut & Northern	278[34]	1,114,831	86,596	1,221,010	141,099	255,599	10,936	370,202	40,834	818,670	402,340	.....	15,739	386,601	190,776
Rutland	468	1,536,889	986,137	2,853,977	335,126	464,716	72,662	1,144,014	65,434	2,081,953	772,024	.....	113,080	658,944	30,962
St. Joseph & Grand Island	319	857,179	340,197	1,317,114	221,381	228,558	49,439	591,672	55,501	1,146,551	170,563	1,054	68,067	103,550	—15,126
St. Louis Merchants' Bridge Terminal	9	.....	3,188	1,467,890	235,041	87,064	4,513	810,991	51,669	1,189,278	278,612	.....	57,732	220,880	—78,289
St. Louis, San Francisco & Texas	244	770,818	270,208	1,110,069	183,761	150,814	30,134	505,407	49,248	919,364	190,705	.....	10,756	179,949	—189,701
San Antonio & Aransas Pass	727	2,658,574	989,574	3,864,947	651,432	474,724	57,777	1,448,420	99,877	2,732,230	1,132,717	.....	111,000	1,021,717	246,132
Southern	7,090[35]	35,098,466	14,134,306	53,493,345	6,487,069	8,479,644	1,402,798	18,515,882	1,583,355	36,468,748	17,024,597	68,802	2,039,127	15,054,272	311,418
Syracuse, Binghamton & New York	81	518,162	335,188	969,340	118,199	77,113	27,888	367,323	23,642	614,165	355,175	.....	64,600	290,575	—36,016
Terminal R. R. Ass'n of St. Louis	35[36]	.....	2,460	2,283,356	352,510	236,130	7,064	860,878	56,300	1,512,882	770,474	91,199	273,010	588,663	—104,053
Toledo, St. Louis & Western	451	2,697,047	354,072	3,256,666	357,659	567,690	82,247	1,198,925	85,489	2,292,010	964,656	.....	149,500	815,156	—32,867
Trinity & Brazos Valley	463	1,845,951	368,102	2,290,590	413,863	287,200	96,163	1,053,135	113,560	1,963,921	326,669	.....	42,838	283,831	173,326
Union Pacific	3,537[37]	27,425,246	8,476,002	39,659,991	3,766,277	5,059,037	1,032,693	11,686,454	1,071,925	22,616,386	17,043,605	—28,808	1,683,532	15,331,265	—3,454,816
Union R. R. of Baltimore	9	1,029,001	204,401	1,249,817	97,020	.....	8,087	56,032	25,271	186,410	1,063,407	.....	57,194	1,006,213	—46,980
Union R. R. of Pennsylvania	31	.....	.....	3,390,133	326,095	798,910	1,020	1,282,779	35,549	2,444,353	945,780	34,054	62,823	917,011	359,409
Vandalia	827	5,496,338	2,015,870	8,436,811	1,128,927	1,676,162	252,972	3,395,346	187,709	6,641,116	1,795,695	.....	282,717	1,512,978	—256,569
West Jersey & Seashore	356[17]	1,592,991	3,317,138	5,240,428	811,184	898,135	133,320	2,283,899	113,402	4,239,940	1,000,488	—36,366	260,449	703,673	—280,229
Western Maryland	543	5,001,176	769,233	6,016,431	676,500	755,987	100,322	2,223,120	137,834	3,893,763	2,122,668	—396	210,000	1,912,272	—200,911
Yazoo & Mississippi Valley	1,372	5,560,314	2,103,033	8,281,082	1,598,254	1,241,570	161,533	3,369,170	265,002	6,635,529	1,645,553	—73	376,804	1,268,676	—1,418,916

Operated in previous period—[26] 469; [27] 6,029; [28] 1,646; [29] 1,737; [30] 1,416; [31] 3,977; [32] 2,334; [33] 1,468; [34] 240; [35] 7,039; [36] 34; [37] 3,473; [38] 353. —Indicates Deficits, Losses and Decreases.

REVENUES AND EXPENSES OF EXPRESS COMPANIES AS REPORTED TO THE INTERSTATE COMMERCE COMMISSION.

MONTH OF OCTOBER, 1911.

	Miles of line covered.		Express revenue.	Gross receipts from operation.	Less express privileges. Dr.	Total operating revenues.	Operating expenses.				Net operating revenue (or deficit —).	Taxes.	Operating income (or loss —).	Increase or decr. (—) comp. with last year.
	Steam roads.	Other lines.					Maintenance.	Traffic.	Transportation.	General.	Total.			
Adams Express Co.	33,043	4,707	$3,028,259	$3,066,474	$1,553,702	$1,512,772	$883,106	$8,024	$1,102,455	$96,766	$1,290,351	$222,421	$203,238	—$40,377
American Express Co.	54,660[2]	2,255	3,797,390	3,944,811	1,895,807	2,049,004	62,447	29,527	1,483,539	136,343	1,711,856	337,148	303,751	2,621
Canadian Northern Express Co.	3,551[1]	22	49,526	51,452	19,811	31,641	106	363	14,591	1,371	16,431	15,210	215	2,158
Canadian Express Co.	6,261[4]	830	248,573	255,097	119,933	135,164	3,589	864	100,092	7,461	112,006	23,158	2,250	20,908	—3,669
Globe Express Co.	2,904[5]	...	62,008	62,635	30,532	32,103	441	1,644	24,566	4,633	31,284	819	800	19	—5,354
Great Northern Express Co.	8,497[6]	399	261,723	262,499	158,283	104,216	1,764	1,215	69,643	3,943	76,565	27,651	3,471	24,180	—1,605
National Express Co.	1,422	218	108,512	109,041	41,646	67,395	822	...	47,848	3,188	51,858	15,537	485	15,052	—3,350
Northern Express Co.	7,310[7]	315	248,814	252,730	129,081	123,649	1,186	3,105	79,217	5,581	89,089	34,560	4,500	30,060	—40,206
Pacific Express Co.†	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Southern Express Co.	31,879[8]	846	1,306,945	1,334,261	630,957	703,304	36,014	7,828	421,208	57,525	512,585	190,719	14,936	175,783	26,864
United States Express Co.	28,965[9]	3,954	1,922,958	1,951,532	851,011	1,100,521	33,936	17,772	827,851	48,654	928,213	172,308	11,627	160,681	22,988
Wells, Fargo & Co.	63,649[10]	17,339	2,788,432	2,842,521	1,391,194	1,451,322	41,983	33,528	1,053,604	91,814	1,210,929	240,393	14,749	225,644	—85,628
Western Express Co.	4,892[11]	4	98,058	99,807	50,496	49,311	1,030	172	34,369	3,186	40,657	8,654	784	7,870	—942
FOUR MONTHS OF FISCAL YEAR, 1912.															
Adams Express Co.	33,043	4,707	$10,866,668	$10,997,240	$5,567,383	$5,429,857	$285,232	$30,632	$4,241,880	339,112	$4,896,856	$533,001	$78,662	$454,339	—$163,480
American Express Co.	54,660[2]	2,255	13,942,493	14,541,580	6,858,692	7,682,888	212,084	115,096	5,806,155	483,936	6,617,271	1,065,617	123,819	941,798	—84,132
Canadian Express Co.	6,261[4]	830	1,016,368	1,037,439	488,725	548,714	23,746	4,216	379,700	26,344	434,006	114,708	9,000	105,708	—8,381
Canadian Northern Express Co.	3,551[1]	22	177,079	183,289	71,402	111,887	905	1,595	54,817	5,633	62,950	48,937	600	48,337	4,779
Globe Express Co.	2,904[5]	...	299,662	302,078	149,989	152,089	2,499	6,606	101,081	15,626	125,812	26,277	3,200	23,077	—15,523
Great Northern Express Co.	8,497[6]	1,016,407	1,021,240	614,572	406,668	2,321	5,594	273,501	15,358	301,774	104,894	14,046	90,848	—15,045
National Express Co.	1,422	218	450,063	451,770	172,416	279,354	3,704	7	197,092	12,121	212,924	66,430	1,939	64,491	—2,650
Northern Express Co.	7,310[7]	315	1,076,630	1,090,008	553,616	536,392	5,823	12,811	319,422	23,829	361,885	174,507	18,000	156,507	—125,419
Pacific Express Co.†	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Southern Express Co.	31,879[8]	846	4,395,320	4,481,721	2,134,334	2,347,387	74,497	39,018	1,598,929	221,565	1,934,009	413,378	59,353	354,025	1,453
United States Express Co.	28,965[9]	3,954	6,988,600	7,098,893	3,254,652	3,844,241	135,060	67,397	3,235,201	184,999	3,622,657	221,584	41,374	180,210	—205,661
Wells, Fargo & Co.	63,649[10]	17,339	10,142,723	10,327,989	4,875,079	5,452,910	200,184	101,378	3,945,246	310,892	4,557,700	895,210	98,961	796,249	—59,284
Western Express Co.	4,892[11]	4	381,081	387,605	200,196	187,409	4,349	11,789	139,883	13,855	169,876	17,533	3,004	14,529	18,687

†Operations ceased July 31, 1911. Business disbanded.
Operated in previous period: Steam roads—[1] 32,309; [2] 54,898; [3] 6,964; [4] 3,292; [5] 2,837; [6] 7,835; [7] 6,601; [8] 31,595; [9] 28,784; [10] 46,203; [11] 3,506. Other lines—[1] 3,727; [2] 2,659; [3] 381; [4] 261; [5] 816; [6] 3,816; [7] 5,042.

COURT NEWS.

At Baltimore, Md., June 10, P. W. Pitt, a grain broker, charged with forging bills of lading for goods valued at over $200,000, pleaded guilty. Sentence was suspended by the court. Pitt was arrested in Naples, Italy, after a long chase.

The Supreme Court of the United States has adjourned until October. No decisions have been handed down concerning the Union Pacific merger, the suit against the anthracite coal railways, or the suits involving conflicts relative to freight and passenger rates prescribed by state authority and interfering with interstate rates or complained of on that alleged ground.

The Commerce Court has upheld the Interstate Commerce Commission in its order reducing the rate on rough, green, fir lumber from the Willamette valley to San Francisco. The commission had refused to reduce the rate on all other classes of lumber except this cheap grade, which it reduced from $5 per ton to $3.50 per ton. The opinion was by Judge Archbald.

The Commerce Court has dismissed the complaint against the order of the Interstate Commerce Commission, which refused reparation on shipments of coke from West Virginia to Chicago and South Chicago. The court has held that the commission was acting clearly within its powers and that its finding of fact that a rate was reasonable is binding on the court. The opinion was by Judge Carland.

The Commerce Court in the case of the Crane Iron Works v. the Interstate Commerce Commission has upheld the order of the commission refusing the Crane Railroad the right to make joint rates with other railway companies. This is the case in which the commission held that the Crane Railroad was a mere plant facility of the iron works, and was not entitled to a division of freight rate. The court holds that the commission made no error in law, and that its order is therefore binding.

In the Federal Court at Toledo, Ohio, June 11, fines for giving and receiving illegal rebates were imposed by Judge Killetts on the Hocking Valley Railroad Company, $42,000, and on the Sunday Creek Coal Company, $20,000. The contention of the government was that the railway had violated the law relative to rebates when it accepted notes in settlement of freight bills thus virtually giving extended or unlimited credit to the coal company, while other coal companies were required to pay cash. The defendants entered pleas of nolo contendere, making no defense, but probably will appeal.

The Commerce Court has dismissed the complaint against the order of the Interstate Commerce Commission, which order refused to find a rate of $2.10 per ton on coal from the Coal Creek Mines in Tennessee to Augusta, Ga., unreasonable. The present complainants claim that the commission made errors of law, but admit that no one of these errors was sufficient in itself to justify the court in reversing the decision of the commission. The court refuses to amalgamate these alleged errors and to hold that the sum of errors at law, no one of which would justify a reversal, in toto justify a reversal.

Three Reversals of Commerce Court.

The Supreme Court of the United States on Friday, June 7, handed down three decisions overruling the commerce court and reversing its judgment on cases which had come from the Interstate Commerce Commission. In the case of Proctor & Gamble, who had applied to the Interstate Commerce Commission for relief against demurrage charges imposed on private cars and who had been denied any relief by the commission, the commerce court had granted an injunction looking to a reversal of the commission's decision. The commission, backed by the Department of Justice, appealed to the Supreme Court, claiming that the commerce court had no jurisdiction to hear a case in which the commission had denied a petition and had refused to make an order. The opinion of the Supreme Court is by Chief Justice White. He says that the commerce court has no greater power or jurisdiction than that heretofore exercised by the circuit courts.

The Eagle White Lead Company's case involved the same questions as that of Proctor & Gamble, the commission having

refused to grant an order asked for. In both cases the chief justice orders the commerce court to dismiss the suit, for want of jurisdiction. The purpose in establishing the commerce court was to provide for reviewing the action of the Interstate Commerce Commission under proper circumstances; but to sustain the contention of the court in these cases, that it has the power to enjoin a negative order of the commission by assuming that the commission established a new rate, would be to wipe out the entire history of the Interstate Commerce Commisison act and do violence to the very purposes of the act. Such a finding would create disorder and confusion. The important question is whether the commerce court's authority is confined to enforcing or restraining affirmative orders of the commission, or has it the power to exert its own judgment to originally interpret the administrative features of the act, and upon that assumption to treat a refusal of the commission to grant relief as an affirmative order and accordingly pass upon its correctness? These words give the court its authority: "To set aside, annul or suspend any orders of the commission." Giving these words their natural significance we think it follows that they confer jurisdiction only to entertain complaints as to affirmative orders of the commission. If the judgment stands it would result in frustrating the legislative policy which led to the adoption of the act.

In the cases of the Baltimore & Ohio and other roads which had given reduced rates on coal belonging to railway companies and to be used by them, the commission had declared such rates to be an unlawful discrimination; the commerce court on application of the railways enjoined the enforcement of the commission's order. The Supreme Court now reverses this action of the court and sustains the commission.

The Commerce Court has annulled the order of the Interstate Commerce Commission, which enjoins the Louisville & Nashville and the Nashville, Chattanooga & St. Louis from granting re-shipping privileges at Nashville, while refusing to grant them at other points, such as Atlanta, Ga., Columbus, Macon, etc. The court holds that conditions are so substantially different at Nashville from those at the other points that there may properly be a difference in privileges granted to Nashville shippers. The court finds that the especial privileges granted Nashville were compelled by competition, and that there still is potential competition.

A preliminary decree in the case against the St. Louis Terminal Railroad Association in which the Supreme Court recently held that the present organization of the company is in violation of the anti-trust law, was filed in the United States District Court at St. Louis on June 6 by E. C. Crow, special counsel for the government, and the date for hearing arguments on the decree was set for Tuesday, June 11. The proposed decree orders the complete abolition of the so-called bridge arbitrary and provides that St. Louis and East St. Louis be placed in a zone of equal rates. It became evident that the government and the railway cannot agree on a decree, and counsel for the Terminal Association presented preliminary arguments, taking the position that the court has not specifically ordered the abolition of the arbitrary, but that the question of rates may be passed upon by the Interstate Commerce Commission. They also announced their intention of asking that Judge Dyer be disqualified from hearing the case because he appeared as counsel of record for the government when the case was first tried in the circuit court.

The Turkish government has consented to the construction of a line from Uskub via Kalkandele to Gastivar, about 39 miles, by the Oriental Railway Company.

A line is proposed from Barnoldswick, England, to Gisburn. It is estimated that this line will cost $300,000. It is proposed to connect this line with the Lancashire & Yorkshire outside Gisburn.

The North Eastern Railway, England, has two new gasolene motor cars to be used in inspections. The new cars are stationed at Newcastle and at York. They are 23 ft. 6 in. long, and 8 ft. 6 in. wide.

French railways are again buying coal from British collieries. Orders had been sent elsewhere recently, owing to the coal strike. The Paris, Lyons & Mediterranean has ordered 8,000 tons of Welsh coal, to be delivered at Marseilles.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

John Bell, secretary of the Central of Georgia, has resigned. Effective June 30.

R. E. Anderson has been appointed auditor and cashier of the Georgia Coast & Piedmont, with office at Darien, Ga., succeeding F. S. L. Grundy.

L. W. Hill, until recently president of the Great Northern, has been elected chairman of the board, succeeding James J. Hill, resigned. Effective July 1.

Joseph Ramsey has been elected president of the Wheeling & Lake Erie, and G. P. Rust, of Cleveland, and R. E. Slaven, of New York, vice-presidents. See Railway Financial News.

H. Ernest, formerly auditor of freight receipts of the Chicago Great Western, at Chicago, has been appointed chief of the bureau of agency accounts of the Wells, Fargo & Company Express, with office at Chicago.

L. S. Storrs has been appointed a vice-president of the New York, New Haven & Hartford, with such duties as may be especially assigned to him by the president, with office at New Haven, Conn. Mr. Storrs' especial assignment is to relieve the president in connection with six street railways and power systems controlled by the company in Massachusetts, Rhode Island and Connecticut.

J. J. Turner, second vice-president of the Pennsylvania Lines West, has been elected also president of the Lake Erie & Pittsburg, and W. C. Brown, president of the New York Central Lines, has been elected also vice-president of the Lake Erie & Pittsburgh, a new joint line extending from the Cleveland Short Line near Cleveland, Ohio, south to a connection with the Baltimore & Ohio, 40 miles.

A. Hermany, auditor of passenger traffic of the Chicago, Rock Island & Pacific and the St. Paul & Kansas City Short Line at Chicago, has been appointed auditor of disbursements, with office at Chicago, succeeding L. K. Luff, resigned to accept service with another company. C. G. Weaver, auditor of freight traffic, succeeds Mr. Hermany, and Paul Peters, assistant auditor of freight traffic, succeeds Mr. Weaver.

John W. Nokely, whose appointment as general auditor of the Chesapeake & Ohio lines, with headquarters at Richmond, Va., has been announced in these columns, was born on December 5, 1871, and was educated in the public schools of his native town. He graduated from high school in 1888, and began railway work on January 8, 1891, as statistical clerk in the auditor's office of the Chesapeake & Ohio at Richmond. In May, 1896, he was appointed traveling auditor, and in February, 1907, was made special accountant of the same company. From June 1, 1909, to November of the same year he was with the Interstate Commerce Commission as an examiner of accounts, and then returned to the Chesapeake & Ohio as special accountant. In December, 1909, he was appointed assistant secretary and assistant treasurer of the same company, at New York, which position he held at the time of his recent appointment as general auditor, with headquarters at Richmond.

Harry G. Clark, whose appointment as assistant to second vice-president of the Chicago, Rock Island & Pacific, with office at Chicago, has been announced in these columns, was born July 8, 1875, at Leavenworth, Kan. He graduated as a civil engineer from the University of Kansas in 1898, and began railway work in September of that year with the Atchison, Topeka & Santa Fe as a chairman on the Kansas lines. Later he went with the Chicago, Burlington & Quincy as rodman on construction and transitman on location in Iowa during double tracking in that state, and in October, 1900, went with the Choctaw, Oklahoma & Gulf, now the Chicago, Rock Island & Pacific, at Little Rock, Ark. He was consecutively resident engineer, division engineer, first of the Western division of the C. O. & G. and then of the Pan Handle and Arkansas divisions of the Chicago, Rock Island & Pacific, and district engineer of the Choctaw district of the Rock Island from September, 1905, to October, 1909. He was train-

master of the Arkansas and Oklahoma divisions from October, 1909, until his present appointment as assistant to second vice-president, giving special attention to all matters pertaining to maintenance of way and structures.

Operating Officers.

M. W. Jones, acting trainmaster of the Guayaquil & Quito, has been appointed trainmaster, with headquarters at Huigra, Ecuador.

H. F. Burch has been appointed assistant trainmaster of the Saratoga division of the Delaware & Hudson with office at Albany, N. Y.

J. P. Linton has been appointed general manager of the Blakely Southern Railroad, with office at Blakely, Ga., succeeding E. Morris, resigned to go to another company.

M. L. Masteller has been appointed superintendent of the Mexico North-Western, with office at Madera, Chih., Mexico, succeeding D. F. Bucher, resigned on March 31.

E. E. Gray, chief despatcher of the First division of the Denver & Rio Grande, at Pueblo, Colo., has been appointed assistant superintendent of the Third division, with headquarters at Gunnison.

A. E. Fontaine has been appointed chief train despatcher of the Quebec, Montreal & Southern and the Napierville Junction, with office at Sorel, Que., succeeding W. M. Ross, resigned to go to the Canadian Northern Quebec.

M. V. Hynes, engineer of maintenance of way of the Cincinnati, Hamilton & Dayton at Cincinnati, Ohio, has been appointed superintendent, with office at Dayton, Ohio, succeeding E. E. Cain, resigned to go with the Pere Marquette.

A. B. Apperson, general superintendent and traffic manager of the Castle Valley Railroad at Salt Lake City, Utah, and formerly division superintendent of the Denver & Rio Grande, has been appointed general superintendent of the Utah lines of the Denver & Rio Grande, with office at Salt Lake City, succeeding J. W. Mulhern, resigned.

W. L. Blair, superintendent of transportation of the New York, Chicago & St. Louis, at Cleveland, Ohio, has been appointed assistant to the general manager. R. W. Mitchener, superintendent of the Cleveland division, at Cleveland, succeeds Mr. Blair, and G. C. Todd, superintendent of telegraph at Cleveland, succeeds Mr. Mitchener.

A. V. Brown, superintendent of the Montana division of the Northern Pacific at Livingston, Mont., has been appointed superintendent of the Lake Superior division, with office at Duluth, Minn., succeeding K. M. Nicoles, transferred. B. O. Johnson, superintendent of the Fargo division at Dilworth, Minn., succeeds Mr. Brown, and K. M. Nicoles succeeds Mr. Johnson.

M. E. Lucas, trainmaster of the Rock Island lines, in charge of subdivision 50 of the Indian Territory division at Haileyville, Okla., has been appointed trainmaster, with office at El Reno, Okla., succeeding H. G. Clark, promoted; and H. F. Reddig, trainmaster at Haileyville in charge of subdivision 49, 49-A, 50-A and 50-B, has had his jurisdiction extended to cover subdivision 50, succeeding Mr. Lucas.

A change has been made in the operating organization of the Pere Marquette by which the S. T. & H. division and the Ionia territory have been combined as the Saginaw-Ionia district; and the line from Toledo to Bay City, Saginaw to Ludington and the Saginaw terminals have been made the Toledo-Ludington district. A. R. Merrick, superintendent of the Saginaw division at Saginaw, has been appointed superintendent of the Saginaw-Iowa district, with office at Saginaw, succeeding J. E. Church, assigned to other duties, and the office of superintendent at Ionia, Mich., has been abolished. E. E. Cain, superintendent of the Cincinnati, Hamilton & Dayton at Dayton, Ohio, has been appointed superintendent of the Toledo-Ludington district, with office at Saginaw, succeeding Mr. Merrick.

William J. English, whose appointment as superintendent of the Susquehanna and Tioga divisions of the Erie Railroad, with headquarters at Hornell, N. Y., has been announced in these columns, was born in February, 1874, at East Mauch Chunk, Pa., and was educated in the common schools. Mr. English began railway work in March, 1888, as a telegraph operator on the Lehigh Valley, and remained with that company until 1893, when he went to the Erie in the same capacity, and ever since has been in the service of that company. In 1901, he was promoted to despatcher, and three years later was made chief despatcher, becoming trainmaster in 1907. Mr. English was appointed assistant superintendent in 1911, with headquarters at Jersey City, N. J., which position he held at the time of his recent appointment as superintendent, as above noted.

John B. Hammill, whose appointment as superintendent of the Boston division of the Boston & Albany, with headquarters at Boston, Mass., has been announced in these columns, was born in July, 1874, at Needham, Mass., and was educated in the public schools. He entered the service of the Boston & Albany at the age of 18 as a telegraph operator, and soon afterwards became train despatcher, from which position he was promoted in February, 1904, to trainmaster, with headquarters at Boston. For about two years he was passenger trainmaster, with authority over the entire system from Boston to Albany, which position he held until his recent appointment as superintendent of the Boston division of the same road. Mr. Hammill will have charge of all the main line and of the branches between Boston and Springfield.



J. B. Hammill.

Charles A. Allen, whose appointment as assistant to the general superintendent of the Erie Railroad, with office at Galion, Ohio, has been announced in these columns, was born on a farm near Paris, Ill., and was educated in the country schools. Mr. Allen began railway work in 1872 as a laborer on the Indianapolis & St. Louis, and was afterwards trainman, brakeman and conductor on that road until it was absorbed by the Cleveland, Columbus, Cincinnati & Indianapolis, which later became a part of the Cleveland, Cincinnati, Chicago & St. Louis. He was then appointed assistant trainmaster of the St. Louis division of the Cleveland, Cincinnati, Chicago & St. Louis, and was later made trainmaster of the Indianapolis division. He left that company to go to the New York, Pennsylvania & Ohio, and ever since has been in the service of that company and its successor, the Erie Railroad. He was trainmaster of the Third and Fourth divisions at Galion, Ohio, for four years, then superintendent of these divisions, and at the time of his recent appointment as assistant to the general superintendent, he was superintendent of the Cincinnati division of the Erie.



C. A. Allen.

W. S. Becker, whose appointment as general superintendent of the Western General division of the Norfolk & Western, with office at Bluefield, W. Va., has been announced in these columns,

was born in 1857, at Selma, Ala. In 1879, he began railway work as a brakeman on the Union Pacific, and became a conductor in 1880. He went to the Yellowstone division of the Northern Pacific in 1882, and held various positions with that company until he was made assistant superintendent in 1891. He entered the service of the Norfolk & Western as assistant trainmaster of the Pocahontas division in 1898, and a few months later was promoted to trainmaster on the Radford division, and in 1901 was made chief clerk to L. E. Johnson, then general manager. In 1903 he was promoted to superintendent of the Norfolk division. He was transferred in August, 1905, as superintendent to the Pocahontas division, which position he held at the time of his recent appointment as general superintendent as above noted.

Traffic Officers.

H. R. Whiting has been appointed commercial agent of the Louisiana & Arkansas, with office at Alexandria, La., succeeding H. D. Graham, resigned.

C. B. Woodul has been appointed assistant general freight and passenger agent of the Muscatine North & South, with headquarters at Muscatine, Iowa.

R. N. Golden has been appointed traveling agent of the Chicago & North Western, with headquarters at Cincinnati, Ohio, succeeding J. A. Ritchie, deceased.

E. G. Hayden, traveling passenger agent of the Chicago, Milwaukee & St. Paul at Cleveland, Ohio, has been appointed district passenger agent, with office at Cleveland.

James B. Blanton has been appointed soliciting freight agent of the Texas & Pacific, with office at Dallas, Tex., succeeding W. M. Bottorff, resigned to engage in private business.

F. P. Crawford has been appointed division freight and passenger agent of the Chicago Great Western, with headquarters at Chicago, succeeding George A. Smith, resigned to engage in other business.

W. L. Griner, soliciting freight agent of the New York Central Lines at Salt Lake City, Utah, has been appointed traveling freight agent, in charge of the company's wool business. LeRoy Adamson succeeds Mr. Griner.

J. T. Bridwell, traveling freight agent of the Illinois Central at Cleveland, Ohio, has been appointed commercial agent, with office at Cleveland, succeeding E. Doul, deceased, and E. W. Stafford succeeds Mr. Bridwell.

C. H. Gulick, soliciting freight agent of the Lehigh Valley, at Auburn, N. Y., has been appointed commercial agent, with office at Newark, N. J., succeeding A. B. Walmsley, resigned. D. J. Sims succeeds Mr. Gulick.

O. F. Higginson, formerly trainmaster on the Albuquerque division of the Atchison, Topeka & Santa Fe Coast lines at Winslow, Ariz., has been appointed passenger and freight agent, with headquarters at San Diego, Cal.

J. D. Boylston, traveling freight agent of the Atlanta, Birmingham & Atlantic, at Atlanta, Ga., has been appointed commercial agent, with office at Nashville, succeeding M. S. Flanigan, resigned to go into other business, and M. M. Sanders has been appointed soliciting freight agent, with office at Nashville, succeeding Raymond Boatwright.

J. E. Anderson has been appointed commercial agent of the Cleveland, Cincinnati, Chicago & St. Louis, with office at Detroit, Mich., succeeding H. H. Squire, resigned. G. C. Chamberlain, soliciting freight agent at Chicago, has been appointed traveling freight agent, with office at Chicago, succeeding H. T. Yeaton, promoted. E. C. Bywater succeeds Mr. Chamberlain.

W. H. Morton, soliciting agent of the Louisville & Nashville, at Nashville, Tenn., has been appointed traveling freight agent, with office at Kansas City, Mo., succeeding H. D. Hughes, resigned to engage in other business. Leo Bolster succeeds Mr. Morton, with office at Nashville. H. S. Daniels, contracting agent at Atlanta, Ga., has been appointed general agent, with headquarters at Knoxville, Tenn., succeeding J. P. McBride, deceased; and A. L. Burnet succeeds Mr. Daniels.

C. A. Sullivan, commercial agent of the Wheeling & Lake Erie at Cleveland, Ohio, has been appointed general agent, with office at Toledo, Ohio, and the joint freight agency of the W. & L. E. and the Wabash at Toledo has been abolished. R. F. Smith, traveling freight agent at Cleveland, succeeds Mr. Sullivan; and W. D. Morley, chief contracting agent at Cleveland, succeeds Mr. Smith. M. A. Hagerty, contracting freight agent at Detroit, Mich., has been transferred to Toledo.

A. J. Morriss, traveling freight agent of the Houston & Texas Central at Dallas, Tex., has been appointed traveling freight agent of that road, the Galveston, Harrisburg & San Antonio, the Texas & New Orleans, the Houston East & West Texas and the Houston & Shreveport, with office at Houston, Tex. As has been announced in these columns, R. E. Lay has been appointed traveling freight agent at Dallas, succeeding Mr. Morriss. C. M. Reeves, city ticket agent at Austin, Tex., has been appointed division freight and passenger agent, with headquarters at Austin, succeeding W. R. Smith, promoted.

W. C. Lewis, division freight agent of the Michigan Central at Chicago, has been appointed division freight agent, with office at Bay City, Mich., succeeding J. A. Ferguson, resigned, and G. M. Weaver, assistant general freight agent at Detroit, Mich., succeeds Mr. Lewis. As has been announced in these columns, F. H. Thompson, general agent at Detroit, has been appointed assistant general freight agent, succeeding Mr. Weaver. R. P. Hurley, commercial agent of the Lake Shore & Michigan Southern at Toledo, Ohio, succeeds Mr. Thompson. This corrects the item in our issue of May 24, page 1178, which stated that William Rogers succeeded Mr. Thompson and that Mr. Weaver had been made district freight agent.

Guy Tombs, general freight and passenger agent of the Canadian Northern lines east of Ottawa, Ont., in Ontario and Quebec, with office at Montreal, Que., has been appointed general freight agent. R. L. Fairbairn, assistant general passenger agent, at Toronto, Ont., has been appointed general passenger agent, with office at Toronto, and James Morrison has been appointed assistant general passenger agent, with office at Montreal. F. A. Young, commercial agent at Chicago, has been appointed division freight agent at Toronto. R. H. Bell, commercial agent at Pittsburgh, Pa., has been appointed general agent at Chicago. A. E. Hodgins has been appointed general agent at Pittsburgh. J. H. McKinnon, commercial agent at St. Paul, Minn., has been appointed general agent, with office at St. Paul, and John A. Tait, city freight agent at Regina, Sask., has been appointed district freight agent with office at Regina.

Engineering and Rolling Stock Officers.

Glenn Warner has been appointed fuel inspector of the Pere Marquette, with office at Detroit, Mich.

Peter McQuaid, roundhouse foreman of the Prince Edward Island Railway, has been appointed master mechanic, with office at Charlottetown, Prince Edward Island.

J. E. Tierney has been appointed master mechanic of the Louisiana & Arkansas, with office at Stamps, Ark., succeeding A. J. Wade, resigned on account of ill health.

T. S. Murray, roadmaster of the Mexico North-Western at Madera, Chih., has been appointed general roadmaster, with office at Ciudad Juarez, Chih., succeeding A. Howren, resigned.

Samuel G. Thomson, acting superintendent of motive power and rolling equipment of the Philadelphia & Reading, and subsidiary companies, at Reading, Pa., has been appointed superintendent of motive power and rolling equipment, with office at Reading.

M. V. Hynes, engineer of maintenance of way of the Cincinnati, Hamilton & Dayton at Cincinnati, Ohio, having been promoted to superintendent, H. B. Dick, engineer of maintenance of way of the Baltimore & Ohio at Cincinnati, has had his jurisdiction extended over the C. H. & D.

J. R. Stephens, whose appointment as chief engineer of the Missouri Pacific-Iron Mountain system, with office at St. Louis, Mo., has been announced in these columns, graduated from the Stevens Institute of Technology in 1878. He began railway work with the Oregon Railway & Navigation Company in 1880, and has been engaged in railway engineering work ever since, having worked in various parts of the United States and Canada, as well as in South Africa and Mexico. He was with the Northern Pacific for a time; also with the Atchison, Topeka & Santa Fe,

the Denver & Rio Grande and the Grand Trunk. About a year ago Mr. Stephens was appointed assistant chief engineer of the Missouri Pacific-Iron Mountain system, from which position he has just been promoted to chief engineer.

Purchasing Officers.

D. A. Williams, general storekeeper of the Baltimore & Ohio, at Baltimore, Md., has had his authority extended over the Cincinnati, Hamilton & Dayton.

Special Officers.

A. McFatridge, agent of the Southern Railway at Princeton, Ind., has been appointed inspector of agencies, with headquarters at Mount Vernon, Ill., his territory to include all stations on the St. Louis division between St. Louis and Louisville.

OBITUARY.

James K. Geddes, general manager and chief engineer of the Ohio River & Western, with office at Woodsfield, Ohio, died on June 6, at his home in Zanesville.

Thomas C. Burke, traveling passenger agent of the Baltimore & Ohio, at Wheeling, W. Va., died on June 1, at his home at Elm Grove, a suburb of Wheeling.

W. A. Amory, assistant auditor of the Chicago, Burlington & Quincy lines east of the Missouri river, with office at Chicago, died at his home in Chicago on June 9. He was 74 years of age.

James Stephenson, formerly for a number of years general superintendent of the Grand Trunk, with headquarters at Montreal, Que., died recently at Walton Park, near Cleveden, England, where he had lived since his retirement from the Grand Trunk service. Mr. Stephenson was born in 1838, and was educated in England. He went to Canada in 1856, and entered the service of the Grand Trunk as a telegraph operator. Mr. Stephenson held various positions, finally rising to be general superintendent. He was retired under the pension rules of the company about 14 years ago.

A preliminary survey is being made of the country between Karachi, India, and Guadur, over which a part of the projected Trans-Persian railway will be built if the Russian and British governments can agree upon conditions.

Surveys have been completed for the railway between Bagdad, Asiatic Turkey, and Mosul. A large corps of engineers has been in Bagdad all winter and expects to start construction work at Bagdad by July 1 and build toward Mosul, whether the plans have been approved by that time or not. Three or more vessels will be put on the Tigris by the construction company to carry the supplies.

The engineers are still at work surveying for a railway from the Red Sea at Jedda, Arabia, eastward some 50 miles to Mecca, the route over which pilgrims pass who arrive by sea. Nothing is now said of the extension of the Hedschas railway from Medina southward to Mecca, some 250 miles, which was part of the original plan of this line, planned wholly for the use of pilgrims. Nearly the whole length of this line, from a point a little south of Damascus, is over desert. The travel over it in the five years it has been open has been disappointing. In this time 205,000 pilgrims from the North visited the holy cities, of whom 160,000 came by water to Jedda, and only 45,000 by the Hedschas railway. On their return 75,000 took the railway and 110,000 the steamers.

A bill has been introduced in the Roumanian parliament authorizing the district of Prahova to grant a concession for constructing and operating an extension of the private railway from Ploeshti to Valeni de Munte as far as Maneciu-Ungureni, and to contract a loan of $500,000 for the purpose, which is to be issued as necessary. The new line is to be built in two sections, from Valeni to Homoraeni and from Homoraeni to Maneciu-Ungureni, and work on the second section is not to begin until after the first is in operation. The estimated cost of the first section is $360,000 and of the second section $240,000, the income derived from the whole line from Ploeshti being applied in connection with the proceeds of the loan. The object is to open up additional petroleum lands.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

THE KANSAS CITY SOUTHERN has ordered one Shay locomotive from the Lima Locomotive & Machine Company. This will be the largest Shay locomotive ever built. It will weigh 330,000 lbs., and will be built to move 250 tons around a city street corner with a 60-deg. curve on a 7 per cent. grade.

CAR BUILDING.

THE DELAWARE, LACKAWANNA & WESTERN is in the market for 8 passenger cars.

THE HAVANA CENTRAL has ordered 100 box cars from the Standard Steel Car Company.

THE COLD BLAST TRANSPORTATION COMPANY, Chicago, is in the market for 350 refrigerator cars.

THE CANADIAN NORTHERN is said to be in the market for freight cars. This item has not been confirmed.

THE CHICAGO & ALTON is in the market for 9 refrigerator cars, 26 box cars, 4 stock cars, 26 automobile cars, 3 furniture cars and 5 flat cars, to replace equipment destroyed in wrecks or by fire.

THE ILLINOIS CENTRAL has ordered 2,500 steel gondola cars as follows: From the American Car & Foundry Company, 1,000; from the Standard Steel Car Company, 750, and from the Pressed Steel Car Company, 750.

THE NORFOLK & WESTERN has ordered 10 postal cars, 8 combination baggage and mail cars and 6 combination baggage and express cars from the Pressed Steel Car Company; also 35 coaches and 5 combination passenger and baggage cars from the Harlan & Hollingsworth Corporation. These cars are all-steel, and are the first all-steel cars to be ordered by the Norfolk & Western.

IRON AND STEEL.

THE GRAND TRUNK PACIFIC has ordered 10,000 tons of rails.

THE CHICAGO, MILWAUKEE & ST. PAUL has ordered 15,000 tons of rails, and 1,000 tons of bridge material.

THE BOSTON & ALBANY has received bids for 600 tons of bridge material.

THE HARRIMAN LINES have given a supplementary order for 6,000 tons of rails.

THE NEW YORK, NEW HAVEN & HARTFORD has ordered 6,000 tons of bridge material.

THE CHESAPEAKE & OHIO has received bids for 8,000 tons of steel to be used on coal piers.

THE LOUISVILLE & NASHVILLE has ordered about 8,000 tons of structural shapes for bridge work.

THE BRIDGE DEPARTMENT, New York City, is asking for bids on 1,400 tons of rolled and cast steel for subway construction in connection with the Manhattan terminal of the Brooklyn bridge.

GENERAL CONDITIONS IN STEEL.—The May statement of the United States Steel Corporation shows unfilled orders of the subsidiary companies on May 31 amounting to 5,750,983 tons, an increase of 86,983 tons during the month. The new business exceeded shipments at the rate of a little over 3,000 tons a day. The shipments during the month were heavy, averaging about 42,000 tons a day, and the average daily production was at the rate of about 92 per cent. of the total capacity. Since the first of June less new business is coming from the railways and structural orders are also much less after the recent very large bookings.

Supply Trade News.

The Pittsburgh Testing Laboratory, Pittsburgh, Pa., has opened a branch office at 204 White building, Seattle, Washington, in charge of C. A. Perkins, district manager.

R. A. Dugan, in charge of the sales department of the Chicago office of the Scullin-Gallagher Iron & Steel Company, St. Louis, Mo., has been made district manager, with office at 1049-50 McCormick building, Chicago.

The Vulcan Iron Works, Wilkesbarre, Pa., has received orders from the Read Construction Company, Quinebaug, Conn., for two locomotives with 11 in. x 16 in. cylinders, and from the Purcell Construction Company, Taft, Tenn., for four 10 in. x 16 in. locomotives.

The H. W. Johns-Manville Company, New York, has moved its Winnipeg, Manitoba, offices to 92 Arthur street. This is a six-story and basement building, 50 ft. wide and 100 ft. deep, and will be occupied throughout by the company's offices and storerooms. The office force will be increased.

The Jacobs-Shupert U. S. Firebox Company announces that it will make a public test of a firebox at its works at Coatesville, Pa., on Thursday afternoon, June 20. This is one of the series of tests being made under Dr. W. F. M. Goss. A radial stay boiler will also be tested (to failure) at the same time.

The Cincinnati Locomotive & Car Works has been incorporated in Ohio with a capitalization of $25,000, to make and repair locomotives, cars, machinery and general railway equipment at Cincinnati. The incorporators are John Glenn of Ludlow, Ohio, and William Edwards and Daniel Goldstein of Cincinnati.

Burton W. Mudge & Company, of Chicago, are planning to open an office in New York City. The item published in this column last week implying that this firm already had an office in New York was incorrect. Robert M. Smith, who has been appointed sales manager with office at Chicago, has only recently come to this firm.

The following companies, which are controlled by the same interests, have moved their general offices to the new Vanadium building, Forbes and Meyran avenues, Pittsburgh, Pa. The American Vanadium Company; the Vanadium Sales Company of America; the Flannery Bolt Company; the Vanadium Metals Company; the J. Rogers Flannery & Company, and the Keystone Nut Lock Mfg. Company.

The Eastern Car Company, recently incorporated with a capitalization of $2,500,000 as a subsidiary of the Nova Scotia Steel & Coal Company, advises that its intention is to erect a modern steel freight car plant at New Glasgow, Nova Scotia, with a capacity of 25 cars a day. Plans are now being prepared, and it is expected that the work will be commenced within two weeks. From 800 to 1,000 men will be employed. The plant will be located immediately adjoining the mills of the Nova Scotia Steel & Coal Company.

At the annual meeting of the Barney & Smith Car Company, at Dayton, Ohio, June 4, the following officers and directors were elected: President, H. M. Estabrook; vice-president and general manager, A. J. Stevens; second vice-president and treasurer, J. F. Kiefaber; secretary and assistant treasurer, E. A. Oblinger; assistant secretary, E. H. Sines; and directors, Walter St. J. Jones, J. Rawson, John L. Lincoln and John M. Wright, Cincinnati, and Eugene J. Barney, E. Frank Platt, H. M. Estabrook, A. J. Stevens and J. F. Kiefaber, Dayton.

Charles Singleton Sweet, assistant to the president of the Pullman Company, Chicago, died at his residence in Oak Park on June 7. Mr. Sweet was born at Mt. Sterling, Ill., November 3, 1848, graduated from the old Chicago University and the Columbia Law School, and entered the law office of Isham & Lincoln. When Robert T. Lincoln, who later became president of the Pullman Company, was appointed Secretary of War, Mr. Sweet became his secretary and continued in the same capacity for William C. Endicott, secretary of war. For two years he was secretary of the Chicago, Santa Fe & California railway, and then became private secretary to George M. Pullman, continuing in the same capacity when Mr. Lincoln became president. Later he was made assistant to the president. He had been in the service of the Pullman Company for 22 years.

Railway Construction.

New Incorporations, Surveys, Etc.

Alberta Pacific.—See Western Dominion.

Baltimore & Ohio.—An officer writes that a sub-contract has probably been given to Fred Schusley for grading the roadbed for two westbound set-off tracks at Sand Patch, Pa. F. L. Stuart, chief engineer, Baltimore, Md.

Beersville Coal & Railway Company.—See North Shore Railway & Navigation Company.

Boston & Maine.—An officer writes that surveys have been made for the line from Windsor, Vt., north to White River Junction, but contracts for this work have not yet been let. A contract was given recently to Holbrook, Cabot & Rollins, to build from Hinsdale, N. H., to Brattleboro, Vt., about ten miles.

Canadian Pacific.—This company has secured control of the Kaslo & Slocan, which operates 23 miles from Kaslo, B. C., south to McGuigan, and has entered into an agreement with the British Columbia government to reconstruct the line from Kaslo to Bear Creek, making the line standard gage. J. G. Sullivan, chief engineer, Western Lines, Winnipeg, Man.

Chicago, Milwaukee & Puget Sound.—This company is now at work with its own men on the tunnel through the Cascade mountains, Wash., to secure easier grades. The tunnel will be 11,400 ft. long. E. O. Reeder, chief engineer, Seattle, Wash. (April 26, p. 982.)

According to press reports, contracts have been given to build 140 miles of new line in Montana, as follows: To Winston Brothers, Minneapolis, Minn., to build from Great Falls southeast towards Lewiston and to Twohy Brothers, Spokane, Wash., to build from Lewistown northwest towards Great Falls. There will be six tunnels on the line, the longest about 1,900 ft. long. (June 7, p. 1262.)

Cincinnati, New Orleans & Texas Pacific.—An officer writes that this company has under consideration the question of double tracking the line between Erlanger, Ky., and Williamstown, 28 miles, also some double tracking north of Chattanooga, Tenn., about two miles. The surveys are not yet finished. C. Dougherty, chief engineer, Cincinnati, Ohio. (June 7, p. 1262.)

Elberton & Eastern.—An officer writes that preliminary surveys will be made within the next 90 days for a line from Tignall, Ga., east to Lincolnton, about 20 miles. A contract has been given to J. Y. Cogan, Elberton. W. O. Jones, president; A. W. Wilson, chief engineer, Elberton. (June 7, p. 1262.)

Grand Trunk.—This company has decided to lay 100-lb. rail on the line between Woodstock, Ont., and Sarnia, about 100 miles. The work is to be started soon.

The governor of Massachusetts has signed the Southern New England bill, giving permission to this company to build from the New Hampshire line to Boston. (June 7, p. 1262.)

Gulf, Texas & Western.—Arrangements have been made to build an extension from Jacksboro, Tex., south to Salesville, 23½ miles. The work is to be started within 90 days. E. B. Cain, vice-president and general manager, Dallas. (April 12, p. 871.)

Kansas, Oklahoma & Southwestern.—According to press reports, the Continental Construction Company has been given a contract to build between Caney, Kan., and Siloam Springs, Ark., 100 miles; also between Caney and Pawhuska, Okla., 40 miles. About 30 miles of grading has been finished. R. E. Wade and S. A. Masters, Perry, Okla.; J. H. Brewster and F. D. Brewster, Independence, Kan.; and S. M. Porter, Caney, are the promoters. (May 31, p. 1221.)

Kaslo & Slocan.—See Canadian Pacific.

Lake Erie & Northern (Electric).—Announcement has been made that this projected line from Brantford, Ont., to Port Dover and to Galt, is now assured, provided by-laws carry in the various municipalities for debenture stock. Bonds to the value of $1,100,000 have been purchased by Montreal banks. Local men

will purchase $275,000 of the $500,000, or 5 per cent. stock, while the remainder will be sold to the municipalities along the line. The line when completed, exclusive of equipment, will cost about $2,000,000, and will be closely affiliated with the Canadian Pacific through a traffic agreement. The directors are: John Muir, president; John Sanderson, W. P. Kellett, Harry Cockshutt, Lloyd Harris and Richard Thompson. W. P. Kellett, chief engineer, Brantford. (February 16, p. 321.)

MEXICAN ROADS.—Application has been made to the federal government by the Mexican Construction Company for a concession to build a railway from Pachuca, Mex., north to the town of Metztitlan in the state of Hidalgo, about 30 miles.

MIRAMICHI VALLEY.—Incorporated in New Brunswick, to build from Newcastle, N. B., or from a junction with the Intercolonial near that place, northeast along the Miramichi river to Tracadie, about 50 miles. The provisional directors include J. Robinson, E. A. McCurdy, D. Morrison, W. L. Allen, W. A. Park, E. H. Sinclair and A. Richie.

NORTH SHORE RAILWAY.—See North Shore Railway & Navigation Company.

NORTH SHORE RAILWAY & NAVIGATION COMPANY.—Incorporated in New Brunswick, to build from a point near Adamsville, N. B., on the Intercolonial, to a point near Snowshoe lake, and from Beersville to Richibucto Head, with a branch from Harcourt southwest to the Salmon river, also other branch lines. The company has authority to take over the North Shore Railway, which was formerly the Beersville Coal & Railway Company, extending from Adamsville northeast to Beersville with a branch from Beersville to Mt. Carlyle. The provisional directors include G. W. Fowler, Sussex, N. B.; M. F. Keith, Moncton; A. B. Carson, Rexton; H. J. VanHazen, E. E. Smith, New York; J. H. Wood and W. A. P. Davis, Philadelphia, Pa.

OREGON-WASHINGTON RAILROAD & NAVIGATION COMPANY.—A contract has been given to Flagg & Standifer, Portland, Ore., for track laying between Spokane, Wash., and Ayer Junction, 102 miles.

PACIFIC GREAT EASTERN.—Financial arrangements are said to be made to build from Vancouver, B. C., north to the Grand Trunk Pacific at Fort George, and work will be started at a point near North Vancouver this month. J. W. Stewart, of Foley, Welch & Stewart, St. Paul, Minn., may be addressed.

SASKATOON TRANSFER.—The plans call for lines connecting the Canadian Pacific with the Grand Trunk Pacific and the Canadian Northern, passing through a manufacturing district in West Saskatoon, Sask. The company expects to complete its organization and start construction work by July. The provisional directors include C. I. Alexander, L. N. LeValley and J. G. Hill, Saskatoon.

SOUTHERN NEW ENGLAND.—See Grand Trunk.

ST. LOUIS, BROWNSVILLE & MEXICO.—An officer writes that a grading contract has been given to P. G. Burns, and a contract for the bridge-work to W. J. McMurray, on the branch under construction from Heyser, Tex., to Austwell. There will be one steel bridge over Guadalupa river. F. G. Jonah, chief engineer, St. Louis, Mo. (May 31, p. 1221.)

TEXAS ROADS (Electric).—According to press reports, F. J. Wade, of the Mercantile Trust Company, St. Louis, Mo., is back of a project to build an electric line from Fort Worth, Tex., west to Mineral Wells, 70 miles. The total cost of the line will be about $1,000,000. Four routes have been surveyed. Dr. W. E. Brown, Fort Worth, may be addressed.

TIDEWATER SOUTHERN (Electric).—An officer writes that the plans call for building a line from Stockton, Cal., south via Escalon, Modesto, Turlock, Merced, Madera and Kerman to Fresno. A number of branch lines are to be built south and west as follows: To Manteca, to Ripon, to a point northwest of Modesto, to Patterson, and from a point northwest of Turlock southwest via Newman to Los Banos. A branch is also projected east to Oakdale. Work is now under way from Stockton south to Turlock, 51 miles. Grading on this section is nearing completion, and track has been laid on 13 miles. The maximum grades will be .5 per cent., and maximum curvature, except in towns, 6 deg. At the Stanislaus river crossing a steel bridge having two spans, each 123 ft. 6 in. long, is nearing completion. The Shattuck & Edinger Company are the contractors. There will also be a steel bridge over Tuolumne river. J. H. Wallace, chief engineer, Stockton. (May 24, p. 1181.)

WESTERN DOMINION.—Incorporated in Canada, to build from near Cardston, Alta., northwest via Pincher Creek to the Canadian Pacific Crow's Nest Pass branch at Lundbrek, thence northerly via Calgary and Edmonton to Fort St. John, B. C., with a branch from Pincher Creek to Oldman river. This project was formerly known as the Alberta Pacific, and the new company has power to take over the charter of that company. Surveys will be made soon for the section from Pincher Creek to Calgary. The provisional directors include J. E. Asquith, O. F. Culbert, Ottawa; H. McI. MacCallum, Regina, Sask.

RAILWAY STRUCTURES.

CLAYTON, N. Y.—Applications have been made to the New York Public Service Commission, Second district, for the elimination of grade crossings over the New York Central & Hudson River, on the Rome, Watertown & Ogdensburg division, at Clayton, Jefferson county, also at Reading, Schuyler county.

DECATUR, ILL.—Receiver F. A. Delano, of the Wabash, says that plans are under discussion for the construction of new shops at Decatur, to cost perhaps $750,000.

DENVER, COLO.—The Union Pacific is making extensive improvements in its shops at Denver, formerly leased by the Pullman Company, so that they will be able to handle general locomotive repair work for the Colorado division, thus saving the cost of sending locomotives a long distance to other shops. It is planned to have the improvements in operation early in July, including a 10-pit machine shop, and a locomotive blacksmith and boiler shop with a capacity for making heavy and general repairs to about 15 engines a month. About $90,000 has been expended on modern motor-driven tools arranged for group motor drive. A new modern power house equipped with water tube boilers, filters and coal and ash-handling machinery is also to be built at this point.

DETROIT, MICH.—A contract has been given to the Roberts & Schaefer Company, Chicago, by the Michigan Central, for putting up a 300-ton Holmen station at Detroit.

DULUTH, MINN.—A contract has been given to the Roberts & Schaefer Company, Chicago, by the Clarkson Coal & Dock Company, for the design and for building a large traveling coal bridge at Duluth, to cost about $100,000.

GAINESVILLE, GA.—An officer of the Southern Railway writes that the passenger and freight station facilities are being improved at Gainesville. The work includes putting up a new passenger station of brick construction with tile roof, 34½ ft. x 133 ft. The present freight station is to be remodeled and enlarged, and the tracks re-arranged. (May 31, p. 1221.)

HARTSDALE, N. Y.—The New York Central & Hudson River is making plans for putting up a new station at Hartsdale. Work is now under way eliminating grade crossings at that place.

HAYTI, MO.—A contract has been given to the Roberts & Schaefer Company, Chicago, by the St. Louis & San Francisco, for putting up a 250-ton Holmen coaling station at Hayti.

NEW ORLEANS, LA.—It is reported that the Texas & Pacific has authorized the construction of a new passenger terminal estimated to cost about $2,000,000.

READING, N. Y.—See Clayton, N. Y.

REGINA, SASK.—Bids are in for putting up the Grand Trunk Pacific station at Regina, and it is expected that the work will be started at once. The estimated cost of the improvements is $175,000.

UTICA, N. Y.—The New York Public Service Commission, Second district, has ordered the elimination of grade crossings of the New York, Ontario & Western and the Delaware, Lackawanna & Western at Pleasant street, in Utica. The street is to be carried over the tracks by means of a steel viaduct and approaches.

Railway Financial News.

Artesian Belt Railroad.—The control of this company has been bought by the European Contract Syndicate for $600,000. It is understood that the San Antonio Chamber of Commerce will raise an additional $200,000 toward building a road, and will provide terminals in San Antonio, Tex.

Brooklyn Rapid Transit.—The bankers who are to handle the financing of the Brooklyn Rapid Transit subways and elevated roads—Kuhn, Loeb & Company, and the Central Trust Company, both of New York—may decide, it is thought, to take six-year 5 per cent. notes of a subsidiary company of the B. R. T., secured by collateral and guaranteed by the B. R. T., in place of bonds.

The Appellate Division of the New York Supreme Court has affirmed the decision in part of the lower court of the Brooklyn Heights suit against the Brooklyn City Railroad, giving the Brooklyn Heights Road $1,740,258 and interest. The B. R. T. claims a much larger interest and will, it is understood, appeal from this decision.

Canadian Pacific.—Stockholders of the Georgian Bay & Seaboard Valley, controlled by the Canadian Pacific, have authorized a mortgage to secure additional bonds for the completion and equipment of the line from Victoria harbor to a junction with the Ontario and Quebec.

See Quebec Central.

Central of Georgia.—The stockholders have approved an issue of $15,000,000 6 per cent. cumulative preferred stock, to refund the present outstanding $15,000,000 three series of income bonds. A meeting of stockholders has been called for July 18 to vote on a proposal to authorize the issue of $50,000,000 refunding 5 per cent. bonds. It is planned to issue only three or four millions at present. The present income bonds are secured by a mortgage which does not permit the capitalization of improvements and additions unless the full interests is being paid on these bonds. This led to numerous lawsuits and to the necessity of paying for improvements out of earnings.

Chicago & Alton.—This company is to issue $20,000,000 6 per cent bonds to be secured by a general mortgage. Of these bonds $4,500,000 have been bought, it is understood, by Kuhn, Loeb & Company for the account of the Union Pacific. The proceeds of these bonds are to pay for double track, more particularly on the Kansas City division, reducing grades, and enlarging terminals at Chicago, Kansas City and St. Louis. The remainder of the bonds not already underwritten will be sold from time to time. A large block of the preferred stock of the Chicago & Alton is owned by the Union Pacific, and on this investment the Union Pacific is not now receiving any interest.

Concord & Montreal.—Stockholders have authorized $1,500,000 additional class 4 stock, which is to be offered to stockholders at $160 per share.

Denver, Laramie & Northwestern.—The application for a receiver made by interests opposed to the present management of the D. L. & N., having been denied, "friendly" receivership proceedings have been brought to "protect the credit of the road."

Georgia Coast & Piedmont.—T. D. Rhodes has been elected a director and vice-president.

Interborough Rapid Transit.—The $170,000,000-53-year mortgage 5 per cent. bonds offered to bankers by J. P. Morgan & Co., have been over-subscribed, and it is understood that subscribers for small amounts will receive their allotments in full, and subscribers for large amounts will be cut down somewhat in their allotments.

Kansas City, Mexico & Orient.—R. L. Day & Co., Boston, have bought $1,000,000 5 per cent. receivers' certificates at about 98.52. They have also taken an option at what is said to be the same price on additional certificates, which may be used to build the sixty-three miles of line to Alpine, Texas, to form a connection at Alpine with the Southern Pacific.

Missouri & North Arkansas.—Francis Bros. & Company and the Mercantile Trust Company, both of St. Louis, are offering the unsold portion of $1,250,000 receivers' certificates of May, 1912-May 1, 1915, at 100. The total authorized issue of receivers' certificates is $2,500,000, of which $1,250,000 is now issued. The certificates are an absolute first lien on the entire property of the road which runs from Joplin, Mo., to Helena on the Mississippi river.

Missouri Pacific.—The resignation of F. T. Gates as a director, which is expected to take place shortly, is said to be partly on account of added duties that Mr. Gates will have to perform for John D. Rockefeller, owing to the resignation of Henry E. Cooper from the Standard Oil Company.

Justice Giegerich, of the Supreme Court of New York, has held, in the Missouri Pacific suit against the Mercantile Trust Company, that 7,450 shares of St. Louis, Iron Mountain & Southern stock, valued at $2,745,000, should be returned by the Trust company to the railway company. The stock was deposited in accordance with an agreement by which the Trust company was to certify to bonds to the amount of stock deposited, but there were 7,450 shares of stock deposited in addition to the amount against which bonds were certified.

New York, New Haven & Hartford.—The bill consolidating the Berkshire, Springfield and Worcester street railways has been passed by the Massachusetts legislature.

Pennsylvania Railroad.—Kuhn, Loeb & Company, New York, have bought $6,000,000 "Pennsylvania General Freight Equipment Trust" 4 per cent. certificates, dated June 1, 1912, maturing in ten equal annual instalments, from June, 1913, to 1922. The certificates are guaranteed principal and interest, by the Pennsylvania Railroad. The proceeds from the sale will be used to buy additional equipment for both the Lines East and Lines West.

Quebec Central.—The share and debenture holders, at a special meeting in London this week, unanimously ratified the lease of this road to the Canadian Pacific for 999 years. The Quebec Central extends from Harlaka, on the south side of the St. Lawrence river, five miles from Quebec, southwest to Sherbrooke, 137 miles, with a branch from Tring Junction to Megantic, 60 miles long, and another branch to St. Sabine, 55 miles long. The main line is a part of the through route from New York to Quebec.

Seaboard Air Line.—The new interests which have bought into Seaboard Air Line, as mentioned in these columns last week, have acquired $9,000,000 preferred stock and $12,000,000 common stock of the outstanding $23,894,000 preferred stock and $37,019,000 common stock. S. Davies Warfield has become chairman of the managers; and those associated with him are Frank A. Vanderlip, president of the National City Bank, New York; Albert H. Wiggin, president of the Chase National Bank, New York; Blair & Company, New York; Benjamin Strong, Jr., vice-president of the Bankers' Trust Company, New York; Charles H. Sabin, vice-president of the Guaranty Trust Company, New York; Samuel L. Fuller, of Kissel, Kinnicutt & Company, New York, and Roberts Walker, until recently president of the Rock Island Company.

Southern New England.—The Massachusetts House of Representatives has concurred in the amendments made by the Senate to the bill permitting this subsidiary of the Grand Trunk to build its line from Windsor, Vt., to Boston, Mass.; and the bill is now a law, having been signed by the governor.

Wabash-Pittsburgh Terminal.—See Wheeling & Lake Erie.

Wheeling & Lake Erie.—The minority stockholders held a meeting last week and elected a board of directors, which, in turn, elected Joseph Ramsey, president, and G. P. Rust, of Cleveland, and R. E. Slaven, of New York, vice-presidents. An executive committee was formed consisting of Mr. Ramsey, Mr. Slaven, F. E. Palmer, F. A. Henry and A. G. Webb. The minority stockholders claim that the stock held by Wabash-Pittsburgh Terminal, cannot legally be voted. The majority stockholders, represented by the W.-P. T. claim that the meeting last week was illegal, and that they will elect their own board of directors. B. A. Worthington is receiver and has charge of the road, and represents the choice of both majority and minority stockholders

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A PROBLEM will be presented to the executive committee of the Master Car Builders' Association if the attendance and the interest in the meetings continue to increase as they have during the past two years. Although the seats are filled in the meeting hall, there are not even now sufficient chairs for those attending. While there would be a number of objections to such a move, it may be necessary to hold at least part of the meetings next year in the Hippodrome, on the second floor of the exhibition hall.

THE rank and file of the Master Car Builders' Association are chiefly responsible for seeing that the standards of the association do not become obsolete and useless. The committee on revision cannot be expected to personally discover every phase of changing conditions that may make an alteration in some standard or recommended practice advisable. It is up to the members individually to draw attention, either by letter to the committee or on the floor of the convention, to anything bearing on the subject of standards that may come to their notice.

AN inspection of the exhibits in machinery hall gives evidence of an increased appreciation by machine tool builders in general of the demands of the users for safety appliances. In practically all cases, the tools exhibited have all the exposed gearing carefully covered; belts are inclosed and there are no exposed bolt heads or pins on moving parts, and in one case at least, push buttons for stopping the motor are provided within convenient reach of the operator. That the builders have so quickly caught the spirit of the move toward greater safety in the shops, now so vigorous throughout the whole country, is but another proof of the desire of the fraternity to coöperate with the users, not only in securing the output desired but in every other reasonable suggestion even though it may add considerably to the cost of their product.

THE use of car unloaders for ore and coal has been confined largely to the docks on the great lakes and the Atlantic coast, but the economic handling of heavy low grade materials has suggested their use for cars loaded with stone and cement and this extension of the territory where car unloaders are used, will cause a more general interest among M. C. B. members as the means for preventing damage to cars by these devices. The committee is making good progress in designing protective blocking for this purpose, but continued coöperation is necessary to keep this damage under control and provide for changing conditions both in the cradles and the cars. One would naturally think that hydraulic or pneumatic cylinders which would provide an adjustable contact between the car side and the cradle would be a practical solution of the difficulty, but the trial of such a device at one of the large docks has proved a disappointment, and the chief reliance for relief is now based on the proper use of the wooden blocking which the committee recommends.

IT is not an unusual thing for an exhibit in connection with the mechanical conventions to excel all its predecessors. The exhibits have been steadily improving year by year. It cannot be too emphatically stated, however, that this year's is distinctly the best ever made. The floor space occupied is the largest ever used, it is probable the number of different devices shown breaks all previous records, the number of new devices displayed is extraordinary and the exhibit committee and the individual exhibitors have been unusually successful in making both attractive general and booth arrangements. The machinery exhibit is very large, and the number of machines in operation is in proportion. The successful efforts made year after year by the supply men to place on the pier all the mechanical devices that will be interesting or instructive to railway men merits the most unstinted commendation. Furthermore, it calls attention forcibly to the large and important part played by the capital, enterprise and inventive genius represented by the supply fraternity in promoting the safety and economy of railway transportation. This is a point to which attention is not called as often as it well might be. The business ability and engineering skill in the supply trade have been a mighty factor in giving its present character to transportation in this country, and probably no other class of men more frankly recognizes or fully appreciates that fact than the railway officers who year after year attend the conventions of the great mechanical associations.

"AN air pump is the most extravagant thing on a locomotive," said Robert Quayle in his address to the members of the International Railway Fuel Association. He did not mean that the air pump, *per se*, is extravagant but that it is forced to operate at an extravagant rate of speed practically all the time the locomotive is on the road. Even under these conditions they are not infrequently found in train line pressures of not over 50 lbs. during a whole trip of a long freight train, often with two of the largest size air pumps working at top speed. It is not the air pump that is extravagant, it is the waste of air. Every effort is being made to reduce transportation costs by operating the maximum sixe trains. Larger locomotives, grade reduction, large capacity cars, accurate tonnage rating, everything, is directed toward more ton-miles per train and per hour. There can be no backing down in this effort. The big train is here, and will continue to get larger, and its pressure is the cause of the trouble with air pressure in the train line. The trouble in this case cannot be cured by removing the cause. Much of the waste of air in the long trains occurs at the hose couplings between the cars at the head of the train. This is especially the case when some of the older equipment occupies this position, and is greatly aggravated by cold weather when the hose is stiff. This weather equipment will be in use for many more years and it appears that the committee on Train Brake and Signal Equipment has in it a problem sufficiently serious to warrant careful and prompt investigation.

IN discussing the report on Overhead Inspection of Box Cars there seemed to be a feeling on the part of some that the faulty condition of the equipment from the standpoint of damage and loss to freight was due to negligence on the part of the car department officers in not insisting on a higher standard of upkeep. If this is true then the Master Car Builders' Association should take immediate and thorough steps to remedy the difficulty, for a reading of the discussion of this report will convince anyone that an unsatisfactory condition exists at the present time. This was also demonstrated in the series of articles on Defective Box Cars and Damaged Freight which appeared in the RAILWAY AGE GAZETTE during April and May of this year. The conditions of the box car equipment on most roads is such that it cannot be put in proper shape without the expenditure of considerable sums for replacing defective parts with satisfactory ones. The master car builders cannot do this without support and authority from above. Mr. Brazier's resolution to the effect that the matter of defective equipment be called to the attention of the American Railway Association is on the right track. There is no question but that the members of the Master Car Builders' Association can keep the equipment in good condition if it is properly constructed in the first place, but if it is not and the railway executives are the only ones who can remedy the difficulty by authorizing sufficient expenditures to put it into first-class shape. Moreover, the only way in which concerted action can be had on all of the roads is for the American Railway Association to take the matter in hand and insist that proper measures be taken to bring this about. It cannot be accomplished in a day. If only those cars which are burglar and leakage proof were allowed in service, practically the entire box car equipment of the country would be tied up. It will take time to clear up the situation, and serious as the condition is and much as it needs to be remedied quickly, care must be taken to go about it in the right way. The logical course, as already suggested in the RAILWAY AGE GAZETTE, would be for the American Railway Association to take steps to see that all new cars are properly built, and that the ones now in service are properly fixed up as they go through the shop for heavy repairs. The conditions would thus be entirely cleaned up within a few years.

FREIGHT CAR TRUCKS.

IN the earlier years of the Master Car Builders' Association efforts were made to adopt a standard freight truck, and several successive committee reports were made on the subject. Car capacity was then growing from 40,000 to 60,000 and 80,000 lbs., and increasing loads made new designs for trucks necessary. The association was then, as it has since, unconsciously perhaps, appointing committees to recommend standards which it did not intend to adopt. And so the reports on standard freight trucks were received but never adopted. In later and more recent years the principal details for freight trucks have been separately taken up for investigation as to materials and proportions, until nearly all have been considered, and there is at hand sufficient recommended or standard practice to make up a complete truck. The first and most important standards were the axle, journal box and bearing, the wheel and brake shoe, as these were the parts which wear out and require most frequent renewals, often on foreign lines. The economy, convenience and time saved by the standardization of these parts probably exceeds that relating to any other railway standards, as the renewals are made in such large numbers.

The two reports on truck details presented this year complete the list of the more important details. That on springs takes up the important question of obtaining greater flexibility in springs under high capacity cars. The space for springs in the accepted designs for freight trucks is so small that spring bars of large diameter are necessary to obtain sufficient strength with steel which cannot be safely stressed beyond 85,000 lbs. per square inch. These large bars make a very rigid spring with a small range of deflection. The committee has in view the use of alloy steel bars, heat treated and carefully tempered, so that a safe working stress of 100,000 to 120,000 lbs. per square inch can be used. With such material the size of the bar can be reduced, the deflection increased and a much easier motion obtained.

For 50-ton cars the springs should be more flexible than they now are, so that the truck will not be so rigid when the car is empty or lightly loaded. This is especially true for the proposed springs for the trucks of 70-ton cars where the bar is 1⅜ in. in diameter. The spring makers should supply springs made of higher grade steel, and the association could secure better results by making a standard specification for freight car springs which can only be met by a steel having a much higher working stress than that heretofore used.

The railways are to blame in buying freight cars under sharp competition, where metal fixtures of ordinary quality are accepted in consideration of the low price. It is for this reason more than any other that the quality of freight car springs has not improved. The report on freight car springs includes a design for 140,000 lb. capacity cars, while that on freight truck sides deals with the requirements for 80,000 lb., 100,000 lb. and 150,000 lb. capacity cars. It would seem desirable for the association to settle on 150,000 lb. capacity as the next step in increased car capacity, and see that all details considered as standard are proportioned for that capacity. This will avoid the multiplicity of dimensions which must follow if intermediate capacities are included.

The report of the committee on Freight Truck Sides and Bolsters is not a final one, because the association has not provided funds for the tests of complete structures, necessary for the proper preparation of the specifications. The recommendations are based on current practice as regards the quality of the material, which is low carbon and low strength steel. An ultimate strength of 60,000 lbs. per square inch can be obtained from the most ordinary steel casting, and, considering the magnitude of the stresses to which freight truck sides and bolsters are subjected, it seems desirable that a higher grade of material should be obtained so that the sections of the structure are not made larger and heavier than necessary. Some of the lines are already using a specification which requires a grade of steel having an ulti-

mate strength of 80,000 lbs. per square inch—33 per cent. higher than that recommended in the report.

It is not clear why the committee recommends that its specification for the quality of the steel castings should be adopted as standard, when its investigation is incomplete and it is unable to make definite recommendations concerning physical tests of the completed structure. It seems desirable that a standard specification should be based on an investigation of the best material available. The truck sides and bolsters of the truck for a 75-ton car will have massive proportions if low strength steel is made the basis of its dimensions, and the railways should not be required to haul an excessive dead weight when the minimum weight which is necessary for safety can be obtained by the use of a proper grade of cast steel and by good engineering design.

GOVERMENT REGULATION OF SAFETY APPLIANCES.

THE Master Car Builders' Association did very little regarding the matter of safety appliances. Doubtless it will be possible to make the same statement next week in reference to the Master Mechanics' Association. There are two main reasons for this. One is that the safety appliance specifications adopted by the Interstate Commerce Commission are still new, and as in the main they are satisfactory under present conditions, there was not much opportunity for suggestions or discussions of proposed changes. The second reason is that legislation and the commission having taken the determination of what appliances shall be used out of the hands of the railways, there is a natural, and probably inevitable, disposition on the part of railway men to give comparatively little consideration to that matter.

There is a danger in this situation of affairs to which attention should be given during the present period of transition. It must be perfectly evident to every intelligent and thinking person that the Interstate Commerce Commission and its inspectors do not know, and never can know, the needs of the railways in respect to safety appliances and the best methods for meeting these needs, as well as the operating and mechanical officers of the railways know them. Even if the commission should employ as its advisers some of the most experienced and expert mechanical men in the country, who were not in railway service, they would be less able to decide what changes in appliances should be adopted from time to time than would the operating and mechanical officers of the railways; and the commission has no such expert advisers now. It is unfortunate that the commission and its inspectors sometimes seem inclined to proceed on the theory that it is their function to catch the railways in breaking the laws and to prosecute them for it, rather than to co-operate with them in preventing accidents and removing their causes. This tends to excite antagonism and fear on the part of railway men, and to prevent them from engaging in that free discussion among themselves and from offering freely that advice to the commission which is so essential both to the most salutory administration of existing laws and regulations, and to the future progress in the development of the devices and methods that are necessary to best promote the safety of transportation.

However, the present safety appliance specifications were adopted and the present boiler inspection law was framed after full consultation between the commission, the representatives of the railways and the representatives of the railway brotherhoods; and it is to be hoped that the same policy will obtain in future.

The success of government regulation will be much greater and more certain, and economy and safety in transportation will be best furthered, if the commission will on all occasions frankly indicate to railway officers that it fully recognizes its need, and sincerely desires the benefit of their great collective experience and knowledge, and if railway officers will freely place their experience and wisdom at the commission's disposal. The policy that will, in the long run, get the best results, is for the commission merely to give the force of law to the best judgment of railway men. If it tries to do any more than this, it will do a great deal less. Public regulation should seek to prescribe ends, not means; regulating authorities are competent to say what ought to be accomplished, but they are, and always will be, far less competent than practical men in actual service, to say how it ought to be accomplished, and when they try to usurp the functions of the railway manager, the railways will be neither well regulated nor well managed.

IMPROVED BOX CARS.

WHEN the valuable features of this convention are considered, we venture to predict that the subject of "box car defects," as explained at length in the report on The Overhead Inspection of Box Cars, and further illuminated by the discussion, will stand out prominently as the most important. The number of box cars now in service in the United States is nearly one million, or more than 45 per cent. of the total freight equipment. A large proportion of them have wood underframes. Antiquated types of wooden roofs and poor door fixtures are also found in large numbers. Even where steel underframes are used the attachment of the wooden superstructure is frequently of poor design, so that there is even more leakage of grain than in a good wooden car. The box car body has been made stronger by the use of larger posts and braces, but the soft pine siding and lining is not as good as that used on the older cars built when sound lumber could be obtained for the purpose.

Taken altogether, the box car is the weak member in the train, and when roughtly used in classification yards and by the application of heavy brake pressure, producing sudden stops in main line service, there is a movement in the joints which results in defects, and the inertia of the door under the same violent shocks soon destroys its stops. The speed of handling freight cars in yards is based on the resistance of all-steel hopper and gondola cars, but the box car has not sufficient strength for such rough handling without damage. Under this service the general condition of box cars has become dilapidated, and the defects are such that the lading of grain, merchandise, flour and similar commodities is not properly protected. A defective car body does not render the car unsafe to run, and inspection and repairs have been directed principally to the trucks and underframe.

The large losses due to grain leakage, theft, injury by water due to leaky roofs, and similar defects are now calling forcible attention to the necessity of proper repairs to the car body. The report of the committee on Overhead Inspection of Box Cars should be regarded as a preliminary one which shows the gravity of the situation and the necessity for greater care in providing equipment in proper condition to protect lading liable to loss or damage in transit. A further consideration of the subject should concern itself with necessary improvements in the design of box cars so they will not be so liable to injury as the older equipment.

The ordinary wooden box car which is still built in large numbers is no longer suitable for modern conditions. A steel underframe as strong as that of other cars should be regarded as a prime requisite, and the design of the car body should be such as will substitute steel for wood whenever it can be economically applied. A pressed steel end has been successfully introduced on a few box cars, and it adds greatly to the strength of the car. Steel carlines and metal roofs are also largely used, and a steel door which combines the grain and side door in one is now being applied to some new cars. Improved door fixtures which overcome all the objections which were pointed out in the discussion are now available, and it would seem proper for the association to standardize some of these improved box car fixtures or require their equivalent.

Announcements.

TO-DAY'S PROGRAM.

M. C. B. ASSOCIATION.

Individual paper, Car Shop Apprentices, I. S. Downing, M. C. B., L. S. & M. S.	9.30 to 10.00
Discussion of reports on:	
Train Pipe and Connections for Steam Heat	10.00 to 10.30
Tank Cars	10.30 to 11.00
Specifications for Tests of Steel Truck Sides and Bolsters	11.00 to 11.30
Capacity Marking of Cars	11.30 to 11.45
Lettering Cars	11.45 to 12.00
Unfinished business; reports of committees on correspondence, resolutions, and such other committees as may be named during the convention	12.00 to 12.15
Election of officers	12.15 to 1.30

Adjournment.

ENTERTAINMENTS.

Orchestra Concert, 10.30 A. M.—Entrance Hall, Million Dollar Pier.

Orchestra Concert, 3.30 P. M.—Entrance Hall, Million Dollar Pier.

Musicale, 9.00 P. M.—Entrance Hall, Million Dollar Pier.

RAILWAY CLUB SECRETARIES.

The annual meeting of the Society of Railway Club Secretaries will be held at 10 o'clock Saturday morning, at the Marlborough-Blenheim. At 7.30 o'clock in the evening the members and their friends will have their annual dinner at the Strand Hotel.

DISCS ON BADGES.

The Enrollment Committee has a request to make of the railway men, and it is this: "Please be sure to see to it, in each and every individual case, that the proper disc, given when you register, is worn around your membership button on all occasions."

UNIVERSITY OF ILLINOIS DINNER.

The University of Illinois men attending the conventions will have their annual dinner at the Shelburne this Friday evening at 6.30. Illinois men are requested to leave their names with Parker G. Stevens, at the booth of the Railway and Engineering Review.

SEMI-ANNUAL MEETING OF ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.

The semi-annual meeting of the Association of Railway Electrical Engineers will be held today at the Dennis hotel. The morning session will begin at 10 o'clock and will be devoted to business. The afternoon session begins at 2.00 P. M., when addresses will be made by A. I. Totten, of the General Electric Company, and F. H. Herzsch, of the Westinghouse Electric & Manufacturing Company, on "Railway Shop Equipment." A. J. Sweet, of the Halophane Company, and L. Schepmaer, of the Safety Car Heating & Lighting Company, will talk on "United States Postal Car and Passenger Car Illumination." Informal talks on "Method of Axle Generator Control, Constant Current vs. Constant Potential," will also be given by manufacturers of axle car lighting systems.

SIGN THE PETITION!

Manufacturers attending the conventions can sign the petition regarding a railway plank in the platforms of the two political parties, adoption of which the Railway Business Association is seeking, by stopping at the table in THE DAILY'S booth just inside the railing separating the booth from the ball room. The Railway Business Association is very anxious that all supply men who have not already signed, shall do so at once so that a large petition can be presented to the republican convention next week in Chicago.

George A. Post, president of the association, who has been presenting its views to the republican chieftains now gathering in Chicago, arrived in Atlantic City, Wednesday evening to spend a short time here. He will return to Chicago tomorrow. Mr. Post says that the petitions are being numerously signed, not merely by railway supply men, but by shippers generally. Petitions have been received signed by 600 shippers in Chicago, 400 in Pittsburg, 600 in Cleveland, etc., and a total of 2,000 names had been attached to them at latest reports, the railway plank favored by the association was outlined in THE DAILY for June 12, page 1270.

WANTED—WESTERN BALL PLAYERS.

The Western baseball team wants two railway men and two supply men. Must be good players. Apply to Capt. Hammond.

FOUND.

Small gold initialed pin at the Marlborough-Blenheim informal dance Wednesday evening. Apply at the office of THE DAILY.

REGISTRATION HOURS.

The Enrollment Committee announces that its books will be open for registration purposes on Saturday from 9 a. m. until 12 noon; and from 7.30 p. m. until 10 p. m.; also on Sunday from 11 a. m. until 1 p. m.

PURDUE DINNER.

The Purdue graduates here at the convention will get together at dinner on Saturday evening. All Purdue boys are cordially invited to attend. Please register as soon as possible with Harold A. Smith, of the Railway and Engineering Review, booth 12-14.

CLEAN YOUR BOOTHS.

President Stafford, of the Railway Supply Manufacturers' Association, requests that exhibitors assist the committee to keep the aisles clean by having their booths swept out each evening before leaving.

Some of the projected railways from Peking, China, into the western and northwestern country have a direct relation with lines in operation and projected immediately south of the imperial capital. Of immediate importance, however, is the recent construction in Shantung and neighboring provinces, the most successful work in Chinese railway fields in 1910 being in this part of the empire. During 1910 the most notable lines completed were portions of the great German system in Shantung, which extends from Tientsin to the Yangtze river, and is generally known as the Pukow-Tientsin railway. The southern portion of the system is in operation from Pukow, opposite Nanking on the Yangtze, to Linghwaikwan, a distance of about 94 miles.

Proceedings.

President Stewart called the meeting to order at 9.40 a. m. Thursday morning.

The President: As chairman of the committee on safety appliances, I want to say, the committee has no formal report to present. The work of the committee last year in conjunction with the Federal authorities was such that the entire case was covered, but there are some recommendations that we are making to the executive committee, the most important of which being the question as to what rules shall be adopted for handling foreign cars, which for any reason must be rebuilt or given general repairs; second, foreign cars shopped for ordinary repairs but not equipped with U. S. safety appliances; third, foreign cars stencilled "U. S. Safety Appliances" but improperly equipped.

In the past year the committee had a meeting with the chief inspector of the Interstate Commerce Commission in regard to having uniform instructions or uniform understanding, and it was found that the chief inspector made those arrangements and relieved a good many situations that were not understood alike by all inspectors. That will probably be the function of the committee in the future, to straighten out matters of that kind, and the committee asks that if any member has any suggestions to make or any questions to ask, that he do not hesitate to write the committee on safety appliances so we can get it uniform for the next convention.

REVISION OF RULES OF INTERCHANGE.

The members and various railway clubs and organizations in the rules of interchange were asked to submit what changes were considered desirable. These have been considered and the recommendations of the committee are given under each rule. Several suggestions were received in regard to changes in Rules 98, 101, 102, 107, 116 and 117, covering the matter of changes in prices for labor and materials. These have been referred to the committee on that subject.



J. J. HENNESSEY,

Chairman, Committee on Arbitration.

Rule 2.—The committee would suggest that this rule be change to read as follows:

"Cars (whether loaded or empty) with defects constituting a violation of the law must not be offered in interchange. The unnecessary movement of leaking tank cars loaded with inflamable materials is in violation of the law. Such cars should be repaired or have lading transferred at the nearest available point. Cars having defects for which delivering company is responsible must be properly carded when offered in interchange. Empty cars offered in interchange must be accepted if in safe and serviceable condition, the receiving road to be the judge in cases not provided for in Rules 3 and 4 and 32 to 88, inclusive.

"Owners must receive their own cars when offered home, subject to the provisions of these rules. Loaded cars offered in interchange, except those having defects constituting a violation of the law, must be accepted. The receiving line may also reject cars not loaded in accordance with the rules for loading materials, A. R. A. car service Rule 15 to apply (see page 22) when transfer or rearrangement of load is necessary. The car transfer check authorizing the transfer

M. C. B. ASSOCIATION—AUTHORITY FOR TRANSFER OR ADJUSTMENT OF LADING.

NAME OF ROAD

Date

Lading

Transferred or Lading Adjusted Account of

Issued to R R

Car No Initial

Inspector at

NOTE. To be printed in black on white paper in duplicate form, filled out with ink or black indelible pencil. Original to accompany bill and duplicate retained for record.

Send bill and this check card to

Fig. 1—Car Transfer Check.

or rearrangement of lading to be of the form shown herewith. Balance of rule to remain as at present.

"The form shown above to be modified by the addition of the words 'or lading adjusted.'"

Rule 8.—The committee would suggest that for the words "tacked on" in the fifth line the words "securely attached to," be substituted.

Rule 9.—The following suggestions are approved:

Change the rule to read:

M. C. B. couplers, or parts thereof, R. and R.....	new or secondhand. steel or malleable. size of shank. size of butt. complete, or name of part or parts. name of coupler. open or solid knuckle. yoke, stem or key attachment.
Wheels and axles, R. and R.	cast iron, cast steel, rolled or forged steel or steel-tired wheels. new or secondhand. cause of removal (see Rule 10). trucks: solid pedestal or arch bar type.
Journal bearings, R. and R..	solid, filled or other kind. length of bearings. box number (see Rule 14.)
Metal brake beams, or parts thereof, R. and R.....	make or name of beam. new or secondhand. complete, or part or parts. cause of renewal. parts or parts scrapped.
Brake shoes, applied.....	Cast or reinforced back.
Triple valve, R. and R.....	Name of maker and type.

When triple valve or cylinder is cleaned, the initial of road and date of last previous cleaning must be shown. If necessary to remove load to make repairs, as specified in Rule 107, it must be plainly stated.

Rule 10.—The committee recommends that all of the first paragraph after the word "used" in the third line be omitted.

Rule 11.—The committee recommends making the rule clearer as follows: "Journal bearings having a babbit lining 3/8-in. thick or thicker, shall be charged as filled journal bearings and not as solid journal bearings."

Rule 12.—The committee would propose the following additional paragraph: "If an intermediate line finds it necessary for safety to standardize wrong repairs, it may render bill against the car owner for the expense, and the billing repair card of such intermediate line shall be final as to the fact that such wrong repairs existed, and shall perform the same function as a joint evidence card. If the car carries repair card covering such wrong repairs, such repair card must accompany bill against the car owner. If such repair card covers items other than those corrected, the items corrected must be crossed off and the card replaced on car, but a copy of such repair card must accompany the bill against the car owner."

Rule 14.—The committee proposes that the first part of the

rule read: "Defect and repair cards (and joint evidence cards, as per Rule 12), must be securely attached to car," etc.

Rule 18.—The committee would suggest that this rule be modified as follows:

1. "Couplers that exceed the distance of 5⅛ in. between point of knuckle and guard arm measured perpendicularly to guard arm, must have the defective part or parts renewed to bring coupler within gage, in which case owners are responsible. (See drawing, page 11.)

2. "Cars having couplers with stem or spindle attachments or American continuous draft rods will not be accepted in interchange after September 1, 1914."

Rule 20.—The committee recommends that the rule be changed to read: "Cars must be maintained within the limits of standard height for couplers, measured from the top of the rails to the center line of coupler head. Any company finding cars not within the limits of standard height for couplers may repair and charge to owners. As far as possible, cars should be adjusted when empty.

"Empty cars measuring 32½ in. or less shall be adjusted to 34½ in., or as near as practicable thereto, but not exceeding 34½ in. Loaded cars measuring 31½ in. or less shall be adjusted to 33½ in., or as near as practicable thereto, but not exceeding 33½ in. When bill is to be rendered, the height of car before and after altering must be shown on repair cards."

Rule 21.—The committee suggests changing the rule to read: "Bills may be rendered against car owners for the cost of applying temporary running boards and hand rails to cars originally equipped with roofs or running boards to make such cars safe for trainmen."

Rule 24.—The committee suggests the omission of the word "new" in the first line of the second paragraph, as this provision should apply equally to secondhand wheels.

Rule 33.—The committee approves of the addition of "hatch covers" and "vent slides" to the exceptions in this rule.

Rule 34.—The committee approves the omission of this rule.

Rule 35.—The committee would recommend that the rule be changed to read: "After September 1, 1914, cars equipped with couplers having stem or spindle attachments, or American continuous draft rods, will not be accepted in interchange."

Rule 36.—The committee suggests that this rule be eliminated.

The committee would recommend that the heading to combinations (Rules 37 to 42, inclusive) be changed by the addition of the words "and requiring repairs or renewals."

Rule 40.—The committee proposes that the rule read as follows: "Damaged end sill, accompanied by damage to two longitudinal sills."

Rule 42.—The committee approves changing the rule to read: "Damaged corner and end posts, if necessitating the renewal of more than three posts," and would suggest the following note: 'Damage as used in the above combinations is understood to mean injury so serious as to render renewal or repairs necessary to the part or parts mentioned."

Rule 48.—The committee would recommend the rule be changed to read: "Side doors, end doors, roof doors, grain doors, water troughs and attachments, and all inside *parts* or *all* concealed parts of cars missing or damaged under fair usage," etc.

Rule 50.—The committee would recommend the addition of the words "as provided for in Rule 20" to make reference to the provision in this rule.

Rule 52.—The committee would suggest the following change in the fourth paragraph of this rule: "On cars stenciled 'United States Safety Appliances Standard,' or on cars stenciled 'United States Safety Appliances,' lag screws must not be used where bolts or rivets are required by law." Also the omission of the bracket from this paragraph of the rule.

Rule 53.—The committee suggests making the rule read: "All freight cars offered in interchange must be equipped with air brakes, angle cocks, quick-action triple valves, M. C. B. standard 1¼-in. train line and pressure retaining valves."

Rule 54.—The committee approves the suggestion of adding to this rule the words, "that require repairs or renewals."

Rule 56.—The committee approves the suggestion to eliminate this rule.

Rule 59.—The committee suggest the elimination of reference to Rule 56, on account of the suggestion that it be omitted. Also suggest including "broken brake pipes and cross-over pipes due to insecure fastenings" after the words "rust or seams" in third line.

Rule 60.—The committee approves the changing of the last paragraph to read: "Triple valves cleaned must be tested in accordance with the M. C. B. code of tests for repaired triple valves."

Rule 63.—The committee approves changing this rule to read: "Damage of any kind to truck due to unfair usage, derailment or accident that requires renewal or repairs."

Rule 66.—The committee would recommend that the second paragraph of this rule be changed to read: "After September 1, 1915, cars equipped with brake beams other than all metal will not be accepted in interchange."

Rule 69.—The committee approves the omission of the words "or if it extends ⅛ in. past the center of flange."

Rule 70.—The committee approves the suggestion that the words "or steel tired" be omitted from the third paragraph.

Rule 82.—The committee approves eliminating the last two lines of this rule.

Rule 101.—To conform to the provisions in the proposed change in Rule 20, the committee would recommend the following change in prices:

Altering height of one end of car, over or under center plates or on top of body bolster, net	$1 25
Altering height of one end of car, shimming springs, net	.75

Rule 107.—The committee would recommend the addition of the following item:

Draft timber bolts, tightening up, on one end of car, ½ hour	$0.12

Rule 108.—The committee suggests that the second paragraph read as follows: "No charge to be made for adjusting brakes, angle cocks or tightening unions."

Rule 110.—The committee suggests this rule be changed to read: "Applying center plate or center plate bolts when car is raised to standard height adjusting center plates or body bolster, at same end of car."

Rule 115.—The committee would recommend that the word "nearest" in the eighth line of first paragraph be changed to "designated." Also change second paragraph to read: "Except in cases of trucks of 50,000 lbs. capacity or less, where the railway company destroying the body of car may elect to retain the trucks and settle for them at their scrap value, except that such of the wheels, axles or all metal brake beams as are good for further service, must be credited at their secondhand value under the M. C. B. rules. This paragraph will not apply to trucks belonging to individual ownership."

Also an additional paragraph reading: "The underframes of damaged steel and steel underframe cars when intact and in serviceable condition may be forwarded to owner on defect card."

Rule 122.—The committee would recommend the following change in this rule: "Companies shall promptly furnish to each other, upon requisition, and forward, freight charges F. O. B. point of shipment, material for repairs of their cars damaged upon foreign lines." etc., balance of rule to remain as at present.

Rule 123.—It has been suggested that rule state which party to dispute shall prepare abstract. In case of any dispute or question arising under the rules between the subscribers to said rules, the same may be submitted to this committee, through the Secretary, in abstract, to be signed by both parties to the dispute, to receive consideration by the arbitration committee. The abstract should set forth: An agreed statement of facts; argument of plaintiff and argument of defendant

The abstract should consist of not more than three typewritten pages, letter size, single space, and should be signed by both parties to the dispute. Balance of rule to remain as at present.

Rule 131.—This Code of Rules shall take effect September 1, 1912.

Page 105. Rule 2. Item (C).—Under item C, Rule 2, of the passenger car code of rules, page 105, the committee would suggest the addition of "shades" and "belts" under the heading of electric lighting, believing these two items should be included in line expenses proratable.

JOS. W. TAYLOR,
Secretary.

The Secretary: In accordance with the request of the arbitration committee, a meeting was held yesterday afternoon at 4 o'clock, at which time a large proportion of the members of the association in attendance at this convention were present. The object of the meeting was to consider the report of the arbitration committee in reference to proposed changes in the rules of interchange. As a result the arbitration committee would recommend the following changes in its recommendations:

Rule 2.—Cars having defects for which the delivering company is responsible must be properly carded when offered in interchange. Empty cars offered in interchange must be accepted if in safe and serviceable condition, the receiving road to be the judge in cases not provided for in Rules 3 and 4, and 32 to 88, inclusive. Owners must receive their own cars when offered home for repairs, subject to the provisions of these rules. Loaded

cars offered in interchange must be accepted, with the following exceptions:

(a) Cars (whether loaded or empty) having defects in violation of the Safety Appliance Acts, must not be offered in interchange.

(b) Leaking tank cars containing inflammable liquid must be repaired or transferred without any unnecessary movement or at nearest available point with least possible risk. Also, cars loaded with explosives shall be handled in accordance with the regulations of the Interstate Commerce Commission.

(c) Cars improperly loaded, when not complying with the rules for loading material.

(d) Lading of open cars when dimensions of lading are in excess of published clearances of roads over which the shipment is destined.

(e) When cars cannot pass approved third rail clearances of American Railway Association.

American Railway Association car service rule 15 to apply (see page 88) when transfer or rearrangement of lading is necessary.

The car transfer check authorizing transfer or rearrangement of lading to be of the form shown under rule 2 of the report.

When the lading is transferred by the receiving line the car, when empty, may be returned to the delivering line.

(Last paragraph as at present.)

Also, that American Railway Association rule 15, as shown on page 88 of the rules of interchange, be changed to conform to the rule as amended by that association, reading as follows:

Rule 15. Unless otherwise agreed, the cost of transferring the lading of freight cars or rearrangement of lading at junction points shall be settled as follows:

First:—The delivering road shall pay cost of transfer or rearrangement.

(a) When transfer is due to defective equipment that is not safe to run according to M. C. B. Rules.

(b) When transfer or rearrangement of load is due to contents being improperly loaded or overloaded according to M. C. B. rules or the Interstate Commerce Commission regulations for the transportation of explosives and other dangerous articles by freight and by express, or when dimensions of the lading of open cars are in excess of the published clearances of any of the roads covered by the routing.

(c) When transfer is due to delivering line not desiring its equipment to go beyond junction points.

(d) When cars cannot pass approved third rail clearances of the American Railway Association.

Second:—The receiving road shall pay cost of transfer or rearrangement:

(e) When cars cannot pass clearances, except as provided in paragraph (d) or when cars and lading exceed the load limit or cannot be moved through on account of any other disability of the receiving line. (Note:—The word "cars" covers both closed and open cars, but not lading on open cars. The words "load limit" refer to the limits placed on bridges, tracks, etc., and not to car capacity.)

(f) When the receiving road desires transfer to save cost of mileage or Per Diem.

Rule 20.—As agreed, the committee would change the word "head to "shank," in the third line of the first paragraph of its recommendation to conform to the terms employed by the Interstate Commerce Inspectors.

Rule 30.—Inasmuch as weighing associations do not now stencil the new light weight on the car, the committee will suggest to the executive committee that the matter should be preferably referred to the American Railway Association from this association, so that any weighing bureau or association light weighing cars shall, in addition, properly restencil the new light weight on the car. In the meantime the present rule should remain as it now reads.

Rule 64.—The committee would suggest that the words "and nuts" in last line of the rule be omitted.

Rule 91.—The committee will refer the proposed changes in this rule to the executive committee, with the request that it will confer with the accounting officers association, and advise whether they would concur in the proposed changes in the rule leaving the rule as it now stands.

Rule 98.—The committee would suggest that in the last line, the dimension 1/16 in. be changed to 1/8 in.

Rule 102.—The committee would suggest that the last sentence in this rule be changed to read:

No charge to be made for lettering, except when done to preserve the identity of the car and not necessitated by other repairs.

Rule 110.—The committee finds that the word "by" has been omitted between the words "height" and "adjusting" in the second line of its recommendations, and suggests that it be placed there.

The question was raised as to the proper height of passenger car couplers. The committee will refer this to the executive committee for decision.

JOS. W. TAYLOR,
Secretary.

F. W. Brazier (N. Y. C. & H. R.): I move that the report of the arbitration committee be accepted and adopted. (The motion was seconded and carried with no discussion.)

The decisions of this committee were also accepted and approved.

A rising vote of thanks was given the committee for the excellent work they have done in the past year.

PRICES FOR LABOR AND MATERIAL.

The special committee appointed to suggest additional prices or modification of present prices as given i nthe rules of interchange, to cover all classes of cars, prepared a circular of inquiry requesting recommendations. Replies were received from only 32 railways and 8 private lines.

The following report is submitted:

The committee recommends no action on Rule 116; committee not being certain that they have authority to take this matter up, though mentioned in circular of inquiry, and very few suggestions as to changes were received.

The entire subject of prices for labor and material on passenger equipment is not reported upon for the reason that very few roads made suggestions in regard to changes, and on account of the many changes now taking place in the construction of passenger equipment we were unable to give this subject the necessary attention, and recommend it be given further consideration.



F. H. CLARK,
Chairman, Committee on Prices for Labor and Material.

The committee has, however, accepted the recommendations of chairman of Master Car Builders' train lighting committee, which are embodied in report herewith.

Rule 98. Bills rendered for wheels and axles shall be in accordance with the following schedule of prices for material, with the proper debits and credits:

	Present Prices.			Recommended Prices.		
	New.	Second hand.	Scrap.	New.	Second hand.	Scrap.
One 36-in. cast-iron wheel	$10.50	$7.75	$5.25			
One 33-in. cast-iron wheel	9.00	7.00	4.75			
One 33-in. forged or rolled steel wheel	23.00		5.00	$21.00		$4.50
One axle, 100,000 lbs.	21.50	11.75	7.75	20.00	$12.00	7.50
One axle, 80,000 lbs.	17.75	10.00	6.50	16.00		
One axle, 60,000 lbs.	14.00	7.75	5.25			
One axle, 50,000 lbs. or under.	11.50	6.25	4.25	10.00	5.00	3.00
And with an additional charge for all labor for each pair of wheels and axles removed from all arch bar trucks of.	1.75			2.00		
And from all solid pedestal trucks of	2.00			2.25		

If new wheels and axles are substituted for second-hand wheels and axles, proper charges and credits shall be allowed, although such substitutions be made on account of only one loose or defective wheel or a defective axle with the following exceptions: In case the owner of a car removes a damaged wheel or axle, no

charge shall be made for any difference in value between the parts used and those removed that are not damaged.

Removing, turning and replacing a pair of forged steel or steel-tired wheels: $3.25 for pedestal type of truck and $3 for arch bar truck.

It is recommended that this paragraph be changed to read:

"Labor turning per pair forged steel or steel-tired wheels, $1.25.

"The price for new forged or rolled steel wheels shall only apply to such wheels having treads 1⅜ inches thick or over, measured from base line of tread to the condemning limit which is ¼ inch above witness groove. For wheels having treads less than 1⅜ inches thick as described, a reduction shall be made in price at the rate of 75 cents per 1/16 inch thickness (on radius) of tread.

"Any loss or increase of service metal on forged or rolled steel wheels shall be credited or charged at the rate of 75 cents per 1/16 inch thickness (on radius) of tread."

The necessary information must be given in all cases, as pro-

In cases of slid-flat wheels, 1/16 in. for loss of service metal will be allowed for flat spots 2½ in. long and 1/16 in. for each additional inch or fraction thereof.

It is recommended that this paragraph be changed to read:

"In case of slid-flat wheels, 2/16 in. for loss of service metal will be allowed for flat spots 2½ in. long, and 1/16 in. for each additional inch or fraction thereof."

[The rest of the report is given over to prices of Rules 101, 107 and 111.]

On page 108, Rule 12, the last paragraph should be changed to read: "On electrically lighted cars equipped with storage batteries or axle device, furnished to foreign roads, where no agreement is made, a charge of 75 cents per car per day shall be made for the use of the electrical equipment."

The report is signed by: F. H. Clark (B. & O.), chairman; G. E. Carson (N. Y. C. & H. R.); C. F. Thiele (P. C. C. & St. L.); Ira Everett (L. V.); B. Julien (U. P.); S. T. Park (C. & E. I.), and H. E. Passmore (T. & O. C.).

DISCUSSION.

J. J. Hennessey (C. M. & St. P.): I move that the recommendations of the committee on prices for labor and materials be accepted as prices of the rules of interchange. I have had some years of experience on this rules committee, and the amount of labor that is put into this report is not fully realized by the average member who has not undertaken a similar job.

A. W. Gibbs (Penna.): The committee on tank cars has a price recommendation in regard to safety valves, and also in regard to the periodical retesting of safety valves. I wish to ask for permission to submit these prices, which have been arranged by trial, and if approved by the committee, that they may be included in the list of prices submitted by them.

F. H. Clark (B. & O.): The committee will be glad to receive and consider the prices and take such action as may seem necessary.

J. J. Tatum (B. & O.): I want to say before the motion is submitted, that it was found necessary, due to some changes made by the arbitration committee to all an additional item to Rule 101, which will read as follows:

"Stenciling on sides and ends when done to preserve identity of car and not necessitated by other repairs, net price 50 cents."

The committee's report was then accepted.

RULES FOR LOADING MATERIALS.

The committee reports the following recommendations for changes in the present rules for loading materials. The modifications, in the main, have reference to reductions in amount of material required to build up loads, having due regard for the safety of cars as well as lading in transit. A good deal of information has been collected from railways and shippers in connection with the several suggestions that are recommended.

Attention is called to Rule 6, and with particular reference to its apparent conflict with paragraph *D* of the American Railway Association Rule 15, some allusion to which was made in the report of 1910.

The paragraph reads as follows:

"The receiving road shall pay cost of transfer or rearrangement: (d) When cars exceed load limit or can not pass clearances or be moved through on account of any other disability of receiving line."

After the presentation of the 1911 report the committee recommended to the arbitration committee the acceptance of the last suggestion offered by the American Railway Association, which was to add the following paragraph to Rule 6:

"Should it become necessary to transfer or rearrange the lading in transit on account of excess width or height of lading, see American Railway Association car service Rule 15, paragraph *D*."

This was done under the impression that the supplement would remove the apparent conflict, still leaving Rule 6 in such shape as to allow the shippers to build up loads within reasonable limits, without infringing upon the principle involved in American Railway Association Rule 15. But the application of the second paragraph or added portion of Rule 6 soon demonstrated the wisdom of the rule as it originally stood prior to the change last year, which required that the load be built up with reference to the clearances of the roads over which the lading is routed. In the light of this development the General Managers' Association, of New York, at their meeting held in New York, December, 1911, concluded to suggest to the American Railway Association certain modifications to their Rule 15, having further in mind that in the event of the American Railway Association adopting such changes the Master Car Builders should be requested to modify Rule 6 for loading materials, erasing therefrom that portion of the rule which was added in 1911, which would leave the rule practically in its original shape. The committee has no further reference to make relative to Rule 6 until the matter is disposed of by the American Railway Association.

RULE 10.—Wooden cars of light capacity when used as idlers between cars of heavier capacity are liable to break down when



A. KEARNEY,

Chairman, Committee on Rules for Loading Materials.

placed in a train composed of heavier capacity cars, in case of sudden stops or emergency application of the brakes; a paragraph, therefore, should be added to Rule 10 reading as follows:

"If the idler is a flat car of wooden construction, its capacity must be not less than that of the carrying cars."

RULE 23.—The first sentence of this rule should be changed to read as follows, so as to also cover the placing of sliding as well as bearing pieces:

"Bearing and sliding pieces must never be placed between bolster and end of car, unless special provision is made therefor in detail instructions."

RULE 43.—This rule should be changed to read as follows:

"The lading overhanging the idler must be governed by restrictions contained in General Rule 11 so that overhang will not exceed clearances in curving."

RULE 45.—The last portion of this rule should be changed to read as follows:

"Where the pile of lumber on the idler exceeds 20 ft. in length, 4 stakes on each side must be used, 3 on each side being sufficient for shorter piles to conform to Rule 34."

RULE 55.—We find that some of the Canadian roads have flat cars equipped with permanent chains and short stakes, which are used for the handling of logs, and having ascertained that logs loaded on these cars with this method of binding the lading are safe, we would recommend the addition of a note to that effect immediately after Rule 55 so as to allow the use of this equipment for handling the material in question.

RULES 56 AND 57.—These two rules should refer to flat as well as low-sided gondola cars and, therefore, should be changed to read as follows:

"RULE 56.—When material of this kind is loaded on flat or

gondola cars with sides less than 30 in. high, and lading does not exceed 4 ft. in height measured from floor, and the lading is not loaded in pyramidal form, the stakes must be as high as the lading and must be tied together at the top with not less than eight strands equal to four wrappings of good ⅛-in. diameter wire and must be tight. Stakes must be sound hardwood, free from knots and of the dimensions specified in General Rule 12."

"Rule 57.—If the material is loaded on flat cars or gondola cars with sides less than 30 in. high, to a height more than 4 ft. measured from floor, opposite stakes must be bound together with wire at about one-third of the height above car floor after one-third of the load has been placed on the car, and in such a manner that when the remaining load is placed on the car the wire will have a tendency to draw the tops of the stakes toward each other. The middle as well as the top wrappings of wire must consist of not less than ten strands equal to five wrappings of good ⅛-in. diameter wire and must be tight. Bearing-pieces may be placed between the lower and upper sections of load to facilitate application of wire after all the lading has been placed on the car. Stakes must be sound hardwood free from knots and of the dimensions specified in General Rule 12. Stakes must incline toward center of car a total of about 12 in. before load is placed on car, and in no case will they be allowed to incline away from center of car after the car is loaded. The inspector must assure himself that all wiring is tight before load is moved."

Rule 58.—The size of the 3 pair of live saplings mentioned in the first sentence of this rule should be 4½ in.

Also add the following paragraph to this rule:

"When lading is in two piles not over 20 ft. in length and ends of piles are interlaced at center of car, there must be not less than five pairs of stakes for total length of load. If the length exceeds 20 ft., there must be not less than six pairs of stakes for total length of load. The ends of poles must extend not less than 18 in. beyond the center stake."

Rule 81.—Some suggestions have been made with reference to handling twin loads of flexible material where the shipment is light and can be handled safely without the use of blocking prescribed for full loads, and in order to make this entirely clear, the following paragraphs should be added to this rule:

"81-A. If the total weight per bolster does not exceed 10,000 lbs., the center post and bolster cross braces may be omitted, provided the bearing-piece is not less than 8 in. x 10 in.

"81-B. For twin loads of plates with two bearing-pieces and two or four sliding pieces, if the total weight does not exceed 20,000 lbs., or 10,000 lbs. per bearing-piece, the center post and bolster cross braces may be omitted, provided the bearing pieces are not less than 8 in. x 10 in.

"81-C. For loads less in weight than those specified in paragraphs *A* and *B*, the dimensions of bearing-pieces may be proportionately reduced as per Rule 29."

Rule 103.—In order to bring the weight of the lading nearer to the allowable limit for double and triple loads, the following paragraphs should be added to provide that girders, either of the solid or latticed type ranging from 10,000 to 30,000 lbs. each in weight, shall be so arranged that two or more can be loaded side by side on pivoted bolsters:

"Two or more girders may be loaded vertically, side by side, provided they are bolted together near pivoted bolsters, with proper spacing-pieces between them, in such a manner that they act as one girder."

Fig. 56.—It is claimed that the method of loading pipe 24 in. or more in diameter on a flat car in accordance with the present rules is wrong on account of there being no provision for holding the second and top tiers of pipe from sliding off endwise. Pipe of this description should be loaded with the bell ends

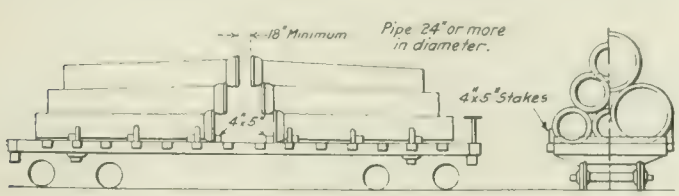


Fig. 1—Method of Loading Pipe on Flat Cars.

toward the center of car, the bell ends of the second tier overlapping the first toward center of car. There should be at least 18 in. clearance between the bell ends of the top tier and when loaded in this manner the end blocking is not required, therefor Fig. 56 should be changed as shown in Fig. 1 herewith.

Rule 121.—Due to objection on the part of the shippers to the size of blocking now specified, and due also to the fact that blocking of smaller dimensions can be used without interfering with the safe movement of boiler shells and tanks, this rule should be changed to read as follows:

"Lading of this description 8 ft. or less in diameter, when loaded on single flat or gondola cars, should be substantially chocked with side blocking equal in height to 1-7 the diameter of the shell, providing that blocking of more than 10 in. in height will not be required. End blocking to be not less than 4 in. in height as shown in Fig. 2 herewith.

"Lading over 8 ft. in diameter, when loaded on single flat or gondola cars with sides less than 30 in. in height, must be substantially chocked with side blocking not less than 10 in. in height and backed up by the use of stake pockets, and in addition to this must be secured with 2 bands of not less than ¾-in. round iron or flat bands of equal section. End blocking to be not less than 4 in. in height."

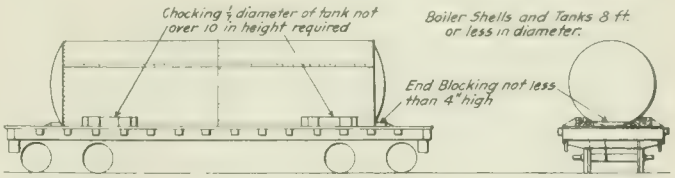


Fig 2—Method of Loading Boiler Shells and Tanks; 8 Ft. or Less in Diameter.

"When loaded in gondola cars with sides 30 in. or over in height the bands will be unnecessary, but precaution with reference to blocking must be taken as specified for lading 8 ft. in diameter."

"When such lading is placed upon 2 or more cars as a tandem shipment it should be secured with 2 bands of not less than ⅞-in. round iron or flat bands of equal section, in addition to the prescribed blocking."

"Steel tanks, lined or unlined, in sections weighing not over 2,500 lbs. per section, 8 ft. or less in diameter, when loaded on single flat or gondola cars, must be substantially chocked on each side with blocks not less than 6 in. in height and of sufficient length and width so that they may be securely spiked to the floor of the car. End blocking to be not less than 4 in. in height and of sufficient length to provide for proper bearing area against head of tank or shell and to be securely spiked to the floor of the car. If more than 8 in. in diameter the same side and end chocking is to be used and in addition each tank or part of tank must be secured with 2 bands not less than ⅛ in. x 2 in. in section passing over the top and properly secured to the floor or stake pockets of the car. In lieu of the bands over the top of the shell the same may be secured to the floor of the car or stake pockets by straps of ¾-in. round iron or equal section bolted to the flange of the tank or shell with not less than 2 bolts, the lower end of the strap passing through the floor or stake pocket.

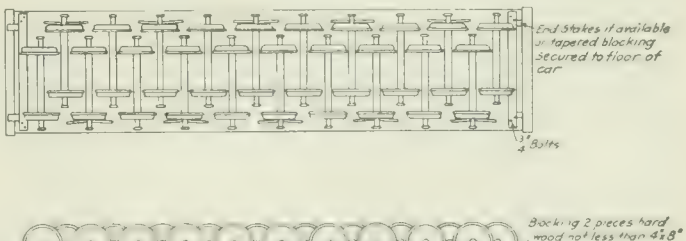


Fig. 3—Method of Loading Mounted Wheels.

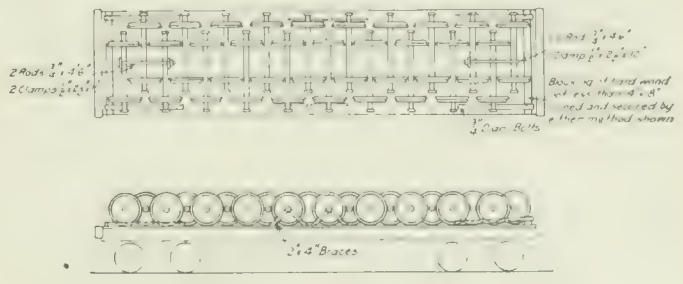


Fig. 4—Method of Loading Mounted Wheels.

A new Rule 122-A should be added to cover the shipment of mounted wheels on flat cars, as follows:

"122-A.—Mounted wheels may be loaded on flat cars as shown in Figs. 3 and 4. If Fig. 3 is followed the end blocking must be not less than 8 in. by 8 in. in section in one piece, or made up of two pieces of hardwood of equivalent section and secured by end stakes in addition to bolts through floor, or by separate blocking pieces secured to floor and end sill with ¾-in. bolts. In addition to this, for a full load, five pair of wheels must be secured by 2 in. by 4 in. hardwood braces as shown, spiked to floor of car.

"If Fig. 4 is followed, three pairs of wheels at either end of load are to be tied together, using ¾-in. rods with clamp plates or ¾-in. U-rod and plate as shown, and blocking at ends and along sides of hardwood not less than 4 in. by 8 in., joined and bolted to car floor by either of the methods shown in Fig. 4."

The two new figures referred to in new Rule 122-A should be inserted in the code, immediately following Fig. 66 and ahead of Fig. 66-A.

RULE 124.—The second sentence to read as follows (The italics show the words added):

"Cars without doors, *and containing freight of a character requiring it,* must have the lading protected from falling or rolling out of car by strips or slab wood, not less than 1½ inches thick at center, nailed to inside of door posts, and sufficiently close to floor of car and to each other to prevent lading from passing between them."

The present prescribed practice of loading triple loads of long flexible material (angle irons and plates) is open to criticism, but the committee has not had time to make sufficient study of the situation with a view to changing the present rules.

During the current year the committee has received a great deal more assistance than heretofore and it is hoped that it will increase, for it is doubtful if the committee is getting the benefit of the general experience or the many ideas arising in handling commodities under local conditions which must necessarily develop from time to time.

The report is signed by:—A. Kearney (N. & W.), chairman; R. E. Smith (A. C. L.); C. H. Osborne (C. & N. W.); W. F. Kiesel, Jr. (Penna.) and L. H. Turner (P. & L E.).

DISCUSSION.

A. W. Gibbs (Penna.): Does the report include the requirement that the car shall comply with the clearances for the electric third rail, which was adopted by the American Railway Association at its last meeting held in New York last month.

A. Kearney (N. & W.): I do not think that would conflict with rule No. 6, because this places the burden upon the railway having the disability.

Since presenting this report we have received correspondence from the Ohio Quarries Company and the Cleveland Stone Company, in reference to loading stone. We have also had some correspondence with the National Tube Company, and L. C. Bihler, traffic manager of the Carnegie Steel Company. I would like to ask if it will be satisfactory to have the committee go over the questions submitted to us, and then submit the conclusions with the report to the members of the association for letter ballot.

The subjects which Mr. Bihler speaks of are: Plates too wide to go in a single car, overhanging loads in single cars and plates too wide to be loaded flat on gonolas, but may be loaded flat on flat cars, the load being held in place by clamps extending across it, secured by bolts running through the stake pockets. There is no reference to the last item in the present rules either in text or by sketch. When the committee takes hold of this matter they will fully consider all the points. It will be necessary of course to make a safe load.

C. E. Chambers (C. of N. J.): I wish to make a few remarks in connection with the report which has been submitted. I want to have it thoroughly clear in my mind that the recommendation of this committee is that rule 15 of the American Railway Association, and our Rule 6 will put the expense on the loading road, where the loading road does not load according to the clearances, etc., on the lines on which this car must pass. Is that the point?

Mr. Kearney. If you will recollect, and no doubt you will remember, about 2 or 3 years ago we were asked to modify rule No. 6, so as to make it harmonize with the American Railway Association rule No. 15. Rule 15 placed the responsibility upon the road having the disability. That meant that if you load a car, it does not matter how wide, and turn it over to some other road they would be required to take that car, and they would be required to carry the burden, and simply because they could not handle the car on their line because their clearance limits were apparently too small, they would be responsible for the incorrect loading of the car. At a meeting of the General Managers' Association of New York, it was thought that that was unfair, and I might say here, it is the position of the committee that this is unfair, we have always considered that such a ruling created a most unreasonable situation. The General Managers' Association at the meeting to which I have referred, decided to except the loads on open cars, which brought it right back to the point we have been contending for for some two years. That means that if you load the car in excess of the clearance limits of the line over which the car is routed, you make the transfer of the load, you as the delivering line.

Mr. Chambers: I want to be perfectly clear on that, because it is a matter of great importance to the Central of New Jersey. We are down on the Seaboard where we get cars from all the roads in the country, and deliver many cars to roads which have all these clearances, and it meant a great deal to us if we had to accept that.

C. A. Schroyer (C. & N. W.): I move the acceptance of the report as a whole, with the supplemental matter presented by the chairman of the committee, and that the recommendations of the committee be submitted to letter ballot.

The motion was seconded and carried.

DAMAGE TO FREIGHT CAR EQUIPMENT BY UNLOADING MACHINES.

The standing committee on rules for loading materials was instructed to investigate the damage to freight-car equipment handled through dumping or unloading machines, and reports that it finds very valuable work has already been done in the same direction by several railways whose equipment, in rather larger proportions, has been handled through such machines, and as a result has sustained considerable damage.

The Pennsylvania and the Lake Shore & Michigan Southern took hold of the question some time ago and were very successful in locating several fouling points and parts throughout a number of unloading machines responsible for damage to cars.

Some time ago a committee was appointed on the Pennsylvania to investigate the subject and to make observations where some of the larger unloading machines were in use; they found that more than 95 per cent. of the cars were damaged in one way or other as they were handled through the machines, and further that the safety appliances were damaged on something like 32 per cent. of the cars.

It seems this situation arose principally through lack of uniformity in unloading machines as well as in cars, and that the greatest percentage of damage is occasioned by the condition and relative position of the clamps, also the breast plates, blocks, etc., against which the cars rest while being rotated in the machines.

It has been the thought of the committee to secure plans from manufacturers showing the relative position of the bearing points assumed by the cars as they are handled in the machines and then develop a composite diagram showing the relative position and limitations of such areas. It has also been the idea that if it will be possible to gradually reduce the increasing variety in car designs in such parts, at least as foul the lines and areas as might be determined upon, a great deal will have been accomplished toward reducing the expense now incurred on account of damage to cars, and at the same time minimize delays to equipment.

It was hoped by this time more information would be secured with relation to dumping machines, also composite diagrams from all roads showing the various classes of freight equipment likely to be used in such machines, believing that with complete information along this line some headway might be made by putting the respective composite plans together into one large sheet so as to show to the builders of machines, as well as to railways and car builders, the bearing areas they have each independently appropriated.

The two phases of the question, namely, the one relating to the design of the machine, as well as the car, are so intimately associated that the best results are only to be accomplished by endeavoring to solve the two problems together; but to what extent it is going to be possible to do this remains to be seen. Although the committee has received assistance from some of the railways as well as the manufacturers of unloading machinery, they feel confident that the field has not been covered, and, therefore, the work is still incomplete.

The work of the committee seems to show that so far as the types of unloading machines are concerned, there are practically three schools of design to meet. While the various types differ somewhat in detail, the general arrangement or systems are represented by the three following descriptions:

First: One in which the car is run onto a supporting track,

which slides transversely on a cradle, being held in place by clamps from underneath when the machine is in its normal position. Four chains are passed through hollow hook clamps to counterweights on the opposite side of the machine and are attached to the supporting track. The hook clamps move vertically in guides on the cradle sides, and are held at a height sufficient to clear any car, by means of vertical rods which extend to seat blocks underneath the cradle. When the cradle is raised the cams disengage and the supporting track is pulled over by the counterweights until the weight of the car braces itself against the cradle side. The hook clamps fall by gravity until they have assumed a bearing on the top flange of the car.

Second: One in which the car is run onto a supporting track which tilts on a horizontal shaft until the car has a bearing on the cradle. This arrangement has chains and hook clamps as above described, but the latter are anchored in the cradle side instead of to the supporting track.

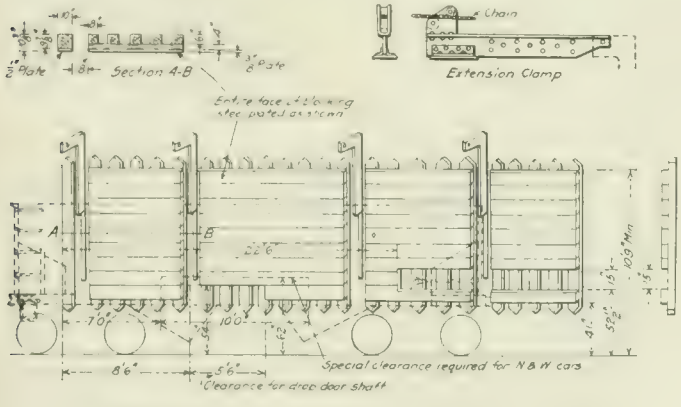
Third: One in which the supporting track is stationery, and the cradle side is moved inwardly and up against the car by pistons.

In all three types of machines the clamping arrangements are quite similar, consisting of hooks and clamps. A great deal of damage now sustained by the equipment is due to the manner in which the car is seized by the clamps and other apparatus belonging to the dumper, and the bearing the car assumes up against the side of the cradle, also in some instances on account of clamps being missing and chains alone being used to hold and steady the car. In some machines the cradle sides are constructed with insufficient bearing surface for the car to rest against, or they have bearing surfaces fouling the ladders, grab-irons and other parts of the car as it is being rotated in the unloader.

In the revolving type first described, the lifting as well as the rotating motion of the machine carries the car sidewise until the car sides rest up against the cradle, regardless of the width of the car. This is for the purpose of supporting the car on its wheels and on one side in the rotating movement.

There was a joint committee representing several roads sent out not long ago to examine a number of dumping machines, and their report was to the effect that they considered it possible to readily modify the cradle and blocking of the first two types of machines so that the safety appliances and other parts would be subjected to little chance of being damaged. A modification in the third type, however, would seem to be more extensive.

Plans are shown herewith giving recommended dimensions for cradle sides, which it is believed will diminish, to a very



Recommended Dimensions for Cradle Sides.

large extent, the damage to cars, provided each car is properly spotted. The support of the sides of the car consists of four sections, each composed of 6 in. by 8 in. vertical pieces, upon which are carried horizontal boards 4 in. thick fastened thereto, and plated with ⅜-in. steel. The proposed design of extension clamps is shown in detail in the illustration.

The cars are intended to be spotted so that the ladder end is clear of the end section. The two sections at the opposite end are cut out to provide clearance for the side handholds for cars of various lengths. The dotted lines covering part of Sections 1 and 2 show the amount that must be cut out for Norfolk & Western cars where the drop door rigging is located rather high and spaced farther apart than on many other classes of cars. This recess need not be provided except on machines in territories where such cars are handled.

The committee, in submitting this report of progress, states that as the subject is of such wide importance it should have more time.

The report is signed by:—A.Kearney (N. & W.), chairman; W. F. Kiesel, Jr. (Penna.); R. E. Smith (A. C. L.); C. H. Osborne (C. & N. W.) and L. T. Turner (P & L. E.).

Mr. Kearney presented the report, and in connection therewith said: Since preparing this report, I have talked over with some of the manufacturers of unloading machinery, this subject, and we discussed the matter at considerable length. They have all expressed themselves as being willing and anxious to help the committee in its work.

DISCUSSION.

H. La Rue (C. R. I. & P.): We are concerned with these unloading machines in the West. The mineral products in the West are being developed, especially along the line of the erection of cement buildings. The factories are placed, and the limestone quarries are at quite some distance from the factories, and the cars are loaded with limestone at the quarries and then taken to the factories, and they are now using dumping machines, of course, in unloading the limestone, in all classes of cars, and we are finding serious damage done to the cars by the unloading machines. I have seen no reference in the report, nor have I yet had an opportunity to find out from the railways on the Lake ports who is responsible for the damage done to the cars by the unloading machine. I would like to hear something on that point.

I. S. Downing (L. S. & M. S.): In reply to Mr. LaRue, I will say that I happen to be on a committee that is investigating this subject in the Lake territory. We handle a good many Norfolk & Western cars, which require a special provision made in the blocking of the unlocker to take care of the winding shaft. When the car is turned on its side, the shaft would sometimes project beyond the side and shove the side of the car in. This occurred on cars of the Pennsylvania line, and the Pennsylvania line was held responsible for that damage. There is no use in trying to collect from the people who own the machines or the company which operates them. Generally the railway companies own the machines and lease them to the people who operate them. The damage has not been done in connection with the kind of a cradle, which is shown in the report of the committee, but with the old style of machine that has a plunger which is forced out of the side of the car, out by air pressure, and that forces the side of the car in. There are two or three of these machines used in the Pittsburgh district.

Mr. Downing: It is very important that some general practice be adopted. The steel people and the coal people seem to be willing to do anything we want, but they do not want to have to change this blocking every six months. The blocking which is shown here solid, we feel absolutely sure will take care of the safety appliances. It is gained in on one end to take care of the handle. On the outer span the ladder clears the cradle. In order to apply these appliances shown, it will be necessary for some of these machines to be reinforced in the cradle which is quite a little job and involves some expense. In building cars for this territory, the designer should consider the cradles on these large machines because they cannot be changed to suit the conditions called for in a few cars that some fancy designer may get up.

R. L. Kleine (Penna.): The design which the committee presents I feel is a good one, in that it presents a plane surface. There is one thing in connection with the design, and that is the reinforcing plate, which they apply to the face of the planking. An objection has been raised to that feature at Lake points and tidewater ports in winter weather for the reason that the load would be liable to slip along these plates, whereas that would not be the case if they had wooden blocking. But I feel that the design presented is one which will avoid a whole lot of damage to cars. The design should be applied to a number of cradles, so that we could get some experience with regard to its service. Also the committee should be continued so that they can go further into the question, and make some recommendation as to necessary changes in the Brown dumping machine which have the plungers and which are now badly damaging cars.

John J. Tatum (B. & O.): We have had some experience in Pittsburgh and on the Lake ports with dumping machines, and we found about three years ago that the dumping machines were damaging many of our cars on account of the method of blocking arranged on the machines. As a result of our investigation we have had the blocking so located that it has avoided a great deal of that damage to the cars, the side of the cars, by the machines, and we have so arranged the blocking that when the cars turn over the bearing will be so distributed that it will be taken care of on the stronger portions of the construction of the car, and in this way we will prevent damage to the car. Since that time we have

been getting along very nicely. We have not had our cars damaged to as great an extent as previously.

It is not only the dumping machine which is worrying us now, but the fellow who comes along after the car is loaded with ore, and puts an excess load on them, and then comes along with a traveling crane, with a clamshell bucket on it, and takes out a portion of the excess load, and also carries out the cross bracing; and because of this, new Rule 15 is going to make a little trouble for us as it will allow our cars to spread, and that is one of the new developments we must look into.

Mr. Kearney: May I ask Mr. Tatum how they would distribute the loads on the sides of the car that he referred to?

Mr. Tatum: Blocking sometimes was placed so that it would bear on an area of the sheet that had no support on the inside of the car, and that would result in crushing the car on the inside. By placing the blocking so that it would be back of the supports on the inside of the car we prevented this, but it was not only the crushing in of the side of the car that gave us trouble; we also damaged the safety appliances. The blocking was not deep enough, did not have the necessary clearances for the grabirons, etc.

Mr. Kearney: You mean by reason of not having a suitable or sufficient bearing, the cross braces will fail?

Mr. Tatum: Yes.

Mr. LaRue: I would like to ask in connection with the use of the unloading machines at lake ports: Do they use these machines in the case of all classes of coal cars, and similar cars, with inside and outside stakes, and cars having from two ft. sides to four ft. sides, promiscuous cars, foreign cars, wooden cars, etc.?

Mr. Kearney: I should think if we could answer that question in the affirmative, the work of our committee would be complete. We tried to include in our report a consideration of all the cars now being operated with these machines.

Mr. Tatum: Possibly I misunderstood Mr. Kearney's question. It has been suggested by some of the members sitting near me that I did misunderstand it. If so, I want to correct it. I understood that Mr. Kearney wanted to know what effect there was from the loss of the bracing, which resulted in spreading the car, brought about by the unloading machine—

Mr. Kearney: You said the absence of the bearing.

Mr. Tatum: That is correct—I said the absence of the bearing allowed the sides of the car to spread.

Mr. Downing: In regard to the plate recommended by the committee to prevent wear. We found that the horizontal blocking as well as the vertical blocking on the machines is badly worn, and there would not be an even bearing along on the angle of the stakes. The recommendation of this plate is simply to prevent wearing of the blocking.

The report of the committee was accepted and the committee was given more time in which to carry on its work.

H. L. Trimyear (S. A. L.): I would like to make a recommendation that the committee on prices for labor and material be continued for another year, as I think that the revisions made are very large, and a great many questions are going to arise, covering these prices, that will be referred to the arbitration committee, and I think the committee will be able to help the arbitration committee to solve these problems, and I also think that there are some more new prices that should be considered, and one of which would be the welding of tank cars which we are all coming into the use of now, and which we have no prices to cover.

The President: If there are no objections on the part of the association, the suggestion made by Mr. Trimyear will be referred to the executive committee.

OVERHEAD INSPECTION OF BOX CARS.

The committee on rules for loading materials, to whom was assigned the formulation of rules for overhead inspection of box cars for loading, makes a report in the way of explanation, that it does not feel it has had sufficient time to cover the field as carefully as the subject would seem to warrant, hence the report is offered as one of progress. Still the problem is not a new one; on the contrary, every road in the country is striving to control as best they can, and the fruits to be secured by concerted action on the part of all roads are unquestionably conceded.

From 1900 to 1910, the payments by the railways for freight loss and damage per annum has increased in the United States from $7,055,622 to $21,756,671. These figures do not include the enormous clerical expense involved in the investigation and handling of claims. Furthermore, it is estimated that the unreckoned inconvenience and loss of time, by the public, incident to these failures of transportation, represents another loss about as great.

The extent of this apparent loss has become a matter of so much concern to the management that the American Railway Association has taken official cognizance thereof, through its committee on relations between railroads, and a special committee, composed of three representatives from the three General Managers' Associations, has been created, and is known as the committee on marking, packing and handling of freight.

This special committee has gathered a great deal of valuable data, and its statistics relating to losses growing out of or incident to, the condition of car equipment seemed to be of so much interest, that Mr. Hale, chairman both of the special committee and the committee on relations between railroads, raised the question with the Master Car Builders' Association, suggesting a joint meeting between their executive committee and the sub-committee on marking, packing and handling of freight, which was held in New York in December, 1911.

Inquiries had been sent out by the committee on relations to some of the larger systems asking for amount of claims paid on account of defective equipment covering the month of November, 1911, resulting in the following:

Total mileage of roads reporting	82,360
Gross earnings	$111,004,783.00
Claims paid:	
Account of leaky cars	[illegible]
Defective cars leaking contents	19,919.89
Projecting nails, etc.	529.08
Dirty cars	1,625.61
Other causes	1,341.37
Total claims paid as above	59,650.15

While the roads reporting showed an aggregate mileage of 82,360, with gross earnings amounting to $111,004,783, and a total amount in claims of $59,650.15, it is possible that some of the claim figures are incomplete; still the details are of interest and should be accepted as showing in the aggregate the extent of such losses. Going a step beyond this the committee has equated the figures, calculating what the loss might be per year for all roads which totaled, as will be seen, $139,194.01. The details are as follows:

Gross earnings for the year	$259,061,997.00
Damage claims per year from	
Leaky cars	51,919.37
Projecting nails, etc.	46,351.61
Dirty cars	3,793.04
Other causes	3,062.27
Unclassified	32,710.59
Total	139,194.01

While the losses directly assignable to defective car bodies are not the largest feature of the total loss, it is probably true that such items as inefficient car doors (facilitating robbery or pilfering), etc., represent another considerable source of loss indirectly chargeable to the cars, which do not appear in the figures.

It seems to the committee that without directly undertaking an answer to that question, there are two distinct avenues through which an improvement can be directly approached, namely:

First—Concentrate the responsibility for losses due to defective car bodies in such a manner as to provide an automatic incentive for the use of better cars.

Second—Establish standard requirements for the inspection of car bodies.

The General Managers' Association of the Southeast has been giving a great deal of attention to the general question of freight loss and damage, and the feature of defective car bodies has been under consideration. On April 9, 1908, they called a general meeting of officers of several departments of lines in their territory to which representatives of roads in other sections were also invited, and their minutes show the following:

Defective Cars.—A committee on loss and damage make a report as follows: "It is unfortunately true that the scarcity of equipment has almost compelled the use of cars which were defective in roofs, doors or end windows, but which were kept in service as long as the running gear was entirely safe. We would suggest a closer inspection of the bodies of cars, especially box cars, before loading, projecting nails removed, and if roofs and sides are defective, that they be placarded, 'Not to be loaded with freight that could be damaged by rain,' and be loaded towards home with nondestructive freight, in order that owners make thorough repairs necessary before cars are again permitted to go in service."

This recommendation was unanimously approved and endorsed. The present car doors and car-door fastenings were also condemned, and it was the sense of the meetings that it was very important that a more satisfactory door and secure fastenings for car doors be devised.

The result of their inquiries was, they reached the conclusion that the rules of the Freight Claim Association so operated

as to split up the loss in each case between all the lines participating in the haul, so that the gravity of the deficiency was not brought home to the original loading road. It appears in claims of this character the loading line can throw the loss on the route as a whole, by showing that there had been the "usual and customary" inspection at point or origin. This is so vague as to really mean little or nothing, according to the laxness of the custom of inspection of car bodies at loading point.

Therefore, on December 10, 1908, a resolution was adopted by the General Managers' Association of the Southeast, as follows:

"That the entire responsibility for all loss and damage arising from defective car roofs and bodies be centered upon the line loading the car, and that it shall be the duty of said loading line, in order to relieve itself to produce clear and specific proof—not 'usual and customary inspection,' that the defects did not exist at the time the freight was placed in the car.

"And the Chairman is hereby instructed to transmit this resolution to the Freight Claim Association, with request that it be acted upon, and a suitable rule be framed for adoption at their next meeting."

We understand the Freight Claim Association has failed to act on this, even as yet, but at a joint convention of Freight Claim Agents representing three Atlantic seaboard organizations, *i. e.*, the New York Claim Conference, the Southeastern Claim Conference, and the Virginia Claim Conference, to which this committee was invited, this matter came up, and after full discussion, a resolution was unanimously adopted, as follows:

"That it is the sense of these Conferences that, in order to provide an incentive for the more thorough inspection of car bodies, the Rules of the Freight Claim Association should be so amended as to place the burden of responsibility more positively upon the loading line, to show evidence of proper inspection before loading."

End Window.—The Southeastern Claim Conference reported to the General Managers' Association of the Southeast on September 9, 1910, and a recommendation was adopted as follows: "As the end windows afford an easy means of access for thieves, admit rain, cinder and dirt, with consequent damage to certain commodities and to a considerable extent destroys the effectiveness of seal records, it is recommended that the practice of equipping straight box cars with end windows be discontinued, except where the traffic demands otherwise."

Protruding Nails and Bolts.—The Committee on Maintenance and Mechanical Matters of the General Managers' Association of the Southeast made a special examination at Atlanta and Chattanooga as to the number of protruding nails, in cars, with the following result:

	Cars Examined.	Nails Projecting.	Bolts Projecting.	Nails Bent Down.
Atlanta	425	15,362	867	11,929
Chattanooga	305	13,243	286	6,312
Total	730	28,605	1,153	16,241
Average	...	40	1 4/7	25

Of the 13,243 projecting nails found in cars at Chattanooga, 3,518 were found above belt rail and 9,725 below the belt rail. Something like 20 cars were inspected at Chattanooga in one day and it was found that not over five, possibly ten per cent. of the protruding nails had worked out of the cars, the vast majority of them having been used in order to hold lading. In the four corner posts of one car were found 102, 100, 94, and 67 bent down nails, respectively. As a result of the several conferences in the Southeast, most of the lines issued circulars.

Leaky Roofs.—In a report on defective car bodies presented at the October meeting of the General Managers' Association of the Southeast, the statement was made that a great deal of trouble was being experienced on account of leaky roofs, causing damage to merchandise, sugar, flour, cement and other freight subject to damage by water, and an earnest request was made that the railways institute an active campaign to improve condition of roofs, sides and doors of their box-car equipment. In this connection the following record was presented by the St. L. & S. F. purporting to be the result of an investigation showing the condition of car equipment found at their Springfield station platform on a certain day:

Forty-five box cars out of 52 were leaking; 38 cars leaking through the roof and 7 through sides only; a total of 152 roofs leaking with an average of four leaks to each car.

In another report made to the General Managers' Association of the Southeast, January 25, the following data were submitted showing the result of replies received, giving percentage of defective equipment found at certain stations:

It was further reported that for 10 days beginning October 1, the empty box cars passing through a certain division terminal were examined for defective bodies. The result for 702 cars examined is shown at the top of the next column.

Road.	Station.	No. Cars Examined.	No. Cars Leaking.
Atlanta & West Point R. R.	Montgomery, Ala.	60	51
Atlanta Joint Terminals	Atlanta, Ga.	531	33
Atlantic Coast Line	Wilmington, N. C.	43	21
Carolina & Northwestern	Hickory, N. C.	66	52
Carolina, Clinch & Ohio	Johnson City, Tenn.	20	14
Central Georgia Ry.	Macon, Ga.	58	29
Georgia R. R.		102	64
Gulf & Ship Island R. R.		....	....
Louisville & Nashville	Birmingham, Ala.	89	9
New Orleans & N. Eastern	Meridian, Miss.	1,801	106
New Orleans & N.-Eastern	New Orleans	1,195	224
St. Louis & San Francisco	Springfield, Mo.	52	45
South Georgia Ry.	Adel, Ga.	13	4
South Georgia Ry.	Quitman, Ga.	8	5
Tennessee Central Ry.		....	....
Total		4,038	662

Four hundred and sixty-seven or 66 per cent., were found defective (of these 106, or 15 per cent., had leaky roof).

Two hundred and thirty-five, or 34 per cent. were found O. K.

The 467 cars had from 1 to 33 cracks, or openings, in the sides, ends and doors. At Station "A" 1,195 cars were inspected for loading, and 224, or 18.75 per cent. were found with defective roofs, and at Station "B" 1,801 cars were examined and 106, or 5.86 per cent. were found with defective roofs.

In response to a subsequent circular of inquiry sent out by the General Managers' Association of the Southeast, the following was tabulated:

Road.	No. Cars Examined.	No. Cars with Leaks. In Roof.	Elsewhere.	Total No. Cars Defective Bodies.
C. Ga.	136	37	35	72
C. Ga.	289	93	136	229
L. & N.	148	...	...	48
L. & N.	579	...	...	495
L. & N.	358	...	...	189
M. & O.	70	10	33	43
N. & W.	81	32	15	47
N. & S.	105	22	38	60
S. A. L.	148	...	...	51
T. C.	514	120	43	163

While a great many records have been taken in other parts of the country, too voluminous to enumerate, the above will give a very good idea of what is generally found.

Inspection Card.—Another committee recommended the use of a card certifying as to the proper condition of car when furnished for any specific load, and suggested that such cards should cover a more thorough inspection as to the suitability of a car for a given commodity. Furthermore along this line of handling the work, attention was invited to the system in vogue on the Frisco, which had been reported as being very successful in materially reducing the number of claims which they felt satisfied would otherwise have been incurred. The card used by this road is one about 8 in. by 6 in. printed in red.

The use of the card by the Frisco carries with it the understanding between the railways and the mills and other shippers that they must not load a car with flour or mill products until one of the cards is attached to the car, and when car is loaded the card must be removed from the car and turned into the Agent to be attached to the duplicate bill of lading, and the Agents are instructed not to sign bill of lading for flour or mill products until such card is signed by the Inspector or the Agents's representative, if there is no car inspector at the point of loading. This card is then filed in the station record with the duplicate bill of lading, and in event of a damage

Application for car to load_____
(Article.)

Applicant _____

Request Received, Date_____ **Hour**_____

Car placed_____ **Date**_____ **Hour** _____

I hereby certify that car Initial_____ **No.**_____

was placed on date and at hour stated, and was in suitable condition for loading above mentioned article.

Date_____

_____
(Sig. person exm. car.)

Fig. 1—Inspection Card Proposed by the General Managers' Association.

claim being presented, the loading station is asked to produce a copy of the flour inspection card. As pertinent to this, in the year 1911 the Frisco system reports having paid $43,150 for claims directly traceable to defective equipment, which amount was 8½ per cent. of the total loss and damage to freight handled.

The same General Managers' Association suggests the general adoption of a card, somewhat revised, showing that the car has been examined as to its condition before loading, as per Fig. 1.

This form was sent out to the members of the Southeast for criticism, but it has not yet been reported upon.

The Chicago, Milwaukee & St. Paul reported that they have found it profitable to adopt an inspection card certifying to the condition of the car before loading flour, on account of the number of cars that have apparently been loaded at stations before they were put in proper condition for such shipments.

The St. Paul further informs us that they were somewhat surprised at the number of cars reported in unsuitable condition for the loading of such commodities, thinking that their own cars in this traffic were in very fair state of preservation, as many of them were taken directly from the repair tracks for loading; therefore, in order to know how foreign cars were running in this respect a close inspection was instituted which showed that out of 100 cars, 65 were unfit for this class of traffic.

The Chicago, Great Western reports that at Minneapolis, where they handled heavy flour and grain shipments, they have introduced with very good results, a special overhead, as well as interior, inspection of box cars to insure their being in good condition and clean, thus making them suitable for such shipments. Where the floors are somewhat foul and the car otherwise in good condition, the floors are painted over with a quick-drying paint to prevent damage to lading. In the selection of cars for this service extraordinary inspection is made of the superstructure, floor, sides, roof, etc., after which a card is made out by the party making such inspection which is signed by him and turned in as a record of the car being suitable before loading.

Grain Leakage.—In a report on freight loss and damage to the General Managers' Association of the Southeast, March 10, 1910, Mr. Levy explained the method they follow for preventing the leakage of grain, and as it is so much to the point we quote it herewith:

"Through our traffic department, I received a letter from Mr. Christensen, the freight claim agent of the Texas Lines of the M. K. & T., which gave some interesting figures on grain claims. It stated that the Galveston Wharf Company, at Galveston, a port that exports considerable grain, made a test inspection of 7,429 cars of grain unloaded at their elevator, and found that 4,859, or 67 per cent. were leaking grain, and accepting these figures as being correct it is startling information. Of the 4,859 cars found leaking, 2,381, or 40 per cent. were grain-door leaks; 2,478, or 51 per cent. were due to other defects. In thinking these figures over, we felt that if we could devise some method for doing away with the leaking at the grain doors, we could then by one operation, reduce by one-half the number of claims for loss of grain in transit. We made some investigation, and found that while our grain doors cost us in the neighborhood of $1.50 to $2 per car, they do not give us the protection against loss of grain for several reasons: The nails are not always removed from the door post, preventing the grain door from fitting tightly against door post, permitting leakage of small grain between door posts and gain doors. Furthermore the grain doors, which are made in 20-inch sections, 7 feet long, are of unequal strength. The tendency of the weight is to go downward, and to press out at the weakest point, which is the grain door. Sometimes you will find a car where one of the 20-inch sections is bowed out, allowing grain to run through the opening, and when the car is unloaded, the board goes back to its original position, and you have a perfect car, still you are short a number of bushels of grain.

"We made some experiments, and they are satisfactory and we are carrying them further. We purchased eight-ounce burlap in bales of 2,000 yards, which cost us about a fraction over 4 cents a yard. It requires in the neighborhood of fifteen yards to fix up a car in the manner that I will describe, or 60 cents per car. If we had a claim on a car of grain, it would cost us more than 60 cents to investigate it, even though we could escape payment. This burlap is 40 inches wide and we cut it in strips of 8 feet, and after we place the grain doors in the car, we line the grain door on the inside, one section of the burlap extending about 10 or 12 inches to the center of the car floor, the top section lapping over the top of the grain door and over the first section of burlap 18 or 20 inches, so that when the grain bulges, the cloth will draw up, but it will not tear.

"Then the burlap is held in place by small wooden strips, made out of scrap lumber, which are nailed to the car at the angle of the end of the grain doors and the side of the car, making a tight joint between grain door and side of car, and absolutely preventing loss at grain door. In addition to lining the grain doors with burlap, we put a strip of burlap about 3 ft. long over the draft and king bolts, placing a tack in each corner. We require our car inspector to grain door and burlap cars for grain loading, and to show on his grain inspection card, Form 405, that it was grain-doored and burlapped by him. If loaded at a point where there is no car inspectors, we furnish the material to the elevator men and they apply it. When loaded to a point on this line, we instruct agents at destination to return burlap to point of loading. At some elevators they tear out the bottom section of the door, and in so doing mutilate one section of the burlap. We write the agents at destinations of the grain loaded in burlapped cars and ask if there is any leakage, and opinion of consignee of using burlap, and they all report no leakage at grain door, draft or king bolts.

"We feel that 60 cents a car expense is cheap insurance, and we are going to continue that use of the burlap and at the expiration of six months we will be prepared to issue some statistics on both the flour method and the grain method, but we will not get the maximum results unless we can induce other roads to join in something of the same kind."

The committee has in mind the apparent wisdom of going somewhat cautiously and shows here appended in detail its idea as to how it thinks the division might be made; at the same time it does not believe it would be well to attempt for the present to go beyond defining the inspection for the commodities readily damaged by moisture, and for the reason that the rough shipments offered and other shipments carried in box cars might take care of themselves a while longer.

It is also certain that the most earnest and sincere cooperation on the part of all railways is absolutely necessary, otherwise little can be gained though much money might be expended.

In the Twenty-fifth Annual Report of the Interstate Commerce Commission, issued December 20, 1911, it is reported under the heading of Shippers Claims, that—

"From their annual reports to the Commission for the fiscal year ending June 30, 1910, it appears that the interstate steam railway lines during that year paid out the sum of $21,941,232 in settlement of claims presented by shippers for the loss of or damage to their freight in transit. For the fiscal year 1909 the amount paid out on this account was $24,916,830 and for the year 1908 such claims aggregated $27,554,526. The payment for the last mentioned year amounted approximately to 1.6 per cent. of the total freight revenue of the rail lines so reporting to the Commission. For the year 1909 the amount aggregated approximately 1.5 per cent. and for the year 1910, 1.1 per cent. of their total freight revenue. Although it is apparently diminishing in amount, the charge thus made annually against the operating expenses of the rail lines is still substantial enough to be a heavy tax on the transportation of the country.

The method and definitions of inspection the committee is suggesting are as follows:

INSPECTION OF BOX-CAR EQUIPMENT FOR CERTAIN SHIPMENTS NOT OTHERWISE COVERED BY RULES FOR THE TRANSPORTATION OF EXPLOSIVES.

Classification of Equipment for the Following Classes of Freight.

Classification (A)—Freight Readily Damaged by Moisture, such as lime, cement, plaster, flour, sugar, boxed, sack and crated packages of seeds, coffee and merchandise, grain, hay, dry goods and notions, high grades of finished lumber, leaf tobacco, furniture and household goods, and certain grades of tin and galvanized iron.

Classification (B)—Freight Not Readily Damaged by Moisture, such as raw wool, baled cotton, crated china, agricultural implements, barreled liquids, hides, shooks (knocked down boxes), wagons, carriages, tools, stoves and stove castings, certain grades of lumber, etc.

Classification (C)—Rough Freight, such as coal, coke, brick, pig iron, slate, tiling, earthenware, pipe, ties, barrel staves and other rough lumber.

Method of Inspection Before Loading.

(a) Inspection to be made at point of loading whenever practicable, or,

(b) At point of distribution from which car is forwarded to loading station and again by agent.

(c) Cars received and unloaded at stations where no inspectors are located should be inspected by the agent.

Aside from the Master Car Builders' inspection of car, including roof, running boards, air brakes, safety appliances and running gear, as well as the external inspection of sides, ends, doors, ventilators and windows, an internal inspection

must be made of the roof and siding, with doors, ventilators and windows in closed position:

1. Search for light indicating openings and cracks which might produce leaks.
2. For loose, damaged and broken boards, loose knots, knot holes, bad joints, etc.
3. For all nails and bolts extending above surface of floor and lining and nails protruding through roofing.
4. Search for water stains indicating cracks and air spaces.
5. Search for cracks sufficient to admit storm water beating through opening, also for openings and bad joints around windows and doors.
6. Examine for metal sheets out of position along edge of subcarlins or down from edge of ridge pole.
7. Search for small holes in metal roofs due to rust or small openings in roof from other causes.
8. Doors must operate and close properly.

The floors should be clean, dry and free from defects sufficient to admit moisture, and any fouling by previous shipments, such as fertilizer, oils, and other frieght which would damage more perishable commodities. If the center pin is uncovered it might be necessary to cover it with a piece of board, depending entirely upon the character of freight to be loaded.

Inspect closely for defect in framing which might, by reason of their weakness allow the sheathing being readily broken or damaged.

INSTRUCTIONS.

After car is thoroughly inspected and known to be in good condition and suitable for the transportation of commodities in Classification (A), the Inspector or Agent, as provided for, making such inspection or able to certify to the condition of the car must make out the prescribed certificate of inspection card, marking the same O.K. for (A) classification, as per sample card, shown in Fig. 2.

A B & C Ry.

THIS CAR

No._____ Initial_____

O. K.
FOR
SHIPMENT OF COMMODITIES

Under_____Classification.

Inspected by _____

Date _____191____

Station _____

Fig. 2—Inspection Card for Box Cars.

The certificate of inspection card must be delivered to the Agent before Bill of Lading is issued, and card must be attached to the Agent's office copy of bill of lading or shipping ticket, for future reference in case of question arising as to the condition of car before loading.

The report is signed by:—A. KEARNEY, (N. & W.), chairman; R. E. SMITH, (A. C. L.); L. H. TURNER, (P. & L. E.); W. F. KIESEL, JR., (Penna.), and C. H. OSBORNE, (C. & N. W.).

DISCUSSION.

Mr. Kearney: This is a report of progress. The subject comes to us quite late and the committee did not feel they had been able to cover it sufficiently. We believe if it is so desired to continue the committee and continue this work, we ought to change the personnel of the committee and get into the committee some of the members of the Western lines handling this particular freight that they protect by these cars, and in that way we might be able to get a settlement on a definite form of card, provided it is desired to use a card for material readily damaged by moisture.

The President: This is a matter which deserves a great deal of discussion. I believe we have all had trouble with leaky roofs, and loss and damage due to defective cars, and I would like to hear further discussion on the subject.

F. F. Gaines (C. of Ga.): This is certainly a very valuable and important paper, and I believe if any members of this association will pick out a day when we have a good hard, drifting rain, and go to some good central points of line where we have cars, they will see the results. Now, the majority of the defects that cause these troubles are so small that the average car inspector, in ordinary car inspecting, is not going to find them; and that brings up the point I wish to call your attention to. Who is going to be the proper party to make an inspection of this sort, as to the interior car and its safety and proper condition for labeling? I think it is not one we should not load on our present car inspectors. They have all got their duties, and it is quite impossible for them to make a thorough interior inspection. It seems to me and it would be my suggestion that it would be necessary and desirable for a conference with the American Railway Association along these lines with the idea of relieving the car inspectors from this inspection.

Mr. Brazier: This is a report which comes before our association that hits us more than any other. I wish every member could have been in the arbitration meeting yesterday and heard the joint inspectors of these companies tell us the amount of money it costs to keep up the ordinary repairs under the M. C. B. rules. This grumbling away about repairing cars is a myth, and the sooner we get down to the spending of money on repairs and keep equipment up, the better for us. What I want to impress upon you is: there are many claims to-day paid that should not be paid out of repairs, many more than should be, and many more than are apparent. The condition of equipment to-day in this rush of transportation system is wrong. Our traffic department wants to get business; it is our bread and butter; but at the same time they do not give us time enough to properly inspect the old cars or properly to repair them. And what is the result? On our system in the month of March we had 41 wrecks caused by broken trucks. Why? Some little nut or thing missing. I am just old fashioned enough to believe we will have to come to some rigid way of inspecting; that is, not to allow a nut to pass unless it has something reliable to hold it in place. We have got to do that to protect ourselves. The inspecting is in charge of departments which are held responsible, and at the same time the traffic department is out after business. They want to make fine runs and they are running freight trains to-day like passenger trains; as a result there are too many accidents which are caused by loose inspection. The sooner our management finds out that we must spend more money to keep up equipment, the better it will be for all of us.

I want to offer a resolution that has been handed to me, which hits the nail on the head, and which reads as follows:

"Whereas, for the safe and expeditious movement of traffic, the freight car equipment of this country should be maintained in the highest state of efficiency;

"Resolved, that the Master Car Builders' Association urge upon the American Railway Association, also on the several general managers associations, the necessity for the authorization on the part of the executive officers of the railways, of sufficient expenditures for the maintenance of freight cars as will attain and maintain this efficiency; and be it further,

"Resolved, that for the purpose of immediate procedure, it is recommended that the members of the Master Car Builders' Association as individuals shall urge upon their several corporations, that, in the case of home equipment when placed empty upon shop tracks or repair branches, it shall be placed in condition for M. C. B. interchange; and in the case of foreign cars, authority shall be granted by the owning road to follow a similar plan, or the car returned to the owner immediately for the accomplishment of this purpose."

I believe if our managing officers could realize what this means we would have what we call on our road—running repair men. We require all cars to be put into condition and inspected under the M. C. B. rules; we try to do that; but we repaired a million and a half of cars last year, and yet to-day we are with more than 4 or 5 per cent. of our cars in bad order; and I think that is the way you will find they are running throughout the country, and we cannot keep up with repairs.

It is a disgrace to us car builders to go to the ordinary railway yard and see the condition of doors and doorsteps. I think the manner in which an ordinary wooden doorstop is applied to-day, is a disgrace; as soon as the air-brake is applied, it splits and the door opens. And then the condition of the roofs; they are in terrible condition; and we cannot do anything by talk alone; we must do it by money and work, and I would therefore offer this as a resolution to be adopted.

M. K. Barnum (I. C.): I would like to second Mr. Brazier's resolution. I believe the figures of most railways show that freight cars go onto the repair tracks on about an average of ten times per year, and many are turned out without doing all the work required to put them in first class condition. If all the work that should be done on cars that come to the repair tracks was done, it would be more economical than the present practice, but at first it would require an increased force and a larger expenditure. I know of one road that handles a great deal of flour and cement, and the superintendent of transportation told me that in order to get 25 cars to safely load with

flour and cement, he had to set in from 100 to 125 cars. That is sufficient to show, I maintain, why our cars, particularly box cars, should be kept in the best state of repair; and I don't think we should be afraid to tell our managers that we need more money for this purpose.

Mr. Tatum: Inspection will not repair the car; it will fix it as a candidate for the repair shop. If the inspector, after shopping the car, fails to get it to the repair shop, the value of his inspection is worth nothing to the railway. The repair shop foreman must have sufficient facilities and labor to repair the car. To arrange cars and inspection for cars of various classes of trade, I do not think is a practical arrangement. It may be wise to have your equipment arranged for two classes of freight, especially your box car equipment. You may have a certain portion of it set aside for rough freight, the balance should be arranged to prevent any loss of freight that the transportation department sees fit to load into it. If you fit your cars for the best loading, and your superintendent loads rough freight into it, what is the result? It only makes one trip before it is not fit for the loading it is required for. If you fit your cars up for flour, for cement and for other commodities, and your superintendent loads it with coal, with coke, mine crops and such material as that; is it likely to be fit, after unloading, for the loading it was intended for? It is not. It has to go to the repair shop again. Go through your yards and you will find the ends of the cars broken out; you will find the doors in bad condition. Why? Because it has not had proper attention; it has not been placed on the shop track when it first needed repair. Instead of that, it was allowed to run until it cost 3 or 4 times to repair, than it would if it had been repaired when the defect was light.

We should have our cars equipped with substantial roofs, tight roofs, and substantial ends, that will stand the average service of to-day. They should all be kept in their proper service. But it is a question whether that can be brought about. If it is done, I believe we can keep our equipment in better condition of service than heretofore. It narrows right down to the rule before the association, that we must let our management know the condition of equipment, that we must have facilities to repair, and we must have time to make the repair. I would suggest that this association support the paper that has been submitted.

Mr. Downing: I wanted to talk along the same lines that Mr. Tatum talked; and I think it would be a good idea to let the mechanical department know what percentage of box cars should be maintained for certain freightage. I do not think it is along the line of safety to pick out certain cars for a certain commodity. As Mr. Tatum said, we have cars outlined in this paper, and if we do not maintain our cars at 100 per cent. we are just as liable to find 500 all in a bunch, not fit, and another 500 in some lumber district. In regard to inspection as outlined by Mr. Gaines, the inspector will have to do it; the cars will have to be inspected on arrival at the terminals. If you don't do that they will be switched into the transportation yards at different points. It is up to the inspector to look after that. A man who does not understand construction will only look at the roofs and floors. A good many cars have roofs and floors all right, but they have weak parts somewhere else, and they are not safe to load grain on. Instead of talking about spending a lot of money to equip cars to make them fit for grain, let us spend the money for new cars.

C. E. Swanson (A. T. & S. F.): I want very forcibly to bring out the question of the insecure fastenings of the side door. Mr. Brazier touched on the subject, and it is a very important one to-day. We have cars in good order with good door fastenings that can be entered and pilfered, and the fastening placed back without the seal being disturbed, and further, nobody could tell that it had been pilfered. On our line last month, we had 462 losses on sealed shipments. My attention was especially called to this by a special officer who asked me to go through our shop with him. We went to the shop and sealed for inspection fourteen cars from different roads, and that man entered everyone of those cars without breaking the seal. He did it very quickly, and placed it back so no one could tell that he had been in. These cars were equipped with the old staple with one bolt, and I find a great many of the roads are still maintaining that old iron staple with one bolt. With a bar of iron about 16 in. long, you could easily break that hasp and enter the car. Another thing, the back corners of our doors, not being protected by iron, are soon chewed up so that they can be pressed outward enough for one to enter the car without breaking the seal.

Regarding leaky cars, our management two years ago started a loss and damage committee, which meets twice a year to talk over and apply remedies to prevent the robbing of our treasury unnecessarily, and I believe that the agitation that has been started and the questions that are being discussed in all the organizations will have a beneficial effect. The Secret Service convention meets in Buffalo and this subject of side doors is going to be discussed there. The mechanical department get the blame. The Claim Association is going to take the matter up also, and we will get the blame because the roads will not repair our cars.

Mr. Hennessey: I will move as an amendment that the resolution of the Master Car Builders' Association be referred to the executive committee of this association, and that they in turn refer this discussion, or such part of it as they see fit, to the American Railway Association.

E. T. Millar (B. & M.): I want to confirm what Mr. Brazier has said as to the expense of repairs as compared with the cost of damage, and also what Mr. Swanson has said regarding the entering the cars without breaking the seal. A number of employes on the road I am employed by experimented on this subject. One set of men fastened a door as it should be and another set of men entered the car and put it back in its original condition. In the majority of cases there is no trouble at all to enter the car without anybody knowing, and the car goes through with an unbroken seal. I believe every person connected with this association should do everything he can to get a stronger and more suitable device for their cars. Those things can't be obtained for nothing. We have to pay money for them, and those of us who are lower down will have to talk loud and long to our superiors to get the money for them.

Mr. Kearney: I think we are responsible, and very largely responsible, for our equipment. I am sure I would regret very much to usher our general manager down the line, because I could not defend the condition of the cars; I could not blame him for it and I could not blame them for it: that is, for not giving us the amount of money to spend on equipment, because they would come right back at us and tell us we had recommended a standard as satisfactory to us which was not satisfactory. As a gentleman said a moment ago, we would be blamed for it, and I think it belongs to us; if we do not put the right kind of hasp on, we can't blame the general manager for that. I would not think of telling the management that they did not give us the right kind of hasp. They would tell us we did not know what a hasp was for; but they would also tell us they wanted a car in good condition, and they would accept the car just as soon as we had decided it was satisfactory for service. I think if we would raise our standard for the condition of cars and fix them as we think they should be fixed, and in accordance with our ideas as we have expressed them here, they will very soon back us up. The trouble is, and isn't it a fact, that we pass the cars through the shop to work.

F. H. Stark (Pitts. Coal Co.): I believe the matter should be brought to the attention of the general managers regarding the manner of handling equipment and the large loss sustained through the rough handling of cars, which cannot be measured. Another feature is that we cannot better the condition by making a new resolution and then going home and be governed by the wishes of the individual railways. It would not be practicable to tighten up on the inspection, as a force measure; for the shipping interests of this country would not stand for the return of the old protective system. Consequently, we must adhere to the present system of expediting freight. As to how to force railways to maintain their cars to a better standard, is a question, but it cannot be done by tightening up on inspection. Some 10 years ago I suggested that if the mechanical department did not take the initiative, the transportation authorities would assume control of the interchange of cars, and they are gradually making inroads on our jurisdiction. I suggested at that time that a commission be inaugurated to represent all of the railways in this country, and that inspectors be employed to travel the country over—much as the Interstate Commerce Commission inspectors do. This will enable all roads to delegate to the company having foreign cars in its possession the right to make all the repairs necessary, instead of making partial repairs as is the practice, so long as they maintain the car to standard. If, through these inspectors the owner will be assured that they will be made proper, and that the charges will be made accordingly for the repairs, no one will object to repairs being made at any time and place.

I believe it is coming. The American Railways Association has already taken steps to appoint a commission to look after the proper handling of cars, and the question of interchange and maintenance is equally important. Such a commission could assist in bringing about uniform inspection, proper repairs and billing therefor; also prevent the use of materials not in accord with standard specifications.

E. Chamberlain (N. Y. C.): Mr. Downing, an official of the Lake Shore Road, stands up here and says we cannot maintain an equipment of 100 per cent. efficiency, that is very true; but by the able assistance of the American Railway Association

you can take some steps in that direction. If, upon your repair branches and tracks, when the cars come there, they are put in a perfect condition for M. C. B. interchange, you have accomplished a great part of the proposition. It would be, of course, very desirable to have all the equipment at 200 per cent. of efficiency, but cars would drift away from your inspection points and be apt to be loaded with something you did not want.

Mr. Brazier: My resolution is offered in the best of spirit, and we want to put this thing up to our managers, that we may be authorized to take it up. As to my good friend Mr. Stark, I cannot agree with him. I would like to ask him how it affects the traffic department. We had, week before last, a foreign car break down—one truck—and we had 41 cars delayed by reason of that one break. I can't say that is poor inspection; but you are going to have expense whatever you do. Equipment is going to be the same. Mr. Downing strikes it right; we should wipe out these old cars and get new cars. Mr. Tatum has the right idea. I don't know that it will do us any good to discuss it any more. You all know I am telling the truth, and we should have greater efficiency and more money. Let this go to the executive committee; they in turn can turn it over to the American Railway Association, and they can tell us what to do.

Mr. Hennessey: They talk about tightening up on inspection and that we keep tightening up on inspection. Now, if we only put our cars in proper condition, we will lessen inspection and will not require tightening up. If a car is in proper condition, we have no inspection to make.

D. R. MacBain (L. S. & M. S.): The air of the convention is rather pessimistic to say the least, concerning the car situation. I will agree with a great deal that has been said, but I think we ought to look back a little way and try to see the cost of the low efficiency in the freight car equipment. I think everybody in the room will remember the spirit we had during 1905, 1906 and 1907 when everybody had more business than he could do with the equipment end, and at that time it was an universal thing for everybody throughout the country to do what he could to get his equipment moved. That lasted until 1907, when the panic came, and from that time on we have been in bad condition, from slighting repairs. The trouble was we were forced to keep the car moving just as long as it was safe to run and we went back on the maintenance, and we have not taken hold of that end since as it ought to be taken hold of in order to get back to where we ought to be. I don't think the situation is so disastrously bad as has been stated. As one gentleman said this morning, the greatest difficulty is in the roof and the door. A walk through the big yards will convince anyone that the roof and the door have been neglected. Even the poorest arrangement on the door would do well if it had been maintained; but it had been neglected. Now getting back to the soundest way of treating repairs, the proper thing is to repair the car, not make it fit to run only—as we did at the time we could not do anything else.

Mr. Kearney: That is the thing exactly.

Samuel Lynn (P. & L. E.): Our superintendent of car service called us up and said at a certain point of our line where we had 10 shipments, he had something like 60 cars, and I had the inspectors go over those 60 cars, and we got 4 out of the lot. Now, we are using on our line a system where the inspector passes on the cars that are fit for loading, and the percentage of cars we can use is very small. We find in some cases where we have put cars on, the shipper will turn the cars down because he has a test, and the percentage we pass would probably be cut down 50 per cent. Now, that is in line with what Mr. Stark says.

Mr. Barnum: I want to say if we should only tighten up our inspection there would not be enough serviceable cars left to handle the ordinary business. I presume you have all had the experience, when there was a shortage of cars, of being instructed to have your car inspectors look over the "bad orders" and return to service all that had no penalty defects and were safe to run even though they might have leaky roofs, loose siding and other defects which ought, for their proper maintenance, to be repaired at the time. I have spent a great deal of time in the last 10 or 12 years figuring on who was making their car repairs the cheapest, but have seldom been asked who was keeping their cars in the best condition. The road in the West that is the very lowest in the cost of its car repairs, is also above all others in the way its cars are maintained.

A great deal of the trouble starts with the buying of new cars. The question of side doors has been raised here. We all know the difference between a first class door and one that is not first class is only a matter of a dollar or two a car, but it means $2,000 for 2 000 cars and so the cheap, flimsy door is generally specified.

The President: Gentlemen, you have heard the motion as amended by Mr. Hennessey. The motion was put and carried.

COUPLER AND DRAFT EQUIPMENT.

At the last convention, the committee was instructed to design an M. C. B. coupler and present it to the next convention. The committee was also authorized to take up with the coupler manufacturing companies the subject of redesigning the freight car coupler; to invite representatives of coupler manufacturing companies to join with the committee in designing and adopting one standard freight-car coupler, and to employ, at the expense of the Association, such expert assistance as was found necessary to carry out the work of designing the proposed new coupler, the amount of this expenditure to be subject to the approval of the executive committee. The committee was also instructed to prepare a design regarded as a temporary coupler and submit it to the executive committee.

The committee has made a report on this last item which was adopted by a special letter ballot and is contained in the 1911 Proceedings, pages 513 to 520, inclusive.

STANDARD M. C. B. COUPLER.

Each coupler manufacturer has developed, subject to the restrictions of the M. C. B. Association, one or more couplers based upon his own ideas, but employing certain fundamental



R. L. KLEINE,

Chairman, Committee on Coupler and Draft Equipment.

principles, consequently the couplers thus produced vary in design and it is neither practical to develop a composite design from the ideas and principles thus employed nor even to standardize any of the individual parts. As the service conditions increased or the design or strength of the individual type of coupler proved inefficient, the manufacturers developed other couplers in the effort to keep pace with the conditions imposed, which accounts for the number of types of couplers in existence. The increase in the requirements of M. C. B. Specifications from time to time is directly responsible for some of these later types having been developed and the elimination of many others, the direct result being the reduction of the total number of types in service.

The committee in order to acquaint itself with the different service conditions determined upon a thorough investigation of the performances and failures of the existing couplers so as to determine the limitations of the present M. C. B. coupler and establish a basis upon which to design the standard coupler. To facilitate this work a subcommittee was appointed consisting of representatives of the members of the committee with instructions to review the subject carefully by making an investigation of existing couplers visit roads where trouble is experienced with the present M. C. B. design of coupler and submit recommendations for the design of a standard M. C. B. coupler.

CONTOUR LINE DISTORTION AND COUPLER FAILURES.

The chairman of this subcommittee was directed to correspond with railways in various sections of the country to ascertain whether or not it is general that serious trouble is being

experienced with coupler contour lines being distorted on certain roads having severe grade and curve conditions, especially where the Mallet locomotive is used, and also to learn what difficulties are being experienced in maintaining the present coupler in repairs.

The replies to this circular brought out that there was no more trouble experienced from coupler failures where Mallet locomotives were used than with the consolidation or other types of locomotives and that the coupler failures enumerated below were common on most of the roads predominating where heavy service obtains.

Coupler Head.—Face of coupler cracking and breaking; guard arms spreading and breaking; striking horn crushing in, making lock inoperative; coupler lugs breaking off, starting from the inside; knuckle pin holes in coupler elongating; distorted contour lines, and difficult to couple with slight impact.

Knuckles. Breaking through pivot pin hole; broken tails; breaking through shank of knuckle; worn knuckles at lock-bearing area, and elongation of pivot pin hole.

Knuckle Pivot Pins.—Breaking and bending.

Locks. Worn and damaged.

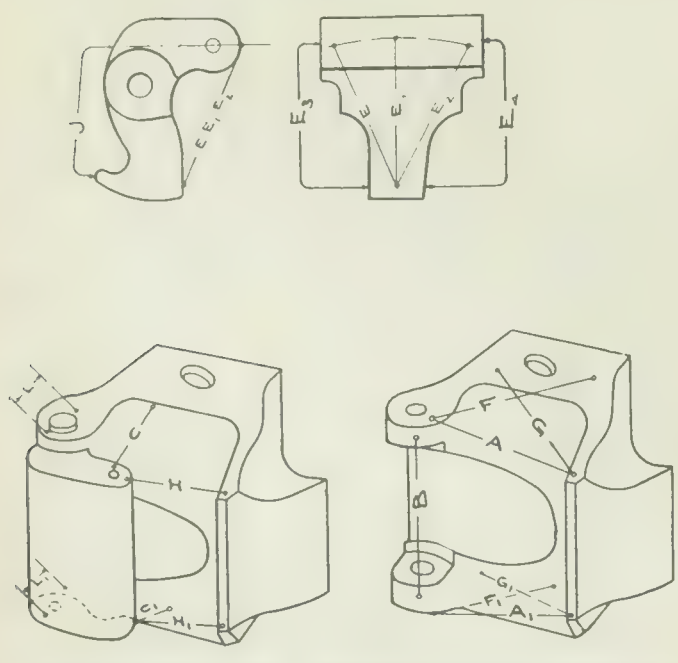
The recommendations contained in the above replies were not very numerous, the most common being as follows: Strengthen the guard arms; increase thickness of front wall; increase size of coupler lugs; strengthen side wall back of lug side of coupler; increase size of knuckle and make pivot pins as large as possible; modify contour lines to provide for increases suggested in above, and increase lock-bearing area.

The subcommittee investigated coupler conditions during the summer and fall months of 1911, visiting several railways, in addition to the roads which they represented.

During their investigation, the common coupler troubles and recommendations heretofore mentioned were kept in mind and thoroughly looked into. Scrap piles were examined, couplers gaged in service and freight trains ridden in order to measure and observe the true action of couplers in service. Records were taken of the broken couplers, knuckles, etc., and the gage of couplers in service. The committee has this data at its command to be used in the designing and developing of the standard coupler.

The investigation developed that a large percentage of the coupler contour lines being beyond gage was due to couplers of old design not being maintained and some of the later types being very poorly fitted up when new; knuckle breakages resulting from air-brake troubles on long trains; and guard arm and face failures, due to rough handling of cars in classification. Knuckle-tail failures were common, attributed in many cases to faulty design. It was quite evident that new couplers did not receive the close inspection necessary to insure proper fitting of the detail parts.

Aside from the above, numerous failures of coupler bodies and contained parts forcibly impressed the committee that the couplers should be materially strengthened, and with a view of determining the increased strength required it was considered absolutely essential that the strength of the present coupler should be established.



Tramming Points for New Coupler Tests.

TESTS.

At a meeting of the subcommittee in conjunction with C. D. Young, engineer of tests, Pennsylvania Railroad, a series of static, drop and road service tests was outlined. Heretofore, all coupler and separate knuckle tests have been made by measuring the ultimate distortion after the final blow as prescribed by the M. C. B. specifications, but in the tests now being conducted the distortions are measured after each drop or pull and tabulated by so much plus or minus from the original dimensions, the idea being to establish the point at which permanent set takes place. The location of points, etc., are shown herewith.

During the last several years the process of heat treatment has been given attention with a view toward increasing the tensile strength and elastic limit of cast steel, but couplers have not been experimented with, under this process. Pulling test of the couplers and parts with varying chemistry and treatment are being included in the test program.

The Pennsylvania Railroad has kindly volunteered to conduct all the tests for the committee and they are now under way at Altoona, under the direct supervision of C. D. Young, engineer of tests. These tests, embodying the features mentioned, are being carried out on the following types of 5-in. x 7-in. couplers; Pitt; Janney X; Major; Major Special; Gould Z; Latrobe; Sharon; Krakau; Bazeley; Simplex and Simplex Special. The total number given for test by various roads is 322.

The road tests to be conducted are as follows:

By the Pennsylvania—12 couplers; 2 each of the Pitt, Sharon, Gould Z, Simplex, Major and Latrobe, applied to 100,000-lb. capacity steel hopper cars regularly assigned to the coal trade; 3 Pitt, 3 Sharon, 12 Krakau, 12 Simplex Special and 6 Bazeley couplers applied to steel tenders in freight service. These couplers are to be plate labeled, gaged and trammed before application, and will be followed closely .

By the New York Central & Hudson River—6 Gould Z and 6 Simplex couplers applied to tenders in freight service.

In both cases these tender couplers were furnished by the respective roads.

The following coupler manufacturers were represented at a joint meeting held in Altoona on March 4, 1912: American Steel Foundries; Buckeye Steel Castings Company; Gould Coupler Company; National Malleable Castings Company; Monarch Steel Castings Company, and McConway & Torley Company.

The chairman outlined the position of the committee in regard to the probable procedure, substantially as follows:

"The idea is to design the one standard coupler on the best principle or principles known to the art, to be determined from the fundamentals used in the design of present or past couplers and from our knowledge of their behavior in service, eliminating in the new design the failures and proven mistakes in the old. If this can be done without infringing any existing valid patents it would be an ideal solution, in any event it is the purpose to design the best coupler within our power, then submit it to ascertain whether it contains infringements of any existing valid patents. Should it be found that the coupler thus designed infringes any patents, it is the purpose of this committee to recommend to the Master Car Builders' Association that the owners of any patents involved be given due consideration and settle upon a basis mutually agreed upon between the coupler manufacturers and the M. C. B. coupler committee, so that the standard coupler may be manufactured and purchased in the open market. It is understood that with the design of the standard coupler suitable gages covering the detail parts will also be included as well as specifications in accordance with which the new coupler must be purchased."

The subject of patents, should they be involved in the standard coupler, was taken up by the manufacturers, and at the next joint meeting they presented a tentative proposition, the substance of which was as follows: That all the coupler manufacturers are willing and glad to coöperate with the M. C. B. committee in reference to designing and adopting a standard coupler, and, in order that the work of the committee may be entirely unhampered by any patents of the present coupler manufacturers, the manufacturers have been considering what arrangements could be made between them to this end which would afford to any company owning patents which might be embodied in the coupler selected, proper compensation for the use of these patents as suggested by the committee. The manufacturers had not succeeded in working out the details of such a plan, but they believed it could be arranged.

Another joint meeting was held with the coupler manufacturers at Altoona, Pa., May 15, 1912, at which propositions were submitted to the committee, which have been referred to the executive committee of the Association.

The coupler manufacturers named representatives to act with the committee in designing and adopting a standard coupler.

M. C. B. STANDARDS.

1. *Location of Lock Lift.*—In answer to recommendations referred to this committee by the committee on standards and recommended practice, the committee would recommend including in the standards the operation of the lock from the bottom in addition to the present top lift, which requires the following changes in the standards:

Page 624, 1911 Proceedings, sixth paragraph, change to read: "That all top-lift couplers must have a 1 1/16 in. eyelet for locking device located immediately above locking pin hole."

Same change to be made in note on Sheet M. C. B. 23.

Page 628, 1911 Proceedings, first paragraph, change to read: "The lock lift must be in the central longit dinal vertical plane of the coupler located between the vertical plane of the striking horn and contour lines, and must operate either from the top or bottom by an upward movement. The total lift of locking pin shall not be more than 6 in."

2. The attention of the committee has been directed to a discrepancy in a dimension shown on Sheet M. C. B. 23. Since the introduction of the 9¼ in. and 12¼ in. heads the distance from the pulling face of knuckle to the buffer block or end sill as now shown on Sheet M. C. B. 23 is only correct for the original 8¾ in. head. As this dimension varies in accordance with the length of head and amount of compression in draft gear it is of no special value, and, therefore, would suggest that the Secretary be authorized to eliminate this dimension from Sheet M. C. B. 23.

In conclusion, the committee desires to express their thanks to the various railways visited by the subcommittee for the courteous treatment accorded and the facilities extended them in making their investigations. The association is also indebted to the railways previously enumerated for the couplers which were donated for test purposes and to the Pennsylvania Railroad in particular for the large number of couplers donated and for the facilities and expert assistance given in testing these couplers.

The report is signed by:—R. L. Kleine (Penna.) chairman; F. W. Brazier (N. Y. C. & H. R.); J. F. De Voy (C. M. & St. P.); Henry La Rue (C. R. I. & P.); F. H Stark (Pitts. Coal Co.); H. C. Trimyer (S. A. L.) and G. W. Wildin (N. Y. N. H. & H.).

Mr. Hennessey: I move that the report be accepted, the committee continued and a proportionate vote of thanks for the work they have put in on this job be tendered to the committee.

The motion was carried.

Mr. Schroyer: I move that the recommendations of the committee in the last part their report be adopted as submitted. The motion was carried.

A report drawn up by the joint committee on Joint Interchange and Inspection Bureaus as presented to the executive committee of the Master Car Builders' Association, and to the Association of Transportation and Car Accounting Officers was distributed to the members for their information.



W. F. KIESEL, JR.,

Chairman, Committee on Springs for Freight Car Trucks.

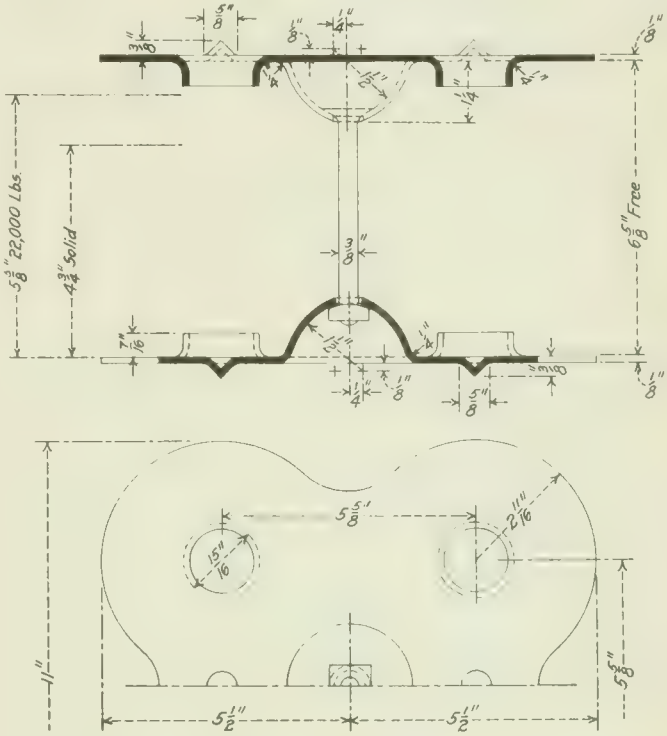
SPRINGS FOR FREIGHT CAR TRUCKS.

The committee in their report of progress states as follows:

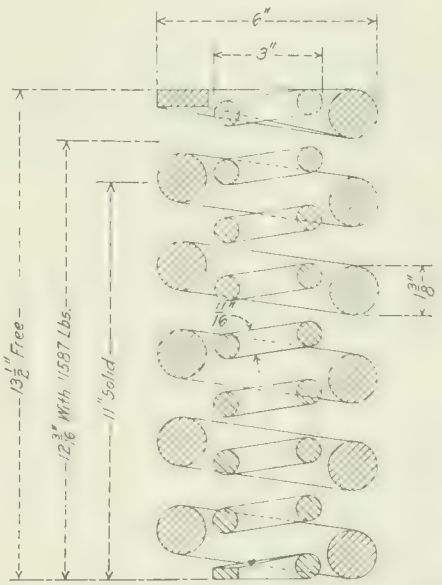
Springs now used under freight cars take permanent set, have too little range of deflection, and sometimes break in service. Some manufacturers are preparing to make experiments to develop a scheme involving the use of more reliable material and more uniform temper, but to date these experiments have not progressed sufficiently far for positive recommendations.

The indications are that relief will be obtained by heat treatment of steel and careful tempering, which will permit the use of higher allowable stresses when springs are compressed solid.

The steel at present used has about one per cent. carbon, and when springs are compressed solid the stress is between 80,000 and 85,000 lbs. per sq. in. With carefully tempered, heat-treated steel, this stress can be increased to 100,000 lbs. per sq. in., and



New Type of Spring Cap.



Spring H for 140,000 lbs. Cars (Arch Bar Trucks).

Two bars. 1st bar 1⅝ in. dia. 116¼ in. long, tapered to 123½ in. 2nd bar 11 16 in. 116¼ in. long, tapered to 119⅞ in.

Normal wt. 1st bar 48 lbs. 12 oz., minimum wt. 47 lbs. 5 oz. 2nd bar 12 lbs. 3 oz., minimum wt. 11 lbs. 13 oz.

Outside dia. 1st coil 6 in., 2nd coil 3 in.

Heights, 1st coil 13½ in. free, 11 in. solid, 12 3/16 in. 9270 lbs., capy. 17636 lbs. Heights, 2nd coil 13½ in. free, 11 in. solid 12 3/16 in. 2317 lbs., capy. 4414 lbs.

Cluster of Springs. Heights, 13½ in. free, 11 in. solid, 12 3/16 in. 11587 lbs., capy. 22070 lbs.

possibly to 120,000 lbs. per sq. in. without producing permanent set or breakage, and the resultant decrease in diameter of wire will give a greater range of deflection within the limited space now available in trucks. Better tempering of the steel now used can be obtained, and should be required. To avoid obtaining the springs either too hard or too soft, a specification for physical test is necessary.

Attention was directed to the impossibility of making the spring caps, shown on Sheet H, of ⅛-in. material without change in the central depression. In view of the situation, the committee recommends that no changes be made at this time in the design of the springs, and that the design of the spring caps be modified, as shown herewith.

[The modified spring cap of Spring *A* is shown herewith as an example of the changes which have been made.—EDITOR.]

The committee desires that it be furnished with the dimensions of available space, or preferably prints of springs, which have been designed for 140,000 lbs. capacity cars, for consideration in connection with making an M. C. B. design for such springs. As an example, an illustration of a spring used for that purpose is shown.

These can be used either with or without spring caps.

It is also recommended that before assembling the springs they should meet the following physical test:

1. Every coil of each spring must be compressed solid with shock not less than six times.
2. At least 10 per cent. of each kind of coils must be weighed and measured.
3. The weight of each coil must not be less than the minimum weight specified.
4. The outside diameter of coil must not vary more than 1-16 in. above or below the given dimension.
5. The free height must not exceed, but may be less than the given dimension.
6. The load height must not be less than, but may exceed the given dimension.
7. If any coil of the 10 per cent. selected does not meet these requirements, all coils of the same kind must be checked, and those which do not meet the requirements for weight and dimensions must be rejected.

The committee believes that the adoption of these preliminary rules will tend to give some relief from spring troubles, pending the development of better material and tempering.

The report is signed by:—W. F. Kiesel, Jr. (Penna.), chairman; T. A. Lawes (N. Y. C. & St. L.); J. R. Onderdonk (B. & O.) and J. Hainen (So. Ry.)

The report was accepted and the recommendations referred to letter ballot.

TRAIN LIGHTING.

The committee has gone over carefully the suggestions as to recommended practices given in the report to the 1911 convention, and have also given careful consideration to the various points as brought out by the committee on standards of the Association of Railway Electrical Engineers at their 1911 convention, and desire to change our suggestions as to recommended practices given in our report of 1911 to read as follows:

GENERAL.

1. That in electrically lighted cars the following voltages should be used:

60 volts (nominal) for straight storage, head-end and axle dynamo systems.
30 volts (nominal) for straight-storage and axle-dynamo systems.

2. That each electrically lighted car be provided with a notice giving the following information, and that this notice shall be posted in the switchboard locker:

*System.
Type of generator.
Type of regulator.
Voltage of system.
Ampere hours capacity of battery at 8-hour rate.
Number of sets of battery in parallel.
Nominal charging rate ..... amps. ..... max. amps.
Size of train line wires—B. & S.
Number of train line wires — (2 or 3).
Capacity of generator ..... amps.
Axle pulley ..... in. diam.
Generator pulley ..... in. diam.
Length of belt ..... ft. ..... in.
Wiring diagram (show location and capacity of fuses).

*State whether axle dynamo, straight storage, and if used on head-end system.

3. That the rules of fire underwriters shall cover all car wiring.

4. That all wiring under car to the switchboard shall be run in conduits.

5. Standard lamps for car-lighting service should be in accordance with dimensions as shown on Exhibit I.

6. That where train-line connectors are used, a connector having dimensions as shown on Exhibit A shall be used and located as previously shown. If only two wires are used they shall be connected to the outside terminals and the female connector on each end of the car shall be stenciled: "Not for use on head-end system."

7. That each electrically lighted car equipped with batteries shall be provided with two charging receptacles with swivel supports, as shown in the details on Exhibits B, C and D, installed one on each side of the car, as shown on Exhibit E, the outside annular ring to be the positive.

Control and Protection of Parts.

8. That each electrically lighted car shall be provided with a switchboard upon which shall be mounted switches, fused switches or terminals. The switches, fuses or terminals to protect and completely disconnect the following parts: Train line; battery; axle dynamo, and circuits for lamps, fans, etc.

The axle-dynamo terminals to control the positive and negative armatures and the positive field of the dynamo. Each of the above switches, fuses or terminals to be plainly marked, designating the part controlled, the positive terminal to be on the right side facing the board.

9. Where a main lamp switch is used, or where fuses controlling all lamps are used, they shall be so stenciled in plain letters.

10. The switchboard or regulator panels of electrically lighted cars shall be provided with fuses for the protection of the parts given below and with the type of terminals as specified.

Train Line.—Terminals for reception of flat fuses shall be provided 2½ in. between centers; stud or screw to be —— in. diam., with —— threads per in.

Battery.—Optional. Fuse terminals, if used, shall be same as for train line.

Main Line Switch.—Optional. Fuse terminals, if used, shall be same as for train line.

Circuits.—For lamps, fans, etc., fuse shall be of the Edison screw-shell type for both opisitve and negative.

Axle Generator.—Positive armature fuse terminal; terminals to have N. E. C. code standard 150 amperes knife blade contact clips mounted with 4-in. clearance between clips. Negative armature fuse terminal optional. If used, terminal shall be same as positive. Positive field optional. If used, to have ferrule type clip mounted with 1-in. clear space between clips and to take N. E. C. code standard, 0 to 30 amperes.

NOTE.—Capacity of fuses, as designated above, to be such as to properly protect the parts in question.

11. That each electrically lighted car equipped with battery box or boxes shall have provided a fuse block, mounted in a suitable metal box at the positive and negative terminals of each set of batteries, and that the fuse block shall be in accordance with the detail as shown on Exhibit F, and installed on the car substantially as shown on Exhibit E. Knife-blade fuses shall be provided with a capacity of between 101 and 200 amperes.

12. That where axle dynamos are used, negative, positive and dynamo field shall be fused as close as possible to the dynamo and prior to the said leads either entering the conduits or being secured to the bottom of the car. The above fuses to be used for emergency service only and to be at least one hundred per cent. above the capacity of the fuses on the switchboards protecting the same leads.

13. All wires or terminals must be marked for identification.

Batteries.

14. That batteries as a set shall be connected up with a positive pole to the right, facing the car.

15. Where lead storage batteries are used they shall be preferably installed in double compartment tanks substantially as shown on Exhibits G, H and I.

16. That where double compartment tanks are used, the connections and arrangements of battery terminals are to be as previously indicated.

17. Battery boxes shall have provided in each door a vent, substantially as shown on Exhibit K.

Axle Dynamo.

18. That a straight pulley seat be provided for the axle pulley. That if a bushing or sleeve be used it should preferably be secured to the axle, independent of the pulley. Bushing to have an external diameter of 7½ in. and to be 8½ in. long, turned straight. That the pulley hub have a uniform internal diameter of 7½ in., the length of the hub to be 6½ in., the face of the pulley to be 9 in. or wider if flangeless, and 8 in. if flanged. That the generator pulley be flanged, crowned and perforated, and have a 7-in. face.

19. That when facing the end of the truck on which axle

generator is mounted, the pulley or sprocket shall be on the right-hand side.

In the above the following changes have been made from the recommended practices as given at the 1911 convention:

The information originally shown on Exhibit A has been incorporated in the body of the report and the following items added to recommended practice:

Item No. 2—Type of generator. Type of generator. Voltage in place of number of cells and series. Size of train-line wires. Number of train-line wires. Capacity of generator. Length of belt.

The following items being omitted: Cut in voltage. Amperes no light. Amperes full light.

Item No. 5—Added.

Item No. 6—The principal dimensions of Gibbs No. 3-G train-line connector have been shown on Exhibit A, and reference to the specific type of connector omitted from the body of the report.

Item No. 8—Item D, covering circuits for lamps, fans, etc., has been added and the reading slightly changed.

Item No. 10—Details covering type of fuse terminals have been given.

Item No. 11—Item has been changed so as to provide for a fuse at the positive and negative terminals of each set of batteries and fuses specified with a capacity of between 101 and 200 amperes in place of 150 amperes.

Item No. 13—Added.

Item No. 14—The words "as a set" have been added after the word "batteries," first line.

Item No. 15—Has been changed so as to cover only lead batteries.

Item No. 17—The word "substantially" added.

Item No. 18—The word "preferably" has been added in the second sentence.

Exhibit A—Canceled, the information being shown in the body of report and new Exhibit A made showing principal dimensions of recommended train-line connector.

Exhibit E—Detail of fuse box crossed off; dimension of center line of charging receptacle to the needle beam omitted. Sketch added showing arrangement of fuses with two batteries in parallel.

Exhibit F—Detail of fuse box removed, showing only details of fuse block and clip.

Exhibit G—Detail of battery terminal connectors omitted. Hole omitted at handle plate.

Exhibit H—Detail dimensions of plates slightly changed. Redesign of bridges shown.

Exhibit I—Detail of handle changed and detail of battery terminals omitted.

Exhibit K—Part of note covering application of copper screen to vent, cut out.

Exhibit L—Standard train-line lamps added.

In addition to the above report on recommended practices the committee desires to make the following suggestions to the Association for consideration:

(1) The adoption of standard size straight axles for different journal sizes for use with axle dynamos. This in view of the adoption of the axle device throughout the country, and the fact that with the present standard tapered axle it is very difficult to properly secure the axle pulley or bushing. The straight axle would result in less maintenance cost in axle pulleys and belts and improvements in service. A number of roads have adopted the straight axle, and if this practice spreads, the diameter of the axle should be standardized in order to minimize the different sizes of bushings or pulleys for car-lighting equipment.

(2) The design and adoption of standard arrangement of axle-dynamo suspension; the axle-dynamo people arranging to provide necessary lugs so that their dynamos will be applicable to the M. C. B. standard suspension. This suggestion is made in order that a safe suspension may be provided for all equipment and that the generators as manufactured by the various manufacturers will be interchangeable.

(3) If the train-lighting committee is continued, the committee would like to be advised as to whether or not it is desired that they include in their investigation recommended practices as to maintenance and repairs of batteries and other electric-car lighting apparatus, and maintenance and repairs of axle generators.

The report is signed by:—T. R. Cook, (Penna.), chairman; C. A. Brandt, (C. C. C. & St. L.); Ward Barnum, (L. & N.); J. H. Davis, (B. & O.); E. A. Benson, (Pullman Co.); D. J. Cartwright, (L. V.), and E. W. Jansen, (I. C.).

Mr. Cook presented the report, and at its conclusion said:

I would suggest that the natural way to deal with this report would be to consider first, the body of the report, as to whether it should be submitted to recommended practice, and second, to consider the suggestions offered by the committee in the last part of the report.

DISCUSSION.

C. A. Seley (C. R. I. & P.): I am of the opinion that this report is a very good compendium of train lighting practice, and represents a very large amount of very intelligent effort, I believe, on the part of the committee, not only this year, but on the part of the committee's preceding years. I would move the adoption of the report, and couple with that motion that it be sent to letter ballot, except the three suggestions, which should be referred to the executive committee.

R. L. Kleine (Penn.): I would like to amend Mr. Seley's motion, by providing that the report be referred to letter ballot by items. There are possibly some detail objections to some portions of the report, and if we refer it as a whole, we will not secure such a good result in the vote as if we refer it by items, in which event we will get the benefit of such items as may carry.

D. J. Cartwright (L. V.): Last year this report was practically submitted to a vote *Yes* or *No*. The result was that we got no definite action except that the thing was thrown out. This year we would like to have each separate item voted upon in the letter ballot, and then we will have something to work on.

Mr. Seley's motion was carried as amended.

SUPERHEATERS APPLIED TO OLD ENGINES.

That the application of superheaters to old or existing locomotives is an economical practice, is demonstrated by the fact that more than one thousand superheaters have been installed in old locomotives during the past year. The economies obtained by this practice have proved that the application of the fire tube superheaters furnishing highly superheated steam to old engines is no longer dependent upon the time of the application of new fireboxes and flue sheets, but upon the time that the engine can be spared from service long enough for the installation of the superheater.

Many of the largest railways are at the present scrapping serviceable flue sheets for the purpose of applying superheaters to their existing power and are installing superheaters on old engines in allotments each month, as the engines pass through the shop for a general overhauling. The loss sustained by the practice of throwing away serviceable flue sheets is more than compensated for by the economy in fuel obtained by the superheater locomotive. Of course, in instances where the flue sheets are to be scrapped away, the cost of the application of the superheater is greatly reduced.

The application of the fire tube superheater may be made to any of the existing types of locomotives, provided only that they are equipped with piston valves. There are many locomotives in this country filling the requirements as far as piston valves are concerned that were built several years ago and are deficient in boiler capacity. It is not possible to haul the tonnage with these engines that the cylinders and adhesive weight should permit because of the inability of the boiler to furnish steam. The use of highly superheated steam in these engines invariably overcomes the difficulty and makes it possible to increase the diameter of the cylinders, providing the weight on drivers is sufficient and the running gear is strong enough to take care of the increased piston thrusts.

Another important feature in the application of superheaters to old locomotives is the fact that the life of the boiler may be prolonged without reducing the rating of the engine or decreasing its capacity as a dividend earner. It becomes necessary, often times, on account of the age of a boiler, to reduce the pressure in order to insure safety in operation. In many instances where it has been found necessary to reduce the boiler pressure, fire tube superheaters have been advantageously applied and by increasing the diameter of the cylinders the original tractive effort of the engine has been maintained and in some instances has been increased. With the application of the superheater

to these old engines they have invariably operated with a marked increased economy in coal and water. Where it has been found impossible to increase the size of the cylinders on account of the thinness of the walls new cylinders have been applied and the economy has been sufficient to cover the cost of the application of the superheater and the new cylinders within one year.

Added to these features which make it economical to apply superheaters to old or existing engines, is the fact that almost invariably when engines have been equipped with superheaters their rating has been increased in some instances this increase has been as much as 20 per cent. which makes the locomotive a better investment from the standpoint of a revenue earner.

CAR WHEEL REPORT.

An error was made in Fig. 8 in the committee report on car wheels, as published in the DAILY RAILWAY AGE GAZETTE, June 13, page 1316. The height of the lug on the tire should have been 1¼ in. instead of 1¾ in. as shown.

AN APOLOGY TO THE WESTERN BALL PLAYERS.

The Daily owes an humble apology to the Western base ball players, and hereby makes it. Stanley Midgly calls attention to the fact that the item in yesterday's Daily, giving the results of past games, credited the East with having won last year and with having won four of the seven that have been played between East and West. The fact is, that the West won last year, 12 to 11, and that it is the West that has won four games out of seven. It was a hard fought battle in 1911, and the annals of the conventions as recorded in these columns should not mislead future generations as to this important matter. The East hopes to get revenge this year for last year's defeat; but the West manifests no inclination to yield up the pennant.

NOMINATIONS FOR SUPPLY ASSOCIATION OFFICERS.

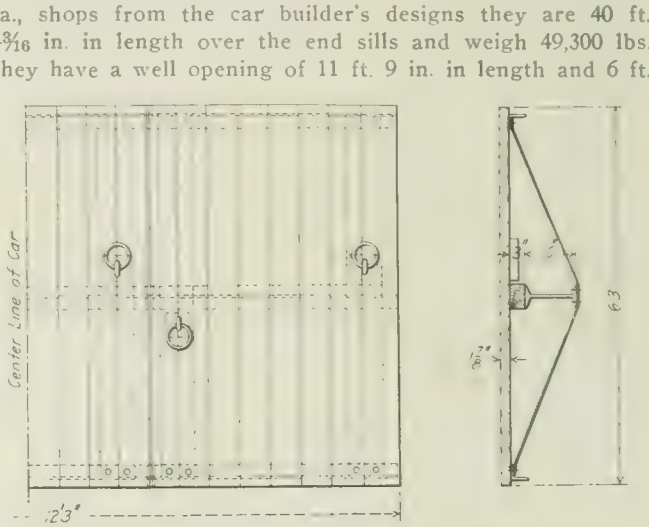
The Nominating Committee of the Railway Supply Manufacturers' Association has nominated the following for the coming year: For President, Samuel G. Allen, Franklin Railway Supply Co.; for Vice President, B. A. Hegeman, Jr., United States Metal & Manufacturing Co.

M. C. B. OBITUARY COMMITTEE.

President Stewart of the M. C. B. Association has appointed the following members as Obituary Committee in relation to the deaths of the members named: For Julius Krause (Penna.), R. L. Kleine; for E. Fisher (T. H. & B.), J. Christopher; for W. H. Lungren (P. B. & W.), J. Milliken; for J. F. Mann (P. M.), W. H. Rourk; for G. T. DeVilbiss (H. V.), M. A. Kinney; for F. H. Scheffer (N. C. & St. L.), A. G. Kautman; for R. N. Durborow (Penna.), J. T. Wallis; for G. W. Dixon (Pitts., Lisbon & Western), J. W. Taylor; and for R. F. McKenna (D. L. & W.), H. C. Manchester.

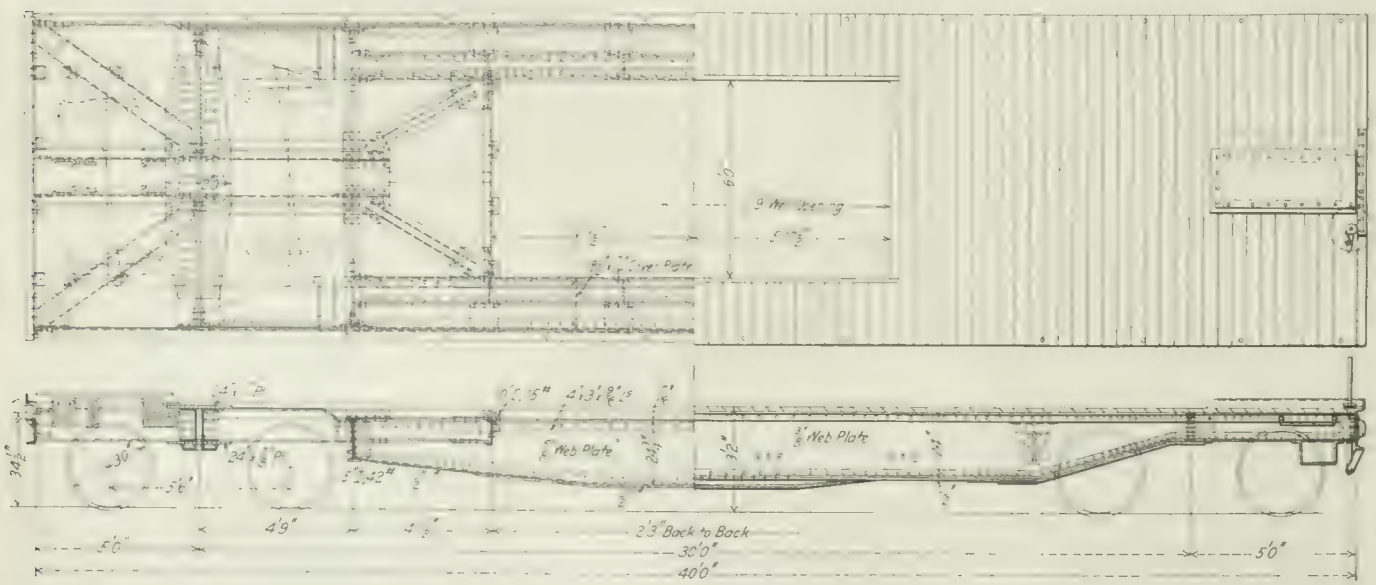
WELL CAR OF 75 TONS CAPACITY.

The Erie Railroad has recently received from the American Car & Foundry Company, New York, six steel well cars of 150,000 lbs. capacity. These cars were built at the Berwick, Pa., shops from the car builder's designs they are 40 ft. 6-3/16 in. in length over the end sills and weigh 49,300 lbs. They have a well opening of 11 ft. 9 in. in length and 6 ft.



Well Cover for Erie Well Car.

in width. The side sills are built up of a ⅜ in. web plate reinforced at the top and bottom, both inside and outside, by 4 in. x 3 in. x ½ in. rolled steel angles. A built up side girder extends just inside the side sill and is connected at each end to a 15-in., 42-lb. I-beam crosstie, which extends across the car from side sill to side sill. This side girder is built up of two 5/16 in. web plates, each being



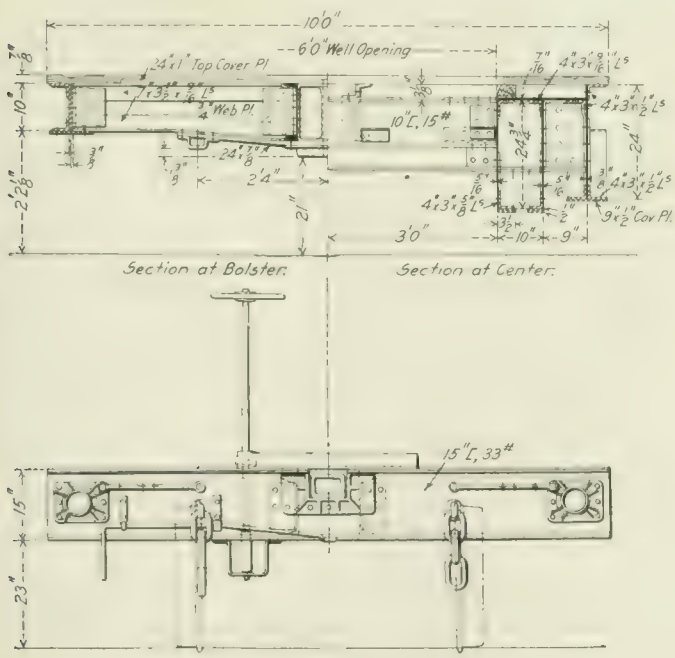
Elevation and Plan of 75-Ton Well Car.

reinforced at the top by a 4 in. x 3 in. x 9/16 in. angle and a 7/16 in. cover plate, which is also secured to the side sill inside top angle. The bottom of the side girder is reinforced by 4 in. x 3 in. x 5/8 in. angles which are secured to the inside of the web plate. The draft sills consist of two 12-in., 25-lb. steel channels and extend from the end sill through the bolster to the crosstie, and a 15-in., 33-lb. channel is used for the end sill. The body bolster is built up of a 3/4-in. web plate with 7 in. x 3½ in. x 9/16 in. angles at the top and bottom and on both sides of the web, with top and bottom cover plates. Two diagonal braces consisting of two 8-in. 13.75-lb. channels placed back to back extend between the crosstie and the well end member. They are tied to the well end member and to the crosstie by gusset plates. The well end member is a 10-in., 15-lb. channel.

The well cover is made up of a 10-in., 25-lb. I-beam center member secured by 1/4 in. steel plate straps to two 3/12 in. x 3 in. x 3/8 in. angle side members. The flooring on the well cover and on the car is of wood. Among the specialties applied to these cars are the Miner friction draft gear, the Sharon couplers and the New York air brake. The trucks upon which the cars are mounted are equipped with the Andrews cast steel side frames and bolster and have a capacity of 150,000 lbs.



75-Ton Well Car; Erie Railroad.



Underframe Sections of 75-Ton Well Car.

M. C. B. REGISTRATION.

Appler, A. B., M. E., Del. & Hudson Co., Marlborough-Blenheim.
Barry, J. J., M. M., Norfolk & Western R. R., Raymond.
Bawden, Wm., Wiggins Ferry Co., Watkins.
Cartwright David J., Elec. Engr., Lehigh Valley Ry.
Connor, J. T., M. C. B., 816 Sanjacinto St.
Dow, Geo. N., G. M. I., L. S. & M. S. Ry., Chalfonte.
Gibbs, A. W., C. M. E., Penna. R. R., Chelsea.
Gray, G. M., S. M. P., Bessemer & Lake Erie R. R.
Grewe, H. F., Wabash, Pittsburgh Terminal Ry., Richmond.
Grove P. L., A. E. M. P., Penna. R. R. Co., Chalfonte.
Hayward H. S., Consulting Engr., West Jersey Sea Shore R. R., Chalfonte.
Henry, J. M., M. M., Penna. R. R., Chalfonte.
Jansen, E. W., Elec. Engr., Ill. Central R. R., Dennis.
Keiser, C. B., M. M., Penna. R. R. (Penna. Term. & Tunnel Div.), Traymore.
Kendig, R. R., C. M. E., N. Y. Cen. Lines, Marlborough-Blenheim.
Knox, W. J., M. E., Buff., Roch. & Pitts. Ry.
Libby, J. E., Swift Refr. Transit Co., Traymore.
Meloy, H. C., Chief Electrician, L. S. & M. S. Ry., Traymore.
Mengel, John C., M. M., Penna. R. R. Co., Chalfonte.
Meredith, H. P., Penna. R. R., Chalfonte.
Monfee, A. J., S. M., B. S. R. R., Young's.
Nelson, E. D., Penna. R. R. Co., Strand.
Ott, William B., Asst. Engr. M. P., Penna. R. R. Co., Chalfonte.
Parks, R. H., M. C. B., Merchants' Despatch Transportation Co., Chalfonte.
Shoemaker, C. A., German-American Car Lines, Haddon Hall.
Smith, Benjamin T., Gen'l Foreman, W. J. & S. S. R. R.
Smith, Henry J., Gen'l Car Insp., D. L. & W. R., Monticello.
Spoor, C. E., M. C. B., Buffalo & Susquehanna R. R., Haddon Hall.
Stillwagon, Geo. W., M. C. B., Pitts., Shawmut & Northern Ry., Lexington.
Thomas F. H., V. P. & Gen. Mgr., Bellefont Central R. R., Craig Hall.
Vincent, M. M., G. M., National Car Lines, Traymore.
Walsh, F. J., M. M., Chesapeake & Ohio Ry., Marlborough-Blenheim.

M. C. B. GUESTS.

Adams, J. W., B. & O., Lexington.
Albers, L. H., Supr. Air Brake, N. Y. Central, Francis.
Allcroft, A. E., Clk. Pur. Dept., Penna. Lines West, 12 South Arkansas Ave.
Anderson, J. B., Penna. R. R., Pgh. Div., Runnymede.
Andrewcetti, Joseph Asst. Elec. Eng., C. & N. W., Dennis.
Baker, G. T., Foreman Car Shops, P. R. R., Worthington.
Barrett, W. M., Adams Ex. Co., Marlborough-Blenheim.
Bates, R., West Jersey & Seashore R. R. Co.
Best, J. I., Ch. Clerk Motive Power Dept., P. & R., Dennis.
Blackburn, R., Erie.
Bloxham, Chas. M., Union Tank Line, Cheltenham Revere.
Bosworth, W. M., M. E., Kansas City Southern, Raleigh.
Brogan, J. P., D., L. & W., Schlitz.
Bromley, Joseph, Supt. Safety Appli., Interstate Commerce Commission, Monticello.

Brown, B. S., Draftsman M. E. Office, P. R. R., Hotel Kenderton.
Chambers, Andrew, Engr., P. R. R.
Chestnut, Jas., P. R. R.
Childress, B. F., Young's.
Crysler, P. A., Asst. M. C. B., Canadian Pacific, Shelburne.
Currier, H. C., Chf. Clerk Pur. Dept., M. C. R. R. Co., Shelburne.
Davis, H. E., Gang Leader, Penna. R. R.
Davis, W. E., Foreman Nice Shop, Penna. R. R.
Dickinson, W. J., Pullman Co., Shelburne.
Dobson, F. L., M. P. Inspector, P. R. R., Chalfonte.
Dolan, J. C., Pur. Agt. Office, Denver & Rio Grande R. R., Arlington.
Donahue, C. M., P. R. R., Chalfonte.
Downs, M. D., Penna. R. R. Co. (Hudson Div.), Haddon Hall.
Drayer, U. S., Penna. R. R. Co.
Duffy, A. F., Interstate Commerce Comm., Monticello.
Eliot, H. H., Jr., P. R. R., Haddon Hall.
Elliott, Edward O. P. & R.
Eyler, J. W., American Ice Co., Raymond.
Formwalt, F. E., P. R. R., Seaside.
Fosnot, G. N., Cumberland Valley, Chalfonte.
Foster, Lewis, West Jersey & Seashore R. R. Co.
Fox, Geo., N. Y. C., Pennhurst.
Frame, R. E., Haskell & Barker Car Co., Gladstone.
Frost, F. R., A. T. & S. F., Dennis.
Garber, F. M., Baltimore & Ohio, Harmony House.
Garey, Martin, L. & H., Benton.
Gatshall, H. M., Northern Central, Ellwood.
Geisking, C., P. R. R., Seaside.
Gill, John, Young's.
Gracie, A. M., P. R. R., Ellwood.
Hassler, H. G., P. R. R., Young's.
Johnson, J. C., Penna.
Jones, G. R., N. Y. C. & H. R. R., Chalfonte.
Jones, W. F., N. Y. C. & H. R. R. R., Chalfonte
Jones, W. L., N. Y. C. & H. R. R. R., Chalfonte.
Kauffman, D. A., Penna. R. R., Worthington.
Keen, C. J., American Rys.
Kern, W., B. & O. R. R.
Kidd, C. M., Norfolk & Western, Raymond.
Kincaid, B. M., Penna. R. R., Malatesta.
Lamerding, F. A., P. R. R., Haddon Hall.
Leet, W. B., P. Ry.
Leslie, R. J., P. R. R., Seaside.
Lyon, A. N., K. & M., Haddon Hall.
McCarthy, J. H., P. R. R., Young's.
McDonald, M. S., C. & O., Marlborough-Blenheim.
McGary, A., N. Y. C. & H., Young's.
Markland, W. H., Penna. R. R., Seaside.
Metz, Cecil, P. R. R., Haddon Hall.
Middleton, J. A., Lehigh Valley.
Millen, Thos. C.
Minowa, E., South Manchuria Ry., Marlborough-Blenheim.
Mooney, T. H., Sunset Central Lines, Lexington.
Morris, W. M., P. R. R.
Muchnic, Charles M., American Loco. Co., Marlborough-Blenheim.
Murray, John A., D. L. & W.
Newbury, E. H., P. R. R., Lexington.
Newland, Lewis, N. Y., N. H. & H., Wadsworth.
Norberg, A., Pittsburgh & Susquehanna R. R., The Edna Cottage.
Ogilvie, Jas., Board of Ry. Commissioners, Dunlop.
Ozawa, N., South Manchuria Ry., Traymore.
Paxton, C. M., Scranton Ry., Chalfonte.
Pease, O. D. A., Penna. R. R., Young's.
Pendergrast, A. P., B. & O. R. R., Shelburne.
Phetteplace, L. H., C. C. & O. Ry., Haddon Hall.
Potts, John D., Ches. & Ohio Ry., Shelburne.
Powers, M. J., Denver & Rio Grande R. R., Arlington.
Pries, Herman, Haskell & Barker Car Co., Gladstone.
Purt, A. F., P. R. R., Boscobel.
Quinn, C. H., Norfolk & Western, Traymore.
Rafter, E. L., P. R. R.
Reeve, W. K., N. Y. C. & H. R.
Rice, W. L., P. & R. Ry., Monticello.
Riley, P. C., Penna. R. R., Malatesta.
Sandman, A. G., B. & O. R. R., Haddon Hall.
Sheldon, F. R., N. Y., N. H. & H., Wadworths.
Smock, F. A., Penna., Chalfonte.
Stevens, Geo. W., C. & O. Ry., Shelburne.
Stewart, H. A., Armour Car Lines, Marlborough-Blenheim.
Thayer, C. H., Penna. R. R., Ellwood.
Thomas, Francis, Bellefonte Central, Craig Hall.
Totten, E. C., N. Y. C., Pennhurst.
Trigs, J. H., P., B. & W., Wellsborough.
Wahl, Geo., D., L. & W., Schlitz.
Wallace, F. C., Erie.
Wallace, J. E., Wilmington & Southern Tract. Co., Haddon Hall.
Walsh, E. J., Pitts. Coal Co., Shelburne.
Walther, G. C., Penna. R. R., Young's.
Watkins, G. H., Penna., Chalfonte.
Whittaker, F. M., C. & O., Shelburne.
Wightman, D. A., Shelburne.
Wine, W. E., A. C. L., Young's.
Wintroop, Wm., P., B. & W., Wellsborough.
Woolwine, Emory, Virginia, Continental.
Wray, R. W., Penna. R. R., Craig Hall.
Wynn, F. S., Southern Ry. Co., Traymore.

THE M. C. B. DANCE.

The dance last night, though lacking the spectacular features of the balls of previous years proved most popular. It seemed that the floor was as filled as last year, and one noted no difference in the number of ladies who were present. The informal character of the affair, particularly noticeable through the omission of the grand march, was further emphasized by the members of the Entertainment Committee wearing business clothes, their example being followed by many others.

FOREIGN RAILWAY NOTES.

Under a concession formerly held by Belgians, but now worked by Chinese, a line is slowly being constructed in China from Honan, a city of Honan province, to Sianfu, the capital of Shensi province, as a part of the Peking-Hankow system. In February, 1911, coolies were at work on the embankment of this line near Sinan, a small city about 20 miles from Honan. Three years have been occupied in the work so far done. It is understood that the company expects to push the construction of the line as soon as financial arrangements can be made. The board of communications at Peking has planned an extension of this line to Lanchow, the capital of Kansu province, and the survey for this extension was completed in 1911. The board of communications has also announced its intention of extending this line from Lanchow to Ilifu, on the farthest frontier of the empire, the terminus of the proposed extension of the Kalgan-Suiyuan line, about 1,250 miles distant. Surveys for this great extension have been ordered to be commenced immediately.

The Yangtze valley railways in China are in some respects the most interesting problems in the country. The country they serve, is in many respects the richest portion of the empire, and under ordinary circumstances would be the most promising. However, most of the railways, both those constructed and those proposed, parallel the Grand Canal north and south and the Yangtze river east and west. The result is that the vast mass of freight is still carried in native boats, and will continue to be so carried in the future, in spite of railway facilities. Only rich cargoes, like silks, or cargoes of material that can be handled to advantage by machinery or by standard equipment, like coal or ore, can be counted upon by the railways. For example, the Shanghai-Nanking Railway, one of the best equipped of the new lines in the country, well built and well started by foreign promoters, has found it impossible to make money so far, because of the competition of Yangtze river steamers. The Shanghai-Hangchow line, while apparently enjoying a good business and in a position to prosper, has been in the public eye for some time as a result of troubles in the Chekiang Railway Co. and allied interests, and questions of management have so far mixed the situation that the exact financial position of the railway is uncertain, although admitted losses are great. It is announced from Peking that as a result of the general unfavorable situation in the company the government is to take over the line and carry it forward as a government enterprise.

Conventionalities.

Speaking of this weather—can you beat it?

As Friend Bullard aptly puts it, we're here for bUsiness; *not* bOOziness.

Mr. and Mrs. Mark A. Ross, Chicago, are at the Marlborough-Blenheim.

We have been wondering why they put Treasurer Lord in a cage this year.

R. M. Mitchell, superintendent of the Barney & Smith Car Company, returned to Dayton last evening.

The hotel waiters seem to be the only people who know they are dressed according to the rules of the game.

The challenge has been accepted and Harry Vaughan and Leigh Best will match ability on the golf links of the Country Club on Sunday.

George W. Lyndon, representing the Association of Manufacturers of Chilled Car Wheels, was an early arrival and registered at Haddon Hall.

W. J. McBride, president of the Haskell & Barker Car Company, cannot attend the meetings this year, business of importance preventing the trip.

Harvey G. Kittridge, general manager of the Kay & Ess Company, is attending the convention as usual. He is staying at the Marlborough-Blenheim.

R. L. Brown, who represents the National Lock Washer Company in Chicago, will join the sales force of the Barney & Smith Car Company on July 1.

Herbert Green, vice-president and general manager of the Alcohol Heating & Lighting Company, is a firm believer in alcohol—of the denatured variety.

Harry S. Whitehair has just joined the Chicago sales staff of McCord & Company. Mr. Whitehair was formerly connected with the Chicago Varnish Company.

F. M. Lucore, assistant to the general agent of the American Railway Association, was here yesterday. He was particularly interested in car interchange matters.

W. A. Bonitz, recently appointed general manager of sales of the American Vanadium Company, Pittsburgh, with headquarters at Pittsburgh, is attending the convention.

Judging by the gaily bedizened key to the city presented by Mayor Bacharach to President Stewart, a very large and brilliant time may be expected during the convention.

R. W. Bell, superintendent of machinery of the Illinois Central, is making an inspection trip, but will probably complete it in time to get to Atlantic City by next Sunday.

A. S. Goble, who during the last year has been in the sales department of the New York office of the Standard Steel Works, has been transferred to the Chicago office.

F. M. Whittaker, vice-president of the Chesapeake & Ohio, was an arrival Thursday from Richmond. He spent a part of the day at the meeting and among the exhibits.

D. Dunbar, manager of the Acme Supply Company, had reserved Pullman accommodations to Atlantic City, but was compelled to cancel them through the press of business.

J. T. McGrath, superintendent of rolling stock of the Chicago & Alton, is attending the convention with Mrs. McGrath. It is expected that considerable improvements will be made in the motive power on that road in the near future.

Frank W. Furry, general manager of the Ohio Injector Company, and his son, William S., assistant mechanical engineer of the same company, are among the convention visitors.

J. R. Cardwell and L. T. Canfield, president and vice-president, respectively, of the Union Draft Gear Company, arrived Wednesday morning and registered at the Traymore.

It will be regretted that Mr. and Mrs. W. E. Fowler will not attend the gatherings at Atlantic City this year. Mr. Fowler's health will not permit the visit, although he is grealy improved.

Fred. De Long, report says, is seriously engaged in writing a book entitled "Wild Spark Plugs I Have Known." In one chapter he explains, in less than a million words, why spark plugs grow loose.

J. H. Schermerhorn, assistant secretary and treasurer of the Joseph Dixon Crucible Company, is expected on Friday evening. Mr. Schermerhorn will be accompanied by his wife and they will stop at the Chelsea.

Harry Frost tried his best to force summer soon after his arrival at Atlantic City; but judging from the subdued clothes that he has worn since the first day, we take it that someone has tipped him off.

Mrs. C. L. Winey, wife of the secretary and treasurer of the Franklin Railway Supply Company, had been ill for the past three weeks with blood poisoning in the arm. She is reported to be recovering rapidly.

Walter Leach can certainly hand out compliments when he feels so disposed. If you want to hear something real nice, ask him what he thinks about the success of this year's conventions and who is responsible.

Colonel Lacy Williams and Major Grafton Dodd are in town with their famous "Virginia Guards." Napoleon's old grenadiers have nothing on them, for not even an Arizona sand storm could get by their double barrelled front.

F. O. Bunnell, of the Rock Island, is one of a large number of engineers of tests who are in attendance at the conventions this year. Mrs. Bunnell is with him and they are stopping at the Marlborough-Blenheim.

George W. Stevens, president of the Chesapeake & Ohio, is at the Shelburne and will stay here until Sunday. He spent yesterday afternoon amongst the exhibits on the pier. Mr. Stevens is recovering from a recent surgical operation.

Robert E. Frame, assistant to the president, and Herman Pries, general superintendent of the Haskell & Barker Car Company, arrived Wednesday and registered at the Gladstone Hotel. They will stay during both conventions.

W. P. Richardson, mechanical engineer of the Pittsburgh & Lake Erie, will be prevented from attending the conventions this year because of the pressure of work in connection with the drawing up of plans for new equipment.

George S. Allen, who for more than forty years was master mechanic for the Reading at Tamaqua, Pa., is attending the conventions. Mr. Allen began railway service 54 years ago and was one of the early members of the M. M. Association.

Miss Edna Postlethwaite, daughter of C. E. Postlethwaite, spent part of Wednesday on the pier with her father. She is a student at Swarthmore College, and was a guest here of one of her college chums, Miss Haines, of the Hotel Morton.

George T. Anderson, superintendent of the Chicago, New York & Boston Refrigerator Company, a member of the M. C. B. Association, has recently passed through a serious

illness, but is now well on the road to recovery. He will not be at Atlantic City this year.

E. D. Nelson, formerly engineer of tests of the Pennsylvania, with Mrs. Nelson and their two daughters, are stopping at the Strand. Mr. Nelson since leaving the Pennsylvania, has been very busy in the general consulting field, for which his long experience so well fits him.

Mr. and Mrs. J. F. Graham, of Portland, Oregon, heretofore regular attendants at the conventions, cannot make the trip this year. Mr. Graham is assistant general manager of the Oregon-Washington Railroad & Navigation Company, and this year could not leave his office duties.



Miller of the Nickel Plate.

J. D. Murray, formerly mechanical engineer of the Delaware, Lackawanna & Western and later for several years located at Christmas Island in the Indian Ocean, is spending a few days at the convention meeting his old friends. He has been spending the past year in London.

Warren J. Lynch, vice-president of the American Steel Foundries, at New York, is this year for the second time attending the conventions as a supplyman. Prior to taking his present position, he was passenger traffic manager of the New York Central Lines, with office at Chicago.

Dr. J. M. Griffin, president and general manager of the Wheel Truing Brake Shoe Company, one of the regulars at the conventions, is at the Dennis. He has brought with him, as usual, his favorite billiard cues and with his friends will enjoy some leisure time at the "gentleman's game."

J. A. Pilcher, mechanical engineer of the Norfolk & Western, attended the meeting on Wednesday, ready to uphold the recommendations of the committee on Car Wheels, of which he is a member. He then left for Norfolk, but will return on Monday for the Master Mechanics' meetings.

W. O. Thompson, district master car builder of the New York Central & Hudson River and secretary of the Traveling Engineers' Association, reports a large increase in membership for that association and prospects for a still better convention than that of last year, if such a thing is possible.

E. A. Gilbert, who has attended the conventions for many years as a supply man, will be absent this year. He has returned to "his first love," the Southern Pacific, as general inspector of motive power, and on account of a pressure of business will not be able to come to Atlantic City.

B. O. Yearwod, general foreman of the Virginian, has some great stories to tell about the new power which will shortly be placed in service on that road. The new Mallets will have a tractive effort of 138,000 lbs., working simple, and will be the largest and most powerful locomotives ever built.

F. R. McFeatters, Port Perry, Pa., superintendent of the Union Railroad, was one of the first to arrive at the scene of action and is stopping at the St. Charles. He reports a most congested condition at Port Perry, owing to the press of business, complicated by labor conditions in that section.

Mr. and Mrs. E. W. Pratt arrived from Chicago Tuesday afternoon and are guests of the Marlborough-Blenheim. The absence of their daughter, Miss Verona Pratt, will be noted with regret this year by the many friends of the young lady. On June 8 in Chicago Miss Pratt became the bride of Robert Bernardd Barton.

It seems that J. Alexander Brown is not the only one here wearing a badge that resembles the label sometimes found on top of a box of corn plasters. Uncle Bill Lewis is sporting a duplicate of Brown's badge; but not being in the advertising business, he wears it at the bottom of his vest instead of on the lapel of his coat.

L. F. Hamilton, publicity and spcialty manager of the National Tube Company, is not here this year, because of a long period of illness. Mr. Hamilton has been confined to his bed for nearly four of the last six months; but he is now very much improved. He is spending a few weeks at his old home in Kewanee, Ill.



Charles F. Thiele Enjoying a Good Smoke.

Those who have closely observed the work of C. Haines Williams, Jr., the new vice-president of the Chicago Railway Equipment Company, at the conventions, will readily credit the rumor of his early appointment as ambassador near the court of St. James. His earnest courtesy and his courteous earnestness are irresistible.

C. D. Young, engineer of tests of the Pennsylvania, is attending the meetings of both associations, as usual. President Stewart, on discovering his presence at the first meeting, appointed him chairman of the dance committee. Mr. Young is now trying to find out who informed the president of his reputation as a cotillion leader.

Sam Lynn, master car builder of the Pittsburgh & Lake Erie, says that the large car repair shop which was built at McKees Rocks, Pa., a number of years ago is being used entirely for repairs to steel freight cars. The steel hopper and gondola cars which were put in service 12 or 15 years ago are now requiring heavy repairs in many cases.

C. L. Acker, master mechanic of the Toledo Terminal, spent Wednesday and Thursday at the convention. Pressure of business made it necessary for him to return to Toledo last night. He was enthusiastic over the exhibit in Machinery Hall and noticed several devices which he feels can be installed in his shops to good advantage.

One of the sweetest guests of the M. C. B. Association is little five-year old Florence Telford, daughter of the purchasing agent of the Queen & Crescent. Mr. and Mrs. Telford, the young daughter and their son Elliott, are staying at the Marlborough-Blenheim. With them is Mrs. C. A. Parquette, wife of the chief engineer of the Big Four.

A. R. Ayers is registered at the Marlborough-Blenheim and will remain for both conventions. Since the last meeting Mr. Ayers has assumed the duties of the newly created position of general mechanical engineer of the New York Central Lines, west of Buffalo. What is of more importance, he has also, in the meantime, assumed the position of a benedict.

G. E. Carson, district master car builder of the New York Central & Hudson River at West Albany, N. Y., is especially interested in the training of car department apprentices and is developing a special course for them, entirely different from that used in the motive power department. Important additions are being made to the car repair plant at West Albany.



Mr. and Mrs. J. E. Marden—Mr. Marden was M. C. B. President in 1903.

Harry R. Warnock, master mechanic of the Monongahela, arrived Wednesday morning. His wife and daughter had preceded him, getting here on Friday last. Mr. Warnock is looking forward with considerable interest to the delivery of six new consolidation locomotives in July. They will have a number of new features and will be more powerful than those now in service.

S. T. Fulton, New York, general sales agent of the Railway Steel-Spring Company, is attending the conventions. Mr. Fulton formerly represented the company in Chicago, and was promoted to his present position recently. Prior to entering the supply business, he was assistant to the president of the Rock Island Lines. This is the second year he has attended the conventions.



J. F. Deems in Action—Was He Selling Supplies or Talking Politics?

J. F. DeVoy, assistant superintendent of motive power of the Chicago, Milwaukee & St. Paul, who is also president of the Cornell Men's Association this year, is closely watching the papers having reports of the work of the crews preparing for the intercollegiate races at Poughkeepsie. Mr. DeVoy rowed in the Cornell 'Varsity crew when he was in college and has maintained his interest in college athletics.

W. L. Kellogg, superintendent of motive power of the Pere Marquette, was among the first of the railway men to register. He is stopping at Haddon Hall. Mr. Kellogg's brother, D. P. Kellogg, master mechanic of the Southern Pacific, is also quartered at Haddon Hall and has become thoroughly interested in the work of this, his first convention in the railway mechanical field.

It is with pleasure that we announce the arrival of "Jay" Henry, of the Safety Heating & Lighting Company. "Jay" is famous as the dare-devil auto driver of Orange, N. J. He was attired in his orange-colored gauntlets when he arrived for the convention and had no sooner reached his hotel than he commenced to expound to his friends his wonderful views regarding the future possibilities of automobiling.

The "Bureau of Information" which, so far as anyone here has been able to discover, exists in name only, said name being duly emblazoned in gold on a three-foot sign, was discovered yesterday morning swinging more or less gracefully between two uprights at Booths 501-3-5. Stephen Mason has been made temporary chairman. It is probable that Secretary Conway will in due course announce where the "bureau" may be found tomorrow.

H. J. Small, general superintendent of motive power of the Southern Pacific, was in the east about two weeks ago and thought at the time that he would be able this year to attend the Atlantic City conventions; but many important matters have since come up, and Mr. Small will therefore be unable to leave his office. He is an important member of both the M. C. B. and M. M. associations, and many will regret his inability to be present at the meetings.

R. W. Burnett, general master car builder of the Canadian Pacific, is stopping with his wife at the Marlborough-Blenheim. The first all-steel passenger coach on the Canadian Pacific is just being placed in service. It was designed and built at the Angus shops and has a number of special features, including a unique roof contruction with a dormer window effect in place of the usual clear-story windows; also a special headlining and a cork floor. Each truck has its own brake cylinder and brake apparatus.

Thomas R. Cook, assistant engineer of motive power of the Pennsylvania Lines West of Pittsburgh, is registered at the Brighton. Mr. Cook, when he was stationed at Ft. Wayne, Ind., was very successful in developing a storage-battery system for equalizing the load on the power plant generators at ore docks. The load on this plant has almost instantaneous fluctuations of large amounts and by the system devised, much smaller generators, which operate at a constant load, have been made possible.

F. C. Pickard, master mechanic of the Pere Marquette at Saginaw, Mich., and president of the International Railway General Foremen's Association, arrived in Atlantic City yesterday. He is enthusiastic about the outlook for the General Foremen's convention at Chicago the latter part of July. The papers which have been prepared are said to be of more than ordinary interest and value, and the indications are that there will be a large attendance, the membership having increased considerably during the past year.

Dan Cupid has certainly been working overtime this year, having added the names of Ross Hayes and George Fox, of the eastern office of the Curtain Supply Company to his lengthy list. Both gentlemen are attending the conventions with their brides. Naturally these happy people are blindly oblivious to things mundane, so they are under the protecting wing of Mrs. Stanley W. Midgley, than whom none is better known. Mrs. Midgley is now enjoying her tenth consecutive convention. She, too, made her dèbut at these conventions as a bride.

H. E. Dickerman came to the convention this year with a very definite idea in his mind of "hanging" his exhibit without any casualties—and he nearly got away with it. But "Dick" weighs about 300, and it is sometimes hard for him to avoid all that starts his way. However, he did manage to hobble far enough away from danger to avoid what might have been a serious accident when one of the I-beams got away from the erecting gang putting up the frame intended to carry his exhibit. As it was, he was badly scraped both on his back and legs; but he stuck to his job and is still there.

Reference to stokers brings a ready response from F. H. Clark who, since his arrival, received news of some splendid work by his very large mallets equipped with stokers. These locomotives are in pushing service on 2 per cent. grade 8 miles long, and on Wednesday made two trips behind trains of 1760 tons, during which the shovel was not used at all and the hook but twice. These locomotives are among the largest ever built and have 99.9 sq. ft. of grate area. This is probably the best locomotive stoker work that has been done. The fuel consumption was at the rate of about 7000 pounds of coal per hour. The stokers are of the conveyer type using crushed coal.

A. J. Stevens, the new vice-president and general manager of the Barney & Smith Car Company, has been with the company since 1897, when he was made assistant lumber buyer. He, together with his father and paternal grandfather, have, in the aggregate, spent 90 years in the service of the Barney & Smith Car Company. Mr. Stevens reached Atlantic City yesterday morning; and he and the newly elected second vice-president and treasurer, J. F. Kiefaber, will go to New York to-day and from there back to Dayton. Mr. Stevens will return on Monday next with President Estabrook.

Prof. E. C. Schmidt, of the University of Illinois, arrived on Tuesday in a receptive state of mind for suggestions from anyone that considers himself an expert in designing locomotive testing plants. The new plant at the University of Illinois is now in course of construction and it is expected to be in operation before the end of the year. It will have a capacity for a drawbar pull as high as 125,000 lbs., and is arranged to eventually accommodate the largest types of Mallets. At the start, however, but four pairs of supporting wheels will be installed. This will be the largest locomotive testing plant in the world.

Eureka! Eureka!! The tyrant trusts, Electric Light and Gas are on the road to oblivion and bankruptcy. No more will struggling humanity have to dodge the meter man, or go to bed with the chickens. Gone are the days when we must use matches to see who should dig up the inevitable quarter. C. W. Wardell has solved the problem. Two little gold fishes (ordinary garden variety), a glass aquarium filled with water, a few glass tubes and a box of pills does the trick. The result is a beautiful white light. Of course, the secret lies in the pills; for these are fed to the fish, which immediately start on a marathon race. This disturbance causes the water to throw off oxygen which, when ignited, produces the above result.

R. D. Smith, superintendent of motive power of the Boston & Albany, who heads the committee on the Maintenance of Superheater Locomotives, is an enthusiastic advocate of superheat. The price of coal in New England is so high that fuel savings amount to more than in the more favored districts which have coal mines along the line. A saving of 25 per cent. in fuel, due to the superheater, when coal is $4.00 per ton, means a substantial gain. Mr. Smith finds also that the firemen appreciate the fact that the amount of coal to be handled for a given trip is so much reduced that they can do better work in keeping up steam to maximum pressure for the whole trip. Incidentally, therefore, the superheater is to a certain extent accomplishing the same object as the automatic stoker though in a different way.

Malicious rumor has it that Wildin broke his bat in last year's game by holding it flat-grained to the ball. This he most emphatically and indignantly denies, and characterizes as maliciously intended. 'Twas a trusty bat, so Wildin says, and carried a long record of home runs unequalled even by the swat-sticks of Wagner, Cobb and Baker. It simply couldn't respond and hold together. True, Wildin had carefully calculated the stress himself in designing the bat; but the force behind the suddenly and intensely developed desire in him to spoil Pitcher Bale's curve and knock the ball to England was far beyond the calculated factor of safety, and really more than any bat should be expected to stand. It naturally broke. Nothing else was left for it to do. Wildin knows it, and so should everybody else. Could anything be simpler? If this rumor (and Downing, of the western team, is suspected of knowing something about it), is still sufficiently rugged to live after the above explanation, given us by Wildin, we will be forced to a conclusion that an asylum or membership in the Ananias Club is the only thing left for the doubting Thomases.

The Exhibit.

The Standard Coupler Company, New York, is no respecter of politicians. It was showing on a slide at its booth yesterday photographs of Taft, Roosevelt and La Follette, Republicans, and Wilson, Harmon, Underwood and Bryan, Democrats.

J. V. Robinson, president of the Robinson Coupler Company, Washington, D. C., will not attend the convention this year. Mr. Robinson is now in British Columbia supervising the installation of connectors on a number of Great Northern cars. Clinton M. Smith, of the same company, is in charge of the pier exhibit.

In spaces 572 and 573 the Acme Supply Company, Chicago, is showing its new diaphragm. The novelty consists in its being made in sections and requiring no hood. Its construction provides for easy repairs and long life. The Apex type shown is especially new in shape, one of its most interesting and valuable features being its sharp drainage at the top.

F. H. Quail and Philip J. Duffy, representing the permanent manufacturers' exhibit of railway supplies and equipment, located in the Karpen Building, Chicago, are here in the interests of this recently established central-western institution. They report considerable success in securing tenants for space in their exhibit. They may be found in Booth 527.

The Storrs Mica Company, Owego, N. Y., has recently shipped a number of mica chimneys and lantern globes to a railway in Peru. In the mountainous country traversed by this railway, there has been a great deal of trouble from breakage of glass lamp and lantern globes, and after a thorough test of the Storrs company's articles, the railway placed its order.

The combination body and truck bolster steel underframe car shown this year by the Mid-Western Car Supply Company, Chicago, combines features which tend to reduce the cost of operation of freight trains by reducing excess dead weight per car, reducing liability of derailment owing to the low center of gravity, reducing first and maintenance cost per car by eliminating the number of parts and weight. By lowering the floor line of the car the cubical capacity is increased, with consequent increased revenue resulting.

A new steam hose coupler with locking device is being exhibited at the booth of Gold Car Heating & Lighting Company, New York. It couples in ordinary way and is steam tight—a slight tap, and it is locked. Also it couples and locks with other makes of couplers. The company is showing another device, which will be appreciated by those who travel in sleeping cars and have experienced the necessity of using pillows or blankets to stop the draughts when the window is raised for ventilation. This is the car window ventilator, or window shield, which provides fresh air without draughts.

There was the half-way making of a dog fight in the booth of the Pennsylvania Flexible Tube Company yesterday morning. The muzzled watch dog of the company stood at the back wagging his pneumatic tail, when a lusty bull terrier in flesh and blood was led by in leash. The goggle eyes and wagging tail were too much for the bull terrier's irritable sensitiveness, and he barked viciously and strained at the leash. Had he not been firmly held the tube company's good natured poodle would have been no more. The crowd that gathered to see a real dog fight was as much displeased as was the real dog when he was dragged away.

The Jones & Laughlin Steel Company, Pittsburgh, Pa., has an attractive exhibit of some of their wares arranged on a pulley, which is made to revolve on a vertical and horizontal axis at the same time. The base on which the pulley turns is a rope sheave. The spaces between the spokes are paralleled, and on these panels is arranged an attractive array of examples of cold rolled shafting, sheets, spikes, twisted reinforcing bars for concrete work, chains, nails, wire, channels, I-beams, rails, special shapes, rounds, hexagons and squares, angles and Z's, all in a number of sizes, showing, in part, the wide range of the products of the company. The exhibit is in charge of W. T. Mossman.

The condensed time tables of the S. C. H. & L. Lines furnishes about all the information visiting railway or supplymen need to get into, or out of, Atlantic City, or to add to their comfort while here. The pages show correct time tables giving connections with through western trains; through express service to and from New York and Philadelphia; officers and members of the executive committees of the M. C. B., M. M. and R. S. M. associations. entertainment program; automobile road map, showing routes between Atlantic City, Philadelphia and New York; map of Atlantic City and a diagram of exhibit spaces and location of each exhibitor. A two-page physical map of North America shows the railways using Pintsch mantle lights and location of Pintsch plants. A copy of this handy reference will be given to visitors calling at the booth of the Safety Car Heating & Lighting Company.

The McConway & Torley Company, Pittsburgh, Pa., is showing a full size model of the Buhoup flexible truck, embodying some improvements in design over the truck exhibited at last year's convention. This truck has been thoroughly tested out in service and has demonstrated its claims of superiority and efficiency over the rigid type of truck. It is being applied to many new locomotive trucks and is an especially desirable truck for this service. Its feature of vertical flexibility allows the truck to adapt itself to all uneven conditions of track, high or low joints, with all wheels firmly on the rails, without any undue strains on any part of the truck, and thus practically eliminating derailment from these causes. While the truck is flexible to vertical movement, it is rigid to any twisting or angular horizontal movement and is always square. It has a wide distribution of load and an increased spring capacity, using either spiral or elliptic springs, insuring a very easy riding truck.

WHY PLUSH FOR CAR SEATS?

The evolution of the modern passenger coach has shown many changes in the form and mechanism of the seats; but the seat covering has remained practically the same through all these changes. Plush serves that purpose better than any other material. Moleskin, hair cloth, leather, artificial leather and rattan have been used; but only in the exceptional case have they been found superior to plush, and by far the greater number of seats have been covered with that fabric. On examination, no other material seems to present so many advantages, and the reason for its use is the natural selection as the result of experience. Plush is durable; it is soft and pliable to the touch; dust, cinders and dirt sink into it; lint and the more solid materials are brushed away by it; air circulates through its meshes, and the yielding surface of plush seems to cling to another cloth surface and give none of the sliding sensations of two hard surfaces in contact. Plush takes any color, and selection has a wide range. Large railway systems use a standard color for reasons of uniformity and economy. Variety is offered by the use of frieze—a high-pile plush with a figure or design in uncut fiber to relieve the solid mass of color. Within the last four years there has been extensive use of friezette—a low-pile plush with the design formed by cut loops. These figures meet the eye against a background of uncut loops, having the elegance and refinement of satin. The car plush industry of this coun-

try centers about Boston. The Bay State Brand is made there by the Massachusetts Mohair Plush Company. W. W. Melcher, of the company, has Booth 22 in the main building, where he tells about car seats and plush and why Bay State Brand is best.

SEVENTY-TON PEDESTAL JAW TRUCK.

The accompanying illustration shows a new design of freight car truck which is exhibited by the American Steel Foundries Company, Chicago. It is intended either for 50-ton equipment using 5½ in. x 10 in. journals, or 70-ton equipment employing 6 in. x 11 in. journals. The standard design of Andrews' cast steel side frame has been so modified that the necessity of a tie bar has been done away with entirely, and the frame is so secured to the journal boxes that the wheels can be changed with even greater facility than is the case with trucks using any of the usual designs of arch bar construction. The frames are known as the pedestal type, being made with jaws on each end which fit over the boxes and engage with guides cast on the sides of the boxes. The weight of the frame and truck holds the jaws securely in place across the top and against the side guides of the journal boxes.

A bolt passing through the lugs on the top of the journal box and end portion of the frame holds the two parts together and eliminates the possibility of the frames becoming separated from the oil boxes in case the car should be derailed. These top journal box bolts carry no weight in service and are subjected to little or no wear. The journal boxes are of standard M. C. B. design with the exception of the side guides and the top bolt lugs.

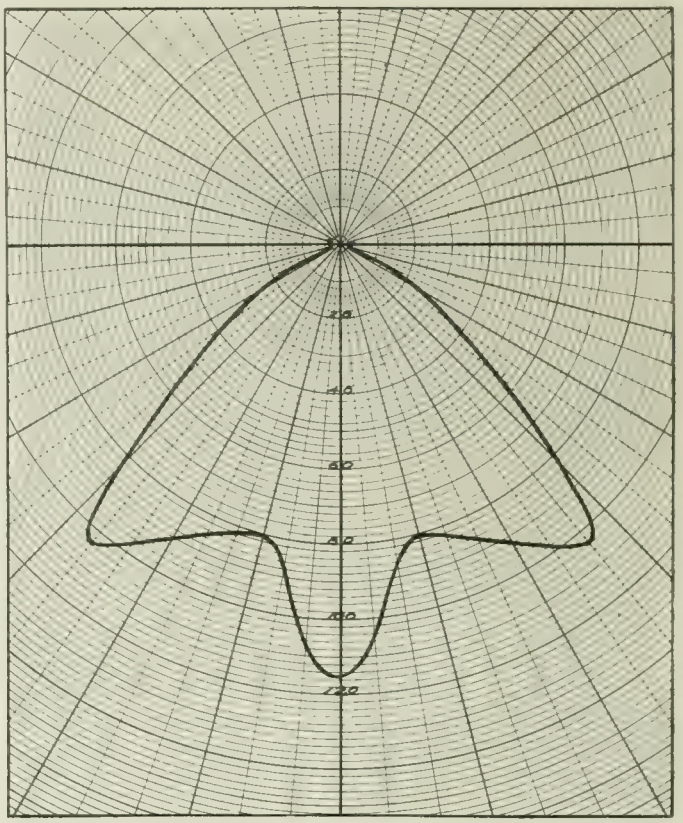
The two side frames of the truck are held rigidly at right angles with the axles by a heavy channel spring plank, which is secured to the spring seat of each side frame by 10 rivets, making a total of 20 rivets per truck. This construction assures the truck remaining square and prevents excessive friction of the wheel flanges against the rail and the abnormal wear of journal bearings and wedges, which occurs when trucks are out of square.

When it is necessary to change wheels on cars equipped with trucks of this design the top bolts are removed from the journal boxes, and the frames are jacked up sufficiently to allow the jaws of the frame to slip out of the journal box side guides, after which the wheels and axles can be rolled out.

As these pedestal jaw frames are intended for use without the usual tie bars or journal box bolts, a material saving in the total weight of the truck is effected, and at the same time the number of parts is reduced. The total weight of the truck exhibited, which has 6 in. x 11 in. journal boxes and is intended for 70 or 75-ton equipment, is 8000 lbs. Other material manufactured by the American Steel Foundries and used on the truck consists of Davis cast steel wheels, the cast steel truck bolster, Ajax brake beams and Simplex bolster springs.

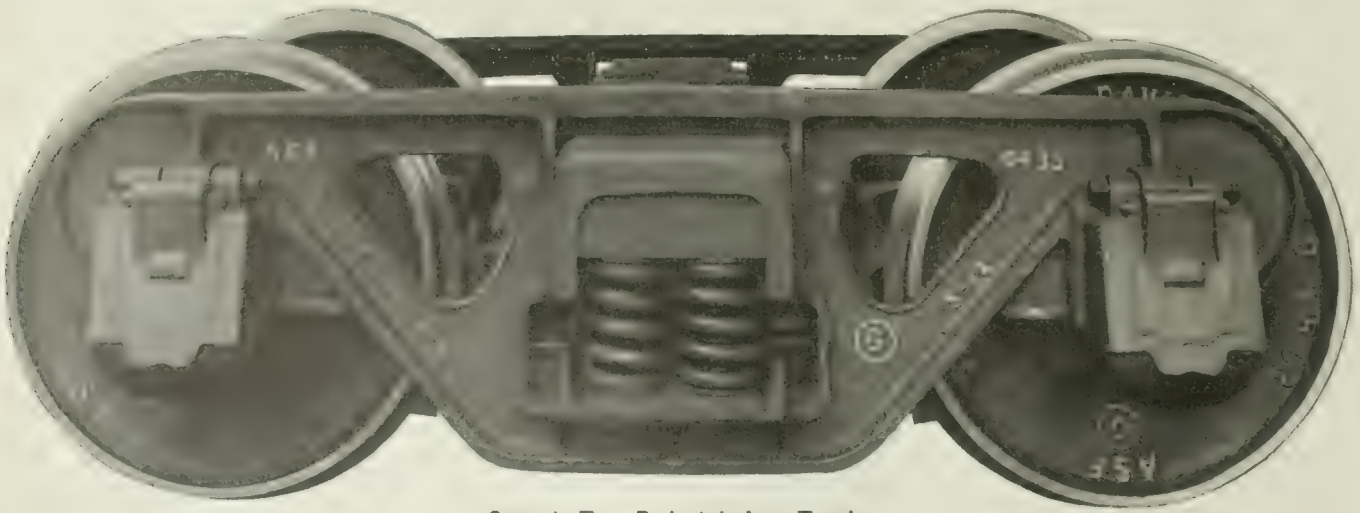
CAR LIGHTING FIXTURES.

The display of car lighting fixtures at the exhibit of The Safety Car Heating & Lighting Company, New York, is even more attractive than the exhibits made by this Company in former years. Many new fixtures have been developed in



Characteristic Distribution of Electric Center Lamp (reflector-bowl opal envelope type) Using 50-Watt G-30 Tungsten Lamp.

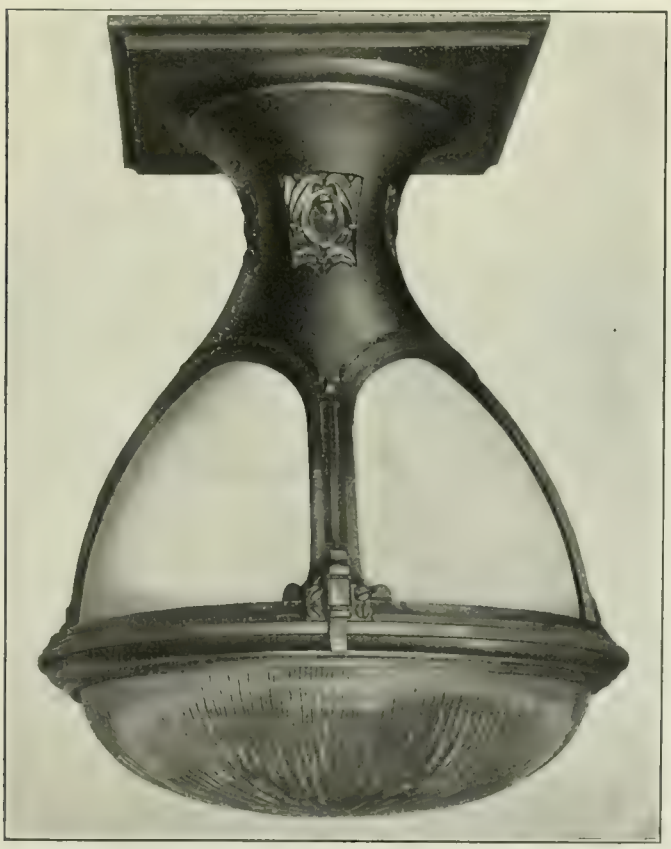
the past year, among which are two types of fixtures known as the reflector-bowl-enclosing envelope-type. One of these fixtures is used with the Pintsch mantle and the other with the electric lamp. The object of using an enclosing envelope with this type of fixture is to eliminate the objection of dust



Seventy-Ton Pedestal Jaw Truck.



Prismaic Reflector-Bowl Unit and Opal Glass Enclosing Envelope.



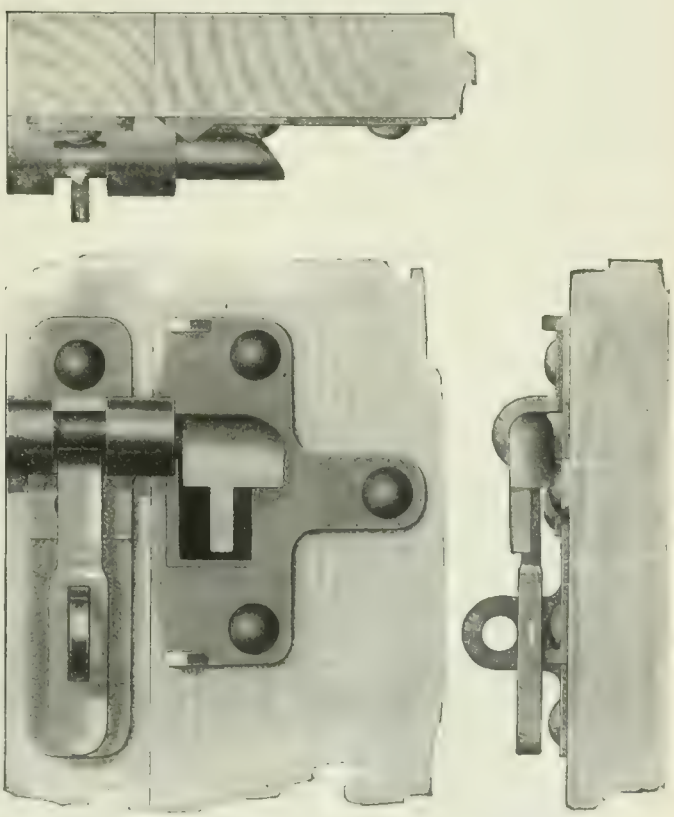
Reflector-Bowl, Enclosing Envelope Type Lighting Fixture Used with Either Pintsch Mantle or Tungsten Electric Lamp.

and dirt collecting on the prismatic glass reflectors and bowls. The reflectors and bowls employed have been designed to give the correct distribution of the light with the maximum illumination on the seats of the car. To accomplish this the prisms in the glass are used on the outside of the reflector and the inside of the bowl. With this arrangement a serious objection arises with the uneven surfaces necessitated by the use of prisms, and presented where they will collect the most dirt. These fixtures are mechanically constructed, so that all dirt is excluded from the interior of the lamp, and from the prismatic surfaces on the outside of the reflector.

The Safety Car Heating and Lighting Company announce that they are in a position to make these fixtures in several different sizes for use on both the center deck and the half deck of the car. The recent installation of these fixtures in some new Frisco dining cars is not only attractive in appearance but is capable of giving the best light distribution from either the Pintsch mantle or an electric lamp.

UTILITY AUTOMATIC LOCK FOR BOX CAR DOORS.

The repair of freight car doors is a large item of expense to railways and, in addition to the actual cost of the repairs, the loss of cars from service while in bad order is often a serious matter. If a car door is damaged so that it cannot be locked and sealed the car cannot be used until repairs are made. While cars are being handled empty the doors bump back and forth and become damaged; the door stops split; the hangers



Utility Automatic Lock for Box Car Doors.

and track are damaged and the back stops and bottom guides are loosened and knocked off.

The Utility automatic locks prevent most of this damage, because the first time the car door rolls open or shut it is securely locked so that no matter how rough the switching the door is not damaged.

The accompanying illustration shows the lock. It consists of malleable castings fastened together by three bolts which pass

through the door stop and door post with the nuts on the inside.

The lock consists of a back plate, a loose pin and a clamp over the pin. The pin has a lug at one end to engage with the door and a sealing lever at the center. The hasp on the door has a recess to receive the lug on the pin. When the door is closed, the lug is pushed back, revolving the pin and raising the sealing lever. When the recess is opposite the lug the latter drops into it and the lever falls into place. A seal may be passed through the seal slots and the lever cannot be raised to allow the door to be opened. A padlock may be put through the hole in the lug over which the lever arm rests. The recess in the door hasp allows for any sagging of the door and any variation in the thickness of the door does not affect the working of the lock. The projecting pin wedges the door securely in place and shifting loads cannot bulge it as with the ordinary hasp and pin. The support at the center of the door is also a useful feature.

A lock is also placed on the rear of the door to engage a combination back stop and hasp on the car. This locks the door open. The need of locking car doors open is recognized, as very often it is necessary to dry out or air cars while being handled empty. The locks cannot be removed from the car when the doors are closed, and a burglar cannot enter the car by removing the lock and then avoid detection by replacing it. Utility automatic locks are manufactured by the Railway Utility Company, Chicago.

SEVENTY-TON ORE CARS.

The type of ore car shown in the accompanying illustration has been used for several years by the Woodward Iron Company for carrying ore. The first lot cars were of 100,000 lbs. capacity, the second of 120,000 lbs., and the third lot has been increased to 140,000 lbs. These cars were made by the Pressed Steel Car Company, Pittsburgh, Pa., and are of the hopper bottom center dumping type with the doors hung in pairs. They are operated by means of a chain and gear device and may be easily and quickly opened or closed, by one man, from either side of the car. The floors and hopper sheets are steep and the door openings large and so arranged that the entire load is dumped between the rails. Steel plates, rolled shapes and pressed steel have been used in the construction to obtain a car of the required size, with a minimum weight and yet strong enough to withstand the service to which such cars are subjected.

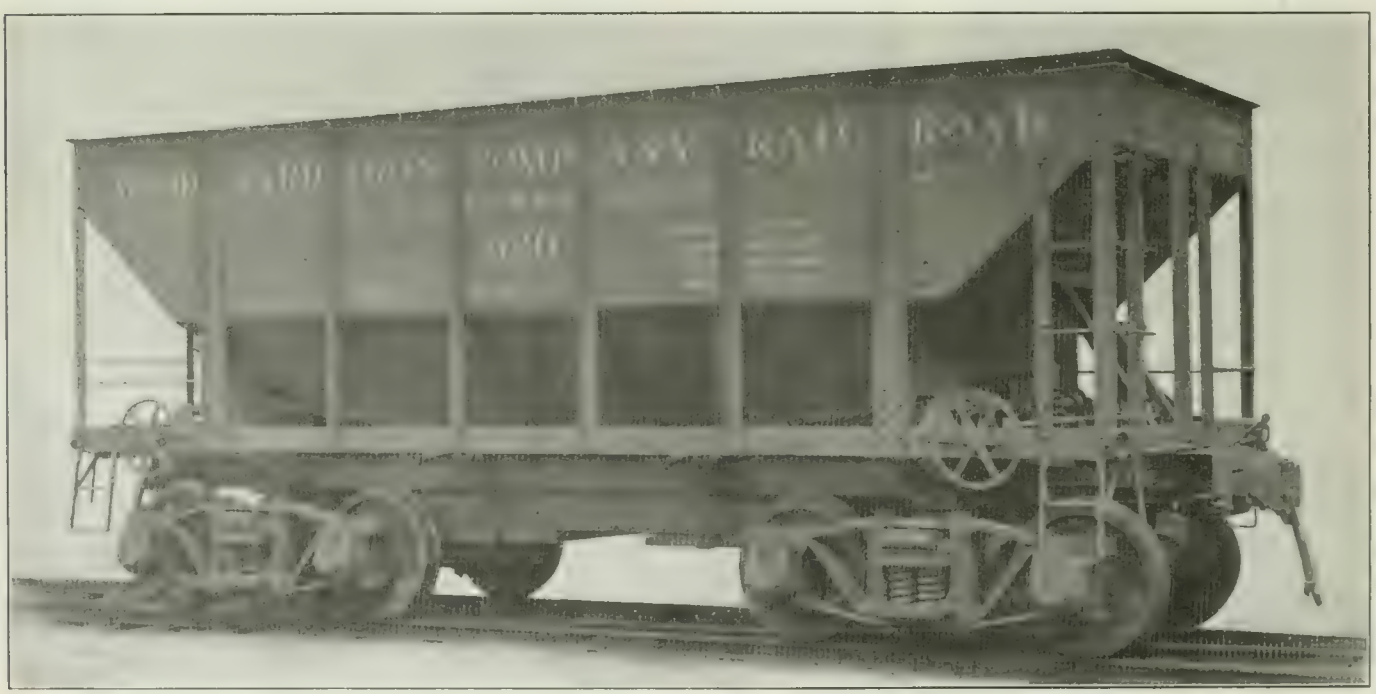
The center sills which extend from bolster to bolster on either side of the door opening, are made of 10-in. bulb angles. The draft sills are made of pressed steel and have the shape of an inverted U. They extend from the end sill back through the bolster web plate and are attached to it by means of a ⅜ in. tie plate on the top and a ½ in. tie plate on the bottom and by 3 in. x 3 in. x 5/16 in. angles on either side. The side sills are made of 6-in. channels and extend from end to end of the car; the end sills are also made of the same size channels and have pressed steel sub-end sills at the coupler opening. The side, end and floor sheets are made of ¼ in. plates substantially reinforced and braced by angles and channels. The corners of the car are additionally braced by means of diagonal braces made of 5-in. channels extending from the bolster and draft sill tie plates to the corner of the car.

The trucks are of the arch bar type with M. C. B. 6 in. x 11 in. axles. They have steel wheels, reliance truck bolsters, pressed steel truss type brake beams, and bearings and stop wedges to suit the latest M. C. B. 6 in. x 11 in. axles. The cars were equipped with the Westinghouse K-D 10-12 air brakes, friction draft gear and 5 in. x 7 in. shank steel couplers with the ordinary release rigging arranged to be operated from either side of the car.

The general dimensions are as follows:

Length inside of body	23 ft. 7 in.
Width inside of body	8 ft. 11½ in.
Width over side stakes	9 ft. 6 in.
Length over end sills	25 ft. 3¼ in.
Height from rail to top of body	10 ft. 3 in.
Distance center to center of trucks	15 ft. 8 in
Length of each door opening in clear	3 ft. 6 in.
Width of each door opening in clear	2 ft. 11¾ in.
Cubic capacity—level	1,105 cu. ft.
Cubic capacity 10 in. average heap	1,275 cu. ft.
Weight of body	18,150 lbs.
Weight of trucks	20,350 lbs.
Total weight of car	38,500 lbs.
Ratio of paying freight to total weight of car when loaded	80 per cent.

Cars of this type have been built for a number of the Western ore carrying roads and have given satisfactory service.



Heavy Ore Car of 140,000 Lbs. Capacity.

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WE have had enough experience in the manufacture of cast steel to be able to tell pretty definitely the kind and quality of metal that is needed for various classes of work, and to be able to draw up rather close and reliable specifications as to chemical and physical properties and the tests to which the metal should be subjected. And this is exactly what was done by the committee on specifications for Freight Car Truck Sides and Bolsters. As to the tests for the complete truck side or bolster, the recommendations are tentative and are offered purely for the purpose of obtaining criticisms for future guidance. Probably the desired result will be obtained. In the case of the truck side the proof load will require a factor of safety of about four and for the bolsters about two, which is undoubtedly enough, though it is probable that very few bolsters will pass through a month's service without being subjected to stresses.

SEVERAL errors occurred in the report of the discussions which took place at Thursday's meeting. This was because of inaccuracies in the stenographer's transcript. Among the worst of these errors was one which credited a motion in connection with the coupler report to C. A. Schroyer, instead of to C. A. Seley. Those who are acquainted with Mr. Seley know that he has felt that the M. C. B. Association had made a serious mistake in making a standard of the top lift for couplers, and has used all his influence to change this standard to include a provision for the operation of the lock from the bottom. The motion to include in the standards the operation of the lock from the bottom as well as from the top should have been credited to Mr. Seley.

HAS the steel passenger car passed beyond the point of interest to an association like that of the Master Car Builders? A casual visitor to the exhibits or a regular attendant at the meetings might be inclined to think so. There is not a steel passenger car, or a major part of one, on exhibition, and the term was hardly heard in either the reports or discussions. Only a few years ago there was an extensive exhibit of steel cars, and the features of design and repair frequently came up at the meetings. That there has been wonderful progress in the development of this class of equipment is admitted, but to assume that all the problems have been solved would be a big mistake. There are now nearly as many different designs of steel passenger cars as there are roads using them. It may be that they are all satisfactory, but it is doubtful if there are not features of some which are better than those on others. Where are these problems to be threshed out if not at the meetings of the Master Car Builders' Association?

IT IS useless to expect results from a car department apprenticeship course if the boys are not paid a journeyman's rate when they are graduated. The average boy, after he has served a four years' apprenticeship in the car department and has received a reasonable amount of attention from his instructors and foremen, where a good apprenticeship system is in effect, should be in position to give better service to the company than the average mechanic who has not had such a training. If so, why not pay him the same rate? We like the attitude of one master car builder who absolutely insists that the graduate apprentices be given this sort of treatment. If a boy is not worth a journeyman's wage at the end of four years of apprenticeship, it is either because he is not suited to the work or the railway has not done its duty in training him. If not adapted for the work he should have been dropped or transferred within a few months of the time he entered the service, to a department for which he was better suited. As far as the railway performing its duty in training the boys is concerned, it must do it, or the shortage of good men in the car department, which was so forcibly commented on at last year's convention, will become still more serious.

IN the convention yesterday C. B. Young, of the Pennsylvania, called attention to the fact that THE DAILY yesterday morning published an editorial entitled "Freight Car Trucks," which discussed the report of the committee on Specifications for Tests of Steel Truck Sides and Bolsters before that report had been presented to the M. C. B. Association. On his motion the matter was referred to the executive committee. We hasten to admit the entire justice of Mr. Young's criticism, and to make apology to the association for the error—for error it was. The editorial in question was intended for publication this morning along with the abstract and the report, and not yesterday morning. It has always been the consistent practice of this paper to keep inviolate the confidence of the mechanical as well as all other associations. We fully recognize the fact that it is not only

the right and even the duty to insist on this course being followed by all publications which they honor by entrusting to them advance copies of their reports, and we give the most explicit assurance that only one of those mistakes which are apt to happen even in the best of regulated newspaper families caused this apparent indiscretion.

DURING the "free for all" discussion that filled the interval before the tellers made their report, several very valuable suggestions were made. Mr. Young advanced the idea of having a committee appointed to rewrite the specifications of the association and bring them to a uniform condition of statement and arrangement. Anyone having to use or refer to these specifications will fully appreciate the importance of this idea. The American Society for Testing Materials has had a committee of this kind at work for some time and it was probably the noticeable effect of its work that led to this suggestion. It is to be hoped the executive committee will appoint such a committee and that it will get at its work promptly. Slower speed of freight trains during protracted and severe winter weather, as suggested by Mr. MacBain, will no doubt have a beneficial result on the extremely large number of loose and lost nuts on truck bolts, slid-flat wheels, broken brake beam hangers, etc. Even with slower speed, conditions are frequently so severe as to make it seem impossible to provide a construction that will successfully stand the test. One member mentioned track where one rail was 11 in. out of surface. Under such conditions, even at the slowest speed, the car and trucks receive very severe punishment. Reference to the "stitch in time" is heard so frequently that it does not have the effect it should have. In spite of its repetition the statement of Mr. Brazier hits at the very heart of most of the trouble and expense of both car and locomotive maintenance. Spend $1.50 when it is needed and prevent the necessity of spending $500 in the very near future.

CAR DEPARTMENT APPRENTICESHIP

THE discussion on Mr. Downing's paper on apprenticeship was a distinct disappointment. This is such a tremendously big subject, and there is so much to be said of a serious nature that it is unfortunate that the meeting developed into a series of reminiscences, mostly related to what happened from 25 to 40 years ago. Everybody knows that the car department is confronted with a serious problem because of the shortage of young men who have a thorough knowledge of the business, and nobody will dispute the fact that conditions have become so changed in the past few years that the matter must be approached by radically different methods from those previously followed. There were men in the convention hall who have gained results in the developing of apprentices along the right lines; it is too bad more of them did not participate in the discussions.

There were two bright spots in the discussion. One was when J. J. Hennessey emphatically said that if the railways hoped to get the right kind of young men into the car department they must not only put them on the same basis as the motive power apprentices, as far as remuneration is concerned, but that they must pay them as well after graduation. The other was when M. K. Barnum said that car department apprentices must have a general training and should be transferred from one class of work to another according to a regular schedule, which they would thoroughly understand before they entered the service. This schedule should cover all the more important parts of the work from the repairing of freight cars to such cabinet work as the skill of the individual apprentice will permit. Mr. Downing is undoubtedly right in believing that the best results can hardly be obtained by having a number of highly specialized apprentice courses in the car department and Mr. Barnum's conclusion is the reasonable one.

What is really needed now is action—and quick action. There has been plenty of talk, almost too much. The suggestions made by Messrs. Hennessey and Barnum are logical and will give results for they have been tried out either in whole or in part and are giving good results.

THE FORTY-SIXTH CONVENTION

"A GOOD record of conservative progress." This is the way in which one of the members summed up the forty-sixth annual convention of the Master Car Builders' Association at its close yesterday. The meetings were largely attended; at times the meeting hall was not nearly large enough. Those in attendance seemed to follow both the reading of the papers and the discussions closely, although the latter were possibly not as lively and spicy as many of them have been in the past. In most cases, however, they were right to the point.

Usually the reports or the discussions of some one or two subjects seem to overtop all of the others. Possibly the two subjects which received the most attention at this convention were those on Overhead Inspection of Box Cars and Car Trucks. One paper which many of the members thought would receive more than its share of the discussion received practically none. This was the coupler report. It was necessarily only a report of progress and represents an enormous amount of work on the part of the committee. The problem of adopting a standard coupler will undoubtedly prove one of the hardest tasks the association has ever set itself to perform and possibly the lack of discussion was largely due to the fact that the members generally felt that the committee in charge and the executive committee were on the right track, and with another year's work on the problem would be in position to determine how the problem might best be solved.

The report on Overhead Inspection of Box Cars was one of three reports made by the same committee. The committee on Rules for Loading Materials which had it in charge was also asked to investigate and report on the Damage to Freight Equipment by Unloading Machines. The report on Overhead Inspection was inspired by a meeting between the executive committee of the Association and a committee of the American Railway Association last December. The members generally were not aware that such a report was to be made, but that they have been giving the matter of defective box cars more or less thought and study was indicated by the way in which they took part in the discussion. No question was raised as to the seriousness of the situation, but there was a difference of opinion as to how it should be remedied. On the one hand some of the members felt that it would be an admission of negligence on their part to admit to the railway managers that the equipment was in the condition it was, but that they should set about to remedy it in their own way. Others believed that the matter should be referred to the American Railway Association in order that the car department heads may receive the proper authority and support to go ahead and put the equipment in first-class condition. It will require large expenditures to do this, but after it is once done, the cars can be maintained in good shape.

Time and time again the matter of poor freight car trucks and the resulting derailments and accidents come up, and it is apparent that this matter must also receive prompt and effective treatment without delay.

It was expected that the report on Car Department Apprenticeship would also be thoroughly discussed and while the discussion did occupy a considerable amount of time it was not, with one or two exceptions, to the point.

On the whole the convention will pass down in history as one of the most successful that has ever been held. The association is awake to the importance of its work and the possibilities that lie before it. The spirit of the convention indicated that the members intend to use their best efforts to bring about a thorough and satisfactory solution of the important problem with which they are confronted.

Announcements.

TO-DAY'S AND SUNDAY'S PROGRAMS.

SATURDAY.

Orchestra Concert, 10.30 A. M.—Entrance Hall, Million Dollar Pier.

Base Ball Parade 2.00 P. M.—Million Dollar Pier to special trolley cars.

Base Ball Game, 3.00 P. M.—East v. West, Pennsylvania Railroad Company's Inlet Park Base Ball Grounds. Free trolley cars for those wearing the official badge.

SUNDAY.

Concert 11.00 A. M.—Marlborough-Blenheim Hotel Orchestra, Leo Sachs, musical director: Largo (*Handel*); Two Intermezzi from the Opera, The Jewels of the Madonna (*Wolf-Ferrari*); Andante Cantibille from the String Quartet (*Tschaikowski*); Serenade (*Drdla*); Suite (*Kate Vannah*); (a) Dawn (b) Sleepy Baby; Fantasie, La Boheme (*Buccini*), Violin Solo; Andante from the Concerto (*Bruch*), Michael Benner; Ave Maria (*Gounod*).

Concert, 8.45 P. M.—Overture, Tannhauser (*Wagner*) Violin Solo; Faust Fantasie (*Wieniwski*), Michael Benner; Fantasie Samson et Delila (*Saint-Saens*), Cello Solo; Tartantalla (*Popper*), Leo Sachs; The Lost Hope (*Gottschalk*), Piano Solo; Polonais (*Liszt*), Henry Gruhler; Hungarian Rhapsody (*Liszt*).

WHERE TO DO YOUR CLEANING.

Exhibitors will please assist the committee in charge by insisting that their janitors clean cuspidors at the ocean end of the pier, not in the aisles or vicinity of the boardwalk.

FOUND.

One large coat button and one brass key. Call at office of Secretary Conway .

CORNELL DINNER.

The seventh annual dinner of Cornell men attending the conventions will be held at the Hotel Chelsea on Saturday evening at 7.30. All Cornell men are requested to leave a note on Mr. Averill's desk in the booth of the RAILWAY AGE GAZETTE, before 3 P. M. stating that they will be present. The dinner will cost $5.00 a plate.

ENROLLMENT.

The booth for the registration of members and guests of the Master Mechanics' Association will be open at 8.00 o'clock tonight. No charge will be made for badges.

MUSICAL ENTERTAINMENT.

A musical entertainment was given on the Million Dollar Pier last night by the La Favorita Quartette, composed of Katherine Rosencranz, Julia Z. Robinson, Henry Hotz and Anthony D. McNichol, and by Ray Goldsmith and William H. Gwinnutt, vocal soloists; Joseph Cervantes, W. Boecklin, xylophonist, and Eugene Engel's orchestra. Following the programme by the regular entertainers William H. Gwinnutt led the crowd in singing "My Old Kentucky Home," "I Want a Girl," "Put On Your Old Gray Bonnet," "Auld Lang Syne," "In the Good Old Summer Time" and "America."

The committee in charge of the entertainment was composed of Leonard J. Hibbard, chairman; H. E. Oesterreich, E. S. Toothe, Thomas Farmer, Jr., William Miller, L. B. Sherman and T. W. Illingworth.

Proceedings.

President Stewart called the meeting to order at 9.45 Firday morning.

CAR SHOP APPRENTICES.

BY I. S. DOWNING, Master Car Builder, L. S. & M. S.

The recruiting of workmen in the car department has not been given the consideration in the past that it should. The apprentice system is a very good plan if we could get the boy to enter the car department, but in order to get the boys to take up car-department work we must be able to show them some inducement, either in mechanics' rates of pay or a line of promotion. There is no real reason why we should not be able to establish rates which would be sufficient to induce the boys to take up car-department work, without filling their heads full of the idea that some day they will be general manager or superintendent of motive power.

The trades we teach the boys are generally not trades that can be applied generally, and for that reason we should classify them railroad trades. The upholsterer trade in car shops consists of upholstering seat backs and cushions and the tieing of a few mattresses. Tufted work is seldom, if ever, done. What can the apprentice do after he has learned this trade in a railway shop? He con only follow upholstering in railway shops; if he goes to furniture factories or any other commercial concern he will have to learn the trade over. The above is also true of the tinners' trade. Railways purchase practically all tinware, and steel cars have eliminated a great deal of the tinners' work.

The painters' trade is taught more thoroughly, but the work is specialized, and I have known men to do nothing but varnish for 10 years. With reference to cabinetmakers—it is my opinion that the steel car will eliminate the cabinetmakers and carpenters entirely. These 2 trades were the most important trades in the car department and required a great many years to learn. With conversion from wood to steel, the work in these departments will be less complicated, the finish and other parts being machine work and will be ready to apply when received in the shop. Very little time will be required to teach the men how to remove and apply the various steel parts. It will necessarily follow that the cabinetmaker and carpenter will be converted into steel-car men.

It must be admitted that the car department has not the technically trained men that other departments have, and that the car-department salaries are not as attractive as the other departments. It must be admitted by car-department heads that the locomotive department requires more men with technical knowledge than the car department. This is true at least so far as shops are concerned, but I will not admit that there is more executive ability required to manage the locomotive department than the car department. The head of the car-department to-day is an operating officer as well as a car builder; he comes in contact with shippers and other railway officials and coöperates with officials in all departments on his own line. This the locomotive man does not do, except with his own line. A narrow-gaged car man can lose more business in one day than the freight department could solicit in a month.

I do not agree with car-department men that the line of promotion for the head of the car-department should be to superintendent of motive power. It is true some car-department men have been promoted to that position and have been successful; however, it was not due to the car-department training. I will also have to disagree with car-department men that the two departments should be separated, the car department being on an equal basis with the head of the locomotive department. There is too much in common with both departments to separate, and they should be under one head. It would be very encouraging to car-department men if they were considered for promotion through the transportation department. There is no reason why a division general foreman or general car inspector would not be able to fill the position of trainmaster and the master car builder as assistant superintendent, and if he knew his line of promotion was in that direction it would not be difficult for him to fit himself for that line of work, as he follows the operation of trains the same as the trainmaster. We need trained men for what we have to do, and the apprenticeship system is as good a recruiting scheme as I could suggest to supply the shop with trained workmen, but with the inducements we have to offer we do not seem to be able to get the boys—they want to go into the locomotive department, and we get what is left.

In view of the facts stated, relative to the different trades, remuneration and the absence of line of promotion higher than

the head of the car department, it is a question, unless some radical changes are made, whether the recruiting of workmen through the apprentice system is superior to the old helper system.

The accompanying illustrations give as an example of the kind of work the car apprentices of the New York Central Lines are given in their course. The paper closes by giving typical examples of the miscellaneous home problems.

The following is an example of these home problems:

1. A load of lumber consists of 1¼-in. boards, 12 in. wide and 16 ft. long, placed edge to edge. How many feet does the load contain if it is 36 in. wide and 30 in. high?

2. A carload of lumber consists of three tiers of 2½-in. planks. The tiers are 12 ft. long, 8 ft. 2 in. wide and 8 ft. 4 in. high. How many feet does the car contain if we deduct 2 in. from the width of each layer for cracks between the edges of the planks?

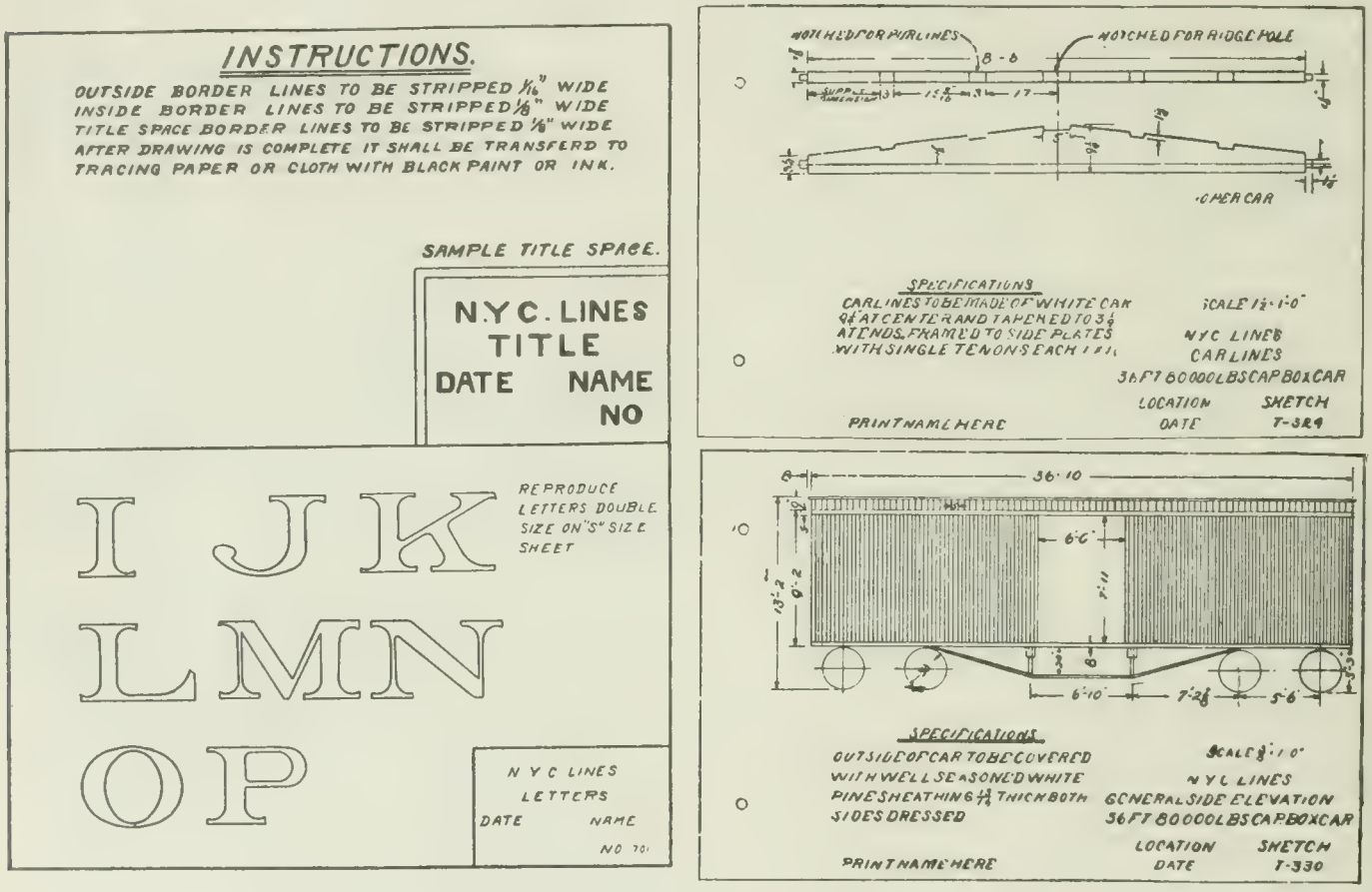
3. A stack of 1¼-in. boards is 16 ft. long, 12 ft. wide and 13 ft. 6 in. high. To allow for seasoning, each layer of boards is separated from the other below and from the ground by 3 pieces, each 1 in. by 6 in. by 12 ft. long (one at either end and one in the middle running crosswise of the stack). It we deduct 3 in. from the width of the stack for cracks between the edges of the board and count in the cross pieces, how many feet does the stack contain? (Make sketch.)

4. How many feet would there be in the stack in Problem 3 if the boards were 1 in. thick and the cross pieces 4 in. instead of 6 in. wide?

5. Find the cost of material for seventy-two tool racks, each requiring the following stock:

1 piece 2 in. by 2 in. by 15 in., white wood at $70 per M.
1 piece ⅝ in. by 4 in. by 15 in., white wood, at $60 per M.
3 flat-head screws, 1¼, No. 7, at 20 cents per gross.

6. How many feet of lumber will be required to floor a platform 16 ft. 4 in. long by 11 ft. 6 in. wide, the lumber to be 1 in. thick and no allowance is made for waste (nearest foot)?



Examples of Work Given to the Apprentices of the New York Central.

DISCUSSION.

F. W. Brazier (N. Y. C. Lines): As a car man 38 years in the service I have got to a point where I suppose they will think I am too old to be good for much, and will be laid on the shelf. In saying this I have no motive in what I am going to say, but say it from the heart. I want to say that anything I say is simply my opinion coming from my heart; but I have a motive, to talk to the young rising men in this convention, representing I don't care whether it is the car department or the motive department. I want to say the car department is the department of the future. The present steam motive power men will be laid on the shelf in 10 years from now, and the car department men will be on top, because the motive power in 10 years from now will be electric; you will have just as much chance of going into the motive department as the steam men have to-day. So that there is a bright future for the car department men.

I wish to say that in my opinion the paper is well written, but there are some things stated in the paper with which I do not agree—I do not agree in the opinions advanced by the writer. First, I do not believe in having the car department under the same heads as the locomotive department I believe in having the car department under the supervision of the general manager. The car department represents the expenditure of more money than the locomotive department does. The road with which I am connected spends more than $12,000 000 annually in the car department against $8,000 000 in the locomotive department. In my opinion there is not care enough given to the selection of men for positions in the car department. The old way of thinking that almost anyone was good enough for the car department has gone by. The man who has charge of the car department is the man who spends the money. Each day a car foreman can either waste more, or save more than his salary, and it was with a great deal of feeling of regret that sometimes when we tried in days gone by to get a man's pay raised from $75 to $90 a month, a man who is annually handling material representing $400,000 to $500 000 a year, that our efforts to secure such an increase in his pay were unsuccessful; whereas, a master mechanic would be paid $200 a month, and have a small number of men under him and only a little to do, compared to the car foreman only to keep his engines running. I have a warm spot in my heart for the locomotive men, and think that many of them have a harder job than the men in the car department. The engine is the important thing in the operation of a railway. I do not believe we can fully appreciate the troubles and trials that the average enginehouse foreman

has to contend with. We know it is a hard job, and I am not saying anything against that.

I do not agree with the writer about the car department apprentices not having as good an opportunity for advancement as the apprentices in the motive power department. In my opinion, the apprentices in the car department have fully as good opportunity for advancement, and in some cases even better opportunity for advancement, as those in the motive power department have. In the car department the apprentices are worked through the different grades; in any well organized system this should be done. It is true that an upholsterer in the car department may upholster seats and car backs, and would not have the ability to go into a high art building and upholster some of the fine decorations, the fine decorations in such a building, but if he has the stuff in him he will get ahead. We all know it is true in the erection of a building the mason puts the foundation in, the carpenters put up the building and the painters paint it, and the plumbers do their part. The work of mechanics is specialized in all the trades of life, whether in the railway or any other trade. We know that the motive power man turns and fits the wheels, but many of them could not adjust a side rod or tell how many tubes there are in a boiler.

I am a motive power man, in a sense. I served my time as an apprentice in a motive power department, but I finally entered the car department, I am proud to say, at 20 cents an hour, and have risen from the ranks to my present position.

In those days they did not select their car department men from the plan from which we have to select such men to-day, but in those days they selected men who had tools and served their time as apprentices. There are men in this room who came up the same as I did, and who learned his trade thoroughly in a car department. I feel that if I can say anything to encourage the younger element here I want to do it.

Furthermore, I feel proud of this badge which I wear as a past-president of this Association, and I thank the members of this organization for having made me eligible to wear it. I am also proud to sit up here in this front seat with these old veterans of the car department.

(Mr. Brazier closed his remarks with a poem of tribute to the Master Car Builder.)

C. A. Schroyer (C. & N.): I am very glad to hear Mr. Brazier make that address, and I think it is to be regretted that there are not more of our American boys that enter our car departments of railways. The work of the car department on railways to-day, because of the skillful manner in which it has been managed by the superintendents of the car departments and car builders, has become more of a specialized work than a general work, and the boy who enters the car department as an apprentice to-day will ordinarily stay on the repairing of trucks or the repairing of platforms or the repairing of roofs, or something else; and unless we take that boy in as an apprentice with the understanding that he is to be given a general knowledge of all the departments of the work we will never be able to educate our boys for future heads of car departments.

It is up to us to go into the high-ways and by-ways to get the boys by offering them inducements to come in. The inducement is not necessarily one of compensation; it is a prospect of what may come later. I know there are brains enough in the car department to-day to get to the upper levels, but when you get a good man in a place, you want to keep him there. But I really think to-day the trouble we have in the car department is due to the class of men we have to employ for that purpose; and the tendency of individual employment for individual jobs. Now, if a man goes to work on piecework, that man wants to do the kind of work that he can receive the most money for.

Another difficulty with our young men to-day, when they start out in life, is that they want to start at the top of the ladder at once. They want the best compensation, and they will take any class of work that will give them that compensation, and they will leave one class of work for another class of work where they can get 10 cents more for their work. Now, I know when I started out as a young boy, I started out at 18 cents a day and worked 10 hours a day. There are not many boys who will do that to-day. I left a position at $2.50 and took one at $1.50 after having served 5 years at cabinet making, during which time I had received not one cent for my labor. After getting $2 a day back in the seventies, I left the car department in which I was employed, and went into the Pennsylvania Company. In those days they would give you a chance, and they saw I had displayed an inclination to learn the work, and I had to, because I had a wife and baby; and I will say I never had a better place.

There is too great a tendency to-day to find out what pay you are going to get before you let them know what you are going to give them. That is one of the great drawbacks to-day; and it is not confined to the car department. It is confined more forcibly to many other departments of the railway; but I think if we will take an intelligent class of young men in the car departments and put them through all the departments and give them a general knowledge, we will have plenty of men to fall back on in our respective departments in the future.

John J. Tatum (B. & O.): I want first to emphasize the remarks of Mr. Brazier, that there is an opportunity in the car department for the young man. I started 33 years ago on the Baltimore & Ohio, and did my part at anything, as the boy says, helping to build grain elevators, helping to build locomotives, and then I went into the car department. The railway companies have made a mistake in placing me in the car department, because I have not been able to do enough for the young men. When you place a young man in the car department, he should be trained along up, so that he knows the value of a man's labor, knows what to expect of him and what he can do. We do not do that to-day, as we have years before. We start a man in the car department who goes along and earns the highest rate of salary that he can from the age he starts in; he starts in as a helper, and as soon as he can qualify himself for the best position, then he advances over the apprentice who starts in with his first, second, third and fourth year. We forget the apprentices very often and take the man who has not had the advantage of four years' apprenticeship. We should give the opportunity to a boy when he starts in with the shop as an apprentice, and do what we can to make him more eligible for a higher position.

H. LaRue (C. R. I. & P.): I want to say a word in regard to the remuneration for apprentices in the car department. I hardly think that the rules for the machinists, boilermakers and others should apply to the car department at the present time, with regards to the piece work system. I think the men, who in the future will be at the head of the car department, will be those men that have proven their ability while working piece work. I think a young man that can start in at the lowest grades of piece work and can demonstrate his ability to keep up his end, shou'd be promoted to the extent of his ability. I believe that is part of the solution of our men for the car department. Of course, you will occasionally find one or more that will not take advantage of these conditions. I have found in the apprentice system in the car department, that after the boy has been there a short time, he wants to quit on account of poor pay.

J. F. DeVoy (C. M. & St. P.): The Chicago, Milwaukee & St. Paul do offer advantages to apprentices in the car department, and it appears to me unless this is carried out along the lines of both departments, there will not be any good come from the final results. For instance, a machinist in the car department must, to a certain extent, in the making of jigs and other things, be just as skillful as the man who fabricates in the steel line. An apprentice in blacksmithing must know far more than the man in the locomotive design, for the season that he must know how and have enough brains to make cut dies that will form different forgings quickly and cheaply. In the upholstering or in the inside trimming of the car we do not take the same amount of apprentices, but we do feel and give the same attention as we do in the other lines; and unless it is followed out, I don't think any good can come from the results to be obtained.

There never will come a time in this world when a car foreman will not be a man on whose shoulders there will rest greater responsibilities than on any man connected with the locomotive department.

I feel that I do know something about cars and that there is today not to exceed 25 good carmen in the United States who know all about it, and that is a matter which is to be very much regretted.

Referring to yesterday's discussion regarding the need of more money for the repairs of cars: We must have the necessary money to keep our equipment in proper order, but you must have men who can impress their superior officers and show them what is to be done.

J. J. Hennessey (C. M. & St. P.): The main question is: Why are we not getting more bright young men in the car department? What is the future for the apprentice? We might as well look the matter directly in the face. Very few carmen today would advise their sons to go in the car department. Why? Not that he considered the car department as inferior to any department in connection with the railway business, but there is not the same amount of money to be earned in the future in a

car department as in some other department. When a young man serves his time in a car department after spending some years as an apprentice, and in gaining knowledge of all the various branches of the department, his pay may be 30 or 32 cents an hour. If he serves his time in the locomotive department he is advanced at once to the position of a full machinist with a full machinist's pay of from 37 to 45 cents an hour. It can hardly be expected that we shall be able to get bright, intelligent young men to go into the car department and serve an apprenticeship in that department when he cannot see as good an opportunity for promotion as he can see in some of the other departments. The thing which must be done by the railway is to offer better inducements to the car apprentices than are offered in the other departments of the railway service, because to become a thorough car man, the apprentice must do a great deal more hard, disagreeable work; he has got to know how to be a car inspector, know how to repair his trucks, and go through the business from A to Z.

It has been my privilege to have had knowledge of the apprentice system for many years, in both the car department, the machinist department and also in the blacksmith shops, etc. I can turn a young man out of the blacksmith department, or the machinist department, after his regular time, having begun at the same time that the apprentice began in the car department, and this apprentice will be capable of going out and commanding a full day's salary. I ask if we would dare to put a young man, after four years' experience in the cabinet makers' trade, inside a sleeping car that costs anywhere from $18,000 to $25,000. There is not a man living who is a thorough car man, who can become a thorough car man in the same length of time that he can become efficient in any of the other departments.

M. K. Barnum (Ill. Cent.): I believe that there is a distinct field for a car department apprentice, but I do not believe that he should be either a cabinet maker's apprentice, a carpenter apprentice, a painter's apprentice, or an apprentice in the mill. I believe the apprentice should start in with the understanding at the start, between him and the management, that he will be given a chance to learn the business of the entire department, and I believe that a schedule should be arranged which he could look over before he starts work, and see what he is going to learn, see what opportunities he will be given, and that schedule should cover everything in the car department, all the more important parts of the work, from that of repairing a freight car truck putting in a brass, packing a box, up to such cabinet work as his skill and ability will enable him to do properly.

I do not agree with the writer of the paper that the cabinet work is going to be short lived in passenger cars. I believe that the ideal passenger car of the future will still have an interior finish of wood. One other suggestion of the writer of the paper appeals to me, and that is that the car department and the locomotive department should not be actually separated. I believe they should all be considered as part of the mechanical department. But I do believe that the organization of the car department should be given more prominence and that the salaries should be better than they have been in the past, and as to salaries, that matter is fast regulating itself, because the salaries have to be paid in order to get competent men. All who have had occasion to select men for the higher positions of car department work know that it is increasingly difficult to find men who are well qualified, as our friends, the supply men, are drawing so strongly on competent car department men and making their offers so attractive that the railways are being deprived of much of the talent that starts in their employ and shows capacity.

I am tempted to criticise one statement that Mr. Brazier made concerning the life of the steam locomotive. However, I do believe that the importance of electricity in the operation of railways is bound to increase rapidly.

Mr. Downing was given a vote of thanks for this paper.

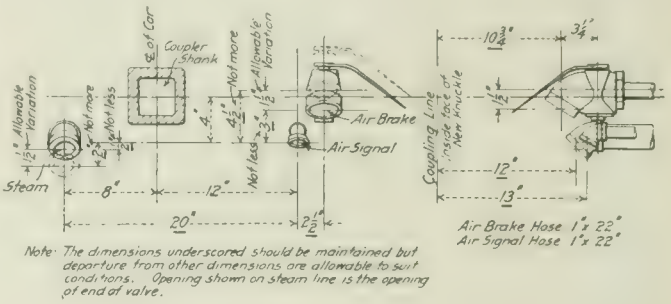
W. C. A. Henry (Penna Lines West): Mr. Crawford is not here this morning and I have been asked to withdraw his name as candidate for the presidency of this association. He is willing to allow his name to stand as a candidate for the vice-presidency.

TRAIN PIPE AND CONNECTIONS FOR STEAM HEAT.

In the 1911 report the committee recommended the following Recommended Practices be advanced to Standards: Two-inch train line; end steam valves, with not less than 1½-in. openings; location of steam, brake and signal pipe, as shown in Fig. 1.

Recommended for adoption as Recommended Practice: Nipple, as shown in Fig. 2; steam hose to be 5-ply, 1½ in inside diameter and 25 in. long; hose clamp, as shown in Fig. 3; each end of hose to be fitted with nipple, as shown in Fig. 2 and coupler to have not less than 1½-in. opening. The horizontal elevation of nipple to opening through coupler is: minimum, 15 deg.; maximum, 20 deg.; coupler to be tapped with 1½-in. pipe thread. Couplers were considered, but no recommendations were made.

The committee sent out a circular of inquiry, under date of August 14, 1911, from which a number of replies were received, and from the data thus sent in and from investigations during



Note: The dimensions underscored should be maintained but departure from other dimensions are allowable to suit conditions. Opening shown on steam line is the opening of end of valve.

Fig. 1—Location of Steam, Brake and Signal Pipes Recommended for Standard.

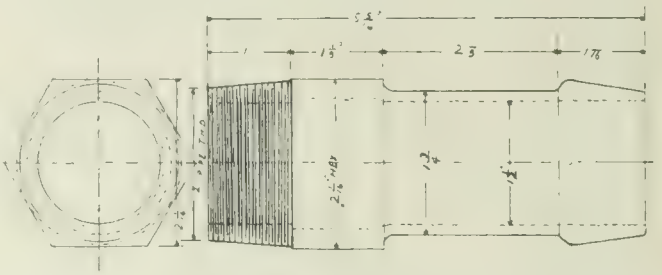


Fig. 2—Train Pipe Nipple Recommended for Standard.

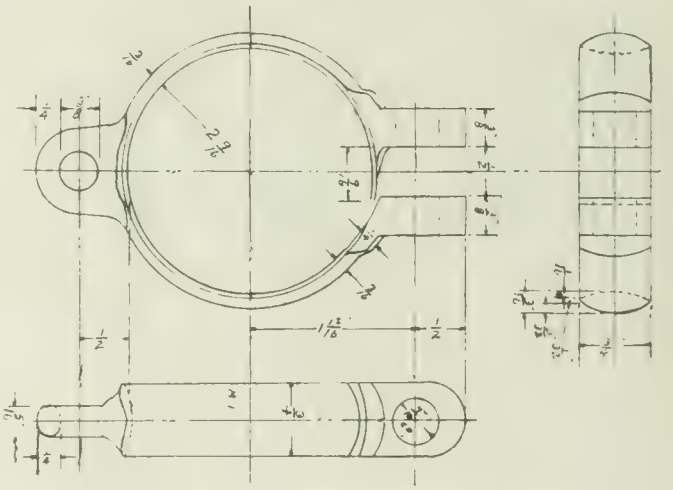


Fig. 3—Hose Clamp Recommended for Standard.

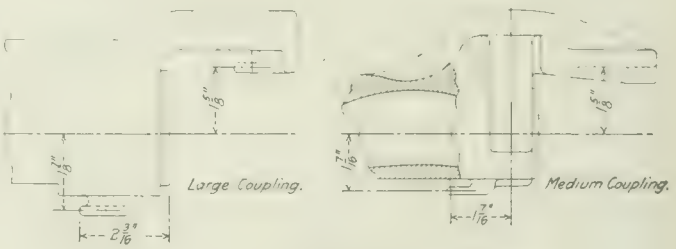


Fig. 4—Large and Medium Hose-Couplers.

the past year, the committee makes the same recommendations, except recommendations for the coupler.

In regard to couplers, the committee finds a large number of roads using the so-called large coupler with 1½-in. full-opening gasket, and equally, if not a larger number, using the medium size with 1⅜-in. full-opening gasket, and a very small number using the small coupler with 1¼-in. full-opening. The latter the committee did not consider, in view of the fact that

the roads using the large size claim they can not operate their long trains successfully with gasket opening less than 1½ in., and the committee being unable to agree on a coupler, two couplers are submitted for the consideration of the Association, which are shown in Fig. 4. The coupler shown as medium coupler with 1⅜-in. can be made to take 1½-in. full-opening gaskets. These couplers are not interchangeable. The question for the Association to decide will be between the heavy coupler with 1½-in. gasket and medium size coupler with 1⅜-in. or 1½-in. full-opening gasket. The committee made service tests of hose to determine the proper angle of the nipple with the opening through the coupler. An equal number of hose manufactured by the same company were fitted up. The angle on half of the couplers was 20 per cent., the other half was 45 per cent. At the end of the test the hose were examined, and there was practically no difference in their condition. While there is no difference in service of the hose by using the larger angle, it is possible to use hose 2 in. shorter, thus effecting quite a saving in hose. Specifications for steam hose have been considered and are submitted herewith. Copies have been submitted to the manufacturers, and their criticisms are also given.

PROPOSED SPECIFICATIONS FOR STEAM-HEAT HOSE.

1. Steam-heat hose must be composed of a tube of rubber, wrapped with 5-ply cotton fabric and the whole covered with rubber.

2. *Tube.* The tube must be hand-made and composed of three calenders of rubber, the middle calender being of a color so much different from the others that the three may be easily distinguished. It must be free from holes, bits of wood, bark, sand and other foreign matter, and from other imperfections. It must be so firmly joined to the fabric that it can not be pulled off without tearing it. It must be free from rubber substitutes.

3. *Fabric.* The fabric must be of duck, made from long-fiber cotton, loosely woven, and weighing not less than 20 ounces per square yard; it must be frictioned on both sides and have, in addition, a distinct layer of rubber on one side, readily visible between the piles when the finished hose is cut open.

4. *Cover.* The cover must be as securely attached to the fabric as is the tube, and be equally free from defects. Both ends of the hose must be covered with caps of rubber, securely vulcanized on in such a manner as to form a continuous member with the tube and cover.

5. *Labels.* Each piece of hose must have securely vulcanized to it a label of white or red rubber, as shown below. The letters and figures must be 1¼ in. high and stand in relief at least 1/32 of an in. Each lot of 200 pieces of hose or less must bear the manufacturer's serial number, beginning with 1 on the first of each year and continuing consecutively until the end of the year. Serial numbers of hose which are rejected must not be used again. With each lot of 200 hose or less, one extra piece must be furnished, free of cost.

6. *Dimensions.*

	Minimum, Inches.	Maximum, Inches.
Length	23½	24½
Inner diameter		
Outer diameter		
Thickness of tube		
Thickness of cover		
Thickness of end caps		

7. *Tests.* The railway company's inspector will select for test one piece at random from each lot of 201 pieces, and will subject it to the following tests:

A. *Friction Test.* A section one inch long will be cut from the hose and supported in such a manner that it will turn freely on its axis. A 25-lb. weight will be suspended from the separated end of the fabric. The latter must unwind uniformly, if at all, and not faster than 8 in. in ten minutes. This test may be made at any point in the strip of fabric.

B. *Stretching Test.* One-inch-wide strips of both tube and cover will be marked at points 2 in. apart and stretched until the marks are 8 in. apart, and immediately released and remarked at 2 in.. The pieces will then be stretched until the second marks are 8 in. apart and held thus for ten minutes, then released, and at the end of ten minutes more the distance between these marks will be measured. This distance must not exceed 2⅛ in. If the strips break or develop holes extending clear through their thickness during this test, they will be considered to have failed.

C. *Tensile Test.* A 1-inch-wide strip cut from the tube will be marked at points 2 in. apart and the width and thickness will be accurately measured. It will then be slowly stretched in a suitable tensile testing machine until it breaks. The ultimate tensile strength must not be less than 500 lbs. per sq in., and the elongation at fracture must not be less than 400 per cent. of the original length.

D. *Steam Test.* The remainder of the sample will be suitably mounted on nipples and will be subjected to dry, saturated steam at 50 lbs. pressure for four days of eight hours each, the steam being shut off over night. The cover must not develop any holes or cracks, and the hose must not leak at any point during this test. At the end of the test period the hose will be allowed to cool for sixteen hours, and the friction, stretching and tensile tests will be repeated. The deterioration thus indicated must not exceed 30 per cent. of the figures obtained from the original sample.

E. *Pressure Test.* If desired by the railway company, the piece remaining from the steaming test may be subjected continuously to dry, saturated steam at 100 lbs. pressure for 200 hours, which it must stand without bursting.

8. If the sample fails to pass the above tests, the lot represented by it will be rejected, and the same serial number must not be applied to any other steam hose during the same calendar year. If the sample passes all of the tests, all pieces represented by it will be accepted if free from injurious mechanical defects.

Rejected hose will be returned at the expense of the manufacturer.

CRITICISMS ON SPECIFICATIONS FROM THE MANUFACTURERS.

2. "I presume the object of requiring a middle calender of different color is to prevent the manufacturer from making the tube on a tube machine. Is there any definite proof that a tube run on a tube machine is not as serviceable as a calendered one? It seems to me that if the tube meets all the tests, that is all that is necessary, and such small points of construction should be left to the manufacturer.



I. S. DOWNING,

Chairman, Committee on Train Pipe and Connections for Steam Heat.

"It is hardly necessary for a tube to be so firmly joined to the friction that it tears when being separated. If this were the case, it would be difficult to obtain a test piece for tests given later in the specifications. An adhesion equal to that called for in the friction test would be sufficient.

4. Comment same as for No. 2.

7. (A) "I would consider a 20-lb. dead-weight test sufficient. A 25-lb. friction increases the cost of the hose, without any particular advantage in service.

(B) "A stretching test is seldom made on steam hose, for the reason that compounds which best resist the action of steam do not take a great stretch or have a small set. I see no advantage but a decided disadvantage in this test to insure good steam-resisting hose.

(C) "It is difficult to obtain an accurate tensile on a straight 1-in. strip. A much more accurate tensile can be obtained on a ½-in. piece cut with a die made for the purpose which is wider at the ends where the piece fits into the jaws of the tensile machine. A low tensile and big elongation will give a soft piece of rubber unfit for resisting steam. Good steam-resisting compounds usually have a tensile higher than 500 lbs. and elongation less than 400 per cent.

(D) "Not enough detail is given in any of the tests given above, leaving too much room for misunderstanding. Much more should be said as to what is meant by 30 per cent. deterioration on the different tests. In the after-steaming friction test

is the deterioration to be figured from the decrease in weight that will pull as much as the 25-lb. weight did before steaming, or will the increased number of inches the 25-lb. weight pulls after steaming be used to figure the deterioration? How would you figure the deterioration on the stretch and set test? Such points should be made clear in the specifications.

"In these specifications, and in most rubber-goods specifications in general, not enough details are given as to the exact method of carrying out the tests. In your own interest, you should eliminate from your testing methods the factor of personal equation and possibility of misunderstanding. Inasmuch as is possible, your specifications should be so worded that there can be no doubt as to how the test is to be carried out and what result is expected or demanded for approval. You should eliminate from specifications things about which there are no data to prove their value—in other words, the test should require no property of the material, the value of which is not known. You should specify physical properties which have a definite bearing upon the quality of the article. The design and use to which the article is to be put should in every case determine the nature and severity of the test. A good factor of safety should be arranged for, but there is absolutely no need for a test four or five times as severe as the article gets in actual service."

RECOMMENDATIONS.

The committee would recommend that the following be submitted to letter ballot for adoption as Standards in the Association:

1. Two-inch train line.
2. End valves with not less than 1½-in. opening.
3. Location of steam, air and signal pipe as shown in Fig. 1.

The committee would recommend that the following be submitted to letter ballot for adoption as recommended Practice of the Association:

1. Nipple, as shown in Fig. 2.
2. Steam hose, five-ply, 1½ in. inside diameter, as shown in last year's report on Print D.

NOTE.—Length to be omitted until the Association has adopted a coupler showing the standard angle.

3. Hose clamp as shown in Fig. 3.
4. Each end of hose to be fitted with nipple as shown in Fig. 2.
5. Specifications for steam hose as noted.

The report is signed by:—C. A. Schroyer (C. & N. W.), chairman; W. C. Arp (Vandalia); J. J. Ewing (C. & O.) and J. S. Downing (L. S. & M. S.).

DISCUSSION.

Mr. Downing: The committee has not been able to agree on the coupler.

H. LaRue (C., R. I. & P.): I think we should send the committee back to consider the matter until they do agree. I would like to ask the reason for the change of the location of the steam pipe from the center line of shank of coupler from 9½ in. to 8 in., also the new location for the air and signal pipes. It seems to have been a change, as near as I can determine, of 1½ in.

Mr. Downing: The old standard showed the distance from the center line of the shank of the coupler. This shows the distance from the center line of the car which is just the same location as was shown on the old standard. The hose is in the same location, and there are a good many straight shank couplers being built, and the coupler being out of center practically all the time, we felt that it would be better to show the center line of the car than the center line of the shank. The hose is the same.

W. E. Dunham (C. & N. W.): I think if you will look at Fig. 1 you will see that the air-brake line ought to be at an angle of 20 deg., the same as in the freight equipment. A great many roads are arranging the air-brake line that way. I think that ought to be changed before it is made standard.

As regards the nipple shown in Fig. 2, I think but a very few roads consider that as a good nipple. There is a great deal of trouble with the nipples pulling out and many roads are using the nipple with a rib around it, on which a two-piece clamp goes over the rib. I do not believe that is a good standard for the association to adopt at this time. The same remarks would apply to the clamp as shown in Fig. 3.

C. D. Young (Penna.): The hose required in the paper has enlarged ends, having a difference in diameter of 3/16 in. It has been our experience that if the manufacturer fabricated hose of a large number of ply over two diameters, a great deal of trouble is experienced in getting good friction, owing to the fact that you have to wind the same fabric over two diameters. I feel that a straight hose is to be preferred to one with enlarged ends. There is no provision made for the manufacturer's serial number on the badge plate which is practically a necessity, if you are purchasing hose under specification, in order to identify the material. Neither do I find on the badge plate the letters "M. C. B." which should certainly be required so that the lines in interchange would know that the hose offered on the car had been purchased under this specification.

Referring to Fig. 3, our experience with the steam hose on long cars is that a large overhang is necessary in using the two-piece clamp, with the lips, so as to hold the heavy hose on the nipple fit. With the heavy couplers which are used, it is almost essential to have a mechanical fit between the nipple and the clamp. Our experience with 5-ply hose has not been entirely satisfactory, and we believe that for high pressure lines, where you are using 120 to 130 lb. of steam, that 6-ply will give very much better service. The increase of one-ply makes little difference in the stiffness or weight of hose and the hose gives much better service under that steam pressure. I believe that the roads which are using a head-end system and are coupling up for turbo-generators with 5-ply hose will have considerable trouble from burst hose with even fairly new hose.

In paragraph 3 of the specifications, it requires that the duck shall be 20 ounces to the square yard. I would like to ask how the committee expect to measure it. The hose is offered as a finished product, and the rubber is imbedded in and attached to the duck, and I do not quite see how the committee will weigh the duck with the calendar attached to it. It seems to me it is very desirable to have in the specifications the duck required, and it should be so stated that we can measure just what is being furnished. I would suggest that the committee standardize the duck required, as at the present time the manufacturers seem to have no standard for 20-oz. material. I have some figures here from five manufacturers of hose. Manufacturer *A* uses 15 x 27 strands per inch, 5 x 3 threads per strand; manufacturer *B* uses 19 x 26 strands per inch, and 5 x 3 threads per strand; manufacturer *C* uses 18 x 26 strands per inch, and 5 x 3 threads per strand; manufacturer *D* uses 24 x 28 strands per inch, and 4 x 3 threads per strand; and manufacturer *E* uses 21 x 22 strands per inch, and 7 x 7 threads per strand.

In making tensile test of these different ducks, there is quite a variation, and I have the figures there of the strengths but it is not necessary to read them. I will say there is considerable variation, and it seems to me, in preference to the simple language which is contained in the specification, *i. e.*, "fabric must be of duck made from long-fiber cotton, loosely woven, and weighing not less than 20 ounces per square yard," that this paragraph should be reconstructed to give the strands per inch, the threads per strand, and the load on the section, so many inches in width for the warp and so many inches for the filler, and in this way it can be determined from the hose which has been offered just what duck has been furnished.

Referring to paragraph 7-A, the friction test: If the section for the friction test is taken where the large end comes down to the small diameter, that is permitted under this paragraph, it will be impossible to meet hardly any friction test at all, as the calendar will have no strength at the place where the duck is stretched over two diameters. I do not believe there is any steam hose made to-day that will pass this specification if the sample was selected at that point.

In section *B* relating to the stretching test, I am inclined to think from our experience that the 8-in. stretch will give too soft a tube which will be undesirable for steam hose. It is absolutely necessary in order to get a high temperature hose to have a high amount of mineral matter in the mixture of the tube, and where a high amount of mineral matter is used, it is necessary to have a more lenient stretching test, and I suggest that this section be looked into further, and that the committee recommend that a 6-in. stretching test be used instead of the 8-in. stretching test. The permanent set required of 1/8 in. for 10 minutes, applies equally to these remarks, as to the length of the stretch. If a highly mineralized filler is used, it is desirable for steam heat work, that the permanent set shall naturally be lower, and it seems to me that the permanent set should be taken out of this paragraph.

The tensile test, paragraph 7-C, calls for a test piece 1-in. wide. I believe it to be fair both to the manufacturer and consumer that it is desirable to have enlarged ends on the test piece and to recommend the test piece which is generally used by laboratories in making this test, one-half inch, and enlarged ends of an inch. 200 per cent. elongation is required under this paragraph, which, for the same reasons stated under paragraph 7-B, I believe to be too high, and it should be reduced to get a good steam hose. It is very necessary in water or air-brake hose, to have a long elongation, but in steam hose service I believe the lower elongation will make better material.

In paragraph 7-D, under the steam test, after the hose has been put into the digester, as required, it is provided that deterioration shall not exceed 30 per cent. I would like to ask the committee how, under paragraph 7-A, friction test, this 30 per cent. deterioration is to be measured. In this paragraph it is required that a 25 lb. weight will be used, and that the hose shall not unwind faster than 8 in. in 10 minutes. You have three factors there which should be considered in deterioration. Does the committee mean to take 30 per cent. for the weight, 30 per cent. for the distance and 30 per cent. for the time, or only one of these requirements, and if so, which one?

Under the pressure test, paragraph 7-E, I believe that under specification requirements as to duck and friction that the 200-hour, 100-lb. pressure could be very easily increased to 300, and very satisfactorily pass the test, I would recommend that this be increased.

In view of the fact that I have made so many objections, I would recommend that this be referred back to the committee for further consideration.

I. S. Downing (L. S. & M. S.): We are obliged to Mr. Young. There was a Pennsylvania Railroad representative on the committee. Unfortunately he did not attend any of the meetings. It would be useless for any of us to try to argue with Mr. Young in regard to this specification, as we are not expert in that line, and for that reason I will not attempt to answer him or to defend the report any more than to say that we had an expert from one of the leading manufacturers, and also an expert chemist, and the Pennsylvania Specifications for them to work with, and that is the result of their work. Unfortunately there are none of the experts present. It would be a very good idea, I believe, if this report was referred back to the committee, and I know that the other members of the committee would be very pleased to have Mr. Young a member of this committee. None of the manufacturers would write us a specification. We feel that if this matter was started right, it would bring the manufacturers in line and get them to either approve or make objections to these specifications, and in that way we could make progress.

Mr. LaRue: I would emphasize Mr. Dunham's remarks in regard to the angle of the angle-cock. I see no valid reason why there should be any change made. We cannot locate the pipes so that we can get the same angle on our passenger car drawings as is shown in the freight car drawings, and I believe it is just as necessary on the passenger cars as on freight cars.

C. A. Schroyer (C. & N. W.): I want to say, as regards that, that we can show the angle of these cut-out cocks at any degree it makes no difference, because they must be made to meet requirements. When you locate the cocks and couple the cars together, and find the hose is chafing against each other, what will you do? You will turn the angle so that they will clear each other.

As regards the specifications for the hose, we cannot get very much worse hose than we are getting to-day. You all know the trouble you are having. The hose could not be made very much worse, but don't you think it would be a good idea to make a move to adopt some standard methods, and then improve on these methods, and not let the matter go on year after year without any action as we have been doing. We have been trying for 3 years to get a report on this subject of hose. Let us do something now. Let us begin to work from the specifications we have presented, using this specification as a basis on which to make improvements and to frame other specifications in the future. As regards the 20-oz. duck, we have always bought duck and indicated the weight of the duck by the ounce, not by the number of threads, or the size of the mesh, or anything of that kind. If we specify 20-oz. duck, the manufacturers will use 20-oz. duck.

Mr. Young: I wanted to say that I omitted to preface my remarks about the specification by saying that I feel the material which is specified in these requirements would probably make very satisfactory steam heat hose. I thoroughly believe the committee has prepared specification which will give better material than the average railway is getting today for steam heat purposes, but I brought up these points to illustrate the testing under the specifications would be a difficult matter as the laboratory must have certain information in order to know that the material is in accordance with the specification and certain details of information must be furnished. The omission of these details makes it very difficult for them to do the work. I agree with Mr. Schroyer that it would be a good thing to let this report go to letter ballot for recommended practice if the committee will take up these details which I have cited in reference to specifications next year, with a view of bringing the subject up again at the next convention. I think it is very desirable to have something for the railways to purchase under, which we do not have at the present time, particularly in regard to the steam heat hose.

F. F. Gaines (C. of Ga.): I agree with Mr. Schroyer that we cannot possibly have anything worse than what we are getting now, and there is a chance of getting a little better hose if we have a specification, and if it is in order I move that we adopt the specification as recommended practice and the committee continued to revise the specification next year.

The President: Will Mr. Young accept that as an amendment?

Mr. Young: Yes.

S. B. Andrews (S. A. L.): I would call attention to the specification for the label, paragraph No. 5, where it says: "The letters and figures must be ¼ in. high and stand in relief at least 1/32 in." That does not seem to be clearly understood by the manufacturers and in place of the word "stand" I suggest we use the word "raised," and that they be at least 1/32 in. above the plane of the badge, the portion of the sentence to read "and raised in relief at least 1/32 of an inch."

TANK CARS.

The tank car committee herewith submits a revision of the existing tank car specifications.

This revision was primarily brought about by the growth in shipments of products which were not handled in tank cars at the time when the original specifications were drawn. It has been considered advisable to also rearrange the order of the paragraphs of the specifications, so as to make it more logical.

Since the original specifications were drawn the great increase in the shipments of naphthas has been a very marked feature of the tank-car business; and within the last 4 or 5 years a new product, known under various names, but principally as "casing head naphtha," has been developed and is now offered for shipment in tank cars.

This product is obtained through the compression, cooling and subsequent expansion of natural gas, which yields a very volatile product, of undoubted value, but also presenting special problems when handled in tank cars. A description of the product will be found under the head of "Liquefied Petroleum Gas," on page 35 of the report of the chief inspector of the Bureau for the Safe Transportation of Explosives and Other Dangerous Articles, February, 1912; also in Technical Paper No. 10, Bureau of Mines, Department of the Interior, entitled "Liquefied Products from Natural Gas," and therefore it need not be further described here.

The raw product, especially that from certain of the gas fields, is entirely too volatile to be shipped, and consequently it is subjected to a partial evaporation, known as "weathering." The resultant liquid, after the evaporation of some of the lighter products, is what is offered for transportation.

This natural gasoline showed a sudden mounting in pressure when the tank was exposed to the flame, the gas catching fire and burning above the safety valve. Generally, it will be noted that the time interval from the lighting of the fire to the initial blowing of the safety valve was very much less with the natural gasoline used than with the refinery gasoline.

When the original specifications were drawn none of the products which were shipped in tank cars showed high vapor tension at the ordinary temperature of transportation, and the setting of the safety valves at 8 lbs. was considered ample to prevent the escape of the liquid in a gaseous form, and at the same time it was shown that it relieved the cars of any dangerous pressure, even in the event of a fierce fire.

The new products have developed a very much higher vapor tension at ordinary temperatures, and the Interstate Commerce Commission has provided for the transportation of such products by a rule reading:

GROUP 2—INFLAMMABLE LIQUIDS.

"RULE 1824. All inflammable liquids in this group must be shipped in . . . . . , or in tank cars, provided the vapor tension of the inflammable liquid corresponding to a temperature of 100 deg. F. (90 deg. F. November 1 to March 1) does not exceed 10 lbs. per sq. in.

"Liquefied petroleum gas is a condensate from the 'casing head gas' of petroleum oil wells, whose vapor tension at 100 deg. F. (90 deg. F. November 1 to March 1) exceeds 10 lbs. per sq. in. Liquefied petroleum gas must be shipped in . . . . , or in tank cars especially constructed and approved for this service by the Master Car Builders' Association. When the vapor pressure at 100 deg. F. exceeds 25 lbs. per sq. in., cylinders, as prescribed for compressed gases, must be used."

The producers of this product petitioned for a safety-valve setting of 25 lbs., complaining of the excessive losses of the product when shipped in the ordinary tank cars.

Before agreeing to any change in existing tank cars, the tank car committee felt that it was necessary to determine whether the safety valves as prescribed for the ordinary product were adequate to relieve tanks of the usual capacity when loaded with the new product.

It was decided that for this purpose a tank of greatly re-

duced capacity should be used, equipped with safety valves of reduced size, but of the same type as those used on the standard tank cars, and of a capacity as nearly as possible proportioned to the experimental tank.

The American Welding Company, Carbondale, Pa., offered to prepare a welded tank, similar in form to that of the cars, the shell, ends, and dome being all welded, the only cost to the association to be that of the steel plate used, the tank to be returned to the makers after the test. This tank was shipped to Follansbee, West Virginia, mounted on brick piers, and provision made for a gasoline fire underneath, very much as was done at Lima when the original specifications were framed.

Three safety valves, of which one was as nearly as possible of an estimated capacity comparative with that of the standard safety valve on the 6,000-gallon tank, one of an estimated capacity 25 per cent. less, and a third having a capacity of 25 per cent. greater, were prepared and furnished by the Crane Company, free of cost. The first two of these valves were those used in the tests.

The plan was to make fire tests with the same grade of oil that was used at Lima, and then with the new product from the gas wells, with the hope that the resulting pressures from the new product would be near enough to those developed by the refinery product to obviate the necessity for any modification in the requirements for safety valves, and to avoid the necessity of tests with full-size tanks.

The Atlantic Refining Company agreed to duplicate the material used in the original tests, record of which was in existence, and furnished without cost to the association 1,600 gallons of gasoline, 66-deg. Baumé gravity, which was prepared as a close cut—in other words, the gravity was that of a fairly homogeneous liquid, rather than a blend of high and low values. This was very desirable, so as to maintain the gravity of the liquid fairly constant during the tests. This liquid will be alluded to hereafter as "refinery gasoline."

The condensed or casing head naphtha was obtained from the wells immediately around Follansbee, and varied both in gravity and vapor tension, as will be noted in the record of the tests.

Seven tests were made, viz.:

No. 1, refinery gasoline, No. 2 (normal) safety valve, 12-lb. setting.

No. 2, casing head naphtha, same value as No. 1, same setting.

No. 3, casing head naphtha, No. 1 (25 per cent. less) safety valve, 12-lb. setting.

No. 4, casing head naphtha, No. 2 safety valve, 20-lb. setting.

No. 5, refinery gasoline, No. 2 valve, 20-lb. setting.

No 6, refinery gasoline, No. 1 safety valve. 12-lb. setting

No. 7, refinery gasoline, No. 2 safety valve, 12-lb. setting. This was a repetition of Test No. 1, in which the burners were not working well, and the heat was not, consequently, as great as in the subsequent tests.

From the results obtained the committee believes that the present standard M. C. B. size of safety valve will fully meet the requirements and properly relieve the pressure when transporting gasoline of a gage as high as 88 deg. Baumé. This in view of the fact that the fires employed during the tests were probably more severe than those to which tanks would be exposed during fires resulting from accidents.

From the vapor tensions shown it was evident that casing head naphtha can not be even normally handled in the present tank cars with valves set at 8 lbs., and that even with the 12-lb. setting there would probably be a loss of liquid through evaporation.

While the present type of tank car would better suit this business with all valves set at 12 lbs. than with the present setting, where at least one valve is set at 8 lbs.; nevertheless it is evident that for the economical handling of this particular grade of gasoline a higher setting is desirable.

The committee feels, however, that rather than to allow the setting down of the valves on the existing tank cars, which aggregate between 35,000 and 40,000 in number, it is better to provide a special car for this particular product, and in doing so to provide for a setting of 20 lbs.

It is believed that the total equipment necessary to handle this entire business would be less than one per cent. of the total tank-car equipment of the country.

While it is perfectly practicable to provide tanks which would be safe with very much higher pressures than 20 lbs., it is felt that it would be undesirable to do so, for the reason that in case of any injury to the tank in the course of transportation, the higher pressures would involve greater dangers in the handling of the cars, and therefore, for the present at any rate, the committee does not recommend any higher setting.

It is evident that any means which will retard the admission of heat to tank cars carrying such materials as casing head naphtha will probably prevent the attainment of the high temperatures which would be reached through the exposure of the naked tank to the summer sun. To determine this a final test was made at Altoona.

The same tank was employed, being lagged with 2 in. of magnesia lagging, protected by a sheet-iron jacket. This tank was mounted again as at Follansbee, and filled with casing head naphtha having a gravity of approximately 87 deg. Baumé at 60 deg. F. The valve used was No. 2, with 20-lb. setting. The fire was obtained by small wood and kerosene.

In this test over two hours elapsed between lighting the fire and the appearance of any flame at the safety valve, notwithstanding the fact that about a half cord of wood and 10 barrels of kerosene were used to maintain the heat under the tank during the test, which lasted about 4 hours.

The results of this test show that whereas with the naked tank the safety valve opened in about 2 minutes after the lighting of the fire, with the lagged tank it required 2 hours and 22 minutes; and that whereas with the naked tank the outage per minute amounted to as much as 114.6 lbs., with the lagged tank this was reduced to a little over 6.6 lbs., and it is probable that had the fire not been so severe as to burn through the sheet-iron jacket, causing part of the magnesia lagging to fall down, the outage would have been considerably less.

This leads to the conclusion that the high vapor tension naphthas should preferably be handled in special cars and that these cars should be lagged to reduce the absorption of heat; under which condition it is most probable that a vapor tension sufficient to raise the safety valve would never be reached.

The attention of the committee has also been called to the question of handling liquefied chlorine gas in tank cars.

This material is used for the removal of the tin from tin scrap.

The number of tank cars in use for this purpose is small, and at the time attention was called to the matter they were not equipped with any safety valves or relief of any kind.

The tanks are welded, and completely lagged, and the shippers, who are also the consignees, objected to the regular safety valve, owing to the fact that the liquid evaporates very sluggishly, that it is exceedingly objectionable when liberated, and that the gas is non-corrosive while dry, but very corrosive in the presence of water.

Various forms of safety valves have been submitted by the shippers, but have been respected by the committee, for the reason that the setting of the valve could be controlled by a handle, so as to shut it off from action as a safety valve. The owners have agreed, however, to provide a combination of safety valve and fusible plug which will insure tightness.

To settle the question of whether the tank would be relieved before it could reasonably be expected that the fusible metal would start, a test was made at the works of the Goldschmidt Detinning Company, Chrome, New Jersey, with a small-size tank.

The tank was 19 in. diameter inside, 6 ft. 8½ in. long over all, with spherical heads, 19 in. radius; made of ¾-in. steel; all seams welded. It had a dome 12 in. diameter inside, 9½ in. high above sheel of tank, made of cast steel, 1 in. thick, with cover of cast steel secured by bolts. The tank was designed for a working pressure of 300 lbs., and tested to 400 lbs. per sq. in. It was insulated by lagging with two 1½ in. layers of asbestos sponge felt and one 2 in. layer of vitribestos, covered with a sheet-iron jacket, the lagging being carried over sides, ends and dome.

The tank was filled to within a short distance of the top with 1,050 lbs. of liquid chlorine, the gages showing a pressure of 42 lbs. per sq. in., and an atmospheric temperature of 44 deg. F. when the fire was lighted.

The log of the test shows that though exposed to a fire which was certainly as fierce as any which could be expected in a wreck, the exposure of 3 hours and 26 minutes raised the pressure to but 150 lbs., and the temperature to but 140 deg. F.

The tendency with a full-size tank car would be to still further reduce the rate of pressure rise, owing to the fact that the cubic contents increase as the cube of the dimensions, whereas the heating surface increases but as the square of the dimensions.

The committee feels that from the results shown, the probability of reaching a bursting pressure during the duration of an ordinary fire would be remote. Nevertheless, a combined

safety valve and fusible plug, which the users of these cars are perfectly willing to apply, will be called for.

It is probable that from time to time other products, such as compressed oil gases, transported for buoy lighting, compressed oxygen gas for acetylene welding, etc., will be cared for, and it is recommended that it be required that such questions be submitted to the association with the designs proposed for special cars, for these purposes, for the consideration of the proper committee and the approval of the association.

SAFETY VALVES.

The standard safety valves have proved entirely reliable for relieving the pressure where tank cars carrying inflammable products have been exposed to accidental fire. The port or ports of the valve, which are directed downward toward the tank, should be closed, however, to prevent the injury of the tank by the burning gas thus directed upon it.

A safety valve has been submitted to the committee as an alternative for the standard safety valve. The changes are in the form of the seat, to facilitate grinding and to provide a better escape for water which may lodge on top of the valve, it having been complained that in some cases the ordinary form of valve does not have sufficient depth to accommodate the water and cinders which lodge, and that these cinders cause corrosion. Another change is in the form of the lip, which is more flaring, to give a freer discharge of the gas when the valve opens. The form of the valve and stem has also been changed, the stem being free from the valve, so as to prevent any possibility of cocking the spring cage. Still another change is in the form of the top of the eye on top of the valve, which is flattened and provided with a hole, so that the valve may be rotated on its seat, as well as lifted, using a plain pointed fid.

A test of these valves was made, using an empty tank car with a large steam connection, and both the modified valve and the standard valve. All of the valves were found to work very well—popping freely, the pressure dropping ½ lb. before the valve seated. The form of the discharge of the valve was very satisfactory, and your committee is prepared to accept this valve should the designers wish to use it.

The test indicated that the holes in the bottom of the cinder cavity, especially where pointed downward, are objectionable, as during the time the valve is open gas is discharged downward, and in the case of the test at Follansbee it provided a gas flame of a high temperature, which, impinging on the tank, was evidently injurious.

In the proposed alternative valve but one port is provided, and this is turned so as to throw the flame horizontally as far as possible away from the tank.

As regards the setting of the safety valves on existing tanks, the only question is one of expense.

It is claimed that a very large part of the tank car equipment now equipped with safety valves is carrying products having a flash point higher than 80 deg. F., and that with such a product the vapor tension never reaches the eight pounds to which the tank valves are now set.

In the shipment of naphthas, however, especially those of light gravity, there is a probability that the vapor tension, under summer conditions, may exceed 8 lbs., and since the wording of the I. C. C. rule provides for the shipment of products having a vapor tension of not over 10 lbs., it is evidently desirable that safety valves carrying such products shall not allow the leakage of any product which comes within the terms of the requirements, and, consequently, the committee recommends that all new cars and all existing cars which are in the business of carrying naphthas shall have safety valves set at 12 lbs. pressure. Also, that all new valves, and all valves which have to be reset to a pressure of 12 lbs., which in time will result in all valves, except those on special cars, being set at this pressure, and will allow existing cars to handle casing head naphthas which have been weathered so as to show not more than 10 lbs. pressure at 100 deg. F.

The committee believes, however, that the higher safety valve setting of 20 lbs. should be restricted to the special cars assigned to the casing head naphtha business, rather than to require existing cars to be changed to accommodate this particular traffic.

DISCHARGE VALVES.

Complaints have reached the committee which show the necessity for improvement in the construction of the discharge valves on a great part of the existing tank cars. In some cases the valves are attached to the bottom of a nipple extending downwards from the tank, so that in the event of a serious shifting of the tank in the frame or any derailment the nipple is exposed to breakage, with consequent escape of the tank contents.

The committee believes that the better plan would be to have the valve entirely within the body of the tank, the outside extension being merely for the purpose of making connection to the discharge piping, and that the valve should be so placed that, in the event of the breakage of the extension, the valve itself would not be unseated.

Plans have been proposed to dispense with the bottom discharge valve, the scheme in brief consisting of a pipe through the upper part of the tank, reaching downward almost to the bottom into a pocket secured to the bottom, the discharge of the tank being effected by means of compressed air, as now common practice with cars carrying acids. The committee believes that this will be a satisfactory arrangement, and recommends making it optional with car owners.

WELDED TANKS.

The construction of the experimental tank used in the tests at Follansbee and Altoona, which was welded without seams, and which after 8 fire tests does not show any injurious effects from the fires, and has never shown any indication of leakage, indicates that it is possible by this process to make very desirable tanks from the tightness standpoint. The committee believes that this is a very desirable form of tank, due to the absolute tightness which results from the absence of seams, and that tanks of this form should be accepted as an option, but the committee is not prepared to require this form of construction. It does recognize the fact, however, that absolute tightness, particularly when hauling inflammables which are normally under pressure, is a very desirable feature.

The committee feels that the time has come when the safety valves on tank cars should be periodically tested, and the test pressure and date stenciled on the valve, and in order that this may be carried out, it recommends that the absence of the test within the prescribed period and of the stenciling shall be considered an owner's defect.

The report is signed by:—A. W. Gibbs (Penn.), chairman; C. E. Chambers (C. of N. J.), S. K. Dickerson (L. S. & M. S.), E. J. Searles (B. & O.), J. W. Fogg (B. & O.), Wm. Schlafge (Erie) and Thos. Beaghen, Jr. (Union Tank Line).

The following appendix contains the specifications for tank cars.

DEFINITIONS.

Tank Car. Any car to which one or more tanks, used for carrying liquids or compressed gases, are permanently attached.

Tank cars shall be divided into two classes: Ordinary and special.

Ordinary Tank Car. One used for the transportation of products, the vapor pressure of which, at a temperature of 100 deg. F., does not exceed 10 lbs. per sq. in.

Special Tank Car. One used for the transportation of products, the vapor pressure of which, at a temperature of 100 deg. F., may exceed 10 lbs. per sq. in.

GENERAL REQUIREMENTS.

(a) Tank cars offered for movement over the lines of a railway must conform to the following specification.

(b) Tanks which bear evidence of damage by fire must be withdrawn from transportation service.

ORDINARY TANK CARS, OTHER THAN WOODEN UNDERFRAME CARS.

1. No tank cars built hereafter shall be accepted for transportation unless equipped with steel underframing or with reinforced shell. The design and construction of the car throughout must be at least as strong as the following detailed specifications.

2. Steel or iron tanks constructed subsequent to 1903 must be designed for a bursting pressure of not less than 240 lbs. per sq. in.

3. When riveted, all longitudinal and head seams must be double-riveted. Where head blocks are not used, head seams need not be double-riveted.

4. Dome heads and covers must be made of either cast or pressed steel, or of malleable iron. The joint of the dome cap must be made tight against vapor pressure, and when necessary to insure this a satisfactory gasket must be used.

5. Tanks must be carefully inspected and tested with cold-water pressure at least once in 10 years. The test for tanks built prior to 1903 shall be at 40 lbs. per sq. in., and for tanks built since that date at 60 lbs. per sq. in., cold-water pressure, which they must stand without leak or evidence of distress. This inspection and test must be made by the tank-car owners. Tanks when tested must be stenciled with date and place where test was made, and by whom, as follows:

Tested (date) .....
Pressure (pounds per square inch).....
At (place) .....
*By (name of firm).....

6. By January 1, 1914, all tanks carrying products that give off volatile inflammable vapors at or below a tempera-

ture of 80 deg. F., and having a vapor pressure of 10 lbs. per sq. in. at a temperature of 100 deg. F., shall be equipped with 5-in. safety valves of approved design, and these valves shall be set to open at a pressure of 12 lbs. per sq. in.

Provided, that where the lading is such as not to give off inflammable vapors (as determined by flash point from Tagliabue's open-cup tester as used for test of burning oils) at a temperature below 80 deg. F., the setting of the 8-lb. valves to 12 lb. may be deferred to such time as the valves require removal.

All required pressures for safety valves are subject to a tolerance of 1 lb. above or below that specified. One valve shall be provided for a capacity of 6,500 gal. or less, and 2 valves for a capacity of more than 6,500 gal.

Where tanks carrying such products are divided into compartments, each compartment must be provided with a safety valve.

7. All safety valves must be tested and adjusted, if necessary, by January 1, 1914, and at intervals of not over 2 years thereafter, and the date of the last test and pressure at which valve is set shall be plainly stenciled on the body of the valve, as follows:

Tested (date) .....
Pressure (pounds per square inch).....
At (place) .....
By (name of firm).....

The test may be made without the removal of the valve from the car, provided the valve unseats at a total pressure corresponding with the area of the seat multiplied by the required pressure. Valves improperly set, or not tested and stenciled at proper intervals, shall constitute defects for which owner shall be responsible.

8. Tank cars carrying volatile non-inflammable products whose vapor pressure at a temperature of 100 deg. F. does not exceed 10 lbs. per sq. in., may be provided with vents depending on frangible lead disks for safety, which vents shall be of approved design or the disks to be of a thickness that shall insure rupture at a pressure not higher than 25 lbs. per sq. in.

9. Tank cars carrying non-inflammable or non-volatile material, such as sulphuric acid, vinegar, linseed oil, cottonseed oil, lard oil, fish oil, tannery products, glucose, molasses, calcium chlorid, caustic soda, silicate of soda, etc., need not be provided with 5-in. safety valves, but each tank must have a small open vent or valve, equal to not less than 2 in. in diameter.

If, for any reason, splashing of the liquid or contamination by moisture is to be avoided, a 2-in. vent with frangible lead disk, of a thickness which will insure rupture at a pressure not higher than 20 lbs., should be used in place of the 2-in. open vent.

10. The center-sill construction of the underframe between bolsters must have an effective cross-sectioned area of at least 30 sq. in.

11. Each car must be equipped with steel body and truck bolsters, steel couplers, and a draft gear of approved design, having a capacity of at least 60,000 lbs.

12. Particular attention must be given to the longitudinal anchorage of the tanks, which must be thoroughly substantial, to prevent injurious end-shifting. The preferable method of securing tank against end-shifting is by anchoring the tank to the underframe at or between bolsters, rather than by means of head blocks, inasmuch as the latter method results in damage to underframe forward of body bolster.

MINIMUM REQUIREMENTS FOR LONGITUDINAL ANCHORAGE.

Tank connection:

Shearing area of rivets 25 sq. in. } For tanks of 8,500 gal-
Bearing area of rivets, 20 sq. in. } lons capacity or over.
Shearing area of rivets 18 sq. in. } For tanks of less than
Bearing area of rivets, 14 sq. in. } 8,500 gallons capacity.

Frame connection:

Shearing area of rivets, 12½ sq. in } For tanks of 8,500 gal-
Bearing area of rivets, 10 sq. in. } lons capacity or over.
Shearing area of rivets 9 sq. in. } For tanks of less than
Bearing area of rivets, 7 sq. in. } 8,500 gallons capacity.

13. Tanks must be secured from turning on the underframes either by means of an anchorage or by dome yokes, and must also be secured to underframe by means of tank straps, two for tanks not more than 76 in. in diameter, and four for tanks of greater diameter, or their equivalent.

The sectional area of dome yokes and tank bands must at no place be less than ¾ of a sq. in. or 1-in. round iron upset to 1⅛ in. at threaded end. Cars having no underframe, with tank securely riveted to body bolsters, do not require dome yokes or tank bands.

Explanation: A threaded end, 1⅛ in. in diameter or more, with a body consisting of a flat band 2 in. by ⅜ in. or equivalent section; or round iron 1 in. in diameter, will be accepted as meeting the requirements.

The dome yoke proper which passes around the dome may be a rod ¾ in. in diameter, or its equivalent, to which is secured the strap or rod which is fastened to the underframe. The sectional area of dome-yoke strap must be the same as required for tank straps.

Where tanks are equipped with a greater number of tank bands than called for, the total sectional area of all bands will be considered as meeting the requirements, if they equal the total sectional area of the rods specified.

14. Steel underframe tank cars in which the tank is secured from end-shifting by means of head blocks, must have a longitudinal clearance for tank valve extension of not less than 2½ in. on each side of valves.

15. Preferably the top of the discharge-valve handle should be within the tank, but in the the event that it is carried through the dome, precaution must be taken by packing and cap nut against leakage.

16. If the car has no underframe the tank shell at bottom must be at least ⅝ in. thick, and all circumferential seams in bottom sheet, except head seams, must be double-riveted. The sectional area of the additional metal in bottom of tank shell must be at least 20 sq. in.

17. Each car must be equipped with air brakes of a capacity equal to not less than 70 per cent. of the light weight of car, and at least one hand brake operating the brakes on both trucks.

18. There shall be a push-pole pocket at every corner of the car. Where, from the construction of the car, the push-pole pockets cannot well be placed on the body, they must be applied to the trucks, so placed above the journal boxes that the push pole will push toward the center of the truck.

19. Each truck must have a strength equal to or greater than the strength of the axles used.

20. All tank cars at home on a railway must be inspected by inspectors in the employ of that railway company, and when such tank cars meet the requirements herein set forth.

If foreign tank cars and individual tank cars at home on foreign lines, stenciled with the legend "M. C. B. Construction" by a foreign road, are offered for movement over another railway, and some of the details do not conform to the requirements of the tank-car specification, a report of same should be made through the proper officers to the official in charge of equipment, and the car allowed to proceed until further notice.

OLD TANK CARS HAVING WOODEN UNDERFRAMES.

1. Tank cars having wooden underframes, of railway or individual ownership, will be required to conform to the requirements of the "Specification for Ordinary Tank Cars," relating to test of tanks, safety valves, test of safety valves, 5-in. safety vents with lead disks, 2-in. vent hole or small valve with lead disk, dome yokes, tank straps, etc., brakes, push-pole pockets, trucks, axles, and inspection for compliance with M. C. B. specification, and, in addition, must be as strong as the construction covered by the following detailed specifications:

2. Where tank cars are fitted with cast-iron dome heads and covers not sufficiently strong to stand the necessary 40 lbs. hydraulic test, they must be replaced by others of cast or pressed steel, or of malleable iron.

3. Tank heads less than 7/16 in. thick, bearing evidence of damage from impact with head blocks, should be reinforced at bottom by means of steel plate shoes ⅜ in. thick, riveted to head and shell.

4. If cars are not equipped with intermediate sills, the underframes must have 2 center sills, each not less than 5 in. wide by 10 in. deep, or the equivalent in strength. If the car is equipped with intermediate sills, the center sills must not be less than 5 in. wide by 9 in. deep, or the equivalent in strength. Center sills must not be spaced more than 18 in. apart.

5. Where draft timbers are underneath the center sills, the space between the center sills must be filled in with timbers not less in depth than center sills, extending from end sill to the center of nearest cross-bearer or cross timber, provided the latter is located not less than 4 ft. 6 in. from center of bolster. On cars where the draft arrangement is between center sills, the filler timber must be extended to the cross-tie timber when the cars go to shop for repairs to center sills. Center sills and filling timbers must be securely bolted together by means of ¾-in. bolts. On cars having center or intermediate sills not less than 10 in. wide by 10 in. deep, which may be made up of two 3 in. by 10 in. sills bolted together, the filling timbers may be omitted.

6. End sills not reinforced by buffer blocks must not be less than 9 in. wide by 10 in. deep. End sills 6 in. wide by 12 in. deep, reinforced with buffer blocks not less than 6 in. wide by 10 in. deep and of sufficient length to overlap center sills, will be acceptable as a substitute for 9 in. by 10 in. end sills.

On existing cars, if buffer blocks are used for the purpose of reinforcing end sills which do not come within the specified

requirements, the buffer blocks in no case must be less than 4 in. thick nor end sills less than 6 in. thick. The total strength of the end sill and buffer block must be equal to the strength of the construction specified.

7. Draft timbers secured to inside of center sills and extending to cross-bearer or cross-timber will be accepted as a substitute for filling timbers referred to above. Where center sills are 9 in. wide by 10 in. deep, or over, and draft timbers are placed between same, they need not extend farther back than body bolster, provided they are adequately secured to center sills by means of seven ⅞-in. bolts or their equivalent, and butt against body bolster. Draft timbers located underneath the center sills must not be less than 4 in. wide by 8 in. deep, and each draft timber must be held to center sills, end sills and buffer blocks by means of 7 or more ⅞-in. bolts or 6 1-in. bolts. Where an arrangement for supporting draft timbers is substituted for one or more bolts and the construction is of equal strength, the same will be acceptable. Draft timbers extending beyond bolster must be secured to center sills by additional bolts.

8. The draft gear and draft attachments must be at least as strong as the design required by these specifications. Cars should be provided with draft-gear stops gained into draft timbers or heeled on end sills, filler timber or body bolster, and secured with 5 ¾-in. bolts; but cars having stops gained into draft timbers or heeled on end sills, filler timber or body bolster, secured with three ¾-in. bolts, may be continued in service until such time as they go to shop for repairs, when 5 bolt stops must be provided. In all cases, tail yokes or attachments of equal strength must be used. Tail bolts, tail straps, or American continuous draft gear, will not be accepted.

9. Head blocks must not be less than 10 in. wide unless reinforced by metal plates, and of sufficient depth to extend at least 6 in. above bottom of tank, and may be made of 2 pieces bolted together and bolted to underframe by means of not less than 4 ⅞-in. vertical bolts. They must be cut out to suit curve of tank. The ends of each head block should preferably be tied to corresponding end of head block at the other end of car by means of rods not less than 1 in. in diameter, with 1⅛-in. threaded ends, and each head block supported at center by means of a substantial casting securely bolted to end and center sills. Where the construction of the car does not permit of this fastening, the following may be substituted:

The ends of each head block tied to corresponding end of head block at the other end of car by rods not less than 1 in. in diameter, with 1⅛-in. threaded ends, and each head block secured by 2 stay rods 1 in. in diameter anchored to center sills;

Or, head block supported at center by means of a substantial casting securely bolted to end and center sills and 2 1-in. rods passing diagonally through head block toward bolster and secured to underframe;

Or, head block secured by two stay rods 1⅜ in. in diameter anchored to center sills;

Or, head block secured by two stay rods 1 in. in diameter, anchored to center sills, and two 1-in. rods passing diagonally through head block toward bolster and secured to underframe;

Or, head block secured by 2 stay rods 1 in. in diameter, anchored to center sills, and 2 straps not less than ¾ in. thick and 3 in wide, passing over head blocks and securely fastened to underframe.

SPECIAL TANK CAR FOR CARRYING VOLATILE INFLAMMABLE PRODUCTS WITH A VAPOR TENSION OF OVER 10 LBS. PER SQ. IN. AT A TEMPERATURE OF 100 DEG. F.

1. For these cars the tanks may be either welded or riveted; with or without steel underframes. The welded tank is preferred on account of tightness. Where riveted tanks are used, all longitudinal and head seams must be double-riveted. Heads must be not less than ½ in. thick; and if head blocks are used, heads must not be less than ⅝ in. thick.

2. Domes of steel plate, preferably drawn without vertical seams, riveted or welded to the shell proper. Dome must have a capacity to provide for an expansion of 3½ per cent. of the contents of the tank, measuring from the inside top to shell to the top of the dome. Cover for dome may be secured either by screw joint, by bolting, or by yoke with center screw. Lid must be provided with suitable gasket to insure tightness against the escape of gas under pressure.

3. The safety valves to be of the same pattern as those used for other inflammable products, set to blow at a pressure of 20 lbs. gage pressure, with a tolerance of 1 lb. above or below that pressure.

4. The safety valves must be tested and adjusted, if necessary, at intervals of not over 6 months, and the pressure and date of the last test shall be plainly stenciled on the body of the valve, as follows:

Tested (date) .....
Pressure (pounds per square inch) .....
At (place) .....
By (name) .....

The test may be made without the removal of the valve from the car; provided the valve unseats at a total pressure corresponding with the area of the seat multiplied by 20 lbs. Valves improperly set, or not tested at proper intervals and stenciled, shall constitute defects for which owner shall be responsible.

5. The barrel, ends and dome to be lagged with a thickness of 2 in. of 85 per cent. carbonate of magnesia, or its equivalent, covered with sheet-iron jacket ⅛ in. thick. Tank before lagging to be well painted. The sheets of the jacket to be lapped so as to shed rain and maintain the dryness of the lagging.

6. Tank to be tested before being put into service and once every 2 years thereafter with a cold-water pressure of 100 lbs. per sq. in., which it must stand without leakage or evidence of distress. This test to be made by tank-car owner, and car stenciled with pressure, date and place where test was made, and by whom, as follows:

Tested (date) .....
Pressure (pounds per square inch) .....
At (place) .....
By (name) .....

7. Discharge valves, if used, must be so arranged that the valve shall not project below the bottom of the shell, and the connection pipe must be so arranged that its breakage will not unseat the valve. An alternative arrangement, by which the valve is placed on top of the car and the contents of the car discharged by air, will be accepted.

8. In some convenient location on either the sides or the ends of the car shall be stenciled the words: "For Liquefied Petroleum Gas."

On the side of the dome shall be stenciled: "Caution: Liquefied Petroleum Gas (Casing Head Naphtha): Before removing manhole cover, safety valve must be lifted and held open until the internal pressure, if any, is relieved."

9. All other requirements for these special tank cars to be the same as those for "Ordinary Tank Cars."

10. The designs for these "Special Tank Cars" to be submitted to the Master Car Builders' Association for approval.

SPECIAL TANK CAR FOR TRANSPORTATION OF LIQUEFIED CHLORINE GAS.

1. Liquefied chlorine gas may be shipped in a lagged tank car of approved design, which shall be tested before being put into service with a cold-water pressure of 300 lbs. per sq. in., and stenciled in accordance with the requirements in this respect of the specification for ordinary tank cars.

2. Car shall be provided with an approved design of small safety valve and fusible seal which must be so located that in case the car became involved in a fire the seal would be exposed.

3. The designs for these "Special Tank Cars" to be submitted to the Master Car Builders' Association for approval.

DISCUSSION.

Mr. Gibbs: The manufacturers of the material were very anxious that we should allow the safety valve to be set at a much higher pressure, but the committee were unwilling to allow that. I may say that in all this work we have had not only the co-operation of our own committee, but we have had the co-operation of the Atlantic Refining Company and of the Bureau of Explosives. We have still included in the specifications a specification for wooden underframe tanks. The only reason for retaining it was in changing the order we thought the order might stand afterwards, so that subsequent specifications might cut out all this material, because the rules prevent the construction of any more; so I suggest after this that we cut out all specifications for wooden underframe tanks.

Mr. Brazier: Mr. President, I move that the report be accepted, that whatever recommendations there are be adopted, and furthermore, that the thanks of the Association be extended to that committee.

E. T. Millar (B. & O.): I would like to ask Mr. Gibbs if the tank cars have been used for carrying any particular gas, could naphtha or anything else be carried in such cars?

Mr. Gibbs: My understanding is the cars used for naphtha can be used for any of the naphthas, but would not be suitable for crude oils. If the recommendations of the

committee are adopted, the ordinary tank cars carrying this product will have their safety valves set to 12 lbs., and they can be used for carrying that product which has been weathered or exposed to the air, so its pressure won't run above. Special cars can be used for carrying ordinary gas without any trouble.

Mr. Brazier's motion was carried.

SPECIFICATIONS FOR FREIGHT CAR TRUCK SIDES AND BOLSTERS.

The committee on specifications for truck sides and truck bolsters was appointed by the executive committee in July, 1911, and was instructed to prepare specifications for these structures for freight cars of 80,000, 100,000 and 150,000 lbs. capacity. The appointment of this committee grew out of a recommendation made at last year's convention by the committee on revision of standards. The committee has assumed that it was to deal only with cast-steel structures.

A circular was sent to the members of the Association and to all manufacturers of cast-steel truck sides and bolsters concerning the specifications for the physical and chemical properties of the material and methods of inspection. The information received has formed the basis for the recommendations touching these matters which are embodied in the report. Definite recommendations concerning physical tests of the completed structures are not given, as the funds necessary to make such tests were not available this year. In this connection, however, the committee has had placed at its disposal through the courtesy of C. D. Young, engineer of tests, Pennsylvania Railroad, the results of thorough static and drop tests of bolsters and truck sides of various capacities, and from this information it has drawn up tentative suggestions concerning such tests.

SPECIFICATIONS FOR CAST-STEEL TRUCK SIDES.

The following suggested specifications are based upon a study of specifications now in use by members of the association.

Manufacture.

1. Castings furnished under these specifications must be made of open-hearth steel in accordance with the best foundry methods. They must conform to the dimensions shown on drawings and must be free from rust, scale, blow holes, and shrinkage cracks.

2. Each casting must have the following markings cast upon it in raised figures and letters:

a—Initials of the railway company.
b—Month and year in which cast, thus: 6-12.
c—Manufacturer's serial number and trade-mark (or other designation).
d—M. C. B. S.

3. The manufacturer shall have cast on each truck side two test coupons having a cross section of 1⅛ in. by 1⅛ in. and 6 in. long. These coupons are to be used for the physical and chemical tests and their location upon the casting shall be as specified by the purchaser. There shall be two additional coupons of a cross section not less than the average cross section of the casting, which coupons are to be used to determine the character of the annealing as specified in Section 7.

4. The manufacturer shall protect all castings so that they do not become covered with rust. They must not be painted before inspection unless so specified.

5. Truck sides shall not vary more than 3 per cent. above nor 2 per cent. below what has been determined upon as the normal weight of the casting, except that in case the casting has met all requirements save that of overweight, it may be accepted as of the maximum allowable weight here specified. For the purposes of this requirement, the normal weight shall be previously agreed upon between the purchaser and the manufacturer.

6. When the manufacturer is ready to make shipment of the material, he shall notify the purchaser of that fact and await the arrival of the purchaser's inspector, to whom he must furnish free any assistance and labor needed to make satisfactory inspection, tests, and prompt shipment.

7. All castings shall be thoroughly annealed. Test coupons shall be annealed with the casting before they are detached. To determine the quality of the annealing the inspector will have one of the test coupons, mentioned in Section 3, cut half-way through and broken off from the casting for examination of the fracture. If, in his opinion, the annealing has not been properly done, he may require the casting to be reannealed, using the second test coupon for examination in this case. If, after annealing or reannealing, any casting is so much out of gage as to require heating in order to bring it within the gage, it shall again be annealed before it may be accepted.

Chemical Properties.

8. The chemical composition of the steel shall conform to the following requirements:

Carbon	from 0.20 per cent. to 0.30 per cent.
Manganese	not over 0.70 per cent.
Phosphorus	not over 0.05 per cent.
Sulphur	not over 0.05 per cent.

Physical Properties.

9. The physical properties of the steel shall be as follows:

Ultimate tensile strength, lbs. per sq. in.	not under 60,000
Yield point (by "drop of the beam")	not under 50 per cent. of the ultimate strength
Elongation in 2 in. (per cent.)	not less than the quotient of 1,400,000 divided by the ultimate strength

Inspection.

10. For the purpose of determining whether the physical and chemical requirements are complied with, the inspector shall select at random one casting from each heat. From this casting, the two physical and chemical test coupons (referred to in Section 3) shall be removed by the inspector. One of them shall be subjected to physical tests, but if the coupon casting proves unsound, the other coupon shall be used in its stead for this purpose. From the coupon which has satisfactorily passed the physical requirements, borings shall be made for chemical analysis. In case the test pieces selected do not meet the specifications, all castings from the entire heat represented shall be rejected.

11. At his option, the inspector may require that any or all castings be subjected to sand blast in order to make an examination of the surface for checks or cracks.

12. From each casting rejected by the inspector under these specifications he shall cause to be chipped the "S" of the letters M. C. B. S. which are specified in Section 2.

Tentative Specifications for Static Tests of the Complete Truck Side.

The following tentative specifications are presented for the purpose of securing such criticism as the members of the Association may wish to offer.

13. The truck side selected as representing the heat shall be supported in the testing machine at each end, directly beneath the center line which corresponds to the center of the axle when the truck side is in the truck. The load shall be applied in the center of the bolster opening midway between the points of support, and the allowable deflection shall be measured at this point. When so mounted, the truck side shall be subjected to the initial load stated in the following table. This initial load shall be next reduced to 5,000 lbs. and then increased to the proof load as stated. Under this proof load there shall be no permanent set and the deflection shall not exceed the amount indicated:

For cars of	Initial load, pounds.	Proof load, pounds.	Maximum deflection.
80,000 lbs. capacity	20,000	135,000	⅛ in.
100,000 lbs. capacity	25,000	160,000	⅛ in.
150,000 lbs. capacity	35,000	210,000	⅛ in.

Recommendations Concerning Truck Sides.

The committee recommends:

1. That the specifications concerning freight truck sides contained in Sections 1 to 12, inclusive, be made standards of the Association.

2. That the work of the committee be continued, and that, if possible, funds be provided to make tests upon which specifications for physical tests of the complete truck side may be based.

3. That some committee of the Association, competent to deal with matters of design, be directed to prepare designs of cast-steel truck sides for freight cars of 80,000, 100,000 and 150,000 lbs. capacity, to serve as a guide to those members of the Association who now buy these structures made from designs which they do not themselves prepare; in the expectation that such designs may eventually be added to the recommended practice of the Association.

SPECIFICATIONS FOR CAST-STEEL BOLSTERS.

The following suggested specifications are based upon a study of specifications now in use by members of the Association:

[The following 12 sections are identical with those presented in the specifications of the truck sides, and will therefore be omitted here.—EDITOR.]

Tentative Specifications for Static Tests of the Complete Truck Bolster.

The following tentative specifications are presented for such criticism as the members of the Association may wish to offer.

The static test proposed below is intended to subject the bolster to stresses which shall be similar in amount and direction

to those which it receives in service. To this end the bolster would be inclined in the testing machine both sidewise and endwise, and subjected to a vertical load. The angles chosen would be such as to give the following relative magnitudes to the downward, transverse and longitudinal stresses:

Load normal to the center plate surface	100 per cent.
Side thrust	25 per cent.
End thurst	40 per cent.

The above stated relation between stresses is derived from the report of the committee on axles, journal box, bearing and wedge, page 149 of the Proceedings of the Association for 1896. The proposed tentative specification is as follows:

13. The bolster selected as representing the heat shall be supported in the testing machine as mentioned, it being tilted sidewise through an angle of 13 degs. 4 min., and endwise through an angle of 21 degs. 13 min. The load shall be applied vertically through a block with a horizontal upper face, which rests upon the bolster center plate. When so mounted the bolster shall be subjected to the proof load stated in the following table and the load shall then be decreased to 1,000 lbs. Under this proof load there shall be no permanent set and the deflections shall not exceed the amounts indicated. For the purpose of measuring set and deflections the position of the bolster under the load of 1,000 lbs. shall be considered as the datum.

For Car of	Proof Load.	Deflection Normal to Center plate.	Lateral Deflection.
80,000 lbs. capacity....	110,000 lbs.	0.15 in.	0.10 in.
100,000 lbs. capacity....	140,000 lbs.	0.15 in.	0.10 in.
150,000 lbs. capacity....	210,000 lbs.	0.15 in.	0.10 in.

Recommendations Concerning Truck Bolsters.

The committee recommends:

1. That the specifications concerning freight truck bolsters contained in Sections 1 to 12, inclusive, be made standards of the Association.

2. That the work of the committee be continued, and that, if possible, funds be provided to make tests upon which specifications for physical tests of the complete truck bolster may be based.

3. That some committee of the Association, competent to deal with matters of design, be directed to prepare designs of cast-steel truck bolsters for freight cars of 80,000, 100,000 and 150,000 lbs. capacity, to serve as a guide to those members of the Association who now buy these structures made from designs which they do not themselves prepare; in the expectation that such designs may eventually be added to the recommended practice of the Association.

An appendix to the report gives a synopsis of the answers received from the circular of inquiry.

The report is signed by:—Edward C. Schmidt (Univ. of Ill.), chairman; J. S. Sheafe (Ill. Cent.) and C. D. Young (Penna.).

DISCUSSION.

I. S. Downing (L. S. & M. S.): I think the committee should be continued for another year, and in addition to truck bolsters and truck sides of freight cars, they should consider the question of passenger trucks. I move that the report of the committee be accepted, the committee continued, and that they consider passenger truck frames.

C. D. Young (Penna): Do I understand that that refers the entire matter back to the committee as to the specifications in paragraphs 1 and 2? It seems to me it would be advisable to let the specifications go to letter ballot and the committee be continued if necessary, and go after further details. I would like to amend the motion that the subject matters of one, two and three, be referred to letter ballot.

J. F. DeVoy (C. M. & St. P.): I was rather of the opinion as expressed by Mr. Young, except for recommendation of No. 3, and I am not clear in my mind just how they intended to handle that.

The motion was carried with Mr. Young's amendment.

CAPACITY MARKING OF CARS.

The committee appointed to look into and report on the subject of capacity marking of freight cars desires to refer to the report of the committee on axle limits passed upon by the Association at the meeting held at Atlantic City in June, 1906, (see pages 299 to 310 of the Proceedings for that year).

It would seem this subject of capacity marking of cars was thought to have been definitely disposed of by the Association at that time, and the interchange rules were changed to conform to the recommendations of the committee; it will be noted that Interchange Rule 86 makes it optional with the car owner whether he shall stencil his cars with the light weight and nominal capacity, or with the light weight and maximum weight, depending upon the axle requirements specified in this rule. However, in order to secure the individual car owner's views in regard to this subject at this time, the committee sent out a circular to all car owners.

The committee is in receipt of forty-three replies—a careful analysis of which is as follows:

SUMMARY OF REPLIES TO M. C. B. CIRCULAR NO. 25 CAPACITY MARKING OF FREIGHT CARS.

	No. of Replies.	Cars Represented.
In favor of stenciling cars with their light weight and maximum weight.	19	319,535
Against stenciling cars with their light weight and maximum weight. (There were no specific reasons indicated in the replies).	8	204,085
Against stenciling cars with their light weight and maximum weight for the reason that the maximum weight stenciling is likely to confuse shipper or car inspectors.	6	121,850
Against stenciling cars with their light weight and maximum weight, for the reason that it has not been demonstrated that this practice might not be applied to cars, the body or trucks of which are structurally weak, and which are at present stenciled to carry the maximum load to which they should be subjected)	5	209,153
In favor of stenciling cars with their light weight and nominal capacity, also maximum lading	3	84,079
In favor of stenciling cars with their light weight and nominal capacity plus 10 per cent. (For instance, an 80,000-lb. capacity car would be stenciled 88,000-lb.)	1	14,000
In favor of stenciling cars with their light weight and maximum lading	1	11,000
Totals	43	963,702

It would appear from this that, notwithstanding the authorization given the car owner as expressed by the vote of the Association on this subject at the convention held in June, 1906, a great many companies are timid about adopting the light weight and maximum weight stenciling, for the reason, apparently, that they have no evidence that the construction of cars (including steel and steel underframe equipment) is so consistent as to justify the belief that the car can be loaded up to the full carrying capacity of the axles. It would, therefore, seem desirable for the Master Car Builders' Association to determine for itself the minimum strength of car bodies of each nominal capacity to which the maximum weight stenciling shall apply, and the committee, in order to go into this subject more exhaustively,



C. E. FULLER,

Chairman, Committee on Capacity Marking of Cars.

would recommend that time be granted in which to further consider this subject and make the report.

The report is signed by C. E. Fuller (U. P.), chairman; M. K. Barnum (I. C.); A. W. Gibbs (Penna.); F. H. Clark (B. & O.) and F. W. Brazier (N. Y. C. & H. R.).

DISCUSSION.

C. A. Seley (C. R. I & P.): I move that the suggestions of the committee be adopted, that they be granted additional time, and that the committee be continued.

The Secretary: I would like to read some comments from Mr. Fuller, the chairman of the committee, which are as follows:

"Referring to the report on capacity marking of freight cars:

"This association, at its 1905 convention, appointed a committee to look into and report the merits of stenciling cars with their light weights and maximum weights; the recommendation of that committee, which clearly set forth the principles I have been advocating, was accepted by the convention held in June, 1906, and having been approved by the convention, committed the members of this association to the practice of ultimately stenciling all cars with their light weights and their maximum weights. Further, in accordance with this idea, certain changes were made in dimensions of axles, and interchange rule No. 23 (present rule No. 86) was promulgated to show the minimum dimensions of axles for the different capacities of cars marked 'maximum weight.' It was thought that a majority of the car owners would avail themselves of the increased measure of carrying capacity thus afforded, after they had increased the sizes of their axles to conform to dimensions prescribed in the interchange rules.

"After the lapse of 6 years in which to work into the axles specified for the different 'maximum weight' stenciling of cars, are we to be held back another indefinite period before we can enjoy the benefits intended by such changes because we are told that some car bodies or trucks may not have been constructed to carry as great a load as the axles? Or are we going to be consistent with ourselves and reconsider and rescind the action taken by the 1906 convention?

"The majority of the committee appointed by this association in June, 1911, is not favorable to the 'maximum weight' plan of stenciling, and car owners are not enthusiastic over the plan as is evidenced by the views expressed in reply to the committee's circular. It would seem from the replies received that a great many car owners want to be 'shown' and the committee has, therefore, incorporated into i s report a willingness to 'show' up the carrying capacity of car bodies if its suggestion to do so is approved by this association. It was not possible for the committee to bring in a complete report to this convention, owing to the late date at which the views from the car owners in answer to the committee's circular of inquiry were received. It would seem to be necessary and advisable to remove all doubt relative to the carrying capacity of car bodies, and if it should be found by the committee assigned to that task, that there are steel or steel underframe or all wood cars which are not up to the requirements of the carrying capacity of the axles with increased dimensions as required in interchange rule 86 for 'maximum weight' stenciling, then I must confess that such investigation would be as great a benefit to the railways as the measure to increase the carrying capacity.

"If it were found that some car bodies were structurally weak, I would be in favor of defining the minimum, and would exclude all cars below that minimum from the 'maximum weight' plan of stenciling, and I would, furthermore, be in favor of modifying such other rules as would hold the car owner responsible for failure under fair usage of cars, so excluded from the 'maximum weight' plan of stenciling, either by amending interchange rule No. 42 for steel and steel underframe cars, or by increasing the combinations now in force for wooden cars. I am not at all convinced that it will be necessary to adopt this course, but should it be found necessary to do so, this discussion will at least have served a good end, possibly will result in being a greater boom to the railways than the adoption of the 'maximum weight' stenciling which promised to increase the net tonnage per unit of equipment.

"There seems to be a misunderstanding on the part of some of the members of the association in connection with this discussion. It appears that this 'maximum weight' stenciling is thought to be something new, something which has been recently brought before the association, but on the contrary, it should be noted that the association approved of this method of stenciling 6 years ago. The matter was brought up at last year's convention as it was thought that sufficient time had elapsed in which car owners could get their cars equipped with the axles prescribed in interchange rule No. 66. Now that further objections have been raised to this plan, I believe it will serve a good and useful purpose to institute an investigation in regard to car bodies, etc., and have recommendations made to this association in regard thereto in order to permanently dispose of this subject."

Mr. Seley's motion was then carried.

CONCLUDING EXERCISES.

The Secretary presented the report of the committee on correspondence and resolutions, as follows:

The committee would recommend that the appreciative thanks of the association be extended to President Stewart for his excellent address and the splendid manner in which he has conducted the proceedings of this convention; to the officers in general for duties well done in handling the many details in connection with our convention; to the various committees that have considered and reported on the various subjects assigned to them; to the committee on arrangements for its effective service in making such complete plans for the meeting; to the railways for courtesies extended; to the hotel men of Atlantic City for their hospitality; to the Railway Supply Manufacturers Association for the complete exhibition of railway appliances; to the technical press generally, and to the RAILWAY AGE GAZETTE, especially, for the daily reports of all the features of the convention.

C. A. Seley (C. R. I. & P.): I would like to suggest an addition. The coupler committee report suggests a vote of thanks to the various railways for courtesies extended them. I believe the thanks of the association are due to all the railways who have contributed in any way, either by material or otherwise, to the work of the coupler committee. That committee has traveled thousands of miles, put in a good deal of time and had expenses which were assumed in large part by their own roads. I therefore suggest that the resolution of thanks include the tender of thanks of the association to all railways participating in supplying material or otherwise to the coupler committee's work.

The motion with Mr. Seley's amendment was carried.

M. K. Barnum (Ill. Cent.): I would like to move a vote of appreciation of the faithful and efficient service of our secretary during the past year. I feel confident in saying that the good order and promptness with which our business has been transacted is very largely due to his efficiency and ability in handling our work.

J. J. Hennessey (C. M. & St. P.): In seconding that motion I want to say that the arbitration committee has probably had more connection with the secretary than anyone else, and he has responded to every call we made upon him, been always prompt on time, and I think the association owes the secretary very much appreciation.

The motion is carried unanimously.

The Secretary: Mr. President and Gentlemen, I certainly appreciate this compliment to me, but I would like to say to you gentlemen that it is a pleasure, and I might say my life work to serve this honorable body. I think it is the grandest institution of the kind in the world.

While waiting for the report of the tellers the following discussion took place.

C. D. Young (Penna. Lines): In the working of the specifications as to truck sides and bolsters, it was brought to my attention that there was no general form or style in our specifications for the association, and it seems to me the time has come when all the valuable specifications we have should be reviewed by some committee under some certain form, so you will know where to look for a particular specification if you want it. It is difficult to determine what is the rejection limit in certain of the requirements, and I would like to make a motion that a committee be appointed, of which the secretary of the association should be a member, to go over all the specifications of the society, and, without changing the form or substance in any way, revise them in some order of form and style. I might say the American Society for Testing Materials found themselves in a similar position this year, and they have found it a valuable thing to have such a committee, and I suggest that this matter be referred to the executive committee for the appointment of such committee.

The Secretary: I think Mr. Young's suggestion is a very good one, and as that will be a part of the records of the meeting, it will be referred to the executive committee.

E. W. Pratt (C. & N. W.): It seems to me that the committee on truck side frames ought to include specifications, or at least limiting strains per square inch, of the arch bar trucks. I do not see why we should be so critical of other styles, and accept everything that is passed to us in arch bar trucks, when we know the failure in that respect is considerable. If we are going to get up a specification and live up to it, and decline to receive cars that are loaded beyond what the public considers safe for a steel side frame, why should we pass over arch bar trucks?

The Secretary: That suggestion will be referred to the executive committee. You will help out the executive committee a great deal by just such suggestions as these you are making now.

E. A. Miller (N. Y. C. & St. L.): The severe weather of the past Winter has very clearly demonstrated that much trouble has been brought about by the weakness of the arch bar truck. Many cars, as we all know, are still equipped with the arch bar truck. This is a matter that can very properly receive careful attention from this association. Another matter that with us has developed an unusual trouble during the past winter is the dropping of brake beams. There was a general discussion here on brake beams, the brake beam head and the brake beam shoe, but the construction of the brake beam is something that should receive very careful attention from the fact that not only on our own road, but from reports on other roads they had very serious trouble and that trouble has steadily increased. I think that is due to a number of causes. The general trend of the operating department is to carry the trains over the road, to spend but very little time on inspection at intermediate points or terminals, so that the little defects that crop out, such as the losing of cutter keys, the losing of bolts and those minor things in the travel of a car several hundred miles bring about these defects of inspection. So, altogether, I think we are losing for the lack of more careful inspection, especially on running repairs of loaded cars and the dropping of brake beams. On our own road there were more than 50 brake beams dropped during the months of February and March, and those brake-beams were not from any one company's cars, but practically from every company's cars that were doing business over our line.

J. F. DeVoy (C. M. & St. P.): I had personal charge of a track that had been below zero weather for 40 to 50 days, and within one mile of track. I have seen track heaved out of level 11 in. It was that condition more than anything that pounded out your trucks, that caused hot boxes by the severe pounding of waste and dropping it away from the axle; and I say for at least 4 months there was no known method of preventing 50 per cent. of the failures you have referred to. I go further and say, whether the traffic department or the car men or any other department be censured or not, nothing could have prevented them. The minute the cold weather left us and the track began to resume its normal condition, the accidents and the failures fell off, and I believe everybody will agree with me that when the weather does not interfere, you do not hear of anywhere as near as much failure as that trouble you speak of. I have seen new tires broken from nothing but severe weather; tires that would have lasted two or three terms, and that would not have failed under ordinary conditions.

F. W. Brazier (N. Y. C.): I would like to emphasize what the gentleman said, and I think a great deal of Mr. Miller's trouble is in the construction of the cars; in addition to the hangers, there should be some form of safety strap or safety chain. We have had the same trouble.

Mr. Schroyer: Many complaints came in to me during this past winter of nuts working loose, and I knew it was the hard condition of the track that was causing the trouble. Now, as to the arch bar truck—there was never iron put together that would stand as much as the arch bar truck, and yet I believe after we have reached a certain capacity of a car with an arch bar truck, that we have gone beyond the capacity of the iron to withstand the strain, and we have to go to some other construction. Now, we use a good many steel trucks on the Northwestern with a great deal of satisfaction, and yet, after long continued use and under like conditions, and under the same percentage of heavy load that the arch bar trucks have been carrying so many years, I think we have got to give the palm to the arch bar trucks until we go to something else.

The following officers were elected: President, C. F. Fuller, Union Pacific; vice-presidents, M. K. Barnum, Illinois Central; D. F. Crawford, Pennsylvania, and D. R. MacBain, Lake Shore and Michigan Southern; treasurer, John S. Lentz, Lehigh Valley. Executive Committee: R. E. Smith, Atlantic Coast Line; C. E. Chambers, Central of New Jersey, and Henry LaRue, Chicago, Rock Island and Pacific.

President Stewart was presented with an ex-president's badge and the Convention adjourned.

A railway is projected in southern Russia to connect the town of Akerman with that of Leipzig on the Southwestern railway, the distance being about 100 miles, and to cost $3,090,000. This line, if carried through, will be of great benefit to the province of Bessarabia.

M. C. B. REGISTRATION.

Cox, W. N., Supt. Mach., Western Ry. of Ala. & Atlanta & West Point R. R.
Dunn, J. F., S. M. P. & M., Oregon Short Line R. R., Chalfonte.
Endsley, Prof. L. E., Purdue University.
Ewing, J. J., Ches. & Ohio Ry., Holbrook.
Kapp, W. F., S. S. & M., R. F. & P. Ry., Marlborough-Blenheim
Manchester, H. C., S. M. P., Dela., Lack. & Western R. R., Marlborough-Blenheim.
Schlafge, Wm., Gen'l Mech. Supt., Erie R. R.
Schnepel, J. H., Chief Draftsman, N. Y. C. & H. R. R. R.
Westervelt, Jos., M. C. B., Retired, N. Y. C. & H. R. R. R.

M. C. B. GUESTS.

Andrews, D., B. & O., Lexington.
Beale, G. M., B. & O.
Beaumont, C. A. Elwood.
Bently, H. T., Chicago & N W., Marlborough-Blenheim.
Bickley, H. E., Cumberland Valley R. R., Chalfonte.
Billan, Lewis S., B. & O. R. R., Arlington.
Borup, O. V., B. & O. R. R., Kenderton.
Boyer, W. P., Penna. R. R., Elwood.
Braucher, P. S., P. & R., Seaside.
Burton, G. H., P. R. R., Chalfonte.
Burton, W. C., Penna. R. R.
Butts, H. M., N. Y. C., Chalfonte.
Chase, E. P., Pa. R. R.
Cromwell, J. E., B. & O., Kenderton.
Dailey, E. B., U. P. R. R., Traymore.
Dare, John., P. R. R., Roxborough.
Davidson, Wm. W., P. R. R., Wittil.
Davies, H. W., Norfolk Southern R. R., Traymore.
Demorest, George L., C. R. R. of N. J., Dunlop.
Deyot, F., N. Y. C. & H. R. R., Ben Hur.
Dobson, J. D., B. & O., Bouvier.
Engard, Capt. Albert C., U. S. Navy, Bothwell.
Ensign, J. F., (U. S. Gov.) Int. Commerce, Marlborough-Blenheim.
Erb, C. W., P. R. R., Marlborough-Blenheim.
Fleming, Joseph M., P. R. R., Maryland.
Force, H. J., D. L. & W., Chalfonte.
Foster, C. G., P. R. R., Roxborough.
Freeman, L. H., B. & O. R. R., Kenderton.
Fritch, L. C., Chgo. Great Western, Chalfonte.
Germar, Rodolph, Austrian Society of Credit for Land Mortgages, Seaside.
Glass, J. C., P. R. R., 21 Illinois Ave.
Glass, J. C., Jr.
Haig, J. F., Penna. R. R.
Haynes, J. W., Cornwall & Lebanon R. R., Jackson.
Hays, J. L., B. & O., Arlington.
Hebrank, M. M., P. R. R., Biscane.
Hengstler, D., P. R. R.
Herrera, A., National Rys. of Mexico, Traymore.
Hill, J. P., P. R. R., Marlborough-Blenheim.
Holst, William A., Union Tank Line Co., Young's.
Hughes, S. W., The Washington Terminal Co., Craig Hall.
Ingersoll, G. R., Lake Shore, Shelburne.
Johnson, R. E., Canadian Pacific Ry., Young's.
Josias, Herman, Cuba R. R., Shelburne.
Killian, W. J., P. R. R.
Kniter, G. G., P. R. R., Maryland.
LeCompte, J. V., B. & O. R. R., Lexington.
Lentz, Robert P., Lehigh Valley, Dennis.
Lewis, M. N., Oklahoma Central Ry.
Little, D. A., P. R. R., Dunlop.
Livelv, B. F., South Ry.
Lowmann, H. F., Southern Ry., Traymore.
Macklin, H. C., Seaboard Air Line, Haddon Hall.
Macklin, Harold H., Seaboard Air Line Haddon Hall.
Marshall, C. V., Sr., P. R. R., New Strathaven.
Marshall, C. V., Jr., P. R. R. New Strathaven.
Marshall, T. B., P. R. R., Chelsea Hall.
McFarlane, H. B, A. F. & S. F.
Miller, B. E. D. L. & W. R. R., Young's.
Moriarty, G. A., N. Y., N. H. & H., Arlington.
Myers, T. H., Penna. R. R., Elwood.
Parker, C. F., Illinois Central, Marlborough-Blenheim.
Phillippe, B. Pemberton, P. R. R. Shelburne.
Philpot, J. N. Y. C. & H. R. R. Co., Pennhurst.
Porter, C. D., P. R. R., Shelburne.
Powell, James, Grand Trunk, Young's.

Randolph, J. L., B. & O. R. R., Shelburne.
Raquet, E. H., N. Y., W. H. & H., Marlborough-Blenheim
Reusct, H. E., C. R. R. of N. J., Granville.
Robbins, F. S., P. R. R., Haddon Hall.
Robins, J. B., C. R. R. of N. J., Edison.
Rogers, S. M., Elgin, Joilet & Eastern Ry., Marlborough-Blenheim.
Rose, Chas. H., Penna. R. R., Tennessee.
Ryer, F. A., Boston & Albany R. R., Shelburne.
Sandhas, H. L., C. R. R. of N. J., Schlitz.
Schlatter, Louis H., P. R. R., Boscobel.
Sheldon, W. S., N. Y., N. H. & H. R. R., St. James.
Strattan, G. E., P. R. R., Marlborough-Blenheim.
Train, A. H., N. Y. Central, Pierrepont.
Vorback, A. S., B. & O. R. R., Lexington.
White, Geo. D., P. R. R., Marlborough-Blenheim
Whiteman, Harry, Penna. R. R.
Whitsitt, Wm. B., B. & O.
Wight, S. B., New York City, Marlborough-Blenheim.
Wilson, L. M., P. R. R.
Wybel, Wm., National Rys. of Mexico, Traymore.
Young, J., Jr., P. R. R., Craig Hall.

THE CHILLED IRON CAR WHEEL UNDER FIFTY TON CAPACITY FREIGHT CARS.

Chicago, June 5, 1912.

To the Editor of the Railway Gazette:

The purpose of this article is to show, by actual performance records, how well the standard chilled iron car wheel has served under heavy capacity, 50-ton, freight cars.

There have been so many statements made for the purpose of making inroads on the standard chilled iron car wheel business, and particularly with reference to the use of this wheel under cars of heavy capacities, that an actual analysis of a miscellaneous lot of wheels(some of which have been in service six years) will show that this wheel has not only given a satisfactory account of itself, but that the possibilities of future increases in car capacities have no significance, because the chilled iron car wheel will perform equally well under even heavier cars than are in use to-day.

Attention is first called to the development of the freight car from 10 tons to 50 tons. Previous to 1875, the maximum freight car capacity was 10 tons; from 1875 to 1884 it was 25 tons; in 1886, 30 tons; in 1896, 40 tons; from 1901 to the present time, 50 and 55 tons. Comparatively few cars in service are of over 55 tons capacity.

The wheels designed to carry these cars were as follows: 10-ton car, 525-lb. wheel; 25-ton car, 550-lb. wheel; 30-ton car, 600-lb. wheel; 40-ton car, 650-lb. wheel; 50-ton car, 700-lb. wheel.

It was not until the year 1909 that the Master Car Builders' Association changed its standards for 30, 40 and 50-ton capacity cars as follows: For 30-ton capacity car, 625-lb. wheel; for 40-ton capacity car, 675-lb. wheel; for 50-ton capacity car, 725-lb. wheel.

Particular attention is called to this fact, because the wheels that are now being furnished according to the Master Car Builders' Association recognized standard, adopted during 1909, were first applied during 1910. Therefore, the statement which I will submit will be principally for wheels furnished under 50-ton cars prior to 1910, which were the regular 700-lb. wheels. Wheels furnished in 1910 and subsequently thereto weighed 725 lbs.

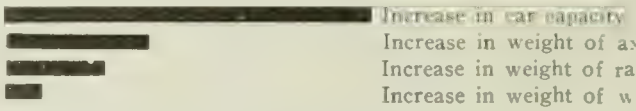
During the rapid development of the freight car from 10 tons to 50 tons, all parts of the car have been increased in weight, and the rail also, but no part of the car or rail has shown such a slight increase as the chilled iron car wheel.

Note the following showing a comparison of the 10-ton capacity cars with cars of 50-ton capacity:

	Per cent. Increase.
Car capacity, increase 10 tons to 50 tons...	400
Weight of axle, increase 350 lbs. to 870 lbs.	149
Weight of rail, increase 50 lbs. to 100 lbs...	100
Weight of wheel, increase 525 lbs. to 725 lbs.	38

The following diagram shows the relative increases in car, axle, rail and wheel:

One-half inch represents 100 per cent. increase.



Note that the standard wheel for 50-ton capacity cars up to the year 1909 weighed 700 lbs., an increase of 33 1-3 per cent.

According to the Interstate Commerce Commission report for the year ended June 30, 1910, there were in service about 383,000 freight cars of 50 tons capacity, which would represent about 3,000,000 wheels.

Attention is directed to the following statement which represents the performance of about 22 per cent. of all the wheels in service under fifty ton cars. The record of the performance of the balance of the wheels in service is not accessible.

	Shipments.	*Replacements.*	*Per Cent Replaced.*
1906	167,207	2,861	1.7
1907	165,110	1,318	.8
1908	76,117	793	1.0
1909	78,256	890	1.1
1910	105,654	258	.2
1911	84,894	19	..
Total	677,238	6,139	.9

It will be observed that out of a total of 677,238 wheels shipped, there were 6,139 wheels removed which were defective and which the makers were compelled to replace.

An analysis of the replaced wheels shows that replacement was for the following causes:

Worn tread	1,028
Shell out	1,987
Cracked plate	2,197
Seam	531
Broken flange	86
Broken rim	105
Broken	8
Miscellaneous defects	197
Total	6,139

It is well known that the flange of the chilled iron car wheel has not increased proportionately with the balance of the wheel, and this has been because the Master Car Builders' Association have been confined to limits of track clearance. Notwithstanding this, it is interesting to know that the flange failures are comparatively few.

This statement shows total shipments of 677,238 wheels, there having been removed on account of broken flanges, 86 wheels, or one wheel in every 7,875 wheels shipped; and it must be remembered that not every broken flange is due to an inherent defect in the wheel, because there may be many contributing factors over which the makers have absolutely no control, as in the cases of defective frogs, crossings and rail. Furthermore, faulty inspection may be a contributing factor, as sometimes a wheel may be allowed to wear too much before being removed; the strength of the flange is consequently decreased. Furthermore, it must be remembered that the flange of the wheel furnished prior to 1910 was not as strong and serviceable as the one now being supplied under the Master Car Builders' Association standard recommended in 1909.

In analyzing the performance of this lot of wheels under 50-ton cars, it must be remembered that all of the wheels are sold under a minimum guarantee time service of four years. The makers will, therefore, have to consider further replacements of wheels sold during the years 1908 to 1911, inclusive, but the wheels sold during 1906 and 1907 have practically fulfilled their guarantee as far as the manufacturers' liability is concerned, and a very large part of those sold during 1906 and 1907 are still in service.

A separate analysis of the wheels sold during the years 1906 and 1907 will give an actual demonstration of the performance of the wheels, and, therefore, attention is directed to the following:

	1906	1907
Total shipped	167,207	165,110
Replaced account worn tread	498	233
" " shelled out	1,094	431
" " cracked plate	896	327
" " seam	186	214
" " broken flange	48	21
" " broken	1	2
" " broken rim	31	41
" " miscellaneous defects	107	49
Total replaced	2,861	1,318
Percentage replaced	1.7	.8

While there may have been isolated cases where wheels have not given satisfactory service under some classes of 50-ton cars, the record of the performance of this lot of wheels ought to silence those who question the limitation of the service of the chilled iron car wheel, and, if in the future it may be advisable to increase the capacity of the car still further, the chilled iron car wheel can be relied upon to safely carry loads up to 125 tons capacity.

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS.
By Geo. W. Lyndon.

SUPERHEATERS AND LOW OPERATING COST.

In the recent reports of railways, the reduction in the cost of transportation in some cases has been sufficient to provoke an investigation of the causes for the decrease. In one case in particular inquiry was made as to the means by which the increased cost of labor employed, in train movement particularly, was partially or wholly offset. This inquiry has brought forth the information that the adoption of superheaters on the locomotives had made possible an increase in capacity per locomotive thus making it practical to haul more cars per train, with a reduced cost per train mile. It has also shown a large saving in engine mileage, brought about not only by the longer trains, but by eliminating the necessity, in many cases, of double-heading.

Individual cases, illustrating the fact that the superheater has reduced the necessity of double-heading, may be found in considerable numbers. With a superheater locomotive it is often possible to handle, in passenger service particularly, from 2 to 4 more cars over the ruling grades than was possible with saturated engines of the same class. The superheater locomotive has, in addition to hauling this greater number of cars, proved itself capable of maintaining a faster schedule with the larger train than the saturated engine could maintain with 3 or 4 cars less.

These facts, together with the continuity of operation of superheater engines, resulting in fewer engine failures, have materially reduced the cost of transportation on roads where the engines are extensively equipped with superheaters.

ELECTION OF EXECUTIVE MEMBERS, SUPPLY ASSOCIATION.

The election yesterday morning for four members of the executive committee of the Railway Supply Manufacturers' Association for the first, second, fourth and seventh districts, each to serve a term of three years, resulted as follows:

First district, Fred. M. Nellis, Westinghouse Air Brake Co., Boston, Mass.

Second district, Oscar F. Ostby, Commercial Acetylene Co., New York.

Fourth district, J. C. Whitridge, Buckeye Steel Castings Co., Columbus, Ohio.

Seventh district, S. M. Dolan, American Car & Foundry Co., St. Louis, Mo.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.

The semi-annual meeting of the Association of Railway Electrical Engineers was held at the Hotel Dennis, Atlantic City, June 14, and finished with a one day session. There were about fifty members in attendance. This summer meeting was held at the time of the M. C. B. convention so that the members could hear the report of that association on Train Lighting, hear the discussion and see the exhibits of electrical apparatus relating to train lighting.

The morning session was occupied first with regular routine business, including the address of the president, F. R. Frost (A. T. & S. F.), and the report of the secretary and treasurer, Joseph A. Andreucetti. The Electrical Testing Laboratory of New York sent an invitation to the members to visit it, which was accepted by about half a dozen. The executive committee decided that the next meeting would be held at the Auditorium Hotel, Chicago, October 21-25. The committee reports were preliminary and not complete. They are simply an indication of what may be expected in the reports at the October meeting.

E. J. Cartright, chairman of the Committee of Standards, reported that it is working on standards for ball bearings for the generator axle, for shafts and pulleys, and for lubricants. Nineteen of its recommended standards have been adopted by the M. C. B. Association. A motion was unanimously carried in opposition to clause 12 in the proposed standard of the M. C. B. Association, which will be submitted to their letter ballot. This relates to the fuses in the generator circuit, which are not regarded by the Electrical Engineers' Association as necessary. In the discussion of this report it was pointed out that the dynamo suspension for car lighting is not satisfactory and should be standardized, and the trucks should be designed with special reference to the mounting of the dynamo. Another member reported that steel postal cars were being so designed with deep center sills that only 4½ in. clearance can be obtained between the dynamo and the top rail and the proposed standard provides for 6 in. clearance.

The Committee on Car Illumination will report in October on the lighting of postal cars and on the lighting of railway shops and stations. It will present an elaborate report of about 150 pages on the car lighting practice of the Baltimore & Ohio. The question was raised as to how funds would be provided for the expense of publishing such large reports, and the subject was referred to the executive committee.

J. R. Sloane made a preliminary report on specifications, and said that it was expected to present specifications for rubber belting, for incandescent lamps, and for wire for electric conductors.

F. E. Hutchinson said that the train lighting report would be principally concerned with battery charging and the organization of the men at large terminal stations where this

work is done. The committee had found that for regulator and dynamo inspection two men could inspect 15 cars in a day of 10 hours.

The Committee on Insulation of Wires in Railway Buildings reported progress.

At the afternoon session A. I. Totten, of the General Electric Company, discussed the subject of electric equipment for railway shops and said that the alternating current motors can be adapted to the bulk of the requirements, including cranes and transfer tables, the principal exception being motors for variable speed tools, and at present quite a number of machine tools are built so as to provide sufficient speed changes by gearing without the necessity of a direct current motor. Planers, however, require a direct current motor on account of the necessity of high speed acceleration, and it is not probable that the work can be accomplished by an a. c. motor for some years to come. At the General Electric Works a number of planers are now driven by a reversing motor, and in the exhibit of the Niles-Bement-Pond Company on the pier, there is a planer driven by a reversing motor. It is found that there is an increased output of 25 per cent. due to the use of this type of motor on planers. Mr. Totten referred to the general design of railway shops, and said that they were not always best, as the type of erecting shop was usually due to the personal preference of the superintendent in charge. The Seaboard Air Line shops combine the advantages of the longitudinal and cross track types by the use of a separate shop for removing locomotives from their wheels. This scheme has also been adopted by the Chicago & Northwestern at its new Chicago shops.

The specifications for railway electrical equipment often impose impossible conditions and the requirements should therefore be standardized to some extent. For example, there is no general agreement in regard to the temperature limit and overload for generators, and railway requisitions should follow the recommendations of the American Society of Electrical Engineers. In the power plants for large railway shops the reciprocating engine has become almost obsolete. Turbines are now quite generally used and the total cost of the turbine and generator is less than that of the cross-compound engine and generator. Where the older shops have been equipped with direct current motor and reciprocating engines, in some instances the current for extensions has been provided by the use of exhaust turbine using the waste steam from the reciprocating engine.

Returning to the motor for tools, Mr. Totten said that the automatic stopping and starting of d. c. motors is found necessary on account of the rough usage they get when such fixtures are not provided, and on most new equipment push button control is now used for starting machinery and it is sold at a comparatively low price. For driving wheel lathes the hard spots in the tires often require a rapid change in speed, and devices for accomplishing this electrically are also in use.

In regard to wiring of shops, the general practice now is to use conduits throughout. For shop lighting the carbon arc lamp is now obsolete and present methods employ the flaming arc lamps and the filament lamps. Mr. Totten's suggestion from the manufacturer's point of view was that if equipment is ordered without full knowledge of the latest improvements which the manufacturers provide, only standard equipment will be obtained, and it would be an advantage by possible conference with the manufacturers' engineers to obtain improved equipment which would include the later refinements.

The same subject of electrical shop equipment was also discussed by F. H. Herszsh, of the Westinghouse Electric & Manufacturing Company, who said that it was often a question whether it was best for the railways to put up an expensive power house for generating current or to purchase it from some other central power plant. This would avoid a large investment for the building and equipment, the service would be reliable, and there would be simplicity in the bills for the power supply and the bookkeeping would be easier to check. It would then be easily possible to compare the power consumption with the locomotive output at various times. In car shops the tools required for steel cars are usually of variable speed and require direct current motors, and this is true to the extent of 40 to 50 per cent. of the total power consumption.

The numerous advantages of direct driven tools were pointed out. They avoid the loss due to the friction of driven shaft, the elimination of belts and the loss due to their slipping, and numerous other troubles found with belting, especially the accidents to workmen. One of the principal advantages of direct drive is the possibility of checking by a graphic meter in the foreman's office the power required for operating tools and the time when they are in use.

Next followed a discussion on car illumination by A. J. Sweet, of the Holophane Company, who spoke at length in a very interesting and instructive manner. He explained the latest views in regard to illumination as applied to power requirements. He said it was the first duty of the engineer to harmonize different requirements. The three major requirements in car lighting are, first, comfort to the passenger; second, artistic effect, and third, efficiency. Ocular discomfort is due to the vision of the light source, but it is not necessary to entirely envelop the lamp, and a bowl shape reflector is often sufficient. Eye fatigue is due also to vision of light and not necessarily to indirect reflected light. The efficiency of lighting in cars is largely effected by the color of the head lining in the upper deck and on the sides of the car and by the windows and dark color finish generally which absorbs large percentages of light; in fact, in railway cars nearly all the conditions are in the direction of maximum inefficiency. He also made the surprising statement that light walls are unfavorable to eye efficiency. The round upper decks of some steel cars now used in this country are more favorable to good illumination than those with the upper deck. For a time it was thought that indirect lighting would be found a very satisfactory improvement for car lighting, but it is found to be only 25 per cent. efficient, and on account of the limited production of light in cars, it is not now regarded as feasible. It depends largely on clean reflectors, and for proper illumination it would require these reflectors to be cleaned every 500 miles run. The advantage of indirect lighting does not lie in the fact that the source of light is concealed but rather to the multiple direction of the reflection.

The minor requirements of car illumination relate to their advertising value and to maintenance. The maintenance cost is affected largely by the expense for reflectors, and the sockets for these should be such that the reflectors can be easily removed and cleaned, and it might be possible to have duplicate sets of reflectors, so that new sets could be put in while the others are being cleaned.

A second paper on car lighting was read by L. Schepmoes, representative of the Safety Car Heating & Lighting Company. This related to the design and location of car lighting fixtures and was an interesting discussion of the artistic features of lamps. Mr. Schepmoes presented nine handsome photographs showing the latest designs for center lamps made by his company. He said that cheap fixtures should be condemned. The appearance of the lighting fixtures is important in day time as well as at night, and the color of these fixtures is important and should not necessarily be the same as the car interior, but some contrasting color in the fixture should be permitted. Lamp fixtures should be carefully designed on artistic lines and excessive ornaments should be avoided. A question of which is best, to locate the lamps in the center of the main deck or in the lower deck, is one upon which there was not general agreement, but Mr. Schepmoes was in favor of center

lamps. The most attractive fixtures in use are those which use the enclosed bowl. With the indirect lighting many attractive effects from an artistic standpoint can be produced, but it is not an efficient method. The importance of proper shades and reflectors is now greater than formerly, because much stronger illumination is used and the intense glare effects produce a corresponding discomfort. Polished surfaces have a bad effect on illumination and should be avoided where possible.

The next subject discussed was the method of axle generator control, constant current against constant potential. This subject was discussed by representatives of axle car lighting companies, and it was pointed out that in the present state of the art it is not possible to adopt either system, that of constant current or constant voltage regulation, and the attempts to effect operation under either condition would fail. Variable speed is a fortunate thing for charging batteries from axle lighting and it remains for the engineer to take advantage of this fact. It introduces effects which must be provided for and both the battery and the generator should be properly protected. It might be best to regulate for the benefit of the battery, but it might not be most economical for the railway or best for the lighting, so that a compromise under present conditions is necessary. Various schemes have been suggested for apparatus which are intended to regulate upon either of these plans, but they have not yet been fully worked out. At present regulation by voltage was decidedly the simplest method. The further discussion of this subject completed the afternoon session and the meeting adjourned.

MEETING OF M. C. B. EXECUTIVE COMMITTEE.

The executive committee of the Master Car Builders' Association met yesterday after the convention adjourned. Secretary J. W. Taylor was re-elected, and F. W. Brazier (New York Central), was named to succeed E. D. Bronner (Michigan Central), on the arbitration committee, Mr. Bronner having resigned from that committee.

The executive committee decided to meet early in July to appoint the committees for the ensuing year, and an attempt will be made during the next year to get the reports out earlier than in the past.

ILLINOIS ALUMNI DINNER.

The following attended the University of Illinois alumni dinner held last evening at the Hotel Shelburne: Gilbert E. Ryder, Locomotive Superheater Company; J. A. McFarland, Chemist and Engineer of Tests, St. Louis & San Francisco; Grant W. Spear, Dearborn Drug and Chemical Works; F. H. Clark, G. S. M. P., Baltimore & Ohio; C. B. Young, M. E., Chicago, Burlington & Quincy; J. A. Kinkead, Parkesburg Iron Company; J. A. McRae, M. E., Michigan Central; George R. Carr, Dearborn Drug and Chemical Works; R. M. Smith, Burton W. Mudge & Company; Prof. E. C. Schmidt, University of Illinois; W. C. Bradbury, O. M. Edwards Company; Frank W. Bunne, Roebling Company; A. A. Hale, Griffin Wheel Company; A. S. Goble, Standard Steel Works Company; Parker G. Stevens, Railway and Engineering Review.

A line is projected from Soochow, on the Yangtse River, China, to Hangchow, the capital of the Province of Chekiang, a distance of 60 miles.

Surveys have been completed from Wuchow, China, to Konghow, on the proposed line from Wuchow to Nanning. Konghow is very near Nanning. The line when completed will be 360 miles long.

TO-DAY'S BASE BALL GAME.

The annual base ball game will be played at the Pennsylvania Railroad's Inlet Park grounds this afternoon at 3 o'clock. The parade will be formed at the entrance to the Million Dollar Pier at 2 o'clock, and will proceed from there up the Boardwalk to South Carolina avenue, where trolley cars will be taken to the grounds.

The committee in charge of the game is composed of George W. Wildin, manager of the eastern team; F. M. Nellis, manager of the western team; Leonard J. Hibbard, Harry S. Hammond, E. F. Chaffee, George R. Carr and J. P. Landreth.

The mascot of the western team will be Master Charles Gossett, Jr., son of C. E. Gossett, general master mechanic of the Minneapolis & St. Louis, and the mascot for the eastern team will be Master Elliott A. Telford, son of Andrew Telford, purchasing agent of the Queen & Crescent.

The batting orders are as follows:

EASTERN TEAM.

Right field	Clifford Beaumont (B. & O.).
Short stop	Leonard J. Hibbard (L. J. Hibbard Co.).
First base	George W. Wildin (N. Y., N. H. & H.).
Second base	T. P. O'Brian (O. M. Edwards Co.).
Left field	Al Engle (Jenkins Bros.).
Third base	Sheldon C. Potter (Reliance Electric & Engineering Co.).
Center field	Melon C. M. Hatch (D. L. & W.).
Catcher	Arthur W. Byron (P. R. R.).
Catcher	Harry Oviatt (N. Y., N. H. & H.).
Catcher	John Randolph (Franklin Railway Supply Co.).
Pitcher	Harry Bradford (Westinghouse Air Brake Co.).
Pitcher	Harry B. Oatley (Locomotive Superheater Co.).

WESTERN TEAM.

Short stop	J. E. Tarleton (Union Draft Gear Co.).
Second base	Stanley W. Midgley (Curtain Supply Co.).
Center field	Neil W. Snow (Detroit Twist Drill Co.).
Pitcher	Elmer J. Smith (W. C. Baker Car Heater Co.).
Catcher (or c. f.)	Harry S. Hammond (Pressed Steel Car Co.).
First base	C. L. Schwartz (St. Louis Refrigerator Car Co.)
Right field	H. C. May (C. I. & L.).
Catcher (or l. f.)	A. J. Odegaard (Spencer Otis Co.).
Left field (or c.)	J. H. McCloy (Zug Iron & Steel Co.).
Third base	J. E. Fleming (National Tube Co.).
Catcher	R. L. McIntosh (McCord & Co.).
Left field	E. B. Van Patten (Murphy Varnish Co.).

The umpires will be: W. E. Cade (Frank A. Barbey Co.), for the East, and George Cooper (Frost Railway Supply Co.) for the West.

T. D. O'Brian will be captain of the eastern team and Harry Hammond of the western team. Our sporting editor interviewed the rival leaders yesterday, and found each in a mood of the most buoyant optimism regarding the merits

of his own aggregation, and of corresponding contempt for the opposition.

Quoth—

Captain O'Brian—I figure the game will go about five innings, although the West may blow up even sooner than that. I have had some trouble holding my men since they saw the line up of the other team; they protest that they signed up to play ball, not to teach the rudiments of it to such unpromising material. But I have persuaded them to come out and act just as if they were playing against nine real ball players. I am particularly anxious to make it look like a regular game, instead of warming up practice. For this reason I shall make it a point to have nine men on the field each inning, instead of using only an infield.

Captain Hammond—I have done my best, by spreading reports of our need of players, to instill enough confidence into the eastern team to insure their coming out to the field, at least. It is now no secret that I have had for months the finest aggregation of ball players ever gathered on this or any other planet. This is a conservative statement, and I make it only after a painstaking study of the history of the game. Their experience in many climes and under all conditions of service is a guarantee of their ability to continue in action under the most trying circumstances. Even though convulsed with merriment at the efforts of the opposing team, they will still play ball.

FOREIGN RAILWAY NOTES.

Construction work will be pushed forward rapidly on the line from Chengtu, China, to Chungkiang, 200 miles. This line will form a portion of the proposed Hankow-Szechwan system

One of the chief features of the present railway policy of the Chinese government seems to be the disposition to take over all railway enterprises which have been undertaken by private capital, but which have been unduly delayed in execution. For example, the recent troubles in the Chekiang railway led the government to step in and announce that it would take over the entire enterprise. The company is reported to have sent a representative to Peking to change the determination of the government, but at last accounts the latter was adhering to its decision. Similar action has been taken in a number of cases, and it has been announced by the board of communications at Peking that all railway-building privileges granted to private interests must be put into operation during the present year or the government will take them over. However, the Chinese gentrymen interested in building roads with Chinese capital find it difficult to raise the money. Unfortunately, the fact that some of the railways already in operation have been ill managed or have been operated under conditions that render it impracticable to secure fair returns on the Chinese capital invested in them is a constant discouragement. That present conditions in the railway situation of China can continue indefinitely is impossible. The pressure from the people in favor of railway construction, taking the country as a whole, is growing. The demands of trade in the interior are becoming more pronounced in favor of rapid, safer, and better communication. Throughout China, particularly in the districts accessible to coast ports, improved means of communication are being brought into use, such as motor and steam boat services on the rivers and canals, and in some localities improved roads and automobile service. These improvements are accentuating the need and the advantage of railways, and public sentiment is slowly but surely preparing for great railway development.—*George E. Anderson, American Consul General at Hongkong.*

Conventionalities.

"Senator" Brazier! How unkind, and to an ex-president.

If in doubt as to the proper way to oil a wheelbarrow, ask Stanley Bullard.

F. M. Egolf, of the Curtain Supply Company, is attending his first convention.

Herman Josias, purchasing agent of the Cuba Railroad, is attending the convention. He is registered at the Shelburne.

The Davis brothers are more famous than they were a year ago; and the best part of it is that they use their own ladder to get there.

The enforced separation of Wilkinson and Jack Turner is really pitiful. Everything possible has been done to pacify "Wilk," but without result.

A. Herrera, purchasing agent of the National Railways of Mexico, is at the Traymore. Mr. Herrera is accompanied by his assistant, William Wybel.

Mr. and Mrs. Burton W. Mudge and Master Burton Mudge, or "Junior," as he is familiarly known, arrived from Chicago Thursday evening, going to the Brighton.

George C. Jerome, president of the Jerome Metallic Packing Company, is confined to his home by illness. He had made all arrangements to attend the conventions.

Miss Nancy Jane Simpson, daughter of William M. Simpson, president of the Railway Materials Company, was married Tuesday evening in Chicago, to Clifford Potter.

Mr. and Mrs. R. J. Evans will be missed during the remainder of the convention. They were unexpectedly called home owing to the serious illness of Mrs. Evans' father.

Grafton Dodd, of the Virginia Equipment Company, was taken with an acute attack of tonsilitis on Wednesday and was compelled to leave for home at once.

D. A. Wightman, formerly manager of the Pittsburgh Locomotive Works, now retired, is among the guests at the convention. He is stopping at the Shelburne.

J. T. Ensign, chief inspector railroad department Interstate Commerce Commission, is attending the meetings of the associations. He is at the Monticello Hotel.

Robert F. Carr, president of the Dearborn Drug & Chemical Works, was compelled to cancel his Atlantic City reservations on account of unforeseen business matters.

We move that the nominations for president and vice-president of the Railway Supply Manufacturers' Association be closed, and that Messrs. Allen and Hegeman be declared elected unanimously.

Admirers of the "Turkey Trot," "Texas Tommy," the "Kangaroo Glide" and other modern classics, will be completely carried away with Stanley Bullard's "Boardwalk Wiggle."

A. E. Ostrander, assistant mechanical engineer of the American Car & Foundry Company, arrived Thursday with Mrs. Ostrander and their two children. They stayed only the M. C. B. convention.

Friends of O. C. Cromwell, mechanical engineer of the Baltimore & Ohio, are glad to see him about again. A bad case of ptomaine poisoning confined him to his home for several weeks this spring. He is now fully recovered.

F. W. Brazier talks "turkey trot." He frankly admits that official stenographers generally find trouble in taking down his remarks. After reading in Friday's DAILY what was credited to him on Thursday, he has promised to try to reform.

W. M. Barrett, president of the Adams Express Company, registered at the Marlborough-Blenheim Thursday and attended the meeting of the M. C. B. Association. Later



Wells Harris, General Foreman Car Repairs, New Haven, Fleeing from the Camera Man.

in the day he made a rather complete inspection of the exhibits.

W. W. Clements, of the Industrial Works, is very much interested in these, his first M. C. B. and M. M. conventions. He arrived from Bay City, Mich., Wednesday, and will re-



Left to Right—John L. Hodgson, M. C. B. Grand Trunk, and Alfred Copany, Grand Trunk.

main during next week. Mr. Clements is making his home at the Shelburne.

It is strange how far we can sometimes go wrong in sizing up a man. Most of us received a jolt yesterday when C. A. Scroyer modestly affirmed that he had not only never asked for an increase in salary, but that he never started in on a job knowing just how much compensation he was to receive.

Among the special guests is O. S. Beyer, Jr., of the Chicago, Rock Island & Pacific. Mr. Beyer was formerly on the Erie and had a very active part in the lengthy studies that led up to the design of the very powerful Mikado type locomotives which are giving such excellent service on that road.

C. H. Cory, former master car builder of the Cincinnati, Hamilton & Dayton, at Lima, Ohio, sends his greetings to his friends, through THE DAILY, and his regrets that he will not attend the conventions this year. Mr. Corey and family will enjoy the "good old summer time" in the Wisconsin woods.

J. H. Regan, assistant secretary of the Pressed Steel Car Company, arrived Thursday evening. He is staying at the Marlborough-Blenheim. Mr. Regan usually manages to steal away from the conventions within a day or two after



F. W. Brazier, Superintendent Rolling Stock, New York Central.

getting there; but this year it is expected that he will stay until the last gun is fired.

H. M. Perry, known as one of the oldest of the old timers at the convention, was found in tears at the end of the pier on Thursday afternoon. A careful search of the Dailies revealed the absence of official notice of his arrival two days before, hence the dejection of friend Perry. He is here, was here early, and expects to remain until the convention is over.

Henry Gardner, supervisor of apprentices on the New York Central & Hudson River, came down Thursday afternoon with Mrs. Gardner in order to be sure to be present during the discussion of the apprenticeship paper on Friday. In addition to his regular duties, he has been busy during the past few months in putting in a successful schedule at the West Albany shops.

J. D. Murray, from Christmas Island—13,000 miles from Atlantic City—left last night for Winnipeg. He expects to meet his brother-in-law, George McMicken, who has been on Christmas Island for five years, and will go to London with him in July. Mr. Murray will complete a railway 8 or 10 miles long on the island within the next year, and will equip it with a couple of Shay locomotives and 30-ton steel freight cars.

H. T. Bentley, assistant superintendent of motive power of the Chicago & North Western and president of the Master Mechanics' Association, arrived yesterday, accompanied by Mrs. Bentley. Mr. and Mrs. Bentley are at the Marlborough Blenheim. Important business at home kept Mr. Bentley from attending the convention of the M. C. B. association except on the last day.

W. E. Dunham, of the North Western, and Henry La Rue, of the Rock Island, got into quite a heated discussion Thursday evening about the action which was taken on one of the reports that was read on Wednesday. Fortunately a copy of Thursday's DAILY was near at hand, which settled the matter conclusively; and they both shook hands and called the fight off.

When the baseball game ends to-day Stanley Midgly (in his ball uniform "Midge") will have played at the conventions ten consecutive years, in three of which he was captain of the winning Western team. He has played two years at Saratoga, one at Manhattan Beach, and six at Atlantic City;



Left to Right—F. R. Frost, Electrical Engineer, Santa Fe; F. E. Hutchison, Chief Electrician, C. R. I. & P.; Jos. A. Andreucetti, Assistant Electrical Engineer, C. & N. W.

and the indications are that he will keep right on playing as long as the game lasts.

Rodolph Germar, a mechanical engineer connected with the Ringhoffer Car Building Company, Prague, Austria, is attending the convention after a month's trip spent in visiting car building plants in the United States. The company in which Mr. Germar is interested turns out about 3,000 freight and 400 passenger coaches a year. The Ringhoffer works are now running to their full capacity for the first time in several years.

D. P. Kellogg, superintendent of shops on the Southern Pacific at Los Angeles, Cal., is attending the convention for the first time. He came by way of New Orleans and St. Louis and it took him a full week to travel the 4,000 miles. Friends of the two brothers are commenting on the close resemblance in appearance, the most notable difference being that W. L. Kellogg, superintendent of motive power of the Pere Marquette, has a mustache.

C. W. Cross, superintendent of apprentices of the New York Central Lines West of Buffalo, was missed in the discussion of the paper on car department apprentices yesterday. He was prevented from attending the convention because of the illness of one of his sons, which made an operation necessary. The young man is said to be well on the way to recovery. Mr. Cross expects to make a trip to Yellow Stone Park shortly after the season opens.

Clarence Parker, vice-president of the Illinois Central, in



Two of the Old Guard—John S. Lentz, M. C. B. President, 1895 and 1896, and J. J. Hennessey, M. C. B. President, 1902.

charge of purchasers, accompanied by M. K. Barnum, general superintendent of motive power of the same road, made a thorough inspection of the exhibits yesterday morning. Mr. Parker is stopping at the Marlborough-Blenheim and will remain



J. F. Walsh, S. M. P., Chesapeake & Ohio.

several days. The Illinois Central will build 50 Mikado, 20 Pacific and 10 switching locomotives, to be followed by 15 Mikado locomotives for the Central of Georgia.

G. Edmund Strattan arrived Friday and is receiving the congratulations from his friends on his recent promotion to the position of inspector of passenger equipment of the Pennsylvania, with headquarters in the office of the superintendent of passenger transportation, Philadelphia. Mr. Strattan is the son of G. W. Strattan, formerly master mechanic of the Pennsylvania at Altoona. Mr G. W. Strattan, who retired six years ago, arrived in San Francisco June 3, completing a trip around the world.

Fourteen thousand miles of travel to attend the M. C. B. and M. M. conventions is the record, and one that will probably stand for some time. Two natives of Japan have made the journey to Atlantic City and will remain through both conventions. They are Mr. Osawa, mechanical engineer of the South Manchuria Railway. and Mr. Minowa, manager of Mitsui & Company, Ltd., Darien. They attended the convention meetings accompanied by Arthur Haller and Charles Muchnic, of the American Locomotive Company, and Mr. Tesheima, of the railway department of Mitsui & Company, Ltd., New York office.

The following telegram from the superintendent of motive power of the Grand Rapids & Indiana was received by Mr. Gardner in due course yesterday morning and, likewise, in due course, was charged to Mr. Gardner's account with the hotel:

Grand Rapids, Mich., June 13-12.

J. T. Gardner, Marlborough Blenheim, Atlantic City, N. J.:

Refuse to start without protection is promised from Riley, Arp, McCarthy and the other porch climbers. Providing these people are driven from the island, I will come on at once. Buhuoup and McCandless are included in list.

J. E. Keegan.
3:35 A. M."

The question is, where was Keegan at 3.35 A. M.?

L. C. Fritch, chief engineer of the Chicago Great Western, accompanied by Mrs. Fritch, is at Chalfonte. Mr. Fritch came here to attend a meeting of the engineering sub-committee of the Special Committee on Relations of Railway Operation to Legislation. He is chairman of the sub-committee, and the other members are George W. Kittredge, chief engineer of the New York Central; W. L. Darling, chief engineer of the Northern Pacific; and C. A. Morse, chief engineer of the Santa Fe System. The meeting, which was held at Chalfonte at 10 o'clock yesterday morning, was called for work on a report on the rail situation which the sub-committee is preparing for the special committee. Senator Clapp, chairman of the United States Senate Committee on Interstate Commerce, was asked for information as to the number and causes of rail failures and breakages in 1911, and the special committee has been instructed by the railways it represents to furnish the desired data.

S. P. Bush, president of the Buckeye Steel Castings Company, is among the convention visitors. Mr. Bush recently has been taking much interest in the question of federal legislation to permit reasonable agreements between competing railways in regard to rates and competing industrial concerns in regard to prices, and which will also clear up the legal status of labor organizations. He was a witness before a congressional committee that held hearings on the subject a short time ago, and subsequently issued a pamphlet outlining his views. He is a firm believer in, and a vigorous, able advocate of some form of legislation that will legalize agreements which will eliminate cut-throat competition and at the same time be hedged about by restrictions which will amply protect the public against monopoly and its attendant evils. If more business men of Mr. Bush's standing would take the active and intelligent interest that he does in public questions of this kind, instead of leaving them to be dealt with so largely by lawyers and politicians, the results in the long run would be much happier both for business interests and the public interests.

The Exhibit.

The safe ends used by the Oxweld Acetylene Company in its demonstration of flue welding in the acetylene annex at the pier end are genuine charcoal iron supplied by the Parkesburg Iron Company, Parkesburg, Pa.

During the past year large additions have been made to the plant of the Haskell & Barker Car Company at Michigan City, Ind. The additions consist of truck and erecting shops with steel frames and traveling cranes suitable for the construction of steel freight cars; also a new power house with electric generator for light and power transmission. The plant now occupies 150 acres and when in full operation will have a capacity of 100 cars per day. The older shops are well equipped for making wheels, axles and forgings, so that the plant produces all the details necessary for freight car construction excepting couplers, air brakes and springs.

The Edison-Beach storage battery car will be in regular operation, leaving Boardwalk and South Carolina avenue daily, at 10 a. m. and 3 p. m., for Ocean City and return. The car is in charge of R. H. Beach, president, and Le Roy Scott. Special trips may be arranged for those visitors to the convention who desire to make a special study of the car, if they will apply at booth 627 on the pier. The car arrived in Atlantic City Thursday, from Silver Lake, N. J., 175 miles, and made an average speed of 32 miles an hour. The current consumption was 460 ampere hours for the entire trip. This is equivalent to 663 watt hours per car mile, or 33 watt hours per ton mile.

The seamless tube is regarded as necessary for superheater elements, and most of those used heretofore have been cold drawn. The operation of drawing tubes cold is so slow that the product is necessarily more expensive than is that of hot drawn tubes. The principal requirement is, that the tube shall be seamless; and a hot drawn seamless tube should answer all purposes and it can be made much more rapidly. For these reasons the National Tube Company, Pittsburgh, Pa., is now making hot drawn seamless tubes for locomotive superheaters, and they have on exhibition a lot of samples of finished tubes and of pieces which have been severely tested to show the good qualities of this product.

Two trucks, with a new design of cast steel side frames are being shown in the booth of the Scullin-Gallagher Iron & Steel Company, Spaces 153-159. The top half of the journal box is cast integral with the side frame, which gives a truck with a minimum number of parts and from which the bolster or wheels can be quickly and easily removed anywhere, without dismantling the truck. One truck also shows a new method of construction in that the spring plank and column guides are made in one solid steel casting, giving a very rigid truck. There are also on exhibition cast steel truck bolsters, a cast steel double body bolster, a one-piece cast steel six-wheel passenger car truck frame and the Durbin safety coupler.

GOLD THERMOSTAT FOR CAR HEATING.

The Gold Car Heating & Lighting Company, New York, is exhibiting a very simple thermostat for railway car heating. It consists of a hydrostatic transmission of the motion produced by the evaporation and condensation of an exceedingly volatile liquid to the cut-off valve in the supply pipe. The volatile liquid, which is very sensitive to slight changes of temperature, is enclosed hermetically in a narrow space between two corrugated discs. One of these is rigid and

the other flexible, moving in and out according as the pressure, generated by the volatile liquid, rises or falls with the temperature inside the car. The movable disc bears, at its center, against one end of a lever whose other end presses on the center of a smaller disc forming one side of a small hermetically sealed circular chamber, which is filled with a non-freezing liquid. This space is connected with a similar one, whose movable disc has a bearing against the stem of the cut-off valve; and as the liquid flows from one to the other, the valve is opened or closed.

The method of operation is as follows: The thermostatic disc chamber is adjusted by means of a screw so that the movable disc bears with more or less pressure against the transmission lever. This is to adjust the apparatus to maintain the desired temperature in the car. As this temperature rises, the liquid in the regulating disc is volatilized and increases the pressure within. This pushes out the movable disc and, acting on the lever, compresses the disc of the hydrostatic chamber and causes the non-freezing liquid to flow through the small pipe connection to the chamber whose movable disc operates the cut-off valve, causing the latter to close.

As the temperature falls, the volatile liquid is partially condensed, the pressure within the regulating disc falls; the non-freezing liquid is forced back to its original position by the spring tension of the hydrostatic chambers, and the cut-off valve is again opened, admitting steam to the supply pipes of the car.

It is the intention to place one of these thermostats on each side of the car so as to secure an independent regulation, and thus tend to equalize the temperature.

This device is absolutely automatic in its regulation of heat and requires no attention whatever from trainmen.

STEEL COACH INTERIOR FINISH.

The advance in the art of steel coach interior finish is shown markedly in the booth of the Hale & Kilburn Company, Philadelphia, Pa. Among other things, they are exhibiting a finished section of a car now in use on the New York Central Lines, which has the new feature of adjustability, combined with perfect insulation. The recent improvements in metal sash having screwless and interlocking metal beading is also to be found, as well as the latest development in steel coach doors represented in various types, so finished as to be indistinguishable from wood. Various types of the imperial steel frame "Walkover" car seats are shown, including the special standard seats of the Pennsylvania Railroad, Harriman Lines, New York Central, and New York, New Haven & Hartford Systems.

OIL ENGINES FOR WATER STATIONS.

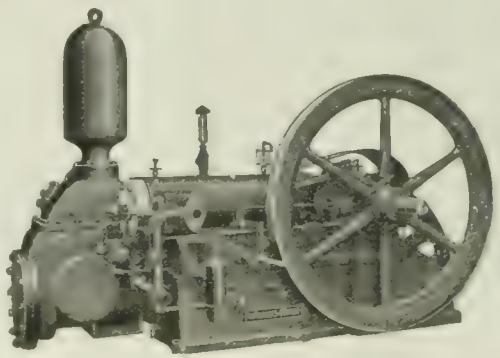
The great economy of engines operating on oil for water station service is illustrated by the following data regarding a short running test made with a 10 h. p. Fairbanks-Morse combined pumping outfit.

No. hours run	7.5
Gal. [illegible]	118,076.5
[illegible]	6.1
[illegible]	138
Gal. [illegible], total	[illegible]
Gal. of oil used per M. gal. water	.0846
Gal. of oil used per hour	1.332
Gal. of oil used per BHP per hr.	.1332
Cost of oil per hr.	0.0333
Gal. of water pumped per hr.	15,743.5
Gal. of water pumped per min.	262.4
Gal. of water pumped for one cent's worth of fuel	4,727.6
Cost of fuel per gal.	$ .025
Fuel cost per 100,000 gal. pumped	$ .2115

The gasoline engine has demonstrated in many instances that it can easily hold its own with a steam pumping plant even where the cost of fuel for operating the steam plant is quite low. This is largely due to the advantage the gasoline outfit has in the matter of attendance. With the reduction in fuel cost in the case of an oil engine over the gasoline engine, the steam plant is even more heavily handicapped.

Attendance cost with the steam plant must always be heavy, as compared to the plant operating on oil, since the latter is entirely automatic in operation after being started. The waste of fuel in getting up steam, plus the loss after the plant is shut down, also figures against the steam plant. The chief feature is, of course, the very low efficiency of the small steam plant, and unless the fuel cost is very low, this item alone makes its operation costly.

The initial cost of an oil operated combined pump will as a rule, be less than that of a steam plant of equal



Fairbanks-Morse Combined Oil Engine and Pump.

capacity, and its compactness will make the matter of installation less expensive. From the standpoint of depreciation, figures will in the majority of cases, favor the oil outfit as, with reasonable attention, the yearly cost of repairs, etc., will be small.

A point that strongly favors the type of engine illustrated is its ability to operate successfully and develop full rated power on nearly 70 per cent. of the refined products of crude oil. This covers fuels ranging from gasoline down through kerosene and into the low grade power distillates.

The fact of greatest significance to the railway man in connection with oil engine operation is the constantly increasing demand for the lighter oils for automobiles, marine engines, etc., which means a constantly increasing production of the lower grade and cheaper oils.

BRASS SASH FOR PASSENGER CARS.

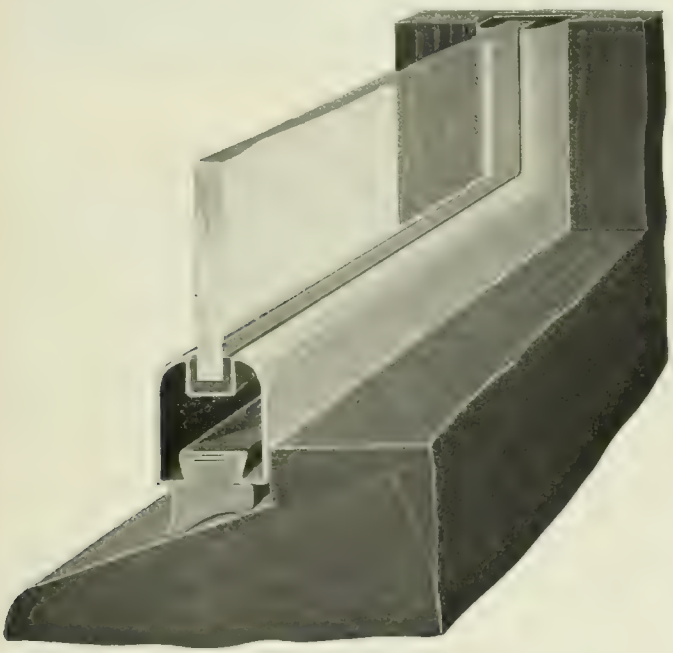
Detailed and accurate figures have been obtained from various railway systems covering the initial cost, together with that of maintenance and replacement, of wooden sash in passenger cars. It was found that during the life of the car, three sets of wooden sash were required, the first sash needed replacing somewhere between the eighth and twelfth year.

At the end of the first year the wooden sash requires only light repairs, including cleaning, revarnishing, reapplying and adjusting in the car. These repairs for the first year run over $25 a car. At the end of the second year the sash are subjected to a general overhauling, including cleaning and revarnishing, the expense amounting to about $50 a car. For five or six years the figures will average from $40 to $65, at the end of which time the sash will have greatly deteriorated and require extensive repairs, including

replacing of parts. These heavier repairs range from $65 to $100. The replacement of the wooden sash at the end of approximately ten-year periods will cost considerably over $200 a car. Taking actual figures, it is found that the total cost of wooden sash in a coach, including maintenance, repairs and replacements, during a period of thirty years, will amount to somewhat over $1500.

In comparison with this, the brass sash now being introduced require little attention. They are oxidized by the atmosphere to a permanent and pleasing finish and do not need varnishing or painting. There is saved, therefore, the cost of removing the sash and replacing it in the car. The brass will not deteriorate like wooden sash, nor become loosened at the joints, and will not become swollen or warped, and do not bind in the window grooves. If brass sash ever become injured in an accident, they possess a very substantial scrap value.

Furthermore, with the brass frame, it is possible to make the rails very much narrower. With the same outside dimensions of sash, therefore, there can be obtained more light in the car. The larger glass also has the effect of adding very materially to the pleasing appearance of the car. If a larger glass is not desired, then correspondingly smaller outside dimensions of window can be used, permitting the use of wider posts between the window openings.



Forsyth Brass Sash with Rubber Bottom Weather Strip.

A perspective and cross sectional view of the bottom of a brass sash equipped with a combined weather and bottom cushion rubber member, is illustrated herewith. This sash is furnished by Forsyth Brothers Company, Chicago. As shown, the upper portion of the rubber is encased in a channel retaining strip. The rubber and its strip are held by a dove-tail insertion in the groove in the lower edge of the sash. It is more difficult to obtain tight and dirt-excluding contact along the bottom of the sash and the window sill than between the sides of the sash and the window grooves In the latter there are two side walls, around which it is necessary for the air and dust to pass before being able to enter the car, whereas in the former there is only one rear wall and the sill, being on an incline, invites the wind and dirt to shoot up in the car.

The bottom rubber cushion on this sash is provided on its under side with a concave surface, which automatically adapts the sash to any variations in the longitudinal alignment of the sill such as camber of the car, or where the sill is not at right angles to the post, as well as to variations in the incline of the sill.

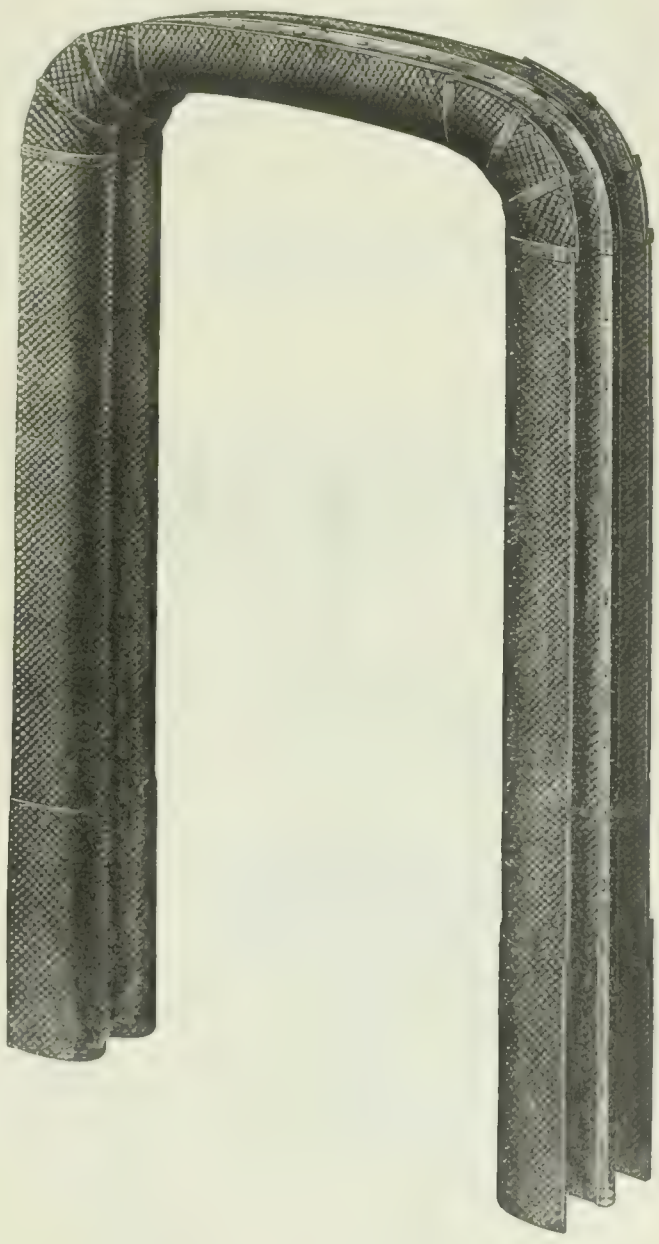
This cushion also breaks the jar of the sash when it is dropped or violently lowered, thereby greatly reducing the glass breakage.

This style of brass sash can be furnished in any shape desired. It is on exhibition at Booth No. 545.

ACME SECTIONAL DIAPHRAGM.

A car diaphragm that does not require a supplemental hood and is made in valleys of U-shape instead of the customary V-shape, thus having no sharp corners to catch cinders and retain moisture, is being made by the Acme Supply Company, Chicago.

The diaphragm is made of heavy three-ply cotton belting



Acme Sectional Diaphragm.

in three sections, one at the bottom of each leg, and the third making up the arch and upper part of the legs. A 20-in. expansion is provided with but two folds, which are bound together by a continuous brass binding around the outside. These two folds are secured by only a single row

of stitching and the real binding is accomplished by this brass channel, which caps over the edges of the belting. The legs of the channel are rounded out at the extremities so as to prevent any possible cutting at this point. It is securely fastened by large brass staples passing through both legs of the channel and the two pleats. These are bent over on the opposite side and securely anchored, and are located at 6-in. centers.

Instead of using a supplemental hood, this diaphragm is provided with a double thickness at the top. The top piece is made of fireproof and waterproof material, and the whole construction is practically self cleaning by the suction of air caused from the moving train. The boot is 24 in. high and extends 4 in. above the bottom of the leg portion of the diaphragm proper. It is placed inside the leg to provide lap and drainage, and has the warp of the belting running at right angles, thus adding greatly to its strength. It is not rigidly connected to the leg proper and does not have a tendency to draw up from the buffer plate at the inner folds.

This diaphragm is made in either the ordinary Pullman shape or the apex shape, the latter to be used when only one buffer spring is provided. It can be inspected in space 572.

MALLEABLE IRON HAND BRAKE FITTINGS.

The National Malleable Castings Company, Cleveland, Ohio, has recently placed upon the market some new malleable iron brake fittings for both square and round brake shafts. The special feature of these new fittings is their adaptability to both the square and round brake shafts, which gives a more substantial arrangement than is obtained with

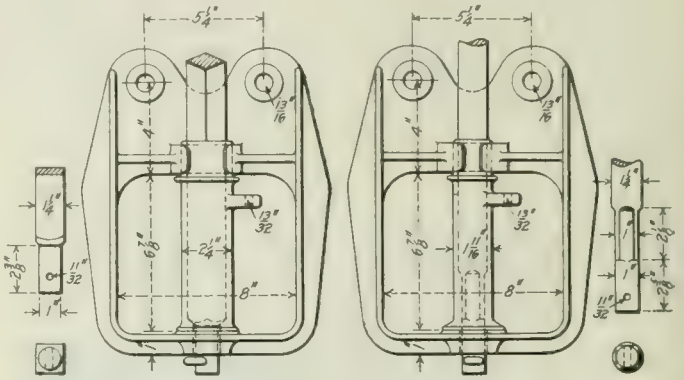


Square Brake Shaft with Malleable Fittings.

the ordinary brake shaft. In considering the advantages of the square brake shaft, the illustrations show the ratchet wheel fitting over the shaft without any pin or keyway to hold it in position. A retainer cast on the ratchet plate holds the ratchet wheel in place, preventing it from rising and thus disengaging the brake pawl. The ratchet wheel may be applied to the shaft at any point, and it is not necessary to machine or weaken the shaft in any way to apply it.

Fewer pieces are necessary with this installation than with the round shaft, and as the wheel bears on the ratchet plate, there is no weight on the brake shaft itself. The brake chain winds on a sleeve that fits over the lower end of the shaft. This sleeve has a square fit on the shaft and turns with it. It is held in place on the brake shaft step by malleable iron lugs which are bent around the upper end of the sleeve after it is put in place. The line drawing shows the work necessary on the end of the brake shaft.

In the case of the round shaft, the ratchet wheel is attached as usual by means of a small key; but a separate



Square and Round Shafts with Malleable Iron Winding Sleeve.

winding sleeve is placed on the end of the shaft as in the case of the square shaft. With this shaft more work is necessary as the end of the shaft is squared, as shown in the illustration, to receive the winding sleeve. However, the principle of reducing the weight and wear of the shaft is the same in both cases. Material used for the round shaft may be taken from any ordinary round iron,, such as old truss rod material, and there is no necessity of keeping any special stock on hand. By using the winding sleeve on the bottom, the strength of a 1¼-in. round shaft is greater than the regular 1½-in. shaft with 9-16-in. hole for the brake chain attachment.

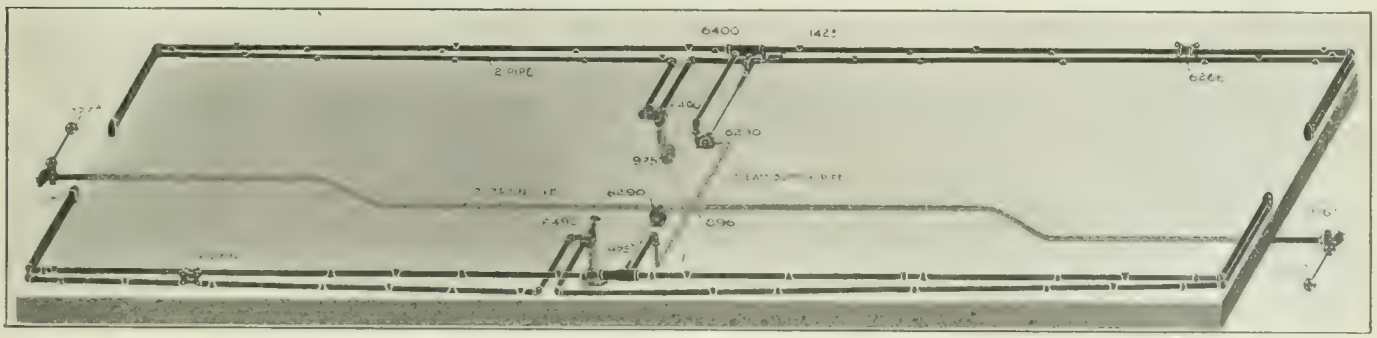
THERMO JET CAR HEATING SYSTEM.

Several new features of the Thermo jet car heating system are shown in the exhibit of the Safety Car Heating & Lighting Company, New York. The claims made for this system are that it saves 40 per cent. in steam and fuel consumption; that it gives a sufficient range of temperature to ensure comfortable car heating with any outside weather conditions; that it saves in the amount of pipe necessary for radiation; and that it reduces the amount of attention necessary to a minimum. In our climate, with its varying changes, a car heating system should be arranged to give a large variation in the amount of heat radiated in the car, and in order to get a range of temperature sufficient for proper car heating, it is necessary to have radiator temperatures varying from 132 deg. to 280 deg. F. It is claimed that the Thermo Jet system gives this large range of radiator temperatures, and that any desired car temperature can be maintained constant, regardless of what the outside weather conditions may be.

The principle of operation is simple; the temperature of the radiators is controlled by the expansion of a portion of the radiator pipe which regulates the amount of steam injected into the radiating system. A valve is connected at a certain point in the system so that as the temperature of the pipe rises sufficiently to expand the pipe, the valve is closed. When the pipe cools by radiation, the valve again opens and steam passes through an injector, and the cycle is repeated maintaining any

predetermined temperature of the car. Iron pipe expands and contracts according to a fixed law, so much per foot per degree, and it is a simple calculation to establish the proper length of pipe for a good valve opening to obtain a desired temperature of radiating surface. The valve opening can be set to any desired point by a simple arrangement with an indicator located at an available point in the car. If the system is set for a low temperature the valve opening is small and enough steam is mixed with the air in the system to give the required temperature.

An admirable modification of this Thermo Jet system is now available for compartment cars, whereby the temperature of each compartment may be regulated by the occupant of the compartment to suit his own particular requirements. This feature should eliminate the objection sometimes raised that the attendant or porter in a compartment car cannot regulate the heating system to give a temperature satisfactory to the occupant of each compartment, owing to the varying requirements of different people.



General Arrangement of Thermo Jet Car Heating System.

STEEL PASSENGER CAR SIDE FRAMING.

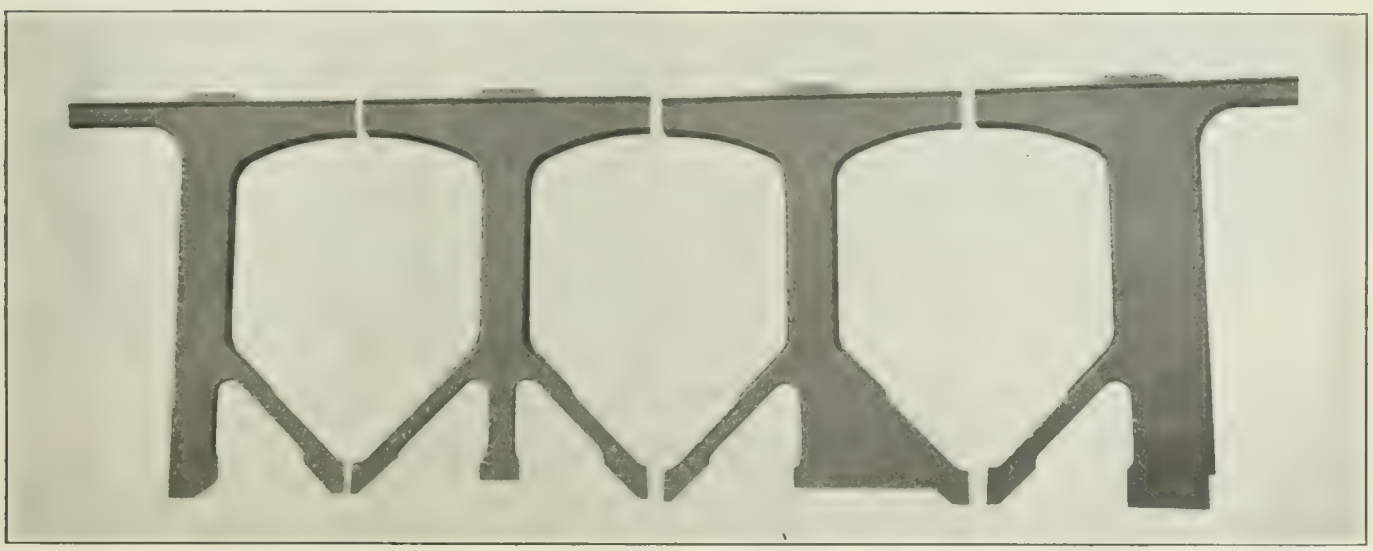
The details of the pressed steel unit panel side truss used on the New York, Westchester & Boston all-steel passenger cars, which were described in the weekly edition of the Railway Age Gazette, of June 14th, are illustrated herewith. Each of these units includes a main post, the diagonal braces, the letter board and the side plate channel. By making these members from one sheet of steel the riveted joints between the parts are eliminated. These unit panels are securely riveted together and form a continuous truss, the depth of which is such as to make the side frame of exceptional strength and rigidity. The panels are pressed from ¼ in. sheet steel, and are riveted together at the top with splice plates, and are butt welded by the oxy-acetylene process. At the bottom they are riveted to the side sill.

This construction is much better adapted to the full utilization of the properties of steel than that of the prevailing designs of wooden passenger cars. For example, a heavy steel belt-rail at the window sills is practically in the neutral axis of the side of the car, if the roof and the letter board be assumed as the compression member, and the side sill as the tension member of the structure. If, however, the belt-rail is assumed as the compression member then the letter board and roof are subject to an appreciable distortion, when the structure is under full load. The elasticity of a wooden structure permits of a considerable deflection without serious damage, but in steel cars the results will be serious if appreciable deflection is permitted.

In the ordinary steel passenger car the load is carried by side girders below the windows. They have an affective depth of approximately three feet. In the side-truss car the effective depth of the girder is about seven feet. The belt-rail in the side truss car is near the neutral axis and consequently only a light sash rest is required. To illustrate one of the advantages of the side-truss, it may be assumed that the side frame is required to resist a moment at the center of 2,000,000 inch pounds; then comparing girders of the heights given above, we have:

Stress on top and bottom members, three feet girder 55,600 lbs.
Stress on top and bottom members, seven feet girder 23,800 lbs.

Thus, it is evident that in addition to the elimination of the weight of the belt-rail, less than one-half as great

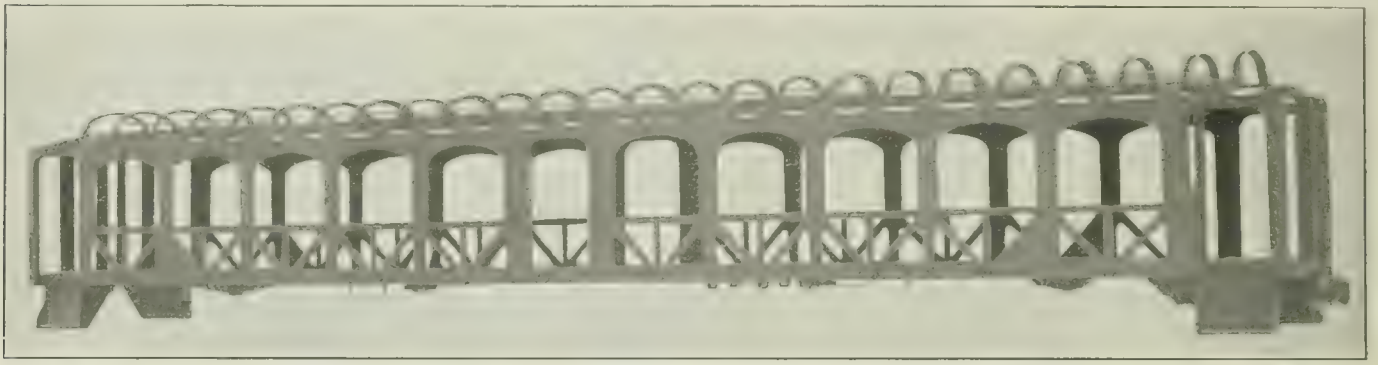


Pressed Steel Side Frame Units of New York, Westchester & Boston All-Steel Cars.

sectional area is required in the side sill of a seven foot girder as in that of a three foot girder for equal fiber stress.

The above example does not take deflection into account. For the purpose of comparison, it may be assumed that the cross-sectional area of the belt-rail and side sill in the three foot girder is 4 sq. in. each, and that in the seven foot girder it is half that, or 2 sq. in. each. Then the deflection of the three foot girder is nearly three times that of the seven foot girder. In actual practice this ratio may be slightly less due to flexure of the posts of the side-truss. However, with the side-truss construction no attention need be given to deflection, whereas in the ordinary type of construction deflection is often the determining factor. The side-truss construction is designed solely for fiber stress, and when thus designed no measurable deflection will take place even under full load.

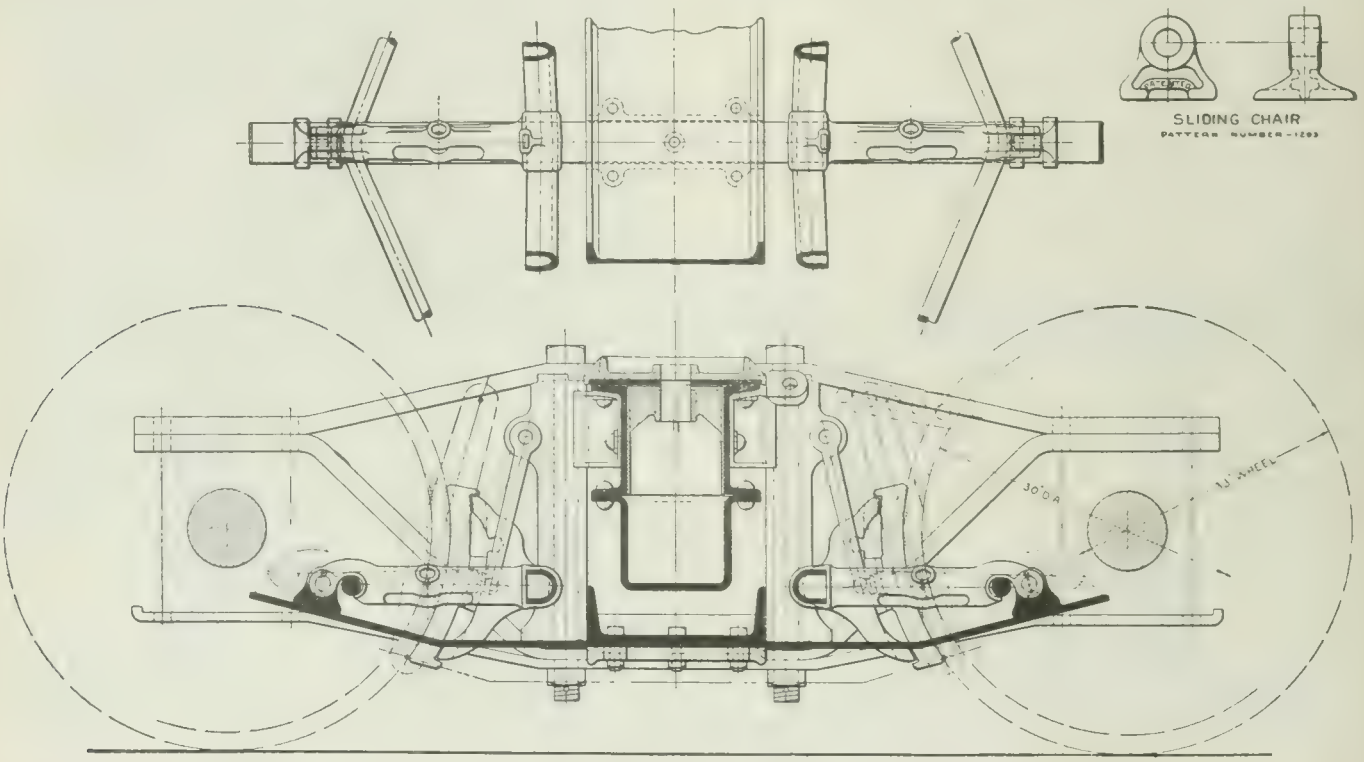
Finally, the side-truss construction saves nearly all the weight of the belt-rail, and approximately one-half the weight of the side sill, when designed for fiber stress alone, and for equal deflection it saves much more, because of weight that must be added to the shallow girder to bring the deflection within the limit. A further saving in weight is effected by the uniform section and center sill construction. The pressed unit side frame material was furnished by Forsyth Brothers Company, of Chicago.



Framing of New York, Westchester & Boston All-Steel Passenger Cars.

CRECO BRAKE BEAM SUPPORT.

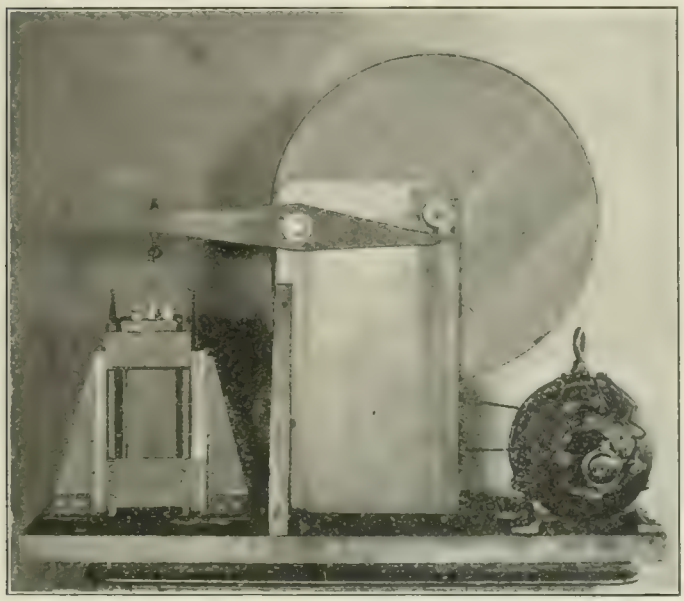
The Creco sliding third point brake beam support and safety device, made by the Chicago Railway Equipment Company, Chicago, is here illustrated. The makers call attention to the fact that this is the only device which provides for the conditions arising from the reduction in diameter of the rolled steel wheels. It has proved in service to add to brake beam safety, and the device maintains a proper relation to the brake beam hangers at all times, and is operative for beams of different strut depths on the same truck. The Creco support prevents the beam from tilting downward and does not pull against the forward movement of the beam when brakes are applied with worn shoes. It does not tie the beam to the flat spring support, and so does not prevent the beam from having such lateral movement as the brake hangers allow. It cannot throw the beam downward in case the underhung spring is bent, and cannot twist it out of place. It does away with the use of the second spring and cotter heretofore used, and permits of cheap and simple spring construction. It has the desired flexibility and broad bearing areas desirable in a device of this kind.



Creco Brake Beam Support.

SEVERE TESTS FOR STORAGE BATTERIES.

When the Edison storage batteries, which are specially fitted for train lighting because of their compact size, light weight, high efficiency and durability, were developed, Mr.



Machine on Which Edison Storage Batteries Were Tested.

Edison insisted that before they were placed on the market they pass successfully the following tests:

One of the batteries was selected at random from a lot of several hundred and was placed in a cage suspended



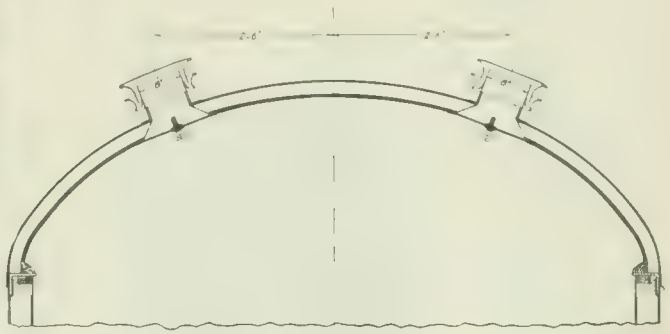
Truck With Edison Storage Batteries Was Projected Against a Brick Wall 500 Times at a Speed of 14 Miles Per Hour.

from a wooden beam, as shown in one of the illustrations. The beam was fulcrumed near its center and the other end bore against the cam attached on the same shaft as the large wheel, which was driven by an electric motor. As the cam rotated the storage battery was alternately raised ½ in. and then dropped on the solid oak base of the apparatus. After the cell had been raised and dropped 1,776,000 times it was tested and showed the same electrical capacity as it had before the test was made.

In another case six of the cells, mounted in a tray, were placed on a truck, which is also illustrated. Special means were provided for projecting this truck against a substantial brick wall 500 times at a speed of 15 miles per hour at the moment of impact, and the batteries were finally perfected to a point where they could stand this violent treatment without suffering injury.

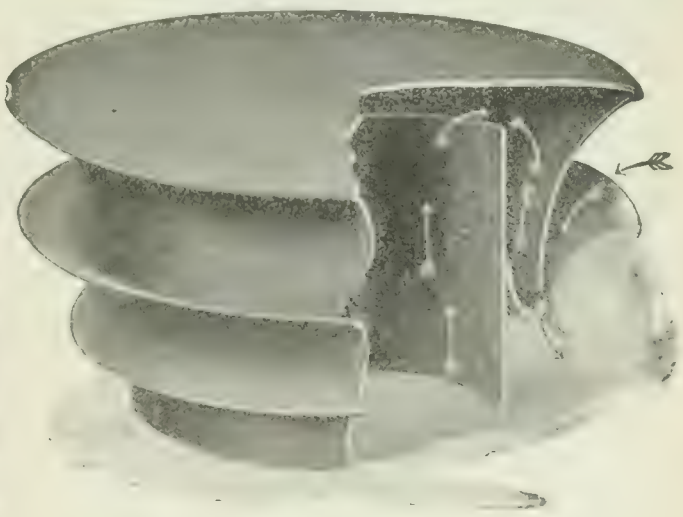
UTILITY EXHAUST VENTILATOR.

The Utility exhaust ventilators shown in the accompanying illustrations are very effective in removing the foul air from a car. The motion of the train causes air to be forced downward between the outer ring and the ventilator body, and this jet action draws air from the interior of the car.



Application of Utility Exhaust Ventilator.

Even when the car is standing still the wind acting on it causes good ventilation. There is no chance for cinders to lodge in the ventilator or between it and the roof and cause the metal to rust out. The ventilator is strong, being made of cold rolled steel, heavily galvanized. The accom-



Showing Operation of Utility Exhaust Ventilator.

panying drawing shows the method of application of about 2,000 Utility ventilators to the new steel cars being built by the American Car & Foundry Company for the Illinois Central. The ventilators are made in all sizes and special lamp jacks for oil and gas lamps are interchangeable with older types. For this service they are most desirable, as

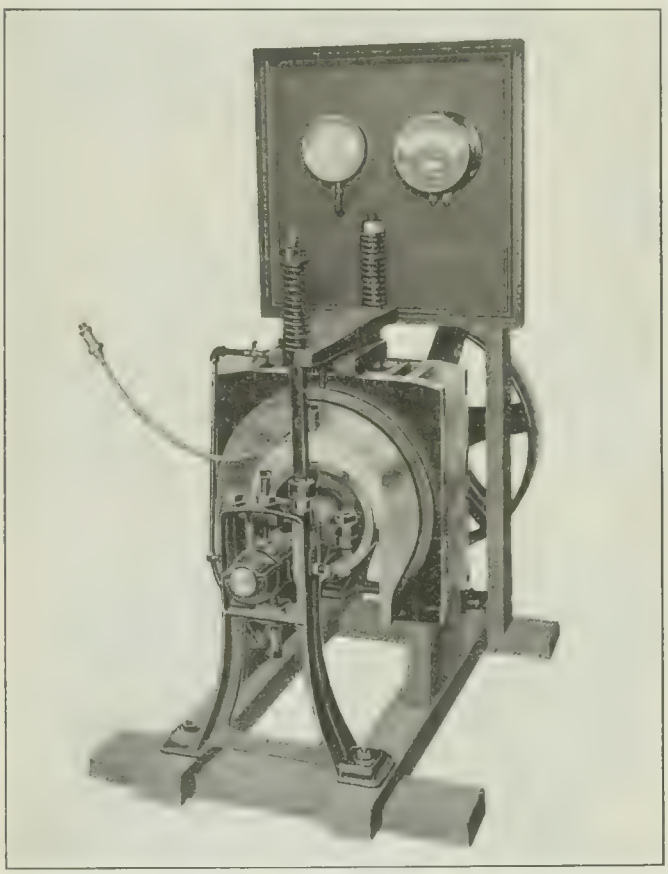
they keep out cinders and carry away the heat rapidly. This ventilator is made by the Railway Utility Company, Chicago.

MACHINE FOR TESTING JOURNAL FRICTION.

A machine for testing the amount of friction between the driving axle of a locomotive and its journal bearing as shown in the exhibit of McCord & Company, Chicago. It consists of a reproduction of a locomotive driving journal actuated by an electric motor connected in series with an ammeter, which indicates the amount of current consumed by the motor in overcoming the friction.

The journal bearing is fitted for the attachment of a McCord locomotive force feed lubricator and a gage is connected to the lubricator, which indicates the pressure on the oil between the axle and the journal brass. An adjustment is provided by which any desired load may be applied to correspond to the weight of a locomotive, supported by one driving journal.

In operation a valve is opened which allows enough oil to flow from the oil chamber in the journal bearing into the pan



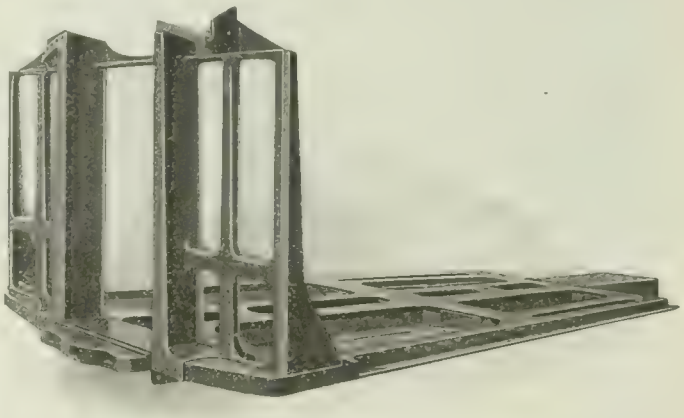
Machine for Testing Journal Friction.

under the machine, reducing the oil pressure to zero on the gage or to the condition of lubrication furnished by any system which relies upon packing a journal box with waste or upon a gravity feed. In other words, the only oil between the bearing surfaces is retained by adhesion and becomes less and less the longer the axle is rotated. The surface of the steel axle is now separated from the journal brass by a very thin film of oil and the reading on the ammeter indicates the amount of current necessary to overcome the friction.

When the relief cock is closed the oil is forced in by the lubricator to any pressure desired within the limits of the machine. The greater the pressure on the oil, the greater is the thickness of the film of oil which lifts the journal brass off of the axle. The greater the pressure of oil the lower will be the reading on the ammeter, indicating a smaller amount of current necessary to overcome the friction between the axle and the brass. When sufficient oil is pumped in so that the brass and the steel do not touch, but each bears on the film of oil, the reduction in current used by the motor is so great as to give conclusive proof of the value of the McCord locomotive force feed lubricator.

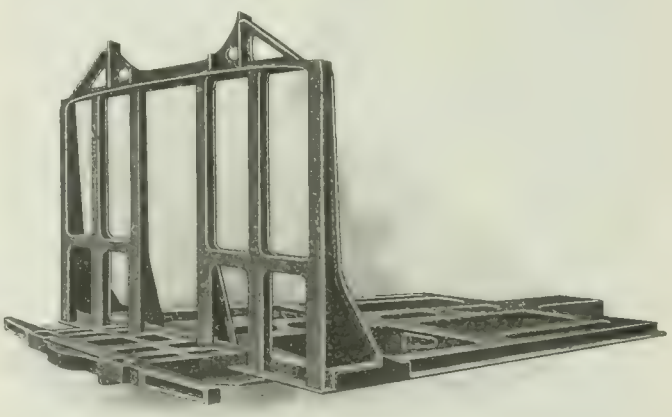
CAST STEEL END FRAMES FOR PASSENGER CARS.

Experience with steel passenger cars in collision where telescoping takes place has shown that the vulnerable part is in the end frame. This fact is recognized in the new specification for mail cars which has been adopted by the Federal authorities. To provide a strong structure at this part of the car, the Commonwealth Steel Company, St. Louis, Mo., has



Commonwealth Cast Steel End Frame for Passenger Car Without Platform.

designed two forms of cast steel end frames, one for passenger cars with platforms, and one for cars without platforms. These end frames are massive steel castings which are intended to be riveted to the Commonwealth cast steel double body bolster, and to the combined platform when required. In this way a strong construction in the end frame is added to that already provided in the cast steel end for the underframe.



Commonwealth Cast Steel End Frame for Passenger Car with Platform.

The connection of these two large castings is made with square abutting shoulders, which provide enormous resistance to shear, so that little dependence need be placed on the rivet section. The end frame casting is designed with proper proportions and economic sections with regard to the relation of strength, stiffness and weight.

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THE twenty-fifth annual convention of the American Railway Master Mechanics' Association was held at Saratoga 20 years ago, with a membership of 511. The president was John Mackenzie, and the secretary Angus Sinclair. The proceedings dealt largely with locomotive testing, one report relating to standard methods of testing locomotives; another was on tests of compound locomotives, and related to tests of a Vauclain compound compared with a simple engine of similar type on the Chicago, Milwaukee & St. Paul. This led to a lengthy discussion which brought out the accounts of the performance of the various types of compound locomotives then in use, and while these were, as a rule, favorable to the compound locomotive, the general opinion as expressed by members was not favorable to it. The meeting was not particularly notable, excepting for this report and the discussion on compound locomotives.

THE special facilities, organization and methods required to properly take care of Mallet locomotives at terminals is a subject that seems to be of sufficient general interest and importance to justify the Master Mechanics' Association in appointing a special committee to investigate and report at the next meeting. The service of these very large locomotives is affected more seriously by lack of attention at terminals, than locomotives of any other type. Not only are they usually compounds, which alone means extra attention if the full benefit of the compound feature is to be obtained, but boilers of the size generally used need the most careful inspection and a high character of workmanship in repairs. The importance of this feature seems to increase in even a greater ratio than the increase in size. Some roads are maintaining the Mallets in practically perfect condition while others have not yet solved the problem of doing it. At some points there are rather elaborate facilities for the work and at others no special arrangements are found necessary. Some engine houses have a special gang used exclusively for work on Mallets, others use the regular workmen as they may be at liberty. There are good and also indifferent results from both ways and it would seem advisable to have the subject studied and a report made which would give the members at least a few general principles which should be followed and permit an open and free exchange of experiences during the discussion.

UNDER the heading "CAR BUILDERS HAD BRILLIANT BALL. Million Dollar Pier Scene of Beauty and Splendor Last Night," the Atlantic City *Evening Union* of Friday thus described the informal social gathering of the M. C. B. Association held on Thursday night last: "Delegates to the Master Car Builders' Convention enjoyed their annual hop on the Million Dollar Pier last night. The function was the most brilliant in the history of the association, fully a thousand members and their ladies being on the floor at one time. Decorations were unusually elaborate, including potted plants of every description, with hundreds of dollars' worth of American Beauty roses going as souvenirs of the occasion. * * * * Gowns worn by the women were exquisite." Sorry we weren't around when the roses were passed. The sort of stuff we have quoted from the Atlantic City *Evening Union* is the kind that makes railway men and many other people think that some newspapers don't care a rap whether they print facts or the opposite. The truth is, as everybody attending the convention knows, that there is a special effort this year to make all entertainment features as informal as possible; that there was no ball last Thursday night, but merely an informal dance; that there were no special decorations at all; that not a dollar's worth, or a penny's worth, of American Beauty roses were given away as souvenirs; that members of the entertainment committee and many other men appeared in their street clothes, and that the number of "exquisite" gowns worn by the ladies was unprecedentedly small. The thing is, of course, a small one but it merits serious comment as illustrating the tendency of many newspapers to publish in regard to more serious railway matters not what actually happens but what ought to have happened in order to make a good newspaper "story." If any other man or woman who had attended that dance had gone away and told what the newspaper reporter told he or she would have been called by that "ugly and shorter name." What makes falsehood, when published in a newspaper, one thereby told to many people, anything different from the lie that is told only by one person to one other person?

LUBRICATION OF LOCOMOTIVE CYLINDERS AND VALVES.

THE use of superheat in locomotives has incidentally brought about important improvements in cylinder and valve lubrication. These relate not only to the methods employed, but also to the quality and quantity of the lubricants. The number of lubricators has been reduced and local applications of the lubricant have been almost abandoned. The new principle is based on general lubrication of both valve and piston by converting the heavy valve oil into a fine spray by means of an atomizer and introducing it in the steam pipe near the steam chest. This method has proved to be very satisfactory in connection with the use of superheated steam.

The black coating often seen on cylinders was formerly regarded as the result of the burning or carbonization of the valve oil, and with superheated steam its presence was accepted as proof of the necessity of more lubricant and of a higher fire test oil. It has been demonstrated that the largest proportion of this deposit comes from the smokebox gases which are drawn into the cylinder when drifting. It has been further shown that the improved valve oils for use with superheated steam will not carbonize at 800 deg. F., and to avoid this black coating some other remedy should be applied beside more oil and a higher fire test. If the throttle is left slightly open, or a drifting valve is used when descending grades, the small steam flow will prevent the suction of gas and sparks into the cylinder and at the same time supply a slight lubricant which will prevent cutting and save packing rings. While this fact has been known for a long time, little advantage has been taken of it in locomotive practice, and it has remained for a lubricating oil company to again point out the importance of the use of a light flow of steam through the valves and cylinders when the engine is drifting. The Lake Shore has used with advantage on superheater engines an automatic drifting valve which accomplishes the same purpose, by opening when the throttle is closed. It is found also that when air and smokebox gases are admitted to the cylinder they dry up the lubricant, while if steam is present this action does not take place. The results of the improved lubricating methods now in operation are showing large savings in the amount of valve oil used, and those directly in charge claim that less than half the oil is now required and the valve and cylinders are kept in better working condition.

RAILWAY ELECTRICAL ENGINEERS.

WHILE the car builders were in session on Friday another meeting with allied interests was being held at the Hotel Dennis, and in the issue of THE DAILY for June 15 was given a report of the semi-annual meeting of the Association of Railway Electrical Engineers. On the same day a meeting of Railway Chemists and Testing Engineers was held at the Chalfonte Hotel. Atlantic City is also the usual meeting place of the American Society for Testing Materials, and in former years it held its sessions immediately after the adjournment of the mechanical conventions. The concentration of these meetings of mechanical societies at Atlantic City at the time of the railway mechanical conventions shows the interest which these men have in the application of science to railway equipment and the manufacture of railway materials. These societies are of comparatively recent origin, and for the first 35 or 40 years of American railways the civil engineer was the only technically educated man employed. The older railway mechanical officers can remember when there was no railway testing room or chemical laboratory nor specifications for materials used in railway shops.

The first railway testing laboratory was established by the Pennsylvania Railroad at Altoona, in charge of Godfrey W. Rhodes. Then followed the chemical laboratory in charge of Dr. C. B. Dudley, and soon after those of John W. Cloud and Richard H. Soule. These men formed the first railway technical club, with headquarters in their rooms at the Logan House, and the application of science to the mechanics of railways and to the preparation of specifications for railway materials thus made its beginning in the early days when iron and steel manufacture and locomotive and car building were growing too important for rule-of-thumb methods.

The Association of Railway Electrical Engineers is the youngest of these technical societies which is directly interested in railway equipment. Starting as a society of electric car lighting engineers it performed valuable service in developing electric car lighting to such a point that it is now considered almost an essential of satisfactory passenger service. Having accomplished this it is now concerned in standardizing the equipment and in perfecting its operation so as to make it more efficient and economical. The society soon found that its activities need not be limited to electric car lighting, and it broadened the scope of its interests so as to include all the different classes of work which the railway electrical engineer directs, and the name of the society was changed accordingly. It is now largely concerned with the lighting of offices, stations, yards, round houses and shops, and the equipment of electric motors for shops, and numerous other places where such motors are finding application to railway work.

At the recent meeting in Atlantic City car lighting and shop motors were the principal subjects under discussion, and while formal papers are not presented, our report of the proceedings will indicate that railway mechanical officers will find in the printed proceedings of the October meeting the latest news and descriptions of the most improved equipment for the application of electricity to railways. The society may well be regarded as a part of the larger railway mechanical associations, for its electrical standards are almost universally adopted by them, and it is fortunate that there is at hand a body of technical specialists to which such questions may be referred.

Announcements.

PROGRAM OF THE WEEK.

MASTER MECHANICS CONVENTION.

MONDAY, JUNE 17.

Prayer	9.30 A. M. to 9.35 A. M.
Address by the President	9.35 A. M. to 9.50 A. M.
Intermission	9.50 A. M. to 9.55 A. M.
Reading of the minutes of the last meeting	9.55 A. M. to 10.00 A. M.
Report of the secretary and treasurer	10.00 A. M. to 10.15 A. M.
Assessment and announcement of dues; appointment of committtees on correspondence, resolutions, nominations, obituaries, etc.	10.15 A. M. to 10.25 A. M.
Election of auditing committee	10.25 A. M. to 10.30 A. M.
Unfinished business	10.30 A. M. to 10.35 A. M
New business	10.35 A. M. to 10.45 A. M.
Discussion of reports on:	
Advisory, Technical	10.45 A. M. to 11.00 A. M.
Mechanical Stokers	11.00 A. M. to 11.30 A. M.
Revision of Standards	11.30 A. M. to 12.00 A. M.
Specifications for Cast Steel Locomotive Frames	12.00 P. M. to 1.30 P. M.

TUESDAY, JUNE 18.

Discussion of reports on:	
Main and Side Rods	9.30 A. M. to 10.00 A. M.
Consolidation	10.00 A. M. to 10.15 A. M.
Safety Valves	10.15 A. M. to 10.45 A. M.
Safety Appliances	10.45 A. M. to 11.00 A. M.
Design, Construction and Maintenance of Locomotive Boilers	11.00 A. M. to 12.00 A. M.
Contour of Tires	12.00 P. M. to 12.30 P. M.
Individual Paper on Increased Power obtained with Superheat as Compared with the Maximum Power Obtained with Saturated Steam, Prof. C. H. Benjamin and Prof. L. E. Endsley	12.30 P. M. to 1.00 P. M.
Steel Tires	1.00 P. M. to 1.30 P. M.

WEDNESDAY, JUNE 19.

Discussion of Reports on:	
Flange Lubrication	9.30 A. M. to 10.30 A. M.
Minimum Requirements for Headlights	10.30 A. M. to 11.00 A. M.
Standardization of Tinware	11.00 A. M. to 11.15 A. M.
Maintenance of Superheater Locomotives	11.15 A. M. to 12.00 A. M.
Engine Tender Wheels	12.00 P. M. to 12.30 P. M.
Resolutions, Correspondence, etc.	12.30 P. M. to 12.40 P. M.
Unfinished business	12.40 P. M. to 12.45 P. M.
Election of officers	
Closing exercises	12.45 P. M. to 1.30 P. M.

Adjournment.

ENTERTAINMENT.

MONDAY, JUNE 17.

Orchestra Concert, 10.30 A. M.—Entrance Hall, Million Dollar Pier.

Orchestra Concert, 3.30 P. M.—Entrance Hall, Million Dollar Pier.

Social Gathering and Informal Dance, 9.00 P. M.—Blenheim Exchange, Marlborough-Blenheim Hotel.

TUESDAY, JUNE 18.

Orchestra Concert, 10.30 A. M.—Entrance Hall, Million Dollar Pier.

Orchestra Concert, 3.30 P. M.—Entrance Hall, Million Dollar Pier.

Informal Dance, 9.30 P. M.—Entrance Hall, Million Dollar Pier.

MEETING OF B. & O. MEN.

It has been suggested by a number of members or guests of M. M. & M. C. B. Associations at the conventions who either served an apprenticeship, began their railway careers or have been long identified with the Baltimore & Ohio, and particularly with its mechanical department, that some kind of organization or fraternity be formed, and that they meet to-day. The American Car & Foundry Company offers its space—No. 610—as convenient, and asks all who are interested to register there Monday as early as possible.

The following are known to be here, practically all of whom have been seen and will gladly co-operate: P. C. Cromwell, J. Snowden Bell, Harry Monkhouse, C. F. Giles, T. G. Smallwood, John Tonge, B. M. Carr, J. B. Kilpatrick, R. F. Kilpatrick, J. F. Deems, F. C. Cooper, E. W. Greives, Edw. Weisgerber, W. M. Bosworth, W. F. Bentley, B. H. Hawkins, A. W. Horton, A. P. Pendergrast, J. P. Callahan, S. M. Dolan.

FOUND.

Return portion of a Pennsylvania R. R. round-trip ticket from Chicago to Atlantic City. Owner can get same by applying at the enrollment booth.

RAILWAY CLUB SECRETARIES.

The Society of Railway Club Secretaries held its annual meeting last Saturday morning at the Marlborough-Blenheim. In the absence of George H. Frazier, the chairman, who had been unexpectedly detained in Boston by business, J. B. Anderson of Pittsburgh, vice chairman, presided. The various clubs with the exception of the Richmond, St. Louis and Southern & Southwestern, were represented by their secretaries and presidents and first vice-presidents. Regrets were received from the absentees that other duties prevented their reaching Atlantic City, and made it necessary to content themselves with sending cordial greetings.

The secretary-treasurer, Harry D. Vought, in his annual report presented, said that progress has been made with the proposed organization of the American Association of Railway Secretaries, which is intended to take in as members all secretaries of railway associations except those of organized labor. As a number of these have signified their readiness to co-operate it was agreed to proceed with the movement and endeavor to complete the work during the ensuing year. Another matter of gratification was the showing as to the popularity and usefulness of the Index published by the society annually, giving the list of subjects dealt with in papers presented before all the clubs during the preceding season of activity, the names of the authors and their official connection. Mr. Vought stated that it had been highly useful for reference purposes not only by club members, each one of whom is furnished with a copy, but by others not eligible to club membership and from whom requests were received for the booklet. The effect had been to increase the circulation of the books of proceedings issued by the clubs and containing papers of special importance. During the past year nearly 10,000 copies of the Index were distributed, which is an indication of the total strength of railway club membership.

Mr. Frazier of the New England club was again re-elected chairman. Mr. Anderson of the Pittsburgh club was made vice chairman, and Mr. Vought continued in the office of secretary-treasurer, in which he has served since retiring from that of chairman some years ago. He is now the only member left of all the secretaries who were originally enrolled when the society was formed in 1896 at the sugges-

tion of Daniel M. Brady, president of the Brady Brass Company, who enjoys the distinction of being the first man that ever performed the duties of a railway club secretary.

At the Strand hotel Saturday evening the members of the society and their friends sat down to the annual dinner. W. F. Jones, of the New York Central, first vice-president of the Central club of Buffalo, presiding. Covers were laid for 30 and the occasion was one of the most enjoyable the society has had. There were no toasts and responses, as it is the rule that only two men are entitled to talk—the chairman and the club officer who occupies the head of the table.

THE PURDUE DINNER.

The Purdue men attending the conventions assembled for their annual dinner on Saturday evening. Of about fifty men in attendance at the conventions, the following were registered for the banquet: E. L. Adreon, American Brake Co.; W. L. Batt, Hess-Bright Mfg. Co.; Hugo Berthold, N. Y. C. & H. R.; Prof. L. E. Endsley, Purdue University; F. B. Ernst, American Steel Foundries; W. J. Eddy, C. R. I. & P.; R. F. Darby, The Billiod Co.; Geo. E. Hallenbeck, Baker Bros.; Percy Houser, Pennsylvania R. R.; W. S. Humes, General Railway Supply Co.; F. H. Herzsch, Westinghouse Electric & Manufacturing Co.; J. H. Jaschka, National Malleable Castings Co.; C. R. Jamison, Acme Supply Co.; J. M. Lammedee, Railway and Engineering Review; J. R. Mitchell, W. H. Miner Co.; R. R. Mitchell, Crocker-Wheeler Co.; J. P. Neff, American Arch Co.; W. H. Patterson; C. H. Quinn, Norfolk & Western; G. P. Robinson, United States assistant chief inspector locomotive boilers; F. S. Robbins, Pennsylvania R. R.; E. E. Silk, Bettendorf Axle Co.; H. A. Smith, Railway and Engineering Review; B. D. Tozzer; A. O. Van Dervort and W. H. Winterrowd, Damascus Brake Beam Co. A committee, consisting of Messrs. Endsley, Silk, Neff, Winterrowd and Lammedee, was appointed to arrange for next year's banquet.

CORNELL DINNER.

Cornellians attending the convention held their seventh annual dinner at the Hotel Chelsea on Saturday evening. This proved to be one of the most pleasant and important meetings ever held by this association. Through the courtesy of J. H. Thomas professional talent from New York furnished entertainment during the serving of the dinner and the impromptu toasts following brought out a lively discussion on subjects of serious interest to all engineering alumni of the university. B. P. Flory, superintendent of motive power of the New York, Ontario and Western was elected president for the ensuing year.

The following members and guests were present: J. F. DeVoy, '88, assistant superintendent of motive power, Chicago, Milwaukee & St. Paul; F. F. Gaines, superintendent of motive power, Central of Georgia; B. P. Flory, '95, superintendent of motive power, New York, Ontario & Western; F. M. Whyte, '89, general manager New York Air Brake Company; L. A. Shepard, '92, Scullin-Gallagher Company; C. P. Storrs, '95, Storrs Mica Company; A. R. Ayers, '00, general mechanical engineer, New York Central Lines West of Buffalo; H. G. Macdonald, '00, Standard Steel Car Company; J. N. Mowrey, '00, formerly master mechanic, New York, New Haven & Hartford; E. A. Averill, '00, Managing Editor, *American Engineer;* A. J. Sweet, '01, Nelite Works of the General Electric Company; C. D. Young, '02, engineer of tests, Pennsylvania Railroad; A. S. Lewis, '02, Chicago-Cleveland Car Roofing Company; R. L. Rogers, '03, Woven Steel Hose and Rubber Company; Mr. Sibson, '03, Harrison Safety Boiler Works; R. S. Cooper, '03, Independent Pneumatic Tool Company; F. C. Wight, '04, *Engineering News*; F. N. Bard, '04, Barco Brass & Joint Company; L. H. Snyder, '06, Jos. Dixon Crucible Company; H. H. Gilbert, '07, Pressed Steel Car Company; Sillstrom, '07, Dahlstrom Metallic Door Company; J. F. Benedict, '07, Boss Nut Company.

WHAT ARE THE WILD WAVES SAYING?

While strolling on the boardwalk,
I saw an M. C. B.
Reclining on the sand nearby
With a well-known S. M. P.

Now, what on earth can this portend?
They surely are not dolts;
One had his ear close to the ground,
The other was taking notes.

A sign near by caused me to start,
For on it plainly painted
Was "Information Bureau"—
And then I almost fainted.



What are the Wild Waves Saying?

"By crimps!" says I; I'm going to see
Who's crazy; they or I.
So down I went to find the truth,
Prepared to live or die.

"What are the wild waves saying?"
Came from the S. M. P.
"You'll find McCord in 5-1-3,"
Replied the M. C. B.

"The Pressed Steel Car is 6-2-0;
Forsyth's in 6-0-1,
And if you call at 4-2-0
You'll see a record run."

A lot more news came from the deep—
The wild waves know it all;
So if you lose your way while here,
Just drop around and call.

THE ANNUAL CONVENTION BASE BALL GAME.

The Western Team, by a Score of Seventeen to Ten, Wins Another Decisive Victory from the Eastern Players.

Those who expected the unexpected got what they expected at the Inlet Park base ball grounds Saturday afternoon. The expected was that the East would beat the West, and that is a perfectly good description of what did not happen. Before the gong was sounded at the end of the ninth round the effete East had once more been knocked over the ropes and was down and out. It was the eighth time that Orient and Occident had met head-on at the mechanical conventions. In four of the previous collisions the Orientals had fallen before the fierce onslaught of the Occidentals. The Easterners had come determined to even up the score. They were touted as an aggregation that could make Mathewson eat out of their hand, that could beat up the Giants as if they were pigmies, and could make the world's champion Athletics look like a Y. M. C. A. handball team. The vocal betting was three to one that they would win. But they came back all the same as Jim Jeffries. When the shades of evening fell, and the conventionites beat it to their hotels to debate whether to put on their evening clothes or not, the score of the game was Occident, 17, Orient, 10, and the score for all the games played between these rivals was East, 3; West, 5. The East came thirsting for revenge, and it went away with some more thirst. There'll be a bloody struggle next year to even up that record, you bet.

It rained, it was cold, and it looked for quite a while as if it wouldn't be possible to play, but in spite of all that it was a pretty good game. And it wasn't one-sided, either, by a long shot. At the start it looked as if it was going to be one-sided and in favor, not of the West, but of the East. Side-wheeler Bradford of the Eastern team was steady and put them over the plate whenever he wanted to, while pitcher Smith of the Western team occasionally was wild as a March hare. But in pinches Smith was reliable in both his pitching arm and his head work, and toward the last, while continuing to be fast, he become as steady as a farm horse, and while the Easterners hit him they couldn't place them, and never registered between the third and the ninth innings. Both nines gave good support, but at times it was of the back lot variety. That given by the East was better than that given by the West. The team work done by the Westerners was surprising in view of the small amount they had practised together.

The weather was distinctly rotten. When the time came for the parade to start from the Million Dollar Pier it was raining pussies and pups. The managers said, however, that there would be a game if it poured full grown tom cats and bull dogs, or Hagenbeck's whole animal show, and a considerably abbreviated procession, headed by a delegation of Atlantic City police, and including a band, teams and a bunch of waterproof rooters, started on schedule time, paddling



THE WESTERN TEAM.

Top row, left to right—McCloy, Cooke, Van Patten, Tarleton, McIntosh. Bottom row, left to right—Schwartz, Snow, Captain Hammond, Assistant Mascot Gossett, Odegaard, Mascot Telford, Smith, Midgley.

down the Boardwalk for South Carolina avenue, where special cars were in waiting. It drizzled off and on all afternoon, and was so cold that it looked as if the players would have to perform in their overcoats, and the rooters did wear theirs. But rain could not dampen nor cold cool the ardor of the players or of that faithful rooting few. They stuck right there till the dinner bell rang.

The game was mostly peaceful, but there were two controversies. In the first half of the second inning a question arose as to whether McCloy was safe at first. Captain O'Brian insisted he was out, and Captain Hammond insisted he wasn't. Umpire Cade decided he was. In the last half of the ninth the Eastern team sent Randolph and Hibbard to bat out of their order, and Captain Hammond kicked strenuously.

Honors were easy for "Midge," the veteran war-horse of the West. It was his tenth game at the conventions, and he made equally sensational two-handed not-stops. Last year Wildin's breaking of his bat was the high point of the game, and as he was called up for the first time yesterday B. A. Hageman, Jr., stepped forth and presented him with a bat big enough to be proof against the insistence of an Ajax. The only bat-breaking done yesterday was by Odegaarde, the iron man of St. Louis.

FIRST INNING.

The first batter up for the West was Tarleton, and the first ball pitched by Bradford was a strike. Tarleton was hit and walked to first, went to second on a passed ball, and stole third. Midgley struck out. Snow drove a three-bagger to center field, Tarleton scoring. Smith's slow hit towards third struck foul, rolled fair and went for a single, Snow scoring. Bradford tried to catch Smith off first and threw wild, Smith going to third. Hammond's hard drive to short was good for a single, Smith scoring. Schwartz fanned. Hammond tried to steal



THE EASTERN TEAM.

Top row, left to right—Umpire Cade, Fleming, Manager Nellis, Engle, Randolph, Hatch, Potter, Umpire Cooper. Bottom row, left to right—Bradford, Beaumont, Manager Wildin, Captain O'Brian, Mascot Mitchell, Hibbard, Oviatt, Oatley.

one hit, and a bunch of nice running catches, put seven men out, and assisted in putting out four others, in the course of which he participated in three double plays and covered a large acreage around second. Snow made two 2-baggers and one 3-bagger, which indicates that he was doing some tall batting. Hammond caught in good style, and made three safe hits, including a 3-bagger.

O'Brian did a good job at second, making three put-outs, one assist and one hit. Bradford struck out twelve men, which ordinarily would win a game.

George Wildin had a bet with Fred. Nellis that he would steal a base, and when he successfully slid to second in the sixth inning he grinned a grin that looked like a crisp new one-dollar bill clean across the diamond at Nellis before he got up. He made one sensational one-handed stop, and some other second while the pitcher had the ball and was put out. Three runs.

Smith couldn't find the plate, and Beaumont walked. Hammond made a nice catch of Hibbard's fly, but threw wild trying to double Beaumont at first, Beaumont going to third. Wildin beat out a slow grounder to first, but Beaumont was afraid to attempt to score. O'Brien bunted safely, Beaumont scoring, and Wildin went to second. Engle also found Smith, and made a neat two-bagger over third, Wildin and O'Brien both scoring. Engle went to third on a wild pitch and scored on Potter's slow hit to the pitcher, which he threw wild, allowing Potter to go all the way home. Fleming was hit by a pitched ball and walked to first rubbing his arm. Midgley made a nice running catch of Oviatt's hit to center and threw to first in time to make a double play. Five runs.



Harry S Hammond, c.



Stanley W. Midgley, 2b.



Elmer J. Smith, p.



C. L. Schwartz, 1b.





A. J. Odegaarde, 3b.



James E. Tarleton, s s.

Capt. Harry S. Hammond, c.



J. H. McCloy, l.f.



E. B. VanPatten, Sub.



G. T. Cooke, r.f.



Neil W. Snow, c.f.



R. L. McIntosh, Sub.

THE WESTERN TEAM.

SECOND INNING.

Cooke singled through the pitcher, Hibbard stopping the ball and making a wild throw, allowing Cooke to make third. Odegaarde struck out, and Hibbard fumbled McCloy's grounder, allowing Odegaarde to score. There was some misunderstanding about McCloy's touching the bag and he was called out. Tarleton struck out. One run.

Bradford drove a single over second base. Beaumont tried to sacrifice and bunted to the pitcher, who threw wild to second. Both were safe. Hibbard's drive to right was caught by Cooke. Midgley took care of Wildin's grounder, tagged Beaumont and threw to first in time to make a double play. No runs.

THIRD INNING.

Bradford could not find the plate, and Midgley walked. Snow made a two-bagger over third, Midgley going to third. Wildin and O'Brian took turns in juggling Smith's grounder, and at last dropped the ball, Smith getting safely to first. Midgley and Snow both scored. Hammond and Schwartz struck out. Wildin took care of Cooke's grounder. Two runs.

Odegaarde fell attempting to get O'Brian's foul fly. O'Brian walked, and went to second on Smith's wild pitch. Engle walked. O'Brian stole third, and Engle stole second. Smith stopped Potter's grounder and threw over the first baseman's head, O'Brian, Engle and Potter scoring. Fleming struck out, and Oviatt did likewise. Beaumont was hit by a pitched ball, Bradford advancing to second. Hibbard went out on a slow grounder to Smith. Three runs.

FOURTH INNING.

Wildin made a great left-handed stop of Odegaarde's hard line drive, and he was out at first. McCloy fanned. O'Brian



Master Elliott A. Telford,
Western Mascot.



Master Edwin J. Mitchell,
Eastern Mascot.



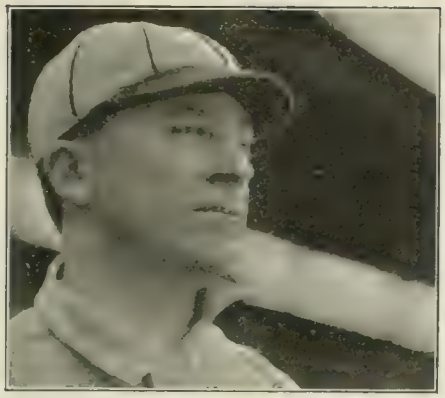
Charles Gossett, Jr.,
Assistant Western Mascot.



Half of Cooper and Most of Umpire Cade.



Cooper Wondering What the Captains Will Do to Cade.



Clifford Beaumont, c.f.



Harry C. Oviatt, r.f.



John V. Randolph, Sub. c.f.



J. E. Fleming, l.f.





Harry B. Bradford, p.



Leonard J. Hibbard, s.s.

Capt. Thomas P. O'Brian, 2b.



George W. Wildin, 1b.



Al Engle, c.



H. B. Oatley, Sub. 1b.



M. C. M. Hatch, Sub r.f.



S. C. Potter, 3b

THE EASTERN TEAM.

made a nice running catch of Tarleton's fly. No runs.

McCloy robbed Wildin of a hit, getting his fly after a hard run. O'Brian was out on his grounder to Midgley. Tarleton took care of Engle's grounder and threw him out at first. No runs.

FIFTH INNING.

Engle caught Midgley's foul, and Midgley threw his bat down in disgust. Although Snow had previously made a two bagger and a three bagger, he struck out. Bradford



Some of the Waterproof Fans.

also fooled Smith, making his ninth strike out victim. No runs.

Potter placed a pretty single to left center, and stole second and third while the Western team was throwing the ball around. Fleming's fly to right field was nailed by Cooke, who made a perfect throw to the home plate, keeping Potter on third. Oviatt hit to Midgley, and Midgley threw to home to catch Potter, but again Potter decided to hug third, and Oviatt was safe on first. He immediately stole second. Bradford's line drive was caught by Smith. Beaumont walked, making the fourth time he reached first without a hit. With three on bases, Hibbard fanned thrice. No runs.

SIXTH INNING.

Hammond made a drive over first, which was good for three bases. Bradford was undecided what to do with Schwartz' slow grounder, and his throw to first was too late, Schwartz getting there safely, and Hammond scored. Potter made a nice stop of Cooke's grounder and a perfect throw to first. Wildin dropped the ball, and Cooke went to second on the error and stole third. Potter took care of Odegaarde's grounder, but his throw to first was too low for Wildin, and Odegaarde went to third, Cooke scoring during the play. Odegaarde scored on McCloy's single to right. Wildin grabbed Tarleton's grounder and touched the bag, putting him out. Midgley drove a hard single to center. Beaumont made a good throw, holding McCloy on third. Snow hit the center field fence and McCloy scored. O'Brian threw Smith out. Hammond made his third hit of the game, his second hit this inning, Snow scoring. Engle took care of Schwartz's high foul. Seven runs.

Wildin drove the first ball pitched to center for a single. Midgley caught O'Brian's fly. Wildin cleverly stole second. Odegaarde stopped Engle's grounder and touched Wildin out between second and third. McCloy made a good attempt to get Potter's long drive to left, but failed, and it went for a 2-bagger, Engle going to third. Fleming walked. Hatch now came to bat for Oviatt. He failed as a pinch hitter and struck out. No runs.

SEVENTH INNING.

Hatch began playing right field and Randolph center field for the East. Cooke was Bradford's tenth strike-out victim. O'Brian made a nice stop of Odegaarde's grounder, but could not recover himself in time to get him at first, and it went for a scratch hit. McCloy struck out, making eleven struck out by Bradford. Tarleton made a long drive to center field which Randolph caught. No runs.

Bradford went out on his hit to Smith and Randolph drew a pass. Tarleton, Midgley and Schwartz made a nice double play of Hibbard's hard grounder. No runs.

EIGHTH INNING.

Oatley began playing first for the East. Midgley drove a long fly to center which Randolph got under. Snow drove a hard grounder to Potter and was put out at first. Bradford walked. Hammond's grounder was taken care of by O'Brian. No runs.

Oatley struck out. O'Brian flied out to Midgley. Engle hit to Schwartz and was put out at first. No runs.

NINTH INNING.

Schwartz waited patiently for a base on balls, and got it. Engle failed to hold Cooke's third strike, and he went to first, Schwartz advancing to second. Odegaarde singled to right, Schwartz scoring and Cooke going to third. Cooke scored while Odegaarde was stealing second. Hibbard made a good stop of McCloy's hard grounder, but it went for a single, Hibbard's throw getting past Oatley, and Cooke, Odegaarde and McCloy scoring. Tarleton drove a single to left, and O'Brian



The First Ball Pitched.

caught Midgley's fly. Snow grounded to Bradford and was thrown out at first. Smith's long fly to left was caught by Fleming. Four runs.

Potter hit to Odegaarde, whose throw was too low for Oatley, and Potter got safely to first, and stole second. Fleming singled to first, and also stole second. Randolph flied out to Schwartz. Hibbard singled to center, Potter and Fleming scoring. Oatley struck out. The Western team claimed that Randolph and Hibbard both batted out of turn, but the referee

refused to put the side out. O'Brian was put out on a grounder to first. Two runs.

The following is the score by innings:

	1	2	3	4	5	6	7	8	9	
WEST	3	1	2	0	0	7	0	0	4	—17
EAST	5	0	3	0	0	0	0	0	2	—10

The following is a summary of the game:

WEST.

	A.B.	R.	1B.	S.B.	S.H.	P.O.	A.	E.
Tarleton, s.s.	5	1	1	1	0	0	2	0
Midgley, 2b	5	2	1	1	0	7	4	1
Snow, c.f.	6	3	3	0	0	0	0	0
Smith, p.	5	1	1	0	0	0	3	2
Hammond, c.	5	1	3	0	0	6	0	0
Schwartz, 1b.	3	2	0	0	0	9	0	0
Cooke, r.f.	5	3	1	2	0	2	0	0
Odegaarde, 3b.	5	2	2	0	0	2	2	0
McCloy, l.f.	5	2	2	0	0	1	0	1
Total		17	14	4	0	27	11	4



"Snow . . . . was doing some tall batting."



"Bradford tried to catch Smith off first."



"O'Brian walked."

EAST.

	A.B.	R.	1B.	S.B.	S.H.	P.O.	A.	E.
Beaumont, c.f.	1	1	0	0	1	0	0	0
Randolph, c.f.	1	0	0	0	0	2	0	0
Hibbard, s.s.	6	0	1	0	0	0	1	0
Wildin, 1b.	4	1	2	1	0	9	0	2
Oatley, 1b.	1	0	0	0	0	0	0	0
O'Brian, 2b.	5	2	1	2	0	3	1	1
Engle, c.	4	2	1	1	0	12	1	0
Potter, 3b.	5	3	2	0	0	0	2	1
Fleming, l.f.	3	1	1	1	0	1	0	0
Oviatt, r.f.	3	0	0	1	0	0	0	0
Hatch, r.f.	2	0	0	0	0	0	0	0
Bradford, p.	3	0	1	0	0	0	2	0
Total		10	9	6	1	27	7	4

Earned runs, West, 3; East, 2.
Two-base hits, Snow, 2; Engle, 1; Potter, 1.
Three-base hits, Snow, Hammond.
Bases on balls, by Smith, 7; by Bradford, 3.
Hit by pitcher, by Smith, Fleming, Beaumont; by Bradford, Tarleton.
Struck out, by Smith, 6; by Bradford, 12.
Double plays, Midgley and Schwartz, 2; Tarleton, Midgley and Schwartz.
Left on bases, West, 3; East, 12.
Wild pitches, Smith, 2.
Passed balls, Hammond.

The game was umpired by George Cooper of the Frost Railway Supply Company, and W. E. Cade of the Frank A. Barbey Company. Harry O. Fettinger (Clement Restein Company) kept the score card.

THE WESTERN TEAM.

The baseball careers of the members of the winning western team have been as follows:

Captain Hammond was both a foot ball and base ball star in his school and college days. He belongs to a family of athletes, the members of which have made names for themselves in the central-western part of the country. He naturally preferred the game of foot ball, although he edged into a base ball game whenever the opportunity offered. He was at his best in the years 1904-5-6-7 when he played right end on the University of Michigan foot ball eleven, having succeeded Neil Snow in the position.

Stanley Midgley has earned his spurs and has retired; at least he so declared after the game Saturday night. But it is to be hoped by his many friends that he will "come back" and be with us again next year. "Midge" played in his younger days in the Cook County (Illinois) league; was three years on the Lewis Institute of Technology (Chicago) team, of which he was captain; and has played the past ten years as a member of the western team at the M. C. B. and M. M. conventions, serving as captain four years.

Snow's achievements in athletics are well known. He first played ball on the Detroit high school team; then he played for one year on the Detroit Athletic Club team, and during the next four years he was a member of the University of Michigan nine, being captain two years. He always liked best the game of foot-ball, however, and in the years 1900 and 1901 he was probably the brightest star in the foot ball firmament of the West; for in the first-named year he was picked by Walter Camp for the All-American eleven, and in the following year Caspar Whitney selected Snow as his right end for the All-American eleven of the year. As a sort of side issue, just to show his general interest in athletics, as a member of the U. of M. track team, in 1903, he won the shot put and high jump events in the intercollegiate contests. Incidentally, yesterday was the anniversary of his wedding—the eighth weekly anniversary—for on Saturday, April 20, at high noon, Snow was married to a charming young lady of Detroit.

Tarleton is a pronounced "White Sox" fan in Chicago. As a youth he played second base in the Lehigh Valley (Pennsylvania) league during which time his team won the pennant twice.

Odegaarde was the best catcher and base runner the Northwest Division High School (Chicago) team ever had. Later he played on the Morris (Illinois) semi-pro. nine, then as catcher on the C. R. I. & P. Ry. team, in Chicago, and after that as a member of the Illinois Trust & Savings Bank (Chicago) team in what was known as the Mercantile League. In that year (1907) his team won the league championship. Until Saturday

he had never played third base. In Chicago, where he lives, he is a "Sox" fan.

Elmer Smith was the crack pitcher on the Central High School nine in Detroit in the years 1903-4; in the four following years he played on the then celebrated Detroit Athletic Club nine as pitcher and manager.

McCloy's first ball experience was with a Fairmont, West Virginia, city league team, in which he played behind the bat. He now plays in his own home-town team in Gladden, Penn., and officiates as captain and manager.

Schwartz was a semi-pro years ago at Alton, Ill., and at St. Louis, Mo. He pitched for the "Sporting News" nine in the newspaper league of St. Louis two or three years. This was his second game as a member of the Western team at the conventions.

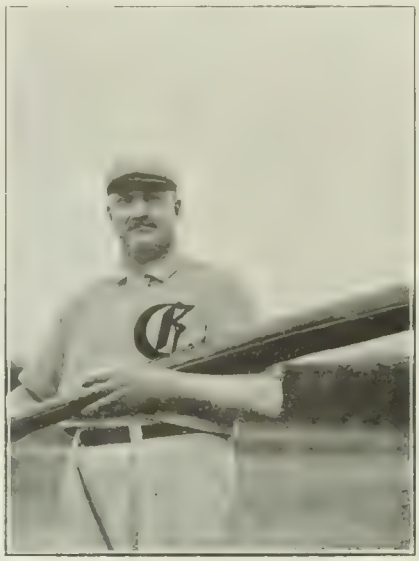
Cooke caught for the Hyde Park (Chicago) High School nine some years ago, and later he played left field and caught for the Armour Institute team in the same city in the Inter-City league. As a member of the Illinois Trust and Savings Bank team in Chicago he played in the Bankers' league in 1908-9, and in 1910 he helped win the championship for the Pullman Company's nine in what was known as the Railway League.

McIntosh, substitute, is a crack runner; he prefers the mile rather than a sprint. Base ball is a sort of side issue with him, although his friends say he would have put up a stiff game Saturday, had the opportunity offered itself. He did well in athletics at Columbia University. When he entered on his business career as a mechanical man he played base ball on machine-shop teams in different localities. Catching is his favorite position.

Van Patten, substitute, has played ball "here and there," as he expressed it and "just for fun." He likes the game more than any other form of sport and is a real fan.



"A question arose . . . ."



Wildin's New Bat.



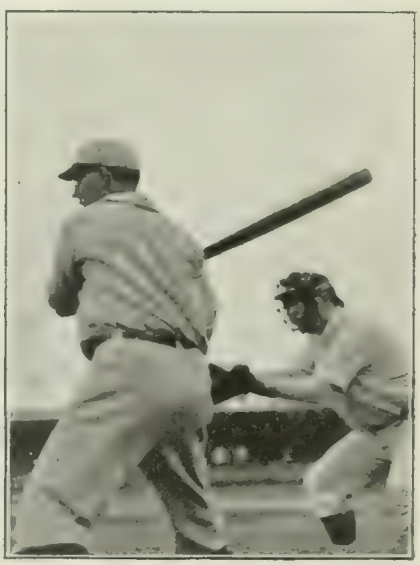
" . . . and Captain Hammond kicked strenuously."



"McCloy's hard grounder went for a single."



"Potter's long drive to left . . . . went for a two-bagger."



"Bradford drove a single over second."

THE EASTERN TEAM.

Thomas P. O'Brian, captain and second baseman, has had experience as a manager as well as a player. This was evident when he was on the coaching lines. For seven years he played on and managed the team of the Railway Y. M. C. A. at Buffalo. Previous to this he played second base on the Central High School team of Buffalo. He was also for



"Hammond made a drive . . . . good for three bases."

four years manager and second-baseman of the Pullman team of Buffalo. He is now identified with the Central Y. M. C. A. team in Brooklyn.

George W. Wildin, who played first base, used to be a pitcher of renown. At that time he weighed but 125 pounds and was on the 'Varsity team of the University of Iowa. Since then his practice has been largely with the teams at the conventions.

Harry P. Bradford, pitcher, has the distinction of having pitched a 19-inning tie game during which there were 10 hits made on his delivery and he struck out 30 men. This was when he was on the team of the Newton High School, Mass., in 1906-7. The game was between Newton and Dorchester high schools. He was pitcher for the Waltham Athletics and since then has played on teams at Wayne, Maine, and Hyannis, Mass.



Hibbard Swinging His Bat Too Fast for the Camera but not Fast Enough to Find Smith.



Midgley's Double-Play Smile.



Beaumont Looking to See if the Umpire Saw Him Strike.



"Hatch now came to bat . . . . He failed as a pinch hitter."



"The only bat-breaking done was by Odegaarde, the Iron Man."

Clifford Beaumont, centrefielder, has confined his base ball experience largely to Baltimore and played third base on three semi-professional teams in that city, *viz.*, Westerns, Chesterfields and Strickers. When on the latter team he developed several men who have since become well known major league players.

Sheldon C. Potter, third baseman, began his serious base ball days with the team of the Cleveland University School. After entering Princeton University he made his freshman team as shortstop and for the three following years played the same position on the 'Varsity.

J. E. Fleming, leftfielder, after playing on several school teams, joined the Kewanee, Ill., team of the Central Association. He played first base with this team for five years.

A. Engle, catcher, is now playing in the same position on the team of the Central Y. M. C. A. of Brooklyn.



Smith Almost Beaned.

Leonard J. Hibbard, short stop, played the same position on the famous Cornell University team of 1903.

Harry C. Oviatt, right fielder, played as catcher on the Mulford High School team in 1900.

Mellen C. M. Hatch, right fielder, made his base ball reputation as first and third baseman of the 'Varsity team of the University of California in 1902.

John V. Randolph, center fielder, was a member of the Boston Blues in 1890. He played first base and catcher.

Harry B. Oatley, first baseman, after playing on various school teams, entered the University of Vermont in the class of 1900. He was pitcher on the 'Varsity team in his senior year.

SOME VIEWS OF THE GAME.

P. P. Mirtz, mechanical engineer of the Lake Shore & Michigan Southern—"We are all boys when it comes to base ball. Who isn't? The annual contests between the East and West at the mechanical conventions should be encouraged by the presence of the railway and supply men, and by the ladies. Well, it was a fine game today, particularly from the pleasure viewpoint. It was well balanced and anybody's game up to the sixth inning, when the Eastern boys went to pieces. There were lots of errors, caused, I think, by too many holes in the players' gloves. There were no holes in George Wildin's gloves, but the trouble was that George didn't hold his hands where the ball was. A little high-degree superheater oil would have helped matters immensely. But George at the bat did wonderfully well, so we will forgive him."

H. A. Beaumont, B. & O.—"If they had taken my brother out of the game before it commenced, the result might have been different for the Eastern boys; perhaps they would have won. I used to play the game myself, and I would say, therefore, that as a whole, the boys did well today, considering the limited practice they must have had. The Eastern team needs a new captain; 'Smiling' O'Brian kicks too much and as for George Wildin, he is O.K. but he won't do."

W. H. Sagstetter, master mechanic, Kansas City Southern —"Sure, we enjoyed it, but it all goes to show that the Western boys are not only superior in mechanical matters as we all know, but they play better ball. The contest, best of all, showed cleanness and good fellowship, and these annual games should be encouraged."

W. M. Bosworth, mechanical engineer of the Kansas City Southern—"Wildin certainly played a 'peach' of a game; it was greatly enjoyed by the audience. Beaumont in center did good work; Bradford used his head at all times and should have had better support. O'Brien's playing was that of some ball player and if he ever comes west we would like to have him on the Western team."

W. May, master mechanic of the C. C. C. & St. L.—"It was a shame to see those eastern boys beaten; they were such nice boys. Their defeat was due to the fact that they didn't make use of the 'big stick' presented to Captain Wildin."

T. T. Cloward, P. B. T. W.—"The first part was all right and I looked for a close fight and a big score. The fielding errors and lack of team work lost the day for the Eastern boys; the lack of practice together was, of course, not their fault. I hope the game once a year will be continued."

M. M. REGISTRATION.

Allen, C. W., Shelburne.
Alling, Edw. W., M. M., N. Y., N. H. & H. R. R.
Averill, E. A., Amer. Engr., Traymore.
Barton, T. F., M. M., D., L. & W. R. R., Haddon Hall.
Bawden, Wm., M. M., Terminal R. R. Association of St. Louis, Watkins.
Bell, J. Snowden, Asst., Member, Jackson.
Bentley, H. T., P. A. S. M. P., C. & N. W. Ry., Marlborough-Blenheim.
Best, W. N., Engineer in Caloric, Shelburne.
Boughton, Wm., Locomotive Superheater Co., Marlborough-Blenheim.
Brangs, P. H., Arlington.
Brazier, F. W., S. R. S., N. Y. C. & H. R. R. R.
Brewer, J. W., M. M., B. & O. R. R., Dennis.
Brown, M. G., S. M. Power, Gulf & Ship Island R. R., Haddon Hall.
Buchanan, A. Jr., Public Service Commission, Lexington.
Burton, T. L., Westinghouse Air Brake Co., Marlborough-Blenheim.
Bussing, G. H., S. M. P. & R. S., B. & S. Ry., Haddon Hall.
Chamberlin, E., Mgr. Equipment Clearing House, N. Y. C. Lines, Marlborough-Blenheim.
Chambers, C. E., S. M. P., C. R. R. of N. J., Dennis.
Chester, W. E., St. Charles.
Clark, J. H., M. M., Staten Island Rapid Transit Ry. Co., Marlborough-Blenhem.
Cole, F. J., C. C. E., American Loco. Co., Marlborough-Blenheim.
Conniff, P., M. M., B. & O. R. R., Lexington.
Contant, M. R., M. M., Nester & Delaware, Shelburne.
Cromwell, Oliver C., M. E., B. & O. R. R., Marlborough-Blenheim.
Currie, H. A., Ass't. Elec. Eng. N. Y. C. & H. R. C., N. Y. C. R. R., Dennis.
Darlow, A. M., M. E. & Gen'l. St. Keeper, Buffalo & Susquehanna R. R., Haddon Hall.
Davis, John E., M. M., Hocking Valley R. R., Traymore.
DeVoy, J. F., A. S. M. P., Chgo., Mil. & St. Paul Ry. Co., Shelburne.
Dolan, John P., M. M., St. Louis & North Ark. R. R.,
Dolan, S. M., M. M., Marlborough-Blenheim.
Dooley, William H., M. M., C. N. O. & T. P. Ry., Dennis.
Dowd, Willard, Shop Engineer, Illinois Central, Dennis.
Dreyfus, T. F., M. M., B. & O. R. R., Traymore.
Egbers, G. F., M. M., Northern Pacific Ry. Co., Chalfonte.
Emory, John B., M. M., Texarkana & Ft. Smith Ry., States Villa.
Endsley, Prof. L. E., Purdue University, Chalfonte.
Fetner, W. H., M. M., Central of Georgia Ry., Chalfonte.
Finley, J. B., Ass't Gen. Sup., S. P. of Mex. & Sonora Ry., Chelsea.
Fitzgerald, D. E., A. S. M. P., St. Louis & San Francisco R. R., Haddon Hall.
Flory, B. P., S. M. P., N. Y., O. & W. R. R., Marlborough-Blenheim.
Fogg, J. W., M. M., B. & O., Chg. Term. Ry., Chalfonte.
Forsyth, Wm., M. E., (Asociate Member), Railway Age Gazette, Marlborough-Blenheimi.
Fowler, Geo. L., Dennis.
Gaines, F. F., S. M. P., Central of Ga. Ry., Dennis.
Garstang, Wm., S. M. P., C., C., C. & St. L. Ry.
Gentry, T. W., American Loco. Co., Wiltshire.
Glass, John C., M. M., Penna. Ry., 21 Illinois Ave.
Gould, Jos. E., S. M. P., Norfolk & Southern Ry., Dennis.
Graburn, A. L., M. E., Can. Nor. Ry., Traymore.
Graham, H. E., Supt., Pittsburgh, Allegheny & McKees Rocks R. R., Young's.
Graham, J. A., Strand.
Greenwood, H. F., Gen'l Foreman, Norfolk & Western Ry., Strand.
Haig, M. H., M. E., A. T. & S. F. Ry., Traymore.
Hale, H. H., M. M., C. H. & D. Ry., Haddon Hall.
Harris, C. M., M. M. Washington Terminal R. R., Traymore.
Hatch, M. C. M., Supt. Fuel Service, D. L. & W. R. R., Traymore.
Hawkins, B. H., D. M. M., D. L. & W. R. R., Traymore.
Henshaw, J. E., Shop Supt., St. L. & S. F. R. R., Haddon Hall.
Hyndman, F. T., Marlborough-Blenheim.
Joughins, G. R., M. S., Intercolonial Ry., Chalfonte.
Kautmann, A. G., Supt. Mach., N. C. & St. L. Ry., Runnymede.
Kellogg, D. P., Shop Supt., S. P., Haddon Hall.
Kellogg, W. L., S. M. P., C. H. & D. Ry., Haddon Hall.
Kilpatrick, J. B., Mech. Supt., C. R. I. & P. Ry., Traymore.
Kilpatrick, R. F., Elwald Iron Co., Chalfonte.
Kinney, C. D., M. M., Kanawha & Mich. Ry., Traymore.
Kinney, M. A., S. M. P., Hocking Valley Ry., Traymore.
Kirkpatrick, James, M. M., Baltimore & Ohio, Lexington.
Knight, Wm. Edward, S. M. P. & S., Cuba R. R., Traymore.
Kyle, C., M. M., Canadian Pacific Ry., Haddon Hall.
Lide, C. D., M. M., Carolina & Northwestern Ry., Aerial.
Little, J. C., M. E., Chicago & Northwestern Ry., Young's.
Lovell, Alfred, Traymore.
Machesney, A. G., Baldwin Locomotive Wo.ks, Pennhurst.
Mackenzie, John, Raymond.
McRae, J. A., Chem. Engr., M. C. R. R., Chalfonte.
McGill, A. M., M. M., Lehigh Valley R. R., Traymore.

McGrath, J. T., S. M. P., Chicago & Alton Ry., Marlborough-Blenheim.
May, Walter, M. M., C. C. C. & St. L. Ry., Chalfonte.
Meade, P. J., M. M., Atlantic Coast Line R. R., Lexington.
Minshull, P. H., M. M., N. Y., O. & W. R. R. Co., Traymore
Mirtz, P. P., M. E., L. S. & M. S., Traymore.
Monhause, H., Rome Loco. & Mach. Works, Chalfonte.
Montgomery, Hugh, S. M. P., Bangor & Aroostook R. R., Dennis.
Montgomery H., M. M., Penna. R. R., Borton.
Moore, B. R., S. M. P., Duluth & Iron Range R. R., Traymore.
Morris, W. D., C. & O. R. R., Shelburne.
Mowery, J. N., M. M., N. Y. N. H. & H. R. R., Chalfonte.
New, W. E., M. M., K. C. Belt Ry., Chalfonte.
O'Neill, W. J., M. M., C. R. I. & P., Lexington.
Osborne, Harry J., M. M., C. R. I. & P., Haddon Hall.
Oviatt, H. C., Gen. Insp., N. Y. N. H. & H. R. R., Strand.
Pfahler, F. P., M. E., Wheeling & Lake Erie R. R., Wiltshire.
Phillips, C., M. M., N. O. & N. E. & A. & V. Ry., Brighton.
Platt, Jno. G., Dennis.
Powers, M. J., M. M., Denver & Rio Grande Arlington.
Prendergast, Jas. F., M. M., B. & O. R. R., Traymore.
Quigley, Joseph, M. M., C. N. O. & T. P. Ry., Dennis.
Ramage, J. C., Supt. Tests, Southern Ry., New Berkley.
Redding, D. J., M. M., Pittsburg & Lake Erie R. R. Co, Traymore.
Reid, H. G., M. M., Can. Pac. Ry., Haddon Hall.
Reynolds, O. H., Ry. Rep., Jessup Steel Co., Pennhurst.
Rhodes, L. B., Chalfonte.
Riley, Geo. N., Supt. Motion Power, McKeesport Connecting Co., Marlborough-Blenheim.
Roope, Thos., S. M. P., C., B. & Q. Ry., Traymore.
Rossnig, W. H. P., Asst. to G. M., St. L & S F. Ry., Marlborough-Blenheim.
Sagstetter, W. H., M. M., Kansas City Southern, Shelburne.
Schwartz, C. L., A. G. M., St. Louis Refer. Car Co., Young's.
Seidel, Geo. W., Supt. Silves Shops, C. R. I. & P. Ry., Traymore.
Sharp, C. L., Gen'l. For., Rock Island Shops, Lexington.
Sheafe, J. S., Engr. Tests, Illinois Cent., Traymore.
Shepard, L. A., Atha Steel Castings Co., Brighton.
Shoemaker, H., Shop Supt., N. Y. O. & W. R. R., Traymore.
Sinclair, Angus, Haddon Hall.
Smith, R. D., S. M. P. & R. S., Boston & Albany R R., Dennis.
Smith, W. T., M. M., Chesapeake & Ohio Ry. Co., Dennis.
Sprowl, N. E., Shop Supt., Atlantic Coast Line R. R., Young's.
Stewart, A. F., M. M., Chesapeake & Ohio Ry., Traymore.
Storey, J. W., C. D., Central of Georgia Ry., Young's.
Stubbs, G. W., Repr., M. M., Gulf Line Ry., Lexington.
Sullivan, J. J., G. M. M., L. & N. Ry., Dunlop.
Sweeley, E. H., G. F. L. R., Long Island R. R., Shelburne.
Swoyer, H., Manager, American Loco. Co. Brooks Wks.
Taylor, Wm. Lucile, C. R. I. & P. R. R.
Thayer, F. C., G. R. F. E., Southern Ry., Dennis.
Thomson, S. G., S. M. P. & R. E., Philadelphia & Reading Ry., Lennox Apts.
Tinker, J. H., Div. M. M., C. & E. I. R. R., Strand.
Todd, Louis C., C. M. M., Boston & Maine R. R. Co, Young's.
Tonge, John, Chalfonte.
Turner, Amos, M. M., Lehigh Valley R. R. Co., Lexington.
Van Buskirk, H. C., S. M. P., C. & S. Ry., Chalfonte.
VanValin, H. D., Baltimore & Ohio R. R.
Wahlen, John, M. M., Montpelier & Wells River R. R., Lexington.
Walsh, J. F., G. S. M P, Chesapeake & Ohio Ry. Co., Marlborough-Blenheim.
Warnock, Harry R., G. F. L. D., Monongahela R. R., Francis.
Weisberger, E. L., M. M., Baltimore & Ohio R. R., Lexington.
Williams, E. A., Traymore.
Williams, F. H., M. M., C. R. I. & G. Ry.
Wilson, G. M., M. M., Buffalo & Susquehanna R. R.
Wright, R. V., Chalfonte.
Wyman, R. L., M. M., Lehigh & New England R. R., Pennhurst.
Young, Chas. D., A. E. M. P., Pennsylvania Lines West, Brighton.

M. M. GUESTS.

Bertin, Michel J. A., Special Apprentice, P. R. R., Altoona, Young's.
Boyer, C. W., Ass't Foreman Erecting Shop, P. R. R., Trenton N. J., Whittle.
Burkhardt, A. A., Gen'l Car For., N. Y. C. & H. R. R. Co., Pennhurst.
Burkhardt, Master James, Pennhurst.
Butterworth, J. A., Puchasing Agt's Office, Southern Ry., Traymore.
Coyle, G. W., Engineer, B. & O., Barthram.
Crawford, M. R., Gen'l Foreman, C. R. R. of N. J., Louvan.
Esterbrook, W. H., Master Painter, Public Service Rwys. Co., Bothwell.
Fisher, A. W., Signal Dept., P. R. R., Borton.
Garland, A. R., Pur. Agt. Office, P. R. R.
Gill, James J., Insp. Public Cons., Lexington.
Gsantner, O. C.
Hemming, S. V., Chemist & Eng. Tests, American Loco. Wks., Traymore.
Hinkens, E. H., Genl. Foreman, B. & O., Shelburne.
Jackson, W. S., Sec y.to S. M. P., Penna. R. R., Chafonte
Jeffrey, Thos., Genl. Piece Work Ins., D. L. & W., Shelburne.
Keller, G. W., Erecting Shop Foreman, Norfolk & Western Strand.
Lewis, A. W., Chief Material Insp., Norfolk & Western, Marlborough-Blenheim.
McCormick, C. C., Insp. Purchasing Dept., P. R. R., Dennis.
McKelven, W. D., Gen'l Foreman, P. R. R., Raymond.
McGill, A. Nelson, L. V., Traymore.
Mayer, Frank, Gen. M. B. M., Southern Ry., Pennhurst.
Merz, Chas. B., C. C. Pur. Dept., C. T. H. & S. E. Ry., Young's.
Moore, R. P., Pur. Agt., Duluth & Iron Range, Traymore.
Norton, A. W., Draughtsman, B. & O., Kenderton.
Orr, J. J., F. B. M., Lackawanna, Dennis.
Pattison, J. H., M. S. F., Norfolk & Western, Strand.
Porter, Allen, Sup., P. R. R.
Rafters, C. D., Foreman, P. R. R., Rafters.
Rhodes, Robt. S., Elec. Dept., N. Y. C., Runnymede.
Richardson, E. L., Gen. Foreman, N. & W., Strand.
Roberts, G. S., Machinist, Penna. R. R., Haddon Hall.
Robertson, A. W., Ck., Pur. Dept., D. L. & W. R. R., Netherland.
Rule, Geo., Engineer, B. & O., Barthram.
Salisbury, R. W., W. P. Insp., B. & O., Haddon Hall.
Scheifele, John, Asst. Rd. For. of Engines, P. & R. Ry., Ariel.
Schramm, T. J. Chief Clerk, G. S. M. P., D. L. & W., Shelburne.
Shaffer, C. A., Gen. Insp. of Tools, Ill. Central, Dennis.
Shay, T. M., Gen. Pass. Car Foreman, B. & O., Haddon Hall.
Shelhorn, Otto, Ord. Dept., U. S. Gov't, Lexington.
Shoester, Geo. W., For. of Electricians, P. R. R., Fontenanck.
Sisler, Lester, Chief Clerk, Interstate Com. Com., Haddon Hall.
Spratt, T., Asst. Pur. Agent, Norfolk & Western Ry., Traymore
Stickley, T. W., Genl. Fore., Norfolk Southern, Arlington.
Town, Col. Thos. J. (Guest of J. Snowden Bell), Berkshire Inn.
Waldo, Dr. Leonard, Consulting Engineer, Shelburne.
White, H. M., Engineer, B. & O., Barthram.
White, R. H., Engr. Machinery, Amer. Loco. Works, Traymore.
Wortham, E. S., Asst. to V. P., C. & O., Chalfonte.

M. C. B. GUESTS.

Beatty, J. B., Chief Clerk Car Dept., Penna. R. R., Dunlop.
Beckam, R. F., Chief Clerk to Auditor of Disbursements, Southern, St. James.
Bower, W. C., P. A., N. Y. Central, Shelburne.
Boyce, W. D., M. E., Chalfonte.
Cloward, T. T., Gen. Foreman, Loco. Dept., Penna. R. R., Haddon Hall.
Cotton, W. A., Chief Clerk to Mech. Supt., Erie R. R., Marlborough-Blenheim.
Derbey, W. A., Eng. Tests, C. B. & O., Chalfonte.
English, G. H. B., Supervisor, P. B. & W. Ry.
French, E. L., Gang Foreman, P. R. R., Devonshire.
Furrer, O. B., Sten. to Eng. Tests, P. R. R., Traymore.
Gearhart, J. F., Master Painter, P. R. R., Dunlop.
Goodfellow, T. F., Inspec. Tests, P. R. R., Traymore.
Henry, H. B., Statistician, Union Pacific, Brighton .
Hickman, A. V., Chief Clerk A. S. M. P., Norfolk & Western, Iroquois.
Jellison, B. T., P. A., C. & O., Marlborough-Blenheim.
Kinter, J. H., Foreman Frt. Car Inspection, Penna. R. R., Edna.
Lowther, L. W., Machinist, D. L. & W. R. R., Runnymede.
Luke, W. J., Gen'l Storekeeper, Norfolk Southern, Dunlop.
Lyons, Jas., Foreman P. R. R., Chalfonte.
Mahon, W. J., St. Charles.
McCracken, J. T., Master Painter, Interboro R. T. Co., Dunlop.
Minshall, P. H., M. M., N. Y. O. & W., Traymore.
Monroe, R. C., Car Engr., N. P. & S. P., Chalfonte.
Nutt, A. S., St. Louis Term. R. R., Beauvier.
O'Neill, J. F., Air Brake Instructor, Penna. R. R., Delaware City.
Partlock, W. M., Gen. Store Keeper, Seaboard Air Line, Young's.
Phipps, J. W., Air Brake Insp., B. & O., Islesworth.
Reifsteck, A. W., Secy. to G. S. M. P., J. C. R. R., Young's.
Robbins, Felix, Marlborough-Blenheim.
Rogers, C. J., Stk., D. L. & W., Bothwell.
Small, J. F., Chief Clerk P. A., Norfolk Southern, Dunlop.

Waters, John H., Ass't. M. M., Georgia R. R., Brighton.
Wertz, Cyrus, For. Painter, Reading Ry., Risley.
Wolf, John D., For. Painter, Reading, Risley.
Wood, H. G., Chief Clerk, Pur. Agt., Seaboard Air Line, Young's.
Wright, F. H., For. Elec., N. Y. Central, Marlborough-Blenheim.

J. F. WALSH TO RETIRE.

J. F. Walsh, general superintendent of motive power of the Chesapeake & Ohio, who is one of the most widely known men attending the conventions, announces that he intends to retire on July 1. He may continue to act in a consulting capacity for the C. & O., but his chief business in future will be to rest and enjoy himself.

PACIFIC TYPE LOCOMOTIVE, LOUISVILLE & NASHVILLE.

Following its usual custom of building all locomotives at its own shops, the Louisville & Nashville has just completed five passenger engines of the Pacific type at South Louisville, making thirty-eight locomotives built at this point since July 1, 1911. These engines were designed in the office of the mechanical engineer of the road and are a development of the locomotives of the same type now in service.

As will be seen by reference to the illustration, they follow modern practice in every particular. Probably the most striking feature is the very deep throat sheet which permits a liberal depth under the brick arch. This arrangement has necessitated the use of a "broken" grate that follows the lines of the mudring. Inasmuch as an arch fitting close to the flue sheet and extending well back and up in the firebox is used, the usual undesirable result of a grate of this form is overcome.

In general the boiler follows conservative practice, having 154 2¼-in. tubes, 18 ft. 6 in. in length. In addition there are 21 5½-in. flues for the superheater elements. This gives 2215 sq. ft. of heating surface in the tubes and flues. The firebox, including the arch tubes, has 229.7 sq. ft., making a total heating surface of 2444.7 sq. ft., or a ratio of 54.3 sq. ft. of heating surface to each square foot of grate area. Considering each square foot of superheater heating surface as being equivalent to 1.5 sq. ft. of evaporative heating surface the equivalent heating surface of the boiler is 2978.7 sq. ft., which gives a ratio to the 45 sq. ft. of grate area of 66.2 to 1. The superheater is of the Schmidt type.

Outside steam pipes of the type now being so generally used in connection with superheater locomotives are employed in this case. The piston valves, 12 in. diameter, are operated by a design of Walschaert valve gear that has proved satisfactory on previous locomotives. The valves have 6¾-in. travel, 1⅛-in. exhaust clearance, and are set with a ¼-in. lead.

It will be noted that both injectors are on the right hand side and feed into a double check valve placed on the top center line of the boiler very near the front tube sheet. This check discharges on a baffle plate which distributes the feed water over a considerable area. Also, in this connection it will be noted that the relative arrangements of the dome, sand box and bell have been studied to give the best general appearance, and that the locomotive as a whole presents a smooth, well balanced effect. The location of the headlight at the center of the front end is in keeping with this idea. The headlight is oil burning and is provided with a fresnel lens of a design developed by the Dressell Railway Lamp Works.

The introduction of these locomotives in service has permitted the operation of 12-car passenger trains, while the previous engines, which were but 15,500 lbs. lighter, were able to handle but nine cars. They, however, were not equipped with superheaters and brick arches.

The general dimensions and weights of the new K 3 class are as follows:

Tractive effort	31,265 lbs.
Cylinders, bushed	21½ in. × 28 in.
Boiler, type	Straight top.
Boiler, minimum diameter	71 in.



Locomotive Designed and Built by the Louisville & Nashville.

Boiler, working pressure	190 lbs.
Tubes, number	21 and 154.
Tubes, diameter	5½ in. and 2¼ in.
Tubes, length	18 ft. 6 in.
Firebox, size	72¼ in. and 90⅝ in.
Firebox, water space—S. and B., 3½ in.	F. 4 in.
Grate area	45 sq. ft.
Fuel	Soft coal
Heating surface, firebox	210 sq. ft.
Heating surface, tubes, 2¼ in.	1,648 sq. ft.
Heating surface, flues, 5½ in.	567 sq. ft.
Heating surface, arch tubes	19.7 sq. ft.
Heating surface, superheater	356 sq. ft.
Driving wheels, diameter	69 in.
Driving journals	9 in. and 9½ in. x 12 in.
Engine truck wheels, diameter	33 in.
Engine truck journals	5½ in. x 11 in.
Trailer wheels, diameter	49 in.
Trailer wheels, journals	7 in. x 14 in.
Weight, on driving wheels	131,000 lbs.
Weight, engine	211,500 lbs.
Weight, engine and tender	354,900 lbs.
Wheel base, driving	12 ft.
Wheel base, total, engine	30 ft. 7 in.
Wheel base, total, engine and tender	62 ft. 9½ in.
Tender wheels, diameter	33 in.
Tender journals	5½ in. x 10 in.
Tender capacity, water	7,000 gals.
Tender capacity, coal	15 tons.

SUPERHEATED STEAM AND THE LARGE LOCOMOTIVE.

The introduction of superheated steam in railway service has made larger locomotives possible. The final capacity of a locomotive is limited by the ability of the firemen to properly supply coal to the firebox, more than by the clearance limitations of the right of way. Before the adaptation of superheated steam to the locomotive the limit in size and capacity, based on the ability of the fireman to supply the engine with fuel, had been practically reached. The use of superheated steam, however, has made it possible to extend these limits from 20 per cent. to 40 per cent.

An interesting method of illustrating the manner in which this increase has been effected is by the following example: Assume two locomotives, one using saturated steam and the other superheated steam, each burning 6000 lbs. of coal an hour. Suppose the superheated steam locomotive burns 4 lbs. of coal an hour to develop one horsepower. The locomotive equipped with a superheater furnishing highly superheated steam will develop the same power on 3 lbs. of coal, a saving of 25 per cent. The saturated locomotive will thus develop 1500 horsepower, but the superheater locomotive will develop 2000 horsepower. The difference in the power developed is 500 horsepower or a 33⅓ per cent. increase in hauling power for the same amount of fuel consumed.

From this it is readily seen that in locomotive practice the capacity increases much more rapidly than the coal saving upon which it is dependent. The work done per ton of coal is what actually counts in the reduction of the cost of transportation. It will also be noted that this increase in capacity or hauling power has been effected without any increase in actual coal consumption; that is, the fireman in handling an engine equipped with a superheater, producing steam at a temperature of from 600 to 650 deg. with the increased capacity, is doing it with no more effort than it was necessary to expend in firing the saturated steam engine.

SUPPLYMEN'S ANNUAL MEETING.

The annual meeting of the Railway Supply Manufacturers' Association was held Saturday morning in Convention Hall, with president Stafford in the chair. There was a thoroughly representative attendance when the meeting was called to order.

In his opening address, president Stafford spoke of the foresight of the association in establishing a permanent secretary's office and told how it had resulted in the accumulation of correspondence, agreements, contracts and other data that is now almost indispensable to planning and carrying out the work of the constantly changing executive administration. He next commended the efficient work of the outgoing executive and other committees, and of the vice-president and treasurer, and commented on the change of policy due to the demand of the two railway associations that certain practices heretofore recognized as standard be modified and told of the efforts made by the executive committee to conform to the wishes of the parent organizations in both letter and spirit.

Mr. Stafford gave some interesting figures covering the exhibits and membership of the association. This year the space on the Million Dollar Pier occupied by exhibitors is 83,507 sq. ft., as against 76,830 in 1911. The track exhibits compare favorably with those of a year ago. This year the membership of the association is composed of 270 exhibitors and 225 non-exhibitors, as against 245 of the former and 209 of the latter in 1911. The number of non-exhibitors this year may be increased before the end of the convention. Although more exhibit space was provided this year, something like 100 possible exhibitors could not be accommodated.

In telling about this year's exhibits, Mr. Stafford went out of his way to thank the exhibit committee for its part and to express to all exhibitors his appreciation, and the appreciation of the exhibit committee, individually and collectively, for their hearty coöperation.

The finances of the association are in a healthy condition.

Following the president's address, C. S. Storrs introduced a resolution so amending the final paragraphs of Section 7, Article I, of bylaws of the association as to make it read as follows:

"After the executive committee shall have fixed this surplus amount, any money in its hands in excess of same may be returned to the members pro rata upon their payments for dues, badges and exhibit space." The resolution was adopted unanimously.

The object in adding the word " badges" to Section 7, Article I, of the bylaws, was as president Stafford pointed out in his address, to make it possible to include in the rebates to members any of the surplus derived from the sale of extra badges; and thus permit non-exhibiting members to share in that rebate.

On the subject of elections to the executive committee by voting members in the various districts, Scott Blewett spoke strongly in favor of making every effort to arouse greater interest at such elections. His remarks were approved by other speakers.

Elections of members of the executive committee, which were held Friday in the various districts, each member to serve three years, were reported as follows and duly approved: First district, Fred. M. Nellis, Westinghouse Air Brake Co., Boston, Mass.; Second district, Oscar F. Ostby, Commercial Acetylene Co., New York; Fourth district, J. C. Whitridge, Buckeye Steel Castings Co., Columbus, Ohio; Seventh district, S. M. Dolan, American Car & Foundry Co., St. Louis, Mo.

The nominating committee for officers to serve for the ensuing year reported as follows: For president, Samuel G. Allen, vice-president of the Franklin Railway Supply Company, New York; and for vice-president, B. A. Hageman, Jr., president of the U. S. Metal & Manufacturing Company, New York.

The secretary was instructed to cast the unanimous ballot of the meeting for these officers.

A rising vote of thanks was tendered President Stafford for his successful administration.

H. C. Manchester, superintendent of motive power and equipment of the Delaware, Lackawanna & Western, is attending the conventions and is accompanied by his daughter. He is looking forward to the arrival of several Pacific type locomotives that are going to make Pocono Mountain look like a mole-hill. These engines are the heaviest of this type yet built by the American Locomotive Company, with the exception of the experimental engine built for the Pennsylvania. One of them is to be equipped with a brick arch.

Conventionalities.

J. W. Faessler, of Boss expander fame, is here again this year, as is the real "Boss"—Mrs. Faessler.

E. W. Summers and Frederick Schaefer, of the Summers Steel Car Company, arrived Saturday afternoon.

G. P. Warner, general sales manager of the Pratt & Letchworth Company, has been called away unexpectedly.

James Hopkins, president of the Camel Company, arrived the latter part of last week, and is at the Marlborough-Blenheim.

P. B. Lameroux, the malleable iron man who made Beaver Dam famous, is circulating among his friends here at the convention.

They say that for the first time in the history of these conventions George N. VanSweringen's sartorial outfit has proven incomplete.

Among the familiar faces we notice Mr. and Mrs. O. M. Edwards and Mr. and Mrs. E. F. Chaffee. They are staying at the Marlborough-Blenheim.

"Doc" Bateman's face has worn the brand of smile that won't come off ever since Saturday morning, when Mrs. Bateman and the kids got here.

H. H. Schroyer, of the Acme Supply Company, and H. U. Morton, of the General Railway Supply Company, have been called to Chicago by press of business.

Roland Gerry, assistant general sales manager of the Jones & Laughlin Steel Company, is registered at the Marlborough-Blenheim and will remain until the end of the convention.

S. M. Rogers, vice-president of the Elgin, Joliet & Eastern, arrived the latter part of last week, and has been inspecting the exhibits. Mr. Rogers is at the Marlborough-Blenheim.

Mrs. A. L. Graburn, wife of the mechanical engineer of the Canadian Northern, is attending the convention this year for the first time. She and Mr. Graburn are staying at the Traymore.

Dr. W. F. M. Goss is expected to-day. Following the close of the conventions he will be at Coatesville in charge of the low water tests that are to be made there on Thursday.

S. B. Wight, general purchasing agent of the New York Central Lines, registered at the Marlborough-Blenheim Friday and proceeded to make a critical examination of the exhibits.

Robert A. Flum, of the McCord Manufacturing Company, is attending the conventions and is registered at the Brighton. He has recently changed the location of his headquarters from Detroit to Chicago.

Senator Lorimer, of Illinois, who is president of the Railway Utilities Company, arrived on Saturday, together with Mr. and Mrs. Gallagher, and will remain several days. They are stopping at the Hotel Dennis.

W. J. Eddy, formerly tool room supervisor of the Erie and now holding a similar position on the Rock Island, where he is engaged in installing a standard practice card system, is in attendance at the conventions.

The major leaguers are not the only baseball aggregations that have enthusiastic followers. Billy Dee, the animated disciple of anti-Pluvius creed has flown in from Detroit to give us an imitation of Hughey Jennings having a spasm on the side lines.

F. C. Thayer, general road foreman of engines of the Southern, is stopping at the Dennis with Mrs. Thayer. Mr. Thayer is a past president of the Traveling Engineers' Association and makes it a point to attend the Master Mechanics' Conventions each year.

M. H. Haig, mechanical engineer of the Atchison, Topeka & Santa Fe, arrived on Saturday. Mr. Haig is chairman of the committee on flange lubrication, which will make its report at Wednesday's meeting. He is stopping at the Traymore.

P. P. Mirtz, mechanical engineer of the Lake Shore & Michigan Southern, a member of both the M. C. B. and M. M. Associations, is attending the convention for the first time. He is accompanied by Mrs. Mirtz and is stopping at the Traymore.

W. E. Knight, superintendent of motive power of the Cuba Railroad, is stopping at the Traymore with Mrs. Knight and their two boys. Mr. Knight plans his vacations so as to attend these conventions. He will leave for New York to-day or to-morrow.

Robert Quayle, superintendent of motive power and machinery of the Chicago & North Western, will not attend the convention this year. So many of the mechanical department officers of that road are here that Mr. Quayle thought he had better stay at home and keep things going.

C. W. Seddon, superintendent of motive power of the Duluth, Missabe & Northern, who is attending the conventions, is delighted with the way in which his ideas of a boiler feed device were received by the members of the Master Boiler Makers' Association at the recent convention in Pittsburgh.

S. K. Dickerson, of the Lake Shore, came to Atlantic City with a brand new cane. After carrying it about for two days and getting on the verge of nervous prostation trying to keep track of it, he begged Lee Parish to take it off his hands. That explains why Lee is sporting the new stick.

In recognizing the work of Oscar F. Ostby, by making him a member of the executive committee for the next three years, the Railway Supply Manufacturers' Association has properly rewarded one who has worked hard at a most thankless task. No one covets the job of chairman of the enrollment committee.

W. F. Richards of the Gould Coupler Company is stopping at the Chalfonte with his two daughters, Misses Marie and Thelma. This is Miss Marie's third convention and Miss Thelma's first. Miss Thelma is attending a young ladies college at Buffalo; but the term fortunately ended in time for her to get to the convention this year.

F. F. Gaines, superintendent of motive power of the Central of Georgia, stands ready to talk combustion and locomotive firebox design with anyone interested in the subject. His type of firebox has been incorporated, in connection with a Security brick arch, in the boiler for the Virginian Mallets—the largest boiler ever built.

For the first time in seventeen years, George Basford will miss a convention of the Master Mechanics' Association. Pressure of business is responsible for his absence. His friends will be interested to know that he recently bought a 54 ft. cruising motor boat, bringing it from Port Clinton, Ohio, to New York over the Great Lakes, through the canal from Buffalo to Albany, and down the Hudson. The trip took about eight days.

It seems that J. H. Sanford, purchasing agent of the New Haven, declined to come to Atlantic City for fear he would be seen talking to George Wildin and thereby lose what reputation he now has. Sanford's anxiety is based on the recent arrest and conviction of Wildin for driving an automobile within the New Haven city limits with the muffler cut out. According to Sanford, Wildin was fined $15.55; and he adds that he wishes it was ten times that amount.

Among the special guests at the M. C. B. convention are the following members of the Master Car and Locomotive Painters' Association: President, J. T. McCracken, Interboro Rapid Transit; H. M. Butts, New York Central & Hudson River; George Drolette, Buffalo, Rochester & Pittsburgh; John Gearhart, Pennsylvania; D. A. Little, Pennsylvania; B. E. Miller, Delaware, Lackawanna & Western, and John D. Wright, Baltimore & Ohio. These men are very active in the Master Painters' Association and hope to attend the M. C. B. conventions every year.

The Exhibit.

The Missouri Pacific has ordered from Fairbanks, Morse & Company, Chicago, 50 of its No. 32 gasoline motor cars. This is in addition to a previous order for 40 of the same cars from the same railway.

The Anderson friction draft gear, eliminating bolts, straps and nuts, as shown on the Mid-Western Car Company's steel underframe flat car among the track exhibits, has been inspected critically by many of the railway men. The buffing arrangement is also another point of interest in the car.

Tests of the ruby mica globes made by the Storrs Mica Company, Owego, N. Y., show that they can be subjected to service on lanterns burning continuously for over 700 hours without any sign of deterioration. The company has numerous reports of lanterns fitted with mica globes being dropped from top of car without injury to globes.

The Acme Supply Company's weatherproof window and post, shown in spaces 572 and 573, indicate the best methods of combining their weatherproof window design with post construction. The post battens and envelopes are made to accommodate the window and its fixtures, so as best to accomplish the positive seal of sash by reason of assistance of the natural external air pressure. A complete model showing the wide and narrow post and standard windows is an interesting feature of the exhibit.

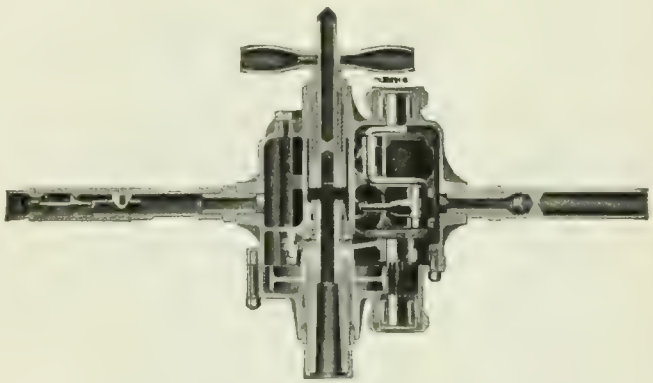
The McConway & Torley Company, Pittsburgh, Pa., is showing full size models of its different styles of passenger equipment couplers in exhibit spaces 501, 503, 505. These include the Buhoup 3-stem coupler, the Pitt passenger coupler, and the Janney passenger coupler. The 3-stem equipment is now in service on over 11,000 passenger train cars, and the Pitt passenger coupler on over 3,000 all-steel passenger cars, for which it was especially designed. Over 60 per cent. of the new passenger equipment built in the United States in 1910 and 1911 is said to have been fitted with McConway & Torley couplers.

The Pilliod Company, New York, has on hand orders sufficient to keep the plant in operation at full capacity and running 13 hours a day for about two months. The company has recently received orders for gears for 10 Atlantic type locomotives for the New York Central & Hudson River, 40 mikado locomotives for the Chicago, Rock Island & Pacinc, 25 Mallet locomotives for the Norfolk & Western, 7 Pacific type locomotives for the Western Maryland, 2 passenger locomotives for the Hocking Valley, 10 mikado locomotives for the Atlanta, Birmingham & Atlantic, one passenger and 2 consolidation locomotives for the Coal & Coke Railway and 5 locomotives for the Richmond, Fredericksburg & Potomac.

On Friday we referred to a device designed to do away with the annoyance of draft and cinders blowing in through the screens of the partially opened windows of passenger cars, shown by the Gold Car Heating & Lighting Company, New York, at its booth, 301-305. It consists of a narrow curtain wound on a vertical roller set at the side of the window and concealed in the seat back. When not wanted it is rolled back out of the way, but when in use it is drawn across the front of the window and fastened at the opposite side. It performs the same function as the deflector used for house and office windows, turning the incoming draft upwards and away from the passenger.

ROLLER BEARING AIR DRILL.

A new line of portable drilling machines has been placed on the market by the Independent Pneumatic Tool Company, Chicago. They are known as the Thor roller bearing piston air drills and possess the general features of other Thor drills of this type, such as Corliss valves, telescopic screw feed, removable crank chamber plate and a large air chamber. Although the size of the spindle has been increased the most radical improvement is in the crank shaft bearings, the connecting rods, eccentrics and eccentric straps. The crank shaft has been strengthened and runs in anti-friction roller bearings

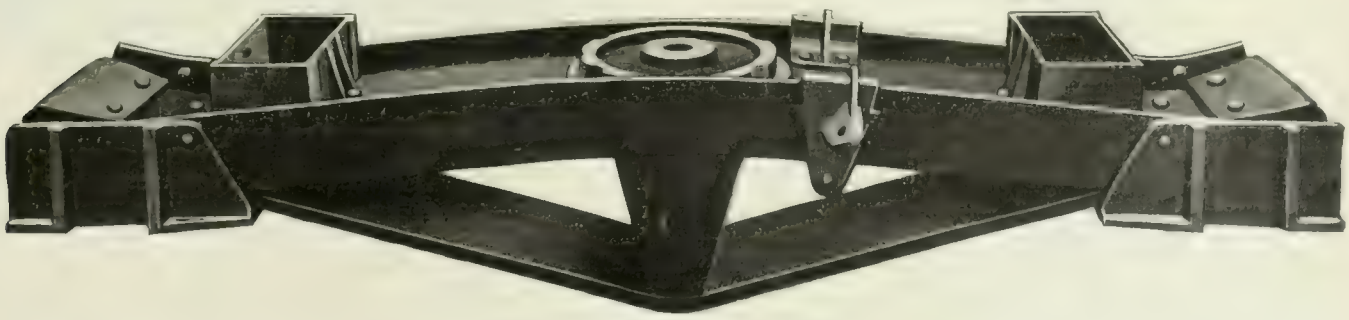


The Roller Bearing Piston Air Drill.

which are retained in a brass cage. These rollers run in bushed bearings that are hardened and ground and the end of the crank shaft is rounded so as to reduce the friction where it bears against a hardened plate thrust bearing. On account of the increased size of the crank shaft, the ordinary center bearing is dispensed with and the eccentric is made smaller in diameter and is mounted on the crank shaft. The connecting rod is made in one piece, being similar to that used in the Thor No. 8 and 9 close corner drills. Roller bearings are also provided for the idler gears in the compound drills, and an improved shifter mechanism is used on two-speed machines.

SAMPSON BOLSTER.

The Sampson bolster, made by the American Steel Foundries, Chicago, is built up, of the Simplex type, and is designed for use on trucks of heavy tenders. With modern tenders having a



Sampson Tender Truck Bolster.

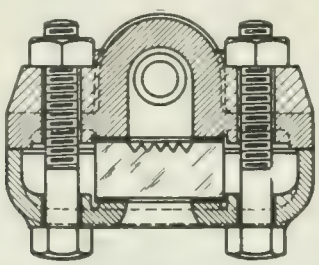
large capacity for fuel and water, the weights carried are so great as to demand a much heavier and stronger bolster than has been found necessary heretofore. This is especially so in the case of tenders for Mallet compound locomotives which frequently weigh 100 tons or more and are sometimes carried on six-wheel trucks. The Sampson bolster has been designed for service of this kind. The compression member is a 15-in. rolled steel I-beam with a rolled steel tension plate; a heavy cast steel king post is used. Bolsters of this type not only provide a structure of great strength vertically to carry the normal load but possess ample strength to resist the transverse blows and shocks due to the inertia of the trucks as well as the stresses resulting from imperfection of the truck and from heavy brake applications which are found in modern railway practice.

RAILWAY SIGNAL VOLT-AMMETER.

The General Electric volt-ammeter, type S-2, is a portable instrument of the smallest size consistent with accurate readings, for testing signal circuits in the field. The instruments are made with three volt-ammeter and three ammeter ranges, and either of the following scales may be provided: 150 v., 15 v. and 1.5 v.; 15 amperes, 1.5 amperes and 150 miliamperes; or 150 v., 30 v. and 3 v.; 15 amperes, 3 amperes and 300 miliamperes. Change is made from one range to another by simply turning a button switch on the front of the instrument and without any change of connections. Ammeter readings can be taken on any of the ranges without opening the circuit so that the clearing and hold clear current for a signal can be accurately read. The instrument, which is of pocket size, in a heavy mahogany case, is especially designed for hard usage, being an adaptation of the automobile type with very light moving element. The design is based on the D'Arsonval principle. The instruments are made by the General Electric Company, Schenectady, N. Y.

RICHARD KLINGER REFLEX WATER GAGE.

The most recent improvements in the Richard Klinger reflex water gage, type N, manufactured by the Nathan Manufacturing Company, New York, are shown in the illustration. The gage is so constructed that the pressure against the glass is distributed more uniformly and with fewer bolts than is ordinarily the case, insuring tightness under most severe requirements. The casing is simplified and is made strong and stiff to guard against warping. The cap screws ordinarily used



Section Through Klinger Water Gage.

are replaced in this latest pattern by bolts running through the casing, and still further adding to the efficiency and convenience in tightening up the bolts. The nuts rest with the flat sides against corresponding flat sides on the casing and cannot revolve, so that the tightening may be done without and difficulty whatever, by applying an ordinary monkey-wrench to the hexagon heads on the front part of the casing where they are most accessible. These gages are substituted for the ordinary tubular glass gages, and are an absolute protection to enginemen against injuries from breaking or flying glass, as the glass will not fly out of the casing even if it should break, which very rarely occurs.

COMMONWEALTH CAST STEEL ENGINE TRUCK FRAMES.

The Commonwealth cast steel frames for passenger trucks, made by the Commonwealth Steel Company, St. Louis. Mo., are well known on account of their extensive use under Pullman cars, coaches and baggage and express cars. The series of cast steel engine truck frames, here illustrated, are recent designs. In all these designs for engine trucks the pedestals

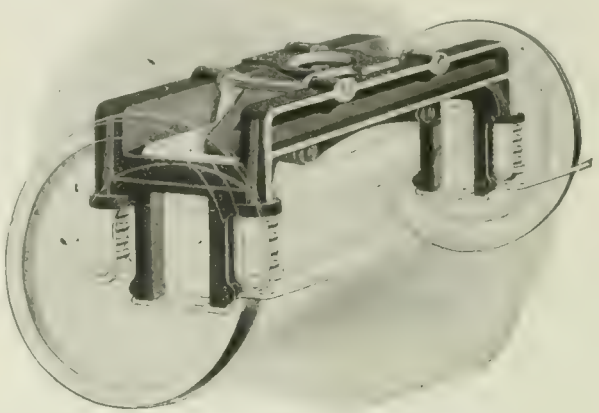


Fig. 1—Easy Riding Pony Truck.

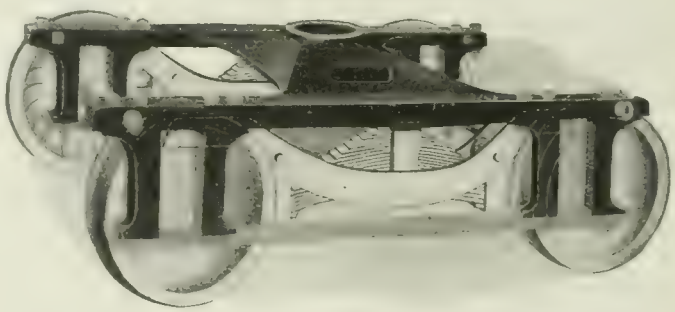


Fig. 2—Easy Riding Rigid Engine Truck.

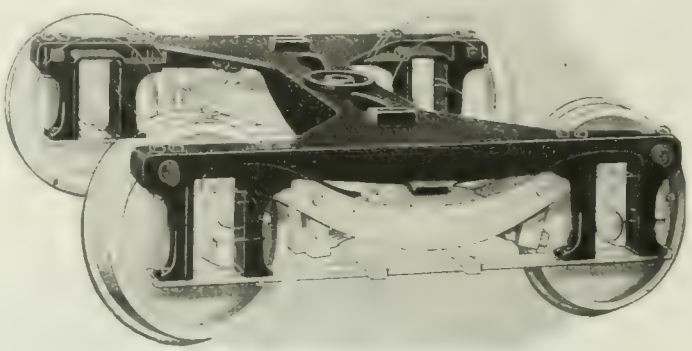


Fig. 3—Non-Derailing Tender Truck.

are cast integral with the wheel piece and transom, and this one casting makes up a large part of the structure required for a complete truck. There are very few pieces, and the number of bolts and rivets is reduced to a minimum and separate braces and gusset plates for holding the truck square are entirely eliminated. For this reason the truck is always maintained square, the cost of maintenance is greatly reduced,

and all the advantages of a square truck are constantly obtained. The flange wear is reduced by this rigid maintenance of the truck alinement. Fig. 1 shows the principle as applied to a pony truck for engines. The pedestals, spring seats and transom are cast in one piece, and in it the pivot bearings are provided for the swinging cradle which supports the center plate. In all these trucks the wearing parts are easily replaced, and they are made adjustable where necessary. Fig. 2 is a

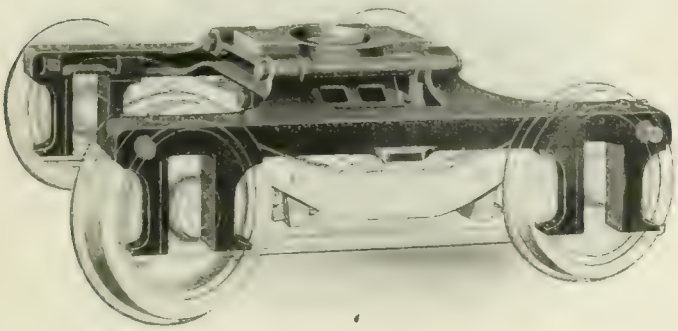


Fig. 4—Easy Riding Swing Motion Engine Truck.

four-wheel rigid engine truck, in which the pedestals, wheel piece, transom and center plate are combined in one piece. Fig. 3 is a somewhat similar design arranged for a tender truck, and Fig. 4 shows the principle as adapted to a four-wheel swing motion engine truck. Here the pivot bearings for the cradle and center plate are cast solid on the transom, as with the pony truck.

FERGUSON SUPERHEATER FLUE WELDING FURNACE.

The increased use of locomotive superheaters during the past year or two has created a considerable demand for tools for safe-ending the large tubes used in this equipment. To meet



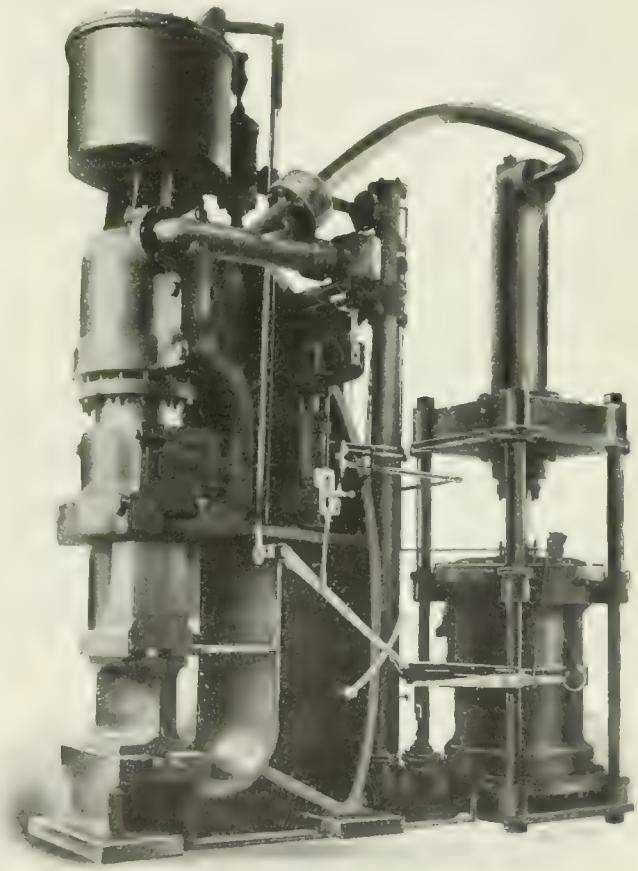
Ferguson Superheater Flue Welding Furnace.

this necessity The Railway Materials Company, Chicago, has designed and placed on the market a Ferguson furnace which is illustrated herewith. This will be recognized as a counterpart of the Ferguson furnace almost universally used in railway boiler shops for welding safe ends on locomotive flues. It is increased in size somewhat to accommodate the large superheater tubes. However, no other change has been made from the old design, and the same soft, clean, rapid and short heats are assured.

STEAM-HYDRAULIC FORGING PRESSES.

A 400-ton single column steam-hydraulic forging press made by the Chambersburg Engineering Company, Chambersburg, Pa., is shown in the accompanying illustration. The main frame is an open hearth steel casting of I-beam section, the web being heavily reinforced and stiffened by ribs. The frame has large guides for the ram and is fitted with a cap that is rigidly bolted on the front to take care of strains in any direction when forging beveled work. Additional support for the press is afforded by projecting flanges at the base of the frame.

This company manufactures the single column type in all sizes up to 400 tons pressure, and also builds a four column type with capacities up to 5000 tons. In both types a double



Chambersburg 400-Ton Steam-Hydraulic Press.

lever control is used, which is simple in construction and has the distinct advantage of being easier to operate. The operator has entire control of the press by two hand levers, one of which is used to adjust the stroke and the other to give the power stroke to the press; since their functions are the same as an operator has been accustomed to secure with the two levers of a steam hammer the operation of the press comes to him naturally. In either case the press ram follows the direction in which he has moved the hand lever.

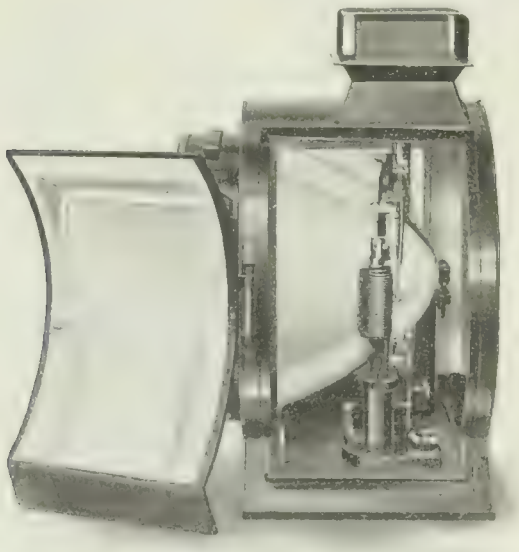
In the larger sizes of presses a triple intensifier is employed; thus in the Chambersburg press of 1500 tons capacity, by means of the triple cylinder intensifier, the operator may put either, 500 tons, 1000 tons or 1500 tons pressure on

the work and according to the work to be done use steam in proportion to the pressure exerted. This selective pressure design effects a great economy in steam consumption as compared to the usual single cylinder intensifier press in which a constant volume of steam equal to the full tonnage of the press is used regardless of the work being done. The presses are designed for maximum production at minimum operating and maintenance costs and are the result of a long experience in building hydraulic machinery.

PYLE-NATIONAL LOCOMOTIVE HEADLIGHT.

The Pyle-National turbo-electric generating set, type E, was designed by the Pyle-National Electric Headlight Company, Chicago, especially for locomotive headlight service, and has proved to be efficient, economical and reliable. It operates on all steam pressures ranging from 100 lbs. to the very highest, and on superheated as well as saturated steam without any adjustment.

Equipment E was designed to use the same armature as in previous equipments, and the same brush holders and brushes and the same ball bearings, which, as a rule, are practically all the parts that need replacing. The principal reason for designing the new type E equipment was to obtain a high steam economy, and at the same time to eliminate all features



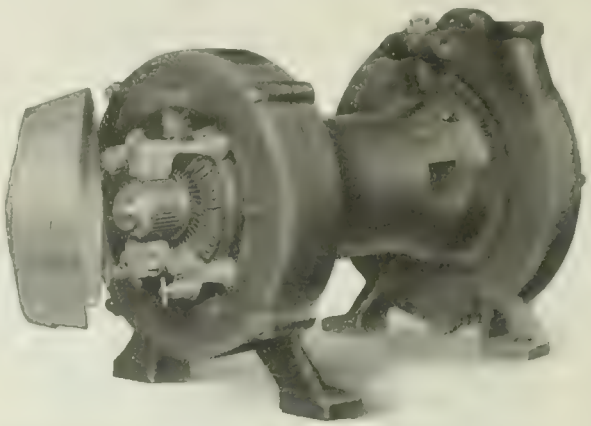
Pyle-National Electric Headlight, Type E.

of the old equipment which experience had taught were undesirable. The steam consumption is very low.

Two ball bearings of a special annular type are used on the equipment. The bearing for the generator is located in the barrel on the end of the main casting, and the bearing supporting the turbine wheel is mounted in the turbine cap. Either of the ball bearings can be removed within a few minutes' time should occasion demand.

The dynamo is of a special design for headlight service. It is of an enclosed type with all windings securely protected from the weather and mechanical injury. The windings are proportioned to carry heavy overloads without injury and cannot be burned out even when short circuited.

The case and reflector are similar in size and appearance to the regular 18-in. round headlight case now extensively used. The over-all height is 30 in. This will be especially appreciated by those who have extremely high engines. The case has a side door and numbers and a patent front goggle and inner ring which allows perfect ventilation, thereby reducing to a minimum the breaking of headlight glasses. The patent goggle is a simple design which is arranged to give free access to the reflector for cleaning, etc. The body of the case is made of heavier steel than any other case now in use. Reinforcing bands one inch wide are used throughout the case for stiffening purposes. All joints and connections are electrically welded



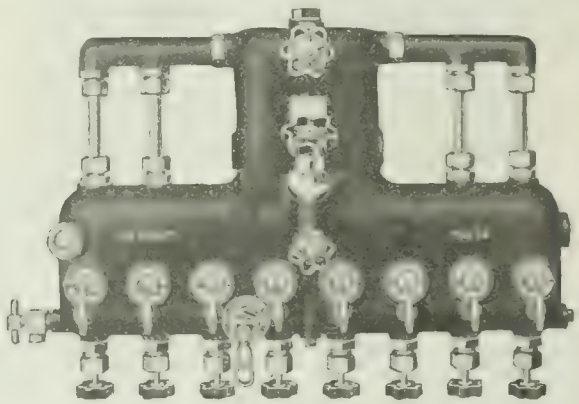
Turbine and Generator of Pyle-National Electric Headlight, Type E.

together, instead of riveted, which effectually prevents moisture or water from getting in and rusting out the metal. It is altogether the strongest headlight case that has ever been made for locomotive service.

DETROIT EIGHT-FEED LUBRICATOR.

The new No. 72 Detroit lubricator has a capacity of ten pints and eight feeds. It can be used on any locomotive on which it is desired to lubricate eight different points, particularly superheater mallet compounds. The six outer feeds can be used to lead to the high pressure valves, high pressure cylinder and low pressure valves; the two middle feeds to two air pumps, to one pump and an intercepting valve or to one pump and a mechanical stoker.

An oil control valve in the oil passage between the reservoir and the sight feed regulating valves places in the hands



Eight Feed Detroit Lubricator.

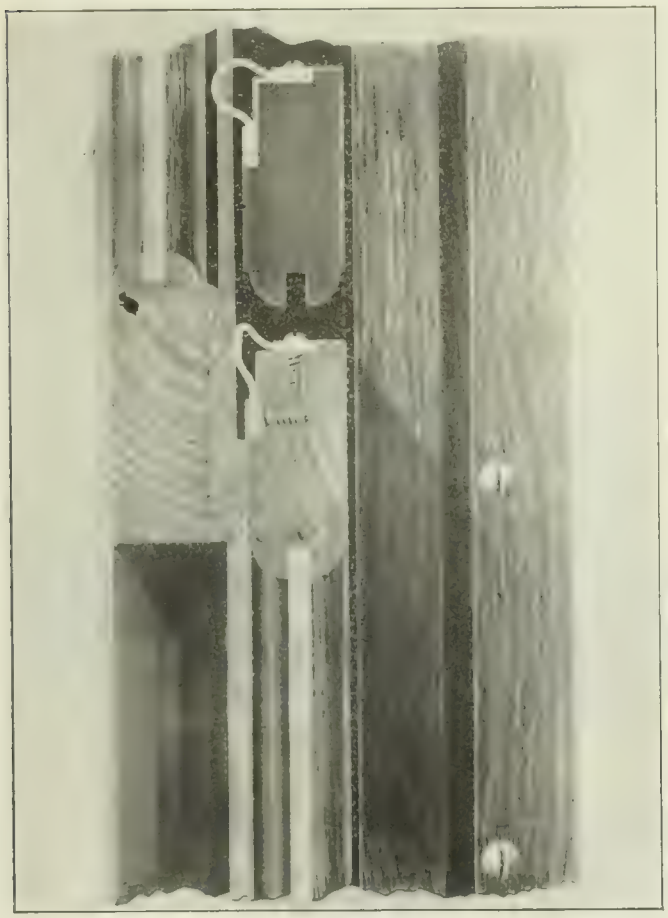
of the engineer a means of instantly starting, stopping or throttling the rate of feed and does away with the necessity of shutting off the feed regulating valves at a terminal or when refilling on the road, and consequently the necessity of again opening and adjusting all of these valves. The oil control valve makes it easy to save oil where otherwise the frequent closing, opening and readjusting of the feed valves would have made this economy impractical during short stops and periods of light service. After having once been regulated for perfect lubrication in a class of service, the feed regulating valves need not be disturbed or touched again until the service is changed.

A half turn of the oil control valve starts or stops all feeds. A quarter turn shuts off all the feeds except the two middle ones which lead to points requiring continuous lubrication. The No. 72 lubricator is cast in one piece, exclusive of trimmings, and has the equalizing tubes and the water and oil passages drilled in the walls of the body and condenser. This construction reduces the number of parts to a minimum, precludes the possibility of equalizing the oil and water tubes from jarring loose and prevents leaking. As all oil passages are in the body the oil is not exposed to the cold and the rate of feed does not fluctuate. This lubricator is made by the Detroit Lubricator Company, Detroit, Mich.

McCORD WEATHERSTRIP.

A weatherstrip for the windows of passenger cars, so arranged as to positively close the opening even under difficult conditions of alignment caused by inaccuracies of window openings or relative tortion of the car parts, is being exhibited at booth 507 by the McCord Manufacturing Company, Chicago.

The general construction and arrangement of this strip are clearly shown in the illustration, where it is shown as used as a seal between the upper and lower sash. It consists of a brass corner grasping, at the end of each leg, the edges of a strip of



McCord Weatherstrip Free and After Coming in Action.

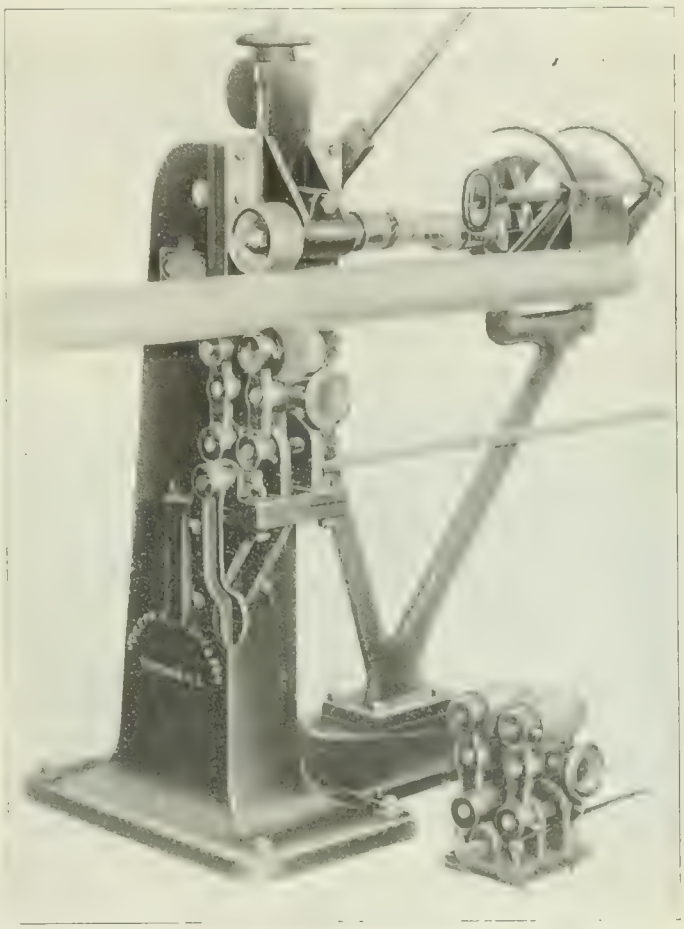
high-grade rubber, covered by linen duck. This strip will positively seal the opening up to the limit of its extension and is exceptionally durable. It will be noted that the screws holding the strip in place pass through the edges of the rubber as well as the lap on the metal body. In addition to these, however, there are spear points to retain the rubber in place while the strip is being applied.

The McCord strip has been adopted by a large number of prominent railways.

A NEW TUBE CLEANER.

The new Matthews tube cleaning attachment, which is here illustrated, was specially designed to be used in connection with the Ryerson tube cutting machine. This combination for tube cleaning and tube cutting gives the shop two complete machines for scarcely more than the price of one, and requires only the working space of one. One passage through the cleaning burrs finishes the cleaning, the tubes traveling about 10 ft. per minute. The scale is thoroughly scoured off without the slightest possibility of damage due to denting or chipping.

The essential elements are the friction wheel and the adjust-



Mathews Tube Cleaning Attachment.

able twin-roller cleaning burrs, which are built up of hardened serrated steel disks. These twin-roller cleaning burrs are assembled in a unit which is readily interchangeable with the roller tube support employed when the machine is used for cutting tubes. Hence, only two changes are required to change the cutting machine over to a cleaning machine; first, by replacing the cutting disk with the friction wheel, and, second, by substituting the tube support for the cleaning burrs. When used for cleaning the longitudinal travel of the tubes is effected by adjusting the roller support slightly out of square, the direction of travel and the rate of speed being determined by the angle of divergence. Joseph T. Ryerson & Son, Chicago, furnish these machines complete for both cutting and cleaning unless otherwise specified; but if desired, machines can be furnished equipped with cutter and reamer only.

Noiseless running is assured by the use of a universal shaft for connecting the driving shaft with the main spindle, which does away with all gearing and consequent noise. The cutting disk is 4½ in. in diameter and is secured on the main spindle which rotates in the vertical sliding head. The feed of the cutting disk is controlled by means of the counterbalanced

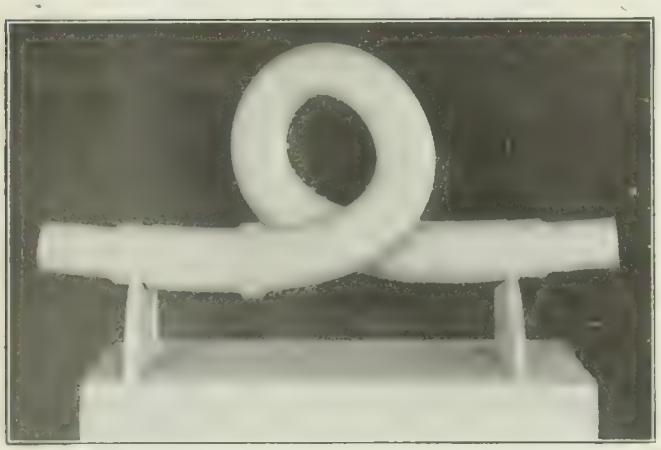
hand lever. The convenient position of the taper reamer opposite the cutting disk is an important feature of the design.

In five minutes this machine and two men can do more work and much better work than the same two men could do by hand in two hours. By the old hand method the tubes are dented, chipped and sometimes destroyed, but on this machine they are not injured in any way.

A three-fold economy is claimed for this machine: First, it reduces the cost of cleaning to about one-tenth of the hand method; second, it saves the labor cost of carrying the tubes between machines, and, third, it is the ideal tool for the moderate-sized shop, as the one machine will do all the work which at best would require two separate machines, thereby saving the expense and floor space of a second machine.

CAMBRIA STEEL AXLES.

It's easy enough to tie steel rods into double bow knots and bend car axles into fancy shapes and do it cold, if you know how—to make the steel and do the tying. At least that is what they say at the booth of the Cambria Steel Company, of Johnstown, Pa., where they have the real things which we can only show in photographs. You see, it's this way. You start away back with the ore and make the proper selections and watch it like the proverbial cat whose eye is on the mythical mouse; and you keep watching it down through the furnaces, blast and open hearth,

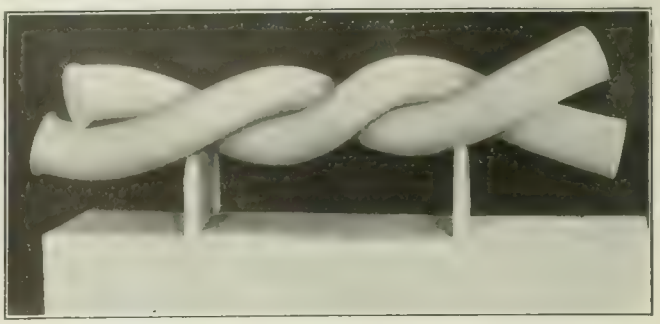


Driving Axle Bent Cold Around a Mandrel.

until it comes out into the ingot containing the proper quota of carbon, say .50 or .60, and manganese, Oh, well, anywhere along between .60 and .80, with just a dash of phosphorus, say, .02 for sauce and about .04 sulphur, as a reminder of the fires of purification through which it is passed, with silicon to suit the taste. Then, following the recommendations of Mother Goose, you

"Patty cake, patty cake, hammer man,
"And roll it and roll it,
"And pick it and pick it,
"And toss it in the oven
"For tender and car."

of course, you have to have a heavy hammer—no tack driving affair; but a real, solid, 15,000-lb. affair. And you take time for it, too, some 20 minutes or so; and when you toss it back in the oven you must regulate its heat most carefully, and when it comes out, glowing with pride, just dip it in a nice oil bath that is regulated in temperature to the nicety of a baby's morning plunge, and then wrap it up and warm again and let it sleep off its sweat in a nice Turkish bath annealing furnace until it is quite cool, and there you are. Then the piece of steel will act like a spring up to 50,000 lbs.; won't break under 90,000 lbs.; will stretch 28 per cent. before it lets go, and if you want to be real mean to it, put it under a hammer and bend it over a mandrel, or put it in a big boring mill and twist it, and you



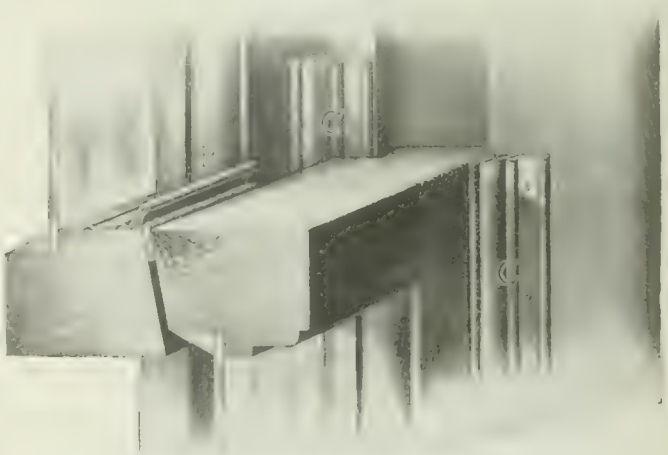
Cambria Car Axles Twisted Cold.

will find that it can be just as obstinate as you are and will elongate 45 per cent. and never show a sign of crack or flaw. Now, if that isn't an easy trick, what is?

THE ASCO WEATHERSTRIP.

The Asco weatherstrip, for use on both doors and windows of suburban cars or other passenger equipment requiring a low price seal is made of either steel or brass formed in the shapes shown in the illustration and gripping a section of finest grade felt. This felt is not affected by water or grease and has a remarkable resiliency. The same form of grip is used at all the different points on the windows, a slightly different arrangement of the same general style being provided for the door strips.

On the window sill and between the upper and lower sash, the felt strip is turned down away from the brass holder and forms the seal by its own resiliency. At the



Weather Strip for Application to Equipment Already in Service.

sides of the sash, the spring of the brass or steel shoulder is taken advantage of. This seal when properly applied insures the window or door being proof against wind, rain or dust. It is very easily applied, the holes being punched at proper intervals during the process of manufacture. It can be applied to the outside of the window as well as to the inside if desired.

The Asco weatherstrip is made by the Acme Supply Company, Chicago, and is on exhibition at booth No. 573. It is not intended for use in new high-class equipment. An inspection of this exhibit will show the construction recommended by this company for this purpose.

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PRESIDENT BENTLEY called attention to a subject of great importance when he mentioned the need for the enactment and enforcement of legislation to prevent trespassing on railways and the accidents that result from it. As the RAILWAY AGE GAZETTE repeatedly has pointed out the number of fatalities resulting from this cause, for which railways are not responsible at all, is greater than the number resulting from all other causes combined. On the average the number of fatalities due to trespassing is over 5,000 a year. Unfortunately, the figures relating to them are included in the regular statistics of accidents, thereby giving the general public a wholly false impression regarding the hazards of railway employment and travel. The American Railway Association at its last meeting adopted a resolution calling attention to the injustice thus done the roads, and urging both federal and state action which will reduce trespassing, and which, so long as it continues, will cause the statistics on the subject to be presented in their proper light. It is a good thing to have attention directed to the subject here, also, and everywhere else where reference to it may tend to develop sentiment and influence developments that will tend to better the situation.

WITH modern locomotives, the railways that have excellent general repair facilities and poor terminal repair equipment are very seriously handicapped. While it is advisable, from every standpoint, to keep locomotives in the shop as short a time as possible and to turn out a perfectly operating machine, it is of far greater importance to keep them out of the shop and in condition to handle full tonnage for longer periods. The roads having good engine houses and terminal shops is the one that will show a low maintenance cost on a ton-mile basis.

THE report on safety valves was not long, but it brought out a good deal of discussion, more than any other report at yesterday morning's session. The discussion showed that the calibration of safety valves is no easy matter. Indeed, it is doubtful if any stamping or marking that may be put on the valve—and this is what the discussion swung about, for the most part—can be more than an approximate indication of what occurs. It is so hard to measure the lift that one experimenter has declared it to be impossible; and as for discharge capacity, Napier's rule may be all very well in its way, but the rate of flow of steam through the annular opening varies so in the size and form of the opening, as well as the shape of the passages, that discharge calculations would be only another approximation. Of course, this is disregarding such other important items as pressure and moisture content in the steam. With all these things considered, the course pursued, of accepting the report and asking the manufacturers' to indicate the lift and estimated discharge for a guide in the use of the valve, was doubtless the wisest. As for the use of three safety valves, the discussion brought out another phase of that ever recurrent question of what will the courts say. It being generally accepted that two safety valves are quite enough to care for any generation of steam in either coal or oil burning locomotives, the third valve is put on and advocated merely because of the extra insurance and a demonstration that everything has been done to avoid disaster. In other words, it seems to be a recognition of and compliance with unreasonable demands.

THE suggestion made by President Bentley in his address, to the effect that the Master Mechanics' Association should co-operate with the minor railway mechanical associations, is a good one. The International Railway General Foremen's Association, for instance, is in a position to study thoroughly problems pertaining to shop organization and practices and to make recommendations as to the best methods to be followed under different conditions. It could do the same thing with the special problems in connection with shop operation and equipment. The Master Mechanics' Association must concern itself with the more general problems and cannot find the time to go thoroughly into these special, but none the less important, ones. On the other hand, the minor associations are specially fitted to take them up and would undoubtedly be only too glad to co-operate with the larger organization in investigating them. The Air Brake, Master Boiler Makers', General Foremen's, Tool Foremen's, Master Blacksmiths', Traveling Engineers' and Master Painters' associations have all shown that they mean business and have been growing steadily in strength

and efficiency. The formal recognition of the worth of these associations by the M. M. and M. C. B. associations, in the way of asking them to make certain detail investigations and recommendations thereon, would still further encourage them and add to their effectiveness. Moreover, it would make the two larger organizations the clearing house for all mechanical department matters. In times past a great deal of energy has been wasted by the smaller organizations in the consideration of subjects which had already been thoroughly gone into by other organizations, or in which they were not vitally interested. There is not so much of this at present, but a closer understanding between the organizations would prevent useless duplication of work.

THERE is so much of importance and interest in President Bentley's address that it is difficult to select any particular feature as being the keynote. The general theme seemed to be that there are many features of design and operation, each equally important, all of which should be given close attention. He also drew attention to the various more prominent features that have marked the progress of the last year. Safety was given the attention it deserves in the address, as was also fuel economy. The Chicago & North Western was among the pioneers in the movement toward greater safety to employees, and the figures quoted were striking evidence of what can and should be accomplished in this direction. Not alone should attention be directed toward safety to employees, but the railways should be protected against trespassers and a federal law against trespassing on railway property was suggested as a necessary part of the work. The appointment of a committee to confer with the Chief Boiler Inspector at Washington, D. C., and straighten out the confusion resulting from the conflicting rulings of the various local boiler inspectors, was advocated. Laws on headlights passed by the various states are proving to be not only a handicap but a menace in some cases. Mr. Bentley recommended that the proper minimum requirements suitable for a double or four-track road be determined and placed on the statute books of the various states, having laws on the subject, in place of those now in force. Special requirements could then be made for the single track lines where more powerful lights can be safely used, if it seemed desirable. The multiple track lines should not be required, Mr. Bentley said, to use as powerful lights as the single track roads. Attention was drawn to the fact that locomotives of the 2-8-2 type are replacing those of the 2-8-0 type and doing more work with the same fuel consumption. Fuel economy was said to be of greater importance than ever, and the good work of the International Railway Fuel Association, of which Mr. Bentley himself was elected president at the recent meeting in Chicago, was mentioned in the address.

LOCOMOTIVE STOKERS.

EACH year the report of the committee on stokers has been more encouraging, and this year it can be termed most decidedly encouraging. It seems that at least two stokers of distinctly different types can be called successful almost without qualification. There are now, in service and being built, 115 stokers of the underfeed type and 150 of the overfeed type. These are on locomotives of several different classes used for some of the most difficult runs in the East. Throughout the whole discussion there seemed to be no question in the mind of anyone present in regard to the ability of these two stokers to do the work for which they have been designed. The very number being used is convincing evidence that those in the position to know best have decided that they are reliable.

For the first time, actual fuel saving with stokers is even hinted at in the discussions on the reports of this committee. In several cases a distinct saving was reported as following successful stoker applications. Mr. Street related one instance where a locomotive was using coal that required 18 revolutions per minute of the conveyor. Full steam pressure was being maintained and the work was successful with the exception that there was more smoke than seemed desirable. The amount of coal being used was about the same as had been required with hand firing. It was thought that if the conveyor was operated at a slower speed and less coal was consumed it might reduce the smoke. This was tried and by a series of tests it was finally found that at 12 revolutions per minute, or 50 per cent. less than at the beginning, the steam pressure was maintained equally well and the smoke was practically eliminated. No tests have been reported bearing directly on this feature, but there is quite evidently an idea among those who have had the most experience with stokers that less coal is going to be required for the same work after the engine crews become more thoroughly acquainted with the stoker. At the beginning the fireman seems to be very doubtful of the actions of the steam gage unless he sees about the usual amount of coal going into the firebox. The tendency at the start is always to overload the fire with coal.

What is the limit of the capacity of the average fireman in pounds of coal per hour on trips covering eight to ten hours? C. D. Young states between 4,000 and 5,000. Mr. Crawford recommended about 3,500, and the statements of other members seem to indicate a general idea that it should not be over 4,000. This conveyed the impression that all locomotives in regular road service that burn over this amount should be equipped with stokers. Later Mr. Crawford made clear that this was not exactly his idea. The automatic stoker is a necessity for very large locomotives, and in the coming year its various advantages will be developed by its use in such service and by application to smaller power. At present there is a prevailing idea that the dividing line where it is an advantage is where the average endurance of the fireman is reached. This view regards the stoker simply as a means of increasing the capacity of the engine. It does not take account of the incidental advantages such as economy of fuel, prevention of smoke and uniformly sustained maximum boiler pressure. These apply to locomotives of ordinary dimensions and indicate that there will be no fixed rule which limits the application of the stoker to a certain rate of coal consumption.

The record of amount of coal handled by one man was reported by Mr. Young as 8,400 lbs. an hour on a three hour trip. The train in this case averaged over sixty miles per hour. On the testing plant a fireman has fired 9,700 lbs. of coal per hour.

A point of far-reaching importance was advanced by Mr. Baker and received the attention of several other speakers. This is the fact that the quality of the engineers in the near future depends very largely on the quality of the firemen now being employed. If the work of firing prohibits a man of ordinary strength and intelligence undertaking it, it will have a serious result on the standing and class of the future engineers. If the stokers will encourage intelligent men to enter the ranks of firemen that alone will justify its general adoption.

In reference to the size of locomotives to which stokers should be applied, Mr. Crawford explained his plan to apply stokers to the larger engines first and then put stokers in the lighter power, principally that used around terminals and in suburban service. This is for the purpose of reducing smoke in the urban districts, as these locomotives are not in the least difficult to hand fire.

LOCOMOTIVE MAIN AND SIDE RODS.

IN considering the report on main and side rods, which is to be presented to-day, special attention should be given to the quality of the steel for use in locomotive details of this sort. While the experience with special alloy and heat treated steels in locomotive details is limited, it is unfortunate that this is true, for their great advantage in other similar engineering details is well recognized and their use well established. Carbon steel axles, annealed and toughened by heat treatment, have been used extensively, and alloy steel, heat-treated and oil-tempered, is used for shafts and marine machinery, and fills an important place in much of the high speed electrical machinery. In such important details as the rods for high speed locomotives the steel is forged and cooled in a rough way with little or no attention to the effect of this treatment on its granular structure, its toughness and elastic limit.

The use of alloy steel for such purposes is so limited that it was the subject of special mention when employed for the frames, cylinders and machinery of a special test locomotive, No. 50,000, recently built. Rod design has not yet been developed to the extent that it is possible by the use of high strength steel, high working stress and the smaller sections which naturally follow. The further development of the subject with respect to these possibilities should be completed before the work on the design of locomotive rods can be regarded as finishd.

In the discussion of the report last year it was shown that the breakage of fluted rods was so general that a number of lines had given up the I-section and were now using a rectangular section which caused a considerable increase in the weight of the rods. On other lines the rods are made of iron and fluted. One reason assigned to the breakage of steel fluted rods was the fact that in the forging process with a steam hammer the surface of the billet is compressed and the grain is closed up while the interior portion receives little effect of the work, and its structure has a coarse open grain with low strength and ductility. Such a forging is then milled so as to remove the best part of the steel and the poorest part remains in the web of the I-section. To overcome this, forging under hydraulic press and the use of dies which would form the rough fluted portion was recommended. The representative of a locomotive works stated that it was difficult to get uniform material for steel rods, and his description of the pipes, seams and similar defects due to segregation would indicate that the ingots bought for this purpose were of much the same character as those from which rails are manufactured.

A reading of this discussion will convince anyone that the quality of the steel used for locomotive rods and the methods of forging are not what they ought to be, and that properly proportioned rods which will not break under normal service will not be obtained until there is some considerable improvement in this respect. A high factor of safety is made necessary by the low strength and irregular quality of the steel used in current practice. The working stress now recommended is less than 13,000 lbs., or about one-sixth the ultimate strength of 80,000 lbs. For the rods of high speed engines it is easily possible to obtain steel having an ultimate strength of 110,000 lbs., and an elastic limit of 75,000 to 80,000 lbs., and with such material the section could be smaller and the rods lighter. This should be the direction of progress, but the return to the use of wrought iron and rectangular sections has been quite general according to the discussion as published in the last proceedings, indicating that the distrust of steel forgings as ordinarily made places the material below wrought iron in ultimate strength. This is a condition which should not continue, and the Master Mechanics' Association should not be content with formulæ and factors in rod design, but should insist on a proper specification for rod steel and a thorough description of the correct method of forging locomotive rods so that the proper unit strength is secured in the steel when finished. This would be a natural supplement to the present report on rod design, and the present committee should be continued to complete the work.

CAST STEEL LOCOMOTIVE FRAMES.

IT is unfortunate that the report on Specifications for Cast Steel Locomotive Frames has been delayed for another year, for the locomotive works are now busy turning out large locomotives and will probably continue to have a large output during the whole of the year to come. The design and proportion of the frames for these large engines should be based on the quality of the material, and there is now a pressing demand for a proper specification for cast steel suitable for this purpose.

The relation of locomotive power to the total weight has had some consideration in designing passenger engines in order to increase the size of boiler without exceeding the proper limits of wheel loads, and there is no good reason why the same principle should not be applied to large freight engines where the boiler is so heavy that some reduction in weight of other principal parts can be made without making the total less than that required for adhesion. To obtain the necessary weight on drivers by the use of heavy frames is a crude method of design, and yet it is frequently seen in many locomotives where this extra weight would be more advantageous in the boiler. Locomotive frames are now made 6 in. and 7 in. wide, and they require wide pedestal binders and other fittings which are correspondingly heavy, and these are located where the frequent removal necessary is laborious. It is surprising too to find these heavy frames of uniform width, when the pattern could be made of various widths proportional to the loads. The drawings of cast steel locomotive frames show that the old plans which were used for wrought iron are still used, and if the proportions are changed they are enlarged, which indicates that the superior strength of the new material is not utilized.

This is probably due to the fact that for a time cast steel frames of the same dimensions as wrought iron broke with equal frequency, but these steel frames were not annealed and they failed on account of shrinkage stresses. Nevertheless, extreme caution still prevents most designers from taking advantage of the greater reliability of the annealed cast steel frames. The wrought iron frame with its numerous welds, or places where the grain of the iron was affected by the welding operation, lacked uniformity in strength, and this defect was about balanced in the cast steel frame by local stresses and poor granular structure due to lack of annealing. The majority of locomotive frames are now made of steel, and good practice requires them to be annealed. Added to this, the use of alloys in steel produces a metal of superior strength and high elastic limit. The ultimate strength of such material is over 80,000 lbs. and the elastic limit 50,000 lbs. With such material available it ought to be possible to revise the drawings, making the frames lighter, and by rational design of the sections they should be of more uniform strength.

A thorough investigation of the quality of steel for locomotive frames and proper heat treatment should result in such a modification of frame design that it would favorably affect other locomotive proportions. These advantages are in a way proportional to the weight of the locomotive, and with the enormous machines now coming into service so rapidly it will be seen that a specification for the grade of steel used in frames should be forthcoming without any delay.

Announcements.

TO-DAY'S PROGRAM.

M. M. ASSOCIATION.

Discussion of reports on:	
Main and Side Rods	9.30 to 10.00
Consolidation	10.00 to 10.15
Safety Valves	10.15 to 10.45
Safety Appliances	10.45 to 11.00
Design, Construction and Maintenance of Locomotive Boilers	11.00 to 12.00
Contour of Tires	12.00 to 12.30
Individual Paper on Increased Power obtained with Superheat as Compared with the Maximum Power obtained with Saturated Steam, Prof. C. H. Benjamin and Prof. L. E. Endsley	12.30 to 1.00
Steel Tires	1.00 to 1.30

ENTERTAINMENTS.

Orchestra Concert, 10.30 A. M.—Entrance Hall, Million Dollar Pier.

Orchestra Concert, 3.30 P. M.—Entrance Hall, Million Dollar Pier.

Informal Dance, 9.30 P. M.—Entrance Hall, Million Dollar Pier.

FOUND.

Two pairs of eyeglasses. Apply at office of John D. Conway, secretary of the Railway Supply Manufacturers' Association.

M. M. MEMBERS PLEASE REGISTER.

In the meeting yesterday Secretary Taylor asked the members of the M. M. Association to register some time during the three days of their convention. It is only by their registering a second time that the association will be able to find out who is in attendance at the M. M. convention, and if they will do so the secretary will appreciate it very much.

TRANSPORTATION FOR RETURN TRIPS.

The Pennsylvania has notified members of the M. M. Association that transportation home over the Pennsylvania lines will be provided if they will hand their names to Secretary Taylor. This transportation must be limited to bona fide railway officers and cannot include members of belt lines, car lines or switching roads operated by industrials.

The Central of New Jersey offers the same courtesy to members who wish to return over the Central of New Jersey or the Reading. A special train of parlor cars for New York will leave Atlantic City at 2.30 on Wednesday afternoon, June 19.

SPECIAL TRAIN TO COATESVILLE.

The Parkesburg Iron Company will run a special train of all stateroom cars via Pennsylvania Railroad, leaving Atlantic City at 9.03 P. M., Wednesday, June 19. After inspecting the Parkesburg skelp and tube mills, automobiles will be provided to take the passengers to see the Jacobs-Schupert low water boiler test at Coatesville, Pa.

The special will leave Parkesburg for Philadelphia at 4.30 P. M. Thursday.

All railway officers who have made preliminary arrangements and other railway men who wish to go will secure tickets Wednesday at the Parkesburg Iron Co.'s booth, No. 388, until the accommodations are exhausted.

M. M. ASSOCIATION OFFICERS, 1911-1912.

President, H. T. Bentley, P. A. S. M. P., C. & N. W.

First Vice-President, D. F. Crawford, G. S. M. P., Penna. Lines.

Second Vice-President, T. Rumney, Asst. 2nd V. P., C. R. I. & P.

Third Vice-President, D. R. MacBain, S. M. P., L. S. & M. S.

Treasurer, Angus Sinclair.

Executive Members, T. H. Curtis; G. W. Wildin, M. S., N. Y. N. H. & H.; F. F. Gaines, S. M. P., Cent. of Ga.; C. A. Seley, M. E., C. R. I. & P.; J. F. Walsh, G. S. M. P., Ches. & Ohio; E. W. Pratt, A. S. M. P., C. & N. W.

Secretary, Jos. W. Taylor.

COMMITTEES M. M. ASSOCIATION.

STANDING COMMITTEES.

Advisory Technical:—G. W. Wildin (Chairman), M. S., N. Y. N. H. & H.; A. W. Gibbs, C. M. F., Penn. R. R.; W. A. Nettleton.

Revision of Standards:—T. W. Demarest (Chairman), S. M. P., Penna. Lines; J. D. Harris, Roland Park, Md.; W. E. Dunham, Supt. M. P. & M., C. & N. W. Ry., Winona, Minn.

Mechanical Stokers:—T. Rumney (Chairman), Asst. 2nd V. P., C. R. I. & P.; E. D. Nelson; C. E. Gossett, M. M., Minn. & St. Louis; J. A. Carney, S. S., C. B. & Q.; T. O. Sechrist, M. M., C. N. O. & T. P.; S. K. Dickerson, A. S. M P., L. S. & M. S.; Geo. Hodgins.

SPECIAL COMMITTEES.

Specifications for Cast-steel Locomotive Frames:—C. B. Young (Chairman), M. E., C. B. & Q.; E. W. Pratt, A. S. M. P., C. & N. W.; R. K. Reading, S. M. P., Penna. R. R.; O. C. Cromwell, M. E., B. & O.; C. E. Fuller, A. G. M., Union Pacific; L. R. Pomeroy.

Main and Side Rods:—W. F. Kiesel, Jr., A. M. E., Penna. R. R.; H. Bartlett, G. S. M. P., Boston & Maine; G. Lanza, Mass. Institute of Technology; H. B. Hunt; W. E. Dunham, Supervisor M. P. & M., C. & N. W.

Consolidation:—D. F. Crawford (Chairman), G. S. M. P., Penna. Lines West; H. V. Vaughan, Asst. to V. P., Can. Pac.; G. W. Wildin, M. S., N. Y., N. H. & H.

Safety Valves:—W J. Tollerton (Chairman), A. G. S. M. P., C. R. I. & P.; I. B. Thomas, M. M., Penna. R. R.; W. D. Robb, Supt. Grand Trunk; Prof. E. C. Schmidt, University of Illinois.

Safety Appliances:—H. T. Bentley (Chairman), P. A. S. M. P., C. & N. W.; M. K. Barnum, G. S. M. P., Ill. Cent.; C. B. Young, M. E., C. B. & Q.

Design, Construction and Inspection of Locomotive Boilers:—D. R. MacBain (Chairman), S. M. P., C. R. I. & P.; C. E. Chambers, M. M., C. R. R. of N. J.; T. W. Demarest, S. M. P., Penna. Lines; F. H. Clark, G. S. M. P., B. & O.; R. E. Smith, G. S. M. P., A. C. L.; E. W. Pratt, A. S. M. P., C. & N. W.; J. Snowden Bell.

Contour of Tires:—W. C. A. Henry (Chairman), S. M. P., Penna. Lines; J. A. Pilcher, M. E., N. & W.; O. C. Cromwell, M. E., B. & O.; H. C. Oviatt, Gen. Insp., N. Y., N. H. & H.; O. M. Foster, M. M., L. S. & M. S. Ry., Elkhart, Ind.; G. W. Seidel, S. S., C. R. I. & P. Ry., Silvis, Ill.

Steel Tires:—L. R. Johnson (Chairman), A. S. M. P., Can. Pac.; J R. Onderdonk, Engr. Tests, B. & O.; C. H. Hogan, D. S. M. P., N. Y. C. & H. R.; R. L. Ettenger, C. M. E., Southern Ry.; L. H. Turner, S. M. P., P. & L. E.

Flange Lubrication:—M. H. Haig (Chairman), M. E., A. T. & S. F.; T. W. Heintzleman, S. M. P., So. Pac.; D. J. Redding, M. M., P. & L. E.; A. Kearney, A. S. M. P., N. & W.; W. C. Hayes, S. L. O., Erie.

Minimum Requirements for Headlights:—D. F. Crawford (Chairman), G. S. M. P., Penna. Lines, West; A. R. Ayers, A. M. M., L. S. & S. M. S.; C. H. Rae, G M. M., L. & N.; J. W. Small, S. M. P., S. P. Co.; F. A. Torrey, G. S. M. P., C. B. & Q.

Standardization of Tinware:—A. J. Poole, S. M. P., S. A. L.; M. D. Franey, A. M. M., L. S. & M. S. Ry.; J. C. Mengel, M. M., Penna. R. R.

Maintenance of Superheater Locomotives:—R. D. Smith, S. M. P., B. & A.; W. H. Bradley, M. M., C. & N. W.; H. H. Vaughan, Asst. to V. P., C. P.; Jas. Chidley, M. M., L. S. & M. S.; J. B. Kilpatrick, S. M. P., C. R. I. & P.

Engine Tender Wheels:—Wm. Garstang (Chairman), S. M. P., C. C. C. & St. L.; W. C. A. Henry, S. M. P., Penna. Lines, West; A. E. Manchester, S. M. P., C. M. & St. P.; R. L. Ettenger, C. M. E., Southern Ry.; J. A. Pilcher, M. E., N. & W.; O. C. Cromwell, M. E., B. & O.

Individual Paper:—"Report of progress on the increased power obtained with superheat as compared with the maximum power obtained with saturated steam," Dean C. H. Benjamin, Prof. L. E. Endsley.

THE B. & O. CLUB.

At a meeting yesterday in the American Car & Foundry Company's booth an organization was formed which probably will be called the B. & O. Club. It is to be composed of members and guests regularly attending the conventions of the mechanical associations who are or formerly were in the employ of the Baltimore & Ohio. E. W. Grieves, who was called on to make a speech, explaining the purpose of the meeting, told a story about an engineer and a fireman who were employed on the B. & O. when camel back locomotives were prevalent on it and who met in Chicago. Each soon found out that the other was a railway employe. "What road are you working for?" asked the engineer. "The B. & O," replied the fireman. "What's your road?" "I'm on the B. & O., too—what do you do?" "I run an engine," answered the engineer. "Well, I'm firing an engine. What's your engine's number?" "No. 713." "Well, now, that's strange," said the fireman; "I've been firing that same engine for a year." Mr. Grieves said that the B. & O. men shouldn't go on as that engineer and fireman had, the one in his cab on top of the boiler, the other down on his foot board without ever getting an introduction.

Organization was effected by the election of Charles F. Giles, superintendent of machinery of the Louisville & Nashville, and formerly in the B. & O.'s mechanical department, as president, and Charles L. Sullivan, sales manager of the Cowles-McDowell Engineering Company, formerly in the B. & O.'s drawing room, as secretary.

A committee composed of S. M. Dolin, J. Snowden Bell and A. Gordon Jones, was appointed to choose a name for the organization and draft a constitution and by-laws, and to submit them to the members by correspondence. The club will act on them next year. Its meetings will be held annually on the second day of the week in which the Master Mechanics' convention occurs.

The following attended the meeting yesterday:

Charles F. Giles, now superintendent machinery, L. & N., formerly in the B. & O.'s mechanical department; S. M. Dolan, now with American Car & Foundry Company, formerly in mechanical department; George A. Nicol, now with Johns-Manville Co., formerly in drawing room, Mt. Clare; Frank T. Hyndman, now with S. F. Bowser & Company, formerly in mechanical and operating departments; John Tonge, now retired superintendent motive power, formerly in mechanical department; B. M. Carr, now with American Car & Foundry Company, formerly in mechanical department; R. F. Kilpatrick, now with Ewald Iron Company, formerly in mechanical department; A. G. Sandman, now chief draftsman, B. & O.; Thomas G. Smallwood, now with Chicago Pneumatic Tool Company, formerly foreman machinery department; S. W. Mullinix, now mechanical superintendent, Second district, Rock Island Lines, formerly in machinery department; John B. Kilpatrick, now mechanical superintendent, First district, Rock Island Lines, formerly in mechanical department; Walter D. Thomas, now president A B C Bearing Corporation, formerly chief clerk to master car builder; Harry Monkhouse, now with Rome Locomotive Works, formerly master mechanic; E. W. Grieves, now with Galena-Oil Company, formerly superintendent car department; J. G. Platt, now sales manager, Hunt Spiller Manufacturing Corporation, formerly in mechanical department; George Moriarity, now master mechanic, New York, New Haven & Hartford, formerly in mechanical department; Joseph Billingham, now with American Locomotive Company, formerly master mechanic; J. W. Brewer, now master mechanic, Mt. Clare shops; G. A. Schmoll, now superintendent motive power, Wheeling; J. Kirkpatrick, now master mechanic, Newark; J. M. Shay, now general car foreman, Cincinnati; W. M. Bosworth, now mechanical engineer, Kansas City Southern, formerly in mechanical department; C. M. Thompson, now with C. M. Thompson Manufacturing Company, formerly draftsman; A. Gordon Jones, now with General Railway Supplies, formerly superintendent, Harper's Ferry and Valley division; John S. Mace, Philadelphia, formerly in mechanical department; R. W. Salisbury, now motive power inspector, Cincinnati; J. Snowden Bell, now patent attorney, New York, formerly in mechanical department; Charles L. Sullivan, now with Cowles-MacDowell Engineering Company, formerly in drawing room, Mt. Clare; E. L. Weisgerber, now retired, formerly master mechanic, Mt. Clare; R. Onderdonk, now engineer of tests, B. & O.; J. W. Fogg, now master mechanic, Chicago Terminal, formerly in mechanical department; John F. Mercer, now retired, formerly in mechanical department; E. W. Dill, William H. Shipley, B. N. Hawkins, C. E. Walker, William Sinnott, C. E. Calahan, George W. Coyle, George Rule, O. Shellhorn.

The Kalgan-Suiyuan line, China, is to be extended by the government within five years to Ilifu, the capital of China's most distant province on the Russian frontier, a distance of about 2,000 miles. This enterprise was first projected by Tang Shao Yi, and was seriously considered about the time of the completion of the Peking-Kalgan line. The enormous expense of the undertaking, however, caused the enterprise to be held in abeyance. Recent events have led to the present determination to build the line as soon as possible. The expense, of course, will be enormous, but there is strong probability of its commercial success from the beginning. There is heavy caravan traffic between North China and the country in question, which is known as the New Dominion, and the possibility of diverting much of the tea traffic with Russia to this route is promising. Possibilities of developing grain country also are immense. However, the line would probably not be justified at this time except as a governmental undertaking. Up to the present, it does not appear that this enterprise is to supersede the proposition to extend the Kalgan line to Kiahtka via Urga. The ultimate plan of the Kalgan-Suiyuan line is for it to connect with a north and south line bisecting Shansi province, though at latest report there was no definite work being done on this road. Chinese merchants are projecting a light railway from Harbin to Shuihue and Huilun, about 150 miles, for which 5,000,000 taels are being raised. The native press reports that of this sum 3,000,000 taels has been pledged by two native banks, and merchants are to furnish the balance. Aside from work commenced before present conditions developed there is little actual advancement promised in that portion of the country. Nevertheless it is there that railway enterprise is likely to have its best returns both to the investor and to the country.

Proceedings.

The first session of the forty-fifth annual meeting of the American Railway Master Mechanics' Association was held on June 17. Vice-President D. F. Crawford called the meeting to order at 9.45, in the absence of President H. T. Bentley who was absent from the meeting on account of illness. The past-presidents of both the Master Mechanics' and Master Car Builders' Association in attendance took seats on the platform. Rev. Dr. William Spurgeon, of London, England, opened the exercises with prayer. In the absence of Mayor Bacharach, of Atlantic City, the address of welcome was omitted and the president's address was read by the secretary.

ADDRESS OF PRESIDENT BENTLEY.

It is a pleasant duty and privilege to address you to-day, and welcome you at this opening of the forty-fifth convention of the American Railway Master Mechanics' Association, and the seventh consecutive one to be held in this beautiful city.



H. T. BENTLEY,
President, M. M. Association.



T. RUMNEY,
Second Vice-President, M. M. Association.

I feel grateful for the honor you have conferred on me, and hope it will be my good fortune at this time, and in the future, to uphold the dignity and prestige of the association, and to follow in the footsteps of my distinguished predecessors in office.

We are glad to see so many ladies here this morning, for their presence shows they are interested in the work that is being done by those near and dear to them, and a convention without ladies would be a very uninteresting affair, or as one man put it, like lemonade without sugar.

I wish to express my heartfelt thanks to the officers and members of the association who have done so much toward making the convention a memorable one; to the officers and secretary who have so cordially helped me, and to the members who have prepared papers on the various subjects, which I hope will be fully discussed to bring out the best there is in them; to the reverend gentleman who so ably opened the convention with such an uplifting prayer; to the exhibitors who have brought here, for our benefit one of the most comprehensive collections of tools, supplies, machines and apparatus that has ever been gathered together; to the members of the Supply Mens' Association who have cooperated with us in providing the entertainments and amusements; to the Hotel Mens' Association for the splendid manner in which they have taken care of us and made us feel so much at home; and to the members of the press who have helped us individually and collectively; the press we are indebted to for keeping us in touch with what is going on all over the world, and without its help we might perhaps be making the same mistakes that other people have made and paid for by dear experience.

In looking over the splendid exhibits brought here for our inspection, I wish to draw your attention to the increase in floor space taken, this year 82,148 square feet being allotted, which is an increase of 6,038 more than last year. As you will notice, greater taste has been displayed in arranging the booths, and I believe nothing has been left undone to make it the most successful display that we have ever looked upon.

At our last convention, I had the pleasure of responding to an address of welcome from your late Mayor, F. P. Stoy, and at that time expressed the hope that he would be with us in the same position as long as we held our conventions here, but as you are probably all aware, Mr. Stoy was taken away from us July 22, 1911, at Wernersville, Pa. The American Railway Master Mechanics' Association owe a debt of gratitude to him for the lively interest he took in our comfort and welfare, and I cannot allow this opportunity to pass without adding a tribute to his memory.

With the tremendous growth of the Association during the past few years, considerable criticism has been heard from various quarters as to the increase in cost, extent, and

amount of entertaining done by the Supply Men's Association, and some people have felt that the formal functions were increasing in formality and the expense was becoming burdensome.

At a joint meeting of the executive committees of the M. C. B., A. R. M. M., and Supply Men's Association, held at New York, October 24, 1911, the question of entertainment was fully discussed, and the committee expressed itself as being under great obligations to the Supply Men's Association for the splendid manner in which they had catered to our pleasure in the past, but it was felt that we could no longer expect them to carry all of the burden and arrangements were made to dispense with the most formal features, such as the reception and ball, substituting informal dances, concerts, etc., where people could thoroughly enjoy themselves; in doing this it was felt that the members and their families would get better acquainted, which is something very much to be desired, and it is sincerely hoped that every one will do their utmost to make things pleasant for one another.

In regard to the cost of entertaining, it was decided that our Association would bear its share with the M. C. B. and Supply Men's Association, and thus relieve the latter association of an expense which properly does not belong to it.

The question of consolidating the two association has been discussed since the last convention, but the feeling of the members generally, appears to be against anything of the sort being done; the thoughts expressed are to the effect that after forty-four years of good service, it hardly seems wise that the American Railway Master Mechanics' Association should lose its identity. It was my thought, however, that the wo conventions could be held in one week, Monday and Tuesday being set aside for the Master Mechanics' meeting; Wednesday for a joint meeting of the two associations to discuss matters of common interest, and Thursday and Friday for the Master Car Builders' Association The principal reason for consolidating is to reduce the time away from business, the present arrangement breaking into two weeks for those attending both conventions, but by handling it as suggested, the duplication of work would be avoided by the joint session, and only five days would be taken up with both meetings.

A suggestion was made on the floor of the General Foremens' Association last year that the members be allowed to investigate and report to the Master Mechanics' Association upon matters pertaining to shop methods and practices, the statement being made that there might be numerous details in shop organization which we were desirous of obtaining information about, but for lack of time had to pass up, and which they were willing and anxious to investigate and report on if asked to do so. This offer was laid before the executive committee who will probably take advantage of it.

Apart from the experience gained at our meetings through the discussion of the various subjects presented, the opportunity for exchanging ideas among members, when outside of the Convention Hall, is great. I am a warm advocate of meetings of this kind, and know personally that valuable information can be obtained from people who have, perhaps, gone through some experiences that we are lacking. As expressed at various meetings and places, I believe we should insist on our men attending conventions; it broadens their ideas, gives them new thoughts and puts fresh life into them, so that on their return to business they are better able to grapple with the problems that confront them.

I was fortunately able to attend the annual convention of the International Railway Fuel Association in Chicago last month, and listened to some of the best papers on the proper firing of locomotives, proper drafting of locomotives, etc., that I ever heard; the discussions were entered into with enthusiasm, and it was, throughout, a real live convention, our master mechanics and road foremen who attended going away with new ideas for the economical use of fuel in locomotive service. For a four-year-old association it is making wonderful strides, and it is deserving of encouragement.

The question of promoting safety in the operation of railways



DONALD R. MacBAIN,
Third Vice-President, M. M. Association.



ANGUS SINCLAIR,
Treasurer, M. M. Association.

has received a tremendous impetus lately. About eighteen months ago an organization was started on the Chicago & North Western Railway, in a very humble way, for the purpose of trying to reduce the number of accidents that were occurring daily on our tracks, in the movement of trains and in our shops and roundhouses. The plan worked out so well under the forceful leadership of the general claim agent, and with the assistance of the members of the central safety committee and the local committees on the various divisions, and the results were so gratifying, that the scheme was quickly taken up by all of the large roads in the country, and now, fortunately, nearly everybody has acquired the "safety" habit, or as one road tersely sets forth, "It is better to be careful than crippled."

At one time it was thought that most accidents were inevitable, but when live safety committees got into action it is remarkable how quickly this idea changed, and a reduction in 16 months (the latest date for which figures are available) of 107 persons killed and 3,996 persons injured on the Chicago & North Western, shows what can be done when men make up their minds that it is better to cause a delay than to cause an accident. The fact that it is possible to make such a remarkable showing has induced the railway commission of Indiana to ask all the roads in that state to go and do likewise. Before long the Federal Government will probably step in and call for some action that will help this good cause along; if it would only pass a trespass law and enforce it, a large number of the 5,000 men, women and children who are now being killed each year, because of the dangerous track walking habit would be saved.

The past winter has been the most severe in years, as most of us know to our sorrow, and now that summer is here, we must remember our weaknesses and fix our fences before another winter comes along. In the summer we are liable to forget the cold weather, but that is the time to remember it, and taking advantage of the experience gained, to profit by it. It is only by having the engines and roundhouses in first-class condition that the best results can be obtained, and I am sorry to say when the weather is warm we are likely to forget some of the things we promised to do when we were in trouble.

The last year has seen some serious labor difficulties which fortunately are now a thing of the past. The coal strikes in this country were settled without the serious conditions that existed abroad. The engineers of the eastern lines made demands for certain increases, which are being settled by arbitration.

The Federal boiler inspection bill has now been in operation nearly a year, and, generally speaking, we have become accustomed to its provisions and requirements. The extra expense involved is enormous, but, if through its operation the maximum safety is gained, it will be money well spent. There appears, however, to be a number of differences in the rulings made by the Inspectors, which is to be expected on account of so many new men being employed, and I believe a committee should be appointed to wait on the chief inspector, to try and bring about greater uniformity, discussing some of the things with a view to a better understanding being arrived at, and also to suggest that we dispense with having to do things that do not improve the safety of the boiler at all. Some of the inspectors' reports sent to our general officers from the chief inspector, cause considerable worry and anxiety, from the fact that they assume, when a report is sent from a government inspector, that their attention is being drawn to some infraction of the law, or a dangerous condition we are allowing to exist, whereas it may be only a statement referring to some trouble that is not covered by anything in the law itself, or the rules laid down for our guidance. It is perfectly proper to report all cases where the law is violated, but the fact that a flue is leaking on an incoming engine, or some other equally trivial defect exists, should not, it seems to me, be sufficient cause for a government report to be made, especially to our general officers.

The progress in locomotive construction appears to have kept pace with the requirements, but nothing of a freakish design has been seen. The most radical departures noticed are the turbing locomotive, built and put in service at Milan, Italy, and the turbine electric locomotive constructed by the North British Locomotive Company. Dr. Diesel is also reported as having designed an electric locomotive, the generator being operated by a Diesel engine. So far, however, nothing definite has been heard of their performance.

The question of fuel economy is of greater importance than ever. The railways and locomotive builders, however, have had this before them, and a large number of Mikado engines have been built, which while pulling very little more tonnage than a consolidation engine, have done it with a decrease in coal consumed for the work performed.

In some places Mallet engines have displaced consolidations with remarkable success in the way of increasing the train load, reducing the number of trains, and doing the work with a reported saving of more than 40 per cent. in the amount of fuel burned over other engines engaged in similar service.

The superheater engine has given a good account of itself during the past few months, and the results obtained last winter, were, generally speaking, very satisfactory. While we have had troubles on account of lubrication, headers leaking, etc., we are overcoming them successfully for the reason that our education has been improved by our difficulties and where regular men are employed, they soon become familiar with the different conditions brought about by the higher temperatures, so that no more trouble is experienced with superheater than with saturated engines, the improved results justifying the regular crewing of power, where possible.

Several switch engines have recently been equipped with superheaters and excellent results in the way of fuel and water economy are reported. It would seem that the best results in superheating could be obtained by an engine that is working practically up to its capacity most of the time, and not one in switching service, working intermittently, as most of them do, but the satisfactory service reported as being obtained by superheater switch engines would indicate a field for the device in that kind of work.

While nothing very new has been developed in the stoker line, steady progress has been made with the few that we consider have passed the experimental stage, and a number of Mallet engines have, during the past year, been equipped with them, in one case over 9,000 lbs., of coal per hour having been fed into a locomotive firebox by a mechanical stoker.

The question of efficiency in our shops has not been lost sight of. Careful investigations are constantly being made tending to increase our output and decrease cost, and in this we are being ably assisted by the tool and machine manufacturers, who are very much alive to our requirements

The headlight question is still a very serious one for us; lack of uniformity in state and railway requirements making it difficult to know what to do for the best. The difference of opinion among railways as to what should be used is perhaps justifiable, for the reason that what would be entirely satisfactory on a busy double or four track road with block signals, might not be suitable for a single track road with very little traffic and no automatic signals, and it would be far better for the various states to call for a minimum requirement, that would be low, so as to be suitable for a double track road, and then those roads that felt a brighter light was necessary in certain sections, could provide it

There appears to be considerable progress in the welding up of locomotive broken parts, firebox sheets, etc., by the use of electricity and oxy-acetylene, and a large number of engines that would ordinarily have required new firebox sheets have been kept in service by repairing defects in the old ones. The welding of flues in place is probably going to be a solution of the failures due to flues leaking.

Considerable interest is being taken in the tests of boiler fireboxes of different designs at Coatesville under the direction of our good friend, Dr. Gross; but so far, results of these tests are not forthcoming and we cannot yet say whether the standard design of box will have to give way to one of entirely new shape and form.

Elaborate locomotive tests have been made on the Altoona testing plant in connection with the Chicago committee on smoke abatement to see what effect the different locations of air tubes with steam and air jets in the side of the firebox will have on the amount of smoke emitted; also what benefit is derived from brick arches, air openings in firebox door, etc. When the results of these tests are tabulated, a very useful work will have been accomplished.

The association has a membership of 1,085, which is an increase of only 25 over last year. I believe that all members should try and get this up to 1,300 before another convention takes place.

The National Conservation Congress invited the American Railway Master Mechanics' Association to send a representative to meet with it as a member of an advisory board, and your executive committee instructed me to accept the invitation and take part in the deliberations. The first meeting was held at St. Louis, Saturday, May 11, at which time it was learned that 35 national associations had accepted the invitation to act on this advisory board, which was formed to co-operate with the executive committee and suggest means for furthering conservation in all directions. While the original scope of the congress was to conserve the national resources, such as minerals, water, forests, etc., it was decided at this year's convention that it would be entirely proper to branch out and make a special effort in the direction of conserving vital forces, and this plan of conservation will be brought into prominence at the next meeting.

Questions were asked the attending members as to what

their associations were actually doing in the way of conserving our national resources, and for our association I was able to tell of the improved designs of locomotives that performed a given amount of work with less fuel than other engines of earlier types; the greatest stride in economy that had been made since railways were first put into use was the superheater, which makes a possible saving of nearly one-fourth of the amount of coal used while the engine is working. Also told them what the various railway safety committees were doing in the way of conserving vital forces, and urged the passing and enforcing of trespass laws so that the annual toll of more than 5000 men, women and children killed while trespassing, could be stopped, or at least materially reduced.

In conclusion, I sincerely hope that our visit here will be beneficial to the companies we work for, and that the few days spent at the seaside will so brace us up that on our return to business we will take a fresh hold of things and accomplish so much more that our short absence from duty will be greatly offset by the new ideas put into effect, greater vim and vigor injected into the business, and, in fact, a general improvement in all directions.

ASSOCIATION BUSINESS.

Secretary Taylor presented his report, which showed that the present active membership is 1,024, the associate membership 21, and the honorary membership 40, making a total of 1,085. Te report of the treasurer showed that the association had purchased 50 New York City 4¼ per cent. bonds for $5,187.17, and that there is a cash balance on hand of $1,533.38.

The report of the secretary and treasurer was referred to an auditing committee made up of J. W. Fogg (B. & O. C. T.); W. E. Dunham (C. & N. W.), and C. H. Rae (L. & N.).

The dues for the current year were fixed at $5.00 per vote as heretofore.

F. C. Thayer, general road foreman of engines, Southern Railway, was present as a guest of the association, representing the Travelling Engineers' Association. He was given the privilege of the floor.

ADVISORY, TECHNICAL.

G. W. Wildin (N. Y., N. H. & H.), chairman: The committee has discussed this matter in its various phases, and we seem to stand in about the same position as we did a year ago. The failure of the two associations to consolidate, has, in a great measure, handicapped this committee, and as it will be almost useless for the Master Mechanics' Associations to have the committee, as recommended in my address of 2 years ago, to represent the mechanical fraternity, as well as the Master Mechanics' Association, and also the fact that the chairman of the committee on railway operation and legistation has in the past year selected men to perform just about the same work, and selected them more with reference to geographical location, which will make it easier for them to get to, and from the place of investigation, I don't know but what this is probably about the best way to handle it at this time; and we feel that the matter should be dropped at this time, and recommend that the committee be discharged.

J. F. DeVoy (C. M. & St. P.): I recommend that the report of the committee be accepted, and the committee discharged with the thanks of the association. (The motion was carried.)

MECHANICAL STOKERS.

The committee pointed out last year that the principal benefit to be derived from the utilization of a perfected stoker fulfilling the requirements specified was the realization of the maximum boiler capacity of locomotives with the ultimate result of increasing their hauling capacity and reducing their cost of operation per ton mile of service rendered.

The actual service performance of two stokers complying with the specifications laid down in last year's report, as developed by extensive inquiry among railways who have heeded the committee's request by lending their aid and installing a limited number upon large locomotives, justifies the committee in now reporting that these two stokers have, in a measure, fulfilled its expectations, inasmuch as the indications are that their service has been sufficiently reliable in practical operation on a large number of heavy locomotives. These stokers are the Crawford Underfeed Stoker, which was described in the American Railway Master Mechanics' Association Proceedings for 1910, volume XLIII, and the Street Overfeed Stoker described in the American Railway Master Mechanics' Association Proceedings for 1910, volume XLIII.

Both types of stokers in successful service to-day maintain the same general principles in design originally employed. The improvements made on them, which resulted in making their operation practicable, are improvements of detail only, such as would result from the knowledge gained of the weakenesses of individual details brought out by actual service.

As the greater sustained tractive efforts of the large engine equipped with superheaters and brick arches is gradually taken advantage of, its fuel consumption per hour will increase, though decreasing on the ton-mile basis, with the eventual result of possibly making necessary to some extent means, in addition to those already provided, to supply fuel to the engine up to its maximum requirements. When this condition develops, as it is bound to, by traffic increases, careful investigation of tonnage ratings, and the raising to a higher standard the efficiency of operation, the demand for a perfected type of mechanical stoker will become more acute than ever. It is, perhaps, somewhat of a good fortune that the superheater has stepped in and tided over the difficulty that would have resulted while the stoker was in process of development and the demand for large engines becoming more insistent.

CRAWFORD UNDERFEED STOKER.

This stoker, in service on the Pennsylvania and the Baltimore & Ohio, has been developed into a practical operating machine, and is being applied to all of the large Pacific type



T. RUMNEY,
Chairman, Committee on Mechanical Stokers.

class K-2 passenger locomotives and the consolidation class H-8-C, freight locomotives building for the Pennsylvania Lines west of Pittsburgh. On these lines forty-five locomotives are now equipped, and twenty locomotives under construction are being equipped. The Lines East have ten locomotives equipped. The Baltimore & Ohio reports one Crawford stoker in service on a Mallet engine with a grate area of 100 sq. ft., and a tractive power of 105,000 lbs., working compound.

The forty-five locomotives on the Pennsylvania Lines West, which include some of the earlier designs, have made a total of 7,361 trips up to the middle of March, of which 3,640 were 100 per cent. stoker fired, 2,082 between 75 and 100 per cent. and 1,639 below 70 per cent. The per cent. stoker fired is in reference to the amount of coal put into the fire box by the stoker; as for instance, a 90 per cent. stoker fired trip means that the stoker fired 90 per cent. of the coal while 10 per cent. was hand fired, the firing by hand being done to fill up spots in the grates which resulted from imperfect distribution of the coal by the stoker. Some capacity tests on the Western Division of the Lines West were run with a dynamometer car on various passenger locomotives, one of which was a Pacific type equipped with a Crawford stoker. The results of these tests have not been completed so as to become available for this report, but the preliminary figures indicated, with respect to the coal con-

sumption, that the stoker made as good a performance as the skilled fireman selected for the hand-fired locomotives.

The Crawford stoker applied to the Mallet engine of the Baltimore & Ohio has been in service about a year. Some difficulty was experienced with this stoker due to the fact that some departures in design were made from the stoker as originally developed, consisting principally in the provision of two cylinders to operate the plungers instead of one. This necessarily added certain complications which subsequently gave trouble. After certain changes, the stoker gave a fair distribution of coal. This stoker is still in service but has not given quite the satisfactory performance so that it could be termed unqualifiedly successful. Inasmuch as this particular stoker is a modification of the Crawford stoker as now perfected for engines of the type to which it has been applied on the Pennsylvania Lines, some difficulty, as experienced with it, might reasonably be expected.

STREET OVERFEED STOKER.

This stoker is now being built in two somewhat different forms, distinguished from one another as the screw conveyor type and the crusher type. The screw conveyor stoker is built to take screened coal from the tank and distribute it evenly over the grates in the firebox without being handled by the fireman. The coal used by this machine must be passed through a screen having 2-in. square mesh before it is placed on the tank. With this type of machine the fireman has no manual labor to perform excepting that of raking the coal on top of the screw conveyor when the supply in the tank is low.

The crusher stoker is designed to take lump, run-of-mine, or slack coal from the tank and distribute it over the grates in the firebox. With this type of machine, all the coal must be scraped or shoveled into the crusher by the fireman. The parts of the stoker on the back boiler head and the distribution systems are the same with both machines. The primary difference between them is in the means provided for conveying the coal from the tender to the distribution system, the screw conveyor type only needing one engine to operate the entire machine, whereas the crusher type needs two; one for the crusher, the other for the conveying mechanism.

It is the opinion of the designer of the Street stoker that the provision of means for preparing coal on the tender for suitable firing is but a temporary expedient to be used with experimental machines, and that for practical operation of a large number of stokers, it would be more feasible to prepare the coal at the chutes suitable for stoker firing before delivery to the tender. The committee last year recommended that a stoker, in order to be complete, should be able to handle run-of-mine coal. In this respect the Street screw conveyor of stoker does not meet the committee's recommendations. The indications, however, are, judging from recent developments, that it will be more economical to concentrate the means for properly preparing coal for stoker consumption at the coal chute with the net gain of reducing to a minimum the complication of a machine which, when applied to a locomotive, will of necessity add to the expense of locomotive maintenance and the likelihod of engine failure.

There are 30 Street stokers applied and in service today, 13 of which are of the crusher type and 17 of which are of the screw conveyor type. Sixty-nine stokers of the screw conveyor type are under construction for application to 45 Mallet engines ranging in tractive power from 72,800 lbs. and 99.5 sq. ft. grate area to 105,000 lbs. tractive power and 100 sq. ft. grate area, and 24 Mikado engines of 60,800 lbs. tractive power and 66.7 sq. ft. grate area. The thirty stokers in operation are applied to engines ranging in size and type from 45,700 lbs. tractive power consolidation freight, 58,000 lbs. tractive power mountain passenger, and 60,700 lbs. tractive power Mikado freight to 105,000 lbs. tractive power Mallet freight and pusher engines. At the last convention of this Association, eight of these stokers were in operation. From the service rendered by them, as well as the results of individual investigations made by various roads, this number has grown to 30, with 69 under construction for entry into service within the next few months.

General inquiry of different roads which have the latest type of Street stoker in service has developed the facts that its service is satisfactory, as indeed is attested to by the extension of its use; that it permits realizing the fullest capacity of the locomotive boiler; that it permits of carrying a thinner fire than ordinarily possible with hand firing; that with considerate attention, it renders practically uninterrupted service; but that it does not necessarily effect economies in fuel consumption. The fact was also developed that the greatest trouble in the operation of this stoker results from the unfamiliarity of engine crews with it at the time of introduction. It takes considerable drilling to get a sufficient number of men on a division trained so that the stoker may be handled successfully in pool service. This difficulty, however, is a minor one, and naturally follows at the outset of the use of a device new in railroad service. As the stoker becomes more generally utilized, this trouble will disappear.

HANNA OVERFEED STOKER.

This stoker, as far as developed, was briefly reviewed in the Proceedings of the American Railway Master Mechanics' Association for 1911, volume XLIV. It did not fully meet the requirements of the committee. As a coal-distributing means, the Hanna stoker has successfully demonstrated its possibilities. It has been in continued service on engines of the consolidation, Pacific and Mallet types, giving a good account of itself, particularly when the engine crews tok a personal interest in its operation. The manufacturers of the Hanna stoker are revising its design and construction so as to increase the scope of their apparatus to comply with the specifications as laid down by your committee.

THE BARNUM UNDERFEED STOKER.

This stoker as developed so far by the Chicago, Burlington & Quincy employs screw conveyors located in troughs extending longitudinally just below the grates. The screw conveyors decrease in diameter from the rear of the firebox to the front. Above the conveyors in each trough are a series of inclined plates, adjustable for height and inclination. The clearance between the conveyor and the bottom of the trough may also be adjusted to secure the best results. The conveyors are operated by a transverse worm shaft under the cab deck which is rotated by two small steam engines secured ont the outside of the frames. A coal crusher on the latest type of stoker as applied to five 2-10-2 type engines recently built for the Chicago, Burlington & Quincy is also provided. This crusher is driven by a small steam engine located on the tender. It delivers coal to a belt conveyor which transfers it to a transverse trough from which it is discharged into the longitudinal feed troughs.

In addition to the five 2-10-2 type engines equipped above, the Barnum stoker has been in service on a switch engine of the Burlington road operating in Chicago, as well as a Prairie type engine operating in freight service. It is reported as having good results with both low grade bituminous coal and lignite. It is further reported that the indications at this time for this stoker are that it is a practical machine, assisting in making steam readily and being free from failures and breakdowns.

DICKINSON OVERFEED STOKER.

This stoker was tried out on the Erie. It employed the fundamental principle of coal distribution of the Hayden stoker further developed. It was equipped with a coal crusher and means for conveying coal, consisting of a screw conveyor transmitting the crushed coal to a bucket conveyor encased in a housing, which bucket conveyor in turn delivered the coal to the distributing mechanism. The apparatus was so arranged that it did not in any way encumber the fire door. The entire machine was driven by two small steam engines, one operating the crusher, the other the conveying apparatus.

The conveying mechanism as well as the distributing device of this stoker were successful, but the coal crusher failed, due principally to its inadequacy. The engines, together with a few minor details, gave considerable trouble, although the complete combination gave a good showing when in proper repair. For it to be maintained in this condition, however, proved very expensive.

From the experience gained from the above stoker, a second one was designed and built, seeking to avoid all the weaknesses of the first while incorporating all its good points. The modified stoker, as finally placed into operation, used only one engine of a special slow speed design, special form of boot, for the elevator carrying all the gearing to avoid encumbering the engine, an improved conveyor, a suitable coal crusher, and better coal distributing means. This stoker was finally placed into operation during the month of February last, applied to a consolidation freight engine. It soon developed that snow and moisture in the coal presented new difficulties by causing the fine coal to dry and cake in the elevator buckets, gradually filling them up, which so diminished the elevating capacity of the conveying mechanism that it clogged and stopped, finally resulting in a failure by breakage of the elevator chain. This trouble was probably due to wrongly designed buckets,

since the bucket elevating system as employed in the Street stoker works without trouble. During the operation of the stoker, steam was satisfactorily maintained and the apparatus worked smoothly. It is now proposed to do away entirely with the bucket elevator scheme and substitute in its stead helical screw conveying means.

CONCLUSION.

Generally speaking, in consideration of the foregoing review of the status of the mechanical stoker, the committee feels justified in concluding that decided progress has been made during the last year in the development of the mechanical stoker. While the perfection of the superheater and the brick arch have assisted in making possible a larger engine, it is considered, judging from these indications, that the advent of the perfected mechanical stoker will make possible a still larger engine.

The report is signed by:—T. Rumney (C. R. I. & P.), chairman; E. D. Nelson; C. E. Gossett (M. & St. L.); J. A. Carney (C. B. & Q.); T. O. Sechrist (C. N. O. & T.); S. K. Dickenson (L. S. & M. S.), and George Hodgins.

DISCUSSION.

W. C. A. Henry (Penna. Lines West): There are in use on the Pennsylvania Lines East and West at the present time, 75 of the Crawford stokers. The performance of these stokers has been so satisfactory that the Lines West have recently ordered 37 heavy freight and passenger locomotives equipped with these stokers. We find we are realizing more power from the locomotives equipped with the stoker than in the case of locomotives where hand firing is used, and altogether our experience is that the stokers are very reliable. On the lines in the southwest we have 10 Pacific type locomotives, which have been equipped with the stokers. During the month of May, 97 per cent. of the coal burned by these locomotives was handled by the stokers, and the remaining 3 per cent. was handled, as explained in the report, in the leveling of the fire, etc. These engines are not assigned to regular crews, but run in a pool

T. R. Cook (Penna. Lines): We have some figures here showing the results of the performance of the stokers on the lines West that might be interesting. The total number of trips over and above those reported by the committee, is now 11,726, of which over 6,000 were 100 per cent. trips. The detail of the last 2 months performance, I believe would be of interest. The stokers on the Pacific type engines in the last 2 months made 992 trips, out of which 682 were 100 per cent. trips. The consolidated engines with the stokers made 837 trips, out of which 566 were 100 per cent. trips.

We have also on some of the consolidated engines the new design of stoker which has departed from the original design in some of the principal features, *i. e.*, in the surface of the grate. The original stoker had a flat grate. The No. 17 stoker, so called, has a sloping grate, that is, the grate slopes towards the center, with a basket effect. In these engines we have been able to carry a much lighter fire, and a fire which is much more evenly distributed. That stoker has been doing very well. It was only equipped within the last 4 or 5 weeks and the engine has made 41 trips, of which 36 were 100 per cent. trips.

J. F. DeVoy (C. M. & St. P.): Mr. Henry referred to the fact that an engine equipped with a stoker developed greater power than the engine which was fired by hand. I would like to ask if he has made any tests, and can give us any relative information as between the 2 forms of firing, the amount of coal saved in firing, or the increased amount of power derived from the application of the stoker over hand firing. The reason I ask that question is that in a stoker which we tried out a year or two ago, it did not develop the fact that the stoker would increase the capacity of the boiler to any great extent, that is, compared with the hand firing, and for this reason I would like to know if there were any comparisons made by Mr. Henry along these lines.

Mr. Henry: Tests of these locomotives were made on the locomotive testing plant at Altoona, Pa., on which tests 9,400 lbs. of coal were burned an hour. The road tests which we have made indicate that by the use of the stoker, in comparison with hand firing, we get an economy of from 5 to 7 per cent., that is to say, the same amount of work is performed with the stoker, with 5 to 7 per cent. less coal, as is performed by hand firing. Our road foremen of engines also tell me that the Pacific type locomotives equipped with stokers make their schedules more easily, and make up lost time more quickly, than engines which are hand fired.

C. D. Young (Penna.): I believe that I can furnish some few figures on the relative capacity of the hand fired engine, or the possibilities, perhaps, of a stoker fired locomotive vs. a hand fired engine. The committee has referred to the application of the Crawford stoker to the Baltimore & Ohio mallet compound engine. I believe that was the first attempt that was made to apply an underfeed stoker to a fire-box greater in width than 100 in., and the problems involved in the construction were very serious, and required some experience, as we afterwards learned, before the problems could be fully met. The performance of the B & O. stoker gave the designers a great deal of information upon which to base future designs, and with the errors and difficulties of the wide fire-box engines before them, as the result of the application to the B. & O. Mallet, the Pennsylvania road has incorporated on their Mallet simple locomotive & Crawford stoker.

In testing this locomotive out on the Eastern slope between Altoona and Gilitzen, a distance of a little over 13 miles, on a 2 per cent. compensated grade, it was necessary to fulfill the requirements of the locomotive, to burn an average of over 11,000 lbs. of coal per hour. This the stoker did. We are rather inclined to believe, from our experience when the stoker has not been operating satisfactorily, that it would require 2 men to successfully keep the fire going burning coal at that rate, and with a single fire door, it would be even very difficult to have 2 men keep up full steam pressure under maximum working conditions, so I think in the case of this application it is fairly safe to say that the application of the underfeed stoker has permitted the maximum capacity of the boiler at low speed.

We have also applied the stoker to another Mallet compound, which is just about to be delivered from the Baldwin Locomotive Works, and that will be tried this summer, when we will know more about the performance. This machine is different in detail, but the same in fundamental design, from that applied to the B. & O. Mallet compound, and the Pennsylvania Mallet simple. In addition to that, we have applied the type of stoker which Mr. Cook spoke of, with the sloping grate to an experimental Pacific locomotive which we have had for some few months, and have tested frequently on the locomotive test plant, having made a series of some 50 odd tests. I believe that this locomotive represents the latest development in heavy Pacific design. It has 27 in. by 28 in. cylinders, and I believe is about the heaviest 80-in. wheel passenger locomotive which has ever been built. During some of the runs on the testing plant we have burnt a large amount of coal and have developed as high as 2,000 boiler h.p. in the boiler, the boiler being equipped with a superheater and a Crawford stoker. The engine indicated, for sustained power, something over 2,500 i.h.p., which I believe establishes a new record for any passenger locomotive. When the members consider this engine will develop 2,500 i.h.p. and give an evaporation sufficient to be rated as 2,000 boiler h.p., they will appreciate that it is quite a large machine. The engine has not been in service on the road long enough to be put on our heaviest and fastest trains, but we have been breaking it in and trying it on some of the slower trains. The results have been equally satisfactory on the road as on the testing plant, and we have been very much satisfied so far with the results of the operation of the engine.

Thos. Roope (C. B. & Q.): We have done some experimenting with the Barnum stoker, and as far as we have gone with it the results have been satisfactory. We have tested it with both bituminous and lignite coal, and, as you all know, the lignite coal is very light. We find with the Barnum stoker that we are able to maintain maximum steam pressure at all times. It is a splendid device for abating the smoke nuisance. The stoker, I might say, is very popular with the enginemen that have used it. I have been on a locomotive that we have been testing on the Lines West under adverse conditions, and in all kinds of weather, and in all the trips I personally made on the locomotive, the results were very satisfactory.

A. G. Trumbull (Erie): Lately we have devoted considerable attention to the Brewster stoker. Some of the difficulties to be encountered in the operation of that stoker, of course, might be anticipated in connection with the vertical conveyor inside the firebox. We find it rather impossible to operate the stoker on account of the action of the heated gases, on the cast iron conveyor, and after considerable effort to develop means whereby the conveyor could be protected from action of the smoke gases, we were obliged to abandon the experiment. Thus far we have no means whatever of overcoming this difficulty. I think, perhaps, there may be a future for this stoker, if the difficulties enumerated can be overcome.

F. H. Clark (C. B. & Q.): I have an idea that the stoker is going to help us to get the full capacity of our boilers. It is a pretty difficult matter to meet all the requirements called for in firing a locomotive. With some stokers that have been offered, the question of distribution is one of the most serious difficulties that is encountered. We have sev-

eral stokers on the road now that a pear to be doing very well. We have a Street stoker in service in one of our big Mallet engines, with a grate area of about 100 sq. ft. and somewhat to our surprise it made a successful first trip. We are going on and putting some more stokers on that class of engines, as we are very much encouraged from the experience we have had with the first stoker, and which has now been in service perhaps a week, and of which we have heard nothing as yet but good reports.

H. F. Staley (C. C. & O.): I have had in service for about one year one of the Hanna stokers of the older type, applied to a Mallet engine having 78 sq. ft. of grate area. With the use of this stoker I find we can maintain a maximum steam pressure at all time while the engine is working at full capacity. We have experienced some trouble with this engine in regard to its steam capacity while running light, due to the fireman improperly handling the stoker, by the application of too much coal to the fire or feeding the coal to the fire faster than the engine was capable of burning the coal. I consider that this stoker will distribute the coal uniformly over the grates, and with its use we can successfully burn a lower grade of coal, and maintain a maximum steam pressure, much more satisfactorily than can be done by hand firing. The Hanna stoker can be used without a brick arch, and in our case no brick arch was used.

W. H. Williams (B. R. & P.): I do not understand why the Street stoker men are so quiet. I rode on some Chesapeake & Ohio engines which were operating very successfully with the Street stoker. We have a large Mikado engine which has been in service something over three months, in which the Street stoker has been operating all the time without failure.

C. F. Street: I think the committee's report covers the situation in very good shape. I now feel that my machine has passed the experimental stage. I am now running about 150 machines. These are in the service, and all of them are giving satisfaction.

T. Rumney (C., R. I. & P.): Of course, it makes a vast difference as to the size of the engine—whether the stoker works on a low grade line or in a rolling country, and particularly where the limiting grades are short. One of the most important things to be considered is the size of the engine and what work a fireman can do, and also as to various other devices, covering certain classes of service, by which we could decide whether a stoker is necessary or not.

G. H. Baker: Some attention has got to be given to getting men into locomotive service with intelligence and brains, as well as muscle. We have got to have engineers after a while and we have got to make them out of firemen. We have got to make the conditions of firing locomotives such that intelligent young men can be persuaded to enter the work and stay in it, and not be driven out of the service by the hundreds after the first month or two. I think the mechanical stoker has been found to be doing a great deal of good work in that direction, permitting the use of big engines where big engines are needed, and the maintenance of their power in emergencies and hard work up to the maximum.

C. D. Young (Penna.: The question that Mr. Rumney asks is a very important one when a person is trying to decide whether they shall put a stoker on an engine or not, and one exceedingly difficult to answer, it seems to me. Now, the problem on that account depends on circumstances. We have some data which I believe is fundamental on the subject of the firemen. It has been worked up with that in view, and I believe it would be very interesting to the association to know what has been done by firemen, proving what at least can be done, and then from those figures perhaps we might be able to judge what an average man might be expected to do. Last Summer and last Fall some capacity tests were run between Ft. Wayne and Valparaiso, a distance of 105 miles, the idea being to determine just how many cars could be hauled on a given schedule speed. Everything was in good shape for the experimental work. The road foreman recommended a man who has broken all records in handling fuel on the deck of a locomotive. He had fired for 3 hours at speeds greater than 60 m. p. h., an average of 8,400 lbs. of coal per hour. I believe that establishes a record which, unless he tries it over again, will not be beaten. Not only did he do that, but he would go back and do it over again. His work was done with a No. 5 shovel. Had he been given a larger shovel, I believe he could have exceeded those figures. We have had men on our locomotive tests plant fire as high as 9700 lbs. of coal per hour. Now, these are maximum figures, I believe you will all agree with me that we should not expect very much more. We know time and again, men who are firing 3,000 lbs. of coal per hour for a 6 or 8-hour run on the road, and they are doing all we can reasonably expect of a single fireman. I don't believe we can expect from the present day fireman operating a passenger engine, anything greater than 4500 to 5,000 lbs. of coal per hour.

Mr. Street: A fireman told me that he had been firing a consolidation locomotive of comparatively small capacity for 6 years, and when he was given a stoker he put in a full month on the stoker, which was the first full month he had ever put in on one of these locomotives. He said there was not a fireman on any of these locomotives that will work continuously a full month. They must all lay off and rest up for a while. Now, these men were not shovelling more than between 2,500 and 3,000 lbs. of coal per hour on heavy freight work. That is a very indefinite proposition, I understand, but before the next session of the convention, I think we will be able to give positive figures. One of the things which has surprised me greatly is the small quantity of coal required in comparison to what I expected. In a number of cases we have slowed down the speed of conveyor for delivering coal to a point which is much lower than we had anticipated. We have not yet made tests to determine just the quantity which is put in.

Angus Sinclair: It has been said that superheated steam would do away with the need of a mechanical stoker, which is taking a rather short-sighted view of the question. The fact is, when we consider the way in which the size of locomotives has increased; what the maximum of a locomotive may be and what the maximum demand for steam may be, the importance of the stoker is evident. Now, on the Southern Pacific I know for a fact that there are oil burning engines using 150 gals. of water per minute. You have to look forward to getting your coal-burning locomotives up to the capacity of oil-burning locomotives, and if that is the case, it is far beyond the capacity of any man to fire them. For this reason, I think that the demand for a mechanical stoker is liable to increase.

T. Rumney (C. R. I. & P.): Just another item in connection with the use of the stoker that is not being emphasized particularly, and that is a grade of coal that you can use with a stoker. We are burning in some cases washed slags that a man could not possibly fire by hand.

H. A. Gillis: We have a number of stokers doing good work to-day, but there is one thing that has not been brought out and that is in regard to the fireman. I have done some firing myself, and I know the question of the human element does come in. I don't care what a man's physical ability is or what his capacity is, there are times when a man is not fit to do the work. There are times when the temperature is such that hardly any man can fire and make any time.

D. F. Crawford (Penna.): I have naturally thought a great deal about the question Mr. Rumney asks as to what size locomotive we could stop at. We naturally started with the application of the stokers to the heaviest locomotives in the equipment. It has been my idea to work backwards, and take first the largest locomotives we have, then the next size consolidation locomotive, and then go to the locomotives that may be called the lighter passenger locomotives, say a 20½ in. by 26 in. cylinder. I want to do that for two reasons: I hope to gain more efficiency or save fuel, I don't know that I will on the smaller; I also hope to so greatly eliminate the smoke that our suburban trains in coal burning districts will be comfortable to the passenger, and I think that is a point we have got to think of a good deal when it comes to the smaller locomotives. If we succeed in getting a stoker that will reduce the smoke, it will not only be useful on the large locomotives, but on the small locomotives, around terminals. In regard to the determining of the capacity of locomotives; we took some 6-wheel truck cars and loaded them with steel rails until they weighed 62½ tons. We made a schedule of 100 minutes for 105 miles, and started in with trains of 5 cars and worked up to 15 cars. With 15 cars we averaged 58 m. p. h., and with 9 cars we averaged 76 m. p. h.; and the fireman that Mr. Young speaks of was able to handle the amount of coal that he has stated. I found, however, in comparing the daily performance of the two classes of locomotives, one of about 39,500 lbs. tractive effort and the other of 42,000 lbs. tractive effort, the larger engine having a larger boiler, and what we thought more steaming capacity, that the man used about the same amount of coal on both of these engines. It was somewhere in the neighborhood of 3,500 lbs. of coal per hour in freight service, and for a run that extends the same as ours did, for 10 hours, it seems to me it is pretty near the limit; and therefore, from a coal burning standpoint I have thought of applying the stoker to all locomotives that require over 3,500 lbs. of coal per hour.

John Tonge (M. & St. L.): I would like to know if the railway companies are making comparative tests. Now, if there is 5 per cent. to be saved in fuel, it is certainly worth while to have a stoker. I think that the discussion this morning has not been as interesting as it ought to be for the reason that not enough mention is made of the power of the engines using the stoker. There is a preponderance of small power engines, and we ought to consider them if we are looking after money or economy.

A Member: In Pennsylvania we have had 4 consolidation engines in service for less than 3 months. We have been experimenting with the coal. The stokers are new to us, but so far the engines are able to go 45 miles without using a shovel, or without using a hook, the engine in that time burning at the rate of 5,000 lbs. of coal per hour, with a maximum grade of 1 per cent. and a steam pressure of never less than 200 lbs. up to 205 lbs.

C. H. Hogan (N. Y. C. & H. R.): One of the most important reasons for this association and the mechanical men of this country encouraging those advancing the stoker, is that it will enable us to employ young men as firemen with a greater degree of intelligence than we can do to-day. It was almost beyond human endurance for a fireman to work on a locomotive, particularly a freight locomotive, and maintain the maximum pressure on a division of 150 miles. The object of all railways at the present time is to build locomotives with the greatest capacity possible, and in order to get good efficiency from these locomotives I believe we must have a mechanical stoker. We are going to have men in the future for firemen that will give us engineers such as we should have. We must lessen the burden of the fireman. I certainly believe that the time is not far distant when all roads, particularly trunk lines, where they have to haul heavy tonnage will be obliged to equip their locomotives with stokers in order to get full efficiency from them.

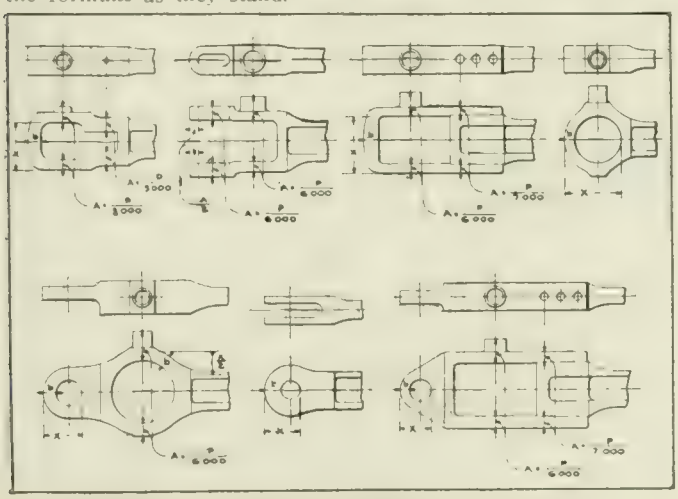
Thos. Roope (C. B. & Q.): I think perhaps we ought to go slow in considering the remarks of the speakers who have just spoken. I doubt if there has yet been a stoker made, with which there could not be found some fault. We have tested the underfeed and the overfeed stoker, and some parts of the reports state that the feed has been very accurate. That I can agree with from observation, but it has not been our experience that you use less coal with a stoker than you do without one. Then again there is no stoker but which has a great number of parts to maintain. That is one thing that we are all trying to keep away from; we want to make our locomotives as substantial as we can, and to avoid delay from break-downs. Some of the stokers are complete in one respect, and it is difficult to figure they are all right otherwise.

W. J. Tollerton (C. R. I. & P.): The question of oil burning on a locomotive versus coal burning will be one which will be soon settled, because of the rapidity with which oil is going out of use, due to the fact that the price has been raised, prohibiting its use as a fuel for locomotives. We have been able to get very much increased service out of a locomotive using oil instead of coal, probably 12 to 15 per cent.—both in carrying capacity and in service on the road. The question, however, of fuel and stokers, I think should receive a great deal of consideration, for the reason, as above stated, that oil, unless the roads own their own wells, will not very long be a factor in fuel.

There was no report on the Revision of Standards and the committee on specifications for cast-steel locomotive frames requested more time which was granted. Wm. Forsyth (*Railway Age Gazette*) suggested that the latter committee request the American Society for Testing Materials to prepare a special specification for a locomotive frame.

MAIN AND SIDE RODS.

One year ago a progress report was submitted, and the members were requested to send in criticisms and suggestions. The committee have received no criticisms or suggestions for changes, and, therefore, must assume that the members are satisfied with the formulæ as they stand.



Sections to be Checked in Strap and Stub Ends.

CHECKING FORMULAE.

All measurements are given in inches and pounds.
A = Area of section considered.
a = Width of section considered.
b = Depth of section considered.
C_1 = Max. compression unit stress for transverse bending.
C_2 = Max. compression unit stress for vertical bending.
c = $c_1 - c_2$ = Coefficients.
d = Cylinder diameter.
L = Length of rod from centre to centre of pins.
M = Bending moment.
P = Max. compression strain acting at end of rod.
p = Max. boiler pressure.
Q = Cylinder pressure = $0.7854\ d^2\ p$.
R = Radius of driving wheels.
r = Radius of crank.
RG = Radius of gyration of section—axis horizontal.
rg = Radius of gyration of section—axis vertical.
S = Stress—and where used in formulæ must not exceed one sixth of ultimate strength of the steel.
s = Amount of horizontal offset in rod.
SM = Section modulus of section considered—axis horizontal.
sm = Section modulus of section considered—axis vertical.
W = Weight on pairs of drivers actuated through rod considered.

Main rod area must not be less than P ÷ 10,000 lbs.

For main rods $P = Q$.

For side rods $P = \frac{0.3\ WR}{r}$

To determine C_1 and C_2, calculations should be based on a section half way between rod pins.

For transverse bending in rods having knuckle pins flexible transversely

$$C_1 = \frac{\frac{P}{A}}{1 - \frac{P\ L^2}{675\ 000\ 000\ A\ rg^2}}$$

For all other rods

$$C_1 = \frac{\frac{P}{A}}{1 - \frac{P\ L^2}{1\ 200\ 000\ 000\ A\ rg^2}}$$

For vertical bending in all rods

$$C_2 = \frac{\frac{P}{A}}{1 - \frac{P\ L^2}{300\ 000\ 000\ A\ RG^2}}$$

Values for C_1 and C_2 can also be taken from tables in "Kent's Pocket Book" under heading "Merriman's Rational Formula for Columns."

First—For rods without offset the larger value of C_1 and C_2 should be taken equal to S.

For rods with offset the larger value of $C_1 + \frac{Ps}{sm}$ and C_2 should be taken equal to S.

Second—$S = C\ \frac{AL^2 r}{SM b} \qquad C_1\ P\left(\frac{1}{A} \quad \frac{s}{sm}\right)$

The calculations should be based on a section located at a distance 0.6 L from crosshead pin for main rods and halfway between pins for side rods.

VALUES OF C AND C_1.

Rev. per min.		256	325	375	420
	c =	0.036	0.055	0.073	0.091
Main rod					
	c_1 =	0.500	0.500	0.400	0.300
	c	0.071	0.106	0.142	0.177
Side rod					
	c_1	0.500	0.500	0.500	0.500

The co-efficients selected should correspond with the highest number of revolutions per minute which the locomotive can make.

If this cannot be determined, use
420 r.p.m. for high speed passenger locomotives.
375 r.p.m. for passenger and high speed freight locomotives.
325 r.p.m. for all other locomotives.

Very simple rules for rods, without offset, and having bodies with rectangular section, based on the above theory, follow.

First—Stress is less than one-sixth of ultimate strength of the steel if "L" is less than 46 "a" or 23 "b" and if "A" is more than "P" divided by one-eighth of ultimate strength of the steel.

Second— $S = c_2\ \frac{L^2 r}{b^2} + C_1\ \frac{P}{A}$

VALUES OF C_1 AND C_2.

Rev. per min.		265	325	375	420
	c_2	0.22	0.33	0.44	0.55
Main rod					
	c_1 =	0.50	0.50	0.40	0.30
	c_1 =	0.43	0.64	0.85	1.06
Side rod					
	c_2	0.50	0.50	0.50	0.59

The safe working stresses for the various sections of rod ends are given in connection with the diagrams following, except where thickness of section is indicated by the letter "b." The figures denote maximum stress allowed under end load "P." If the minimum areas of the two members differ, take double the lesser area for "A."

The minimum area at points indicated by letter "b" should be—

$$\text{For main rods } A = \frac{PX}{50\,000\ b}$$

$$\text{For side rods } A = \frac{PX}{60\,000\ b}$$

in which "X" is the average diameter of eye or average spread of the members.

The above checking formulæ is therefore submitted as recommended practice.

The report is signed by:—W. F. Kiesel, Jr.(Penna., chairman; H. Bartlett (B. & M.); G. Lanza (Bald. Loco. Wks.); H. B. Hunt (Am. Loco. Co.) and W. E. Dunham (C. & N. W.).

DISCUSSION.

O. C. Cromwell (B. & O.): We have some advantage in increasing the fillets joining the sections to the stub, making a very much larger radius. That does not appear to be covered in this report.

W. F. Kiesel, Jr. (Penna): The question of the connection between stubs and rods has not been specially considered. It is generally conceded that it is necessary to make a transition from the body of the rod to the stub gradually, so as not to contemplate deflections at that point.

C. A. Seley (C. R. I. & P.): There are a great many questions in connection with the design of these parts of locomotives. I have had some experience on one class of engines, with rods. It has not been a very satisfactory performance, and identical rods of another class have failed; being a different lot they possibly were affected by a different chemical composition. There are a number of elements entering into the matter beyond the one which is explained. In the short time I have had this paper I have found it difficult to intelligently discuss it. I therefore move that the paper lay over for a year for consideration, and be brought up then for the adoption of a standard, inasmuch as we do not have a recommended practice in the association.

The motion was carried.

SAFETY VALVES.

(1) The committee on safety valves herewith submits the following report: The suggestions given below apply to oil and coal burning locomotives, whether using superheated or saturated steam. Safety valves suitable for the requirements of coal-burning locomotives should be ample for those burning oil, inasmuch as the enginemen have control of the fire of an oil-burning locomotive to a greater extent than on coal burners.

(2) *Formula for the Size of Valves.*—In view of the variation in the various makes of safety valves as regards lift, any formula for the size of valve should take this item into consideration. No change should be made in the formula proposed by the committee of this Association in 1910, except that the lift and diameter of the valve will be substituted for the area. The following formula is therefore suggested:—

ASSUMING VALVES HAVE 45-DEG. SEAT.

D = The total of the actual diameters of the inner edge of the seats of valves required.
H = Total heating surface of boiler in sq. ft. (Superheating surface not to be included.)
L = Vertical lift of valve in inches.
P = Absolute boiler pressure in lbs. per sq. in.

$$D = \frac{H}{L \times P}$$

EXAMPLE.

$$D = \frac{.036 \times 2878}{.1 \times 200} = 5.2 \text{ in. Diameter}$$

which would require two 3-in. valves.

(3) *Maximum Capacity of Safety Valves.*—The only accurate method of determining the capacity of safety valves is by actual test in a testing plant, with safety valves fully equipped with springs, as in actual road service. In order that it should be positively known that safety valves will prevent undue raise in pressure under extreme conditions, they should be subjected to a road test.

(4) *Number and Size to be Applied.*—Every locomotive should be equipped with not less than two, and not more than three safety valves, the size to be determined as per formula in paragraph 2. Safety valves to be set as follows:

First—Boiler pressure.
Second—Two lbs. in excess.
Third—Three lbs above second, or five lbs in excess of first.

(5) *Metal for Valves and Valve Seats.*—No metal has yet been developed as entirely proof against erosion. Nickel seats and valves are desirable, and an improvement over other metal, but are expensive as to first cost and renewals; therefore, the committee's recommendation is to continue the use of bronze alloys.

(6) *Stamping Lift on Valves.*—Manufacturers should be required to stamp on the valve the lift in inches, as determined by actual test, with valve in working condition, and set for a blow-back of not to exceed 3 lbs. The committee recognizes the fundamental importance of valve lift. It, therefore, recommends that in design and manufacture valve lift receive proper consideration.

(7) *Estimating Steam Discharge.*—Steam discharge from safety valves of given size can be estimated closely by the use of Napier's rule for flow of steam, as follows:

Flow of steam per second:
Absolute pressure in lbs. per sq. in., multiplied by area in sq. in. of discharge opening, divided by 70.
Multiplied by 3,600 gives flow in lbs. per hour.

(8) *Location of Valves on Boilers.*—The location of safety valves has much to do with the normal crest of the water in the boiler; therefore, safety valves should be located at the highest point on the boiler, where clearance limits will permit, in vertical position, avoiding the use of piping, long nipples and ells between safety valves and boiler.

(9) *Spacing in Dome.*—Where safety valves are located on an independent dome, they should be spaced as per Fig. 1. The opening from boiler into dome and the area between supporting ribs in dome should not be less than inlet area of valves. If this



W. J. TOLLERTON,
Chairman, Committee on Safety Valves.

VALVE SIZE	SPACING S	RADIUS R
4½"	9"	5 3/16"
4"	8½"	4 7/8"
3½"	8"	4 5/8"
3"	7¼"	4 3/16"
2½"	6½"	3¾"

APPLICATIONS MADE AS DESCRIBED PERMIT USE OF WRENCH FITS RECOMENDED & MOVEMENT OF STANDARD WRENCH ONE SIXTH OF A TURN WITH A REASONABLE MARGIN

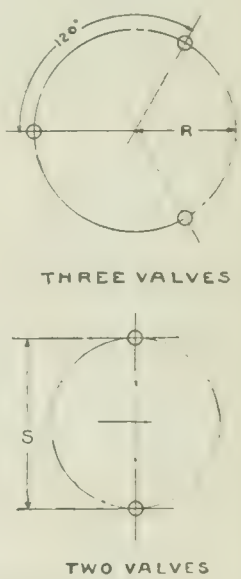


Fig. 1—Location of Safety Valves.

is not done, the opening will momentarily reduce pressure, causing valve to flutter and hammer.

(*10*) *Hydrostatic and Other Tests.*—The practice of screwing down the safety valve spring during a hydrostatic test of boiler should be discontinued. Valves with springs designed for certain pressures should not be subjected to extreme pressures. One safety valve should be removed and replaced with a special high-pressure valve, and the other valves should be removed and replaced with caps or plugs during test.

(*11*) *Standard Connections.*—In order to make valves of different manufacture interchangeable, recommend standard thread and diameter of valves at connections as follows:

2½-in. valve	2½-in. U. S. S. pipe thread	8 thds. to in.
3 -in. valve	3 -in. U. S. S. pipe thread	8 thds. to in.
3½-in. valve	3½-in. U. S. S. pipe thread	8 thds. to in.
4 -in. valve	4 -in. U. S. S. pipe thread	8 thds. to in.
4½-in. valve	4½-in. U. S. S. pipe thread	8 thds. to in.

Valves of above sizes to be made for U. S. S. wrench fit.

(*12*) *Inspection of Old Springs.*—As it has been found that the condition of the safety valve springs greatly affects the discharge capacity of the valve, old springs should be tested as to their deflection under load before being used in required valves.

(*13*) *Repairs to Safety Valves.*—Safety valves should be thoroughly overhauled and put in good condition whenever the locomotive is in shop for general repairs. Standard gages should be used in order that important dimensions may be maintained as originally designed. If this is not done, it generally impairs the efficiency of the valves. The committee desire to thank the various manufacturers and members for the assistance rendered.

The report is signed by:—W. J. Tollerton (C. R. I. & P.), chairman; I. B. Thomas (Penna.); W. D. Robb (G. T.) and E. C. Schmidt (Uni. of Ill.).

DISCUSSION.

M. Flannagan (C. & O.): I notice that the committee in this paper recommend that the valves be threaded for pipe tap connection. I assume that it is the intention of the committee that it shall not be necessary to screw them down to a shoulder, in making this fit. It has been my experience sometimes with certain valves, where the seat is close to the threaded portion that the valve would be distorted by some injudicious workman screwing it on too tightly. Personally, I believe we can get better service with a straight thread, and the valve to be screwed down to a shoulder.

Mr. Tollerton: I will say this in regard to the valve connection: the committee investigated the matter, and was surprised to learn there were practically no 2 manufacturers who turned out a standard connection; that is, the threads and diameters used had no standard taps to suit. In deciding on this standard connection, we used the U. S. standard pipe tap. Of course, I presume that the manufacturers in future will make any special shank that is desired by the railway, and our aim was to get a wrench fit of suitable diameter, a standard by which wrenches could be purchased, and to have all valves made of a given diameter, the same size as for the wrench fit.

In investigating the matter the committee found that open pipes and muffled pipes did not have the same wrench fit, so it was necessary for a workman, who was going on top of a locomotive, and having two valves to remove, to carry two wrenches. As far as the straight thread versus the pipe tap screwed to a shoulder is concerned, the latter method may have some advantages, but it has many disadvantages, such as the likelihood of stretching the valve, reducing it, and hammering it makes the application of the nipple necessary each time you unscrew it.

C. D. Young (Penna. Lines West): I did not expect to discuss this paper this morning, and so did not bring with me the notes which I had prepared on the subject of safety valves, but I will endeavor to bring out some of the points which were brought out after I received this report. In paragraph 4, it is recommended that "not more than 3 safety valves" be used. We have made a large number of experiments on safety valves which follow practically the formula given in paragraph 2, and we have never found a condition yet on a boiler where 3 safety valves were needed. I believe that at the present time it is a mistake for the association to recommend 3 safety valves, for the third one is not needed on any of the largest boilers which are built. If the safety valve is designed in accordance with the formula proposed, I do not feel it will ever be necessary to have 3 safety valves in order to properly assure holding the pressure.

If the committee and the association desire 3 valves, I would suggest a change in the setting of the second valve, from 2 lbs. to 3 lbs. It is very difficult to keep 2 safety valves within 2 lbs. of each other, and I believe we will fully answer all the requirements for keeping the second safety valve in operation by a range of 3 lb. pressure between the nominal working pressure and the next pop. If the recommendations of the committee are to be adopted, to have three valves, I would like to see the second valve set at 3 lb. and the third one set at 5 lb.

The committee in paragraph 5 states that "Nickel seats and valves" (and I presume that the entire body of the valve would be included) "are desirable, and an improvement over other metal, but are expensive as to first cost and renewals." I would like to ask the committee for more information on this subject. It is stated here pretty broadly, that the only reason we should not use nickel seats and valves is because they are more expensive in first costs and renewals. Now, if the nickel valve is the right thing, I believe that many more roads would be using them than are doing so at the present time. I will ask the committee, what percentage of the roads which answered the circular, stated they were using as standard on their locomotive, nickel valves and seats? Before approving this recommendation, I would like to receive some information indicating whether or not we would be justified in going to a nickel valve. I do not believe there are many used. Most of the manufacturers are not bringing them around and talking them up, at least those who have had long experience with them.

In paragraph 11, the committee suggests that the U. S. thread be used, with which I agree, but I would suggest inserting in the paragraph after the word "recommend," the words "where valves are threaded." It is necessary on some of the very high boilers to abandon the use of the threaded valve and use a ground ring joint with studs, and I believe we should recognize that is proper construction; and by so modifying this paragraph, it permits the designer to use the ring type of joint with studs and nuts.

Mr. Tollerton: In answer to Mr. Young's question about the nickel seat, I will say that our investigation showed that very few are being used; you will note by reading further on in paragraph 5, that we do not recommend them, but in our investigation as to use of valves, we found there were some nickel seats. The principal difficulty with them is the insertion of the nickel seat in the brass body of the valve. We felt that the average locomotive machinist could not do it successfully, and by adopting the nickel seat we would only have another leak in the pop valve.

As to the question whether we shall have 2 or 3 valves, our investigation developed that there were a great many lines using 3 valves, and they were just as strong for the 3 valves as the other lines were for the 2 valves. We, of course, wanted to make the report broad enough to suit all of the railways. That is the reason we felt there was no reason for making any further recommendation. The variation between the first and third valve is so great now, that practically the third valve will not work at any time, so that we wanted to make the report broad enough, to enable a road to use 2 or 3 valves as it desired. The report does not state that 3 valves are required or needed, but it gives any road the privilege of using 2 or more valves.

Wm. Elmer (Penna. Lines): While it is true that the engnemen have control of the oil fires to a better extent than they do on a coal-burning locomotive where the exhaust causes a very intense combustion, in case of any derangement of the parts or inability of the enginemen to control the oil fires, is it proper to assume that no more than the ordinary provision which is made for the coal-burning locomotive is necessary?

J. F. DeVoy (C. M. & St. P.): It is altogether probable that in any ordinary practice one locomotive pop valve of sufficient size will take care of any steam generated by a boiler, so that it would seem probable that 2 valves were the proper thing, but there has always been a doubt in my mind as to just what defense you could make, in case of a suit at law, based on the explosion of a boiler which had 2 valves. We will assume that there is a possibility of the first valve becoming inoperative through some means. Then the question arises as to whether the second valve, in say, an oil burning locomotive will properly take care of all the steam generated at a quick shut-off of the engine.

In order to properly guard against anything which might be brought up in a case at law, I believe there can be no question raised but what the third valve will take care of any contingency whatever, and the road with which I am connected has always favored the third valve on that account, not because of a probability that it will be called into play, but to absolutely guard against any contingencies which may possibly arise.

In a boiler explosion of any kind, it has been quite definitely determined that it takes from 14 to 20 minutes to lose the water in a boiler where the gage cocks have shown one or two gages of water, a variation of 2 or 3 in., or down to the point where the rupture or explosion takes place, say anywhere from 9 to 14 in. below the top of the crown sheet. Of course, we all realize that there

is only one thing that will cause a boiler explosion, or to cause the crown sheet to drop, or whatever way you want to put it, and that is the loss of water. There has been a doubt in my mind as to whether the additional 2 valves might not give a man in charge of the boiler a minute or two longer in which to save his life, because if he acts at the right time, there is a possibility that he can prevent something occurring. However, I still believe that the report of the committee is about right in allowing a road to use 2 valves if by doing so, it thinks it is properly protecting itself. But in the case of a larger boiler, generating steam much faster, I think it would be just as well to risk the extra $20 and then you know you have done everything it is possible for you do do to protect the men operating the locomotive.

Mr. Tollerton: None of the lines like the Southern Pacific and the Santa Fe, which are large users of oil burners, had in any way changed their number of pop valves as between oil and coal burning engines. On the Rock Island we have a number of oil burning engines, and use the same installation on oil burners as on coal burners.

Referring to paragraph 9, and the chart accompanying it, probably a word of explanation might be due there. We found in making inquiries and investigation, that it is quite frequently the practice to crowd the safety valve into too small an era. We thought it might be desirable to get up a sketch, such as is shown in connection with paragraph 9, which would give the minimum allowance between the valves, and permit the swing of a wrench to tighten or loosen the valves. That is the idea of that sketch.

Mr. DeVoy: I move that the report be accepted and referred to letter ballot, the rejort just as it is.

T. R. Cook (Penna. Lines): Before that motion is put, there is just one point concerning which I should like to hear further from the committee, and that is paragraph 6, which says "Manufacturers should be required to stamp on the valve the lift in inches as determined by actual test." This, I assume, the committee put in, with the understanding that the lift of the valve determines the capacity of the valve. That was not my understanding. I believe there is a considerable difference in the discharge of valves with the same diameter in lift, depending on the design of the valve, both as to the steam passage and as to the contour of the lifting lip, and if any stamping on the valve should be done it should be in pounds of steam per hour, rather than the dimensions of the valves.

Mr. Tollerton: The idea of asking the manufacturers to stamp the lift on the valve was that it might be readily determined, by the formula, as to the valve requirements for a certain size boiler. It has not anything whatever to do with the discharge of the valve, merely indicates the lift, 1/10 or 1/8, or whatever the amount should be, so that anybody can figure out the safety valves required for a given boiler.

O. C. Cromwell (B. & O.): Referring to paragraph 11, if we want to maintain the standard, we should have standard thread gages for that fit. We find that is necessary, and we furnish the gages to the manufacturer. We have not a very large range. We want a locomotive to take care of your clearances when you are applying safety valves, so in order to keep within the very closest range it is necessary to keep your range up to very close dimensions; therefore we use both a male and a female gage, using the male gage for the safety valve and the other for the spud that is used in connection with it. I should think that should be incorporated in the master mechanics' revised dimensions for these threads.

As regards the sizes made for **the wrench fit, the report** says: "Valves of above size to be made for U. S. S. wrench fit." I do not know how much larger that is going to be over the present size dimensions generally used. It occurred to me it would be somewhat larger. Our locomotives are very much crowded and the safety valves are in a cramped condition, and if we enlarge the wrench fit over what it is at present, you will have trouble in applying the valve.

Mr. Tollerton: The committee took that up with all the pop valve manufacturers, and wrote them what we proposed to recommend as to the standard connection and standard wrench fit. They all agreed to it and said they were very glad to see the move made. I know cases where this wrench fit exceeded the diameter of the outside of muffle, so that any valve that will come in on any dome or turret, the wrench fit will clear.

As regards the increased size, very little is added to the present manufacturers' wrench size fit, to bring it up to the U. S. standard size. I have got the sizes here, and will be glad to read them, as far as we were able to determine, but the increase is from 1/8 in. to 3/8 in. over the bolts, not more than 1/16 to 3/16 on each side, and in no case did any of the large manufacturers complain about the increase in metal. With the sketches as shown, as I said before, the wrench fit will clear the diameter of the muffle.

C. D. Young (Penna. Lines): I want to refer to the point brought up by Mr. Cook who spoke about the lift of the valves. Mr. Nelson, the engineer of tests, did a great deal of work on the subject of studying the lift of pop valves, and after a number of years of effort, he came to the conclusion, that so far as he was concerned, and the department was concerned, it was impossible to determine accurately the lift of the valve when working. I believe that view of the matter has been confirmed by the Massachusetts Institute of Technology, where they have been doing some work along the same line.

I therefore think that in view of this fact, I think it would be well to change the stamping of the lift, and I would propose the capacity, or some other measure of the valve, as to its size; either by number or capacity in steam be stamped. You can measure the capacity of the valve, and that, it seems to me, is the better measure than the lift of the valve, although I feel that some tolerance in lift should be provided for, so that the manufacturer will not be permitted to say 0.15 lift, or greater, or some other such figure. It seems to me it would be desirable to let this report go back to the committee, in view of the discussion we have had, for further consideration of the subject, and for report next year, and I would make an amendment to the motion of Mr. Devoy to that effect.

Mr. Seley: This is a report which has been before our convention for two years. As I recall it, the formula for the discharge is practically the same as was gotten out by the committee in its report a year ago. Nowithstanding what has been said about the impossibility of measuring the lift, I believe, within broad lines, at least, the litt can be expressed as a comparative measure to discharge the valve. Certain manufacturers in the last few years have brought out a higher lift valve, for instance, than has been the custom in the older designs. Whether these new designs have proven to possess all the merits claimed for them by the manufacturers, I do not care to discuss, I do not know; but in any event, the broad field between the high lift and the old lift is sufficient, I think, to carry out what the committee have in mind, and the manufacturers who were consulted on this matter, as I understand it, comprise all of the important ones, and as the matter contained in the report has their approval, I would say that it seems consistent to carry out the recommendation of the committee. I would therefore second Mr. DeVoy's motion without the amendment.

T. Rumney (C. R. I. & P.): Would it not be possible to add to the life of the valve in inches, as recommended by the committee, the discharge of the valve, and that would cover Mr. Young's point, and also take care of the committee's recommendation. To me it would seem too bad to lay the report over another year after the committee has had it under consideration for two years.

Mr DeVoy: I do not know of any other way to measure the discharge of a valve except by measuring the annular opening of the lift of that valve. I understand Mr. Young's point perfectly; it was all right; but you must know the life of the valve before you can know the discharge. The lift of the valve must properly take care of the discharge, or you cannot in any manner figure the discharge of the valve, and so far as I have any knowledge, the discharge of the valve is properly taken care of by the lift, and cannot be taken care of in any other way. Mr. Young shakes his head; but I know, so far as I am concerned, that it does take care of the discharge of the valve, and if you will refer back to your mathematics, you will find out that is the proper way to do it.

Mr. Tollerton: We tried in making up this report to get the last word on the safety valve question. I quite agree with the suggestion of Mr. Rumney in regard to the discharge, and I think the committee will, but it is of vital importance that the lift be stamped on the valves. Valves of the same diameter with different lifts will have different discharges. We have tried it and we know it, and therefore the lift increases in importance. I personally cannot see any objection to it. It should be on the valve. If you want anything else on the valve for further information, the committee will be pleased to make a recommendation to that effect.

Mr. Young: If the committee will accept Mr. Rumney's suggestion and the suggestion I offered on paragraph 5, striking out the reference to nickel seats and valves, I will withdraw my amendment to Mr. DeVoy's motion.

Mr. Tollerton: As a matter of harmony the committee has no objection to accepting it, but I think paragraph 5 should not be taken out for the reason that it will show in the proceedings that the question of nickel seats has been looked into. We could not find where nickel seats were recommended by any manufacturers or were in use

on any number of railways, but we might start some investigations later in that direction.

Mr. Young: I want to read what the committee said in that connection: "Nickel seats and valves are desirable and an improvement over other metal but are expensive as to first costs and renewals." What does that mean? It means, inferentially that the committee would recommend these nickel seats and valves, but that they are too expensive as to first costs and renewals.

Mr. Tollerton: Read the last portion of the paragraph where we recommend the use of bronze alloys.

Mr. Young: You make the broad statement that nickel seats and valves are desirable and an improvement over other metal, but the reason you do not recommend them is because they are expensive as to first cost and renewals. That is a broad statement, to say that nickel seats and valves are desirable, and do not recommend them because they are expensive, and then recommend something cheaper. I do not think we know enough about nickel seats and valves to pass any opinion upon them, no one, to my mind, is using them successfully, and I should think that statement should be carried out.

Mr. Seley: I think that the object of the committee in putting this into the report, as the chairman of the committee has said, is to indicate that the whole matter has been considered. The matter of objection to nickel seats has been fully covered in the discussion. Anyone who receives a copy of our proceedings, and is interested in this subject, as a natural supposition, reads the discussion as well as the paper, and I think we would limit rather than broaden the question if we excluded information as given to us by the committee and as developed in discussion.

Mr. Rumney: The paragraph might be changed to read as follows: "Nickel seats and valves, although providing an improved lift, are undesirable because of first cost, cost of repairs, and the difficulty of their application; therefore the recommendation of your committee is to continue the use of bronze alloys." Would that meet your ideas, Mr. Young?

Mr. Young: I would second such a change, if the committee will accept it.

The Vice-President: Will Mr. Tollerton accept that change in the report?

Mr. Tollerton: Yes.

With that amendment, Mr. DeVoy's motion was passed.

A CORRECTION.

An error was made in the article entitled "The Chilled Iron Car Wheel," published in the first issue of *The Daily*. It was stated that if the cost of a 625-lb. wheel were based on an average life of 12 years this would make the cost of the wheels under a car approximately $2.33 per day. The statement should have been that this would be approximately the cost per year.

M. M. HONORARY MEMBERSHIPS.

During the convention yesterday the following members, whose applications had been approved by the executive committee, were elected honorary members of the M. M. Association: George E. Branch (member since 1894); H. Tandy (member since 1883); J. S. Turner (member since 1887); Thomas Walsh (member since 1874); Charles A. Thompson (member since 1890); W. A. Brown (member since 1891).

FIRE ON THE PIER.

The services of the pier firemen was called into play Saturday morning in the power plant at the entrance to Machinery Hall. On starting up the air compressor, the motor driving it demanded more current than the primary circuit could carry. This overheated the main fuse which refused to blow. As a result, a few sparks flew and the smell of burning insulation brought a fireman with his extinguisher. Needless to say, however, his efforts were fruitless until the attending electrician came to the rescue by pulling the switches. A repetition of the fireworks has been guarded against by W. W. Paxson, the chief electrician of the pier, who has had oil switches installed.

HISTORY OF THE BARNEY & SMITH CAR COMPANY.

The growth of large manufacturing industries is always an inspiring study, especially those which were pioneers in their districts. The Barney & Smith Car Company, of Dayton, Ohio, was established in 1849 when Dayton was a town with 10,000 inhabitants and had no railway connection. The history of the company, which has recently been published, well illustrates the results that follow the honest and conscientious work of a few strong, able men building on a firm foundation. When the works were established by Eliam E. Barney and Ebenezer Thresher, the product was loaded on canal coats and taken down the Ohio River to the nearest rail connection. Now, however, Dayton is a city of 125,000 people, and has numerous steam and electric railway connections. The book is given up quite largely to a personal history of the officers and accounts of the various reorganizations which marked the development of the company from a capital of $10,000 to $4,500,000.

A very impressive table is included that gives a list of the employees who have been continuously in the service of the company for over twenty years. This gives the names of 182 men, of which 41 have served over 40 years. In the latter part of the book is included a history of each department giving the names of the various foremen and their lengths of service.

SUPERHEATERS AND SWITCH ENGINES.

One of the most interesting developments in the progress of superheater locomotives during the past year has been the successful application of the superheater to switch engines. It had been quite generally considered that switch engines did not offer the best opportunity for obtaining the highest efficiency from the superheater. This was based on the conditions under which the switch engine operates. It only works steam a comparatively small percentage of the time that it is in service, and then only during short intervals. The actual experience with superheaters in switching service has shown that the resulting economies have been even greater than those obtained with road engines equipped wi h superheaters.

It is well known that saturated steam switch engines operating under ordinary conditions have a marked tendency to work water out of the exhaust and that they suffer heavy losses from cylinder condensation. These losses not infrequently attain the magnitude of from 40 per cent. to 45 per cent. of the total water evaporated and it is necessary to use extra coal to evaporate the additional water. The use of highly superheated steam in switching service has entirely eliminated these losses and effected a corresponding saving in coal and water.

Under ordinary switching service conditions, where saturated engines are employed, there is a considerable loss of time of the switching crew while the engine is taking supplies, particularly water. During this time the crew is standing idle. Inasmuch as it is not necessary to take water so frequently with the superheater engines in switching service this time is available for the purpose of doing actual work.

In addition, it has been found by experience that switch engines equipped with superheaters furnishing highly superheated steam operate with a remarkable reduction in smoke. This is of considerable importance, especially in passenger terminals in large cities where the smoke nuisance ordinances are strictly enforced. The fact that superheater switch engines do operate with a minimum of smoke is explained by the fact that the saving in water makes it possible to do the same work with a correspondingly less amount of coal. It is, therefore, not necessary to fire so heavily, and more attention may be given to the practice of the proper methods of firing.

Finally, the use of highly superheated steam in switching service produces a smarter engine, thus making it possible to

the same amount of work in less time or considerably more work in the same time. It is often desirable, especially in connection with the present-day high-speed passenger service, to make switching movements at a very rapid rate and the increased flexibility of the superheater switch engine is a valuable adjunct.

A RECORD LOCOMOTIVE PERFORMANCE.

A single locomotive of the 2-8-2 type recently handled a train of 112 cars weighing 7,590 tons over a division with an 8-mile ruling grade of .2 per cent., at an average speed of 15½ miles per hour, running time. An average speed of 9½ miles per hour was recorded on the hill. This is the latest of the record performances of the trial Mikado type locomotive, built last year for the Chesapeake & Ohio by the American Locomotive Company. This locomotive was illustrated and described in the Feb. 2 issue of the RAILWAY AGE GAZETTE and the March issue of the *American Engineer*.

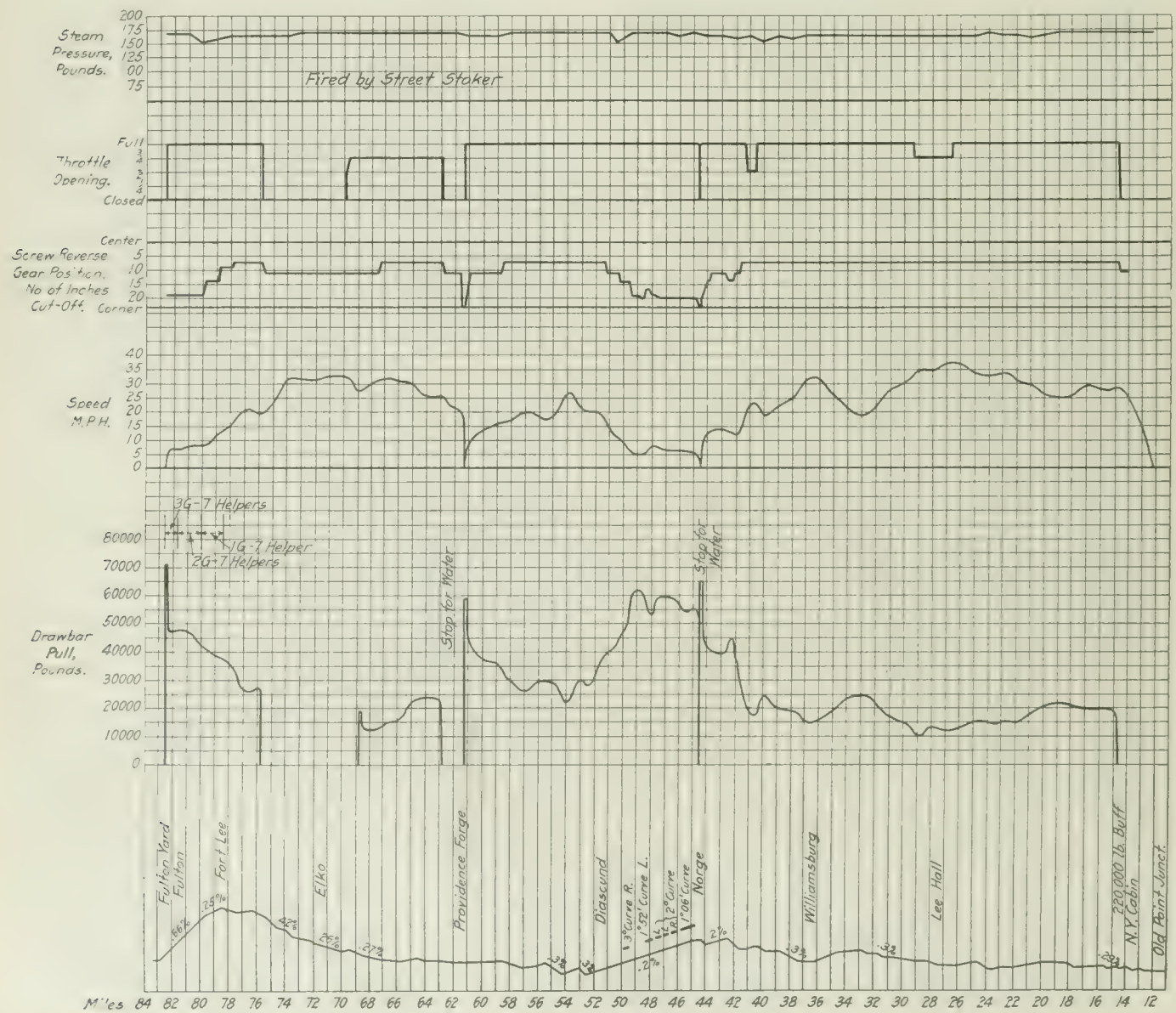
The above feat in itself, apart from the other circumstances of the run, is proof that this locomotive is the most powerful of its type. The real power of the locomotive, however, is possibly best shown by the remarkable hauling capacity developed by it at the higher speeds.

Exceptionally high drawbar pull, maintained mile after mile at speeds ranging from 25 to 30 miles per hour, are shown by the dynamometer record given herewith. A few typical consecutive records taken from the dynamometer charts of this and other runs in the series of tests are shown in the table below:

Mile Post.	Drawbar Pull Pounds Run No. 47.	Speed M. P. H.	Mile Post.	Drawbar Pull Pounds Run No. 53.	Speed M. P. H.
[illegible]	[illegible]	28	[illegible]	[illegible]	23
[illegible]	32,000	23	54	23,000	27
[illegible]	27,000	24	[illegible]	25,000	25
[illegible]	33,000	24	53	30,000	[illegible]
[illegible]	36,000	20			

These figures have an important and very timely significance. They show the enormous power which can be obtained by careful design with a weight of approximately 60,000 lbs. per driving axle and in a type of locomotive well adapted to all around road freight service. This Mikado, weighing with its tender only 47 per cent. more than the Chesapeake & Ohio standard consolidation, can haul 77 per cent. more tonnage in 80.5 per cent. more cars at practically the same speeds. This striking fact is shown by comparison between the run cited above and the best record of the consolidation over the same division made in the same tests.

The record load for the consolidation was 4,246 tons. With this train, an average speed of 17 miles per hour running time over the division was made. The consolidation and tender with



Record of One Mikado Locomotive With a Train of 112 Car s, Weighing 7590 Tons.

full load of coal and water weigh 329,000 lbs., as compared with 484,700 lbs., the weight of the Mikado and its tender.

By reducing this comparison of the performance of the two classes of locomotives to terms of hauling capacity at the same speeds per pound of locomotive weight, the much higher efficiency of the Mikado is still better indicated. The consolidation hauled .0129 tons for every pound of its maximum weight including tender, and the Mikado, .0156 tons, or 21 per cent. more. The maximum record of this locomotive is 27,000 lbs. drawbar pull at 33 miles per hour. This is equivalent to a drawbar horsepower of 2,378 or one horsepower at the drawbar for every 132 lbs. weight of locomotive.

In the two runs, noted in the above table, the best record shown is 33,000 lbs. pull at 24 miles per hour made in run No. 47. This is equivalent to a drawbar horsepower of 2,110. This pull was developed at mile post 52, which is on a .2 per cent. grade. Consequently, by conservative estimate, the above horsepower at the drawbar means at least 2,385 I. H. P.

Run No. 47 also shows the highest sustained drawbar horsepower. Between mile post 53½ and 51½ the locomotive developed an average drawbar pull of 31,833 lbs., at an average speed of 23 miles per hour. This is equivalent to 1,901 drawbar horsepower.

These figures, while interesting in themselves, have a particular significance. They show that in the big locomotive, carefully and properly designed, a greater percentage of increased power is secured for every percentage of increase in weight.

The full record of the run mentioned in the opening paragraph is given in the condensed dynamometer chart. This run was one of a series of tests which the Chesapeake & Ohio has been making to determine the maximum tonnage ratings for its various classes of locomotives. These tests were made with the Westinghouse Company's dynamometer car. On run No. 47, already referred to, the Mikado hauled a train of 102 cars weighing 7,045 tons. On the other runs, it hauled respectively a train of 98 cars of 6,767 tons aggregate weight and one of 100 cars of 6,905 tons.

It is interesting to note the performance of the Mikado with 7,590 tons on the 8-mile grade, at the top of which a stop was made for water. The average speed up the grade was 9.5 miles per hour, based on the speeds recorded at each half mile. For the last four miles, when the run developed into a steady drag, the locomotive developed a sustained drawbar pull of 57,750 lbs. at a practically uniform speed of 6½ miles per hour. Conservatively estimating the locomotive and tender resistance, this means that it maintained a tractive effort of 1,000 lbs. in excess of its maximum rated power based on 85 per cent. of the boiler pressure of 175 lbs. This indicates an unusually high mean effective pressure at maximum cut-off. It is undoubtedly attributable to the use of superheated steam, and in some degree, at least, to the more direct steam passages of the arrangement of outside steam pipes employed.

Starting this 7,590-ton train after taking water at the top of the .2 per cent. grade with the greater proportion of it on the grade is another record feat of the locomotive on this run. A drawbar pull in excess of the theoretical maximum tractive effort was developed at this point. It is particularly evident from the complete records that the locomotive has a large margin of capacity sufficient to maintain its full maximum rated power for protracted periods and to exceed this for short periods or at critical points.

Preliminary surveys have been completed for the railway from Bhamo, China, to Tengyueh, 123 miles. The gage will be either 2 ft. 6 in. or 3 ft. 1 in.



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Giles, C. F., S. M., Louisville & Nashville R. R., Chalfonte.
Gill, John, Young's.
Gillis, H. A., M. E., Seaside.
Gordon, H. D., Marlborough-Blenheim.
Gossett, Chas. E., Gen. M. M., Minn. & St. Louis Ry., Dennis.
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Green, Herbert, Con. Engr., Brighton.
Greenwood, B. E., G. F., Seaboard Air Line Ry., Strand.
Gross, E. G., M. M., Central of Ga. Ry., Islesworth.
Hanlin, J. J., M. M., Seaboard Air Line, Craig Hall.
Harrington, H. H., M. M., Erie R. R., Dennis.
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Haug, Harry, M. M., Brownstone & Middleton Ry., Arlington.
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Heiser, W. F., M. M., C. & E. I. R. R., Strand.
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Hess, Geo. F., S. M., K. C. Southern Ry., Shelburne.
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Hill, W. H., M. M., Cornwall R. R., Arlington.
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Hogan, C. H, Asst. S. M. P., N. Y. C. & H. R. R. R., Marlborough-Blenheim.
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Hudson, T. C., M. M., Quebec & Lake St. John Ry., Shelburne.
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Jackson, O. S., S. M. P., Chicago, Terre Haute & S. E. Ry., Young's.
Jacobs, Henry W., Asst. S. M. P., A. T. & S. F. Ry., Marlborough-Blenheim.
James, Charles, M. M., Erie R. R., Schlitz.
Jaynes, R. T., M. M., Lehigh & Hudson River Ry., Traymore.
Jones, C. H., M. M., Huntingdon & Broad Top Mtn. R. R., Bothwell.
Kapp, W. F., Supt. Shops & Machy., R. F. & P. Ry., Marlborough-Blenheim.
Kendig, R. B., G. M. E., New York Central Lines, Marlborough-Blenheim.
Kiesel, W. F., Jr, Asst. M. E., Penna. R. R., Chelsea.
Kight, H. R., M. M., Western Maryland R. R., Monticello.
Kuhn, W. T., M. M., Toronto, Hamilton & Buffalo Ry, Young's.
Laisure, L. R., M. M., Erie, Pennhurst.
Macbeth, H. A., M. M., N. Y. C. & St. L. R. R., Traymore.
MacFarland, Prof. H. B., Engr. Tests, A. T. & S. F. Ry.,
McArthur, F. A., M. M., St. L. & S. F. Ry., Haddon Hall.
McCarthy, T. W., M. M, C. R. I. & P. Ry., Grand Atlantic.
McCuen, J. P., G. I., C. N. O. & T. P. Ry., Dennis.
Chalfonte.
McNulty, F. M., M. M., Monongahela Connecting R. R., Chalfonte.
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Malthaner, W., M. M., Del. & Hudson Co., Traymore.
Marsh, F. E., A. M. M., Penna. R. R. Co., Dennis.
Martin, H. W., Surt. Mt. J., Kinzua & R. R. R., Kentucky.
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Nelson, C. B., A. M. M., L. S. & M. S. Ry., Traymore.
Nelson, E. D., E. of T., P. R. R, Strand.
Noble, L. C., V. P., Pittsburgh Spring & Steel Co., Dennis
O'Hearne, John E., M. M., W. & L. E. R. R. Co., Marlborough-Blenheim.
Osborne, H., Shop Supt., C. P. Ry., Haddon Hall.
Owens, W. H., M. M., Southern Ry. Co., Channell.
Painter, J. H., Supt. Shops, Atlantic Coast Line, Chalfonte.
Pearce, J. S., M. M., Norfolk & Western Ry., Chelsea.
Perrine, W. M., M. M., Central R. R. of N. J., Pennhurst.
Pfafflin, Louis, M. M., Indianapolis Union Ry., Biscayne.
Pilcher, John A., M. E., Norfolk & Western Ry., Brighton.
Plow, A., Mech. Insp., Can. Pac. Ry., Lexington.
Pomeroy, L. R., Traymore.
Potts, C. H., M. M., Penna. R. R., Chalfonte.
Pratt, Edward W., A. S. M. P., Chg. & Northwestern Ry., Marlborough-Blenheim.
Rae, Clark H., Asst. Supt. Mach., Louisville & Nashville R. R., Chalfonte.
Randolph, V. C., M. M., Erie, Pennhurst.
Reeves, P. H., M. M., B. & O. S. W. Ry., Lexington.

Reid, W. L., Genl. Works Mgr., Amer. Loco. Co., Marlborough-Blenheim.
Rhuark, F. W., M. M., Balt. & Ohio R. R., Arlington.
Richardson, Louis A., M. M., C. R. I. & P. Ry., Haddon Hall.
Riegel, S. S., M. E., Dela. Lack. & Western R. R., Runnymede.
Rink, Geo. W., M. E., C. R. R. of N. J., Dennis.
Robb, G. W., M. M., Grand Trunk Pac., Marlborough-Blenheim.
Robb, W. D., S. M. P., Grand Trunk Ry., Marlborough-Blenheim.
Rollings, E. O., M. M., L. & N. R. R., Westminster.
Rumney, T., Asst. 2nd V. P., Rock Island Lines.
Rusling, W. J., M. M., P. R. R., Chalfonte.
Schlafge, William, G. M. S., Erie R. R., Marlborough-Blenheim.
Schmidt, Prof. E. C., University of Ill., Haddon Hall.
Searles, E. J., S. M. P., B. & O. R. R., Marlborough-Blenheim.
Seddon, C. W., S. M. P. & C., D. M. & N. Ry., Traymore.
Seley, C. A., M. E., C. R. I. & P. Ry., Chalfonte.
Shaffer, C. A., Gen'l Ins. Tools, Ill. Central, Dennis.
Sinnott, W., M. M., B. & O. R. R. Co., Pennhurst.
Sisco, G. E., A. E. M. P., Penna. Lines, Haddon Hall.
Slayton, C. E., Asst Supt., St. J. & G. I R/., Arlington.
Slayton, F. T., S. M. P., Virginia Rv., Arlington.
Smith, E. J., M. M., Atlantic Coast Line R. R., Lexington.
Smith, John L., G. F., P. S. & N. Ry, Lexington.
Smith, P. F., Jr., S. M. P., P. R. R. Co., Brighton.
Smith, Willard A., Dennis
Snell, E. J., M. M., N. Y. C. & H. R. R. R., Lexington.
Staley, H. F., M. M., C., C. & O. Ry., Traymore.
Stewart, R. L., M. M., C. R. I. & P. Ry., Haddon Hall.
Stocks, W. H., Dennis.
Strauss, M. H., M. M., N. Y. C. & H. R. R. R.
Stuart, Charles M., M. M., P. & R. R. R., Pennhurst.
Stubbs, F. W., M. E., C. G. W. Ry., Lexington.
Sumner, Eben T., M. M., B. & M. R. R. Co., Young's.
Symons, W. E., Con. Engr., Traymore.
Tegtmeyer, E. F., M. M., C. R. I. & P., Morton.
Thomas, H. T., M. M., Detroit & Mackinac R. R., Pennhurst.
Thomas, W. H., Life Member, Dennis.
Thompson, E. R., S. M. P., C., St. P. M. & O. Ry., Chalfonte.
Thompson, H. R., M. M., N. & S. S., De Ville
Tollerton, W. J., A. G. S. M. P., C. R. I. & P. Ry., Marlborough-Blenheim.
Tritsch, Chas. M., S. M. P., Western Maryland R. R., Brighton.
Trumbull, A. G., M. S., Erie R. R., Chalfonte.
Tuma, Frank, M. M., Erie R. R., Pennhurst.
VanDoren, G. L., Supt. Shops, C. R. R. of N. J., Worthington
Vaughan, H. H., Asst. to V. P., Canadian Pacific Ry., Marlborough-Blenheim.
Wade, E. H., Supt M. P., C. & M. W. Ry, Marlborough-Blenheim.
Wagstaff, Geo., American Arch. Co., Strand
Walsh, Frank J., M. M., C & O. Ry., Marlborough-Blenheim.
Walsh, Wm. F., A. B. Instructor, C. & O. Ry. Co., Marlborough-Blenheim.
Wardwell, H. F., M. M., None at present, Traymore.
Warthen, J. O., M. M., Danville & Western Ry. Co., Pennhurst.
Watson, R. B., E. of T., Erie R. R., Traymore.
Watters, J. H., Asst. M. M., Georgia R. R., Brighton.
White, Arthur M., Amer. Loco. Co., Traymore.
Whyte, F. M., New York Air Brake Co., Marlborough-Blenheim.
Wieseckel, G. F., M. M., K. C. Southern, Elberon.
Wightman, D. A., Dennis
Wildin, G. W., M. S., N. Y. N. H. & H. R. R., Chalfonte.
Williams, W. H., M. M., B., R. & P. R. R.
Young, C. B., M. E., C., B. & Q. R. R., Traymore.

M. M. GUESTS.

Adams, Jacob, Resident Mat'l Insp., P. R. R.
Anderson, O. L., Sup. of Water S., Atlantic Coast Line, Grand Atlantic.
Andrews, S. B., Mech. Eng., Seaboard Air Line, Dennis.
Atkinson, H. C., Draftsman, Reading, 22 Tenn. Ave.
Atkinson, R. A., Machinist, Trenton Shops, Pa. R. R., 22 Tenn. Ave.
Bachman, J. H., M. P. I., P. R. R.
Baker, Horace, Gen'l Mgr., C. N. O. & T. P. Ry. A. G. S. R. R., Private Car.
Baker, W. P., C. N. O. & T. P. Ry., Private Car.
Beall, J. W., Insp. Shops, B. & O.
Bennett, R. G., Rodman, Penna. R. R., Haddon Hall.
Beyer, W. F., Foreman, P. R. R.
Billingham, Jos., Gen. Insp., Amer. Loco. Co., Traymore.
Borton, F. S., Secy., C. P. & A. Ry., Chalfonte.
Boyden, J. A., M. M., Erie R. R., Chalfonte.
Burke, C. N., Gen. For., B. & O., Baltimore House.
Calnan, C. E., Engineer, B. & O.
Carty, F. J., M. M., B. & A. R. R., Young's.
Chamberlin, F. H., Foreman Mach. Shop, Penna. Ry., Whittle.
Clare, J. E., Asst. For., P. R. R.
Clark, D. B., Supt, Amer. Loco. Works, Traymore.
Clark, J. J., M. M., Tenn. Central, Dunlop.
Clouser, Irvin, Air Brake Insp., P. R. R. R., Miller's Cottage.
Coddington, H. W., Engr. Tests, Norfolk & Western, Traymore.
Cogbill, W. L., Eng., Southern, Channell.
Conneely, Emmett K., Pur. Agt., P. & L. E., Brighton.
Coutant, J. G., Ch. Draftsman in chg. Improvements, D. & H., Marlborough-Blenheim.
Cowgill, C. P., Draftsman Office G. S. M. P., Penna., Dennis.
Cyr, J. W., S. M. P., C. B. & O., Traymore.
Dale, C. E., Chf. Clerk Purchasing Agent, Panama Commission, Seaside.
Derick, J. M., Gang Leader, Penna., Iroquois.
Dette, R. E., For. Mach. Shop, Penna. R. R., Ellwood.
Dice, A. T., Gen. Mgr.
Dill, E. W., Foreman, B. & O., Lexington.
Doolittle, R. L., S. M. P., S. B. & A., Young's.
Ewing, C. H., Supt., Atlantic City Ry., P. & R. Ry.
Ferrar, Geo. B., P. R. R., Traymore.
Flynn, H., Aair Brake Insp., D. & H., Arlington.
Frazer, Wm. H., Clerk Pur. Agt., P. R. R., Traymore.
Frye, Chas. S., Ass't Gen'l M. M., Union R. R., Traymore.
Gaskill, C. S., Asst. Eng. of M. P., P. R. R., Marlborough-Blenheim.
Gassett, Chas. E., Jr., Minn., St. Louis Ry., Dennis.
Goodfellow, F. A., Foreman Loco. Testing Plant, Penna. R. R. Co., Strand.
Goodwin, G. S., Asst. Mech. Engineer, Rock Island, Chalfonte.
Gramm, R., Engr., B. & O.
Grams, S. C., Foreman Pass. Car Shops, B. & O.
Greenwood, R. R., Strand.
Gross, Wilfred, C. of Ga. Ry., Islesworth.
Hall, J. A., Engineer, P. R. R.
Hardy, C. R., M. P. Insp., P. R. R.
Harris, P. F., C. R. I. & P., Grand Atlantic.
Hawkins, F. W., Gen'l Foreman, Cumb. Valley, Chalfonte.
Hays, H. B., M. M., Ala. Great So., Dennis.
Hepburn, M. J., M. P. Clerk, P. R. R., Chalfonte.
Hickok, G. A., P. A., M. K. & T. R. R., Traymore.
Hill, James W., M. M., Peoria & Pekin Union, Lexington.
Horton, James, E. E., Union R. R., Traymore.
Huber, H. G., Ass't M. M., Penna. R. R., Chalfonte.
Hudson, U. L., Road For. Eng., Penna. R. R., Lexington.
Hughes, Geo. H., Schlitz.
Icsman, J. B., Gen'l Foreman, L. & H., Borton.
Irvin, I. B., Gen. For., P. S. & N. R. R., Lexington.
Jones, Chas. Y., Huntington & Broad Top R. R., Bothwell.
Jones, Harry W., Foreman, P. R. R., Elberon.
Kavanaugh, Wm. J., Foreman, B. & O., Lexington.
Keller, F. J., Eng., P. R. R.
Keller, R. B., Supt. Apprentices, D. L. & W. Ry., Haddon Hall.
Kelley, G. W., Blacksmith Foreman, Central R. R. Co. of N. J., Worthington.
Kennedy, L. A., Machine Foreman, B. & O., Shelburne.
Kenzel, Chas. H., Pur. Agt., E. J. & E. R. R., Traymore.
Kerschner, J. C., Fore. Mch. Shops, P. R. R.
Kessler, C. S., Gen. For. Car Dept., P. R. R.
Knears, S. L., Mech. Engr., Wm. Sellers & Co., Marlborough-Blenheim.
Kohler, Geo. D., Engineman, P. & R., Schiltz.
Krouse, E. G., Gen. For., P. R. R.
Kuhn, B. F., Supt. Shops, Lake Shore & Mich. Southern, Traymore.
Lauterback, A., Insp. Test Dept., B. & O., Chalfonte.
Levee, Geo. C., Gen'l E. E., D. & H., Pennhurst.
Mantz, W. C., Eng., B. & O.
McCall, R. B., Supt., Montreal Loco. Works, Traymore.
McCauley, J. E., Shelburne.
McCool, Charles, Rec. Clerk, P. R. R. Pur. Agt., Shelburne.
McCraven, Jas. W., Asst. For., P. R. R., Pennhurst.
McManamy, Frank, Ass't Chief Insp. Loc. Boilers, V. S., Haddon Hall.
McQuillen, J. E., M. M., G. C. & S. F. Ry., Marlborough-Blenheim.
Mathes, S. R., M. M., Norfolk & Southern, Dennis.
Mercer, John T., Insp., B. & O., New Elwood.
Merryman, M., C. C. S. M. P., Western Maryland R. R., Brighton.

Mittenberger, J. C., Creson.
Montague, W. T., M. P. Supt., Penna., Chalfonte.
Morch, John, Mech. Draftsman, P. R. R., Somerset.
Morningstar, E. E., Draftsman, B. & O., Kenilard.
Morton, R. C., Draftsman M. P. Dept., B. & O., Kenderton
Moseley, W. S., Chief Draftsman, C. C. & O. Ry., Iroquois.
Mounce, R. S., Erie R. R., Schlitz.
Nelson, Ley B., Traymore.
Norris, W. B., Gen'l Foreman Altoona Mach. Shops, P. R. R., Dennis.
O'Meara, W. J., Gen. For., N. Y. N. H. & H., Haddon Hall.
Pattison, R. C., M. E., Wheeling & Lake Erie R. R., Strand.
Perrine, Harold, Pennhurst.
Peterson, F. W., M. M., C. & N. W., Pine Hall.
Pickard, F. C., M. M., Pere Marquette, Haddon Hall.
Rhett, E. M., Electrical Engineer, Center of Georgia Ry. Co., Marlborough-Blenheim.
Richards, J. T., Retired Engr., P. R. R.
Riegler, Fred, For., W. & L. E., Chalfonte.
Robinson, W. L., Engr., P. R. R.
Robinson, W. L., R. F. of E., B. & O., New Chatham.
Scatchard, H., Gen. St. Keeper, N. & W. Ry., Shelburne.
Scheck, H. G., Rd. For. of Engines, P. R. R., Jackson.
Schenck, Edwin, Asst M. M., P. R. R., Marlborough-Blenheim.
Schmoll, G. A., Supt. M. P., B. & O. R. R., Traymore.
Schomdorfer, F. C., Asst. For., B. & O., New Elwood.
Seddon, E., For., Lehigh Valley, Edison.
Shackford, J. M., D., L. & W., Marlborough-Blenheim.
Sheldon, R. D., Engine House For., P. B. & W. R. R.
Shipley, Wm. H., Gen. For. Blk Shop & Fdy, Western Maryland, 103 N. Maryland Ave.
Slayton, H. J., Engr., C. G. W., Arlington
Slayton, H. J., C. C. W., Arlington.
Starritt, W. A., P. A., C. C. & O. Ry., Grand Atlantic.
Steele, Ben W., Gen. Mgr., A. & St. A. B. Ry., Chalfonte.
Stroner, Geo., M. I., Sunset Central.
Tapman, N. H., Insp. Test Dept., B. & O., Chalfonte.
Taylor, G. W., Marlborough-Blenheim.
Trego, J. G., Asst. Rd. For. Eng., P. R. R.
Tweed, H., For. Pipe Shops, P. R. R.
Van Gundy, C. P., Ch. Chemist, B. & O., Chalfonte.
Walter, L. J., Erecting For., C. R. R. of N. J., Jackson.
Werts, Jas. R., Car Insp., P. & R., Miller's Cottage
Wescott, E. A., Supt. Car Dept., Erie, Dennis.
Winterstein, John, Dist. Insp. Loco. Boilers, Interstate Commerce Commission, Arlington.
Witherspoon, W. H., For., C. R. R. Co. of N. J., Edison.
Woodbridge, H. C., Genl Manager Special Representative Buffalo, Rochester & Pittsburg Ry., Arlington.
Wright, H., Ex. of Patents, U. S. Gov., Marlborough-Blenheim.
Wrigley, A. M., Motive Power Draftsman, P. R. R., Chalfonte.

FOREIGN RAILWAY NOTES.

The French railway interests in Indo-China are reaching out in all directions for the development of their system. It has been announced in the press of the Far East that the Siamese government has definitely decided to build the connection between its own lines and the French lines into Saigon, as well as to the south, connecting with Singapore, Malay States, by means of a French loan. This, of course, means the further extension of China's railway connections through the Yunnan Railway. Owing to the fact that this French line to Yunnan ends in a sort of cul-de-sac, it has not been profitable, and a concession which will enable the French interests to open up additional country to feed their line is urgently asked.

The French interests in China have proposed a connection between the Yunnan line and Nanning to connect with the Wuchow-Nanning line. The Chinese authorities have so far refused a concession to foreign interests and are working on the proposition themselves. The board of communications through local authorities plans a line from Nanning to connect with the Yunnan line at Mengtsze. Surveys for this line are being made. The route will be about 400 miles long and reports seem to indicate that the proposed route is by Kaihwa and Kuangnan and thence down the river valley to Nanning. While the route presents no great difficulties, apparently, the road is likely to be expensive. No provision for the necessary capital has so far been made.

ROAD TESTS OF MALLET AND CONSOLIDATION LOCOMOTIVES.

The Carolina, Clinchfield & Ohio has had ten Mallet compound locomotives in service for about two years, and fifteen simple consolidated locomotives for about three years. Both of these types of locomotives were built by the Baldwin Locomotive Works. Road tests of the Mallets were made in October, 1910, and February, 1912. The consolidated locomotives were tested under practically the same conditions, in May, 1912. The average results of the tests and the principal dimensions of the two types of locomotives are given in the accompanying tables.

Principal Dimensions and Data of Locomotives Tested.

Wheel arrangement	2-6-6-2	2-8-0
Weight on drivers, lbs.	325,850	178,650
Total weight of engine, lbs.	378,650	199,150
Total weight of engine & tender, lbs.	550,000	350,000
Diameter of cylinders	24 & 37	22
Stroke, in.	32	32
Steam pressure, lbs.	200	200
Diameter of driving wheels, in.	57	54
Tractive effort (M. E. P. = 85% boiler pressure), lbs.	77,400	49,000
Boiler diameter, 1st ring, in.	87	77
Tubes, number and size, in.	448-2¼	412-2
Tubes, length, ft. and in.	21.0	15.3
Grate area, sq. ft.	78	54
Heating surface, sq. ft.	5,752	3,482
Size of exhaust nozzle, in.	5¾	5½

The Mallet locomotives are equipped with Baldwin's reheaters in the smoke boxes. Both engines were hand fired and neither had a brick arch. The tests were conducted from Kingsport, Tenn., south to Soldier, a distance of 22 miles, on a continuous 0.50 grade, compensated for all curves, the compensation being such that tests with a dynamometer car have shown no increase in the train resistance due to the curves. These conditions make this section one of the very best on which to make comparative tests of locomotives, as the engines can be worked at their maximum capacity for the entire trip, and any number of readings and observations may be made under the same working conditions.

The coal used on all the tests was from the same mine, and the analyses, which are given herewith, show the quality to be the same. The coal was carefully weighed

	Oct., 1910	Feb., 1911	May, 1912
Moisture	1.04	1.00	1.10
Volatile matter	32.94	31.13	34.94
Fixed carbon	56.07	55.93	53.68
Ash	9.95	11.94	10.28
Sulphur	.81	1.14	.64
B. T. U.	13,830	13,743	13,736

and sacked, and was dumped only as neded by the fireman.

The tank and boiler were carefully calibrated, and readings to determine the amount of water used were taken under the same conditions each time. It should be remembered, in comparing these tests with those of other roads, that in this case the engines were worked at their maximum capacity throughout the tests.

Results of Tests.

Columns No. 1 and 2 are average of two trips.
Column No. 3 is the average of three trips.

	Col. No. 1.	Col. No. 2.	Col. No. 3.
Locomotive class	2-6-6-2	2-6-6-2	2-8-00
Date of tests	Oct., 1910	Feb., 1911	May, 1912
Grade, compensated for curvature	0.5%	0.5%	0.5%
Weather conditions	Fair	Good	Good
Condition of rail	Dry	Dry	Dry
Length of route, miles	17½	22	22
Time consumed, total	3 hrs. 6½ min.	2 hrs. 40 min.	2 hrs. 43 min.
Number of stops	2	2	2
Total time delayed at stops	33½ min.	38 min.	27 min.
Actual running time	2 hrs. 33 min.	2 hrs. 2½ min.	2 hrs. 15 min.
Number of cars in train, including cab	67	51	35
Tons behind tender	4,437	3,513	2,402
Ton-miles of train load	77,386	77,297	52,851
Time throttle was open	2 hrs. 33 min.	2 hrs. 2¼ min.	2 hrs. 15 min.
Average position of throttle	Full	Full	Full
Total pounds coal burned	14,800	15,550	
Total pounds water supplied boiler	101,629	95,090	12,100 87,388
Average indicated horse-power	1,472.2	.....	1,031

Average initial pressure in cyl.	H. P. 196	.....	188
Average point of cut-off	H. P. .755	.....	.56
Average revolutions per min.	45.5	.....	66.2
Average boiler pressure, lbs.	198.4	195	196
Average speed, miles per hour	6.75	5.377	9.78
Maximum speed, miles per hour	9.95	10.8	46,550
Coal burned per hour, lbs.	5'11		
Coal burned per sq. ft. grate area per hour	5,825	99.5	12.95 7,630
Coal burned per sq. ft. heating surface per hour	74.7 1.02	1.54	97.9
Water supplied boiler per hour, lbs.	39,867	38,708	1.32
Water supplied boiler per sq. ft. heating sur. per hr.	6.92	8.1	11.10
Coal burned per I. H. P hour, lbs.	3.97	.....	5.21
Water supplied boiler per I. H. P. hour, lbs.	27.1	.....	37.7
Water evaporated per lb. coal	6.85	6.1	7.28
Equiv. evaporation from and at 212° per lb. of coal	8.36	7.52	8.82
Average temperature feed water	56.5°	43.5°	66°
Average temperature atmosphere	48°	38°	75°
Coal burned per 1,000 ton-miles of train load, lbs.	198	202	229
Water supplied boiler per 1,000 ton-miles of train load	1,350	1,230	1,653

It is interesting to note that while the tons behind the tender were 85 per cent. more for the Mallet, the coal burned per train mile was only 55 per cent. more, and in some of the individual trip the coal used was only 38 per cent. more for an increase of 82 per cent in the tons behind the tender for the same distance.

While these tests show in favor of the Mallet it is thought that the difference is not as great as it should be, on account of the Mallets having been in service only a comparatively short time when the tests were made. Also the men have become better educated in the handling of these engines, one result of which is that the engines are now run with a larger exhaust nozzle than formerly and burn less coal. This assumption is borne out by the fact that there has been a considerable reduction in the fuel consumption, for the same amount of freight handled, since the tests of the Mallet engines were made. It is intended to make another series of tests on the Mallets in the near future, which will not only give a comparison between the Mallets and the consolidation, but will also show the improvement in the service of the Mallets since they were received.

The Mallets have been used in road service since they were built, and it is largely due to this fact that the road has been able to show a very low operating ratio. Since these engines were built there have been considerable developments in the Mallets, especially in the application of superheaters and stokers, and it is very probable that future engines for heavy freight service on this road will be of this type, equipped with all latest improvements. The tests were conducted by W. S. Moseley, chief draftsman, under the general supervison of H. F. Staley, master mechanic.

The Prussian Landtag has under consideration a memorandum containing comprehensive proposals for electrifying and improving the Berlin city and suburban railways in order to render them capable of dealing with the increasing traffic. With this object in view it is proposed to set up two electric generating stations, one in a lignite district, probably near Bitterfield, and the other near Berlin, the latter as a reserve station, and to supplement the other during the heaviest periods of traffic. The work will involve the laying underground of six pairs of cables of 60,000v. tension. The total cost of the work, which will take about four and one half years to carry out, is put at $30,000,000, of which $12,000,000 is for right of way, construction work, etc., and the remainder for the provision and alteration of rolling stock. It will be necessary to provide 557 electric locomotives and 690 passenger coaches.

Conventionalities.

Langdon B. Valentine, of Valentine & Company, is attending the convention for the first time.

Joseph S. Ralston, president of the Ralston Steel Car Company, reached Atlantic City Friday and registered at the Chelsea.

F. W. Miller, president of the F. W. Miller Heating Company, is attending the M. M. convention and is stopping at the Dennis.

R. L. Mason was parading on the Boardwalk with a pick and shovel when the camera man caught him. Ask him for a copy of the result.

Blue Sundays may be disagreeable; but the best argument for them lies in the apparent ginger everyone possessed the following day.

J. W. Cyr, superintendent of motive power of the Chicago, Burlington & Quincy, took part in the opening proceedings of the M. M. convention Monday morning. Mr. Cyr is a guest of the Traymore.



PARKS TELLING A GOOD STORY.

Left to right—B. A. Keeler, Henry LaRue, Master Car Builder, C. R. I. & P.; O. J. Parks, General Car Inspector, Pennsylvania Lines.

C. A. Dunkelberg, treasurer of S. F. Bowser & Company, has just recovered from an attack of tonsilitis, induced by the spell of damp air of last week.

J. T. Carroll is again in attendance with added powers. He was appointed assistant general superintendent of motive power of the Baltimore & Ohio in February last.

Yesterday afternoon Chairman Ostby of the enrollment committee was presented with a 20-in. pigskin traveling bag and a folding cane by the members of his committee.

B. D. Lockwood, assistant chief engineer of the Pressed Steel Car Company, is here again this year. He was for several years mechanical engineer of the Big Four under Mr. Garstang.

Mr. and Mrs. Horace Baker, son and daughter, arrived from Cincinnati Sunday afternoon in Mr. Baker's private car. Mr. Baker is general manager of the Queen & Crescent and Alabama Great Southern.

The executive committee of the Railway Supply Manufacturers' Association will be glad to know that the "Information Bureau" has been buried at sea with appropriate ceremonies. *Requiescat in pace.*

M. J. McCarthy, assistant superintendent of motive power of the Big Four, is receiving the congratulations of his friends



L. C. Fritch.

on his improved appearance and the very successful result of an operation performed last winter.

Al. Burkhard, general foreman of the car department of the New York Central & Hudson River at West Albany, N. Y., is among the special guests at the convention. He arrived Saturday morning, accompanied by his 7-year-old son, Henry.



The Two Prossers—Tom and C. S.

Mr. and Mrs. J. W. Bettendorf are quartered at the Marlborough-Blenheim. They arrived from Davenport, Iowa, last week and were accompanied by Mr. Bettendorf's father and mother, Mr. and Mrs. M. Bettendorf.

Charles D. Jenks, vice-president of Edwin S. Woods & Company, is registered at the Dennis. Mr. Jenks is accompanied by his bride, formerly Miss Marion Somers, of Chicago. The wedding took place in Chicago on June 4.

A. M. Darlow, mechanical engineer of the Buffalo & Susquehanna, who arrived on Sunday, occupies the unique position of being general storekeeper also. This responsibility has been placed upon him within the past few months.

To his many friends in Atlantic City, George N. Van Sweringen is painting, in eloquent words (we might almost say in moving pictures), the many beautiful things in nature observed on the Pacific coast. Ask him particularly about California.

D. F. Crawford, general superintendent of motive power of the Pennsylvania Lines West, who was compelled to miss the M. C. B. convention, returned Monday in time to act as presiding officer of the M. M. association in President Bentley's absence.

Williard Doud, shop engineer of the Illinois Central, arrived on Sunday morning. An important inspection trip pre-



H. C. Eich, Master Mechanic of the Illinois Central, with Frank Gilmore Telling a Story and M. C. Beymer Looking on.

vented his getting here in time for the M. C. B. meetings. He reports good progress in the work of electrification at the Burnside shops.

The Sherwin-Williams party this year consists of W. B. Albright, director; E. M. Richardson, director; Thomas Madill, manager of the Western railway department; F. M. Elmquist and L. C. Graves. They are quartered at the Marlborough-Blenheim.

J. F. Pendergast, for 10 years master mechanic of the Baltimore & Ohio at Glenwood, Pa., now master mechanic of the East Broad Top Railroad & Coal Company at Orbisonia, Pa., is taking an active part in the meetings. He is also much interested in the exhibits.

Harry Keller, of the Duntley Pneumatic Tool Company, feels the responsibility suddenly thrust upon him; for on account of important business matters, neither John W. Duntley nor Julius Keller will be able to carry out their plans to attend the conventions this year.

H. S. Demarest, with his family, leaves for Europe about the first of July to be gone until the first of November. They will make an extended tour of several countries. In the

absence of Mr. Demarest, F. E. Ransley and L. J. Van de Wall are here in the interest of Greene, Tweed & Co.

H. B. McFarland, engineer of tests of the Atchison, Topeka & Santa Fe, has a new dynamometer car with a capacity of 1,000,000 pounds, which was put in service a few months ago. He reports that it is proving most valuable for tonnage rating work on the very severe grades in the mountains.



Wells Harris, of the New Haven, Trying to Understand Frank Gilmore's Joke.



George Carson, District Master Car Builder, New York Central.

H. F. Wardwell, assistant manager of the Central Locomotive & Car Company, is here for the Master Mechanics' convention and is staying at the Traymore. Last year Mr. Wardwell attended as superintendent of motive power of the Chicago & Western Indiana. Mrs. Wardwell was unable to accompany him here this year.

Secretary Conway disclaims all responsibility for setting up the "Information Bureau" on the beach. We understand, however, that the "bureau" was dispossessed from the pier for non-payment of dues. Early risers yesterday morning sighted a fishing smack just off the pier, in the bow of which the "Information Bureau" was resting easily.

D. E. Fitzgerald, assistant superintendent of motive power of the Frisco, has succeeded in finding time to attend the convention this year. His oldest son, who is attending St. Mary's College at Topeka, Kan., is an enthusiastic baseball fan and asked his father to be sure and send him a copy of *The Daily* containing the account of Saturday's game.

Lewis D. Freeman, connected with the mechanical engineer's office on the Baltimore & Ohio, came up from Baltimore for a day or two. *American Engineer* readers will recall him as the author of the article on "Design of Formers for Hydraulic Press" which appeared in the May issue and was one of the very few articles which have ever been published on this subject in any technical paper.



J. D. Murray, from Christmas Island, Indian Ocean. Formerly Mechanical Engineer of the Lackawanna.



J. C. Fritts, Master Car Builder, Delaware, Lackawanna & Western.

W. D. Robb, superintendent of motive power of the Grand Trunk, was ready for the opening session of the M. M. convention early Monday morning. The Grand Trunk is building 75 locomotives. Mr. Robb smilingly observed that although the brick arch had been used in locomotive construction in Canada during the past 35 years we, in this country, had only recently become thoroughly inter-

The Bostonians here at the convention spent most of yesterday celebrating Bunker Hill day. Of all the enthusiasts, Frank Barbey was the superlative degree; but, judging from some of the persons seen walking around with American flags pinned to their clothing, we suspect that Frank decorated some who are not Bostonians. For instance, J. Alexander Brown. Now, Alex. may be built like a bean eater; but why a Bostonian?

C. B. Flint and A. T. Chester, of the recently organized firm of Flint & Chester, arrived in Atlantic City Sunday with Mrs. Flint and Mrs. Chester, having driven down in an automobile. They are stopping at Haddon Hall. Mrs. Flint was formerly for several years with Manning, Maxwell & Moore. Mr. Chester is a graduate of Annapolis and has been in the mechanical department of the United States Navy for several years.

Walter E. Coffin, man-at-large and free lance in general for the National Malleable Castings Company, happened—just happened—to be in America and is attending the convention. Last year he was in South America on his wedding tour. Three years ago he was traveling in Japan. Next year he may be in South Africa. In the meantime, and for the purposes of these meetings, he is near the Greek Temple and keeping his eyes on what is doing around the throne.

D. J. Redding, assistant superintendent of motive power of the Pittsburgh & Lake Erie, reports building 22 heavy switch engines at the McKees Rocks' shops since last October. Plans are being developed for five consolidation locomotives, which will also be built at the company's shops. Mrs. Redding is not attending the convention this year because of the commencement exercises at the State Normal School from which the eldest daughter is about to be graduated.

W. F. Keisel, assistant mechanical engineer of the Pennsylvania, with Mrs. Keisel and their two sons, John and William, Jr., are staying at the Chelsea. They have just come from the commencement at Lehigh University, where Mr. Keisel attended the twenty-fifth reunion of his class and John Keisel attended his first class reunion. The party motored from Altoona to Bethlehem and then to Atlantic City. Miss Virginia Keisel will not be here this year, as she is in Europe taking an automobile tour on the continent.

William Garstang, superintendent of motive power of the Big Four, left for home yesterday. His wife and daughter, Virginia, who are at the Marlborough-Blenheim, will stay until the convention closes. The eldest daughter, Mabel, was married to Felix Robbins at Indianapolis two weeks ago yesterday. They, also, are attending the convention, having arrived last Friday. Mr. and Mrs. Robbins expect to make their home at Mr. Robbins' country place near New Madrid, Mo. Mr. Robbins is a Purdue man.

H. T. Bentley, president of the M. M. Association, is unfortunately confined to his bed in the Marlborough-Blenheim by a severe attack of malaria, which we hope will abate so that he can lend his enthusiastic presence and influence in presiding at some of the meetings before adjournment. Mr. Bentley wished through The Daily to express his appreciation of the many kind expressions of sympathy and offers of assistance that have come to him and his wife and daughter from hundreds of his convention friends.

C. Phillips, master mechanic of the New Orleans & North Eastern, at Meridian, Miss., a regular attendant at the conventions, is stopping at the Brighton with his young son. For a number of years Mr. Phillips has made a practice of bringing one of his children for company after they reach the age of eight or ten years. This is the fourth son; and the fifth one will be about the right age in a couple of years to attend the conventions. Mr. Phillips finds that besides the companionship, the boys themselves derive considerable benefit from these trips.

J. C. Pickard, president of the International Railway General Firemen's Association, arrived on Sunday and will remain through the Master Mechanics' Convention. The General Firemen's Association has been increased by 78 members since the last convention. The reports for the coming convention, which will be held at the Sherman House, Chicago, July 23-26, are all in hand and advance copies are being sent out. Among the more important papers are those on "Shop Organizations," by William G. Reyer and William Hall; "Shop Specialization," by U. T. Gale, and "The Relation of the Testing Department to Shop Efficiency," by J. S. Sheafe.

C. E. Gossett, general master mechanic of the Minneapolis & St. Louis, and father of the assistant mascot for the Western base ball team in Saturday's game, has some interesting stories about the severe weather in Minnesota and Iowa last winter. The weather bureau records show that the temperature at Marshalltown, Ia., was below zero for 26 consecutive days. A passenger train of three cars got caught in a snow storm in Minnesota and was stalled for 49 hours before the rotary snow plow reached it. The temperature was 38 deg. below zero. Fortunately a farm home in the vicinity was able to furnish plenty of food. When the rescue party opened up the way, the engine was able to get its train through to the terminal without assistance.

Daniel Smith, president of the Baker Heater Company, and of the Peter Smith Heater Company; Elmer Smith, secretary and treasurer of the same companies, and H. S. Williams, chief engineer, came by train as far as Buffalo, and motored from there to Atlantic City. They stopped en route for a short time at Elmhurst, N. J., where their families are spending the summer, and Daniel Smith has returned there. The Smith brothers recently have entered the heater business in the steam railway field by the acquisition of control of the Baker Heater Company, and this is their first year at the conventions. Elmer Smith is a base ball enthusiast of renown, and pitched for the winning Western team on Saturday. He is one of the principal backers of the Detroit Tigers, and at times has gone South with them on their spring training trips.

Under the guidance of W. J. Tollerton, mechanical superintendent of the Rock Island Lines, seventeen mechanical officers of that system visited the exhibits on the pier yesterday, going out one side of the pier and returning on the other. The other members of the party were: C. A. Seley, mechanical engineer; J. B. Kilpatrick, district mechanical superintendent; S. W. Mullinix, district mechanical superintendent; C. M. Taylor, district mechanical superintendent; George W. Seidel, superintendent of shops; George Goodwin, assistant mechanical engineer; L. A. Richardson, master mechanic; H. J. Osborne, master mechanic; F. W. Williams, master mechanic; T. W. McCarthy, master mechanic; E. F. Tegtmeyer, master mechanic; W. J. O'Neill, master mechanic; E. J. Harris, master mechanic; R. L. Stewart, master mechanic; C. L. Sharp, general foreman; W. J. Eddy, inspector of tools and machinery; and O. S. Beyer, Jr., traveling inspector. This is the first visit of many of these gentlemen to the conventions and the idea in going through in a party was not only to discuss the merits of the different devices, but also to give those who were visiting the convention for the first time an idea of the importance and value of looking over and studying the exhibits.

The Exhibit.

An interesting demonstration of the methods employed in the manufacture of the Jacobs-Shupert fire box will be carried on during the convention with the assistance of the Oxweld Acetylene Company, who will weld up the seams between the sections.

The "Gold Dollars" that are being given away at the booth of the Gold Car Heating & Lighting Company, New York, are much appreciated by railway men. The little treatise is designed to show how money can be saved by installing the Gold combination pressure and vapor system.

The severe service test to which the Mid-Western Car Supply Company's exhibit car was put on its journey from Chicago has clearly shown that its construction practically eliminates sharp flanges, end journal bearing wear and king pin troubles. It also permits the removal of the wheels without taking the trucks from under the car.

For the first time in America, a flash signal light for railway service is being shown at this convention. This is the mechanism such as is being used in lighthouse service applied to railway signals, and so arranged as to give any desired number of flashes a minute. The Commercial Acetylene Company, New York, has installed in its booth a flashlight operating in a standard Lehigh Valley lamp.

The McConway & Torley Company, of Pittsburgh, Pa., is calling particular attention to the steel castings which it is now manufacturing in addition to their other specialties. Samples of various car castings showing the class of material which it furnishes, are exhibited. These are made of the same high-grade mixture of acid open-hearth steel as is used in making the M. C. B. couplers, the tests of which require a high grade of steel of great uniformity, with high tensile strength. A specialty is being made of car castings such as center plates, push pole pockets, coupler striking brackets, brake connections, pedestals and similar castings.

NEW ARMORED AIR BRAKE HOSE.

An improved armored air brake hose is shown by the Sprague Electric Works, New York, in Booths 379-381. The design has been modified to obtain greater interlocking strength, and at the same time materially increase its flexibility. Features which have previously been criticised have been eliminated. One of the chief objections to the armored hose has been that the fittings and clamps could not be used with the standard M. C. B. hose; but with the Sprague 1⅜ in. air brake hose, no special fittings are required.

The fittings are secured with the standard M. C. B. clamps, but in such a manner that blow-outs are prevented. This is accomplished by means of what is called the armor clamp, which is welded to the armor (instead of being riveted as formerly), and extends under the M. C. B. clamp to engage with the collar on the nipple, or the head of the coupling, as the case may be. Another criticism of armored hose has been with regard to the quality of the rubber used, although it is generally recognized that the use of an armor not only affords protection against external injury and kinking, but by the elimination of stretching of the rubber, deterioration is very greatly reduced. This objection has been overcome by the use of a three-ply M. C. B. hose with the bursting test of the armored hose increased to 1,000 lbs. In order to conform with the M. C. B. badge as nearly as possible, the armor clamp on the coupler end is stamped with the railway's name, size of hose, date of manufacture, and maker's and serial numbers. With this interlocking armor the deterioration due to the sun's rays is prevented, which, in conjunction with the elimination of stretching, abrasion, kinking and blowing out of the fittings, results in long and efficient service. The exhibit also covers a line of armored hose for car heating, and steam and air hose for shop use.

BAKER VALVE GEAR ON OLD POWER.

Most railways have engines that are giving a great deal of trouble with their frames and valve gear. The frame troubles might be materially lessened and possibly removed altogether if the proper frame bracing could be applied; but the Stevenson valve gear prevents these improvements. If an outside valve gear and proper frame bracing could be applied, it is to be admitted the expense and work of keeping these engines in service would be very materially lessened. The machine shops are already overloaded, and these needed changes are put off from time to time.

The Baker valve gear offers an easy solution of the manufacture of the gears, as the Pilliod Company, New York, is in a position to make up these gears and the necessary parts ready to apply. This relieves the railway of practically all the machine work and leaves nothing but the easiest of erecting floor labor.

The roads that are now doing this find that it occasions no delay in the shop and enables the engine to make large mileage, in some cases the mileage being as much as six times what it was before. It does away with the engine coming in for repairs to frames and valve gears and the delays in the roundhouse for valve gear work.

After the gears are applied, the roads also find that the Pilliod Company's guarantee of 5 per cent. efficiency and economy is very conservative, and that the engine is always capable of handling her tonnage, because the gear has the wearing qualities and does not get out of adjustment.

PINTSCH MANTLE LAMPS WITH ELECTRIC IGNITION.

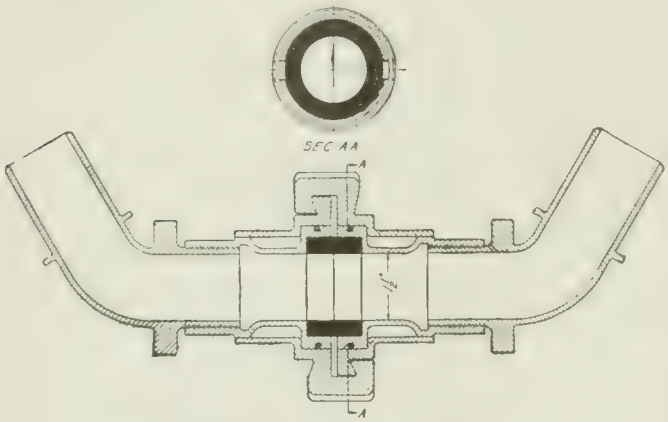
The Safety Car Heating & Lighting Company, New York, has several Pintsch mantle lamps among its exhibits equipped with a system of electric ignition. For some classes of car service, electric lighting fixtures have heretofore been preferable in the matter of convenience to the Pintsch mantle lamp, but with this new improvement and the several new types of fixtures equipped with it, the mantle lamp is placed on the same basis as the electric light from the standpoint of convenience.

All the lamps in the car, or as many as may be desired, can be lighted from one point in the car, doing away with the necessity of the trainman or porter lighting each individual lamp with a torch or matches; in fact, the occupants of the car are unable to distinguish whether electric light or Pintsch mantle light is used except from the increased illumination available with the mantle lamp. The arrangement of this system is simple, an igniting spark being generated by a magneto. The trainman or attendant of the car turns on the gas at the main cock located at a convenient point in the car, preferably the closet, and then turns the magneto handle and the lamps are lighted.

A modification of this arrangement has been designed for sleeping cars, to provide a direct control of the lamp by the occupant of the stateroom or compartment. Each compartment has its individual gas cock on the wall, provided with a combination gas cock and igniter. It is not necessary for the occupant of a stateroom to notify the porter when the mantle light is no longer required, nor is he compelled to ring for the porter when light is required, but the control of the lamp is directly under his personal supervision. No complicated mechanism is required, nor are any elaborate instructions necessary. The Safety Car Heating & Lighting Company has these lamps arranged at its exhibit where they can be demonstrated.

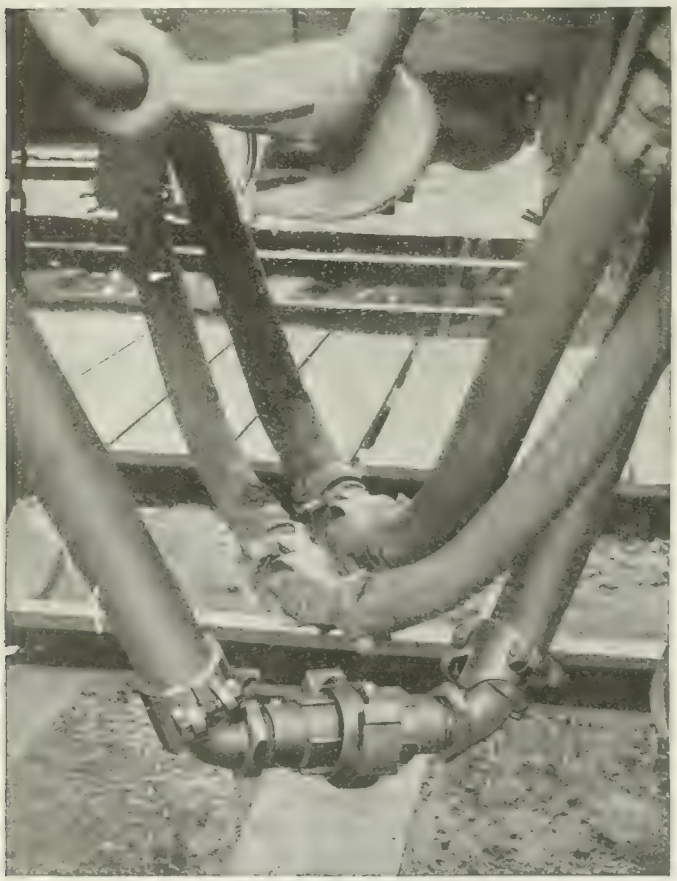
UTILITY STEAM HOSE COUPLER.

One of the chief causes of deterioration and trouble with steam hose couplers using rubber hose is that in bending the hose upward to couple and uncouple, it becomes kinked which reduces the inside area and also weakens the hose, causing it to give out at this point. A greater portion of the steam hose failures are due to this cause. The Utility coupler is designed



Utility Steam Hose Coupler.

to prevent kinking the hose. Each coupler head is surrounded by a loose collar and this collar has a projecting hook lug at one side and a helical flange extending nearly round the remaining portion. To couple two heads together it is only necessary to grasp one in each hand, swing them together face to face, so that the hooked lug of each collar engages the



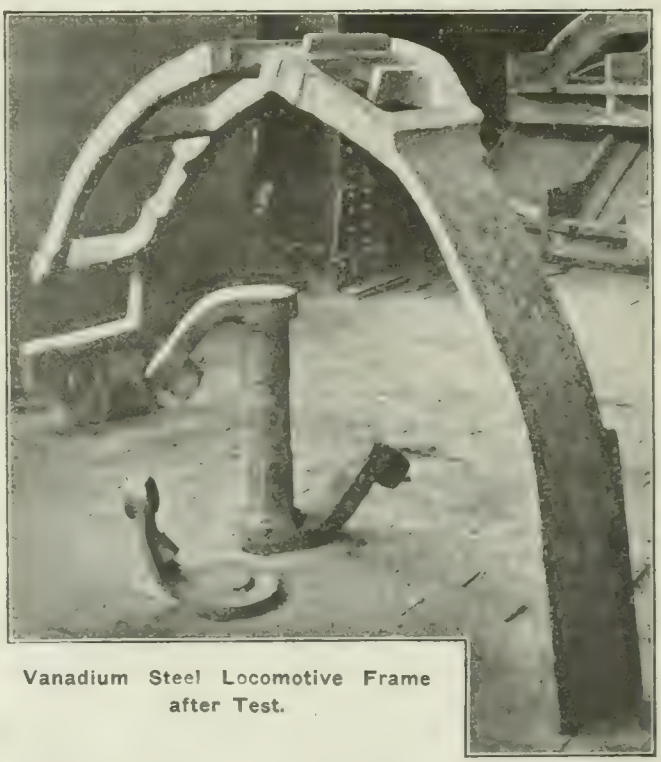
Application of Utility Steam Hose Coupler.

helical flange of the other. A twist of about a quarter turn forces the couplers firmly together, making a tight joint. A slight tap with a hammer tightens them so they cannot jar loose on the road. To uncouple, a reverse twist loosens them.

In addition to the saving of hose, this steam coupler has other advantages. The gaskets are brought together with their faces parallel so they wear evenly. The helical flanges take up all wear, as it is only necessary to turn the collars until a tight joint is made. No extra locking attachments are needed, as the couplers are always securely locked when coupled. The gaskets must always line up and a full 1½ in. opening is insured. This coupler is made by the Railway Utility Company, Chicago, Ill

VANADIUM EXHIBIT.

It is getting to be a familiar story, that of the improvement made in the quality of steel by the introduction of vanadium, but it is a familiarity that cannot breed contempt and is still novel enough to make one stop and think and compare it with the ordinary practice of the day. So when we wander into the booth of the American Vanadium Company, of Pittsburgh, Pa., and find what looks and acts like real springs made of cast iron, and all sorts of gimcracks tied into all sorts of impossible knots; and see evidences of limits of elasticity that run from 90,000 to 113,000 lbs. per sq. in., we know that we are in the presence of the unusual. But we have seen tricks played with this steel before, and the real interest lies, in the eating of this metallurgical pudding, in the wear and tear of railway service. So when we see that pair of good conditional tender wheels with 258,529 miles totheir credit; and hear that their



Vanadium Steel Locomotive Frame after Test.

mates have gone 18,000 miles beyond this and are still going, we know that really we are in the presence of the unusual. This means nearly 11,500 miles per 1-16-in. of wear. Then there are some twisted and distorted locomotive frames in the background, of which 3,000 are in service and no failures. The one illustrated herewith was subjected to 15 blows, 17-ft. drop, and one blow, 12½-ft. drop, of a 3,000-lb. ball. The metal in these frames averages an elastic limit of about 49,800 lbs., with an ultimate strength of 79,500 lbs., an elongation of 27 per cent. and a reduction of area of 51 per cent. This is far enough away from the averages of ordinary steel to make one stop and think there must be something in it. Of course, there is! and if you ask George Norris what it is, he will frankly tell you that it's vanadium; and it is but fair to give him the credit of telling the truth.

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THOSE who have had an extensive experience with superheaters on stationary boilers using temperatures up to 660 and 700 deg. F. have expressed a decided opinion that 600 deg. F. is the limit at which the advantages of superheating can be obtained without excessive cost of maintenance due to high temperatures. It is known that between 500 and 600 deg. F. cast iron enlarges its volume and increases in weight. The carbon rearranges itself and experiments show that after one or two years' exposure to high temperatures the volume has increased 5 per cent and the weight 7 per cent. Copper and tin alloys are also affected by highly superheated steam and cast steel is better than cast iron or bronze for boiler fittings, piping and machinery where bearing surfaces will permit.

THE drop testing machine is probably the most useful device employed by railways in obtaining information as to the quality of iron and steel products which they buy in such large quantities. It was designed originally for testing axles, and its application has extended to the testing of rails, couplers, draft gears, wheels, and to such larger details as locomotive frames. In the report of the committee on Steel Tires, the drop test is for the first time officially recognized as an important element in a specification for such material. This will add to the expense for tires, as every drop test destroys a tire and it is paid for by the railway. The burden of this charge need not be large, as it should not be necessary to drop test a tire from every heat at a works where the process of steel manufacture is as uniform as it should be. This method of testing deals with the complete and finished structure and is therefore an improvement over the previous methods used in this country which deals only with tensile specimens taken from a small test ingot and chemical analysis from the same small ingot. It might be employed at first on a single tire from one order or for one lot of locomotives. The effect on the effort of the manufacturers would be almost as great as if a large number of tires were destroyed at considerable expense. The drop test for tires has been used in European countries for many years and it is surprising that it has not been adopted here before. As a new and radical departure from previous methods it would have been interesting and instructive if the committee had given some account of the experience gained by drop tests of tires in foreign countries with examples showing the basis of the requirements which they now recommend.

THE discussion of the report on the Contour of Tires for Engine and Tender Trucks indicated that there is a reluctance on the part of quite a number of roads to adopt either the old standard or the new one proposed. There has been a gradual modification of opinion as to the necessary height of the flange of steel tires to secure safety from derailment. With the general improvement of the track surface it has been possible to reduce the height to 1⅛ in. for the drivers of road engines, and there was little, if any, opposition to the proposed standard height of 1 in. for engine and tender truck tires. In fact, some lines have used a height as small as ⅞ in. for switching engines, and it is possible that a flange 1 in. deep could be safely used for the driving tires of slow speed freight engines. The reduction in the height of flange will effect an important economy in the expense, as there will be less steel wasted from the tread in restoring a full flange to worn tires. The principal feature of tire contour about which there is the most disagreement is the standard taper which some regard as too sharp, as it requires a greater amount to be turned from the tread of worn tires, and some have the idea that it increases the eccentric load on the rail enough to break down the head. This latter view has been attacked by competent authority, and the advocates of a cylindric tread for tires will not find any strong support for their theory. Other lines have carried the standard taper clear to the rim with a heavy champfer at the edges. This contour takes less time for turning and there is an apparent saving in the amount of steel turned off. The objection to a flat taper on the cylindric tread is that the wheels tend to run to one rail or the other, and flange wear is increased and so also is track resistance. Probably there will always be some departure from any standard tire contour for the reasons here given, and some latitude should be allowed for this for tires used in the less important services. It is best, however, to have a standard for the faster road engines, and that which has been recommended by the committee should be adopted with this in view.

IT is unfortunate that all the members of the Master Mechanics' Association cannot have an opportunity to see the moving pictures exhibited by D. C. Buell at the Railway Fuel Association convention in Chicago last month. These pictures demonstrated a method of instructing firemen in proper firing practice and by giving visible evidence of the effect of incorrect methods, impressed the lesson far more effectively than is possible with text books, lectures or even personal example on the locomotive. Those observing this demonstration could not avoid having a mental picture of the fireman in the act whenever they observed the effect of wrong practice. It would be difficult to prevent a thought of the pile of coal on the platform, shown in one picture, whenever a locomotive is seen with the safety valves blowing or of the fireman "baling" in the fuel as fast as he could when continuous black smoke is seen rolling out of the locomotive stack. There was no doubt in the minds of those seeing the pictures that this new scheme will prove to be the most powerful agent yet discovered for instructing men of the class and age of the general run of new firemen. Proper firing is not the only lesson that can be taught by this means. It is applicable to any kind of work where the movements, action or methods of the workman are the influencing factor. Apprentices can be taught shop work, trackmen how to properly tamp and spike, trainmen and yardmen how to handle cars, etc. New methods or machines of any kind can be demonstrated more effectively than in actual practice as the films can be run through many times and can be operated very slowly, permitting every detail to be thoroughly studied. In fact, a moment's study will bring to mind almost numberless ways in which the idea can be applied. Conventions of this kind are largely depended upon to bring out the latest and best practices in the field and it is hoped that next year, this new idea can be illustrated to the members by either Mr. Buell or some one who takes it up in the meantime.

THE official registration of this year's M. C. B. and M. M. conventions up to late yesterday afternoon, compared with the full registration from 1908 to 1911, is shown by the following table:

	1908	1909	1910	1911	1912
M. C. B. & M. M. members..	504	523	530	552	543
Special guests	530	723	732	820	629
Railway ladies	595	618	632	690	408
Supply ladies	254	272	356	385	246
Supply men 1,177		1,362	1,526	1,653	1,486
Complimentary			40	47	49
Total 3,060		3,498	3,816	4,147	3,361

The figures contain no duplication of names. That is, those persons who registered as members or guests of both railway associations have in every case been counted but once; so that the table represents the actual number of persons who registered from the opening day until late Tuesday afternoon. It will be seen that while there was an apparent falling off this year as compared with June last of 786 persons, but nine were railway men and 191 special guests of either the M. C. B. or the M. M. association. Of the 191 special guests, it is hard to say what proportion were railway men; but not all were railway men. As a matter of fact, it is pretty well agreed that more, rather than less, railway men attended this year's conventions. The discrepancy in registration is due in part to the fact that the M. C. B. association this year charged its members and guests for all badges; and with both railway associations badges were not given out as freely as heretofore. It would be interesting to know the average amount of time spent here by each railway man this year as compared with a year ago; but naturally a computation of that kind is not now possible. Whether or not the increased attendance at the meetings and other ocular evidence contradicts the registration, it is nevertheless true that the businesslike attitude of the railway men, and their increased interest in the exhibits, gives one the distinct impression that this year's conventions were bigger and better than those held a year ago.

CONSOLIDATION

AGAIN the movement for the consolidation of the two great railway mechanical associations seems to be on the verge of settling back into a condition of quiescence. It was reported at the Master Car Builders' convention that the matter was being considered from the legal standpoint, but there was no intimation of what might be the objections or whether there were any probability of their being overcome. The consolidation committee of the Master Mechanics' Association went still further, or perhaps not as far, by reporting that there seemed to be a sentiment adverse to consolidation, and that the usefulness of its committee was at an end. The committees of both associations have been continued to the next meeting of the executive committee, with the seeming probability of their going out of existence immediately after that meeting.

The matter of such a consolidation is a most important one. The two associations have undoubtedly given more valuable technical literature to the world than any others. Outside their own membership there is a wider interest that would make against anything that would tend to curtail or depreciate in the slightest the output of the future.

The subject has been up for periodical consideration for the past twenty years or more. At first the suggestion came from the Master Mechanics' Association and was vehemently and emphatically approved by the master car builders, because the latter were, at that time, lesser officials, and were not recognized as of serious importance in the railway world. It was the opinion of the members that if a consolidation were effected the result would be the obliteration of the influence of the master car builders. With the advent of the representative member and the official control of the formulation and administration of the rules of interchange the tables were turned, and the master car builder became the prominent factor. This destroyed that feeling of jealousy that had previously existed and changed the source of opposition completely.

The argument for consolidation has been based, of recent years, on the ground that the same men control both locomotive and car departments, and that it is absurd that some men should be master car builders one week and master mechanics the next, simply because they were considering cars at one time and locomotives at another, while both have so many things in common. The plea for the continuance of the old conditions is based on the standing of the minor officials who are still separated into the two classes of car and locomotive men, and who each have their interests and problems that deserve attention. The argument for one association and one long week of convention work is answered by the statement that there are limits as to what men can and will do. A full week of continuous convention is too much, and the two days of relaxation between the present sessions permits of the prolonged period of interest without weariness, while, for those who do not attend both conventions, there is really no loss of time.

The result is that the opposition to consolidation has ceased to be an association matter and has become a matter based on individual opinion. Individuals are for or against it, regardless of whether they are car or locomotive men, and from present indications those favoring it are decidedly in the minority.

LOCOMOTIVE BOILERS

IT is so difficult that the difficulty amounts to an impossibility of considering within allowable limits that wide range of compiled practice and experience brought together in the report on the Design, Construction and Inspection of Locomotive Boilers. It is so comprehensive and covers so wide a field that even the convention seemed to be at a loss as to the best method of approaching and handling it in discussion. The result was that it skirted along on the edges, made a dab at some of the details, lost sight of others entirely and showed by all signs that it needed more time than was available to discuss fully this exceedingly important subject.

As it was, it confined itself exclusively to details with one important exception and that lay in the announcement of the policy that it had been decided to pursue in regard to the Federal boiler inspection, which does not seem to be progressing as smoothly as might be desired. The trouble lies mainly in the difference in the interpretation of the law by the district inspectors. The movement, therefore, is to secure uniform instructions for the inspectors. To attain this end the large committee, so distributed as to be representative of the whole country, is a proper one and will probably be an efficient means of dealing with the problem.

Aside from this the discussion and the report dealt with details that were almost innumerable: the shape of staybolt heads, the use of the combustion chamber, the width of water legs, the flanging of the fire door, the scarfing of plates at the round ring, the radius of round ring corners, the comparative influence of coal and oil on the sheets, the methed of fastening tubes, and so on, and so on. But there was one feature noticeable throughout the whole, and that was the slight differences of opinion expressed and how those slight differences might be explained by differences in the local conditions that called them forth. The widest difference, perhaps, was expressed by the two speakers, one of whom rather favored, though he by no means advocated, the return to the narrow water leg of the firebox as contributing to an improved steaming of the locomotive, and another who was getting most excellent results with a 7 in. leg. No very specific data was offered by either, but the coal and water, as well as the traffic conditions, of the two roads were so different that it was scarcely to be wondered at that they found a difference in boiler construction desirable.

It seemed strange, with the possibilities before them, that the effect of check valve location for the feed, the circulation, the stresses on braces and sheets did not receive even a passing notice.

The expression of the opinion that the locomotive boiler was destined to grow in the future, and that the limits of its development had not been reached, showed confidence in its construction, and the brief outline of its history from the crownbar type with the narrow firebox to the almost universal use of the radial stay with the Belpaire as a side or intermediate construction was an interesting summation of what had been done. The mechanical stoker seems to be the instrument that is looked for to modify firebox and boiler construction, and especially to modify its dimensions. This seems to be especially probable in view of two facts that have been brought out: one the great quantity of coal that the mechanical stoker can handle, and the other the recent tests showing the high percentage of the total evaporation of the boiler that is attributable to the firebox. The combination seems to indicate the uselessness of adding to the length of the tubes and the desirability of adding to the length and width of the firebox and the use of the combustion chamber.

These are some of the more important of the items touched on and regarding which there might be and will be much discussion in the future. Whether they will be treated with the same thoroughness that was given to the details of construction in the paper of this year remains to be seen. But the committee that will probably be appointed to report on the operation, care and maintenance of boilers at the next convention has a large subject to handle, a broad field in which to operate and an opportunity to present a report that will be second to none in interest and value, not even to this most excellent one which was presented yesterday.

THE ENTERTAINMENT FEATURES.

PROBABLY no other subject has been so much discussed during this year's convention as the entertainment features. The entertainment programme had been gradually elaborated in past years until it had come to include a large number of formal affairs. It had become the custom to wear formal dress for these formal occasions, and there had developed a good deal of display, and even of rivalry in this display. The joint executive committee, composed of the presidents of the Master Car Builders' Association, the Master Mechanics' Association and the Railway Supply Manufacturers' Association, after mature consideration, decided that, in view of existing conditions in the railway business, a change should be made, and this was done. The formal receptions to the officers of the associations were abolished, and informal evening social gatherings substituted. Similar action was taken in reference to the grand balls, which were superseded by informal dances. The vaudeville entertainments and the card parties with their prizes, were eliminated. The furnishing of roller chairs for railway men, supply men and their guests, by the Supply Association was stopped, each being left to pay his own way. The members of the entertainment committee have appeared at evening social functions in their business suits. The much reduced entertainment expenses have been borne jointly by the railway and supply associations instead of—as in past years—by the supply association.

These were radical changes, and it is not surprising that many expressed grave doubts as to their probable effects, and that honest opinions have differed widely as to their wisdom and results. Many believed that one effect of the reduction of the public general entertainment would be an increase in the amount of more or less concert entertainment of individual railway men by individual supply men, and all agreed that this would be an undesirable consequence. The Daily has closely observed the course of events and made inquiry of numerous persons, and in spite of some conflict in the evidence, our conclusion is that there has been no increase in individual entertainment this year, and that probably there has been even a reduction in it. Never in the history of the conventions, in our judgment, have those attending them been more careful in their conduct. There has, however, been a good deal of complaint about the entertainment features being "slow"—a thing which, of course, no one charges up to the entertainment committee, which has simply acted under orders. Many have also thought that the informal dressing has been carried to an extreme. The worst complaint of all has been made because of the failure this year to provide rolling chairs free for all persons wearing badges.

If one is to reach a correct conclusion as to what should be done about the matters referred to, he must begin by considering the purpose of the mechanical conventions. Their object is to afford the mechanical officers of the railways opportunity to so increase their knowledge of the important and difficult subjects with which they have to deal as to increase the efficiency of their labors for the railways by which they are employed. Anything that interferes with the attainment of that object has no proper place among the features connected with these conventions. During recent years the limelight of publicity has beaten with increasing fierceness on the railways, and their execu-

tive officers have grown more and more sensitive regarding the doing of anything which might be construed in such a way as to reflect any discredit on railway management. The original intimation that the soft pedal should be applied to certain diversions in connection with the conventions, which might be perfectly innocent but open to misconstruction, came from the executive officers, and the changes made this year amounted to an expression of opinion by the executive officers and men of leading influence in the mechanical associations, that some features in connection with the conventions interfered with their serious business or were open to misconstruction. It was felt that the formality of some of the entertainment features caused some persons to dress with a lavishness that was excessive for such occasions, and that the costly dressing of some restrained others, who were quite unable to compete with them, from attending the grand balls, the card parties, etc. It was also felt that the policy of permitting the supply association to defray all of the expenses of entertainment, including the cost of the rolling chairs, was open to the criticism that it established an improper relationship between the supply fraternity and the railway men.

The Railway Age Gazette expressed the opinion after the conventions a year ago, and reiterates it now, that it is not the entertainment of all the railway men by all the organized supply men that may do harm, but excessive individual entertainment. Undoubtedly, however, the most satisfactory plan of all is for the railway associations to share in the entertainment expenses as they have this year. The supply men, with great enterprise and at great expense, furnish the greatest exhibit of its kind ever made in the world. Why should they be put to the additional expense of paying for all of the entertainment, too? Certainly there is no objection to those who are anxious to wear their evening clothes doing so; but the feeling that this is a necessity at social affairs in connection with purely business conventions has been simply ridiculous and ought to be ridiculed to death as it deserves.

It would seem that in the future all of the social features—if the conventions continue to be held in Atlantic City—should be held in the evening on the pier where there is plenty of room; and one of the greatest improvements that could be introduced would be that of keeping the exhibits open at night. This is done at practically every other industrial show in the United States, whether it be the Railway Appliances Association's exhibition in Chicago, or an automobile show, or an agricultural show. It is not every railway man who attends the conventions that wants to dance, and if the exhibits were kept open in the evening and all the social affairs were held on the pier, while those who wanted to were attending the social affairs, those who preferred to be looking over the exhibits could be doing that. It could easily be arranged for the representatives to the supply concerns to take charge in turns of the exhibits at night. Many railway men come to spend only a day or two at the conventions, and we have no doubt that they, and also many who stay much longer, would welcome as a great improvement the innovation of keeping the exhibits open at night.

Whatever criticisms the plan followed this year may be subject to, it is a move in the right direction. The one principle to be borne in mind is, that everything else should be made decidedly subsidiary to the business purposes of the associations. The sessions of the conventions come first, and full opportunity to study the exhibits comes next, in importance; and whatever, to any considerable degree, interferes with these things, or may be construed as interfering with them, should be frowned down. The extent to which these things are borne in mind, and action accordingly taken, may determine the entire future of the conventions and the exhibit.

Announcements.

TO-DAY'S PROGRAM.

M. M. ASSOCIATION.

Discussion of Reports on:	
Safety Appliances	9.30 to 9.45
Flange Lubrication	9.45 to 10.30
Minimum Requirements for Headlights	10.30 to 11.00
Standardization of Tinware	11.00 to 11.15
Maintenance of Superheater Locomotives	11.15 to 12.00
Engine Tender Wheels	12.00 to 12.30
Resolutions, Correspondence, etc	12.30 to 12.40
Unfinished business	12.40 to 12.45
Election of officers	
Closing exercises	12.45 to 1.30

B. & O. CLUB.

In addition to those B. & O. men who met Monday and organized the B. & O. Club, the following B. & O. men signed the register on the desk of the American Car & Foundry Company in its space No. 610; also there were several in attendance at the meeting whose names were inadvertently omitted: J. F. Deems, J. B. Emory, Rush Gramm, Harry M. White, F. J. Cole, H. H. Hale, A. H. Reeves, J. T. Carroll, D. H. Reeves, O. C. Cromwell, E. J. Searles, John Moran, S. C. Granis, C. M. Harris, F. H. Carr, J. F. Francis, E. P. Stevens, C. W. Burke, F. P. Pfahter, G. W. Keller, F. C. Schorndorfer, H. D. Van Valin, L. A. Kennedy.

Present and past employees of the B. & O. who regularly attend the annual M. C. B. and M. M. convention are invited to join the club and to send their names and addresses to the secretary, Charles L. Sullivan, 1601 McCormick Building, Chicago.

FOUND.

A small enameled high school or college pin. Apply to Secretary Conway's office.

BADGE PRESENTED TO PRESIDENT STAFFORD.

It is the custom of the Railway Supply Manufacturers' Association to each year present its retiring president with a past-president's badge. The badge presented this year to Mr. Stafford was accompanied by the following letter, signed by all of the other members of the committee:

"The position of president of the Railway Supply Manufacturers' Association is one of honor and distinction. The conferring of that honor upon you was richly deserved, and the wisdom of that action is proven by the distinguished credit to yourself with which you have filled the post.

"During your administration you were confronted with new and perplexing problems, affecting not only the immediate welfare, but the future, of our association. The careful, conservative manner in which you solved these problems and the consecration of time and effort in their solution, call for the highest commendation.

"The association, through its executive committee, in presenting you this past-president's badge, exercises the only means it has for material expression of its appreciation of the magnificent performance of the exacting duties; but it acknowledges thereby its debt to you for your faithful, self-sacrificing and highly efficient service. The badge itself tells its story of honorable ambition most creditably achieved.

"The responsibilities of office you will soon lay on other shoulders; but the satisfaction of duty well done, and the affectionate regard of your associates, are yours for all time."

Proceedings.

Vice-President Crawford called the meeting to order at 9.50 a. m.

CONSOLIDATION.

Chairman Crawford: This committee has given consideration to the subject of consolidation, and would report that the general feeling does not seem to be in favor of it. The matter was quite well expressed in President Bentley's address yesterday, but inasmuch as the M. C. B. Association has continued its committee on consolidation, at least until such time as the executive committee meets again, Mr. Crawford made a motion, on behalf of the committee, that the committee of this association be continued, at least until the next meeting of the executive committee.

The motion was seconded and carried.

F. F. Gaines (C. of Ga.): I would ask if, in continuing the committee, the committee will consider the suggestion of President Bentley relative to the proposed change in the meeting time. He made some suggestions in his report to that effect.

The Vice-President: I should say that would be considered by the executive committee at the July meeting, when the committees are appointed, and such matters are given consideration.

DESIGN, CONSTRUCTION AND INSPECTION OF LOCOMOTIVE BOILERS.

The committee has the following report to make in regard to design and construction of locomotive boilers: The report on inspection was presented to the members at the last convention. A circular of inquiry was sent to all the members of the Association in regard to their experience and recommendations concerning the construction of locomotive boilers. Replies were received from 29 members, comprising a total of 29,355 locomotives, including the supplementary report that was presented at the convention. The intention of this committee is to give the different members the benefit of the experience of the different railways.

Type of Boiler.—In no case is a special type of boiler used for any special service. One of the members advises that they use Belpaire boilers of crown bar construction for road engines entirely on account of greater ease in maintaining staybolts. Another member advises that they use the Belpaire boiler as well as the radial stay boiler, and their experience with the Belpaire

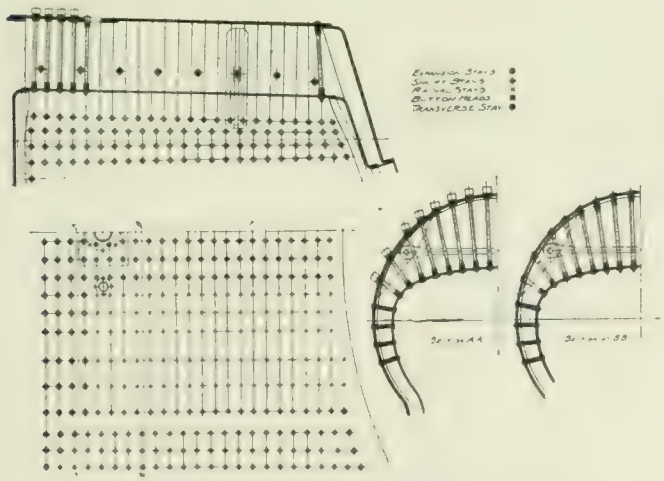


Fig. 1—Crossbracing for Locomotive Firebox.

boiler is that it reduces the number of staybolt breakages. From the experience that they gained with Belpaire boilers, they developed a system of cross-bracing, shown in Fig. 1, which has practically all the advantages of the Belpaire staying, and in addition it reduces the dead weight and is cheaper to construct.

A member of a road operating over 1,000 locomotives advises that they use Belpaire boilers with button heads to support crown sheet, claiming it is stronger, easier to clean and gives more steam space. Another member from a road operating 900 locomotives advises that they have engines with Belpaire, radial stay and crown bar boilers; crown bar boilers are used on older type of engines and have proven unsatisfactory. Radial stay boilers have been used on later types of engines and have generally been satisfactory, except in bad-water districts where broken stay bolts and cracked firebox sheets have given more trouble as compared with the Belpaire boilers used in the same district. This is attributed to a more equal distribution of stress. Radial stay boilers are used on passenger, freight and switch engines where Belpaire is used only on freight engines.

From the replies received from the different members it is the consensus of opinion that the radial stay type of boiler is preferred, as it is easy to construct, giving more free circulation of water, less deposit of sediment on the crown sheet and easier to wash out; also the dead weight is kept down considerably.

Combustion Chambers.—From the replies received the combustion chamber is only favored by 5 members. One member, who uses the combustion chamber covered by Fig. 2, advises that it shows a great economy in fuel, a decrease in the amount of

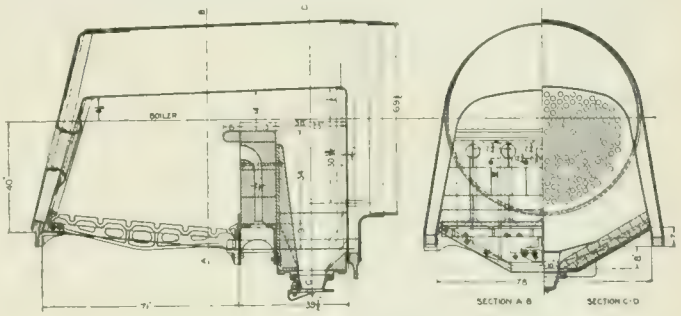


Fig. 2—One Type of Combustion Chamber.

smoke and cinders and increased mileage. No information was given in regard to maintenance. Another member advises that the reason they favor the combustion chamber in certain types of boilers, such as Mallet, is that it keeps the tubes a reasonable length and increases the heating surface of firebox. No information was given as to the fuel economy derived from these combustion chambers, but a saving in maintenance and an improvement in performance is reported. The type of combustion chamber he uses is covered by Fig. 3.

Another member reports being in favor of combustion chambers, but does not have them on all engines. This member was

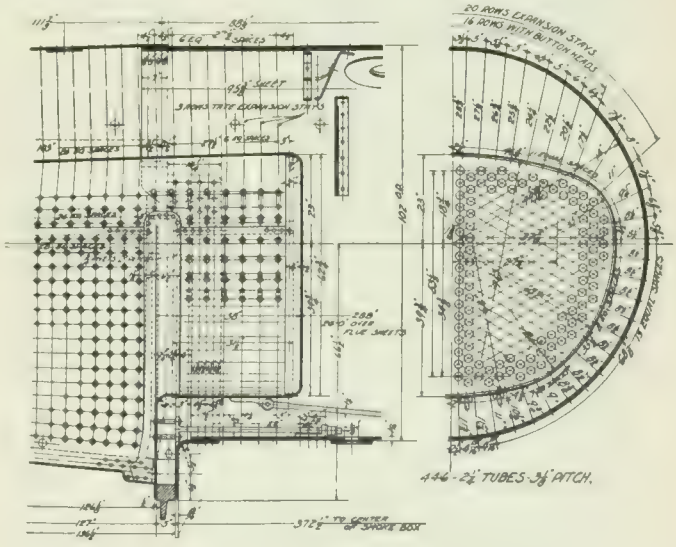


Fig. 3—A Combustion Chamber that has Given Good Service.

from an anthracite road and the particular claim was they thought they got better combustion and also derived a good deal of benefit in the way of protection of flues, particularly so, the boxes being extremely shallow below the flue sheet. Another member advises that they have had all combustion chambers removed on account of costing too much to maintain.

The advantages claimed by the use of combustion chamber are that it keeps the tubes within a reasonable length, protects the flue beads, increases the firebox heating surface and gives better combustion.

The committee feels that a combustion chamber is desirable on boilers with extra long flues, such as Mallet and Mikados, but are not prepared to recommend any particular design.

Firebox.—Continuous crown and side sheets are favored by all

of the members except one. Therefore, the committee recommends the use of continuous crown and side sheet for new construction or with renewal of firebox.

Mud-ring Corners.—The committee recommends mud ring with large radius, and the flanges of the tube and door sheet should be carried back far enough to get at least three straight rivets through the ring. Scarf the inside sheets down to be properly fitted to the mud ring by heating them. If the scarfing and the fitting of these sheets is given proper attention it will overcome leaky mud-ring corners that some of the members are now experiencing considerable difficulty with.

Throat Sheet.—From the replies received, the distance from the top of the grate to the bottom of the lowest boiler tube on wide firebox engines is a minimum of 14 in. and a maximum of 26 in., average about 22 in. Narrow fireboxes have a minimum of 13 in. and a maximum of 28½ in., average about 20 in. One member who uses hard coal advises a distance of 8⅛ in. minimum and 12 in. maximum. This height is limited due to the design of the locomotive.

The committee recommends as deep a throat sheet as the

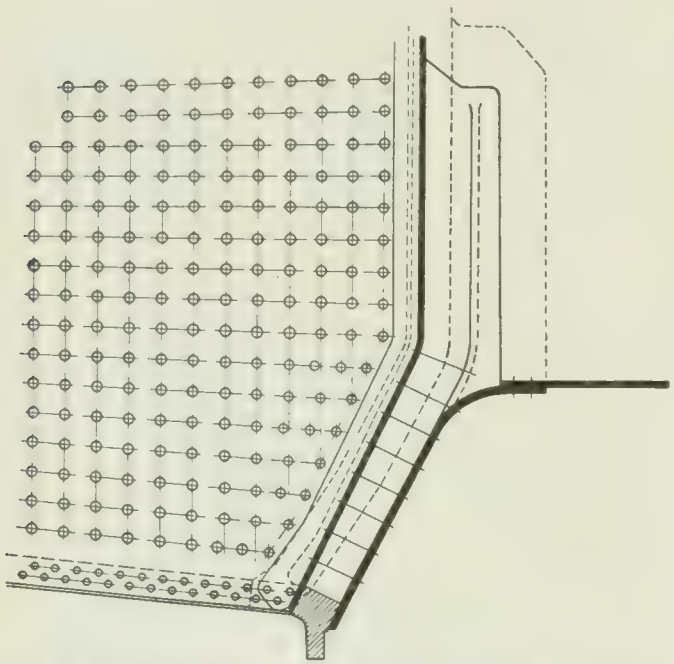


Fig. 4—Recommended Design of Throat Sheet for Boilers With Sloping Mud Ring.

design of the locomotive will permit. The committee also suggests the design of throat sheet as shown in Fig. 4, on boilers with sloping mud ring to allow for more uniform spacing of stay bolts and location of arch tubes and simplifies the flanging of the throat sheet and flue sheet. One of the members operating over 1,500 locomotives uses this design on the latest type of boilers. Boilers having a sloping mud ring with a firebox 60 in. long by 68 in. wide, throat sheet is 25⁵⁄₁₆ in. deep; fireboxes 120 in. long by 61. in wide, throat sheet is 15⅝ in. deep.

From the replies received in regard to thinning out of flue and door sheets, also the use of countersunk rivets where these sheets are joined to the side sheets, you will find the different methods followed out in Fig. 5. About 50 per cent. of the members thin out these sheets and apply countersunk rivets. It is generally acknowledged that the thinning of the sheets and the countersinking of rivets is necessary on oil-burning locomotives. The general practice seems to be to countersink these rivets about half way up the side sheet. No data were given in regard to which practice is the best from a maintenance standpoint.

Spacing of Rivets in Firebox Seams.—The committee suggests ¾-in. rivets spaced 2 in. apart, as this is used by the majority of the members who replied to the circular.

Design of Fire-door Hole.—Fig. 6 shows various designs of fire-door holes used by different members. Five members advise that they use style No. 2, which is the O'Connor type of fire-door. One of the members reports that they have 1,200 locomotives equipped with the O'Connor type of fire door for a number of years. On boilers equipped with this type of fire-door flange they have had several cases where the door sheets have remained in perfect condition although two sets of side sheets and a second back-flue sheet had been applied and cracked badly. In every instance the door hole remained in practically perfect condition when the rest of the firebox was cracked to the point of renewal. Boilers equipped with this type of fire-door hole gives larger water space, fewer stay bolts about the door seam, seems to give freedom for expansion and contraction and also largely prevents mud and scale collecting

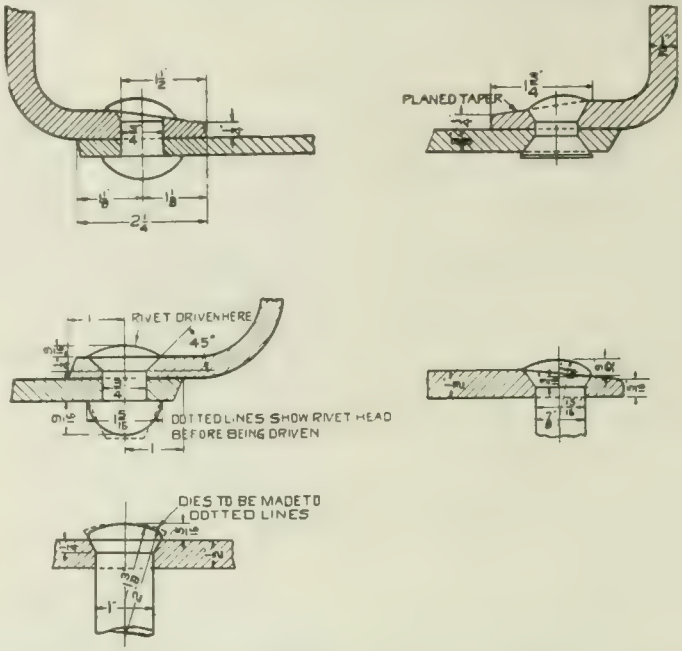


Fig. 5—Methods of Jointing Door and Flue Sheets to Side Sheets.

at this point. It seems to the committee that style No. 1 would have a tendency to collect mud and burn out. The committee has no choice between styles Nos. 2, 3, 4, and 5.

Number and Size of Fire Doors.—It is found that various

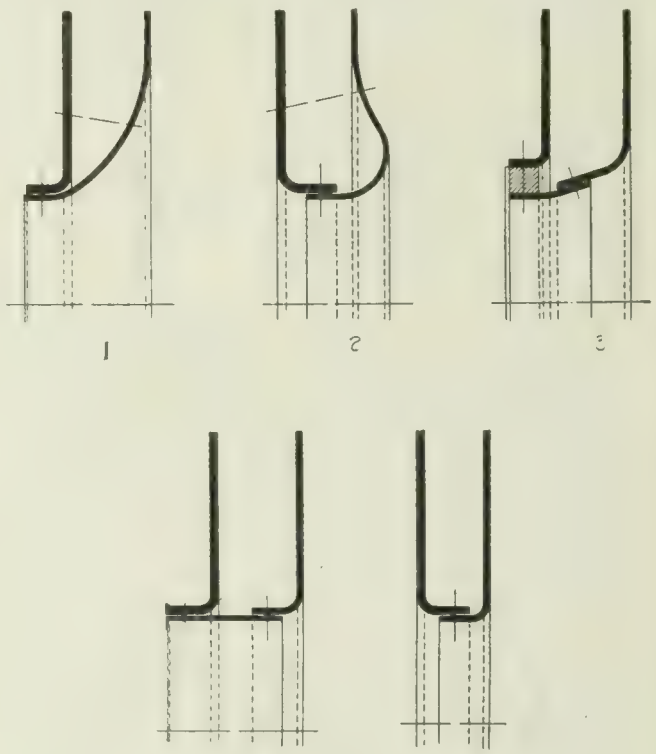


Fig. 6—Types of Fire-Door Holes.

sizes and numbers of door holes are used on different types of boilers.

Arch Tubes.—Of the replies received, 20 members use 3-in. tubes, one member uses 2-in. tubes and one member uses 2¼-in. tubes. Eight members do not use arch tubes at all. One

member supports brick arches with studs fastened into the side sheet.

Thickness of tubes used: 15-in., 165-in., 18-in., 203-in., 25-in. Eight members use thickness of .18-in. Eleven members use seamless steel, one member uses charcoal iron, thickness of tube not given.

Plugs or Plates for Covering Arch Tube Holes in Throat Sheet and Back Head.—Fourteen members use brass plugs, one member uses extra large size brass plugs for covering the holes; these plugs are drilled for 2¼-in. plug so as to avoid removing the large brass plugs when washing the tubes. Three members use plates with ball joints, as shown in Fig. 7, claiming greater ease in removing and applying in close quarters.

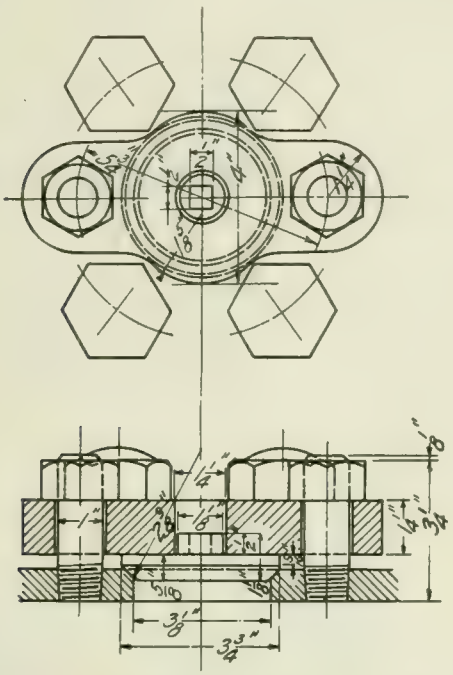


Fig. 7—Plates for Covering Arch Tube Holes.

Method of Setting Arch Tubes.—The setting of arch tubes varies. The replies received were indefinite as to just what practice they are following out. Six members did not state whether they use copper ferrules or not. Nine members advise that they use copper ferrules in setting arch tubes. Three members set the arch tubes without ferrules. Three members set the tubes with a roller expander and a sectional expander to be used in the ordinary manner to set out the tube, as shown in Fig. 8 (A). Tubes are then beaded over with a bootleg

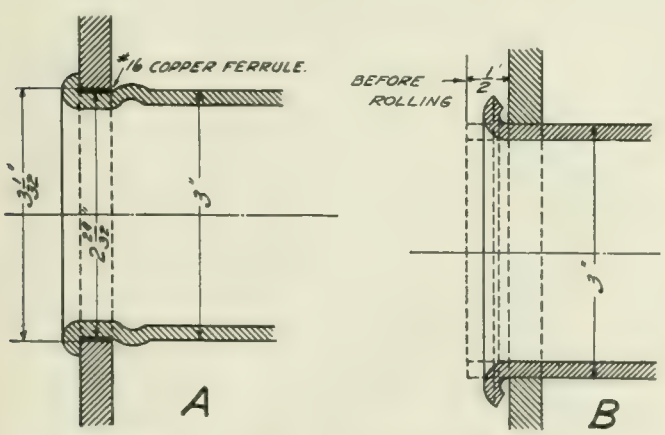


Fig. 8—A Type of Arch Tube Setting.

tool, except by one member who bells out the tube on the water side to prevent the tube from pulling out of the sheet. This member does not use any ferrules. The other two members do use copper ferrules. Fig. 8 (B) shows the arch tube setting as used by one member.

For the information of the members you will find complete set of instructions for setting arch tubes, which is being used by several large roads with success. This covers tubes expanded and beaded on the outside as follows:

Original holes in firebox sheet must be 3 3/32 in. in diameter. Worn holes must be reamed when more than 1/16 in. out of round. Sharp edges must be removed by slightly rounding with file or reamer.

Copper ferrules must be used at both ends of arch tubes. Ferrules should be 3 in. outside diameter, .095-in. thick and ⅝-in. long, expanded by carefully hammering on a round mandrel to snugly fit the hole. Ferrules should be set with 1/16-in. projection on each side of sheet and secured in place with a roller expander.

Tubes must be 3 in. outside diameter, 18-in. thick seamless drawn steel. The tubes should be cut to proper length and bent to template conforming with drawings. The length can only be determined by actual measurement of the firebox and allowance must be made for projection of ½ in. into water space at each end of firebox. Tubes must then be securely fastened with the roller expander. See Fig. No. 1, in Fig. 9.

After tubes have been set they must be flared at both ends with the flaring tools shown in Fig. No. 2 of Fig. 9. After the tube ends have been thoroughly flared the tube ends are then ready for beading.

Additional flaring with tool shown in Fig. No. 3 of Fig. 9, is necessary to start the bead. The bead must then be formed with special beading tool, Fig. No. 4 of Fig. 9. Notice that it is not desired to form a full bead. The bottom of bead should stand 1/16-in. clear of the sheet.

These tubes should be thoroughly examined and cleaned at each washout of the boiler. At the least indication of scale formation in the tubes the pneumatic tube cleaner must be used. The tube cleaner should be secured

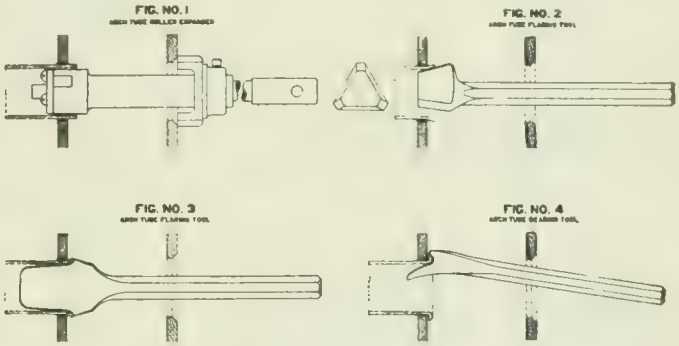


Fig. 9—Maintenance of Arch Tubes.

to a length of ½-in. air hose to which is attached another ½-in. hose for supplying water while cleaning. Care must be taken so as not to break the cleaning cutters by allowing the cleaner to be pushed through the opposite end of the tube. A stop must be provided on the hose set at the proper length for this purpose. The tube cleaner must be lubricated with signal oil fed through a lubricator in the air-supply pipe at the rate of 30 drops per minute. After cleaning, the tubes must be inspected by holding a light at the opposite end of the tube to make sure that the tubes are thoroughly cleaned and free from scale. Leaky tubes must be stopped from leaking by rolling with an expander. Before rolling the tube ends must be thoroughly cleaned from scale.

The committee has been unable to get any information in regard to which type of flue setting gives the best service, therefore are unable to make a recommendation as to which type should be recommended as standard practice.

Radius of Flange in Back Tube Sheet.—Replies received in regard to the radius in the back tube sheet where it connects to the crown sheets. Recommendations were made from ½ in. up to 2 in. Some members had trouble with cracked sheets and leaky seams with large radius; others had trouble with the small radius. One member advises that he is now experimenting with a 4-in. radius and it seems to give good satisfaction, but it has not been in use a sufficient length of time to give a complete report. Two members increased the radius from ⅞ in. to 2 in. and had considerable trouble with the flue sheet working up and the flanges cracking. Two-inch radius has been discarded and they are now using ⅞ in., which improves the condition but does not eliminate the difficulty entirely. Another member reports a 3-in. radius satisfactory.

Distance from Inside of Flange of Back Flue Sheet to Edge of Flue Holes.—The committee recommends that a distance from the inside of the back flue sheet to the edge of the nearest flue hole to be ample to prevent the flue sheet cracking through the flange. This distance will vary, depending on the radius of the flange of the tube sheet. In tube sheets with ⅞-in. radius, this distance should be at least 2 in. at the top, ⅞ in. on the side. Sheets with 2-in. radius, this distance should be at least 2½ in. at the top.

Throat Sheet Brace.—The committee had the members submit designs of throat-sheet belly brace used and Fig. 10 shows 12 styles of braces, the design of brace for this location to be such as to avoid any mud pockets and so as to allow for proper circulation of water.

Method of Supporting Grate Side Frames.—The committee recommends the grate frames to be supported from studs in the mud ring or brackets fastened to the under side of the mud ring, the latter forming a pocket for the grate side frame to fit into.

Sloping Back Heads.—Sloping back heads are used by practically all of the members who replied to the circular. The

slope varies from 8 degs. to 20 degs., making an average slope of 12 degs. Sloping of back heads gives additional room in the cab, reduces the weight of the boiler and gives a maximum length of fixebox, and still remains within a reasonable limit for hand firing.

Staybolts.—Uniform spacing of all staybolts in all parts of the firebox is recommended by the committee. The majority of the members reported the use of button-head crown stays for the 6 to 9 center rows of the crown sheet the entire length; two members use hammered heads for the first 4 or 5 rows from the flue sheet.

The committee favors the use of button-heads on as many rows as the design of firebox will permit, but recommend for the consideration of members the practice of using hammered heads on the first 4 or 5 rows back from flue sheet.

Sling Stays.—Figs. 11 and 12 show the various types of sling stays in use by the different members and no difficulty with any of these types have been reported. Three members use a special flexible staybolt on all new equipment, and the use of this type of sling stays is also favored by, but not used by,

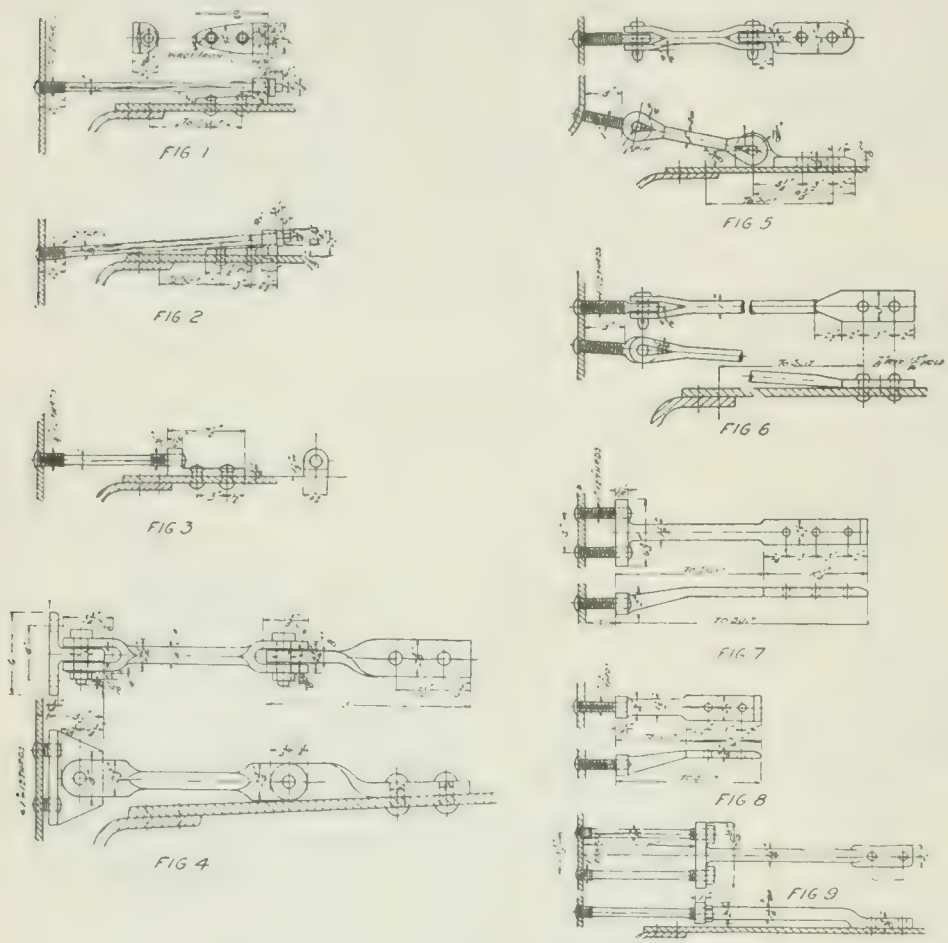


Fig. 10—Designs of Throat-Sheet Belly Brace.

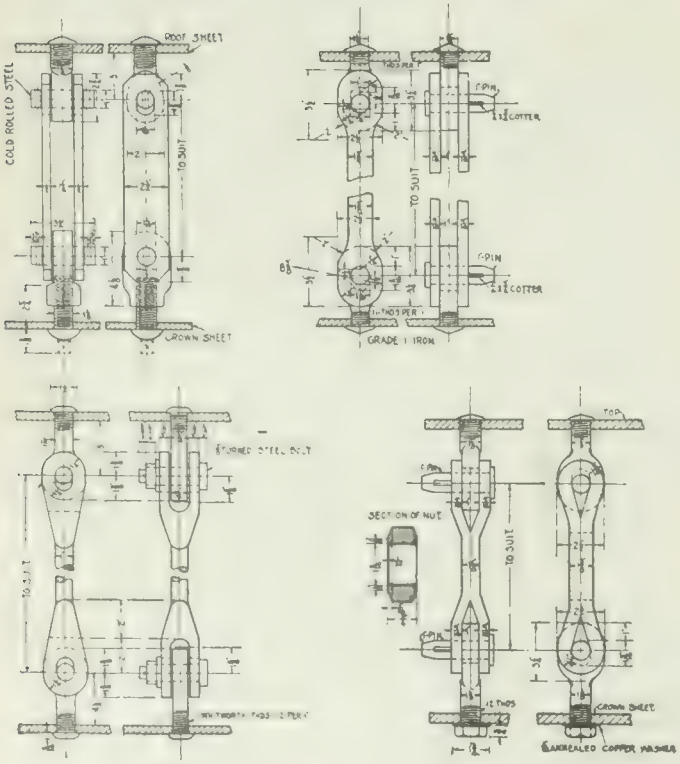


Fig. 11—Types of Sling Stays.

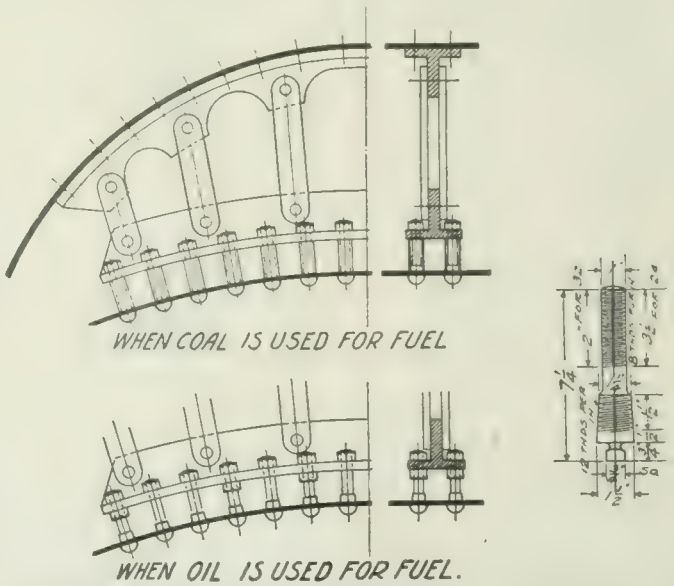


Fig. 12—Sling Stays for Both Coal and Oil Boilers.

another member. Sling stays are used to the extent of 2, 3 and 4 rows back from the tube sheet on boiler with combustion chamber.

Flexible Staybolts.—Of the members who have replied, all except one member use flexible staybolts. Most of the members apply these in the breakage zone. Five members are making full installation of flexible staybolts on boilers with wide fireboxes, and one member uses them in the throat sheet, only. One member has the following report to make:

"In February, 1907, engine received a new firebox with a full installation of flexible staybolts, with the exception of 4 bolts under the auxiliary dome and 4 under the steam turret; also 8 bolts which go on top at the back head. February, 1908, the engine received general repairs and the firebox was in good condition. All caps were removed from the flexible staybolts and they were found to be o. k. In April, 1909, it was found necessary to patch the top of the back tube sheet on account of the sheet cracking from the hole around the flange; this was done in the engine house. In October, 1909, the engine was given general repairs, and by this time the top of the back tube sheet had given out in two more places, but as the sheet was in good condition otherwise it was patched. Three of the mud-ring corners also had to have small patches applied. After rattling the scale from the firebox sheets with a large hammer, it was found that 40 of the flexible sleeves had cracked outside of the sheet, and on being taken out they were found to be crystallized, but no broken bolts were found. In 1911, the engine was again in the shop for general repairs and had all the caps removed from the flexible staybolts and the bolts found to be o. k. A patch was applied on the top flange of the flue sheet, but the half side sheet seam in the firebox was in good condition. When the engine is shopped again it will be necessary to renew the back flue sheet on account of its being patched. This engine has made 319,557 miles to November, 1911, and has lost no time due to broken staybolts."

One member advises that they have equipped some fireboxes with a full installation of flexible staybolts, but can see no advantage in doing this. In their opinion the flexible staybolts are only advantageous when applied in the breakage zone, and

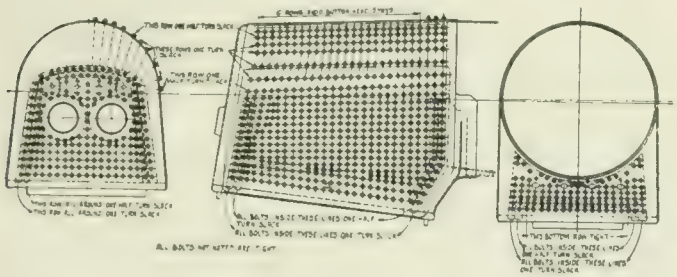


Fig. 13—Rivet Spacing Showing Location of Flexible Staybolts.

they have discontiuued making full installations and are only applying them in the breakage zone. However, a full installation of flexible staybolts in the throat sheet is being used by quite a few members with good results.

Three members advise that they allow a certain amount of slack when applying flexible staybolts. Fig. 13 shows the amount of slack and the location followed out by one of the members. It is the brief that an application of this kind will decrease the number of broken staybolts and allow for a greater expansion and contraction, which prevents the cracking of firebox sheets and increases the life of firebox correspondingly.

The committee believes that this is a subject worthy of further consideration and would suggest that some more of the members carry on a further investigation and make a report at some future date to this Association.

Tube.—It is the consensus of opinion of those reporting that 2-in. tubes are preferred, until the length of tube exceeds 16 ft., when 2¼-in. tubes are then preferred.

Taking into consideration that a 2-in. tube will give a greater amount of tube heating surface, and the cost of maintenance is less, and less damage is done to the tube sheets in working over the flues, the committee suggests that further consideration be given to the use of 2-in. tubes in lengths greater than 16 ft.

Thickness of Front Tube Sheet.—One-half inch and 5/8 in. are used by the majority of the members who replied to the circular. One member uses 9/16 in. and another ¾ in.

Thickness of Back Tube Sheet.—One-half inch tube sheets are being used by 16 of the members. Two members use 9/16 in. and one member uses 5/8 in. All but three report having more or less trouble with flue sheets working up on account of frequently working on the flues, causing the flue sheets to crack across the top of the flange of the sheet. One member reports that this trouble occurs only on the radial type fireboxes. The crown bar and Belpaire type never crack in this way. The top flanges get bent down on the two latter types, the same as in the radial type, but no cracking takes place. They have used eye bolts in crown sheet and roof sheet and sling braces between; also have a number of boilers equipped with flexible expansion stays in the first four rows across the front end of crown sheet, but there does not seem to be any method of bracing yet devised that will overcome this trouble. He suggested that the top of the flue sheet on radial type fireboxes be made straight across top for 24 in. each side of center and make front end of crown sheet conform to this shape.

Width of Bridges.—The width of bridge in the front tube sheet varies from ½ in. to 15/16 in. Three-fourths inch is used by the majority of the members. Width of bridge in the back tube sheet varies from 11/16 in. to 15/16 in. Three-fourths inch is used by the majority of the members.

Flue Setting.—Two members advise that they have tried out soft iron ferrules with very little success. One member advises that they had a limited experience trying to set flues in the back flue sheet without any coppers, but found that it did not work satisfactorily, and that they are now experimenting with a combined copper and iron ferrule, but have not had these under a test long enough to make any report. One member advises that they use soft iron shims on the front flues to avoid excessive expanding.

Setting of Flues in the Front Tube Sheet.—The consensus of opinion of the roads reporting is that tubes should be rolled in the front tube sheet without any ferrules, and 10 per cent. of the flues, equally distributed, should be beaded with a beading tool.

Tube Setting in Back Sheet.—Fig. 14 show the practice fol-

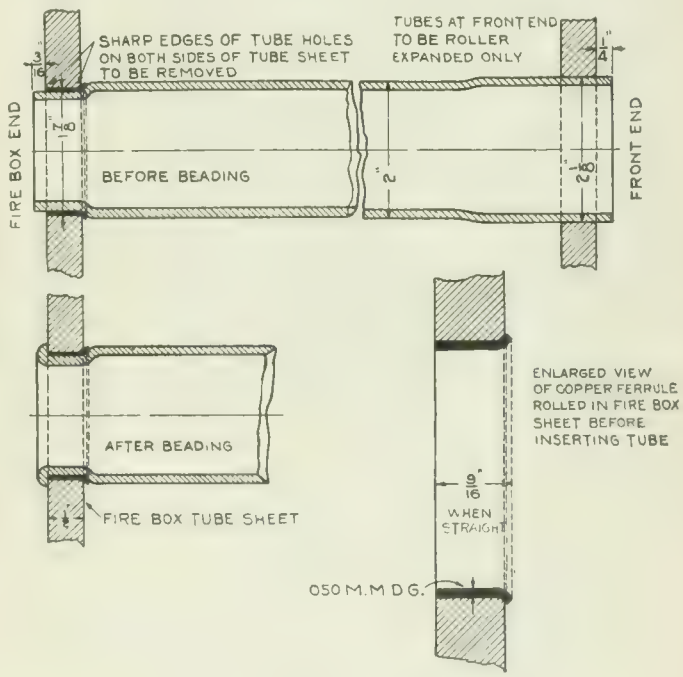


Fig. 14—A Method of Setting. Flues.

lowed out by some of the members in setting the tubes, which are giving good results. Fig. 15 shows the application, maintenance and removal of flues in locomotive boilers as used by three members. Tube setting of this kind gives a large bridge, good circulation of water at the back tube sheet and at the same time the inside of the flue is reduced at the end, so that any cinders which will pass through the swedged end will not clog the flues. The instructions in connection with Fig. 15 are as follows:

Holes in the new firebox flue sheet shall be 17/8 in. diameter. Holes in the new smokebox flue sheet shall be 2 1/32 in. diameter. Holes in an old flue sheet more than 1/32 in. out of round must be reamed (reamer Fig. 1). Inside and outside edges of the flue holes in both sheets must be slightly rounded to remove any sharp edges. The following is the method used:

Flue-sheet Holes (Fig. 1)—Care should be taken that holes in flue sheet are true, smooth and free from burrs and sharp edges. It is desirable that the flue hole have a fillet especially on the water side of about 1/32-in. radius. A sharp edge around the hole often cuts the ferrule in two, even cutting into the flue. The diameter of the flue hole should be the same as outside diameter of flue plus 1/32 in.

Copper Ferrule (Fig. 2)—For New York this should not be far different from No. 16 B. W. G. In old flue sheets when the flue holes are large it is desirable to use enough heavier ferrules to bring the internal diameter

of ferrule when expanded into flue sheet to ⅛ in. less than flue diameter. The ferrule should be set into flue hole flush with fireside and expanded into place with Prosser expander, Fig. 3.

Swaging Flue (*Fig. 4*)—Great care should be taken to give the swage the right length and to have it terminate in as abrupt a shoulder as possible. The flue, after it is swaged, should be annealed and the scale removed from the portion entering the sheet. Grinding this scale off by machine is desirable, but in the absence of a grinder the removal of the scale with a file will answer. The flue when driven into the sheet (Fig. 5) should extend 3/16 in. through the sheet on the fire side.

Rolling (*Fig. 6*)—The front end of the flues having been shimmed, when necessary, both the back and front ends are rolled with the dudgeon or other suitable roller, with proper appliances they may be safely and economically rolled by air; the rolling of the back ends must be done by an experienced boilermaker, and the motor must not be larger than a Thor No. 22 or its equivalent.

Beading (*Fig. 7*)—This may now be done with a beading tool in an air hammer. Do as little hammering with the beading tool as possible, and do not work bead to a feather edge, but leave as much metal as possible for future caulking.

Expanding (*Fig. 8*)—Particular stress should be placed upon this, the most important step in the flue-setting process. Care should be taken that the flue shoulder when heavily expanded bears snugly and firmly against the flue sheet. Hammer not to exceed 4 lbs. after prossering the front ends, then bead a sufficient number for safety which finishes the flue setting. Back ends of flues or safe ends when used in back flue sheet must be cut off square in pipe machine and burr removed by reamer. Wheel-flue cutters must not be used on account of leaving a heavy burr which splits when beading over.

NOTE.—Air motor and roller are only to be used on initial setting. In reworking flues, the Prosser expander only is to be used, and rollers must not be used, as they force the bead away from the sheet.

Copper ferrules 1¾ in. inside diameter, 1½ in. long, .095 in. in thickness shall be used in firebox flue sheet only. Ferrules shall be secured in place with straight expander, Fig. 2, taking care that shoulder of expander is tight against flue sheet, which shall bring edge of ferrule 1/32 in. from fire side of sheet.

Flue safe ends should be 5 in. in length, except that new iron flues shall have safe ends 4 in. long, and when these flues are first removed the 4-in. ends will be cut off completely and 6-in. ends applied, after which 5-in. ends should be used. Flues shall be swaged as per Fig. 4, to 1 11/16 in. outside diameter by 3 in. long, including taper at firebox end, for new work; for old work, just enough to enter the copper ferrule. All scale must be removed from swaged ends of flues before application. Smokebox end of flues shall not be more than 1/32 in. less in diameter than holes in the smokebox flue sheet. If necessary, liners may be used.

Flues shall be placed in back flue sheet with a bar, Fig. 5, and project ¼ in. through the sheet. Gage, Fig. 6, shall be used in checking location of flues. Flues shall then be fastened at firebox end with straight sectional expander, Fig. 7. While flue is being fastened it may be held in place at front end, using bar, Fig. 5. Straight sectional expander shall be checked with master gage, Fig. 8. Before using sectional expander, and in order to obtain exactly the proper length of flue for beading, flues may be rolled lightly to fasten them in sheet with roller expander, Fig. 15. After all flues are fastened they shall be flared at firebox end, using flaring tool, Fig. 9, and long stroke riveting hammer.

Flues at firebox end shall be expanded with sectional expander, Fig. 10, and long stroke riveting hammer. Roller expander must not be used. Pin shall be driven into expander until flue is solid against flue sheet. This must be done three times, expander to be slightly turned before each operation. The expanding shall be performed as follows: First, two vertical rows, from center to top of sheet. Second, same rows from center to bottom. Third, the two horizontal center rows from center to right. Fourth, same rows from center to left. Fifth, all remaining flues. All flues must be carefully inspected after expanding to assure that recess in each flue is the full depth to recess in expander and even all around the flue. Sectional expander, Fig. 10, to be checked with master gage, Fig. 11.

Flues in firebox flue sheet shall be beaded with standard beading tool, Fig. 12, and short stroke riveting hammer. Care must be taken so that nothing enters between head and flue sheet. Beading tool must conform accurately to master gage, Fig. 13, at all times. Smokebox end of flues shall be tightened with flaring tool, Fig. 14, before rolling takes place. All flues in smokebox end shall be rolled with roller expander, Fig. 15.

FLUE MAINTENANCE.

The firebox end of flues in service must be expanded at regular intervals with sectional expander, Fig. 10. This work shall be done when boiler is empty and all flues thoroughly cleaned out. Flue leaks in the firebox must be stopped with the sectional expander and not with roller expander nor beading tool. If beads are slightly away from flue sheet, standard beading tool shall be used to bring beads tight to sheet. Sectional expanders and beading tools must be kept standard by frequently comparing with standard gages. Any beading tool not conforming to gage must be sent to principal shop for repairs; these tools must not be repaired at any other shop. All shops and engine houses must be equipped with standard gages. All gages will be made where master gages are kept. To remove flues, use flue cutter, Fig. 16, for the front end, cutting off flues as close to the front flue sheet as possible. Back ends should be split as little as possible, so that it will not be necessary to use safe ends longer than 5 in.

Setting of Superheater Tubes.—Front Tube Sheet: Only eight members have had any experience with setting large superheater tubes. The practice followed out mostly is that

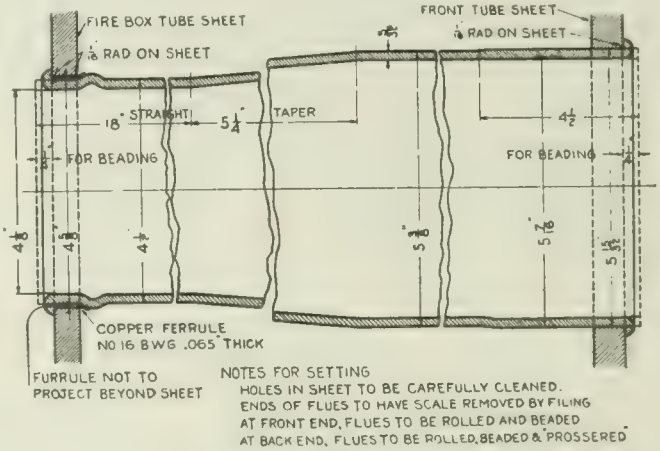


Fig. 16—Setting of Superheater Flues.

the tube is rolled and beaded as shown in Fig. 16, and this type of setting is suggested by the committee for further consideration.

Back Tube Sheet: Eight members advise that they use copper ferrules; one member who omitted copper ferrules is having good success with this method. The consensus of opinion of the roads reporting is that the type of setting shown in Fig.

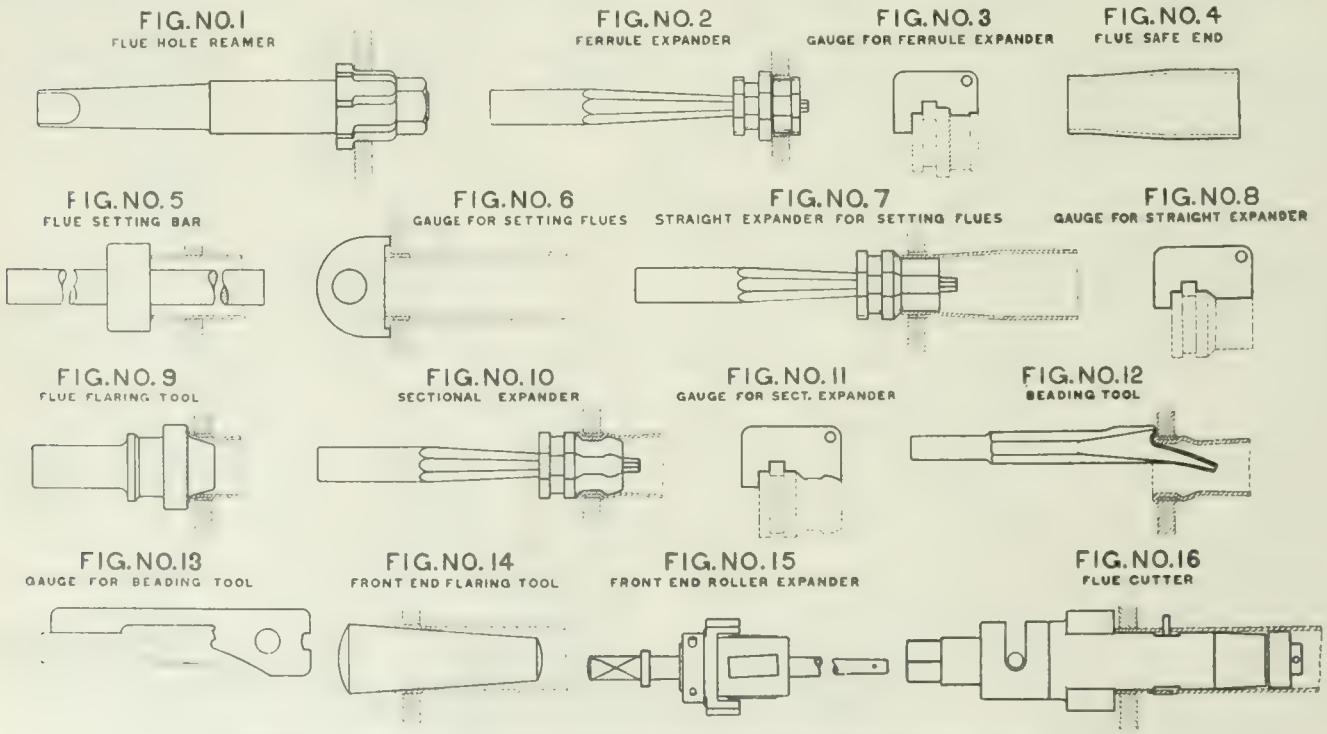


Fig. 15—A Method of Applying, Maintaining and Removing Boiler Flues.

16 is preferred, and the committee suggests this setting, except that the copper ferrules should be No. 13, .095 in. thick, instead of No. 16, .065 in. thick.

Circulation of Water.—The committee took up the question with the members whether any of them employed any special feature of design to facilitate circulation of water. It was found that no member has any special design for this purpose. Four members advise that they use baffle plates in the boiler shells, located ahead and rear of the dome. This is to prevent, as much as possible, the water from surging when making quick stops.

Seventeen members deliver the feed-water to the boiler in the first course on the horizontal center line. The distance from the front flue sheet varies; the minimum distance is 22 in. and the maximum 6 ft. Five members advise that they deliver feed-water to the boiler through the top as well as from the side. One of these members advises that they have never been able to find any particular improvement which the top check has over the side check. Two of these members prefer the water to be fed into the boiler from the top. Boilers having the checks on top of the boiler have a pan-shape deflector under the check valve which catches the water and prevents any direct stream of water falling on the top of the flues. One member advises that they deliver the feed-water in the first course on the horizontal center line and use a deflector plate placed a short distance away from the boiler course. This is to direct the water to the bottom without striking the tubes. Four members have an attachment on the inside of the injector check to deliver water upward away from the tubes. One member advises that in addition to circulating water from the horizontal line of the boiler they have some locomotives with the delivery pipe passing through the back head, extending from 3 ft. to 6 ft. from the front tube sheet, and the end of the pipe set to deliver water towards the side of the shell; the end of the pipe is submerged.

The committee has no recommendaton to make in regard to any particular location where the water is to be delivered to the boiler, as any of the above arrangements seem to give entire satisfaction.

Auxiliary Dome or Manhole Cover to Facilitate Interior Inspection of Boiler.—One member advises that they provide an auxiliary dome, or manhole, for interior inspection of boiler. The size of manhole is 15 in. in diameter, located a short distance ahead of the back flue sheet. This is submitted for consideration, as it makes inspection of the interior of the boiler possible without removing the throttle standpipe and dry pipe. One member of the Association is using larger dome in new construction to accomplish the same result.

Surface Blow-off Cocks.—Four members use surface blow-off cocks. One of these members has discontinued using them while the other two members, using surface blow-off cocks, have located them on a line with the second gage cock, and advise that they get good results from the use of both the blow-off cocks and surface blow-off cocks by getting rid of the mud and scale by blowing the boilers regularly. One of the members locates the surface cock on the left side of the boiler head just above crown sheet and is connected to a perforated pipe about 4 in. above crown sheet and extends to the front end of crown sheet and branches both ways to within 8 in. of sides of boiler and about 6 in. above flues. Perforated pipes lead from cross pipe nearly to front tube sheet. When properly used this device is of considerable value in cases of foaming. One of the members, who operates about 1,400 locomotives, advises that on certain engines in bad-water districts the Talmage type of blow-off is used.

The committee has no recommendation to make in regard to the number or where the blow-off cocks should be located. The number and location of blow-off cocks depends on the quality of water used.

Filling of Boilers.—One member advises that they have had a number of side sheets cracked by filling through blow-off cocks located in the water legs. They did not state whether they used cold or warm water. They are now filling through the blow-off cocks located in the barrel of the boiler. Another member advises that they have had considerable experience with sheets cracking from the filling through blow-off cocks with cold water. They now fill boilers through injectors when using cold water. It seems to be the censensus of opinion of the members that it is most advisable to fill the boilers from the blow-off cocks in the water leg, providing warm water is used. If cold water is used it should be filled through the valve on top of the boiler or through the injectors, and the committee recommends that this practice be followed out.

Washing Out and Filling Up of Locomotive Boilers.—The reports regarding washing out and filling up of locomotive boilers and the use of blow-off cocks were so at variance with what is generally considered good practice, the committee would strongly recommend the appointment of a special committee to report thereon.

Location of Fittings.—Gage cocks and lower column cock should be located so that they will not come directly back of gusset plate or stay angles, and not to be located directly over arch tubes.

The report is signed by D. R. MacBain (C. R. I. & P.) chairman; C. E. Chambers (C. of N. J.); T. W. Demarest (Penna.); F. H. Clark (B. & O.); R. E. Smith (A. C. L.); J. Snowden Bell and E. W. Pratt (C. & N. W.).

DISCUSSION.

F. F. Gaines (C. of Ga.): I think this is one of the most valuable reports that we have had submitted in a long time, and I am sure the association is under great obligations to the committee for their very thorough work. As regards the question of a large mud ring radius, it has been my experience that this is not altogether desirable. We have had some trouble with the large mud ring radius where we have not had it with the small one, and after having tried it we have gone back to the small radius. In regard to the question of arch tubes; I notice the general practice is to use tubes .18 in. thick. I would like to say that I have obtained better results from the .15 in. than I have from other types. Also concerning the radius of the flange in the back tube sheet; I found a smaller radius there gives better results, and after experimenting with a large radius, I have gone back to the small radius. I would also like to endorse the method of using sling stays referred to with the flexible arrangement. I also endorse the plate Z-1, as regards flue setting.

I also would like to call your attention to one other thing that there has not been much said on, in regard to the circulation of water. I find that, contrary to all theory on the subject, wide water legs in the fire box has not proven, according to all my tests and experiments, as good as the narrow water space, much better results being obtained from the narrow water space. In engines built exactly alike, in every respect, except one having a large water space, and the other a small water space, the small water space engine is a much freer steamer in every way. Of course, it is a little hard on the staybolts, but with the use of flexible staybolts, I think we are fully justified in using the smaller water space.

M. H. Haig (A. T. & S. F.): In the oil burning engines, a radial stay is being used which has a tapered head and no button head. It is screwed into the crown sheet within a short distance of the bottom of the tapered portion, and that end is then riveted over. The taper is 1⅜ in. in 12 in. The thread is 12 threads per inch (Whitworth standard). The oil burning service is a little harder on fire boxes than the coal burning service, and as this radial stay gives very satisfactory service in oil burning engines, there is every reason to believe it would be equally, if not more, satisfactory in coal burning locomotives.

It is the practice of one road that I know of, to apply 6 rows of button head stays at the center of the crown sheet for coal burning engines, and use the radial stay which I have explained, entirely on the oil burning fire boxes. I have referred to this radial stay and given these dimensions, as the matter was not included in the report of the committee. With regard to the mud ring, I also noticed that there was no reference in the report to a greater depth of mud ring immediately at the corners to provide for caulking. One railroad uses what you might call a heavy boss at each corner, which is about ¾ in. thicker than the remainder of the mud ring.

Reference is also made in the report to the O'Connor type of fire-box door. The road by which I am employed has applied that arrangement on all engines that have been built in the last few years, and it has given very satisfactory service. A request for information as to the performance of this door on the various divisions of the system has resulted in reports that the performance is very favorable. With regard to the large dome to facilitate entrance to the boiler to permit inspection, in my opinion it is a very commendable recommendation. In practice, the boiler inspection rule requires that the throttle must be removed, or that the information be given that an inspection is being made, as far as possible, without removing the throttle. If domes are made large enough to facilitate entering the boiler conveniently, I think that is a point which could be well taken up, to advantage. I mention that for the reason that rule has caused some confusion in certain districts with which I have been associated, and some of the boiler inspectors are not just fair as to how they shall make the report, and the Government inspectors are rather strong on that. I think that point could also be looked into with good advantage.

D. P. Kellogg (S. P.): We are using the same style of radial stay that Mr. Haig referred to, with good results, except that we use 1½ in. taper. We go a little further and use a thimble on the crown bar bolt, which goes up against the crown bar and eliminates the necessity of caulking into the crown

bolt. Lately we have been applying that without riveting, simply depending on the taper, and we have got good results.

The report speaks of the difficulty experienced from the flue sheet travelng up by reason of the expansion of the flues. In putting in a new fire-box we drop the crown sheet down, and try to make it half the distance we expect it to rise in service, thus dividing the amount of travel, giving it half the amount to start with, and allowing for the other half to bring it to slightly above the straight position.

W. E. Dunham (C. & N. W.): The committee mentions the .18 in. arch tubes. We have been doing some experimenting, using a No. 7 gage and a No. 10 gage arch tubes, both iron and steel tubes, but in the bad water districts of Minnesota and Dakota we find there is not much material difference in the two gages of tubes. The greatest trouble there, especially in South Dakota, is to keep the water in the tube. I do not just understand the reference where the committee makes a reference to the radius of the flange in the back tube sheet, and that 2 members had increased the radius from 7/8 in. to 2 in., and then have gone back to the 7/8 in. It would seem from reading the report that there was an improvement made by going to the 2 in. over the 7/8 in radius, and I do not quite understand why the members referred to should have returned to the use of the 7/8 in. radius.

In regard to the matter of radial stays with the button head: The committee seems to indicate that the use of hammered heads in the central rows at the top are not general. We considered that the use of the hammered head, especially at the forward end of the box, was entirely a matter of safety and ought to be generally used. In connection with the Federal inspection of the domes and inspection of the stays on the front flue sheet, I see that there is no recommendation brought out on that point, although the report mentions the use of an auxiliary dome or a manhole for the inspection of the boiler. That possibly could be taken care of. I have been thinking of locating an especially large water-washing plug near the front flue sheet, and at the top of some of our small boilers so that we can observe these stays.

Mr. Gaines: In reply to Mr. Dunham, I would like to say that the reason from going from the larger radius flue sheet to the smaller radius flue sheet was due to the trouble we had with the larger flue sheet cracking and breaking. Our experience showed that the smaller radius gives very much less trouble in this respect than the larger radius.

J. F. DeVoy (C. M. & St. P.): So far as my personal opinion is concerned, the report is about the best I have ever seen. I do not understand exactly now, even after Mr. Gaines has explained it, why he went to the smaller radius sheets, other than transferring the expansion which you naturally get in the large radius, back to the location between the rivets and the first sling-stay. It would simply transfer the expansion from one to the other and it might relieve the cracking in that way. With regard to what another member said relative to oil burning boilers receiving harder service than coal burning boilers, that is not our experience in the past year. In our first oil burning engines we did not protect the seams and the rivets. For the past year we have covered all the seams and all the rivets with brick so that there is not anything which is any more severe on the fire-box than there was in the coal burning locomotive, and the only suggestion that occurred to me in reading this report was possibly the fact that later on the committee could designate in some way a standard method of protecting an oil burning fire-box by the proper location of brick.

There is only one thing in regard to sling-stays in an oil burning locomotive; it is the button head. On the Chicago, Milwaukee & St. Paul we use a copper washer, only on the coal burning locomotive, and we still find that in our territory this is as good as any other method. In oil burning locomotives the button head is used altogether. I would like to see some attention given here to the distance from the belly of the boiler to the lower point of the mud ring.

W. J. Tollerton (C. R. I. & P.): I would like to call attention to Fig. 5; the scarfing of the seams and riveting the seams. We have been operating the scarfing of riveted seams for about 4 years, and we know that it does eliminate the flange cracking from rivet holes. By scarfing the seam down ½ the thickness, we have been able to run sheets 18 months without cracking at the rivet holes, and I believe it is a great advantage.

Mr. DeVoy: I want it understood that my remark as to the riveting of seams was directed entirely to oil burning locomotives, of which we have about 150, and did not in any way refer to a coal burning boiler.

S. L. Bean (A. C. L.): Concerning oil burning engines, I might say that we used the submerged seams with the present door sheet. As to the flue sheet, we tried the submerged for a short time, and it worked fine; but we have to work the flues so hard that a vertical expansion takes place, and as it goes up you encounter a greater defect. Your crown sheet cracks right across, immediately back of the flue sheet. With the door sheet it works fine where there is no working of flues to disturb it and it helps it wonderfully. One of the gentlemen spoke with reference to putting on some brick. That helps it, but it is desirable to get away from it, and we only use that to prolong weak boxes. We find that the button head stays will peel off in a year or so. We invented this taper head and slightly riveted it over, and now they last practically the life of the box without renewal. Occasionally we do have to renew some of them. We have extended the oil burning firebox period of service from about 18 months to a record as high as 7 years in heavy consolidation locomotives used in mountain service and in a bad water district. And I am free to recommend that taper radial stay. It will surely hold under all conditions, and I don't think it costs any more to apply than the button head. I think Mr. Kellogg will bear with me on that.

With reference to the doing away with the large flange in the flue sheet or bend, we find with a short bend that the metal was somewhat disturbed and a pitting took place much quicker. We also found that with the thimbles under these crown bars, the forward end pit immediately under the thimbles and destroyed the life of the firebox. We took them out and now find we prolong our boxes a great deal by patching. There is where the seam brick comes in pretty well. You can patch the top flange of a flue sheet with a submerged patch, and by using a light seam brick we sometimes get over a year's increased service at a slight expense.

E. W. Pratt (C. & N. W.): I would like to ask Mr. Bean if they use a thimble under the crown bars on their oil burning locomotives.

Mr. Bean: Three in each row. We do that in order to keep away from that burning.

J. A. Pilcher (N. & W.): I wish to say in connection with the matter of construction that we have been making some experiments with every wide water space, as much as 7 in., and it has been very favorable. We have been using it now for several years and applied it to something like 250 locomotives, and I understand from the reports that we have been getting, that it has decreased the stay-bolt renewal as well as increasing the circulation, and keeping the boilers clean around the mud ring. Of course, like most boilers on large locomotives, we have had some trouble in getting all of the depth to the front leg of the firebox that we would like. It seems to me the increase of the water space has been entirely favorable.

Mr. Gaines: I would like to ask some of the members who have had experience with oil burning locomotives, about how soon we should look for trouble when a coal burning engine has been changed to oil burning.

Mr. Kellogg: I will answer Mr. Gaines, that he will have no trouble until he gets out the button head that Mr. DeVoy said he was using already. I cannot use it. I would say that this method of reducing the flange is also very necessary. We want nothing projecting inside of an oil burning firebox that can possibly be prevented.

Mr. DeVoy: I absolutely agree with the last speaker, and perhaps he was mistaken. You cannot have anything projecting at all. We countersink all the rivets and the flange stay, as referred to here, with the taper, and a slight button head is what we use, getting away from as much projection as possible everywhere; so that in order not to confuse between our standard practice of the Chicago, Milwaukee & St. Paul, I call the other the button head. So, I thoroughly agree with you in that. There is but one way to do any transferring from a coal burning to an oil burning firebox; put on a piece of brick just as soon as possible. You can patch it just as easy as you can a coal burning boiler. And apply the brick to it and you won't have any trouble at all. It will repay you for many a failure.

W. J. Tollerton (C. R. I. & P.): I may say for Mr. Gaines' information, that you will have very little trouble with your sheets cracking behind your brick. The cracking will occur above the brick, and you will have much better satisfaction if you slip your brick out slightly outward; even on a vertical sheet it has a tendency to keep the brick in place. A little broken glass thrown on top of the brick will help you very much in your performance.

A. G. Trumbull (Erie): Our practices are very well covered by the report of the committee. However, I should say in regard to Fig. 10, that many of these stays have been submitted by railways that have very good water conditions.

The second one, for instance, could hardly have been better designed as a mud-catcher, if that had been the aim. We have used with considerable success the type of throat sheet stay shown on Plate T-1 of the Supplemental report, our idea being that it was rather incongruous to attempt to resist the influence of expansion by the use of a collared stay, and, as far as my observation goes, we have not had a single case of cracked

flue sheet where the crack is of any length, since we commenced to use a particular type of stay. I have been also interested in the standard method of setting flues as illustrated in Fig. 15, and it seems to me we might very well dispense with the flue-flaring tool and utilize, instead, the sectional expander which, as illustrated here, will answer every purpose in setting the flue, and also in turning the end of the flue over, so that it can be properly beaded. I also think we can very well use the sectional expander, instead of the ferrule expander here illustrated, thereby reducing the number of tools, and consequently the maintenance, and possibly enable us to follow up the practices in engine houses much better than we could with the number of tools that are here illustrated.

Mr. Pratt: As a member of this committee, I am of the impression that there was no report made by any of the members concerning the service of the Jacob Shupert fire-box or its design, and that is the way I can account for its omission in this report. This report is a résumé of the reports of the different railways that took the pains to give the committee the information they desired. I think it would well pay the designers of boilers to consider the suggestion of the committee with regard to length of flues, wherein it is rather modestly stated that the lengths of over 16 ft. be given careful consideration and when we obtain Prof. Goss's report of his evaporation efficiencies, as between the fire-box and the flues, I believe that that will even be more strongly brought to our notice. It is apparent from his preliminary report that the fire-box evaporation is from 50 to 54 per cent. of the entire boiler evaporation. Therefore, it may not be that there is very much obtained by the few feet additional length on the front of the flue, while there would be a great deal gained apparently by an increase in the fire-box by using the combustion chamber. I may not be correct, but it is my impression that more of the railways are doing away with the two holes than are going to the double fire doors.

Relative to the thickness of arch tubes, I believe the water conditions have more to do with the results obtained by the different members, one getting the best results from a heavy arch tube, and another with a light arch tube. On the Chicago & Northwestern road, where we have some pretty poor water and some divisions with treated water and pretty good water, we have found that in the latter case they recommended the light arch tubes, while in the poor water district they preferred the heavy arch tubes, and got better mileage out of it. We experimented with several locomotives making a gage or tram to indicate the upward movement of the top of the flange of the back flue sheet, due to repeated expansion, and in a locomotive with about 400 flues, I don't remember the diameter of the shell, we found that the top flanges of the flue sheet moved upward from ⅝ in. to ¾ in. during a year, with expansions approximately once every month. We tried the O'Connor fire-door flanges out very thoroughly before we adopted it as standard on the Northwestern, running engines with and without it in the same districts, especially poor water districts, and I found it to be quite an advantage. We have over 1,200 locomotives just equipped. In fact, we have nearly as many locomotives equipped with the O'Connor flange on the Northwestern roads as on all the other roads in the country combined. But the reports in the extremely bad water districts in the southwest and the extremely good water districts, where the trouble with the doors and door sheets was due to expansion and contraction, appears to be about the same. In applying this door to a new design where the staybolts are laid out as we would suggest, the nearest bolt on the door sheet side is from 7¼ in. to 8 in. from the edge of the door hole, which gives a much better expansion and contraction. We are new in the oil-burning business; we have less than 50 locomotives at present, equipped for burning oil; but we find that with the front-end burners, as they are being used by most of the oil-burning roads, the flame strikes the door sheet and gives more trouble than with the coal burning engines. With the expansion and contraction that is permitted in these door sheets, by means of this flange, the door lasts very much better than the ordinary type of door. In fact, we find that the large proportion of our engines that are in the boiler shop are receiving new flue sheets and side sheets and the door sheets require no attention whatever, either about the flange or about any part of the door sheet.

F. J. Harrison (B. R. & P.): I would like to ask the gentleman who has just spoken if he found any accumulation of mud about this door sheet?

Mr. Pratt: We did not. There appears to be a much better circulation around the door on account of the greatly enlarged water space, and more particularly because the staybolts are far away from the door; but I believe it is proper to put a wash-out plug above any door. We know there is more or less scale that falls down there and it is quite a distance from the wash-out plugs which go above the crown sheet, and it would be found quite an advantage to have a wash-out hole above any door, to wash it out.

Angus Sinclair: Taking the substance of all the reports on boiler construction that have been presented to this association, I think that this is the best one I have ever examined, and I think it is very creditable to the committee that they have made a synopsis of the whole tendency of progress in boiler construction, and everything that they have recommended seems to be in the right direction.

D. P. Kellogg (S. P.): To prevent accidents due to low water in the boiler we have endeavored to perfect an apparatus, which has proven satisfactory so far. It is operated by a difference in temperature, which is secured by entrapped water in a cup, and partially cooled to about 50 degs. lower in temperature than the water in the boiler. When the water falls to any prescribed limit, the man in charge of the locomotive sees the danger line, or steam enters and expands the mercury in the device which opens a steam valve, and causes an audible alarm, or controls the fire. In the case of an oil burning locomotive, it shuts off the fuel supply, and in the case of a coal burning locomotive it sprays the fire with a jet of water. There are about 40 of these devices in use on the Southern Pacific. At the present time they have proved quite satisfactory, and it is our expectation we will extend the application of them to a very large extent.

J. Snowden Bell: As a member of the committee, in considering the replies that were received from the roads to our circular of inquiry, I was surprised and disappointed at the comparatively little amount of information which we received on the subject of combustion chambers. Now, in view of the admitted superior evaporative efficiency of fire-boxes and heating surfaces, and the ability to attain it by the use of the combustion chamber, it has always seemed to me very desirable that they should be adopted unless there is some good reason to the contrary.

M. H. Haig (A. T. & S. F.): Most of the discussion has centered on the construction of the boiler. At the same time there has been more or less discussion during the entire convention with regard to economies. There is some reference in the report to the method of delivering feed water and I will refer to one arrangement by which water is delivered to a perforated pipe connected to each boiler check. the water coming out of these various perforations in the pipe falls on a plate above the tubes, and the claim is that cold water does not settle so readily at the back of the tubes. I would like to ask some of the members for an expression of experience with regard to that method of delivering feed water. One of these devices was placed on an engine on a western road 6 or 8 months ago, and the only report given so far was from one of the road foremen engines who has been following this engine. His claim is that the engine uses less fuel and less water, and at the same time he states there is a greater tendency for water to be lifted to the throttle. That latter feature, however, is a shortcoming that no doubt can be overcome.

C. E. Chambers (C. of N. J.): Mr. Bell raised the question of absence of information concerning combustion chambers. I presume all anthracite roads, nearly all, at any rate, at one time all used combustion chambers on their engines. There is no doubt at all as to the efficiency of such chambers in aiding combustion, and the aid to the steaming of the engine which follows when the combustion chamber is in good shape, thoroughly clean and the flues clean. However, the use of the combustion chamber means the drawing of the fire at least once a week, and the cleaning out of ashes accumulated behind the brick wall, and the boring out of several of the bottom rows of flues which naturally block up. There is another condition against it, it reduces the number of flues in the boiler, and we also naturally have a small circulation space between the bottom of the combustion chamber and the boiler shell. This requires close watching, if the water is at all bad, to keep it from blocking up. Eliminating these arguments against the combustion chamber, there is no question at all about the good you get from it, so that, after all, it is simply a matter of the conditions that will govern whether you will or will not have a combustion chamber.

A few years ago we changed from the combustion chamber, in several types of locomotives, when we were making renewals of the firebox, to the D-flue sheet type. We also had a number of boilers built with straight flue sheets, and as the boilers required new tubes, flue sheets, or throat sheets, we applied the D sheet, because of the short life we got from the straight flue sheet and the shallow firebox. I find an increase in the life of the D sheet of as much as 40 per cent.

I think Mr. Trumbull made some mention as to the number of tools we have designated for the purpose of applying the various sheets to the boiler. We, of course, attempted to indicate what we considered was good practice. My experience with the average engine house is that if you let the machinist

have his own way, his kit of tools wil consist of a pinch bar, a hammer, and a chisel, and we have designated here what we think is good practice, and have defined the use of suitable tools for the different purposes provided.

One of the members spoke of going to the extent of 7 in. in the water space in the legs of boilers. I do not know how long he has used that space, or how closely he has watched the operation of it, but it seems to me you get a very sluggish boiler with 7-in. water space, and while it may not plug up, I cannot agree to the efficiency of such a spacing. My idea is, and always has been, to use as little space as possible, and keep it clean, if you want to get a good and efficient boiler. As to the scarfing of seams in firebox sheets, that has been tested out very thoroughly on the Central of New Jersey, and, in our opinion, there is no question about the good results obtained.

F. F. Gaines (C. of Ga.): In reply to Mr. Bell would say that my experience originally with the combustion chamber is very similar to that of Mr. Chambers. At one time I was in the anthracite district and was pretty well acquainted with the combustion chamber as it then existed. I have been a little hesitant about saying much about the thing but I would like to refer to Fig. 2 of the report and answer some of the objections Mr. Chambers has made to the combustion chamber and show that these can be overcome. For instance, you can completely remove at any time, any sediment, sparks, etc., deposited in the combustion chamber. You also get rid of the water legs, but do not cut down the number of flues. I would further say that there is an absolute coal economy of about 15 per cent., which was determined on very carefully and thoroughly conducted tests. I would also say that in the matter of flue economy, it is very much more than that. Engines in the district where the first engine was equipped with this combustion chamber, ordinarily make about 25,000 to 30,000 miles, and the first engine so equipped has now made over 110,000 miles, and during the time that it has been making this mileage, we have not had a request from the engineer to blow the flues. The engine has been in the shop twice for tire turning and the flues were examined and probably blown out, but the flues have not been blown out in the engine house, as far as I have been able to ascertain.

It also does another thing, with the soft coal engine it would not be so noticeable as with an anthracite engine, but it eliminates to a large extent, sparks and smoke. An engine with this device properly applied will not emit any black smoke, and but a minimum of brown smoke, and the sparks are noticeably absent. The amount of cinders found in the front end is about 25 per cent. of what you find in the ordinary engine, although we are using in the front end what you would style a self-cleaning front end.

We also found in our short experience, not enough to pass on the matter definitely, as we have only had the superheater engines in connection with the combustion chambers for 6 weeks, and have not found it necessary to blow out the superheater flues, that there is very little trouble with the flues. We have yet to find any indication of these flues stopping up or giving trouble, as they have done in many cases when soft coal is used. In regard to the question of the maintenance, the fact that the engine has made this large mileage as against the ordinary mileage, answers that point thoroughly. We also got rid of another point Mr. Chambers referred to; that is the multiplicity of seams due to the ordinary type of combustion chamber; you have no more seams than with the rest of the fire-box; you simply have a longer fire box, which gives a greater fire-box heating surface.

D. H. Deeter (P. & R.): When we first started in designing the wide fire-box we had the old sloping baffle sheet at the top. After having 75 of these locomotives, we found with the amount of service that was required of the engines, they would not carry the water properly. Our combustion chambers were 22 in. in length at that time. The depth from the bottom of the combustion chamber to the bottom of the barrel at the throat sheet was about 7 in. We had tried various sizes of flanges at the throat sheet from 1½ in. up to 3 in., but mud would collect at that point. We had quite a little trouble with the bottom of the combustion chamber becoming blistered and burning out, and in 2 or 3 years becoming detached. By removing about 8 of the flues every 6 months or a year, in addition to 2 or 3 of the bars, that trouble was all eliminated. This is a small matter compared with the amount of saving of fuel.

After trying these engines for about 15 years, we put on the straight wrapper sheets, and found that we could carry our water more easily and steadily over the road, also obtaining better circulation. Now, in my estimation, if we could lower the depth of the sheet three or four inches more than it is it would be an advantage, as Mr. Gaines says, but from the fact of the construction of the wide fire-box, it is really impossible to go down any further than we are now, from the fact that you cannot get rid of the ashes so readily. They seem to clog up along the side.

Regarding the trouble with the bottom flues in these combustion chambers, we are losing sight of the fact that it is not altogether on account of the construction. Years ago it was very seldom that we would remove the flues. A good deal of the trouble can be laid to the fireman. In previous days he was more careful and we should teach the fireman to properly fire his engine. Furthermore, we have found that the fireman is more or less anxious to fire with both fire doors open at one time, which is very hard on the fire-box. We have cases where we do not clean out our combustion chambers on our fast freight engines once in 2 weeks, but on our high-speed locomotives we are really compelled, as Mr. Chambers says, to clean out the chambers twice a week.

We find that a 2 in. flue is the most serviceable flue that we can have for a wide fire-box locomotive with a combustion chamber. We have tried all sizes of flues, from 1¼ in. to 2½ in. We changed from the combustion chamber about 10 years ago on our D-5 engines to what we term a combination flue sheet. In my experience in handling these engines I found our principal difficulty was to keep these combination sheets stayed properly at the bottom or close to the firing line. The life of these combination sheets ranges from about 2½ years to 4 years. We have discarded quite a few of them and gone back to the combustion chamber, and I find the combustion chamber is economical as to fuel and the life of the fire-box is about 8 years as compared to 4 years in the case of the straight sheet.

Mr. Chambers: For fear that the members may think from the remarks I made that we have discontinued entirely the combustion chamber. I wish to say that at the present time we are building engines both with the combustion chamber and without, largely governed by the service they are going into.

F. T. Slayton (Virginian): I should like to ask if any member present has had experience with the welding of flues to the flue sheet. Several speakers have referred to the growing of the flue sheets, that is, the expanding of the flue sheet in an upward direction, which must be due to rapid working of the flues, with Prosser and roller tools, which not only has a tendency to cause cracking of sheets, but must necessarily take the pressure off the first staybolts next to the seams, thus transferring the load to the next row of stays, and so on, thus doing away really with the use of the first row or rows of stays. It seems to me that if we could avoid this excessive working of flues, we would overcome that trouble.

I understand some of our members have had experience with welding in flues for a year or more. I recently made a test of this kind which has proven very favorable thus far, but I do not know what I am going to run up against later. About 3½ months ago, I took an engine which was in service, where it was compelled to take brackish water entirely from one tank, and had extremely hard service on account of pushing cars over a hump, and then drifting into a yard where it was worked to its full capacity for probably 30 minutes, then drifting around for an hour. The engine got into such shape that it was necessary to "kill" it practically every day to work the flues. The engine was supposed to work day and night. We welded in the flues and since that time we have had no trouble whatever. This was an engine in which the flues were all set in the regular way, and the welding-in simply consisted in sealing the joint between the bead and the flue sheet. By making some experiments with a section of flue sheet with the same welding process, we found we could get a better job by simply letting the tube project through the sheet, the same as for rolling and beading, and then fill in between the end of the tube and the flue sheet, at an angle of about 45 degs. It made a neater job. We also tried belling out the end of the flue and welding in a similar way, but found there was a tendency to burn off the edges of the end of the tube, and that we could get a better job by allowing the tube to extend through straight. This engine is now in the shop for general overhauling, but we are not removing the flues, as they did not give us any trouble, and we wish to continue the experiment.

I next welded in the flues of a Mikado engine having a tractive effort of 55,900 lb., hauling 100-car trains of 7,600 tons in regular service, and welded the flues as well as the fire-box seams of this engine. This engine remained in that service until about a month ago when it was put in lighter service on the mountain, and the engine comes to the terminals only for wash-outs. This engine has given no trouble from leaks in the fire-box, although previous to the welding of the tubes we had had considerable trouble from leaky tubes. In the case of the road engine, there were also about

40 fire cracks in flanges or sheets which were welded successfully.

Thos. Roope (C. B. & Q.): We have only one class of power in which we have welded our flues and that is the Mallet, equipped with double boilers. When we discontinued using the hot boiler and feed water heater and obtained steam from both boilers, we found it necessary to weld the top flues in the front boilers. We were not able to keep them tight in any other way. The engine has been running now for about one year, and up to the present time has been successful.

C. A. Seley (C. R. I. & P.): I do not believe that this committee should be criticised at all for matters omitted from the report. They have given a compendium of information of great practical value of the practice of the railroads in regard to the design and use of boilers, as contained in the responses to the committee's circular of inquiry, which was very voluminous, as members will remember, no doubt, and the committee has framed up a very useful and valuable report. I think we are exceptionally fortunate in having this report for our proceedings, and as a guide in our practice.

Prof. W. F. M. Goss: I have prepared no discussion of this paper, although it is one which interests me very much. I am impressed both with the report of the committee and with the discussion that has been based upon it, with the fact that in very many matters of detail entering into the construction of a steam boiler, much depends upon related details, and it seems to me that the conclusions of the various members of the association responding to the requests of the committee for information, need to be very carefully analyzed before they are in all cases safe as guides to practice. I think the one statement which has been brought out in this discussion, which interested me most, is that of Mr. Gaines, and some others, which seems to advocate a narrowing of the water legs of the boiler. I had rather the feeling that progress in the design of locomotive boilers during the last 15 or 20 years had been expressed as much by a tendency to give greater width to the water legs as by any other tendency, and so I must confess to a great deal of surprise to find there are some who feel that that movement has been carried too far.

Of course, our problems in locomotive design and maintenance change from year to year as practice leads us into new fields. If we look back into the development of the last 25 years, we shall have ample evidence of that fact. When our boilers were small, most of the railways were using the crown bar form of construction, and to my mind that form of construction is necessarily associated with the small boiler of a good many years ago. There is no chance, as it seems to me, to enter into a discussion of the crown-bar type as applied to our modern large boilers. We continued in the use of the crown bar until the forces to be sustained by the crown bar became too great for satisfactory treatment through that form of design, and then we went to another form, the radial stay, and between, perhaps, the crown bar and the full fruition of the radial stay, came the Belpaire boiler, and I take it that the railways for many years past, the past decade anyway, have been devoting themselves pretty largely to the perfection of the radial-stay type of boiler, and the result is a highly perfected design, in the perfection of details of which we are pretty largely engaged at the present time.

But now the radial stay boiler has grown to dimensions undreamed of over 10 years ago in general locomotive practice, and there is no doubt in my mind but the radial stay boiler is going to continue to grow, and that fire-boxes will, in one form or another, continue to increase in size, and what are the problems of the future with reference to such a possible development? That is the large question to look forward to in considering the tendencies in locomotive boiler design, and keeping that in mind it seems to me that some of the propositions which are now being put forth, especially that which has been referred to as represented by the Jacobs-Shupert type of boiler becomes, in the light of possibility of future practice, and of the increasing demands of every-day practice, a matter of very great significance and interest.

G. H. Baker: I wish that the committee could be continued, or that another committee should take up a branch of the subject which has not been dwelt on in the present report. After a boiler is constructed, it must be operated. During the 20 years I have been a member of this association, there has never been a committee, I believe, that considered the subject of the management of locomotive boilers and their operation, although two of the speakers here this morning, have brought in the importance of the human element—the engineman and the fireman.

F. F. Gaines: I move that the discussion be closed, and I would also like to move the suggestion relative to washing out and cleaning locomotive boilers. I think that is a good subject.

E. W. Pratt: It seems as though it would be in line with the recommendation of the committee, if the new work of the committee could be outlined as suggested by Mr. Baker, as well, and perhaps the title of the work which the committee would report on would be operation, maintenance and repairs of locomotive boilers.

The motion was carried with the amendment.

CONTOUR OF TIRES.

The committee on contour of tires has been instructed to look into the various points brought out in the discussion at the last convention and, if possible, recommend a contour of tire that would be most economical in all services; also, recommend a minimum thickness of flange for re-turned tires. The discussion at the 1911 convention was confined to the proposed reduction in height of flange from 1⅛ in. to 1 in., the taper of tread, and the question of limit of flange thickness of less than 15/16-in.

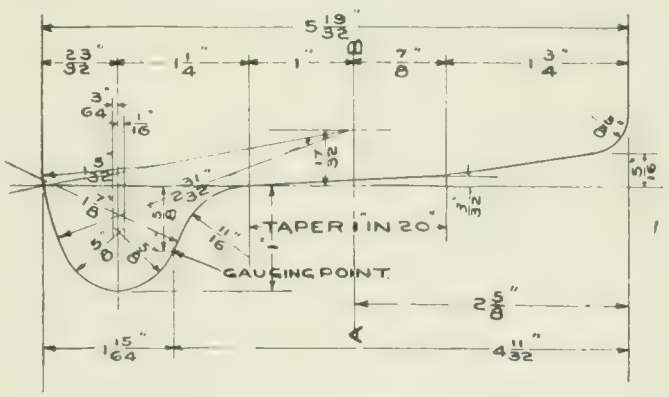
After considering the replies received to a circular of inquiry and such other data as were available, the committee is very



W. C. A. HENRY,

Chairman, Committee on Contour of Tires.

strongly of the opinion that the M. C. B. recommended contour of tread and flange for steel wheels should be used for engine and tender truck wheels. To a very large extent in ordering wheels it is not specified whether for tender trucks or cars, no distinction being made as between the two. It is of distinct advantage to the railways to keep down the number of standards manufactured as insuring more prompt filling of orders and a smaller stock on hand at their own ships. The



Recommended Contour of Engine and Tender Wheel Treads.

committee, therefore, recommends for engine and tender truck wheels in all classes of service the contour of tread and flange as shown in the accompanying illustration. This contour is the same as will be recommended to the M. C. B. Association in June, 1912, and differs from the present M. C. B. recommended contour in that additional metal has been added to the back of the flange, making the contour of the flange identical

with the flange for cast-iron wheels. This thickening of the flange was recommended with the view of increasing the life of the wheel, as many steel wheels are now withdrawn from service due to thin flange. Replies received from the manufacturers of steel wheels indicate that about 80 per cent. of the engine truck and 95 per cent. of the tender truck wheels manufactured during the past year are of the 1909 M. C. B. recommended contour.

In driving-wheel service the conditions are somewhat different, as the brake shoes generally used are recessed for the flange, and also opposite that part of the tread coming in contact with the rail. This tends to keep down the height of flanges and retards channeling of tread. On account of the general opposition to any reduction in flange height of driving wheels in road service and the fact that the present A. R. M. M. A. standard contour of tread is so nearly like the M. C. B. 1909 contour, the committee does not feel justified in recommending, at the present time, any change from the present contour, for driving and trailing wheels of locomotive in road service. As a matter of information, we wish to add that while practically all roads are using a contour of driving-wheel tire approximating the A. R. M. M. A. standard, almost all are deviating in some particular.

In the case of switching locomotives it is felt that a flange one inch in height is perfectly safe and will be more satisfactory than the present standard, as a greater mileage can be made with the shorter flange before reaching an objectionable height. As has been previously mentioned, the A. R. M. M. A. and M. C. B. contours of tread being so nearly alike, it was felt unwise to establish a new contour having the M. C. B. flange and A. R. M. M. A. tread, and we, therefore, recommend the contour shown in the illustration for driving-wheel tires in shifting service.

The six widths of flanged tires shown on Sheet 1 of the standards are, in the committee's opinion, entirely unnecessary, and we would recommend that one width be shown; namely 5½ in. In the case of plain tires, three sizes as recommended last year are sufficient; the two sizes 6¼ in. and 6¾ in. to be eliminated.

As concerns condemning thickness of flange below 15/16 in., after carefully considering the replies received and all information available, the committee can not see its way clear to recommend flanges of wheels under locomotives and tenders being allowed to remain in service when worn below this limit.

The committee's recommendations, therefore, are as follows:

RECOMMENDATIONS.

Engine truck wheels, contour as shown in the accompanying illustration.

Tender truck wheels, contour as shown in the accompanying illustration.

Flanged driving-wheels and trailing-wheels of locomotives in road service, present A. R. M. M. A. standard of 5½ in. in width.

Flanged driving-wheels in shifting service to be as shown in the accompanying illustration.

Plain tires, present A. R. M. M. A. standard, three widths, 6 in., 6½ in. and 7 in.

Condemning limit of thickness of flange, 15/16 in.

The report is signed by:—W. C. A. Henry (Penna.), chairman; J. A. Pilcher (N. & W.); O. C. Cromwell (B. & O.); O. M. Foster (L. S. & M. S.); H. C. Oviatt (N. Y., N. H. & H.) and G. W. Seidel (C. R. I. P.).

DISCUSSION.

E. W. Pratt (C. & N. W.): I do not wish to find any fault with the contour of tires as shown in the illustration, but we on the Northwestern road think there is an extra amount of time spent in turning driving wheel and trailer tires to get the double taper, and we do not gain anything by it; that if the taper is continued out to the outer side of the tire, and a good big corner taken off, we gain the same results and save a good deal of time in turning. The committee has reported on the subject as called for by the title of the committee, but it was suggested last year, and I may have been partially responsible for the suggestion—that in re-turning tires there be some minimum flange allowance. I want to say that I was impressed very strongly and heard other members express themselves similarly when we went across the Boardwalk here last summer and saw a modern lathe turning off metal by inches, almost, to get a full-sized flange, and after they turned down to a full-sized flange, they applied a contour tool and shaved the flanges three or four times around, after that. That is a fine demonstration of what a strong tool will do, but I do not believe that is what we are after, if it is our desire to save our employer's money. I hesitate to say how much of a telltale, as we call it, we can leave on a flange and still have it safe. I am confident we can leave some and in many cases save from any amount up to a half inch of the metal in re-turned tires. We have a gage, and of course we should not allow our tires to get into such shape, that our flanges are so sharp that we will have to turn them ¾ in., or anything approaching that, but we might as well be honest, and say that these conditions do come to us, and if it is possible, I think we ought to save some of that excessive turning, and I believe it is safe to do it. There is a wide variation between this flange shown in the illustration, which measures from the throat across to the vertical inside of the tire 1¼ in. plus $^{23}/_{32}$ in., nearly 2 in., and when the tire is worn to its limit, it is $^{15}/_{16}$ in. Is there not some compromise between $^{15}/_{16}$ in. and 2 in., which makes the wheel safe to run?

F. F. Gaines (C. of Ga.): I would answer Mr. Pratt by saying, that some years ago I had some very careful records kept on the cost of turning steel-tired wheels, and what was a good limit to allow before removing them for turning them, and as a result of that investigation we found it was money thrown away to run them to $^{15}/_{16}$-in. thickness; in other words, when your tire commenced to wear on your flange, the best thing to do was to take it up and turn it, and not wait until it got to $^{15}/_{16}$-in. thickness, and if you kept a record going over the period of a few years, you would find that you will surely save metal by that method of handling.

Now, there is another important point in which I agree with the recommendations of the committee, and yet it is not entirely disposed of and that is the height of flange. Last year after our discussion on this subject, I went home and started out by having the tires on one of our road engines turned up with a 1-in. high flange, to start with. I took a switch engine and turned the tire on that engine to a ⅞ in. height of flange. These engines have been running during the past year, come and go, and we do not know they are on the road any more than any other engines we have. They have not been derailed, and nothing else has happened to them. I do not say we have got to the point where I would recommend using these flanges, but I would recommend that some more of the roads make these experiments and see if it is a possible thing to adopt 1 in. height of flange on our freight engines, and also ⅞ in. for the switch engines, because, if we can do this with safety, it will be desirable to save a lot of metal on the tire.

M. H. Haig (A. T. & S. F.): While I hesitate to question the contour outlined by the committee, I would like to point out a feature which is along the same line, in connection with which we are wasting a certain amount of metal, and which has also an undesirable effect on the rail. The recommendation is a taper of 1 in. in 20 in. for the tread of the tire. I understand that taper was originally based on the desirability of having a small portion, or a small diameter of one wheel on one rail of a curve, while there was a larger diameter of wheel on the other rail. That may hold in some cases, but not always. For instance, if the leading truck leads the front drivers as it should, there are times when the flange of the leading driver is drawn to the inner rail in rounding a curve, and in the matter of a long wheel base, the front driver may be against the outer rail, and the flange of the other drive against the inner rail. However, after an engine has been in service for some time, the tread of the tire is worn to a certain extent, to the shape of the rail, and there is not the cone shape on the tire. I believe, therefore, that it is better to endeavor to form a contour based on the shape which a tire tends to take after it has been in service, and that is certainly more nearly a cylindrical shape than a conical shape. The cylindrical shape of tire has a larger bearing area on the rail, and therefore does not subject the tire to the same stresses of the metal as when there is a smaller bearing area on the rail. A new contour of conical shape tends to bear on what you might call the near edge of the rail, whereas a cylindrical or flat tire will bear more essentially on the rail above the web. The taper of the side of the tire shown for a distance of 1¾ in. will be sufficient to clear the various frogs and other obstructions along the line and will also tend to obviate for some time the shoulder which forms after the tread has been worn to some depth by the rail. Some of the manufacturers of locomotives, unless specified otherwise by the railways purchasing locomotives, will turn new tires with a cylindrical thread and not with a conical thread, and I feel that the cylindrical thread is more economical in the amount of metal turned off as well as in the effect upon the rail.

Robt. Patterson (G. T.): I am not any more convinced this year than I was last year that we should turn our driving tires taper. I think the explanation which the committee has given in regard to tender and engine tires and tires for cars is all right. Where wheels are turned up in the same shop both for the car department and engine repairs, I think that is desirable. We, of course, run our departments entirely separately, and it is not necessary to follow the same plan in turning tires for locomotive work as for car work. Consequently we don't see any reason why we should turn

our tires taper for locomotive work. I have heard no explanation yet of why we should turn our driving tires taper except at the extreme edge. How long does that taper last on the tires after the engines are put out? You can turn them more rapidly. You can make a better job of it. Why turn them taper. As I mentioned before, the road I am representing, we invented that practice 35 years ago. What advantage is there in it? I have yet to hear of an advantage in driving tires being turned taper. It is quicker done. You can make a better job of it. You don't require an expert machinist on the lathe to turn them, and it is only a month or so when the tire becomes worn.

W. C. A. Henry (Penna. Lines): In regard to the question of economical limit, I wish to say that that was discussed by the committee, and they felt that they varied with the different conditions of power between driving wheels and other wheels, and the conditions of service and demand for power and facilities for doing the work, that it was absolutely impossible to recommend a limit that would have any meaning at all. We felt that all we could do was to recommend an extreme limit of thinness. As regards the question of the taper of the tread, I think years ago it was a very general practice to have a portion of the tread cylindrical or very nearly so, and it was often advisable to give the tread some taper, so that the tendency would be for the flange to get away from the rail. While it is true that that original taper depreciates within a short time, it seems to start the wheels wearing properly, and a tread that has that to start with will show a longer flange life than the cylindrical. There seems to be some misunderstanding with regard to the taper of the tread. Many roads apparently have examined the diagram in that book, as indicating 1 in. from the fillet to the base of the flange. The tread is cylindrical. The diagram is very small and the lines run together. As a matter of fact, in 1908, the present contour was adopted, and that was a 1907 M. C. B. contour, which is a taper of one in twenty, commencing from the fillet to the base of the flange.

C. E. Chambers (C. of N. J.): I thoroughly appreciate the remarks made of the production of a flange by turning the tire taper. I am going to ask Mr. Pratt if he has had any experience or trouble with cut flanges, where the tires are straight or nearly so, and where the taper was used at the start. I find that very much depends upon the life of the tire, whether it starts right. The making of a slight taper gives the tire the benefit of going around a slight curve, by making the inside a trifle smaller than the outside, and the greater the curve, the wider track gage naturally gives it the advantage of a still greater taper. As to the turning of full flanges, I think there are several classes of service that you could save your company actual money in, by not trying to build up a full flange on all wheels. It costs very little to remove the tires. For instance, on an 8 driver engine changing those which may have become short, the front and back tires to the middle wheels, you can start your engine out again and it runs just the same and just as long as if they were all full flanges. If it comes down to a matter of engines running 75 to 90 m. p. h., you don't have to stop to consider metal.

F. J. Harrison (B. R. & P.): I would like to state that we have been running tires since the last convention with an inch flange. In fact, we are turning everything with a flange, 1-in. high, and if a tender wheel runs with a 1-in. flange, I don't see why an engine wheel won't run with a 1-in. flange. I don't believe there are very many representatives in this room to-day that are running with driving tires down to a ¾-in. flange, and I think a good deal of attention ought to be given to the thickness of the flanges, with the heavy powers we are getting to-day. That seems to be the trouble with our road.

E. A. Miller (N. Y. C. & St. L.): I think perhaps the conditions under which engines work has something to do with the flange. I remember at one time we went to a 1-in. flange for driving wheels, when Mr. McKenzie was superintendent of motive power, whom I was working under, and we changed them to the 1⅛ in. flange, although we have continued for many years to make the switch engine driving wheel tire flanges 1 in. During the time that Mr. Gilmore was Superintendent of Motive Power of our road, he ordered those on switch engines to be changed to ⅞ in. flange, and we were not able to run our switch engines successfully with that height of flange, we had trouble from derailment, and we went back to the 1-in. flange. I believe that we should carefully watch the brake shoes to see that the wear is proper on the face of the tread, and that they are not unduly affecting the flange; that is as important as the exact taper that is given when the tires go into service.

If any of the roads so far neglect the flanges as to allow them to get bent, we will have to do penance for that by turning off the tread in order to get a suitable flange.

John Tonge (M. & St. L.): I always found that with engines properly squared, there was no difficulty with the flange wear, none whatever. They would keep equal on the flange right along, but when you come to a 10-wheel engine, it is quite different. You have got a long distance from your front wheel to your tread, and unless you keep your truck up, which, under some conditions, it is not always advisable to do, you are going to suffer, and my best advice on that is to put flanges on all wheels, keep away from the blind tires.

Mr. Pratt: I must have been misunderstood if it was thought that I was suggesting a flat tread. My suggestion was and it is our practice, to use a uniform taper. Instead of setting two tapers on the lathe, we set a 1 in. in 20 in. taper and run it out and take a good big chunk off the outside corner. With regard to the height of flange, about 2 or 3 years ago on the Northwestern, we decided to use a ⅞-in. flange on switch engines. We had been using a ⅞-in. flange on narrow gage engines for several years. The narrow gage speed limit is very low. We had no trouble from derailment, and we adopted that for switch engines, and found that we had apparently a good many more derailments. I believe if you will refer to the illustration that I can explain to your satisfaction why we have more trouble with that lower flange. The radii at the top of the flange is ⅝ in., and the centers are located just about the same as with a ⅞-in., a 1-in. or a 1⅛-in. flange. There is a radius shown as 1⅞ in. which connects the radius at the throat and the radius at the top of the flange. There is no center point for that circle. It is the intersection between the tangents to the other two circles. Now, if you lower your flange from 1⅛ in. down to 1 in., or down to ⅞ in., that arc with the 1⅞ in. radius becomes very much more flat. Instead of standing somewhere near vertical, it is very flat, and from careful observation we found that in switching around the yards with trucks, if they have any height of flange, they frequently crawl up the rail and drop back, especially going around sharp turns. And when we had that ⅞-in. flange, this arc of the circle of which I spoke was so nearly flat that the wheel kept on going up and over.

D. J. Redding (P. & L. E.): I confirm what Mr. Pratt has just said. We had an experience along the same lines. I think it is entirely due to the fact that the top of the flange is entirely too flat. We use 1-in. flanges on all freight engines in the yard, and have no trouble at all. If you get below that, you are going to run into trouble.

C. E. Chambers (C. of N. J.): The gentleman said something about the thickness of the tire in heavy service. I would like to know as to what he had reference to.

F. I. Harrison (B. R. & P.): In reply to Mr. Chamberr' remark, the thickness of the tire we had up to about 2 years ago was about 1½ in., and from that it went to 1¾ in., now we are getting to 2⅛ in.

Mr. Tonge: I don't know as there is anything you can save money in faster than you can by taking care of a tire, even if it is only one tire. Look at the increase of mileage you are getting out of your tires; and I don't care how you are cramped for engine power or anything of that kind, there is no excuse to give for that neglect. Now, you take the engine trucks, for instance. I have seen men change a pair of engine truck wheels in 20 minutes. What would be the use of allowing that flange to get worse so as to take off ½ in. Think of all the miles of wear you are taking off and the money out of the pockets of the company you talk so much about that you want to save.

It was moved and carried that the report be accepted, and that the recommendations be submitted to letter ballot.

INCREASED POWER OBTAINED WITH SUPERHEAT.*

We regret that we are unable at this time to make a full report to this convention upon the results obtained on the Purdue locomotive in regard to the increased power obtained with superheated as compared with the maximum power obtained with saturated steam. This is due to the fact that laboratory conditions were such that all the tests of the series could not be completed until so late a date that sufficient time was not available to make a full report.

It was thought worth while, however, to make some statement in regard to the progress of the work, and, in a general way, to indicate to what extent the power of the locomotive was increased by the installation of a Schmidt superheater, which gives a rather high degree of superheat.

It will be remembered that the work reported upon the last three years was a comparison between the efficiency of the locomotive when using first, saturated steam, and then superheated steam while developing approximately the same amount of power under both conditions. When the maximum power

*Individual paper by C. H. Benjamin, Dean of the Schools of Engineering, and Louis E. Endsley, Professor of Railway Mechanical Engineering, Purdue University, Lafayette, Indiana.

was obtained upon the locomotive while using saturated steam, it required the burning of from 120 to 130 lbs. of coal per square foot of grate area per hour, whereas when superheated steam was used, and when approximately the same power was developed, only from 85 to 90 lbs. of coal per square foot of grate area were burned. This difference in the amount of coal burned while operating with saturated and superheated steam, respectively, is due to the fact that about 25 per cent. saving was made in the amount of coal burned.

The work this year has consisted in increasing the power by increasing the cut-off by small increments in an endeavor to burn the same amount of coal per square foot of grate area per hour, as was done while using saturated steam. While we have not up to this time increased the cut-off to such an extent as to make this possible, it is apparent that there will be no great difficulty in burning the same amount of coal. When these tests are completed, it can then be determined to what extent the power has been increased and by what amount the efficiency has been affected. It is evident that if this increase in the amount of coal burned can be effected without decreasing the efficiency of the locomotive, the per cent. of gain in power will be even greater than the per cent. of gain in the efficiency of the locomotive when using superheated steam than when using saturated steam. The tests made so far, however, indicate that there is a slight decrease in efficiency with increased burning of coal, so that a gain of not more than 20 or 25 per cent. in power may be anticipated.

After presenting the paper, Professor Benjamin spoke as follows: "Since this bald statement was made, the tests in the laboratory have been carried far enough to indicate some rather interesting things; for one thing, the efficiency of the cylinder due to the increased cut-off. The increased cut-off, being rather high, has materially decreased, and instead of getting for a quarter of the coal saving an increase of power of 33⅓ per cent., we are only getting an increase of power of some 16 per cent. That is, the efficiency of the cylinder as a separate unit, has decreased almost 16 per cent. The increase of steam necessary to develop a horse-power has gone up about 15 per cent., due to an increase in cut-off of from 45 per cent. in a saturated engine to 70 per cent. in a superheated engine, using the same amount of coal. This increase has been brought about by dropping the reverse lever down until we are running on notches amounting to about 5 per cent. for each notch and we are gaining a cut-off of 14 in. When we get up to the 70 per cent cut-off, we are not getting the efficiency out of our steam. What we are now planning to do is to finish this series of tests with the same sized cylinder and then to increase the size of the cylinder to an amount which will give us the same cut-off with a superheated engine that we have with a saturated engine. This, figured on a basis of 45 per cent. cut-off, will require your cylinders to increase from 16 in. in diameter to about 21 in., the engine now being a 16-in. x 24-in. cylinder. Of course, if this increased size of cylinders should be carried out on your engines, without decreasing your boiler, you would have a very slippery engine, but we are not interested in the slipperiness of the engine, because at the speed at which we are running, it is not necessary to figure on the engine slipping, because the tractive power will not be over ⅛ of the weight of the drivers. The efficiency of the cylinders at 160-lb. to 200-lb. pressure, is developing practically the same, so that we can decrease our pressure to 160 lb. and get the same drawing power with a superheated engine that we would get at 200-lb. pressure if we had a saturated engine. We hope next year to make a full report as to just what we can get out of the larger cylinders.

Paul H. Brangs: In an article by E. D. Dreyfus, in the April, 1912, issue of the *Electric Journal* the decrease in the turbine water rate due to the use of superheated steam is given as follows: 50 deg. superheat, 5 per cent.; 100 deg. superheat, 10 per cent.; 150 deg. superheat, 14 per cent. A paper entitled "Recent Developments in Steam Turbine Practice," by K. Baumann, read before the Manchester section of the Institution of Electrical Engineers, January 16, 1912, gives the following figures: 0 to 100 deg., 1 per cent. improvement on the steam consumption for every 100 deg. F.; 100 deg. to 200 deg. superheat, 1 per cent. improvement of steam consumption for every 12 deg. F. This paper also brings out another important point, viz.: that the efficiency increases considerably with increase in superheat the following figures being given: For 100 deg. superheat 2.5 per cent. better efficiency, and 6.75 per cent. better efficiency for 200 deg. superheat.

The improvement in steam consumption and turbine efficiency given above due to the use of superheat, are compared to the efficiency and steam consumption with dry saturated steam. Ordinarily, however, steam, supposedly dry, will contain a small amount of moisture which causes a reduction in efficiency. According to the paper referred to above, the efficiency will change 1 per cent. for each 1 per cent. variation in wetness, and therefore steam consumption measured as condensed water will be 2 per cent. higher for each 1 per cent. increase in moisture. With reciprocating engines, the presence of moisture in the steam has a still greater detrimental effect as it greatly augments cylinder condensation. For this reason increase in economy of from 12 to 20 per cent. is not uncommon with low superheating of from 40 deg. to 100 deg. F.

The saving in coal consumption, due to the use of superheated steam is not as large as the percentage saving in steam consumption. 100 deg. superheat will reduce the steam consumption of a turbine, say, 10 per cent. This means that instead of 1 lb. of water evaporated under dry and saturated conditions, only .9 lb. of water need be required if the steam be superheated 100 deg. Assuming the feed temperature as 200 deg. the heat absorbed in the boiler for 1 lb. of steam at 150 lbs. gage without superheat is 1,027 b. t. u. The heat in .9 lb. of steam under the same conditions, is 9,243 lb. t. u., the difference, 1,027 b. t. u., being saved. To secure this saving in the amount of water evaporated, 100 deg. superheat must be applied to each pound of steam. According to the latest steam lb. of steam under the same conditions, is 9,243 b. t. u., the This amount of heat, added as superheat, saves twice as much heat, 102.7 b. t. u. in the boiler. It may therefore be said that by using superheated steam there is obtained a fuel economy equal to half of the steam saving. This means that heat imparted to a superheater is just twice as valuable and generates just twice as much power as heat imparted to a boiler.

The excellent papers that have been presented before this association on superheaters, the last two or three years are very commendable. The very useful work and important data bearing on this subject, which has been furnished by Prof. Endsley of Purdue University, is of great benefit to the railways of this and other countries, and the work done by locomotive engineers has been thorough and satisfactory. The splendid work of H. H. Vaughan of the Canadian Pacific, has also been of material benefit to our association, as well as paving the way for more extensive use of superheaters in connection with locomotive and stationary boilers. There have been very many interesting papers and subjects brought before this association in the past decade, and no subject is more interesting and of greater value than the question of superheated steam, in connection with high power central station work and locomotive practice.

W. F. M. Goss: I rise merely for the purpose of making a very brief observation. My impression is that this is the time for a new testing plant. This plant has been in operation now for 21 years, and I want to remind the members of the association that almost every year it has brought a contribution to the association during those 21 years; and I think that if an index were made of the subjects of reports contributed, it would be found to cover a pretty wide range of the association's interests; and in making this observation, I want to express the hope that means will be supplied to Prof. Endsley, whereby this testing plant will be continued.

C. D. Young (Penna.). Mr. Endsley, if I understand him correctly, has not developed the point so far on his tests that he did not form some observations which we have recently made where we are using a high degree of superheat. It was thought that if superheated steam was furnished to the cylinders of an engine, that certain economies would develop. We found that under certain conditions, the water rate on the cylinders would be poorer with a dry and saturated steam furnished under different conditions. That came up in this way: In operating a very large cylinder with superheated steam furnished at 160 or 150 lb. boiler pressure, with 260 degs. of superheat, it was necessary, in order to do the work, to use a cut-off of approximately 70 per cent. and a piston speed of about 350 f. p. m. In other words, this was slow speed, 10 mile service. Under these conditions the water rate was about 26 lb. to 27 lb. of steam per hour, showing quite clearly that where the piston speed is low and the cut-off long there is no economy in superheating; and if it is operated only under those conditions, it would not pay to put a superheater on the boiler. I believe that confirms what Prof. Endsley has found out so far. There is one point which Prof. Endsley brought up which is of interest. He stated that he had obtained the same amount of power from a superheated locomotive, with a reduction in boiler pressure of approximately 40 lb. I think that in modern practice it is necessary to obtain all the power you possibly can, and it is not advisable to reduce the boiler pressure in a great many cases for the simple reason that you have not clearance space enough to make the cylinders big enough to operate with the lower boiler pressure, and in order to operate it, it is necessary to keep the cylinder down to 27 in. or 28 in. in diameter, and therefore you must hold the boiler pressure up to 200 lb. in order to produce the power desired. That being the case, it seems to me that something should be done

as to the boiler pressures which are required under the existing conditions of design. I think if it is possible it would be well for you to consider next year a thorough range in the investigation around the present modern boiler pressures which are absolutely necessary to the designer in order to get the cylinders through the clearance which is provided.

Prof. L. E. Endsley: I might say that I did not mean to state that we were not going to do any work at 200-lb. pressure; we are going to do work at 160 lbs. and 200 lbs., and even as low as 120 lbs. We are doing some work that low. Our boiler is equipped to run at 240 lbs. What I did mean to say was, that you can increase your cylinders 4 to 5 inches and reduce your cut-off, and not cause a slippery engine—because you know what will happen. What we are going to do is to carry the tests with the largest cylinder, at 160 lbs. and 200 lbs., and possibly 240 lbs., next year. So we will have the entire field covered.

C. A. Seley (C. R. I. & P.): I move that the thanks of the association, expressing our appreciation, be extended to the gentlemen who have given us this paper. The motion was carried.

STEEL TIRES.

Since the last convention, the committee, which was continued with a view to presenting a specification from which railway companies could purchase tires, with confidence that they would give the service expected, have worked to that end. Recognizing the importance of a drop test, the committee has gone to considerable trouble in getting the very best practice of the old and new worlds, but as will be seen, clause 8 leaves it optional with the railway companies to demand or not as they wish. The rules for the drop test have been drawn up



L. R. JOHNSON,

Chairman, Committee on Steel Tires.

with the idea of utilizing as far as possible the drop-test machines already in use for other purposes, and so sparing the manufacturers the expense of making special ones for tires.

SPECIFICATION FOR STEEL TIRES.

1. Material.—Stock for tires shall be made by the open-hearth or crucible process.

2. Classes.—There will be three classes of tires for the different classes of service as follows:

Class 1. Driving tires for passenger engines.
Class 2. Driving tires for freight engines.
Class 3. Driving tires for switching engines, and tires for engine truck, tender truck, trailers, and car wheels.

3. Chemical Composition.—

Class 1.	Carbon not less than	0.50 per cent. or over 0.70 per cent.
	Phosphorus, not over	0.05 per cent.
	Manganese between	0.50 per cent. and 0.80 per cent.
	Sulphur, not over	0.05 per cent.
Class 2.	Carbon, not less than	0.60 per cent. or over 0.80 per cent.
	Phosphorus, not over	0.05 per cent.
	Manganese between	0.50 per cent. and 0.80 per cent.
	Sulphur, not over	0.05 per cent.
Class 3.	Carbon, not less than	0.70 per cent. or over 0.85 per cent.
	Phosphorus, not over	0.05 per cent.
	Manganese between	0.50 per cent. and 0.80 per cent.
	Sulphur, not over	0.05 per cent.

4. Finish.—The tires must be free from defects of any kind, and finished tires must be accurately machined to the prescribed dimensions of the Master Mechanics' standard, and roungh tires must not be outside the limits of the attached prints.

5. Branding.—The tires shall be distinctly stamped when hot with such brands as the purchaser may require, and in such a manner that those marks shall be legible when the tires are worn out.

6. Samples for Chemical Analysis.—Drillings from a small test ingot cast with the heat, or turnings, from a tensile specimen, or turnings from a tire (where tires are machined at the works of the manufacturer) shall be used to determine whether the chemical composition of the heat is within the limits specified in paragraph 3. When required, the purchaser or his representative shall be furnished an analysis of each heat from which tires are made.

7. Physical Properties.—The steel for the different classes of service shall meet the following minimum physical requirements:

Class.	Tensile strength. Lbs. per sq. in.	Elongation per cent. in 4 in
(a)	105,000	Quotient of 1,556,000 divided by the tensile strength.
(b)	115,000	Quotient of 1,300,000 divided by the tensile strength.
(c)	125,000	Quotient of 1,150,000 divided by the tensile strength.

8. Falling Weight Test.—Should the contract call for a falling weight test, a test tire from each heat represented shall be selected by the purchaser or his representative and furnished at his expense, provided it meets the requirements.

8a. The test tire shall be placed vertically under the drop in a running position on a spring foundation with an anvil of at least ten tons weight, and shall be subjected to successive blows from a tup weighing 2,000 lbs. falling from heights of 5 ft., 10 ft., 15 ft. and 30 ft. and upwards, until the required deflection is obtained as specified in paragraph 8b.

8b. The test tire shall stand the drop test described in paragraph 8a without breaking or cracking and shall show a minimum deflection equal to X in the following table:

	Class No. 1.	Class No. 2	Class No. 3.
3 ft. diameter and over	$\frac{3\,d}{6\,t}$	$\frac{3\,d}{10\,t}$	$\frac{3\,d}{12\,t}$
Under 3 ft. diameter	$\frac{3\,d}{10\,t}$	$\frac{3\,d}{12\,t}$	$\frac{3\,d}{14\,t}$

Internal diameter of tire = d. Thickness of tire = t.

8c. A specimen for the tensile test is to be taken from a tire that has been subjected to a falling weight test, and it shall be cut cold from the tested tire at the point least affected by the falling weight test. The tensile test specimen when cut from a tire that has been subjected to a falling weight test shall be cut normal to the radius and parallel to the face.

8d. Should the test tire fail to meet these requirements in any particular, two more test tires shall be selected from the same heat if the manufacturer so desires, and at his expense. Should these two tires fulfil the requirements, the heat shall be accepted.

9. Inspection.—The inspector representing the purchaser shall have free entry to the works of the manufacturer at all times while his contract is being executed. All reasonable facilities shall be afforded to the inspector by the manufacturer to satisfy him that the tires are being furnished in accordance with the specifications. All tests and inspections shall be made at the place of manufacture prior to shipment, and shall be conducted so as not to interfere unnecessarily with the operations of the mill.

Tires must be rolled in accordance with the best practice, sufficient metal being discarded to insure sound tires. The tire taken from the bottom of the ingot must be stamped with the letter *A*, before the tire number, the next above *B*, and so on up the ingot.

Tensile test specimens, one from each heat, must be forwarded to the engineer of tests of the railway company, together with a copy of the chemical analysis of each heat, showing the tire numbers rolled from each heat; also destination of each tire, together with the railway company's purchasing agent's order number. If, however, the manufacturer is rolling tires right along for the railroad company, and their inspector is at their plant, the test specimens from heats ready at that time may be pulled at the manufacturer's plant by the inspector and the broken test pieces sent in for analysis, in which case the above information must be furnished the inspector.

An analysis of the test piece made by the railway company's test bureau must agree with that furnished by the manufacturer, and with an analysis made from turnings from the tires after received; a failure to agree within reasonable limits will be cause for rejection.

In addition to the above tests, the railway company reserves

the right to make a repetition of any tests to make sure that only material meeting all requirements set forth in this specification be accepted, and all material found not up to any one or all of these requirements will be rejected.

Samples representing rejected material will be retained in the test bureau not longer than thirty days from date of test. If at the end of that period the sellers have not signified their desire for a rehearing, it will be understood that they agree with the results as reported. If by this time the sellers have not given shipping directions for material rejected at destination, the material represented by the samples will be returned to them at their risk, they paying freight both ways.

The report is signed by:—L. R. Johnson (C. P.), chairman; R. L. Ettinger (So. Ry.); J. R. Onderdonk (B. & O.); C. H. Hogan (N. Y. C. & H. R.) and L. H. Turner (P. & L. E.).

The secretary: The report was received, and action on the recommendation was deferred another year.

LOW WATER BOILER TESTS.

The accompanying photographs show the general arrangement of the boilers and accessories for the low water boiler tests which will be made on June 20, 1912, at Coatesville, Pa. These tests will be the culmination of an extensive series of researches that have been under way for five months for the purpose of determining the relative efficiency, capacity, water circulation and strength of a Jacobs-Shupert and a normal radial stay boiler. All this work has been outlined by and conducted under the direction of Dr. W. F. M. Goss, Dean of the Schools of Engineering, University of Illinois.

Both boilers are identical in design and size, except that one has a Jacobs-Shupert firebox, while the other has a radial stay firebox of standard construction. The general dimensions of each boiler are as follows:

Outside diameter of shell of boiler at front end...	70 in.
Diameter of shell at throat	83⅞ in.
Number of 2¼ in. tubes.....	290
Length of tubes.....	218 in.
Inside length of firebox.....	109⅝ in.
Inside width of firebox.....	76⅛ in.

Each boiler has a total heating surface of about 3,000 sq. ft.

For the purposes of the low water tests, the two boilers have been placed on the cinder dump of the Lukens Iron & Steel Company, and a grandstand has been erected on a hill about 2,500 ft. from the nearest boiler, in order to afford a good view without danger if explosion takes place.

Both boilers will be fired with oil, and the feed water will be supplied from a large pump, operated by an auxiliary boiler not visible in the photographs. The boilers will be controlled by the observers from the inside of a firebox turned on its side and placed about 225 ft. distant from the nearest boiler. All valves controlling the oil fuel, water supply and steam discharge are located within this firebox barricade. The elevated tank just to the right of the barri-



General View of Apparatus Arranged for Low Water Tests at Coatesville.



Water Level and Steam Pressure Indicator at Coatesville Tests.

cade contains the oil fuel, which flows therefrom to the burners by gravity.

The test boilers are placed about 50 ft. apart. The firebox end of each rests on a concrete foundation, and the front end rests on light tumblers, so that when explosion takes place, the movement will be away from the observers.

In order that all witnesses can be kept constantly informed during the progress of the tests, a novel water level and steam pressure indicator has been erected. This consists of a large board, on which there is an outline of the cross-section of the firebox. A block bar, movable vertically, extends across this board and represents the water level. The observers in the barricade can control the position of this bar, which can be plainly seen from the grandstand. On top of this board is a large dial with a movable pointer, and by means of this the steam pressure and any variations thereof will be indicated.

The Jacobs-Shupert boiler will be the first one tested. The test will begin by bringing the boiler up to normal working pressure and water level. The excess steam generated by the boiler will blow off through the pop valves, the principal portion will pass through the exhaust pipe and up the stack in the usual manner to produce the necessary draft. When the rate at which it is working has become fairly high and representative of service conditions, the feed water supply will be shut off. The water level will therefore gradually drop and finally go below the crown sheet, thus causing overheating of the metal and ultimate failure. As soon as the Jacobs-Shupert boiler is tested, the radical stay will be similarly treated. A small fire will continue in the radical stay boiler during the test of the Jacobs-Shupert so that no time will be lost in getting the second test under way.

The tests will begin at 1 P. M. Guests from Atlantic City should reach Philadelphia, Broad Street Station, in time to catch the train leaving there at 11:45 A. M., which reaches Coatesville at 12:48 P. M. In order to catch this train it will be necessary to leave Atlantic City at 10 A. M. via. the Pennsylvania, Delaware River Bridge route. Guests can leave Coatesville going west at 5:46 P. M., reaching Harrisburg at 7:20 P. M., and going east can leave at 5:16 P. M., reaching Philadelphia at 6:23 P. M. Incoming trains will be met at Coatesville by representatives of the firebox company and conveyances will be provided to take the guests to the grandstand and demonstration field, where a buffet luncheon will be served.

INFORMAL DANCE ON THE PIER.

An informal dance was given on the Million Dollar Pier last night. It was largely attended, and the crowd seemed to have a very good time. The committee in special charge was composed of Thomas Farmer, Jr., chairman, E. S. Toothe, W. J. Walsh, H. E. Osterreich, Harry S. Hammond, William Miller, H. A. Nealley, E. F. Chaffee, Roger J. Faure.

SUPERHEATED STEAM ON MALLET LOCOMOTIVES.

The popularity of the Mallet locomotive, occasioned by the saving it is possible to obtain on account of the great amount of power developed by a single unit, was influenced to some extent at the start by the low efficiencies attending its operation. The condensation losses of the Mallet locomotive are abnormally high because of the large cooling surfaces in the steam passages from the boiler to the cylinders and in the cylinders themselves. To eliminate these losses, and to raise the standard of efficiency of operation of so large a unit to what it should be, the use of superheated steam has been resorted to in some cases.

Two distinct methods were adopted at the beginning. One introduced two superheaters; one between the boiler and the high pressure cylinders, and the other between the high and the low pressure cylinders. This method is accompanied by high installation and maintenance cost, and considerable difficulty in maintaining the superheater between the high and the low pressure cylinders on account of its inaccessibility.

The other method is that in which but one superheater is used, placed between the boiler and the high pressure cylinders, and giving the steam a high initial temperature before it enters the high pressure cylinder. This temperature should be sufficient to carry it to the low pressure exhaust without condensation losses. The superheater employed to accomplish this is



ENTERTAINMENT COMMITTEE.

Upper row, left to right: McClintock, Landreth, Nellis, Chaffee, Hammond, Kreps, Illingworth.
Bottom, left to right: Sherman, Wardell, Toothe, Dunkelberg, Walsh, Mitchell, Hibbard, Younglove, Nealley, Green, Furry.

of the fire tube type, which delivers steam at a temperature of from 600 to 650 degrees F., and is located in a manner which makes its installation and maintenance possible at the expense of a minimum amount of labor.

Conclusive and reliable tests have been made to determine the economies obtained by the use of highly superheated steam, and in every case they indicate a remarkable saving in coal and water, as well as the increase in drawbar pull. Through ranges of speed from twelve to eighteen miles an hour, averages show a saving of dry coal per dynamometer horsepower of about 28 per cent., and an increased drawbar pull of 12 per cent. This saving and the increase in tractive effort show clearly the part that the superheater has played in making the Mallet engine an economical unit.

Another advantage of the superheater applied to Mallet engines is the protection afforded against damage to the high pressure steam pipes, steam chests and cylinders, occasioned by foaming. This percentage of priming is greater in the Mallet type than in the older types, on account of the length of the boiler. With the use of the superheater it is practically impossible for water carried into the dry pipe to reach the cylinders in the form of water.

In the last analysis the operating limit of any locomotive is fixed by the ability of the fireman to properly supply fuel to the firebox. As a result of the application of an efficient superheater the capacity of the fireman, measured by the drawbar pull, is increased to an even greater percentage than the reduction in coal consumption.

REVENGE!

When the women go a shopping
And take us dubs along,
They try to make us think we're it,
And right where we belong.

They ask us our opinions
On lacy lingerie,
But how much we will pay is what
They really want to see.

But every doggie has his day—
And now *our* turn has come.
So get together, brothers,
And we'll surely have some fun.

Let one and all his wifey bring,
Out on the great big pier.
No matter where we stop and talk
You'll bore her; never fear.

Go talk to Bourne on his device;
On superheated steam.
Before he's through she'll tear her hair
And then let out a scream.

There's Weatherly, of valve gear fame,
Whose spiel on lap and lead
Will make her want to grab a train
To Reno to be freed.

At last a talk on cutting speeds,
Done on the Bullard tool,
Will prove to her, without a doubt,
You're not a *silly* fool.

So after all, that's all we want;
Don't care about the bills.
If only they will leave us home
When purchasing their frills.

DEATH OF MAJOR E. H. JANNEY.

E. H. Janney, inventor of the coupler which bears his name, and which was the origin of the present M. C. B. standard coupler, died at his old home, Alexandria, Va., June 16, aged 80 years. Major Janney was field quartermaster on the staff of Gen. Robert E. Lee during the Civil War. The Janney coupler was first applied to passenger cars on the Fort Wayne line under the direction of J. D. Laing. About 1878 the McConway & Torley Company assumed control of the patents and began making the Janney coupler. They developed it so that it was adopted for passenger cars by the Pennsylvania Railroad, and soon found application on freight cars, and the lines and principle were adopted as standard by the M. C. B. Association in 1887. After selling the patent, Mr. Janney retired from active mechanical work and purchased a farm near Alexandria, where he quietly spent his remaining years. Mr. Janney was a clerk in a grocery store at the time he invented the coupler and we are thus indebted to the mercantile business for this valuable invention. The idea was suggested by the clasping of two hands in a vertical position with the knuckles bent.

M. M. REGISTRATION.

Aldcorn, Thos., Chicago Pneumatic Tool Co., Marlborough-Blenheim.
Allen, G. S., Retired M. M., P. & R. Ry., Shelburne.
Antz, Oscar, G. C. L. E., N. Y. C. Lines, Pennhurst.
Boyden, J. A., M. M., Erie R. R,, Chalfonte.
Cross, W., Asst. to 2nd Vice-Pres., Can. Pac. Ry., Marborough-Blenheim.
Dalton, Wm., Chief Engr., Traymore.
Dickson, Geo., Insp. Dept., Baldwin Loco. Wks.
Eich, H. C., M. M., Ill. Central, Haddon Hall.
Elliott, J. B., M. M., Baltimore & Ohio R. R., Elberon.
Fitz Simmons, E. S., Mech. Supt., Erie R. R., Shelburne.
Fulmore, John H., M. M. Penna. R. R.
Gilmour, Geo., Supt. Inspt., Travelers Ins. Co., Rudolf.
Goss, W. F. M., Univesity of Illinois, Haddon Hall.
Henderson, Geo. R.
Herr, E. E., Engine House For., P. R. R.
Hill, James W., M. M., Peoria & Pekin Union, Lexington.
Lanza, Galtano.
Leach, W. B., Marlborough-Blenheim.
Lewis, W. H., S. M. P., Norfolk & Western R. R., Marlborough-Blenheim.
McCarthy, M. J., S. S., C. C. C. & St. L. R. R., Marborough-Blenheim.
Markey, Jas., M. M., Grand Trunk Ry., Haddon Hall.
Patterson, Robert, M. M., Grand Trunk Ry., Marlborough-Blenheim.
Smith, Carl B., M. E., Boston & Maine R. R., Brighton.
Turner, J. S., Sales Agent, Pressed Steel Car Co., Marborough-Blenheim.
Wilson, Charles, M. M., Lehigh Valley R. R., Elberon.
Woodbridge, H. C., Gen'l Mgr's Special Rep., B. R. & P., Arlington.

M. M. GUESTS.

Allen, T. B., Engine Dispatcher, Penna.
Arter, Wilbur D., Asst. Eng., N. Y. Central, Pennhurst.
Austin, Geo., G. B. I., A. T. & S. F., Marlborough-Blenheim.
Balfour, C. J., Gang Leader, Penna. R. R.
Beck, Henry J., Gen. Loco. Insp., Spydel.
Beck, I. H., Air Brake Foreman, C. R. R. of N. J., Speidel.
Bixby, O. M., Electrical Dept., N. Y. C. & H. R. R., Lexington.
Campbell, H. A. T.
Carey, J. T., M. P., P. R. R.
Carter, G. H., Gen. Foreman, P. & R., Norwood.
Cooper, W. H., Div. Storekeeper, P. & R.
Cotton, A. C., S. P. P., P. R. R., Shelburne.
Cox, Millard F., M. E., L. & N. R. R., Chalfonte.
Cramer, C. B., Gen. Foreman, Wash. Terminal Co.
Crossman, T. E., Official Reporter, St. Charles.
Co., Whittel.
Daly, John J., Boiler Maker For., P. & R. R. Y. Co., Ramsey.

Davidson, W. W., Gen. Foreman Trenton Shop, Penna. R. R.
Davis, P. L., M. P. Insp., P. R. R.
Dawson, W C., Foreman, Wash. Terminal Co.
DeSalis, J. H., Chief Rd. For. Engines, N. Y. C. & H. R.,
Dillon, Howard W., Draughtsman, P. R. R. Pennhurst.
Diven, J B., Asst. Engr. M. P., Pennsylvania.
Dix, Chas. S., Boiler Maker, P. R. R., Atlantic City.
Eggleston, Harry D., Rd. For. Engs., P. & R.
English, J. P., Night For., Central R. R. of N. J.
Finney, H. R., Asst. Rd. For. of Engines, P. R. R., Chalfonte.
Frost, H., Enginehouse Foreman, Penn. R. R.
Gallagher, F. S., Asst. Mech. Eng., N. Y. C. & H. R. R. R.,
Gallagher, P. F., Shop Foreman, B. & O., Lexington. Marlborough-Blenheim.
Galloway, W. S., Asst. P. A., B. & O. R. R., Marlborough-Blenheim.
Gerhardt, E. A., Clerk, D. L. & W., Lexington.
Gormley, J., Asst. Trainmaster, P. R. R., Jackson.
Goslive, E. W., Foreman Pipe Dept., P. R. R.
Gough, P. J., Storekeeper, P. & R., Norwood.
Graham, J. P., Foreman Elec. Dept., P. R. R., Dunlop.
Green, G. H., Chief Insp., Rock Island, Shelburne.
Groosoors, Edw. W., Foreman, P. R. R.
Guinand, Harry W., Clerk Pur. Dept., Penna.
Haines, W. S., M. M., Erie R. R., Schlitz.
Hall, G. A., Frt. Conductor Meritorious Service, Penna. R. R.
Herbert, Wm. A., Foreman Terminal, P. R. R.
Hinis, J. P., Gen. Foreman Loco. Shops, B. & O., Monticello.
Hinkle, H. M., Asst. Rd. Foreman of Engines, Penna., Ellwood.
Hofmann, G. W., Asst Rd. Foreman, Northern Central R. R.
Hosack, W. K., Mach. Foreman, B. & O., Monticello.
Howes, A. F., Loco. Engr., C. & N. W.
Hunt, J. F., Shop Clerk, West Jersey & Sea Shore.
Hurley, W. J., Supt. Mech. Instruction, N. Y. Central H. R. R. R., Marlborough-Blenheim.
Jay, Thos. C., Ck. Office of Mech. Engr., D. L. & W. R. R., Dennis.
Justice, H. B., Asst. S. K., P. R. R.
Kelly, R. J., Gen. For. Car Shops, Long Island, Traymore.
Kreider, Charles N., Gen. Boiler Insp., P. & R., Monticello.
Ligon, L. P., M. M., N. & W.
Linthicum, Frank, A. R. F. E., West Jersey & Seashore R. R.
Longacre, C. J., G. H., P. R. R.
Lovett, Alfred E., F. P. T. D., Penna. R. R. Co., Arlington.
Lukens, Howard A., Clerk to P. M. Agent, Penna.
Mahoney, M. A., Claim Agt., N. Y. C., Galen Hall.
Mallam, T. L., Foreman, P. R. R.
Mansfield, J. J., Ch. Boiler Insp., C. R. R. of N. J., Arlington.
McMenamin, Chas. G., M. P. S., Pennsylvania, Chalfonte.
McSweeney, J. T., Shop Foreman, B. & O., Lexington.
Meehan, J. E., Painter, P. R. R.
Miller, T. E., Rd. F. of Eng., B. & O. R. R., Lexington.
Monath, J. W., Gang Leader, P. R. R., Iroquois.
Montgomery, Wm. H., Trav. Freight Solicitor, P. R. R.
Murray, J. B., Ass't F., P. R. R.
Murray, L. B., Engineer, The Virginian R. R., Strand.
Nation, J. D., Traveling Eng. Penna.
Neale, F. A., Gen. For. C. R. R. of N. J., Pennhurst.
Nelson, W. J., Jr., Ck. P. D., Penna.
Nicholas, R. H., Genl. Foreman, Central R. R. of N. J.
Oswald, Wm. E., Shop Foreman, C. R. R. of N. J., Edison.
Ott, Wm. B., M. M., P. R. R., Whittle.
Reynolds, J. H., Clk. Office Shop, P. R. R.
Russell, Harry B., Engine House For., P. & R.
Roberts, G. H., Machine Foreman, Long Island, Pennhurst.
Roberts, W. N., Foreman, P. R. R.
Roche, J. J., Blacksmith Foreman, C. R. R. of N. J., Islesworth.
Rommel, G., M. M., B. & O.
Sanford, H. F., A. B. I. of N. J. Div., P. R. R. Co.
Sanford, J. W., Retired M. M., W. J. & S. R. R. Co.
Scott, Harry C., Foreman Machinist, C. R. R. of N. J., Fredonia.
Scott, H. E., Foreman Tin Shop, P. R. R.
Seiders, Irwin A., Rd. For. of Engines, P. & R., Monticello.
Sensenbach, C. A., Foreman Blacksmith, Pa. R. R., Ardmore.
Struter, L. P., Air Brake Engr., Illinois Central R. R., Haddon Hall.
Thompson, G. M., Machinist, Penna.
Toomey, T. H., F. E. Shops, P. R. R.
Watson, David, Genl. Foreman, B. & O., Baltimore House.
Westley, Isaiah S., For. Engine Shop, P. & R.
Williams, David T., Mech. Eng., P. & R.
Wilson, G. E., S. L. O., B. & O. R. R., Young's.
Wilson J. M., Eng. House For., P. & R., Elberon.
Winkler, L., Machinist, Penna.
Woollven, F., Mech. Dept., Baldwin Wks., Ostend.
Woolven, J. C., Mech. Dept., Grand Trunk, Ostend.
Yost, Wm. M. K., Ch. Dept., P. & R., Shelburne.

Conventionalities.

Komical Jack Turner, the Pressed Steel Car man, arrived on late schedule Sunday with a brand new stock of "sayings."

H. W. Jacobs, assistant superintendent of motive power of the Santa Fe, is here to attend the Master Mechanics' convention.

Mrs. R. D. Smith is confined to her room at the Dennis with a badly sprained ankle received while visiting the exhibits on the pier.

Emmett K. Conneely, purchasing agent of the Pittsburgh & Lake Erie, is stopping at the Brighton. Mrs. Conneely is with him this year.

H. Wright, an examiner of patents for the United States government at Washington, is attending the convention and is stopping at the Marlborough-Blenheim.

R. M. Dixon, president of the Safety Car Heating & Lighting Company, arrived Monday night and is registered at the Dennis. Mr. Dixon returned at the end of May from a five weeks' trip to Europe.



C. L. Bundy, General Car Foreman of the Delaware, Lackawanna & Western.

Chairman Philip J. Mitchell, of the entertainment committee, was presented with an appropriate gift by the members of his committee Tuesday afternoon.

Mrs. M. K. Barnum had expected to attend the convention this year, but remained home to attend instead the high school graduation exercises of the youngest son.

George A. Bardon, of the Chicago Pneumatic Tool Company, is attending the M. M. convention. He is stopping at Young's, and is accompanied by Mrs. Bardon.

R. B. Keller, superintendent of apprentices on the Delaware, Lackawanna & Western, is stopping at Haddon Hall. The apprentice instruction on the Lackawanna is being extended and is giving good results.

Walter H. Cottingham, president of the Sherwin-Williams Company, accompanied by his family, will sail on the "Celtic" on June 20 for England. They will occupy their country estate near London during the summer.

E. S. Wortham, purchasing agent and assistant to the vice-president of the Chicago & Alton, through a stenographic error, was transferred to the C. & O. in Monday's registration. We are pleased to put him back on the C. & A.

Tuesday must surely have been "tag day" on the pier, for George Molleson was observed wearing two supplymen's



W. H. Dooley, Superintendent of Motive Power of the Queen & Crescent.

badges. Inasmuch as he had registered as representing two companies, the guards at the door allowed him to enter as often as he pleased.

One thing that has been even more missed this year than J. Will Johnson's band of last year has been Secretary Joe Taylor's white suit. The soft pedal that has been applied to so many things this year seems to have affected the esteemed secretary's sartorial tastes.

W. N. Mitchell, of the International Correspondence School, is the happy possessor of two Republican National Convention tickets. While in Atlantic City for the conventions he received two telegraphic offers for his tickets, but declined both. He left Monday for Chicago.



I. N. Kalbaugh, S. M. P., Coal & Coke Company, and F. B. Ernst.

S. L. Bean, mechanical superintendent of the Santa Fe, is the second railroader from Los Angeles, Cal., to attend the conventions this year, D. P. Kellogg, shop superintendent of the Southern Pacific, also being here. Mr. Bean makes a most favorable report of conditions on the Santa Fe and on the Pacific coast.

H. A. F. Campbell, designer at the Baldwin Locomotive Works, is numbered among the special guests. He has recently developed some very interesting information in connection with the counterbalancing of locomotives, which has had a very noticeable effect on the steadiness of some of the recent high speed power.

George W. Kelley, blacksmith foreman of the Central Railroad of New Jersey and a prominent member of the International Railroad Master Blacksmiths' Association, spent a day at Atlantic City looking over the exhibits. He predicts a record breaking meeting of the Master Blacksmiths' Association in Chicago next August.

Not according to the editor, but through a liberty taken by the compositor, it was stated in this column yesterday that Mrs. Flint "was formerly for several years with Manning, Maxwell & Moore." While it is clear that the "s" was



W. C. Arp, Superintendent of Motive Power of the Vandalia.

inserted in error, we hasten to explain that it was Mr. Flint, not Mrs. Flint, who was with the concern named.

J. J. McCarthy, president of the Chicago-Cleveland Car Roofing Company and ex-president of the Hod Carriers' Union, an organization of prominence in the "good old Saratoga days," is not here because of illness in his family. This is the first time in many years that Mr. McCarthy has not put in an appearance at these annual gatherings.

L. R. Pomeroy, who has been an associate member of the Master Mechanics' Association since 1889, is continuing his custom of not missing a convention. He arrived on Monday morning, and will attend the low water boiler tests at Coatesville at the close of the meetings. Mr. Pomeroy is now in consulting practice in New York.

Farmer L. H. Turner sent word by his assistant, Dave Redding, that he could not find time to attend the conventions this year. It is believed, however, that this is only modesty on his part; the fact that his road has been selected by a noted efficiency engineer as a model of scientific management seems to have embarrassed him and scared him away.

W. C. Hayes, president of the Traveling Engineers' Association and superintendent of locomotive operation on the Erie, is attending the convention. Mrs. Hayes is with him and they are stopping at the Chelsea. Other officers of the Traveling Engineers' Association who are, or have been, in attendance at the convention this year are, W. O. Thompson, secretary; C. B. Conger, treasurer, and F. C. Thayer and V. C. Randolph, of the executive committee.

V. C. Randolph and L. R. Laizure, master mechanics of the Erie, are stopping at the Pennhurst. Mr. Randolph read a report on "Practical Instruction in Fuel Economy" at the Traveling Engineers' Association which attracted great attention, in fact, marked the high point of the convention. He was also elected on the executive committee of that association. The Erie method is to have supervisors of locomotive operation on each division to see that the enginemen are given practical instructions on fuel economy.

W. C. A. Henry, superintendent of motive power, Southwest system, Pennsylvania Lines West of Pittsburg, is attending the meetings of the Master Mechanics' Association. He is much interested in the subject of stokers and states



E. F. Cook, Assistant Vice-President of the Union Tank Line, Chatting with Friends.

that the underfeed type has almost ceased to be a matter of special interest on his system. There are now so many in successful use that the engine crews are not looking on them as a novelty or experiment. He is building a stoker instruction car, to be used in much the same way as an air brake instruction car is now used.

W. S. Moseley, chief draftsman of the Carolina, Clinchfield & Ohio, is among the special guests at the convention. The Mallets which have been in service on that road for some time are giving splendid results. Tests were made shortly after these were introduced and while the enginemen were not accustomed to handling them. In spite of this, they showed much greater efficiency than the consolidations. It is proposed to make another series of tests in the near future. The road is specially favorable for making tests of this nature because of the long uniform grade over which the trains are operated.

Eleven representatives of the Illinois Central have attended, or are in attendance at, the conventions this year. They include C. F. Parker, vice-president; M. K. Barnum, general superintendent of motive power; R. W. Bell, superintendent of machinery; J. M. Borrowdale, superintendent of the car department; Willard Doud, shop engineer; E. W. Jansen, electrical engineer; L. P. Streeter, air brake engineer; J. S. Sheafe, engineer of tests; C. A. Shaffer, general



J. W. Storey, Chief Draftsman, Central of Georgia.

inspector of shop tools; H. C. Eich, master mechanic; and Gus Reifsteck, secretary to Mr. Barnum.

As everybody knows, the initials of chairman Mitchell of the entertainment committee are "P. J." Through somebody's mistake, they were given on his official badge as "P. R." "Pennsylvania Railroad Mitchell," said a man who was looking at the badge yesterday. "They'll read it 'Pretty Rotten Mitchell' before we get through down here, I'm afraid," replied the chairman, referring to the expurgated entertainment programme. However, nobody but Mr. Mitchell is worrying about his administration of the entertainment features. Special conditions require special resources, and he has admirably adapted himself to the situation as it is.



Maham H. Haig, Mechanical Engineer of the Sante Fe.

The Exhibit.

The Gold Car Heating & Lighting Company, New York, has been demonstrating, at its booth, the new Ideal pressure reducing valve for car heating. It is claimed for the regulator that when once set it will not vary.

The new combination body and truck bolster car which has been shown among the track exhibits by the Mid-Western Car Supply Company, Chicago, will be routed to Chicago via the Reading and Lackawanna roads, leaving Atlantic City Thursday. The car will be tested at Chicago.

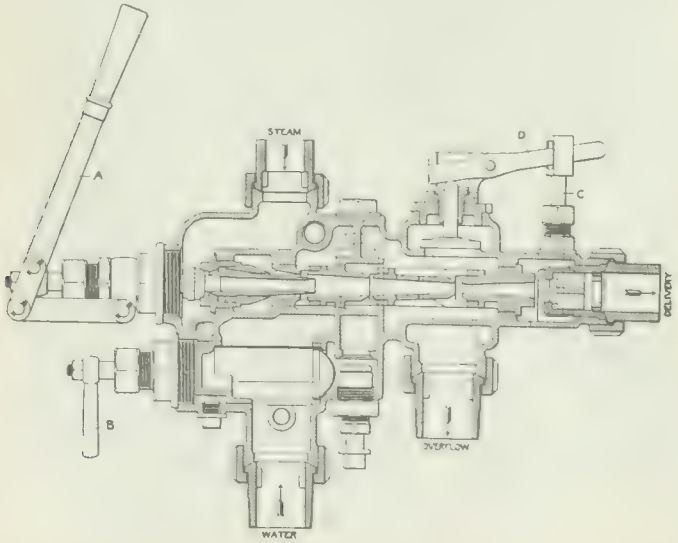
The Acme Supply Company, Chicago, at spaces 572 and 573, is making the first exhibit of Chanarch car floor plates. These plates are used with any of the composition floorings usually found in up-to-date passenger equipment. Chanarch automatically anchors the composition and weighs less and requires less composition than other floor plates, thus effecting a saving not only in cost, but operating efficiency. The Acme company will enlarge its plant on West Lake street and largely increase its output.

INJECTOR WITH AUTOMATIC OVERFLOW VALVE.

Since the invention of the injector by M. Giffard there has been a constant endeavor to improve its design and construction in accordance with the tendency toward increased boiler capacities and higher steam pressures. The first non-lifting injector manufactured by the Nathan Manufacturing Company, New York, consisting merely of a body and a set of nozzles, was followed by lifting injectors of the fixed nozzle type, the restarting type and of the non-lifting type, in which all operating parts necessary to start, regulate and stop it were contained in the injector itself.

All these types have their advantages, but also have weaknesses, one of which is the tendency to spill water at the overflow when the temperature of the feed water becomes higher than is suitable to the characteristics of the injector. This tendency has been overcome, in most cases, by what are called closed overflow injectors, in which the overflow is closed by hand-operated devices. This arrangement is unsatisfactory, and under certain circumstances may even be dangerous, because, if the jet is broken, the steam is blown back in the water tank, and, if it is not noticed, the water in the tank will soon become too hot to be handled.

All difficulties and uncertainties of this kind have been overcome in the D. and M. type injector, illustrated herewith, which represents an entirely new departure in injector construction shortly to be introduced by the Nathan Manufacturing Company.



Nathan D. & M. Type Locomotive Injector.

This new type is, in general, simliar to the restarting type of Simplex instrument, but includes an automatic closing and opening overflow valve. Letter *A* designates the ordinary starting lever, operating in the usual way, and *B* indicates the water valve by which the admission of water is regulated according to requirements. The injector is provided with the usual overflow valves and an auxiliary inlet valve. In the delivery chamber, moving in a suitably packed stuffing box, a small piston, *C*, which actuates a fulcrumed lever, *D*, that at the proper time acts on the overflow valve.

When the injector is started, the pressure in the delivery chamber slightly raises the piston, *C*, and the lever *D* bears down on the overflow valve and keeps it closed. Should the injector break from some cause, such as shortage of water, the pressure under the piston ceases and the overflow valve will open automatically. The injector then restarts automatically as soon as the water supply is restored. Closing the overflow is automatically repeated after the injector is again started.

This injector thus combines within itself the advantages of both the closed overflow and the open overflow injector, and entirely eliminates the disadvantages of the forcibly closed overflow. In view of the overflow being closed automatically, the injector is enabled to work feed water as hot as any type of injector with a hand operated overflow valve.

CUTTING COMPOUND.

An oil that is a distinct departure from the ordinary cutting compounds, is being introduced by Flint & Chester, Inc., New York. Contrary to the general characteristics of oil it thoroughly mixes with water and forms a solution that has all the advantages of water and at the same time the lubricating qualities of oil. It is known that a globule of water will resist a greater pressure than an oil globule, the difficulty in employing water as a lubricant being its lack of viscosity, or ability of globules to cling together.

As a mixture of from 10 to 20 parts of water to one of oil, depending on the character of work, forms the cutting compound, the cost of the mixture per gallon is small and it has the added advantage of cheap handling and storage, for the freight charges on and space occupied by one barrel of the oil cover a final mixture from 11 to 21 barrels. This oil is also valuable for hydraulic machinery. By using from 50 to 75 parts of water with one of oil it forms a preservative for the machinery as well as a lubricant.

The mixture does not give off the usual disagreeable odor when heated; it prevents rust, permits of heavier cuts being taken, and has healing instead of the poisonous qualities.

THE WESTINGHOUSE EXHIBIT.

Contrary to the practice of previous years, the several Westinghouse companies have had no working exhibit, their booth in the entrance hall being tastefully furnished as a place where members and guests of the convention could meet and talk. However, Westinghouse motors with control are being used in connection with the machinery exhibits of the following concerns: American Tool Works, 3 h.p. "CCL" motor driving a 2 ft. geared radial drill; a 20 h.p. "CCL" motor driving a 6 ft. radial drill. Baker Brothers, an "SK" adjustable speed DC motor on a 1 in. x 6 in. automatic drilling machine. Bethlehem Steel Company, two "CCL" motors operating a stress testing machine and a staybolt vibrating machine. Bullard Machine Tool Company, a 20 h.p. "CCL" motor on a 42 in. vertical turret lathe. H. H. Hewitt, two type "R" direct current motors on truck. Manning, Maxwell & Moore, Inc., an "SK" motor with drum type controller mounted on a Reed lathe, and an "SK" motor driving a National multiple spindle topping machine. Special attention is called to the automatic starter with this motor. Clement Street, two Westinghouse air brake motor-driven air compressors. Vixen Tool Company, a "CCL" motor driv-

ing a file testing machine. Yale & Towne Mfg. Company, two direct current motors operating hoists.

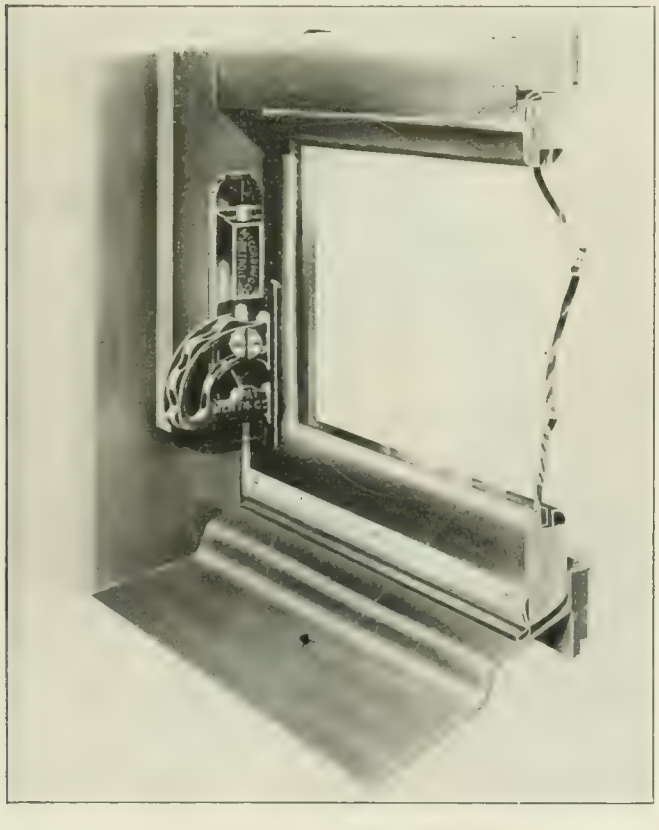
The booth is well lighted by 15 Westinghouse "Wire Type" lamps.

A NEW ELECTRIC DRILL.

There is an attractiveness to doing things by electricity that appeals to the imagination and the practical instincts of most people; hence the innate attractiveness of the electric drill shown by the Independent Pneumatic Tool Company, Chicago. It is not a very heavy affair, but it is good for holes in steel up to about 9/16 in. diam. There is a light shell carrying the fields, and revolving inside is a small armature. The shaft carries a pinion that meshes with a couple of gears which are pivoted on an arm attached to a sleeve serving as the drill spindle. The gears also mesh with an inside gear on the shell, so that as the pinion causes the gear to revolve they walk around and carry the drill spindle with them—a very simple and very old gear arrangement put to new uses that cuts the rate of rotation of the drill spindle relatively to armature shaft down in the ratio of one to nine. It is so simple that it seems strange no one has done it before. Then, with roller bearings and good workmanship, there are all the elments of ease of manipulation and satisfactory execution of work.

UNIVERSAL DECK SASH RATCHET.

Some things do seem too simple to exist. Take the old corrugated deck sash ratchet, for example, that was once used almost universally. The trouble was, that when it wore on its pivot it would slant and drop out of place. The McCord Mf'g. Company, Chicago, took it and put a



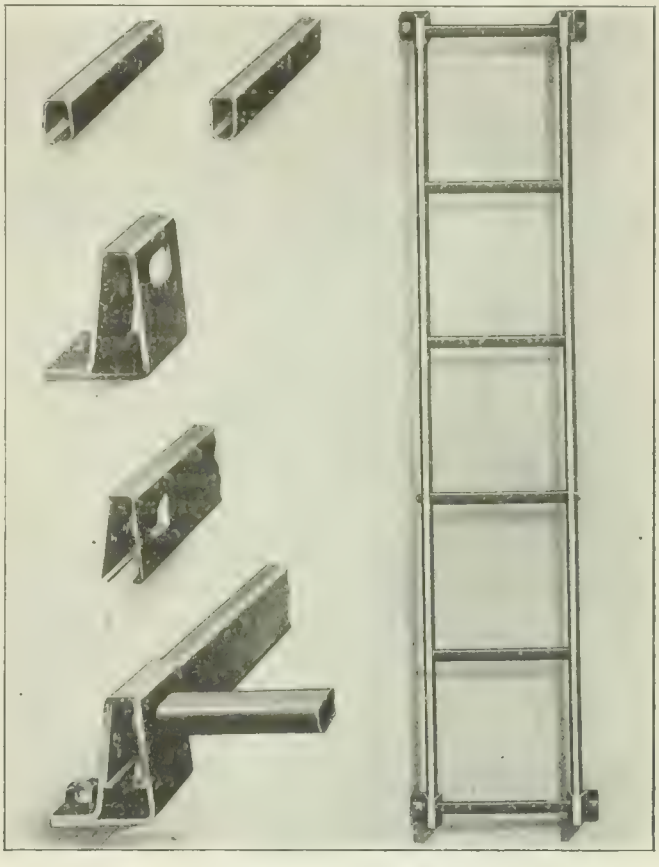
Universal Deck Sash Ratchet.

ridge along the inside, a sort of guard rail, as it were, for the spring stem, and a big-headed pivot pin to keep the thing in line—and there you are. The pin can't run off the track, because of the ridge and the ratchet can't wabble and get out of line; and so there are no more deck sashes coming down on the car floor, and no more sticky ventilators; while an abundance of fresh air is easily obtainable.

STEEL BOX CAR LADDER.

A box car ladder made of pressed steel is shown in the illustration. It consists of two continuous stiles, and required number of treads, and four straps fitted over the stiles for attaching to the car. This ladder, manufactured by the Acme Supply Company, Chicago, Ill., fulfills the specifications of the Interstate Commerce Commission. It is light in weight and ample in strength, and is attached to the car by only four bolts.

The stiles are made of inverted "U" shapes, with legs



Steel Box Car Ladder.

formed over 1/4 in. along the edges. This allows complete access of air to all parts, preventing corrosion, and the shape provides ample strength. The length is made to suit conditions. The hole for the insertion of the tread is provided with a continuous ledge of 3/8 in.; thus providing a solid bearing for each tread in the stile. The depth is 2½ in., its width at the top 3/4 in., and at the base 1¼ in. It is made of steel 1/16 in. thick.

The treads are formed so that there is a space left open, which is closed when the tread is fitted into its position in the stile, providing a spring fit of the tread which securely holds it in position. The shape of the tread not only furnishes a very good grip for hands and feet, but also makes an unusually strong construction. The depth of the tread is 1¼ in., and it is 3/4 in. wide, and made of steel 1/16 in. thick.

The straps are attached to the stiles by means of rivets, and are further held in place by the tread, which engages the stile and strap at the same time. The strap holds the stile out from the car, and thus allows free access of air all around the ladder, and also permits of easy inspection. The strap is bolted through the sheathing of the car by

means of a ½-in. bolt, and has a total depth of 3¾ in., and a total base of 2 15/16 in. It is 3 in. long and is made of steel ⅛ in. thick. The toe of the strap can be turned either outward or inward as desired.

In a five-round ladder a tie-rod is placed from one stile to another through the tread at the middle. On a six-round ladder it is placed at the third tread from the bottom, as shown in 1. To make repairs it is only necessary to take out the tie-rod and two strap bolts and one stile can be completely removed. This ¼ in. bolt also serves as a tie-rod when the ladder is completely assembled and applied to the car.

The parts are made standard, so that repairs can be very easily made; they can be furnished upon receipt of dimensions as to length, etc. Any part can be placed in position in the ladder by simply removing the tie-bolt and two of the strap bolts, which permits the removal of one stile completely.

The approximate weight of the five-round ladder is twenty-five pounds, and of the six-round ladder thirty pounds.

AUTOGENOUS WELDING AND CUTTING.

During one week $216.36 was saved on various repairs in a western railway shop by the use of autogenous welding and cutting, with an additional saving of time which it would have required to get new parts, etc.

The cost of oxygen and the facility of getting it is naturally a great factor in this work. The International Oxygen Company, New York, offers a system for making oxygen right at one's works that is unique for simplicity, and the cheapness of the gases produced. Hitherto, to obtain oxygen, it was necessary to have a chlorate of potash plant, or to bring the gas in cylinders from some distant point. In either case the cost is rather high. At present it is claimed that oxygen can be made by the I. O. C. system at a saving of more than 75 per cent. over the old methods.

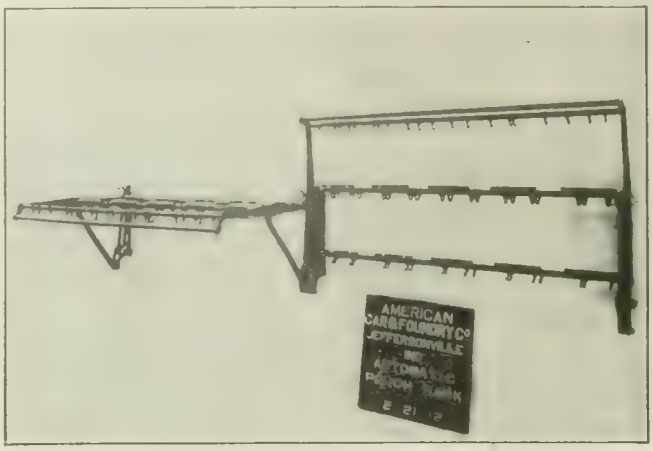
The International Oxogen Company has a 4-cell plant at Booth 307, which produces 12 cu. ft. of oxygen and 24 cu. ft. of hydrogen per hour, at an expenditure for power of 4 k.w.h. The plant requires no expert attention. Once started, the generators can run continuously for days and months, or even years; no replacing of parts and no repairs of any kind are required.

In addition to the oxygen produced by the I. O. C. system, 2 cu. ft. of hydrogen are produced for every cu. ft. of oxygen. The combination of these two gases gives the best flame for cutting purposes. Steel and wrought iron up to 24 in. in thickness can be cut by the oxy-hydrogen flame, which for cutting operations has proved superior to the oxy-acetylene flame. Oxy-hydrogen is used to great advantage in welding thin sheet steel, copper, brass, aluminum and all alloy metals; the oxy-hydrogen weld is said to be stronger and more elastic. Another important method of welding is the oxy-hydrogen-acetylene combination. These three gases together give an ideal flame, neither carbonizing nor oxidizing, and for this reason is suitable for a great variety of welding operations.

The I. O. C. system has been in use abroad for over ten years. The economy realized by this method in the cost of oxygen and hydrogen is large enough to pay for an installation in less than two years.

AUTOMATIC POUCH RACK.

The government is getting mighty particular these days, and especially as to the fittings of its postal cars. Pouch racks must be just the right size and shape; and weight that is excessive must be avoided. So the American Car & Foundry Company, St. Louis, Mo., has brought out a pouch rack that is light, has only ¼ in. between frames, and can be folded against the wall with all pouches hanging in place. It locks automatically open or shut, up or down,

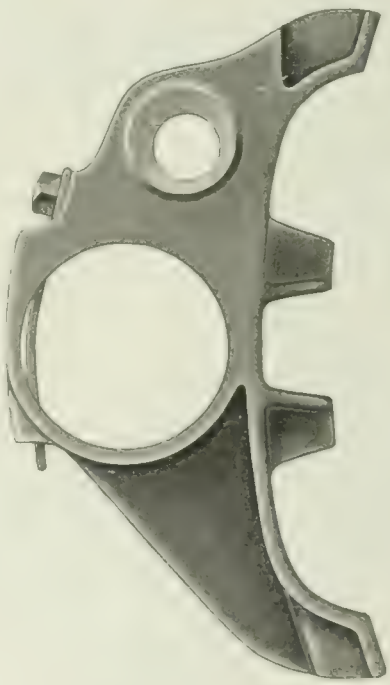


Automatic Pouch Rack.

and has ample strength to carry its load. These racks may be seen at the booth of the company.

THE BUFFALO ADJUSTABLE BRAKEHEAD.

Whatever is wasted in brakeshoe scrap is real waste; and a pound or two is a pretty big percentage of total scrap. Now, don't do it. Just take the old Christie key that you have used for a generation to hold the shoe to the head and make it in the form of a spring. Then you have a slot in the back of the head. Drive the spring key down through it so that it bears on the beam. This will form a friction bearing that will hold the head in place,



The Buffalo Brakehead.

but will still allow it to turn under pressure. Then fit your shoe and apply the air, and the head will turn until the shoe has such an even bearing on the wheel that a uniform wear is insured. And the head will hold that place until the shoe is worn out. No, it isn't a kink that we originated; but the new adjustable brakehead that is being exhibited by the Buffalo Brakebeam Company, New York, and shown herewith.

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THE EXHIBIT 1529

WHILE satisfied and loyal shopmen are a tangible value to a railway, contented and earnest foremen are of even greater importance. In fact, in most cases, it is not possible to have the former without first having the latter. It is noticeable in visiting the different shops throughout the country, that a spirit of enthusiastic loyalty for their roads and both their superiors and inferiors exists among the foremen at some places and is distinctly absent at others. It will well pay the head of a department to occasionally consider broadly the fundamental conditions and see that no opportunity is present for discord to start, or, if it is already evident, to find where the fault lies. The fundamentals are not confusing or involved and can usually be summed up in the term "square deal" or justice. Are your foremen getting all that it is their right to expect? Are they receiving a compensation in keeping with their responsibilities and their relative position, or are there workmen under their direction who draw larger checks on pay day? Does each know definitely within what limits he is supreme and just the limit of the authority of those around him? Is each actually supreme in his dealings with those supposedly under his direction? Is the line of promotion clear cut and straight forward? Is courtesy present in the intercommunications of the department? If these questions can be answered in the affirmative, it makes no difference how much work you demand of them, they will be satisfied and loyal. If these conditions do not exist it is pretty certain that discord and disloyalty are present even if not yet evident.

WHAT can be done in saving fuel by very simple means is well illustrated by the experience of the Baltimore & Ohio during the past year. Five supervisors of locomotive operation were appointed with instructions to study conditions on the sections of the road to which they were assigned and to recommend to the division officers, operating as well as mechanical, changes in methods or practices that would save coal. The work of these five men was very largely responsible for a saving of 12 per cent. in the fuel bill in the first year the scheme was in operation.

IN visiting the machine tool exhibit and noting the record performances being demonstrated, it is wise to make a mental computation to determine the possible output per day or week and compare it with the amount of work you have to do in the same time. Not infrequently it may be found that one of these machines will easily do the work that now requires two tools and its purchase can be easily justified. Again it may be discovered that the capacity of the machine is so great that its services would be required less than half the time under your conditions and the recommendation of its purchase will seriously reflect on your judgment in the choosing of future tools.

THE discussion on the maintenance of Superheater Locomotives was as extended and interesting as that on Boiler Design, as it was made to include questions relating to the general advantage of superheaters, and even invaded the realms of poetry and inspired the chairman of the committee to quote from Emerson that familiar passage about "troubles that never arise." While the subject of the report is so general as to cover the maintenance of locomotives equipped with superheaters, the instructions to the committee limit the range of the investigation to the quality of metal for the cylinder and valve wearing surfaces, and especially to lubrication, while the extra cost of maintenance, due to the superheater fixtures themselves, was not considered. It is, perhaps, too soon to obtain correct figures as to the cost of maintenance of any of these details, as the average time the superheaters have been in use on most lines is one year or less. During this period the question of proper lubrication of valves and cylinders using steam at high temperature has been developing, and the most satisfactory results have been only recently obtained. It is very fortunate for the success of the superheater that the problem of lubrication has been solved so successfully and placed beyond further question. It is fortunate also that a satisfactory metal for cylinders, valves and packing and forms of construction have been found which will permit the locomotive to do its work regularly under conditions of high temperature. This much having been achieved, superheating as applied to the locomotive must be regarded as a very valuable improvement, and it now

remains to ascertain the cost of the maintenance of the superheater itself, covering a period when renewals are required. While this expense may be small compared with the economies obtained, yet it will in time form a real additional charge to locomotive repairs and maintenance which must be reckoned with.

LOSS OF POWER IN LOCOMOTIVE EXHAUST.

THE loss of power due to back pressure in the exhaust of locomotives has been given so little attention that it is doubtful if mechanical officers could state within a large per cent. what it amounts to for a given type of engine working under normal load for any speed, or the relation of this loss to the total useful power developed at the drawbar. The various efforts to increase the capacity of locomotives usually relate to something positive in the way of additional apparatus, or increased dimensions, but little effort is directed to the reduction of negative influences which, if accomplished, would be equivalent to a positive gain in power without an increase in the dimensions of the locomotive or an addition to its equipment. Any increase in the size of the exhaust nozzle which reduces back pressure has this effect, and any substitute for the exhaust as a means for producing drafts, if more efficient will be a positive gain. It is the general impression that the power lost in back pressure in a locomotive of average size may amount to 150 to 200 h.p., but we are hardly prepared to find that on some Pacific locomotives this loss is equal to 590 h.p. and on Mallet engines it exceeds 1,000 h.p. These losses are almost equal to the total useful power obtained from the average passenger and freight locomotive.

In the elaborate paper on Locomotive Drafting and Its Relation to Fuel Consumption by H. B. MacFarland, engineer of tests of the Santa Fe, presented at the recent meeting of the Railway Fuel Association, the loss in power due to exhaust back pressure is given for the principal types of locomotives now used on the Santa Fe. The figures for back pressure and power lost were obtained from actual tests and seem to be unusually high, especially those for oil-burning locomotives. The test of the balanced compound Pacific type engine, showing the excessive back pressure already quoted, was in regular passenger service and burning oil. The loss in horsepower due to cylinder back pressure was 440 h.p. at 40 miles per hour and 590 h.p. at 50 miles per hour. On a somewhat larger simple Pacific type engine burning coal the back pressure horsepower at 40 miles per hour was 270, and at 50 miles per hour, 340. The greater loss with the compound engine is due to the greater area of the low pressure piston on which the back pressure acts, and this power loss should be in the ratio of the piston areas, other conditions being equal.

This limitation of the power of large locomotives by excessive back pressure on the cylinders is a subject which should be thoroughly investigated, as it is a large factor in their economical operation. It is not possible to operate non-condensing engines without at least 4 lbs. back pressure, but the loss due to excessive pressures beyond that is due to the inefficiency of the exhaust nozzle and smoke-box appliances for producing draft.

The actual power required to draw the gases through the tubes of a large locomotive is only about 20 h.p., and the resistance of the diaphragm and netting adds 8 h.p., making a total of 28 h.p. The resistance at the ashpan of oil-burning engines is much greater than that through the grates of coal-burning engines on account of the restriction of the air passages in the present methods of construction of oil-burning on locomotives.

Mechanical draft for locomotives has been frequently proposed, and was actually used as early as 1835 by Segiun, the inventor of the multi-tubular boiler. Since that time the experiments made in this direction have been with inefficient fans and comparatively slow speed reciprocating engines for driving them. The great improvements which have been made in the efficiency of blowing apparatus in recent years, and the possibility of driving such apparatus direct-connected by economical steam turbines, render the conditions for success far more favorable. Mr. MacFarland has already demonstrated that it is possible to produce sufficient draft for a large locomotive by the expenditure of 50 h.p. with a mechanical combination of this kind, and is now arranging for special equipment for application to a locomotive in regular service.

WHEEL FLANGE LUBRICATION.

FLANGE lubrication is effective in greatly reducing flange and rail wear on divisions where curves are sharp or frequent; it does not effect the adhesion of the locomotive if properly applied and maintained, and it does not have sufficient effect on train resistance to make it a factor in tonnage rating. These are, briefly, the conclusions of the committee which reported on this subject at Wednesday's meeting. It seemed to be in full agreement with the experience of all the members that have any extensive trials.

General practice favors the application of the lubricant to the flange of the leading driver. It should be of a quality that will form a thin paste which will be partially transferred to the side of the rail head and from there to the flanges of the following wheels. The committee stated that the effect of the lubricant decreased very rapidly as the distance from its point of application increased, but it seemed that this was not sufficient to lead to the recommendation of more than one lubricator on each side of the locomotive.

In cases where the flange oilers have been extensively applied, savings of considerable size were reported by both the committee and the members discussing the subject. Mr. Gaines stated that on a division where all the locomotives were equipped, a saving of at least $50 per locomotive per year is being made from the reduced loss of metal from tire turning alone. The committee reported a net savings of $84 per year per locomotive on one road. It seemed that the mileage of tires between turnings can usually be doubled where conditions are ordinarily favorable to the use of the lubricators and quadrupled where severe curves are frequent. One number reported an increase from 12,000 to 50,000 miles between tire turnings.

The question of the effect of flange lubrication on the brakes when descending long grades brought forth no evidence that any serious result of this kind had been noticed. This feature, as well as the effect on the adhesion of the locomotive, is largely dependant on the proper design and application of the lubricators, but principally on its maintenance. If oil is permitted to get on the tread of the driver or top of the rail considerable trouble with both slipping of drivers and sliding of wheels can be expected.

The question of the effect of flange or rail lubrication on the adhesion of the drivers and, therefore, on the traction power of the locomotive is one which does not appear to have been fully investigated, and it is easy to realize that if this lubrication is not properly controlled it might decrease the hauling power of the engine to a considerable extent.

There seems to be a general impression that if the lubrication is confined entirely to the flange there can be no effect on the adhesion of drivers, but this assumes that adhesion is only obtained by the pressure of the tread of the wheel on the rail head, which is hardly tenable, for where there is wear there is also friction, and driving flange friction on curves must be a part of the adhesion which is essential to traction power.

In the further investigation of the flange lubricator this phase of the question might be considered, and a conclusion as to the real effect of definite flange lubrication on the traction power of locomotives working on curves, as based on dynamometer measurements, should be stated.

Proceedings.

Vice-President Crawford called the meeting to order at 9.55 a. m.

FLANGE LUBRICATION.

The committee reporting last year on the subject of flange lubrication has been continued to make still further report to the 1912 convention and the original committee has been increased from three to five members.

Since closing the 1911 report advice has been received of flange lubricators having been applied by over thirty roads on which lubricators had not been used previously. In most cases reported, the number of locomotives equipped on each road has been small. In one instance, however, a road operating over 1,100 locomotives has applied flange lubricators to the entire number.

On a number of other roads on which flange lubricators were used at the time of preparing the last report, the application



M. H. HAIG,
Chairman, Committe on Flange Lubrication.

has since been extended. The reports of thirty-five of these roads show an average increase of thirty lubricators each, the number per road varying from one to over two hundred.

An affirmative answer to the question "Does your experience confirm the report on flange lubrication presented at the last convention?" was received from twenty-three of the twenty-nine roads replying in detail to the committee's circular. Five of these roads explained that failure to answer was due to lack of sufficient experience.

The types of lubricators applied during the past year indicate the most general adoption of crude oil as a lubricant. Some reports state that hard grease has been rejected as unsatisfactory, due to the fact that the grease catches and holds sand. The abrasive action resulting has increased instead of decreased the flange wear. Graphite as a flange lubricant has been reported as successful by some roads but others have abandoned it for crude oil. Crude oil with a heavy asphaltum base is spoken of with the greatest favor by roads using flange lubricators. It has been successfully applied by both hydrostatic and gravity-feed devices. Exhaust steam from air pumps as well as water jets are still being used to a limited extent by some railways and beneficial results are reported. An undesirable feature of the water jet is the fact that it must be abandoned during the winter weather.

A type of lubricator especially adapted to electric locomotive service has been developed on the Grand Trunk by W. D. Hall, superintendent of power plant and electrical equipment. This lubricator has been designed to meet the requirements of service through the St. Clair tunnel. Fig. 1 is a sketch illustrating the principle by which this lubricator is connected and operated. Oil is contained in an air-tight receptacle of one quart capacity. The oil is led to the wheel flanges by pipes and is sprayed upon the flanges by jets of air. The air is supplied from the main reservoir by a ¼-in. pipe connected to the oil receptacle above the surface of the oil. This provides a pressure to force the oil from the receptacle. A branch of this pipe is connected to the oil delivery pipe leading to the flanges. The oil is thus forced through the pipes and sprayed upon the flanges.

Used with electrical equipment, the air is controlled by an electric push-button. Valves admitting air above the surface of the oil, as well as to the delivery pipes are operated by electromagnets. The push-button is located in easy access of the engineer and oil is sprayed upon the wheel flanges almost

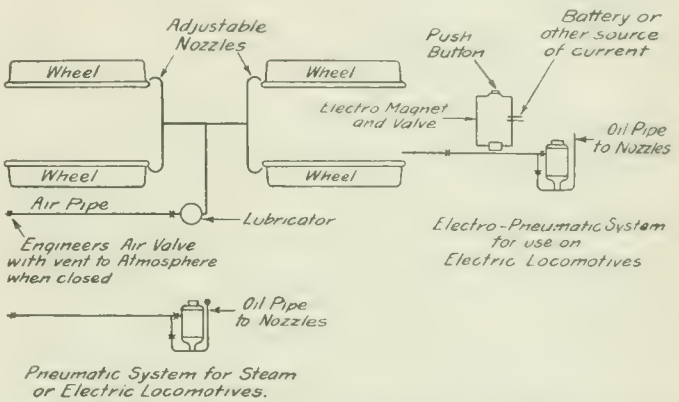


Fig. 1—Pneumatic Flange Lubricator for Electric Locomotives; Grand Trunk.

immediately upon the admission of air pressure. With this arrangement flange lubricant is applied only when needed and when running on straight track the lubricator is not continued in operation.

This apparatus has been in successful operation since July 10, 1910, and has operated under extremely severe conditions. Six electric locomotives have been equipped and handle 1,000-ton trains up and down 2 per cent. grades. Owing to the many curves encountered and also because of the rather slow center of gravity of the locomotives, flange wear has been quite heavy. Since applying this lubricator the conditions have been improved to such an extent that 50,000 miles and over are made between turnings and it is seldom necessary to remove wheels for tire turning before the armature is removed for commutator dressing, and these two operations may, therefore, be performed at the same time.

Before the application of the lubricator, mileage made between tire turnings was from 12,000 to 25,000. The lubricant used is engine oil, most of which is taken from bearing cellars of the railway armatures when the oil in them is being changed. The oil is filtered before being applied to the flange lubricators. No difficulty has been experienced with the delivery of this oil in cold weather. It is sometimes thinned to suit the weather conditions by the addition of a little coal oil. Care has been exercised in keeping the oil free from anything that might obstruct

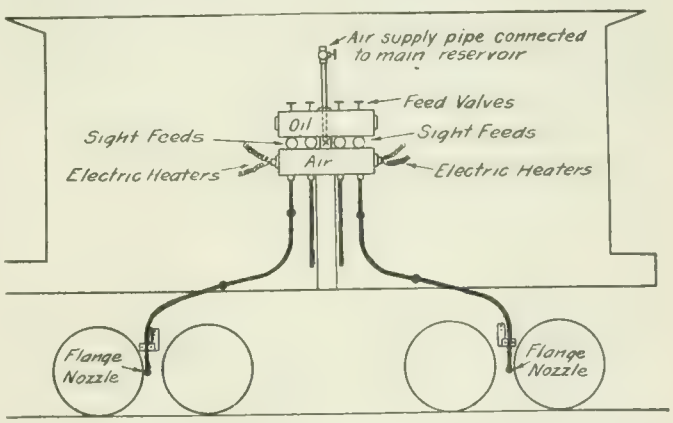


Fig. 2—Electric 4 Pneumatic Flange Lubricator for Electric Locomotives.

the nozzle and very satisfactory results have been obtained under varying and severe weather conditions.

Fig. 2 is a diagram showing the application and principle of operation of an air-operated flange lubricator for electrical equipment, manufactured by the makers of an hydrostatic flange lu-

bricator for steam locomotives. The lubricator is located in the cab as with the hydrostatic device, and sight feeds indicate the rate of formation of the drops of oil. An electrical heater is included in the equipment and the temperature of air and oil is raised by passing through this heater. The air supply is from the main reservoir. Oil is led to wheel flanges by pipes as with the hydrostatic lubricator and is sprayed upon the flanges by air instead of steam. This lubricator is designated by the manufacturers as the "Electric 4." It has been placed in service on electric locomotives of the Baltimore & Ohio and the Pennsylvania.

The Collins flange lubricator illustrated and described in the former report has since been improved. The improved device is similar in construction to that already described. The feeding device of the original type was placed under the body of the lubricator. The lubricating block of graphite composition was pressed against the flange by a pawl engaging in notches in the under side of the block. With the improved type a coil spring and plunger acting directly behind the block of lubricant presses it against the flange, the feed being continuous without adjustment until refilling is necessary. The 1911 report has given the impression that this lubricator was designed to use hard grease. It should be stated that the lubricant is graphite.

Among the simple devices operated by some of the railway companies is one which can be built up of pipe fittings and has been used to apply either hard grease or graphite. The device consists of a short section of 1¼-in. pipe capped at one end and containing a piston actuated by a spiral spring. A small rod threaded into the piston extends through the cap, not only assisting to guide the piston but also indicating the amount of grease in the lubricator. This device is clamped to the frame of the locomotive in front of the drivers and feeds the lubricant directly against the flange. When using ordinary rod grease the lubricant is contained in a section of scrap rubber hose and is deposited as the hose is worn away.

The Pittsburgh & Lake Erie has applied this lubricator extensively, using a mixture of paraffin and graphite as the lubricant. This is contained in a wooden block turned up in a lathe, the cavity for the grease being bored out 1 inch in diameter. The practice of this road has been to apply a lubricator to each wheel which has shown wear or cutting. After the flange has been worn smooth it has not been considered necessary to operate the lubricator until further signs of cutting develop. Some difficulty has been reported as to keeping this device in proper adjustment at all times.

The result of a test of flange lubrication on a number of twelve-wheel locomotives of the Norfolk & Western is contained in the 1911 report. This test led to the conclusion that with track conditions as existing on this line, flange wear was too slight on freight engines to warrant the practice of lubrication. Five Pacific type passenger engines have since been equipped with lubricators for test purposes. The equipment includes three types of lubricators—hydrostatic, gravity and graphite. The comparative mileage between tire removals before and after the application of the lubricators is shown in Table 1. It will be seen that the average service per front tire removed from these engines before the lubricators were applied was 16,518 miles, while the average for the same engines since the lubricators were installed has been 39,909. The former figures are taken from the record of 25 tires removed, the latter from the record of 10 tires removed. The local authorities providing the data suggest that this result may have been affected in some measure by a lateral spring arrangement applied to the trailer trucks to prevent nosing. They state, however, that they consider the improved condition to be due to lubrication and not to the spring.

TABLE 1.

MILEAGE SERVICE OF FRONT TIRES REMOVED FROM PACIFIC TYPE ENGINES TO FEBRUARY 1, 1912.

NORFOLK & WESTERN.

After Equipped with Oilers. Mileage.			Before Equipped with Oilers. Mileage.		
Eng.	Right Side.	Left Side.	Eng.	Right Side.	Left Side.
564	63,141	63,141	564	26,702	26,702
Average miles per tire, 63,141. Tires removed, 2.			Average miles per tire, 26,702. Tires removed, 2.		
569	27,889	27,889	569	13,175	13,175
569	39,582	39,582			
Average miles per tire, 33,735. Tires removed, 4.			Average miles per tire, 13,175. Tires removed, 2.		
571	26,728		571	17,204	17,204
571		43,512*	571	6,845	6,845
			571	12,096	12,096
			571	16,784	
Average miles per tire, 35,120. Tires removed, 2.			Average miles per tire, 12,725. Tires removed, 7.		
572	No tire renewals since oilers applied.		572	15,846	15,846
			572	24,553	24,553
573	33,816	33,816	572	24,297	24,297
			572	14,640	14,640
			Average miles per tire, 19,834. Tires removed, 8.		
			573	17,972	17,972
			573	15,618	15,618
Average miles per tire, 33,816. Tires removed, 2.			573	9,139	9,139
			Average miles per tire, 14,243. Tires removed, 6.		
			Average miles per tire, all engines, 16,518.		

Average miles per tire, all engines, 39,909.

*Includes four months' mileage before oiler was applied.

Fig. 3 shows the contour and mileage records of a decapod locomotive on the Buffalo, Rochester & Pittsburgh. Previous to the application of the lubricator this engine had made 31,529 miles with the flanges worn as shown by the dot and dash contour lines. After making 21,102 miles with a hydrostatic oiler in service the condition of tires was as shown by the dotted contour lines.

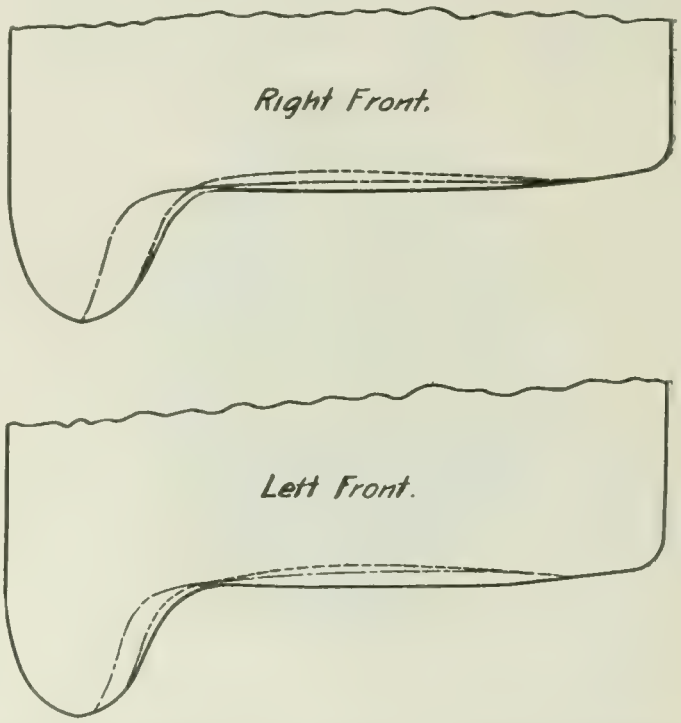


Fig. 3—Tire Contour Taken from a Decapod Locomotive, B. R. & P.

Full lines, standard tread and flange as received new from builders, Sept., 1909, also represents new tires applied July 28, 1911, at which date the Chicago Flange Oiler was applied.

Dot and dash lines, tread and flange July 28, 1911, after making 31,529 miles (previous to applying flange oiler).

Dotted line, tread and flange March 9, 1911, after making 21,102 miles (Engine equipped with Chicago Flange Oiler).

Contours taken from Plaster Paris casts.

The Hocking Valley Railway reports that the service of switch engines operating upon industrial tracks with much sharp curvature has been increased from 4 months to 12 months. On consolidation engines subject to excessive wear of front and back flanges the service of tires has been increased from one year to two years. At the end of this period the flanges are still in good condition.

In Table 2 is shown the estimated saving in cost of fires effected by the use of flange lubrication on the St. Louis & San Francisco. This is based upon experience with consolidation engines equipped with hydrostatic oilers using asp altum oil.

TABLE 2.

SAVING IN TIRES ON CONSOLIDATION LOCOMOTIVES EQUIPPED WITH FLANGE LUBRICATORS.

ST. LOUIS & SAN FRANCISCO RAILROAD.

Value of new 56-in. tire, 3½ in. thick	$30.80
Less scrap metal in tire	2.45
Net value of wearing metal	$28.35
Net value per sixteenth, figuring on 28 sixteenth, wearing metal	1.01

Average loss of metal account flange wear after one year's service if tires have been changed three times	9/16 in.
Average tread wear	5/16 in.
Average loss of metal account flange wear	4/16 in.
4/16 in. at $1.01 per sixteenth	4.04
Loss on consolidation engines, eight tires at $4.04 each	32.32
Cost of changing tires three times	70.86
Total loss account flange wear	$103.12
Deduct:	
45⅝ gallons at 25 cents	$11.41
Storehouse expense and cost of handling flange oil	2.28
Interest on flange oiler and material used in equipping engine	5.40
Total deductions	19.09
Net saving per consolidation engine equipped with oiler per year	$84.03

Comparative mileage of two classes of locomotives of the Queen & Crescent Route is shown in Table 3.

TABLE 3.

MILEAGE MADE BETWEEN TIRE TURNINGS BEFORE AND AFTER THE APPLICATION OF FLANGE LUBRICATORS.

QUEEN & CRESCENT ROUTE.

Consolidation Type.

BEFORE.		AFTER.	
701	22,855	705	44,387
703	18,293	707	43,230
706	16,211	712	51,255
704	26,026	716	45,344
709	25,755	720	42,205
716	25,246	721	43,352
717	24,273	726	40,340
732	18,897	729	44,226
736	24,823	733	42,394
737	27,961	737	43,738
Total	230,335	Total	440,471
Average	23,033 miles.	Average	44,047 miles.

Pacific Type.

BEFORE.		AFTER.	
800, 11-1909 to 6-1909	36,154	800, 6-1909 to 10-1910	76,890
801, 12-1908 to 6-1909	19,743	801, 6-1909 to 10-1910	96,918
802, 12-1908 to 7-1909	46,466	802, 7-1909 to 11-1910	96,470
803, 11-1908 to 8-1909	56,722	803, 5-1910 to 9-1911	97,137
	159,085		367,415
39,771, average before flange oilers.		91,854, average after flange oilers.	

Several roads report a noticeable reduction in tender truck wheel flange wear on engines equipped with lubricators. However, no data have been received to show the extent of reduction or influence upon wheel mileage.

The question of saving in rail renewals and decreased train resistance to be realized from lubrication of rails on curves has been carefully investigated by the Pennsylvania Lines west of Pittsburgh. Tests to determine the reduction in rail wear to be obtained by lubrication were made on curves 3 deg. 20 min. and 10 deg. respectively. The rails on the first half of the curve to be traversed were not lubricated and those on the last half were lubricated by hand. We quote the following from the conclusions of the Pennsylvania Committee: "The data collected shows that with lubrication there would be considerable saving in rail and flange wear on roads with sharp curvature. . . . Our tests confirm a saving but show that for light curvature the saving is very little. The tests show very little more wear on curves up to 4 deg than on straight line."

Records of rail renewal on the Southern Pacific in the Sierra-Nevada Mountains, where all of the locomotives are equipped with flange oilers, show that since the oilers have been in service the average life of the outside rail on all curves above 5 deg. has been increased from 12 months to 32 months, or 2⅔ times the life prior to the use of flange oilers. The average life of the inside rail on curves above 5 deg. has been increased from 13 months to 33 months, or 2½ times the life prior to the use of the oilers.

In this connection it should be stated that rails are now removed having a much smaller percentage of wear than those removed a number of years ago. In other words rails which are now considered unsafe for traffic, a number of years ago would have been allowed to remain in the track several months longer. Keeping this in mind the above figures, which have been abstracted from curve-worn rail reports, will be seen to be conservative.

Attention should also be called to the increase in average daily tonnage. The flange oilers have been in general use on the territory under consideration since May, 1908. For a period of three years prior to that date the average daily tonnage passing over these curves was approximately 15,000 tons. For the three years since that date the average daily tonnage has been 22,000 tons, an increase of 47 per cent. The increase in tonnage should increase the rail wear and in order to get at the actual increase in the life of the rail since flange oilers were put into use, this factor should be taken into consideration. Had the average daily tonnage remained 15,000 tons instead of increasing to 22,000 tons, the rail would have lasted 47 per cent. longer than it did, or practically a period of 48 months. This is nearly four times as long as the life of the rail prior to the use of flange oilers, considering conditions to have been the same in both cases.

Any agency whereby the wear of rail and flanges is reduced may be expected to affect train resistance on curves. This has been observed in the ease with which lubricated engines round curves, but it has not been of sufficient effect to lead to any increase of tonnage rating. It must be considered that the effect of lubricant applied to the flanges of the locomotive drivers decreases very rapidly with increased distance from the locomotive.

The committee of the Pennsylvania Lines, already referred to, continued its tests to determine the effect of flange lubrication on train resistance. A series of runs was made on a division with a grade north-bound of 90 ft. per mile and 60 ft. per mile south-bound.

About two-thirds of the track over the summit is made up of curves from 2 degrees to 6 deg. 45 min. The trains were hauled by a consolidation locomotive. The drawbar pull of runs made with oil lubrication applied to two pair of drivers and the truck wheels, and the runs with graphite applied to the gage side of the rail by brushes was compared with the drawbar pull without lubrication.

North-bound the trains consisted of the dynamometer car and 29 empty cars weighing about 605 tons. South-bound the trains consisted of the dynamometer car and thirteen loaded cars weighing from 915 to 951 tons.

The tests showed a reduction in drawbar pull with a loaded train of 951 tons, of 285 lbs., or about one-sixth of the drawbar pull for one loaded car. The reduction for empty cars was equal to about 1½ cars. The tests were not considered conclusive, however, on account of variable weather.

A similar set of test runs was made over another piece of track as nearly level as could be found with curves from 2 deg. 49 min. to 9 deg. 59 min. This was selected in order to eliminate, as far as possible, any resistance due to grade. The tests showed fairly uniform results and that there was slight decrease in curve resistance due to lubrication, but not sufficient to allow of another car being added to the train.

It is the practice of many roads, where curves occur on grades, to compensate for the curvature by reducing the grade. Where this practice is followed no decrease in curve resistance can affect tonnage rating.

The flange lubricator, like other devices, requires attention. Any defects or any imperfections in the device or its connections should be included by the engineer in his work report at the end of his trip. This work should be done by the enginehouse force and the enginehouse should be held responsible for repairs.

Engine crews should be held responsible for the performance of the lubricators and where repairs are maintained by the enginehouse, the lubricators require comparatively little attention. In view of the economy in life of tires when flanges are properly lubricated, road foremen of engines should see that lubricators are kept in operation on the engines under their jurisdiction.

A good location for a lubricator is just opposite to the top frame rail. This should be far enough from the delivery end of the sand pipe to prevent water of condensation from collecting at the end of the pipe and freezing. In severely cold weather care should be exercised to prevent water of condensation from freezing in the delivery pipes of the hydrostatic lubricator. By keeping a sufficient flow of steam through the pipes this should be avoided. This steam can be throttled sufficiently to keep the pipes clear without emitting so much steam as to be annoying.

CONCLUSIONS.

Considering the previous report and the information upon which the present report has been based, the committee feels justified in the following conclusions: The value of flange lubrication depends upon local conditions. Flange lubrication has proven effective as a means of reducing flange wear, particularly on driving wheels. The effect of lubricant applied to driving-wheel flanges decreases rapidly as distance from locomotive increases. Flange lubrication results in considerable saving in rail wear when sharp curves are frequent. The effect of flange lubrication upon train resistance is not sufficient to make it a factor in tonnage rating.

The report is signed by:—M. H. Haig (A. T. & S. F.), chairman; T. W. Heintzleman (So. Pac.); D. J. Redding (P. & L. E.). A. Kearney (N. & W.) and W. C. Hayes (Erie).

M. H. Haig (A. T. & S. F.) presented the report and added the following: The committee reported to the convention last year and in doing so endeavored to cover the situation as fully

as possible, as developed at that time. It therefore now feels that its further duty lies in the recording of the developments in flange lubrication during the last year, the increase or decrease in flange lubrication, as well as reporting the further actual experience of the various railroads, thereby either confirming or refuting the previous report. Since last reporting, there has been some development in the line of flange lubrication for electric locomotives. Two lubricators for this class of work are described in this report. Some impression has been current that the oil used in flange lubricators which use oil as a lubricant, is provided also exclusively from a certain source. It should be pointed out for the benefit of all members that the oil is available in the most convenient market. It has been found, though, from experiment that the Kern River oil from the Bakersfield district of California, is the most satisfactory for the reason that it adheres to the flanges and forms a sort of paste that not only spreads over the flange, but is wiped off against the rail where it forms a coating. In the hydrostatic lubricator, the oil being a heavy body, will not separate when it comes in contact with steam.

Very often information of unusual interest is contained in the letters that the various members forward to committees, and while this information cannot always be given in full in the reports, I feel that a few quotations would be of interest. For instance, with regard to the delivery of lubricant to the rail. A member states that from personal observation in examining the ball of the rail after train has passed, and when the flange lubricator is properly operated on the engine, it is possible to see a slight indication of oil on the rail which he states proves that the ball of the rail was lubricated to a certain extent; a condition which should reduce wear of rail as well as wear of flanges.

Another member in answering the various questions advises that flange lubrication prolongs the life of the rail by one-third, and goes on to state that anything that will save the flanges will save the rail. With regard to comparative wear of flanges between turnings with and without flange lubricators, I refer to a statement made by a member concerning both passenger and freight equipment. He states that engines working exclusively in mountain service require tire change every 8,000 to 10,000 miles when operated without flange lubricators. He then refers to a ten-wheel passenger engine making 37,186 miles before turning tires, and to a Mikado freight engine which made a mileage of 21,152 miles up to the time of a wreck, and examination of the tires and flanges showed them to be good for, at least, 2 months more.

Another member advises that since the application of flange lubricators to a number of ten-wheel passenger locomotives, it has been possible to make from 65,000 to 85,000 miles per engine. With the same class of engine without flange oiler it has been necessary to turn tires on account of flange wear, after making from 25,000 to 30,000 miles. A number of replies indicate particularly satisfactory results with switch engines. Engines of this class work a great deal over industrial tracks in which the curves are sharp and frequent, and various reports indicate that the life of tires is much longer with flange lubricators than without. For instance, one member advises that the service of switch engines is increased from 4 to 12 months.

The committee was particularly anxious to see that all lubricators which had attained any success were described in this report. A short time before closing the report, we received word from one member of the association that he was using a Detroit lubricator. This lubricator is a gravity feed device. The tank is supported under the running board on one side of the engine and a pipe leads to one flange on each side of the engine. The valve which controls the flow of the oil is operated by a ball which receives its motion from the movement of the locomotive.

DISCUSSION.

C. A. Seley (C. R. I. & P.): I cannot understand what the third recommendation means.

Mr. Haig: The lubricator is naturally located on the locomotive. Usually it is located on the driving wheel, though occasionally it has been placed on the engine truck wheel. Instead of stating that the feed of the lubricant decreases as the distance from the locomotive increases, it might have been plainer had we stated that it decreases as the distance from the point of application increases; the lubricator naturally has its greatest effect on the wheel to which it is applied, inasmuch as it spreads the lubricant very fully over that flange. The flange conveys the lubricant to the rail, and as the train passes over that point each wheel picks up a little of the lubricant, so that by the time the last wheel of the train passes that point, it receives less benefit from the lubricant than the first wheel. The object is to spread a paste over the side of the rail, if possible, in order that not only the rail but all of the wheel flanges will receive some benefit.

F. F. Gaines (C. of Ga.): We have tried out pretty nearly everything in the way of flange oilers except the last one referred to by Mr. Haig, and we have boiled the matter down to the hydrostatic form of lubricator as being the only satisfactory lubricator. On one of our divisions we have had quite some considerable trouble, with our Pacific type engines, from the fact that the flanges would run sharp in the neighborhood of about 30,000 miles, practically, whereas after the application of the lubricator we find we can get about 60,000 miles. After equipping these engines with the lubricator, we find we can get 60,000 miles out of them, and figuring on the tire turning and loss of metal involved, and the labor and material, at $250 for each turning, the improved mileage means a very considerable economy, amounting to over $500 between each tire turning on these locomotives.

On another division we equipped the entire system with flange oilers, and our figures, while not showing the saving that some of the roads reporting show, averaged up to $50 an engine per year on this division, although our figures are not yet as complete as they might be, due to the fact that we have only recently got the whole division equipped. We expect to have more definite figures in the future. As an illustration, I will say that the value of tire loss on 8 tires, in the case of engines equipped with the flange oiler, was $74.88, whereas the value of tire loss on 8 tires, in case of engines not equipped with the flange oiler, the loss of material involved is $132.48.

H. C. VanBuskirk (C. & S.): Our road has had considerable experience with flange lubricators of different types, and as Mr. Gaines has just stated, the hydrostatic type of lubricator is the only one, among those we have used, which gives satisfactory results. Our experience has been principally on the narrow gage lines of the Colorado & Southern, where there are long curvatures and high grade lines. There is one question that has been asked, and that is whether there is any effect on the flange lubricator in the case of trains descending on a heavy grade. I can say from my personal observation that there is not. We have tried that with the hydrostatic type of lubricator, by putting sufficient oil on the flange, which will communicate it to the rail, and there is no effect on the braking power when descending on a 4 per cent. grade. There is no noticeable effect. I have tried a lubricator which uses the solid lubricant, and it will pick up sufficient foreign matter so that it will glaze over the surface and give no result on the flange. We have 30 deg. curves, and lots of them, on 4 per cent. grades, and the locomotives in connection with which we are now using the hydrostatic lubricator will run from one shopping to the next, whereas with the lubricator we formerly used, we could never get over 12,000 to 14,000 miles out of our locomotives. At the present time we are running in the neighborhood of 50,000 miles, and never have to take the locomotives out of service on account of flange wear. The gravity type of lubricator that we have been trying will go about 5,000 to 12,000 ft. elevation on one division in warm weather, but by the time we get at the top of a mountain the lubricator will not feed in the same manner, whereas the hydrostatic is under control at all times and will deliver the oil just as it is wanted.

R. D. Smith (B. & A.): The report of the committee at the last year's convention was such as to prompt us in trying these flange lubricators on some of our Pacific type engines; and the results that we have obtained have been very good. I have, however, heard a criticism of it since being here, with which we have not had any trouble, and that is, there is a slippage of the engine when starting a train, due to the spurting of the oil while the engine is standing. I mention this from a hydrostatic lubricator point. The results that we have obtained have been so good as to warrant us in extending their use.

Angus Sinclair: I think I was one of the pioneers in experimenting with flange lubrication. About 1880 I was running a locomotive on a small road. They had only one engine, and the road was very crooked and it ended with a curve of about 15 deg. or so, and I hadn't been running the engine but a short time when I found flange cutting going on. I was aware that if the engine failed, my job would fail, for they would not ever be able to buy another, and consequently I was very much interested in preventing this flange wear. My first natural impulse was to try a swab that we used for piston rods, but that proved unsuccessful as it also lubricated the tread of the wheel. I finally fell upon a scheme of a piece of graphite and grease mixed, and I was fairly successful with that. I was able to prevent the flanges from cutting, and not altogether without lubricating the tread, but still not to any great extent, and I saved my job through the lubricating device, and I was rather proud of it in those days.

S. L. Bean (Santa Fe Lines): We have in my territory about 2,500 miles of road. The longest tangent is 30 miles. We have increased our mileage from 60,000 miles in the passenger

service in one particular mountain district to between 100,000 and 120,000 miles, which is credited to our flange lubrication.

F. F. Gaines (C. of Ga.): Referring to the question brought up by Mr. Smith, relative to the objection to the hydrostatic lubricator on account of the accumulation of water in causing slipping, I would say that as near as we can find out, that where an engine stands for something like 10 or 15 minutes, we have noticed a little slipping in the first revolution or two; but in an ordinary passenger stop or any other stop where it does not exceed 5 minutes, it is practically unnoticeable.

L. R. Pomeroy: In 1886 when I was connected with the Suburban Rapid Transit Company, we had a number of Forney engines that were very much heavier than the type of Forney engine then in use on the elevated system. We had curves of 160 ft. radius, and in running those engines with the leading driver first, we had a great deal of trouble with flange wear, but the greatest trouble we had was the noise made in grinding around the curves. At that time I arranged a piece of ¾ in. pipe, 6 in. long, on the end of which was fastened a felt swab, and the pipe was filled about half full with oakum and a spring on top of it which kept a constant pressure on the oakum, and it was pressed in so hard, that there was no free oil dropped at any time, and yet it kept up a wiping action on the flange which not only relieved the noise, but reduced the flange wear very materially; and that was afterwards placed on all the engines of the system.

Wm. Forsyth (RAILWAY AGE GAZETTE): The fifth section of the report says it has no effect on train resistance, but that is not necessarily a conclusion on the fact of the tractive effort of the locomotive. I have thought that perhaps in the experiments on the Pennsylvania Road where they oil the track on curves, that there may have been some measurements as to the effect of the lubrication of the rail on the tractive effort of the locomotive, *i. e.*, reducing the amount of adheasion.

F. W. Brazier (N. Y. C. & H. R.): I am very much surprised that there are not a good many more men advocating the use of flange lubrication on railroads. It does not make any difference in what direction you save money, and it seems to me that considerable money can be saved in the direction of lubricating flanges. I know that on the Pennsylvania division we run a great many trains on sharp curves. If some device of this kind will stop that wearing away, it will save money in other departments than the motive power department.

Mr. Haig: Replying to Mr. Forsyth; when properly applied, the lubricant is delivered to the flange of the wheel, and is conveyed to the side of the ball of the rail, and should not get on top of the rail. The matter of adjustment, however, has some effect on the hydrostatic lubricator. The oil is delivered through a nozzle and in other form of lubricators, there are various methods of delivering the lubricant to the flange. Now, if these various devices are not properly adjusted and properly maintained, there is a possibility of the lubricant being delivered to the tread of the wheel, and so to the rail. That was a point that we endeavored to bring out in the report, to call the attention of the railways to the necessity of proper adjustment, and by that I mean ordinary adjustment, which is reasonable to expect. Therefore, if the lubricant is properly delivered, it should not reduce the tractive effort of the locomotive. The effect of the lubricant on the flange will not reduce the adhesion.



D. F. CRAWFORD,
President, M. M. Association, and Vice-President, M. C. B. Association.

In reply to the question brought up by Mr. Smith, I note Mr. Smith states that while the question of an engine slipping on starting was mentioned to him down here, in his experience he had not been troubled in that direction. The same statement that I made with regard to the proper application of the lubricant, will apply in answering him also, and I think Mr. Gaines covered that point very well. In regard to the effect of trains descending grades, as touched on by one of the gentlemen present, there has been no difficulty that I know of with regard to the effect on the trains descending grades or the effect on the breaking power. On the road with which I am associated there has been no difficulty of that kind.

Mr. Gaines: For the benefit of Mr. Brazier I might say

that if he will look at last year's report he will find considerable data from the Southern Pacific on the saving of wear on tender wheels. Now, it is reasonable to assume that if you get a noticeable saving of wear on tender wheels that it will be carried back to the rear wheels of the train; of course, to a less extent. It is reasonable to suppose that there is a reasonable saving of wear on all the wheels of the train to a certain extent.

Mr. Flanagan (C. & O.): On one of the divisions of the Chesapeake & Ohio during the last 2 years we have experimented with practically every type of flange lubricator of the gravity feed class, and in some instances we have been using a rubber hose. In the last year we have tested one of the Chicago flange lubricators, using the special oil directed by them, and we have found that the engine on which we applied that lubricator had the tires in good shape after making 4,000 miles, and others after having made about 5,000 miles, and there is no question but that you would be able to run an engine over a greater distance than that. I think another feature that it would be well to consider, although we have not done any experimenting on it, and that is the question as to what effect it has on the tractive effort of a locomotive. One of the experiments that we have made, which is not a new one, is the use of nozzles from the air pump exhaust pipe. I have no data as to the exact amount of wear, but I am satisfied that we will get 3 times the mileage, from our experiment so far, by using that simple method than we do without it.

MINIMUM REQUIREMENTS FOR HEADLIGHTS.

D. F. Crawford: As chairman of the committee on minimum requirements for locomotive headlights, I would say that the committee had no further data of the scientific character presented in last year's report to present at this time. Some of the members of the committee have had experience during the time elapsing since the last convention, in appearing before some of the Legislative committees, and I think it would be very interesting for the association to hear from Mr. Rae, of the Louisville & Nashville.

DISCUSSION.

Clark H. Rae (L. & N.): In the past 6 months, high-power headlight bills were introduced in the States of Kentucky, Mississippi and Louisiana. In Mississippi, the railway did not present their side of the proposition before the railroad committee of the Lower House, and as a result the committee reported the high-power headlight bill favorably, and it was afterwards adopted. In Kentucky and Louisiana, the railways did present their side of the case, and the bills were rejected. Several members of the committee had participated in quite extensive tests of the headlights, and from my experience, verified by the reports furnished to the Interstate Commerce committee, which were afterwards reported in their bulletins of accidents, the high-power headlight is undesirable, especially on railways having multiple tracks and block signal systems or both. From my experience, I don't hesitate to say that at some of the meetings of the Legislatures of the various States, especially in the south and in the west, some of these high-power headlight bills will be introduced. Some of the bills require 300 watts at the arc, some 1,500 candlepower without the aid of reflector, and so on. I trust that this body will go on record that the high-power headlight is undesirable on railways having multiple tracks and block signal systems or both.

F. F. Gaines (C. of Ga.): I would like thoroughly to endorse what Mr. Rae has said. I think we should, as an association, go on record as being opposed to high-power headlight in connection with multiple tracks, and with interlocking or automatic signals, and I would like to make a motion to that effect.

The motion was seconded and carried.

STANDARDIZATION OF TINWARE.

The committee appointed to report on the standardization of tinware, and confer with a similar committee from the Railway Storekeepers' Association, has been unable to collect and compile the data in form to present at this convention. The Railway Storekeepers' committee held meetings in Chicago, December 19, 1911 and March 20, 1912, to which we were invited; unforeseen and unavoidable business engagements prevented Messrs. Poole and Franey attending. Mr. J. C. Mengel attended the meeting of March 20. Another meeting will be held May 19.

J. R. Mulroy, of the Storekeepers' Association, and his committee have prepared a very creditable report. Data which they have gathered from various roads show lack of uniformity in material used, method of construction and dimensions. Some of these affect first cost, others the life of the article. Cans nominally one, two or three gallons capacity have different dimensions and methods of construction on different roads. Some roads dispense with articles which are considered necessary on others.

From the data now collected and with further conference, the committee should be able to recommend standard articles to be used, also standard dimensions, methods of construction, and material which will represent good practice on our railways and standard practice of manufacturing. It is recommended that the subject be continued for another year.

The report is signed by:—M. D. Franey (L. S. & M. S.) and J. C. Mengel (Penna.).

This report was referred to the executive committee.

MAINTENANCE OF SUPERHEATER LOCOMOTIVES.

The committee on the maintenance of superheater locomotives was instructed to consider and report on: The best metal for cylinder and steam chest bushings; the best metal for valve and piston rings, and the best means of lubricating superheater locomotives.

In order to obtain as much data as possible upon which to base its report, the committee issued a circular of inquiry to the members which brought in the following information:

The total number of superheated locomotives in service is 2,222, of which 1,748 are of the fire-tube type and 74 of the smoke-box type. The following types of superheaters are used: Schmidt, Cole, Emerson, Vaughan-Horsey, Baldwin, Jacobs and Vauclain. Of these types, the first 4 are fire-tube superheaters and the other 3 smoke-box superheaters.

As might be expected, the steam pressures and degrees of superheat vary considerably on the various types of locomotives



R. D. SMITH,

Chairman, Committee on Maintenance of Superheater Locomotives.

on different roads, the maximum steam pressure being 220 lbs. per sq. in., and the minimum 150 lbs. per sq. in. The degrees of superheat, that is, the excess in temperature of superheated steam over the temperature of saturated steam at same pressure, varies from 100 degs. F. for fire-tube superheaters and from 10 degs. to 65 degs. F. for smoke-box superheaters. The temperature of superheated steam as used in locomotives rarely exceeds 600 degs. F.

Twelve roads reported that the cylinder and steam-chest bushings on superheater locomotives wear out more rapidly than on locomotives of the same classes using saturated steam, and 20 roads replied that there is no perceptible difference in the wear of cylinder and steam-chest bushings between locomotives using superheated steam, as now operated, and those using saturated steam. All roads reporting increased wear on superheated steam locomotives have superheaters of the fire-tube type.

Fourteen railways report that valve-packing rings of superheater locomotives wear out more rapidly than those of saturated steam locomotives of the same classes, and 17 roads state there is no appreciable difference between the wear of the rings.

Sixteen roads report they have found Hunt-Spiller gun iron

the best metal for cylinder and steam-chest bushings, and one other road intends to use this iron for cylinder and steam-chest bushings of new locomotives. Nine roads state they are using gray iron for bushings, 3 roads use the same metal for the bushings of superheater locomotives as is used for saturated-steam locomotives, and one road is undecided as to the best metal. All the roads favoring the use of Hunt-Spiller gun iron for bushings also favor its use for piston and valve packing rings, and two other roads report using this material for rings but do not use it for bushings.

Eighteen roads use piston-rod extensions and 12 use valve-stem extensions, but 3 of the 18 roads using piston-rod extensions are eliminating them. Eight roads favor the use of piston-rod extensions, 9 favor the use of valve-stem extensions, and 6 advocate the use of piston-rod extensions on locomotives having large and heavy pistons. Eleven roads are opposed to the use of either piston-rod or valve-stem extensions and two are undecided as to their desirability.

Twenty-three roads report there is no unusual difficulty in properly lubricating the cylinders and steam chests of superheater locomotives as they are now operating. Five roads report it is difficult and 3 state that trouble was experienced at first, but the use of a different grade of oil has overcome the trouble. One road using balance slide valve states, it is difficult to properly lubricate the valve, but no difficulty is encountered in lubricating the cylinders. Reports indicate it is no more difficult to lubricate locomotives with smokebox superheaters than to lubricate the ordinary saturated steam locomotive.

Twenty-nine roads are using hydrostatic feed lubricators with entirely satisfactory results. There is but one road using mechanical feed lubricator exclusively. Of the roads now using hydrostatic lubricators, 4 had formerly tried mechanical feed lubricators. The advantages of the hydrostatic lubricator are its reliability, simplicity of construction and ease of regulation as compared with the considerable number of moving parts of mechanical feed lubricators and the tendency of the latter to wear and get out of order.

Atomizers are used on 3 roads to deliver oil to the steam chest of superheater locomotives and the results are reported to be satisfactory, but the committee is of the opinion that without atomizers, when the oil is discharged into the steam passageway above the entrance to the steam chest, it is partially atomized, which would seem to be desirable. The replies indicate that no advantage is derived from the use of an atomizer.

There are a number of different arrangements of oil pipes on superheater locomotives and these may be divided as follows: The most common arrangement is that in which the oil is delivered at the center of steam chest and at the center of the cylinder. Another arrangement is that in which the oil is discharged into the steam passageway above the entrance to the steam chest, with an independent connection to the center of the cylinder. Some roads use oil connections to both ends of the steam chest, with an independent connection to the center of the cylinder. A common arrangement, and one that is growing in favor, has a connection which discharges oil into the steam passageway only. It is claimed that the oil is thoroughly mingled with and distributed by the steam. A few roads report having oil connections to the center of the steam chests only.



T. RUMNEY,

First Vice-President, M. M. Association.



D. R. MacBAIN,

Second Vice-President, M. M. Association, and Vice-President, M. C. B. Association.

Twenty roads consider it necessary to lubricate the cylinders of superheater locomotives independent of the steam chest, 8 roads that it is unnecessary and 2 are undecided.

From replies received and from the experience of members of the committee, there seems to be no doubt that an oil connection into steam passageway only, near entrance to steam chest, is the best arrangement for obtaining satisfactory lubrication. It reduces the number of feeds to a minimum and furnishes sufficient oil to valves and cylinders.

The allowance of valve oil per 100 miles for superheater locomotives varies according to type and service. The maximum allowance reported for Pacific type locomotives with fire-tube superheaters is 3.25 pints per 100 miles and the minimum 1.25 pints, the average allowance being 2.25 pints. For consolidation locomotives with fire-tube superheaters, the allowance of oil varies from 2.50 pints to 1.25 pints, the average being 1.75

pints per 100 miles. The average allowance of oil for Mikado locomotives with fire-tube superheaters is 4 pints and the allowance for Mallets is about 6 pints per 100 miles.

The allowance of valve oil for superheated steam locomotives varies in about the same proportion as for saturated steam locomotives, according to type and service. It is customary to allow about 45 per cent. more oil for the fire-tube superheaters than for saturated steam locomotives, while locomotives with smoke-box superheaters usually have the same allowance of oil as saturated steam locomotives.

Twelve roads report using special superheater oil exclusively on superheater locomotives and 13 roads report using the ordinary grade of valve oil, but all the roads using superheater oil report it is more satisfactory, and tests which have been made of the 2 kinds of oil, on superheater locomotives, bear out this statement.

None of the roads report the admission of steam automatically to the cylinders when drifting, but 12 roads report good results from keeping the throttle slightly open when engine is drifting, and this practice seems to meet with most general approval. The use of vacuum valves on superheater locomotives is quite general on American railways, as 23 roads report their use gives satisfactory results and 5 roads report using by-pass valves.

There are a number of different makes of metallic piston-rod packing in use on superheater locomotives, all reported as giving satisfactory service. In general, the same types are used as on saturated steam locomotives, the principal difference, if any, being in the composition of the rings.

The chemical composition of the packing rings is in most cases unknown to the railways, the rings being purchased in finished state from the manufacturers. Where reports are given, a mixture of 80 per cent. lead and 20 per cent. antimony has been used with several makes of packing. Some roads have tried a mixture containing a small percentage of tin, but this has been found unsatisfactory. A widely different mixture containing approximately one-half copper and one-half lead has given exceedingly good results, but is expensive. In general, the preferable composition for packing rings is still largely a matter of experiment.

The committee received a great many suggestions and much information that is embodied in the report. The replies were so general as to indicate that this is a very live subject, and the committee feels that a report based on replies from such a large number of railways may be considered as representing conditions prevailing on practically all the railroads in the country.

SUMMARY.

An analysis of the replies indicates that the results obtained from superheater locomotives have been very satisfactory. It is interesting to note that 5 years ago there were less than a dozen superheater locomotives operating in the United States, whereas at the present time there are about 2,500 locomotives in the United States and Canada having fire-tube superheaters.

Minor difficulties have been experienced on a number of railways; but the great advantages to be derived from the use of superheated steam, such as increased economy of coal and water, increased power, due to the absence of cylinder condensation, the permissible reduction of steam pressure combined with the use of larger cylinders—all obtained without material increase in the size or weight of boiler—leads us to believe that the use of superheated steam in locomotives will increase rapidly.

This being so, it is of great importance to determine the metal best suited for use for bushings and packing rings on modern superheater locomotives, because the use of highly superheated steam increases the difficulty of obtaining proper lubrication, and thus the metal is subjected to more severe working conditions than are usually found with saturated steam locomotives.

It is also important that we know the best means of securing proper lubrication because the efficiency of lubrication has a direct bearing on the life of bushings and packing rings.

A metal suitable for use as cylinder and steam-chest bushings of superheater locomotives should be homogeneous, close grained, tough and of good wearing quality, combined with sufficient strength. It should be tough in order to resist wear, but at the same time it must be of such composition that it can be readily machined.

Replies to the circular of inquiry indicate that Hunt-Spiller gun iron has been used on many railways with excellent results. This is stated to be an air-furnace charcoal iron, and the process of manufacture, combined with proper chemical composition, seems to result in a metal which is well adapted for use with highly superheated steam. The analysis of this iron, obtained by the committee, is as follows:

Silicon	1.40 per cent.
Phosphorus	0.35 per cent.
Sulphur	0.07 per cent.
Manganese	0.40 per cent.
Combined carbon	0.80 per cent.
Graphite carbon	2.20 per cent.

The importance of properly lubricating cylinders and steam chests of superheater locomotives, especially those using a high degree of superheat, can hardly be overestimated, because if proper lubrication is not obtained, many of the advantages derived from the use of superheated steam are offset by continual troubles from excessive cutting of bushings and packing rings, which keep the engine in the engine house when its proper place is on the road.

There seems to be a tendency to use too much oil in superheater locomotives, with the result that there is trouble from the oil carbonizing on the cylinder heads, pistons and steam passages. The deposit of carbon also tends to diminish the life of the metallic piston-rod packing, as it builds up in the stuffing boxes and under the vibrating cups to such an extent that the packing in a short time is forced to carry a part of the weight of the piston rod and piston head.

On certain classes of locomotives, possibly those having pistons exceeding 24-in. diameter, it is considered by some advisable to lubricate the cylinder independent of the steam chest, but in most cases we believe better results will be obtained by eliminating the connection to the cylinders and delivering the oil to the steam passageway.

The committee does not approve of the arrangement of oil pipes in which the oil is delivered near the end of the steam chest, as in this case it is probable that part of the oil is lost in the exhaust, due to the difference in pressure between the live and exhaust steam.

A number of roads report that when superheater locomotives were received from the builders oil was delivered to both ends of the steam chest and to the center of the top of the cylinder; but this arrangement has since been changed so that the oil is now delivered into the steam passageway above the entrance to the steam chest, and the feed to the cylinder has been discontinued. The allowance of oil has also been reduced and it has been found that the locomotives are much better lubricated than formerly and there is a marked diminution in the quantity of oil adhering to the cylinder heads, piston heads and steam passages.

There can be no doubt of the advisibility of using a good grade of mineral oil having a high flash point, for locomotives using highly superheated steam, because the temperature of the superheated steam is sometimes as high as 600 degs. F. A number of the roads state they have used valve oil having a flash point of about 520 degs. and also special superheater oil having a flash point of at least 585 degs., and in every case better results have been obtained from the oil having the higher flash point.

Tests have shown that a moderately high temperature has very little effect on the lubricating properties of a good grade of valve oil when the oil is protected by steam, but when the engine is drifting there is, in most cases, no steam in the cylinders, and the bushings are apt to become hot.

There does, however, appear to be a difference in the results obtained on superheater and saturated-steam locomotives. When drifting the conditions are the same on both, but on saturated-steam locomotives the oil deposit on the cylinders is fluid and the condition of the oil does not appear to have changed; while on superheater locomotives the deposit is gummy and sticky to the touch. This difference may possibly account to a large degree for the rapid wear of piston rings and bushings occasionally experienced on superheater locomotives.

When an engine is drifting a good deal with a closed throttle, there is a considerable vacuum in the cylinders and steam chests, and cinders may be drawn through the exhaust and dirt through the relief valves.

This dirt may adhere to the gummy oil on the cylinder walls and convert them into a lap which will wear away the packing rings and piston heads very rapidly.

This theory explains the good results obtained on locomotives where the drifting throttle has been carefully used and is supported by analyses of the deposit found on the cylinders, which show the presence of cinders and dirt in considerable quantities. The remedy is obviously to obtain a quality of oil that does not make a deposit of this nature at the temperature to which it is exposed, and to provide means either by ample vacuum or by-pass valves, or by the admission of steam to prevent overheating when drifting.

Many roads use a tandem type of metallic packing on account of the importance of preventing the blowing out of the lubricating oil, which might result in the cutting of the cylinder bushings.

During the past year or two, several alloys have been tried that have given satisfactory results, and while the preferable mixture will vary with the type of packing employed, this question is not now a serious one.

It is important to use a type of piston-rod packing which will stand up under the high temperature met with in the use of superheated steam, and considerable trouble has been experienced

with packing that had proven satisfactory with saturated steam when this point had not been attended to. The melting point of the packing rings should be higher than the melting point of rings usually found on saturated-steam locomotives.

In conclusion, the committee feels that, in order to insure satisfactory results in the operation of superheater locomotives, it is of the utmost importance not only to use the best metals for parts subjected to the action of superheated steam, but it is also important to take all reasonable precautions to obtain proper lubrication.

When superheater locomotives were first placed in operation it was to be expected that certain difficulties would be experienced, but these difficulties have been overcome one by one and we believe that at the present time, with reasonable care in operation and with proper attention on the part of engine-house forces, superheater locomotives will be no more difficult to maintain than saturated-steam locomotives of the classes.

The report is signed by:—R. D. Smith, (B. & A.), chairman; W. H. Bradley, (C. & N. W.); H. H. Vaughan, (C. P.); Joseph Chidley, (L. S. & M. S.), and J. B. Kilpatrick, (C. R. I. & P.).

there were less than 50 superheater locomotives on locomotives, and today, after a period of only 3 years, there are nearly 3,000 and on my way to the convention, I learned from a representative of the superheater company, that they now have under construction something like 1,000 additional superheater engines.

The committee makes some recommendations about what is claimed to be the air-furnace charcoal iron best suited for superheater locomotives, and we give the analysis as furnished us for this iron, which is very similar to that which has been adopted as standard metal for locomotive cylinder castings, cylinder bushings, cylinder heads, steam chests, valve bushings and packing rings in 1906 by this association.

There is a point about the more rapid wear of packing rings that the committee thought had perhaps been overlooked, and that is that the general practice in parting a cylinder ring, is to leave about 1-32-inch opening in the rings. That will do for saturated steam locomotives, but it is found that it is not sufficient for a locomotive cylinder using superheated steam. We need there at least ⅛ inch for about a 20-inch cylinder. I think that is a point that has been overlooked a little, and it



F. F. GAINES,
Third Vice-President, M. M. Association.



ANGUS SINCLAIR,
Treasurer, M. M. Association.

R. D. Smith, chairman, presented the report in full and after its presentation said:

Since the introduction of superheated steam on locomotives by the Prussian State Railways in 1898, the whole railway world has been much interested in the development of the superheater on locomotives. In the last few years several committees have been appointed by this association to study from different points of view the results obtained from the use of superheated steam on locomotives. If I remember correctly, one of the reports, that which was presented in 1909 which was a very brief one, was in effect that the history of superheating had been gone into very thoroughly, but that the outlook for the future adoption of superheating on American roads looked good, and the committee expressed the belief that there would be a considerable amount of development work along the line of installing superheaters on locomotives. The members of that committee must have been born of prophets, and how well they prophesied is borne out by the fact that at the time they made their report,

may pay some of the members having too rapid wear of cylinder valve rings, to look into it. The committee has been given to understand that the mechanical feed lubricator has been used quite successfully, more so than the information they got led them to believe, and that there are several members here who have had some experience along that line, and would be glad to give these experiences.

The Vice-President: We will consider that the report of the Committee on Maintenance of Superheater Locomotive is received and open for discussion.

DISCUSSION.

C. A. Seley (C. R. I. & P.): I think that the report is an exceptionally good one, and gives information very fully on the very many points which have been covered by the report, although there is one point on which I regret that the committee has not expressed itself in the summary of the report, and that relates to questions referring to the use of piston-rod or valve-stem extensions on superheater locomotives. There is

no doubt of the expense of the application and maintenance of extensions, particularly on piston rods. The location of the device, is one which, in many types of locomotives, materially affects the integrity of the buffer beam, which has to be cut for the rod to pass through it.

On some of our engines which we received with extensions, we have cut off the extensions as a matter of experiment, and while I have not complete information, my impression is that the files show that so far as cylinder wear and other elements of wear are concerned, that there has been no material increase. I would rather favor the valve-stem extension as it is easier to accomplish, very much cheaper to maintain, and it is perhaps more important to effect fine distribution through a longer period of time of maintaining the valve central and without wear, or at least to reduce the wear, but in my own mind I have always seriously questioned the value of the piston rod extension. I know that the opinion is that a very fair majority of the roads or at least a fair number of the roads are opposed to the use of the extensions, as against the number which are using them, or favor the use of the entensions.

C. E. Chambers (C. of N. J.): I note the committee, in framing up the report, made no mention whether snap rings or Dunbar patent type rings were used, and to what extent. It occurred to me there should be less wear with the Dunbar type of ring, and it would also apply to the extra amount of allowance, that would be given to a snap ring, as Mr. Smith stated, ⅛ in., not less than that. The Dunbar type of packing would allow for more expansion without cutting the cylinder.

F. F. Gaines (C. of Ga.): Recently we had a very interesting exhibit and a paper at one of our Railroad Club meetings on the use of oil in connection with superheated engines. The apparatus was very complete, and was so arranged that we were able to see just exactly what happened, how the oil acted with and without steam under these high temperatures, and it emphasized one of the points brought out by the committee as to the value of cracking, the throttle slightly while drifting, so as to always have steam in the cylinder. It was thoroughly demonstrated that as long as there was any steam in the cylinder the oil would not carbonize, but, on the other hand, it would carbonize under these extremely high temperatures if the steam was not present. That not only accomplishes the non-carbonization of the oil, but prevents the cylinder from heating.

While we have not had our superheater engines in service long enough to determine what amount of wear we are going to get with the Hunt-Spiller gun iron, I do feel that we are going to get very favorable results because of several years' experience with the material in our saturated steam engines. Recently, while visiting our chief shop, and in talking with a master mechanic, I asked how he was getting along with his packing rings and pistons, and whether he was still as favorably inclined to the use of that material as his previous reports had shown, and he said: "The best answer to that question is that we have almost forgotten we have a cylinder-boring machine in the shop; formerly every engine coming in for general repairs needed a little truing up, and we have almost done away with the use of the cylinder boring machine."

There was another thing in connection with the lubricating of these engines. At this same Railroad Club meeting, the point was brought out quite effectively, I think, that it is desirable, not only to apply your oil in the steam pipe, but in so doing, to extend the nozzle at least nearly to the center of the pipe, in order to atomize as much as possible of the oil at the moment of delivery. I notice the chairman of the committee referred to the application of the oil where only lubricator pipe has been used, that is, the introduction of all the oil in the steam passage, and I very much wish if any of the members present have been using this device successfully, they would let us hear from them.

C. E. Chambers (C. of N. J.): We have only one superheater engine in service, and that is an Atlantic type, running between Jersey City and Philadelphia. You all know the high speed that the engines make on that division. The oil is piped directly in the passageway, about half way I should say, from the steam chest to the smoke arch, and we simply use a long stem, extending about half way into the middle of the passageway. We had some trouble at the time that we started this lubricator, but it did not amount to very much; the cylinders looked quite dark, not showing any sign of cutting, and did not get the bright effect you ought to have when using saturated steam engines. We have largely overcome that difficulty by simply giving the new metal time to polish up, and so far no bad results are experienced from the one pipe.

It was suggested to us that we should put an additional pipe in the cylinder, but personally I was opposed to it, and I took the trouble to inquire of different roads that had both methods in use, as to the results of their experience, and I convinced myself that I was right in thinking that the steam will be better lubricated by the one pipe going into the passage way.

J. R. Onderdonk (B. & O.): With regard to the lubrication of superheater and the remarks that have just been made, it appears from the tests that we have made so far, that by lubricating the steam, as it were, we get very much better lubrication, both in the steam chest and in the cylinder, than if we attempt to introduce the oil into the steam chest and into the cylinder by several different pipes. By the introduction of the oil into the steam chest, if there is any blow at all, it simply blows the oil out into the exhaust passage, while by introducing it into the steam passage, especially with a bent metal pipe turned in the direction of the passage of the steam, it seems to atomize the oil, lubricating the steam, so that all parts of the cylinder and all parts of the steam chest are lubricated.

Thos. Roope (C. B. & Q.): Yesterday I was very much interested in the remarks made by Dean Benjamin, on the report of the committee, wherein he states that he anticipates a saving of 20 per cent. in fuel. This figure to me seems remarkable, and should greatly assist in the advancement of the superheater locomotives. I agree with the remarks of Dean Benjamin for the reason that on some of our heavy passenger power we have been able to run by coaling stations that before, with the saturated steam locomotive, we were not able to do. That has also been true with water stations, and we have also had the same experience with heavy freight power, which means less labor. We now have about 200 of our largest locomotives equipped with the superheater, and we are adding to that number as rapidly as we can do so. I hope that the time will come when by the use of the superheated locomotive, or some similar device, we will be able to run by or discontinue every other coaling station.

W. C. Hayes (Erie): While the paper itself treats more particularly of the construction of the superheater locomotive and the detail defects that may occur in the locomotive, there is nothing to the report that pertains to the operation of the superheater locomotive, and that is a viewpoint from which I would like to hear the superheater locomotive discussed. There is no doubt that this is one of the questions that is more alive today in locomotive practice than any other one pertaining to large locomotives, and it is being considered mainly from the point of view of the saving that can be made, particularly with regard to the use of fuel, as well as, perhaps, increasing the efficiency of the locomotive to its highest degree. We have, as I said before, no data that will sustain the position that I have had in mind from what little experience we have had with the superheater locomotive, and in seeing these engines in service. The Erie Railroad, with which I am at present connected, has 35 Mikado engines equipped with the Schmidt type of superheater now in service, on one of its heavy operating divisions; it is a heavy, hilly and choppy railroad, and recently the speaker was at a point where he could see the greatest number of these engines in service, so as to see whether or not they were loaded to their maximum capacity. In 4 or 5 days we had half a dozen engines which gave up their trains on account of serious defects that developed in locomotives, so that they were unable to continue further with the load, and had to run in light.

Now, there are certain claims being made as to the savings that accrue from the use of superheater locomotives. Figuring on that from a purely fuel standpoint, and admitting the allowance that the superheater people claim for locomotives equipped with a superheater, say a 20 or 25 per cent. saving, if we figure the value of a locomotive at about what operating people generally do, it occurred to the speaker that the saving in all directions and increased efficiency of the locomotive also, added to that of the fuel which might be saved, would be more than absorbed in the cost of the maintenance of the superheater.

Now, if that is true, that is a serious phase of the superheater problem. If that is not true, and the defects that have been thus far developed can be remedied so that they will not recur, and you can keep your superheater locomotives in operation continuously and constantly, then no doubt it is one of the greatest savers, both in fuel and efficiency of the locomotive, that has struck the American railroads to-day, and it is a result well worthy of all of the best efforts that can be put forth in its advancement.

Mr. Seley: I would like to answer the last speaker in some measure, at least, perhaps, from our own experience. The records of this association will show that the Rock Island road had the greates number of superheating engines of any road in the country for several years. True, it was a small number of engines when compared with the superheater engines in use across the border, but so far as the States are concerned, we had superheater engines in advance of the other railroads in the

States for two or three years, and soon after obtaining them I was very frequently asked how much superheat we obtained. I said, "I do not know," and I did not care very much, the principal point was to overcome the very difficulty which Mr. Hayes speaks of and to have a practical road proposition. I will admit freely, that we did have quite a little trouble with the superheater at the start. It was of a type which has been found not to be of the best in its detail arrangement, and important changes had to be made, as well as attention given to a number of relatively less important matters of detail in the construction, so that it took 2 or 3 years to work these engines up to a practical road proposition, to a point where we did not know that the superheater was on the locomotive.

I feel convinced, from the large proportion of superheaters which we now find being constructed in the shops of the locomotive companies, that the roads generally have overcome, to a great extent, the early troubles. In our own case we have gone on, and with an improved form of superheater in our later engines, we are securing very admirable service. So far as the question of economy is concerned, as compared with the saturated steam engine, I am not able to say from our own records. We have about 60 superheater engines, but they are all passenger engines except one, and that has a front end superheater which is not comparable in performance with the others. I will say this much, however, as testimony in regard to a comparison which was given to me by our friend, Mr. Quayle, who is not present, although admirably represented; in conversation he stated to me that they were giving their superheater consolidation engines a 10 per cent. greater tonnage rating than the equivalent size non-superheater engines, or saturated steam engines, and with that 10 per cent. greater tonnage rating, they were also getting a 25 per cent. coal economy. I presume that those are regular road figures, and are not a test performance, as I do not think Mr. Quayle would make that statement unless he was very fully assured of its being a regular performance.

J. A. Pilcher (N. & W.): I wish to ask Mr. Hayes if he will state the nature of the trouble he experienced. We have had a number of superheaters recently installed, and the general performance has been very satisfactory. We have no exact data yet. I would like to know just what the trouble is with these superheaters and the type of superheater.

W. C. Hayes (Erie): In answer to the gentleman's question, I would say that the troubles occurring on the engines to which he has just made reference, covered a variety of things, leakages in the superheat tubes, in the headers and things of that character, so that the engine would not steam, and had to give up its train on the road, which to my mind would make the superheater a very expensive engine to operate when all things were considered. The Schmidt type of superheater is used on several passenger engines of the Pacific type, the largest type of engine we have in service, and which individually give a very good account of themselves, making a magnificent saving. But when you take the whole general proposition into account so far, after an experience of 6 months with 35 engines, we have not been able to see any saving, as compared with the consolidation, which is prior to the introduction of the Mikado.

S. L. Bean (A. T. & S. F.): I would like to inquire if the members have experienced troubles from the smoke tube breaking at the contracted end or the fire-box end of the tube; also the valve-stems and piston-rod packing blowing out on the road.

W. S. Morris (C. & O.): We have running daily 25 machines on the division which come directly under Mr. Murray's charge. Last year we took some special interest in the saving of fuel on this particular division, and the comparison so far as fuel is concerned, showed a saving of from 18 to 26 per cent. as compared with the engines that we used the previous year which were saturated steam engines. These 25 engines have the following general dimensions: The total weight is 400,000 lbs., weight on drivers, 337,000 lbs.; the maximum tractive effort, 78,200 lbs. They have developed a fuel economy as high as 43 per cent. per fuel ton mile, and I am very much pleased and encouraged with the remarks of Mr. Murray, which indicate that the reports appeal to him, and I am quite sure with the strenuous economical conditions that we have had to contend with on



C. E. FULLER,
President, M. C. B. Association.



M. K. BARNUM,
Vice-President, M. C. B. Association.

our road for some little time, the maintenance of these 25 Mallets was particularly good. Therefore, I am inclined to believe that Mr. Haye's troubles would possibly be little as compared with the great subject of superheat.

Mr. Pilcher: In making these comparisons, did you compare a compound superheater Mallet with a consolidation type?

Mr. Murray: Yes, those were comparisons.

J. A. Pilcher: I would like to ask Mr. Hayes what type of joint, whether a flat joint or a ball joint, and did they give trouble?

Mr. Murray: I want to say for the information of Mr. Pilcher that we practically have the same trouble with leaky joints, and we reduced that entirely.

C. D. Young (Penna.): The Pennsylvania Railroad have not had very long experience with a high degree of superheat on locomotives. Some few years ago they tried a low temperature superheater, but it did not prove very satisfactory, and it was not until about a year ago that investigation was made into the application of superheated steam to our equipment. I believe today we have something over 200 engines either on order or in service, and our experience has not been long, although it has been rather curious in the last 5 or 6 months. We have not had, considering the rapidity with which the engines have gone into service, a great deal of trouble; our troubles were largely confined, not to the superheater, but to the things incident to the application of the superheater, *i.e.*, the proper lubrication, and the proper material for bushings, and packing rings. A careful investigation of the conditions bringing about train detentions or troubles on the road, due to lubrication and packing rings, developed early the fact that it was largely in the handling of the engines, more than in the actual material that was being used, and I feel that the committee have fully covered this situation in their investigation where they say that some steam must at all times be passed through the cylinders in order to obtain good and sufficient lubrication. We at the present time are making a rather careful investigation of the details as to materials and methods of operating the superheater locomotives, and it may be of interest to the committee to know just what we have been doing. I may say first that we have found that it is hardly necessary to lubricate within the cylinder. Our practice at the present time is to put what we call an atomizer on, which is simply a 3/64 in. hole, shaped the same as a nozzle of a viscosimeter, back about 22 in. from the piston valve in the smooth passageway. This seems to give us the best results of any method of lubrication so far as applying the lubricant is concerned. The cylinder lubricant has been omitted, and we have found that the lubrication seems to be better, if anything, with simply one oiler admitting the oil well back of the valve. We have had some experience with hydrostatic lubricators which has not been entirely satisfactory, largely due to conditions of chokage, I believe, and the condition of the oil pipes. I believe I am safe in saying, from our length of experience, that the superheater locomotive is exceedingly sensitive to anything that is slightly wrong. That same condition might exist on a saturated engine, and the engine will go along and do its work daily without giving any trouble. But if that same condition exists in a superheater engine, you can look for trouble pretty quickly. We found trouble from choking in the hydrostatic lubricator at two different points. For instance, at the lubricator, and in the steam passageway down to the valve. If the oil pipes have some slight obstruction in them, trouble will be experienced, and it seems to me desirable and almost necessary to have constant lubrication at all times when running. We recently made some experiments at the locomotive test plant to determine what the temperatures in the valve and valve bushings and cylinders amounted to, to see where most of the trouble originated. The results of these experiments have not been entirely worked out, but the indications are that the average temperature of the valve bushing is only about 93 per cent. of that of the steam in the steam passageway; whereas, the average temperature of the middle walls of the cylinder is as low as 55 to 60 per cent. of the temperature of the steam, showing a very considerable difference between the temperature of the metal in the valve bushing, as compared with the piston and the cylinders. That would seem to indicate to me that careful consideration should be given to design and materials in the valve, in the bushings. The committee has touched upon the necessity of tail rods, and I am inclined to feel the same way that Mr. Seley does, that an extension rod on the piston is not necessary, however, if we are to have 300 lb. valves, it would be necessary to obtain good service.

There has been nothing mentioned whatever about the relative merits of locomotives, equipped with superheaters having dampers, and those not having dampers. The practice seems to vary in that respect, and I would like to ask some of the members if they would give me an expression of opinion as to the necessity or value of the use of a damper or its elimination. I would make a motion that the committee be continued and asked to report next year on the construction and operation of the superheater. I think it is about the liveliest subject we have at the present time.

Mr. Pratt: We had 2 superheater engines that were very much coddled and babied for about 2 years. One was an Atlantic type engine, and the other was one of our largest freight engines. After a while we gradually lost sight of them. However, since that time we have progressed quite rapidly along that line and have nearly 200 superheater locomotives of the consolidation and heavy Pacific types. As fast as the saturated steam engines of the same class pass through the shops for heavy fire-box work, they are changed to superheaters. We use the Schmidt fire-tube heater altogether. We have no trouble with the back end of the small superheater pipes, as some one asked, and lately we have had very little trouble with the joints leaking. That is perhaps our worst difficulty on the start. I don't think our men knew how to make a proper joint, and I am quite sure the builders did not know. We have found some cases of poor results with superheaters, especially in passenger service, that upon investigation proved entirely due to not keeping the large tubes cleaned out, and from our experience I would urge that with this type of superheater careful inspection be made by responsible men.

We have not thought it was necessary to use the extended rod, although we have a limited number and are trying them out to learn which we will finally adopt. We have had but a few cases of the rod-packing melting, and I don't remember but one or two cases in the last year where an engine had had to give up a train for that reason. The use of cylinder feeds is still a question with us. We would rather spill oil unnecessarily than have trouble with rod, and we do use the cylinder feeds quite largely. Some of the master mechanics have cut them out, and are having good results; and, personally, I don't believe that they are necessary, but they may be an added precaution. We have the feeds run into the steam chest at various points, with all the piston valves. Some of the feeds are split and the oil is fed over the traveling rings, which apparently is a little better than fitting it over the center of the spool. I would like to emphasize what one gentleman has said with regard to the avoidance of drifting with a superheater locomotive. I believe it is advisable to avoid drifting on a saturated engine. With the skill and practice of the men in avoiding drifting, we find that we can take the release valves off. We have done so on a large number of engines, and there is no doubt in my mind that if you can depend upon the engine men, that the relief valve is unnecessary; also the air drawn through the relief valve is very likely to carbonize the oil. It is only natural that with the high degree of temperature, great dependence must be placed upon regular lubrication, and we have come to believe that that is perhaps the secret of successful operation more than the amount of lubrication. With a saturated engine, we all know that frequently they fill the lubricator on the road, after which it takes from 15 to 20 minutes to get the oil to the parts to be lubricated. With a superheater engine, that won't do. We have got to have regular feed. On the night runs we have found it most advisable to give the engine crew a light back of the lubricator feed, so that they may know what they are doing at all times. It is with a good deal of satisfaction to me that the reports of careful tests indicated that a lower steam pressure may be used on superheater engines than we have been using on the saturated engines, and I rather regret to see these superheater steam pressures going up to 200 and 220 lbs. We know the lower steam pressure reduces our boiler troubles very greatly, and still it may be necessary to get such a large pressure in order to give power to some particular locomotive. I don't believe that this is necessary on all roads or on all classes of service, and I have a feeling that we should keep our pressures down as much as possible. One gentleman has just suggested that I say a word with regard to some tests that were conducted on our runs between Chicago and St. Paul with superheater engines, because that emphasizes decidedly the fact that the superheater engine is most efficient when worked to its maximum capacity.

The trains upon which these engines were tested were much heavier northbound than southbound, and if I remember rightly the northbound economy would pay for the extra cost of the superheater in between 2 and 3 months, whereas the southbound economy was less than one-half of that obtained on the northbound trips. The use of dampers is something we have never abolished, except when they froze up last winter. Damper cylinders froze up somewhere about every 24 hours on the road and we changed the cylinders from horizontal to vertical, so that this would be avoided. We didn't get it patented so that you can all use it. I understand there are several roads represented here that have used an improved form of plug valve for superheater engines, and it would be interesting to me and perhaps

others if they would advise us if they are giving entire satisfaction.

M. K. Barnum (Ill. Cent.): We have about 125 superheater engines in service, and they have been remarkably free from troubles. They have been now in service about a year, and much to my surprise, everyone that has had anything to do with them has been enthusiastic over their performance, and several of our master mechanics who have had them under their supervision expressed the opinion that they would cost less for maintenance than the saturated steam engines of anything near the same power. These locomotives have rather more power than any of the simple engines on our road. We have had no trouble whatever from piston rod packing. We are using a type of piston packing which has the perforated holes in a curve in the face of the ring, and they are having comparatively no trouble with it cutting the cylinder.

This packing was developed on our road with the sinple engines before we got the Mikado, and was tested first in one of our enginehouses where we had a consolidation engine that was very severe on the cylinder packing, so much so that the packing had to be renewed every week. I omitted to say that this was a snap-ring packing. In the case of this experimental engine, the packing ring was applied, and where the engine had been requiring new packing for about every 700 or 800 miles, it ran 55,000 miles, and was replaced when the engine went into the shop. We have been using the dampers in our engines and believe them to be essential to the proper operation of the superheater. We have had a little trouble with the superheater headers breaking, which seems to be due to shrinkage cracks, and that has occurred in only, I think, 3 cases out of 125 engines. That, we believe, will be overcome by modifying the design. We use a ball joint between the superheater elements or units, and the header, and have had very little trouble. In one or two cases the bends have broken, which was apparently due to the bends having been drawn up too tight, or not properly adjusted when the engine was built. This has been limited to so few cases that it appears to have been simply inaccurate workmanship and not a fundamental fault. We will probably have about 200 superheater engines in service by the last of this year, and we have no doubt whatever as to their success. We are getting about 20 per cent. fuel economy, and about 25 to 30 per cent. present economy of water, and we are able to run water tanks regularly, where formerly the locomotive had to stop.

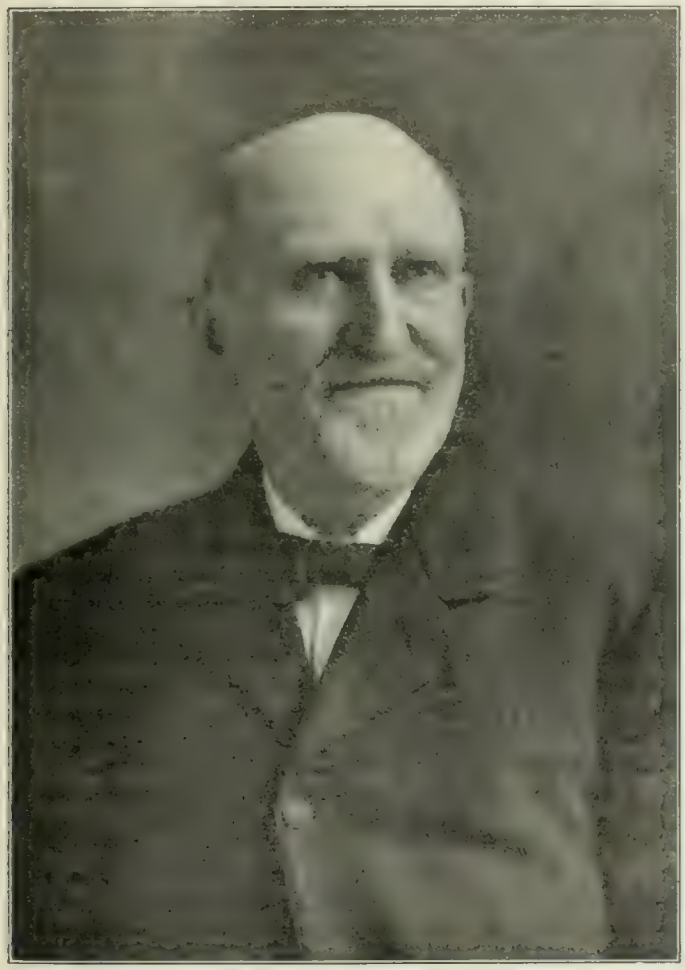
M. Flanagan (C. & O.): The gentleman who has just spoken made mention in regard to the packing. If there is no objection, I am satisfied it would be of benefit to all the members of the association if a sketch could be made of that packing and it can be shown in the proceedings. I hope some arrangement can be made by which it can be done.

M. K. Barnum: I would be very glad to show the packing. It is very nearly identical in design that the Northwestern are using, and it has been very satisfactory. I have had experience with it for something over 12 years.

J. F. DeVoy (C. M. & St. P.): Mr. Pratt of the Northwestern said, which was true, that the highest economy is obtained from the superheater while it was working at its fullest capacity. The only condition I have to add is that where the water is bad the superheater engine acts much better than the saturated engine for the water carried through the throttle is evaporated while going through the superheater tube. I am led to believe that possibly 15 to 40 per cent. can be obtained in ordinary service with ordinary water, and I am ready to believe that in a bad water district, that perhaps as high as 30 per cent. over the present practice can be obtained in a non-superheater engine.

Jas. Chidley (L. S. & M. S.): I want to say for the Lake Shore, that we have removed the dampers and the plates back of the diaphragm. Of course, our road is a low-grade road, and not as much driven on as the Pennsylvania or some higher grade road.

D. J. Redding (P. & L. E.): One gentleman referred to the fact that it seemed necessary to maintain constant lubrication in order to have successful operation. That does not seem to have been threshed out. I think it might be possible to hear from some of the other roads to see if they



J. S. LENTZ,
Treasurer, M. C. B. Association.



J. W. TAYLOR,
Secretary, M. M. Association and M. C. B. Association.

got any better results from the hydrostatic lubricators. We have two superheater steam engines, and all I hear is that the injectors cannot be cut down often enough and the firemen don't get enough exercise shoveling coal.

T. R. Cook (Penna. Lines): Our experience is very meager, and what I say must be taken with a grain of salt. We have engines on our lines that are equipped with superheaters, but I have no information as to the comparative results obtained with the tube type of lubrication. We have had, though, some experience with the 4-speed lubricator, which seems to indicate the necessity of constant and sure lubrication. It was found that the pressure in the choke blocks when the engine stopped dropped very rapidly, dropped down in a short time to 20 or 30 lbs., and it took a number of minutes to get that pressure up again so that oil would be delivered to the parts to be lubricated, and by changing the choke blocks and experimenting with them we have been able to get a choke block that will hold the pressure, so that in the ordinary stops there is no lack of lubrication. As soon as the engine starts the oil begins to feed to the steam chest. As to the location of the pipes, the original installation had a tallow pipe in the cylinder and one in the steam chest, and our experience seems to indicate that we did not get any benefit from the lubrication of the cylinder, and the best location of a single pipe is in the steam passageway—not as to a question of atomizing the oil, but as to putting the oil where it will go to the parts to be lubricated.

R. D. Smith (B. & A.): The matter of extension pistons and valve-rods was discussed in the committee before the circulars were brought out, and while it was not anything the committee were directed to look into, they did think that it was closely allied, and they therefore asked the question, and found that they were not looked on with great favor. We didn't get reports but from very few that were using Dunbar packing. I don't think anybody reported using it exclusively on any type of engine. The spring ring form seems to be that most generally used. The suggestion of using lower pressures seems to me to be a most excellent one, and one that I think we would all aim to follow, providing always that the clearances were sufficient on some of the roads. That is quite an important feature. We are surprised at the experience of Mr. Hayes. Mr. Hayes was evidently looking for trouble and found it—or rather, he was looking for trouble, but perhaps the suggestion might not be amiss to him that he was looking in the wrong place for it. If he had gone to the engine house instead of to the superheater engine, his troubles might have disappeared. Like all devices when new, the superheater engine gave us some troubles. We rather expected them. We started in with a superheater engine looking for trouble, and we have been looking for trouble ever since, and we haven't found it; and the answers that this committee received to some of the questions were very full, and we feel warranted in saying what we have said in the report, that a superheater engine will cost no more to maintain than a saturated steam engine of the same type.

ENGINE FENDER WHEELS.

Action was deferred on the this report until definite action was taken by the M. C. B. Association on car wheels.

The Vice-President: Mr. Seley's motion is that this association do not provide for recommended practice, but simply as a standard. Therefore, in view of that, I would suggest that Mr. Seley move an amendment to Mr. Gaines' motion. Will Mr. Gaines second it?

Mr. Gaines: I second the motion.

The motion was carried.

CONCLUDING EXERCISES.

The usual resolutions thanking the technical press, particularly the RAILWAY AGE GAZETTE, were adopted.

The following officers were elected: President, D. F. Crawford, (Penna.); first vice-president, T. Rumney, (C. R. I. & P.); second vice-president, D. R. MacBain, (L. S. & M. S.); third vice-president, F. F. Gaines, (C. of G.). Executive members, terms expiring 1914, G. W. Wildin (N. Y., N. H. & H.), C. F. Giles (L. & N.), and William Schlafge (Erie).

Scott H. Blewett was delegated to hand the ex-president badge to President Bentley.

It is proposed to extend the Laokai-Yunnan line, China, to Luchow.

DAVID FRANCIS CRAWFORD.

David Francis Crawford, the newly-elected president of the American Railway Master Mechanics' Association, was born at Pittsburgh, Pa., in December, 1865, and was educated in the common schools and at the Pennsylvania Military Academy at Chester, Pa.

In 1885 he entered the shops of the Pennsylvania Railroad at Altoona as an apprentice, and continued there until 1889, when he was appointed inspector of the test department, holding this position until February, 1892. He was then sent to Fort Wayne, Ind., as assistant master mechanic, and continued as such until 1895. This was followed by a promotion to the office of assistant superintendent of motive power, which he filled until 1899, when he became superintendent of motive power. In 1903 he was appointed general superintendent of motive power of the Pennsylvania Lines West, with headquarters at Pittsburgh, where he is still located.

This outline of Mr. Crawford's career would give but a faint idea of his activities without some account of the related matters with which his name is associated. While superintendent of motive power at Fort Wayne he was in responsible charge of designs and construction of a number of electrical power plants which probably paved the way for his appointment on the committee in charge of the electrification of the New York terminal, as well as that charged with the designing of the electric locomotives in use at that point.

Of course, during the whole of his career he has been closely associated with locomotive and car development on the Pennsylvania Lines West. Probably the most spectacular piece of work, and one which has attracted the greatest attention, is the designing of the heavy Pacific locomotives, used on heavy fast passenger service, upon which the men have bestowed the sobriquet of "Fat Annie." At the time of its construction the "Fat Annie" carried the heaviest load on the driving wheels of any passenger locomotive. This weight was 29,500 lbs. The engine was built as an experimental machine to provide for the future increase in train weights, and after three or four years of preliminary trial, has been ordered in considerable numbers.

Another matter with which Mr. Crawford's name is associated is that of the development of the underfeed mechanical stoker. This was a work to which he devoted a great deal of close personal attention for a number of years, and has succeeded so well that the machine is being rapidly applied to the locomotives of the Pennsylvania system, both east and west.

Outside the immediate work of his department, Mr. Crawford has been very active in supporting the railway position before the several legislative bodies that have had matters under consideration for the supposed benefit of the public. Two years ago he was one of the strongest opponents of the federal boiler inspection bill, which was under consideration at the time. He was also in the forefront of the struggle regarding the safety appliance act, which resulted in exclusion from its provisions of a number of objectionable features.

About two years ago the Indiana state railway commission issued an order to the railways of the state that all locomotives should be equipped with what was interpreted by some to mean a high, powerful headlight. Mr. Crawford was largely instrumental in having an elaborate investigation made as to the actual working of such a headlight, an investigation which resulted in the courts declaring the order void.

Mr. Crawford is a member of the American Society of Mechanical Engineers, of which he is one of the managers; the Institute of Electrical Engineers, the American Society for Testing Materials, as well as the local railway clubs and, of course, the Master Car Builders' Association. He is on the committee of maintenance of the American Railway Association, and of the statistical committee on railway account-

ing of the same association, on which he is the representative of the Pennsylvania Railroad.

While these do not cover all of the activities in which Mr. Crawford is interested and engaged, they will serve to show their wide range and the position which he occupies in the railway business.

R. S. M. A. EXECUTIVE MEETING.

At a meeting of the Railway Supply Manufacturers' Association, held yesterday morning, John D. Conway was re-elected secretary. A resolution was also adopted to consolidate the offices of secretary and treasurer, which resolution will be submitted to the members and voted on by letter ballot.

M. M. HONORARY MEMBERSHIPS.

W. T. Smith, formerly superintendent of motive power of the Chesapeake & Ohio, and now retired, was yesterday elected an honorary member of the M. M. Association. Mr. Smith has been a member of the association since 1869, making a period of 43 years.

MR. BENTLEY'S CONDITION.

E. W. Pratt made the following statement in the convention yesterday:

"Mr. Chairman and Gentlemen—I have just come from Mr. Bentley's room, and I think you will be glad to know that the doctor who is there says that he can in all probability get out of bed to-morrow, and within a day or two after proceed home.

"I did not know that I would be called upon to make any expression for Mr. Bentley, and have not been delegated to do so, but I want to assure you that he said over and over again if anyone could be killed by kindness, he believes he would be dead by this time, he has had so many kind inquiries, direct and indirect, from the members of this association, and others, and I think the sympathy and feeling we have had in our hearts has got to him in other ways. He feels very grateful to all of the members for the very large attendance at this meeting, which was a matter which was very dear to his heart; for the very thorough discussion of the papers, as others and myself have told him that it was a good convention, and that we had not any of us overlooked



FORMER EMPLOYEES OF THE CHICAGO & NORTH WESTERN.

Top row, left to right—F. W. Peterson, Master Mechanic, Chicago & North Western; G. F. Slaughter, American Steel Foundries.

Second row from top—B. R. Moore, Superintendent Motive Power, Duluth & Iron Range; M. C. Beymer, American Arch Company; J. A. Kinkead, Parkesburg Iron Co.; John L. Nicholson, American Arch Co.

Third row from top—F. M. Whyte, New York Air Brake Company; George R. Henderson, Consulting Engineer; George L. Bourne, Locomotive Superheater Co.; Henry D. Kelley, Goldschmidt Thermit Company; John P. Neff, American Arch Co.; John T. Carroll, Assistant General Superintendent Motive Power, Baltimore & Ohio.

Bottom row—G. W. Kelly, Master Blacksmith, Central Railroad of New Jersey; George Wagstaff, American Arch Company; W. G. Wallace, American Steel Foundries; Edgar B. Thompson, formerly Superintendent of Motive Power, Chicago, St. Paul, Minneapolis & Omaha; E. J. Arlein, W. H. Coe Mfg. Company; J. W. Kelly, National Tube Company; J. A. MacRae, Mechanical Engineer, Michigan Central.

the part, the very active part, which he played in the planning and preparation of the convention this year.

"Mr. Beatley also wanted me to thank, which I have done, individually the presiding officers of the convention, and it is unnecessary for me to say that he regrets very deeply that he should have been unable to preside, and I know we are sorry, too, because of his well-known enthusiasm and vigor in all matters connected with the administration of the affairs of the association, that he is unable to be with us." (Applause.)

A 600-1200 VOLT DIRECT-CURRENT FREIGHT LOCOMOTIVE.

A standard gage electric locomotive weighing 94 000 lbs. has recently been added to the rolling stock of the Oakland, Antioch & Eastern for handling freight trains. This system when completed will make a net work of lines totaling about 156 miles in the vicinity of Oakland, Calif.

The mechanical parts of this locomotive were furnished by the Baldwin Locomotive Works, and the electric equipment was furnished and installed by the Westinghouse Electric & Manufacturing Company. It is of the double truck type with raised center cab, and is arranged for operation in either direction. It can traverse curves of 50 ft. radius when hauling a trailing load.

The trucks are of the equalized pedestal type, with one-piece forged iron frames and rigid cast steel transoms. The transom gussets have ample bearings on the frame and transom, and act as brake lever guides and brake shoe hanger supports. The brakes are inside hung, and are applied through a radial beam, which is supported on the inner end of the truck frame. The wheels have cast iron plate centers, with steel tires shrunk on and bolted.

The locomotive frame is of the built-up type, composed of commercial shapes as far as possible. The longitudinal sills are four 12 in. channels. Between the middle and outer channels there is, on each side, a strong arrangement of diagonal braces of 6 in. channels. The end bumpers are of steel plate, 7/8 in. thick and 29¾ in. deep. The draw castings, of steel, are riveted in place between the center sills and back of the bumpers, and are arranged to take long-shank radial couplers of the M. C. B. type. The bolster plates, over the trucks, are 66 inches wide, and are substantially braced to provide the necessary stiffness.

This locomotive is fitted with air sanders, having spouts to all the wheels; combined air and hand brakes; two air whistles, and two electric headlights. The principal dimensions are as follows:

Truck wheel base	7 ft. 4 in.
Total wheel base	25 ft.
Distance between truck centers	17 ft. 8 in.
Driving wheels, outside diameter	42 in.
Width over all	10 ft.
Height to top of cab	12 ft.
Actual total weight	98,100 lbs.
Estimated weight of mechanical equipment	57,000 lbs.

For propulsion, there are four Westinghouse 120 H. P., 600-1200 volt commutating-pole railway motors, with a gear ratio of 19 to 54. This motor is of the slow speed type and particularly adapted to freight haulage.



Direct Current Freight Locomotive—Oakland, Antioch & Eastern Railway.

The HL unit switch type of control is used. The motors are connected in series and parallel with each other in conjunction with the necessary resistance to produce smooth acceleration on either 600 or 1200 volts operation. A hand-operated change over switch is used to change the main circuit from 600 to 1200 volts or vice versa. On 1200 volts the motors are operated four in series and four in series parallel. On 600 volts they are connected for operation with four in series parallel and four in parallel. A motor-generator furnishes low voltage for supplying the lighting and control circuits.

This locomotive will exert a tractive effort of 16,700 lbs. at approximately 10.65 m.p.h., and with a clean dry rail, a maximum tractive effort of 23,500 pounds as possible with this locomotive.

M. M. AND M. C. B. PAST PRESIDENTS.

M. M. ASSOCIATION.

H. M. Britton	1868-1876
N. E. Chapman	1876-1880
J. N. Lauder	1880-1882
Reuben Wells	1882-1884
John H. Flynn	1884-1885
J. Davis Barnett	1884-1885
J. Davis Barnett	1885-1886
William Woodcock	1886-1887
Jacob Johann	1886-1887
J. H. Setchel	1887-1889
R. H. Briggs	1889-1890
John MacKenzie	1890-1892
John Hickey	1892-1894
W. Garstang	1894-1895
R. C. Blackall	1895-1896
R. H. Soule	1896-1897
Pulaski Leeds	1897-1898
Robert Quayle	1898-1899
J. H. McConnell	1899-1900
W. S. Morris	1900-1901
A. M. Waitt	1901-1902
G. W. West	1902-1903
W. H. Lewis	1903-1904
P. H. Peck	1904-1905
H. F. Ball	1905-1906
J. F. Deems	1906-1907
William McIntosh	1907-1908
H. H. Vaughan	1908-1909
G. W. Wildin	1909-1910
C. E. Fuller	1910-1911

M. C. B. ASSOCIATION.

I. W. Van Houten	1867-68-69, 1873
F. D. Adams	1870-1871
M. C. Andrews	1872
Leander Garey	1874-1885
B. K. Verbryck	1885-1887
William McWood	1887-1890
Jno. Kirby	1891-1893
E. W. Grieves	1893-1895
J. S. Lentz	1895-1897
S. A. Crone	1897-1899
C. A. Schroyer	1899-1900
J. T. Chamberlain	1900-1901
J. J. Hennessey	1901-1902
J. W. Marden	1902-1903
F. W. Brazier	1903-1904
W. P. Appleyard	1904-1905
J. E. Buker	1905-1906
W. E. Fowler	1906-1907
G. N. Dow	1907-1908
R. F. McKenna	1908-1909
F. H. Clark	1909-1910
T. H. Curtis	1910-1911

There are requests from British interests in China for concessions to enable British interests to open connections with India and Burma and with India through Tibet. These connections would be of international importance. The engineering difficulties are said to be numerous and all but insurmountable. The connection from Szechwan province through Tibet is proposed with the idea that it can follow the caravan and trade routes from Chungking west to Batang south along the caravan routes now used to transport goods from India to Tibet. This caravan service connects with a special steamer sailing at stated periods from Glasgow, Scotland, with British goods for this trade. The light railway from Bahmo to Tengyueh is a portion of this transportation system. The Tibet route seems to be offered as an alternative route to the connection between Tengyueh and Yunnan.

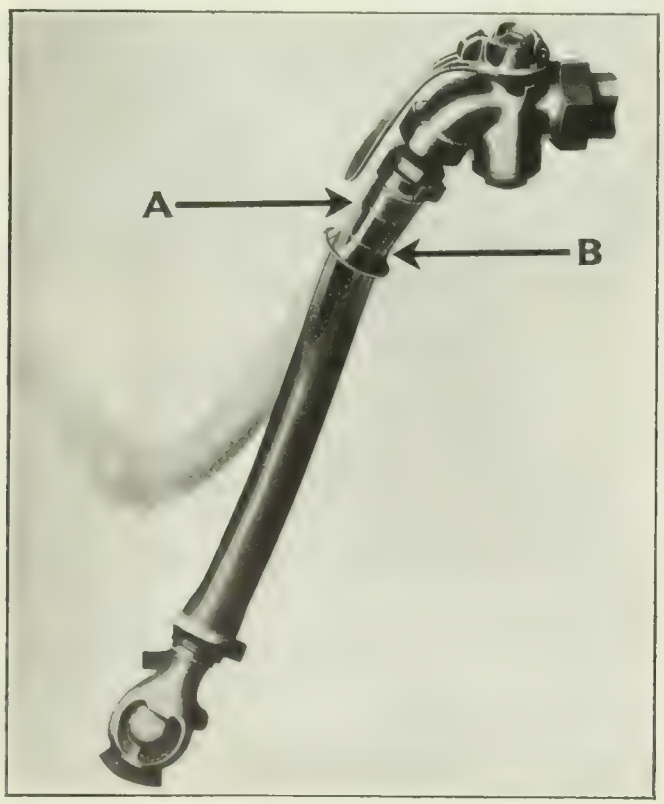
The Exhibit.

INDIRECT LIGHTING WITH THE PINTSCH MANTLE.

One of the serious objections to indirect lighting is the fact that approximately 50 per cent. of the initial candle power of the fixture is absorbed by this method. This objection is serious when considered in connection with electric lighting of railway cars, since all of the available wattage is needed to supply sufficient illumination by the old direct lighting method. The Pintsch mantle, however, has a higher initial candle power, and for that reason should prove efficient in connection with indirect lighting. To those who prefer this method of illumination to the direct system, any arrangement whereby the Pintsch mantle can be successfully employed indirectly, should be a welcome addition to the field of railway car illumination. The Safety Car Heating & Lighting Company, New York, has been conducting extensive tests and experiments along this line, and have announced their success in developing an indirect lighting fixture for use with the Pintsch mantle. This company had expected to be in a position to exhibit one of these fixtures at Atlantic City, but one or two unforeseen defects had to be remedied, which delayed the final completion of the fixture. Whether or not indirect lighting for railway cars will continue to be used, it is interesting to know of the final success of this Pintsch mantle indirect lighting fixture.

AIR HOSE PROTECTOR.

The illustration shows the application of the Universal air hose protector, made by the McCord Manufacturing Company, Chicago, Ill., which is designed to especially protect the hose from damage at the end of the nipple. *A* indicates the lower end of the air hose nipple. It is at this point that a very large percentage of air hose fails, caused by injury to, and the perforation of, the inner tube, as



Air Hose Protector.

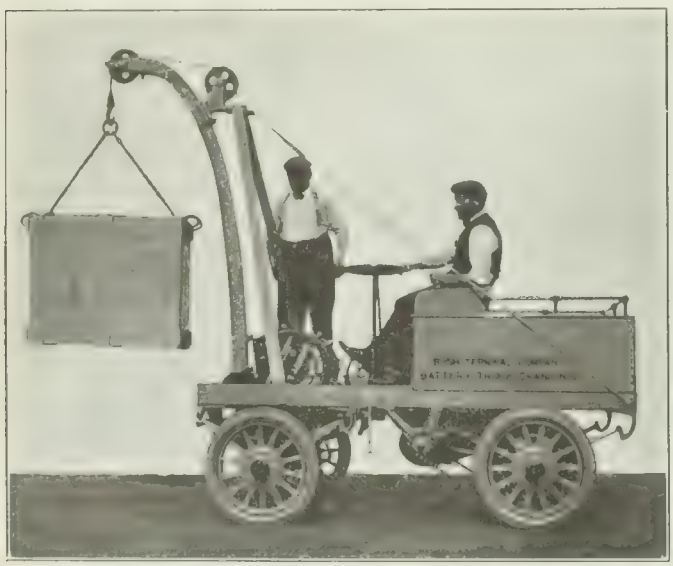
well as in many cases, by being injured on the outside. In the latter case, the action of the elements on the bruised outer portions deteriorates the whole structure of the hose. The Universal air hose protector is a rigid section, formed with a bell-shape at the lower end, effectively supporting the hose at the required distance below the nipple end, properly protecting and relieving the usual strain.

Examination of condemned hose shows the tube to be in perfect condition from a point indicated by arrow *B* down to the coupling. This protector shields and protects all the portion of the hose above arrow *B*, entirely relieving the strains and resultant deteriorating effects, prolonging the life of the hose equal to that of the lower portion. Several thousands of these protectors are in use with satisfactory results.

BATTERY TRUCK CRANE.

The battery truck crane is designed for service in railway shops, freight houses, warehouses, terminals and docks, in short, anywhere where cars or lighters are loaded and unloaded; where packages weighing less than one ton are moved less than 400 feet; or where a number of heavy packages are moved over a greater distance. As an instance of their value, it is estimated that these machines earn each year 288 per cent. of their first cost at the Bush Terminal Company, New York.

For loading and unloading cars, the machine is brought to an advantageous position, the brakes are set and the hoist is



Battery Truck Crane.

put in operation. The limiting arc of the boom is 180 deg., and the maximum weight that the crane can handle is one ton. In one instance 360 castings, aggregating 65,000 lbs., were unloaded from a gondola car in five hours, an average of 1.2 lifts per minute, the speed being limited only by the rapidity with which two men could attach the slings to the castings. In another instance, a box car was loaded with sixty-four 800-lb. barrels of plumbago in 25 minutes, and four cars were loaded in 2½ hours, including spotting cars. This work averaged two barrels per minute, hoisted nearly 5 ft. and swung inside the cars.

When packages are moved in small quantities over a distance of less than 400 ft. they are attached to the hook, raised and carried to their destination. By this method sixty 800-lb. barrels of plumbago were moved 300 ft. in one hour with the assistance of only one helper. At another time one hundred and fifty 300-lb. boxes of rubber were loaded into a box car 75 ft. away in 50 minutes; three boxes were slung together and a round trip was made every minute. In a storeroom, boxes of angle and flat iron, weighing 10,000 lbs. each, were carried 30 ft. and stacked at the rate of 40 boxes an hour.

The machine has proven most economical in transferring large quantities of miscellaneous package freight over distances greater than 400 ft. In this class of service trains of about four trailers are attached to the battery truck crane, three trains of trailers being assigned to one battery truck, one train at loading point, another en route and the third being unloaded at the destination. Horses are used to make up the trains and to spot the trailers, and the men at each end are kept constantly busy. An average of 30 tons of freight an hour can be moved one-half mile by this method. The maximum load per train is six tons. In one instance, 600,000 lbs. of cotton were carried one-half mile in ten hours at the rate of twenty-four 500-lb. bales per load and a round trip every 12 minutes, an average of 1,000 lbs. per minute. On small package freight, using two trailers to the train, one battery truck crane moved 1,000,000 lbs. 600 ft. in 19 hours.

The machine consists of a short, heavy storage battery vehicle, having a swinging crane mounted on its forward end. The crane hook is raised and lowered by a hoist operated from the battery. It has a maximum drawbar pull of 2,000 lbs. The speed is nine miles an hour with a light load, seven miles an hour with one ton on the hook, and five miles an hour with five tons on trailers. The gage is 60-in. and the wheel base is 64 in., which permits the machine to make sharp turns. The weight is 5,000 lbs. The General Electric Company's universal type of automobile motor is used. The torque increases in direct proportion to the current increase without causing a material decrease in efficiency when the motor is exerting extra power. Continuous torque control is the characteristic feature of the controller, which assures starting and acceleration by gradual easy steps and eliminates the jerky movements which are detrimental to the transmission. The hoist has a maximum lifting capacity of one ton 20 ft. per minute with the pulley and double cable, or 40 ft. per minute with the single cable. The hoist is entirely enclosed and weatherproof. The drum has a winding capacity of 35 ft. of cable. The charging of the batteries may be tended by a watchman during the night. The machine can negotiate steep grades and can travel easily over the roughest pavements. The upkeep is cheap and an operator can be made of a common truckman receiving 20 cents an hour.

The battery truck crane is made by the General Electric Company, Schenectady, N. Y.

GRINDING WHEEL RECORDS.

The Carborundum Company, Niagara Falls, N. Y., has recently collected some data concerning the uses of its Aloxite and carborundum wheels. The Aloxite wheels are used for grinding reamers, cutters and general high speed tools, while the carborundum wheels are used for heavier work, such as car wheels, etc. In one railway shop on a large Southern system the tool room foreman has used a 10-in. Aloxite wheel for over five months and in that time it has only lost 2 in. and has not been touched with a dresser. This wheel ground two 2¼ in. drills of mushet steel from the rough stock, losing only 3/16 of an inch. The drills were 26 in. long and were made in the blacksmith shop being twisted from plain stock. In this same shop a 12-in. Aloxite wheel cut a piece of 2¼ in. x 5/8 in., in 55 seconds.

It was also shown that in another shop, car wheels were ground for less than one cent apiece with carborundum wheels. The report submitted from this shop showed that 28 carborundum wheels ground 54,456 car wheels. In another shop one carborundum wheel is credited with 1,348 wheels before it wore out. The exhibit of the Carborundum Company is located in Machinery Hall, where their grinding wheels will be working under actual shop conditions. The exhibit is equipped with a universal grinder, a heavy floor grinder, a drill grinder and a cutting-off machine.

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THE elimination of grade crossings in New York is making some progress in spite of the veto of this year's appropriation by Governor Dix, a number of changes being provided for, so far as the state's proportion of the expense is concerned, by the Good Roads fund. For the improvement of highways, the state has made very liberal appropriations, and where a change of grade is desired in a state highway, and the Public Service Commission approves the plan, the work can go on without delay. The Public Service commission of the Second district has already approved changes at a number of places on state highways. The governor's veto really set back this important and necessary work very materially. The legislature appropriated $700,000 for this year, half of which was to be used in New York City and the other half in other parts of the state. The governor's only reason for his veto was that large balances were already available; but he seems to have been oblivious to the fact that each crossing improvement requires a very long time from the beginning of the preliminary studies to the actual completion of the work. The Public Service Commission of the Second district, with a balance available of $1,209,513, has already used or prepared to use $1,176,132 of this sum, so that it can take no further action (except where the Good Roads fund is available), although there are 27 applications pending before it. The state of New York has made quite brave progress in the grade-crossing reform for a year or two past; but there is still need of a strong and consistent policy. She continues far behind Massachusetts. Frugality with public money is often a valuable virtue in a governor; but New York has suffered a good deal from governors whose notions of economy are shaped largely by the exigencies of an annual budget which had to be trimmed to serve political purposes.

PEACE OF MIND is one of the most important desiderata in traveling—as, indeed, it is in working, studying or any serious occupation; and Mr. Slifer, general manager of the Chicago Great Western, did the railway world a unique service when he put those words in italics in the circular to employees which he issued the other day and which we reprinted in our last issue (page 1351). We are all too ready to rest in the assumption that, as some people are bound to be worried or foolish in any event, there is no use in doing much to aid any one into a better state of mind. That is a mistake. Merely to offer to do something for a passenger, regardless of whether the offer succeeds or the passenger appreciates, greatly improves the social atmosphere on a train (if we may be pardoned so scientific a term). Everybody admires the brakeman who offers to assist passengers, whether to a seat or a drink of water or information not to be had from the folder; and this notwithstanding his propensity frequently to be too free with his advice and to make other mistakes. We other employees would do well to much oftener imitate that kind of man—avoiding his faults, of course. The other important feature of Mr. Slifer's circular is the emphasis on the duty to help all passengers, and not alone those whom it is pleasant to deal with. One of our most luxurious trains is advertised as one which will promote peace of mind by the certainty that the passenger in the sleeper will have a good night's rest. Another is put forth as a rival of the best hotels—the Astor, the Savoy and all the others rolled into one—in its capacity to cater to every possible want. But these trains, with their extra fare, are only for the few. Who will follow the C. G. W. in making this same attempt to please on all trains? We do not mean that the C. G. W. is the only road now doing this; but its circular suggests that not all of the *ways* of stimulating alert courtesy have yet been put into practice. The injunction to despatchers, conductors and agents to work together is a point in the circular worthy of particular attention. Why should not the different classes be trained to stimulate each other? And the habit of being helpful to passengers can be exercised in many situations without waiting for an occasion when a train is behind time; as, for example, when, because of rain, it is neces-

sary to go through some unusual door or by some unusual path to get on or off a train without getting wet; or when, by showing passengers the right place on the station platform from which to board a train, they can be saved the annoyance of going through three or four cars to find seats.

THE railway commissioners of Louisiana propose to adopt a rule "commanding" all railway companies to answer tracers within three days. That would be simple. To give an answer is easy. But possibly the commissioners have in mind an answer which really tells what the shipper wants to know. If this is the case, the enforcement of an order like this would be likely to produce a pretty large crop of "red envelopes" on the railways of Louisiana. However, a hearing is to be held on June 25, and possibly the proposed rule will contain a "saving clause." One of the beauties of the tracer habit is that many times the shipper becomes impatient before the freight has had more than time to reach its destination. Unfortunately for the freight agents they have themselves encouraged some shippers to expect to have a telegraphic "hurry order" sent after any and every car that is claimed to be specially important. At least that phenomenon has been noticed in Illinois, Pennsylvania and other northern states, if not in the south. Big shippers being thus favored, the ordinary citizen of course feels it necessary to ask for his share. Why not make a small charge for these letters or telegrams, the money to be refunded if there proves to have been a delay? That would kill off frivolous complaints. Probably, however, it would be difficult to agree on a reasonable schedule of speeds. On many routes 99 per cent., or more, of the shipments will for a long time reach destination in good time—that is, on the quickest train schedule; but unless rates were to be raised it would be unfair to penalize the railway even in a small sum, for being slow with as much as one shipment in 500. The fact is that, except by costly improvements, it would be impossible to make the fast freight train schedule the normal schedule for all freight. An officer of the Western Union Telegraph Company, speaking of the common feeling among senders of telegrams, that on routes where an answer can frequently be had in 15 minutes the company ought to be able to get all answers in 15 minutes, says that the company is going to try to fulfil this wish or demand of the public. That is a worthy endeavor, and we shall be pleased to see it succeed; but the management of freight trains is another story. The best thing that those commissioners can do will be to adopt some rule which will impel each railway traffic manager to put the question of expedition in the hands of a man possessing the knowledge, courage and persistence (and also the authority) to remove the need of tracers as fully as possible, and to adopt sane methods in the handling of those that cannot be avoided.

THE RAILWAYS OF THE WORLD.

THE statistics compiled for the *Archiv für Eisenbahnwesen* have been brought down to include the year 1910. They show mileages for the different continents as follows:

Old World.	Miles.	New World.	Miles.
[illegible]	[illegible]	[illegible]	283,511
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	19,275
[illegible]	[illegible]	[illegible]	[illegible]

and a total of 640,158 miles for the whole globe, which is 14,460 miles more than one year before, of which increase 6,221 miles were in the Old World and 8,239 in the New. In the last decennial period, the additions amounted to 149,092 miles, 58 per cent. of which was in the New World and more than 40 per cent. in North America. How great the industry of making railways has become, and how it has grown, may be seen from the following statement of the miles opened in each decade since 1840, in which year there were 4,772 miles in the round world.

Miles of Railway Opened in Successive Decades.

Decade.	Miles.	Decade.	Miles.
1840-50	19,333	1880-90	152,179
1850-60	43,159	1890-1900	107,421
1860-70	63,317	1900-1910	149,092
1870-80	101,081		

Thus of the 640,000 miles of railway in 1910, nearly two-thirds had been built in the last thirty years.

The *Archiv* this year gives a table of the mileage of state railways in the different countries. From this it appears that very nearly 30 per cent. of the railways of the world are worked by governments—107,746 miles in Europe, 36,365 in Asia, three-fifths of the small African mileages and 18,036 miles out of the 19,275 miles in Australasia. It is noticeable that while Great Britain has no state railways, and Canada only 1,718 miles out of a total of 24,731, this form of administration prevails in the British possessions of Asia, Africa and Australasia.

STEAM AND STREET RAILWAY CAPITALIZATION.

REPORTS of the railway commissions of two states, Massachusetts and Connecticut, supply some interesting data for comparison of steam and street railway capitalization, as well as for a comparative analysis of the latter. It should be said that the two states have differed widely in their policy toward the financing of street railways. In Massachusetts honest capitalization under pretty rigid state laws aimed in a general way at capital based on replacement value has been enforced; in Connecticut, on the contrary, the general laws have been systematically evaded by special legislation, and the state commission has been lax. The divergence of the two state policies shows in the returns. Massachusetts, with many costly city street railway lines, including the Boston elevated system, returns per mile of track of street railways, including sidings, $63,268 capitalization in stock and debt. Owing to transfers of street railway obligations to the controlling steam railway corporation, the New York, New Haven & Hartford, the figures for Connecticut are much more difficult to obtain. But, making the proper re-transfers, the capitalization of the Connecticut street railways rises to approximately $11,810 per mile. If the Massachusetts capitalization is taken as the standard, there is an over-capitalization in Connecticut of $52,542 per mile.

The actual capitalization of the steam lines in the two states cannot be computed accurately, owing to investments in outside properties. But taking cost of road and equipment, the Massachusetts figures become $45,130 per track mile and in Connecticut almost eactly the same, $45,215 per mile. The amount per mile is obviously much reduced by the large proportion of comparatively inexpensive side track which in Massachusetts is returned as 3,222 miles and in Connecticut 1,556 miles, out of a total of 15,037 miles in the two states. But on the basis of cost of road and equipment of the steam lines the contrast with the street railways remains impressive.

Turning from the two states, where the returns are for the last fiscal year, to the whole country, the figures for street railway overcapitalization, tested by the Massachusetts figure, become amazing. From the gross returns as given by tables in the *Electric Railway Journal* we can derive the capitalization per mile of track. All New England returns $63,466 per mile, the amount being kept down by Massachusetts, Maine ($40,315 per mile) and New Hampshire ($36,933 per mile). Eastern states outside of New England—Delaware, District of Columbia, Maryland, New Jersey, New York, Pennsylvania, Virginia and West Virginia—have $157,444 per mile. Nine central states—Illinois, Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, Ohio and Wisconsin—return $101,436 per mile. Nine Southern states have no less than $136,422 per mile, and seventeen states beyond the Mississippi, including Texas and all the Pacific states, have $112,852 per mile. For the whole country it is $116,795 per mile. Some of the figures for single states are impressive enough. Delaware shows $277,687 per mile, Louisiana with $252,627, North Carolina with $219,113, and Oregon with

$194,298. Evidently street railway overcapitalization is not confined to the thickly settled states or regions. In the latter category are New York state, with $212,800 per mile, and the District of Columbia with $205,116.

Using the mileage capitalization returns of the street railways of the whole country as a test, its contrast with steam line capitalization per mile becomes also very striking. The steam railway capitalization on June 30, 1910, was $62,657 per mile. The street railway capitalization for the country ($116,795) nearly doubles this. As the intercorporate holdings of the street railways are small as compared with those of the steam railway companies, the disparity with those holdings subtracted in both cases would obviously be greater still. Doubtless in the evolution of our steam lines the charging up of construction and equipment to balance capitalization has been a factor, but a very small one proportionally as compared with the street railways.

In the obvious overcapitalization of the street railways, it is to be remembered that often electric light and power capitalization is merged with street railway capital and increases it. But, even if large allowance is made, the overcapitalization of the street railways as compared with the steam lines remains noticeable—even if the allowance is as large as 20 per cent.

PASSENGER SERVICE AND EARNINGS.

THE practice of charging an extra fare on the faster and more luxurious passenger trains seems to be becoming definitely established on western railways, as it long has been on lines between Chicago and New York. The example was set by the Santa Fe when its new weekly "De Luxe" train between Chicago and California was put in service last winter on a 63-hour schedule with an extra fare of $25. The Southern Pacific followed with a $10 extra fare on its Sunset Limited, running twice a week between New Orleans and San Francisco; and it is announced that a $10 extra fare is to be charged on the new Overland Limited train of the Chicago & North Western and Union Pacific, which is to be put in service shortly with a 64-hour schedule.

While competition in rates is practically extinct and maximum passenger fares have been drastically reduced by state legislation, the railways have sought to outdo each other by running faster and more elaborate trains, which have greatly increased the cost of operation. An effort was considered about a year ago to establish an additional ticket charge for passengers traveling in special equipment, but the agitation against the charges of the Pullman Company warned the railways of what would probably be the result of an attempt to adopt such a policy. Yet they have a perfectly valid argument for it in the fact that to charge the same rate for transportation in a luxurious through train on a main line as on a day coach in a slow train on a branch line, with the single exception of the charge of the Pullman Company for sleeping or parlor car accommodations, is a real discrimination in favor of the traveler in the better class of trains.

The plan of securing an increase of revenue by making a distinction in the rates for different classes of service has not been entirely abandoned. But most travelers who use Pullman cars might be inclined to protest against such action, while the American people have in many ways shown themselves not unwilling to pay more for something that is a distinct improvement over what they have been getting. Consequently, there seems less likelihood of objection to an extra fare fixed at the time the improvement is adopted. People who desire to go to California in 63 or 64 hours without the inducement of a summer excursion rate are not apt to find fault with an extra charge for superior service.

Whether there are enough who prefer such service to make it profitable has presumably been given careful consideration. The Santa Fe De Luxe was kept in service only weekly during last winter, and was intended, to a considerable extent, to accommodate travelers who often ride in private cars. It has just concluded a successful season. The North Western-Union Pacific train will be run daily. The Chicago, Milwaukee & St. Paul also is establishing new service to the coast via the Union Pacific on the old three-day schedule and without extra fare, indicating a different policy.

It would seem wise where improved and faster trains are put in service to try to meet the increased cost by an excess fare. American railways are themselves largely responsible for holding down their passenger train earnings while increasing their passenger train expenses. There has been persistent rivalry in the running of faster and more elaborate trains, of which the new extra fare trains are illustrations. The extra fares are an indication that the roads are at last tempering their rivalry with considerations of the cost involved. In most cases the result of this kind of competition has been that the through trains have been unable to handle much local business, and passenger train mileage has been so increased that, in spite of a large increase in the density of passenger traffic, only 50 to 60 passengers are being handled per train. In 1910 the average number of passengers per train was 56. Since the decisions of the Interstate Commerce Commission refusing advances in freight rates, many roads have found it practicable to make considerable savings by taking off trains. But this has usually affected local service, and has brought many criticisms on the roads, while many have found it impossible to economize in this way.

It has often been said that no commission ever made such serious inroads on revenues as did railway men themselves during the days of unrestricted competition in freight rates; and the statistics show they are still following a similar policy with reference to passenger service. According to the latest annual reports the passenger revenue per train mile on eleven of the largest western systems ranged in 1911 between $.893 and $1.438, the passenger train revenue per train mile between $1.123 and $1.661, and the average number of passengers per train mile between 40 and 65. On fifteen of the largest systems east and south of Chicago the passenger revenue per train mile ranged between $.945 and $1.259, and the passenger train revenue per train mile between $1.122 and $1.581, while the average number of passengers per train mile was between 45 and 66.

In 1910, while the average operating revenue per train mile for all trains in the United States was $2.24, and the average freight revenue per train mile was $2.86, the average passenger service train revenue per train mile was but $1.30. The average operating expense for all trains, both freight and passenger, was $1.49 per train mile. It is very doubtful if the passenger train service ordinarily pays its share of operating expenses. It may occasionally earn operating expenses and contribute a little to interest, but usually it must contribute little or nothing to dividends. When it is considered how greatly speed increases expense and the risk of accident, the excessive competition in passenger service becomes a question of moment in a time of rapidly growing normal expenses.

NEW BOOKS.

Pennsylvania Railroad Company's New York Terminal. History of Engineering, Construction and Equipment. Edited by William Cooper. Published by Isaac H. Blanchard Company, New York. cloth, 9 in. x 11 in., 101 pages; profusely illustrated. Price, $2.

This is a carefully prepared history; brief yet quite full. The book contains pictures of all the scenes and of the principal men connected with the inception and construction of the station, tunnels, and yards, and the text consists mainly of monographs prepared by the architects and by the four engineers who were in immediate charge of the work. Some of this matter is made up from papers which the authors had presented before learned societies. The portraits of the principal men, from President Cassatt down through the engineers, contractors and others to the lower grades, are accompanied in many cases by biographical sketches. Following the text there are 30 pages of advertisements (by no means negligible) of the manufacturers and contractors who furnished the materials and did the work.

ACWORTH AND COOK ON A GOVERNMENT HOLDING COMPANY.

Interesting Discussion Concerning Some of the Problems of Managing a Railway System of a Quarter Million Miles.

The *Railway Age Gazette* in its issue of January 19, 1912, page 82, summarized and discussed an article by William W. Cook, general counsel of the Mackay Companies, in *McClure's Magazine* for January, in which Mr. Cook advocated the organization of a gigantic holding company, a return on the stock of which should be guaranteed by the government of the United States, the directors of which should be appointed by the government, and which should take over and operate all the railways of this country. Mr. Cook subsequently issued in the form of a pamphlet, entitled "Industrial Democracy or Monopoly," his article, the comment on it in the *Railway Age Gazette*, a letter from him to this paper, which we published on February 2, and an editorial reply to his letter which was published in the same issue. A copy of the pamphlet was sent to W. M. Acworth, the distinguished English railway authority, and this called forth an interesting exchange of letters between Mr. Acworth and Mr. Cook on the subject of railway control. Through the courtesy of both writers, we are enabled to present their highly interesting discussion.

MR. ACWORTH'S LETTER TO MR. COOK.

I have received, I presume through your courtesy, a copy of your pamphlet, "Industrial Democracy or Monopoly." I need hardly say that I have read it with great interest, and with the sincere respect naturally due to anything you may write on the subject. As you are good enough to refer to me in several passages as a person whose opinion is entitled to some respect, you will, I am sure, allow me to send you my ideas.

First, as to your reference to the recent Vice Regal Commission on Irish Railways, of which I was a member, I would call your attention to the fact that the majority report, from which alone you quote, was only signed by the smallest possible majority, four members out of seven. There were four members of the commission whose title to be upon it was their practical familiarity with railway questions: of those, three refused to sign the majority report. Without desiring in any way to reflect upon the three non-railway members of the commission, for all of whom personally I have the most sincere respect, I think I am entitled to say that the political rather than the purely railway aspect of the question was uppermost in their minds.

Now to come to your proposal itself. First and foremost, I cannot believe that its adoption is within the sphere of practical politics, *natura non facit saltum*. I am convinced that further railway legislation is not likely to depart in so revolutionary a manner as you propose from the lines hitherto followed. I cannot imagine hundreds of legislators and millions of voters ready to vote for so tremendous a leap in the dark. I am getting an old man and have learned by experience to expect that the unforeseen consequences of a new departure will be more important than the foreseen; so that my sympathies would be on the side of the average voter in his hesitation.

But, further, I cannot see that your scheme would work. It appears to me that an essential prerequisite would be the repeal of all existing railway restrictive legislation, and the abolition of state and interstate commissions. This I cannot imagine the public would stand. And, indeed, you appear to contemplate the continuance of at least the Interstate Commerce Commission, for you suggest its exercising certain powers. Now it seems to me unreasonable to suppose that men of the character of your proposed directors would give their lives to an extraordinarily difficult and invidious task if they were liable to be pulled up by the ill-informed politicians who form so large a proportion of the personnel of the state railway commissions.

Again, I do not see how you are to get and keep your ideal board of directors. I run over in my mind the names of half a dozen personal friends of my own, who I think ought to be on it. They are probably at present in receipt of salaries of $50,000 or $75,000 apiece. You could hardly expect them to accept the salary of a justice of the Supreme Court, while continuing to pay the existing scale of compensation to their own subordinates, the presidents of the controlled roads. Yet, I cannot imagine the American public paying the railway director five times the Supreme Court scale.

Nor can I understand how one board could really control. If they are to act as a board they must meet constantly in one place. That place must be, I presume, New York or Washington, and this seems to me to make it impossible for them to keep abreast of local conditions in Texas or California.[1] It seems to me that the theoretic arguments for local autonomy of railways in a country as large as the United States are just as strong as those for the co-existence of the state and federal governments.

I am unable to follow your financial calculations. Surely it is inconceivable that, even with a federal guarantee, 25 billions of stock could be sold at 3 per cent. Put it at 4 per cent. interest, and the margin for reduction of rates and improvement of facilities is enormously reduced. Moreover, I cannot think that shareholders would be willing to sell, or could equitably be forced to sell, on the basis of present prices. I have been a holder for many years of Pennsylvania common stock, and, if the United States government offered to give me $63 a share for my property, I should answer: "Certainly not. I have been content for many years with a moderate dividend. And out of revenue we have built up an undertaking whose road stands in the books at $120,000 a mile, whereas it is probably worth twice or thrice that figure to reproduce. Pay me the real value of what you take, and not the capitalized value of that portion of the real earnings of the property which we have chosen to divide year by year." I see no honest way of avoiding this claim. You have only to compare the price paid by the Swiss government for the Swiss railways, and still more recently by the French government for the Western of France, to see the wide discrepancy between expectations and actualities when a government comes to buy.

But, assuming, for the sake of argument, that there would be a large surplus, I do not envy the directors the task of disposing of it. On the one hand, why should the citizens of Pennsylvania send millions of surplus per annum to help reduce the railway rates in Oregon? On the other hand, how could a board representing the nation make special reductions of rates in Pennsylvania, and so still further increase the differential disadvantage of Oregon?

I must refrain from further discussion. I trust you will forgive the frankness with which I have spoken. I think we can both agree that the problem is one of quite first-rate importance, and that everything which will arouse public interest in its solution, and educate the man in the street to appreciate the importance of preventing fools rushing in with 2-cent fare proposals, is altogether to the good.

MR. COOK'S REPLY TO MR. ACWORTH.

I am glad, indeed, to know the first impressions which my proposal makes upon a conservative English mind, and inas-

[1]The directors of the Bank of England meet every week, and I believe one or two other directors on a rota are expected to be in daily attendance. And, I believe, directors, even if not on the rota, as a rule keep in almost daily personal touch with current business at the bank.

much as you ask me to forgive the frankness with which you write, I am sure you will give due consideration to my reply, especially as you raise serious objections to my plan to bring about a more equitable division of the profits of industry, especially of the railways. I would answer your objections as follows:

You refer to the fact that the politicians outvoted you on the subject of government ownership of the Irish railways in the Vice Regal Commission to which I referred in my article. That is exactly what the politicians will bring about here, unless we forestall government ownership by something better. You strengthen my argument. The politicians are too many for us. Moreover, judging from the present rapid progress of the German nation towards state socialism, it would seem as though we must work out some new form of industrialism or drift irresistibly towards the same state socialism. Old conditions are being rapidly outgrown. I gather from your writings that you think that government ownership of the railways is impending. Why not try to substitute some new form of control by investors?

You say my plan is revolutionary and a leap in the dark, and you think the public will not have it. That certainly is a severe indictment. But is it so revolutionary? The revolutionary program is government ownership, towards which you, yourself, in your writings say we are drifting. The maxim you quote that nature makes no leaps certainly does not apply to my proposal, inasmuch as I am merely applying to all the railways the holding company plan which at present they are applying among themselves. My plan is an evolution without a hiatus, much less a leap. It may be, as you say, that the millions of people in this country will not vote for it. But they may rather than have government ownership. The Americans are bold when convinced. The past 136 years have demonstrated that.

You do not think that the public would consent to abolish present state and interstate commissions. I did not suggest or intend abolishing them. The Interstate Commerce Commission and the state commissions under my plan would continue to supervise a very large amount of administrative detail business, but another large part of their present business would cease to arise by reason of unity of interests, especially as to regulating stock and bond issues, etc. The ill-informed politicians to whom you refer would be outranked by the board of directors of the national holding company.

You mention that the holding company directors would be men who at present are receiving $50,000 to $75,000 annual salaries, and that it would not do to pay them, as directors of my holding company, that salary as compared with what we pay our justices of the Supreme Court of the United States. The answer is that our justices of the Supreme Court bench are content, although any one of them could tomorrow by retiring to private practice get an income five or ten times as great as he is now receiving. Able and honest men in America take high and responsible governmental positions at a much less salary than they could earn in private life. It is entirely possible to obtain proper directors at a reasonable salary. The mere fact that these directors would be paying their subordinates (namely, the presidents of the railways) a higher salary than they themselves were getting would make no difference, just as it makes no difference that justices of our Supreme Court listen to the arguments of lawyers who are receiving five or ten times as much pay as the justices themselves. This alleged difficulty of getting 25 competent and honest Americans to act as directors is very much exaggerated. Naturally, the old regime thinks that its little group alone are capable of properly serving as directors of the railways. The court records and a recent congressional report show that the president of the First National Bank in New York City is a director in 57 corporations, having an aggregate capitalization of over five billions of dollars. If he is able to attend to the duties of 57 boards of directors, involving many and diverse kinds of business, including railways, why should not 90 millions of people be able to produce 25 directors who would devote their time to one board of directors, controlling but one line of business, namely, the railways? I have too much faith in my fellow countrymen to believe that it would be difficult to get 25 men who could run our railways fully as well as they are run now.

You point out that the board of directors would have to meet constantly in one place, probably New York or Washington, and this would keep them out of touch with local conditions throughout the United States. Are the present boards of directors of the railway companies in touch with local conditions? They are almost a humorous paragraph, except as to finances. They know nothing about the local conditions as a rule, except as the president and general manager inform them. Furthermore, I think you hardly caught the idea of the duties of my proposed board of directors of the holding company. Their chief duties would be to keep the proper officers and staff in charge of the different railway corporations. The latter would look after the railways and local conditions, the same as they do now. Furthermore, I believe that a body of men, controlling the whole field, would act more intelligently on the large questions of railway extensions, improvements and policy, by sitting in Washington, than the present boards of directors of railways do, who hold occasional meetings in New York. I agree with you that the local autonomy of railways in America is as important as the co-existence of state and federal governments. But where do we have any such local autonomy at present, so far as the boards of directors are concerned? The railways are now controlled in and about Wall street, as you know, and so far as the railway *staff* constitutes local autonomy, that would be preserved under my plan.

You mention that you are unable to follow my financial calculations, but apparently you refer only to the difficulty of selling $25,000,000,000 of 3 per cent. stock. You overlook the fact that only a very small part of this 25 billions of stock would be issued, under my plan, during the next few years, and the balance would be issued gradually thereafter. Furthermore, the holding company would not *have* to raise any particular amount at any particular time. Its action would be largely automatic in selling its stock and buying the railway stocks when opportunity occurred. There would be no necessity for quick or forced action. The fact also that the people parting with their present railway stock would have to invest the money in something else and would probably invest much of it in this government stock, and the fact that savings bank money and government post office deposits would flow largely into this government guaranteed 3 per cent. security, would justify, I think, a confident belief that the money would be forthcoming on a 3 per cent. basis.

Your argument that as a holder of Pennsylvania Railroad Company stock you should receive more than its present value ($126 for a double share) is an argument I can understand, but in which I cannot concur. I also am a stockholder in the Pennsylvania Railroad, and a very substantial one. I, with you, have been content for many years with the dividends paid, but I would not call them "moderate." I would call them a full, fair return on the money, and would consider that I have been properly treated, even if I sold my stock tomorrow at the market price. The income has been a very good one (about 5 per cent. on the average, besides "rights" on increased capital shares), in view of the high class of security accompanying it. If that stock were taken over by the government at present market prices why should we have something extra for the past earnings of the railway which have been put into improvements? The present market value of the stock represents not only the dividends but also the security of the investment, by reason of past profits used for improvements. A 6 per cent. stock does not sell in this country at 126, except for high safety, and that safety represents past profits invested in improvements, and hence if you should sell at 126 you would already be getting

the value of past profits invested in the plant. Furthermore, larger profits in the future will be due in large part at least to future good management of the property and increased population, general wealth and traffic of the country, and why should you and I be paid for them now in anticipation? We are entitled to an income on our investment and to the market value of the shares, but why should we expect an *increased* income so far as it comes from the work of others and from increased wealth, population and traffic? Have you and I earned it, or are we simply investors, doing nothing as to that particular railway to increase its traffic and profits? To my mind we should be content with the present good income from our past investment. Practically, however, whether we are content or not, I think it is all we shall get. Already the Pennsylvania Railroad has had to abandon its old policy of a dollar for improvements for every dollar paid in dividends. Increased expenses, increased terminals, public demands and Interstate Commerce Commission decisions render impossible, I think, any hope of more than 6 per cent. or 7 per cent. dividends on that stock, and yet I believe it the best railway stock of them all. Let us cherish no illusions or theories on that subject. Some day we may be glad to exchange our stock at 126 for a government guaranteed 3 per cent. stock at par, which would net us about 3¾ per cent. on our present investment and would be worth in the market as much as or more than our present Pennsylvania Railroad stock. I would gladly turn mine in tomorrow and avoid the nightmare of doubt, especially as I could get the principal at any time as easily as now.

Finally, you suggest, for example, that the citizens of Pennsylvania should not have their surplus railway earnings used to reduce rates in Oregon, and that the board of directors, which I suggest, could hardly reduce rates in Pennsylvania, thus increasing still more the differential disadvantages of Oregon, and you say you would not envy directors who were called upon to dispose of the large surplus earnings. The answer is that railway surpluses in America are like snakes in Ireland. They cannot be found. Substantial dividends are paid out by the railways with the one hand, while with the other hand hundreds of millions of dollars are taken in by the issue of new stock and bonds. If my plan were in force the policy pursued would be the plan now pursued by the Mackay companies, namely, the holding company would take only such money from the railway companies as would be needed to pay the 3 per cent. dividends on the holding company's stock, leaving the balance with each particular railway to meet its financial necessities. The saving worked out in my article would not appear in the way of distribution of surplus, but would appear in the way of decreased applications for fresh money. This question of differentials would be left where it is now, namely, with the railways, subject to regulation by the Interstate Commerce Commission, and we would be spared the present interminable litigation over the decisions of the commission. Moreover, government ownership would be faced with the same problem, and have you considered that New York does not complain that its two-cent local postage produces a large surplus that enables Oregon to have cheap postage?

In closing I wish to say that I am not at all insistent on the merits of my particular proposal. But the trouble is that no one else is proposing anything else. The old regime seems to think it sufficient to resist stubbornly and believes stupidly that present conditions can continue indefinitely. This does not apply to you, because your writings show that you see government ownership looming up in the near future. To my mind the undercurrents are changing rapidly. Unless something is done to interest the masses in the preservation of the institution of private property we shall go to state socialism. I believe that my proposal will avoid this. I believe—

First, that the present mode of industrial organization is being outgrown and will be discarded.

Second, that nothing has been proposed in lieu thereof, except state socialism.

Third, that it is possible by utilizing the corporate form of organization, with a government guaranty of dividends, to interest the masses in the railways and all other great industries, thus avoiding government ownership and state socialism, and at the same time bringing about a more equitable division of the profits of industry, especially of the railways.

THE UTILITY OF FLUE GAS ANALYSES IN LOCOMOTIVE TESTING.

BY LAWFORD H. FRY.

During the year 1907 the Carnegie Institution of Washington, published a report on High Steam Pressures in Locomotive Service; in 1910 it issued a report on Superheated Steam in Locomotive Service. Both of these were studies by Dr. W. F. M. Goss of elaborate series of tests made by him on the locomotive testing plant at Purdue University. All of the tests were made on the same locomotive, but the boiler delivered saturated steam for the first series of tests and superheated steam for the second, the boiler being changed to include a Cole superheater. The total heating surface of the boiler in the first case was 1,322 sq. ft., and by the addition of the superheater the evaporating surface was reduced 299 sq. ft., while 193 sq. ft. of superheating surface were added, making a total heating surface of 1,216 sq. ft., with a net reduction of 106 sq. ft., or 8 per cent. of the original surface.

As the superheater boiler has less heating surface, and as the coolest part of the superheater surface is necessarily at a higher temperature than the coolest part of the original boiler heating surface, it would be expected that the superheater boiler would be the least efficient. As a matter of fact, when comparing the results obtained, Dr. Goss says: (Superheated Steam in Locomotive Service, page 75):

"The boiler designed for delivering saturated steam gave an efficiency expressed by the equation:

$$E = 11.305 - 0.221\ H \quad \ldots\ldots (1)$$

while the boiler equipped with the Cole superheater gave an efficiency expressed by the equation:

$$E = 11.706 - 0.214\ H \quad \ldots\ldots (2)$$

E is the equivalent evaporation from and at 212 deg. F. per pound of dry coal, and H the equivalent evaporation per hour per square foot of total heating surface, including superheater surface where this occurs.

"Obviously, on the basis of these equations, the superheating boiler has the advantage."

As the equations are not strictly comparable on account of the different amounts of heating surface in the two boilers, a comparison was made, as in Fig. 1, on the basis of total power

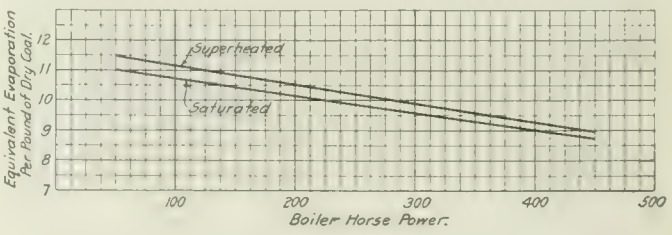


Fig. 1—Boiler Efficiency Curves.

delivered by the boiler, and commenting on this, Dr. Goss said: "It will be seen that even upon this basis the efficiency of the combined boiler and superheater is superior to the boiler alone, the increase averaging between three and four per cent. The reason for this is not entirely apparent. An examination of related data suggests that the lines of the figure should not be far apart. Draft values . . . reduced to equivalent values representing equal . . . power output . . . are identical for both locomotives"—indicating equality for both in the amount of coal lost in the form of cinders and sparks. "Similar comparisons involving smokebox temperature lead to identical conclusions. Upon the basis of these statements the relation defined by Fig. 1 is not confirmed by collateral evidence."

Before using the flue gas analyses to elucidate these tests, our

first task is to remove the conflict of evidence between the measurements of the boiler efficiency and those of smokebox temperature and draft. To this end Fig. 2 has been drawn, the

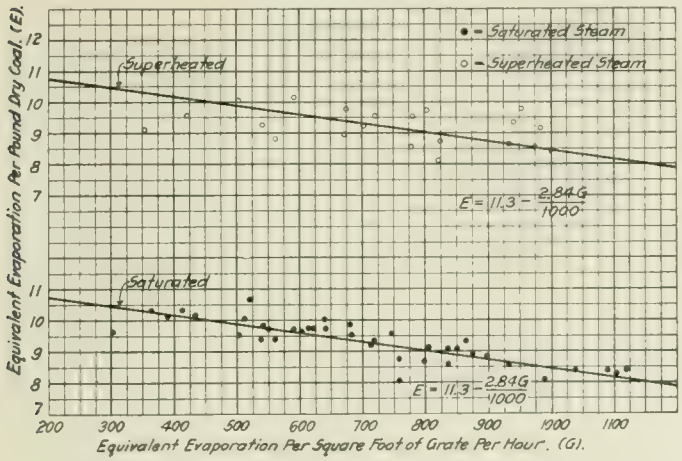


Fig. 2—Boiler Efficiency in Relation to Rate of Working.

equivalent evaporation per pound of coal being plotted in relation to the equivalent evaporation per square foot of grate surface per hour. The results for the superheater boiler are shown in the upper part and those for the saturated boiler in the lower part of the diagram. The lines in both cases correspond exactly to equation (1) proposed by Dr. Goss, and apparently this same equation applies with equal accuracy to both types of boiler. It seems that Dr. Goss's choice of the higher value for the efficiency of the superheater boiler, as given by equation (2), was due to his having neglected some of the superheater tests which showed low boiler efficiencies.

By adopting the same line as representative of the boiler efficiency in both boilers, we follow a course which is supported by the evidence obtained from the smokebox temperatures, etc. It still remains to be seen how, in comparison with the saturated steam boiler, the superheater boiler with eight per cent. less surface can show an equal boiler efficiency. The difference might be due to the superheater surface being more efficient than the tube surface it replaces, but in view of the higher temperature of the steam to which the heat is transferred this appears unlikely, and as will be shown the results of an analysis of the conditions of combustion and heat absorption offer a simpler explanation. Before describing the results, the method of analysis developed by the writer will be described in outline, a detailed description of the various calculations being reserved for a later article.

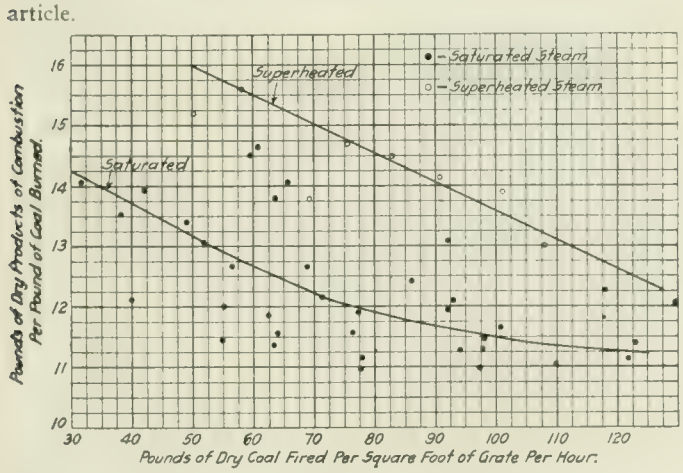


Fig. 3—Weight of Dry Products of Combustion for Different Rates of Combustion.

The starting point is the flue gas analysis, and the first step is the determination, from this analysis, of the weight of the dry products of combustion. These weights for the tests now under consideration are given in Fig. 3. Taken in conjunction with the smoke-box temperatures which are plotted in Fig. 4, and which, as stated by Dr. Goss, are practically identical in both boilers, the weight of the products of combustion enables us to calculate the

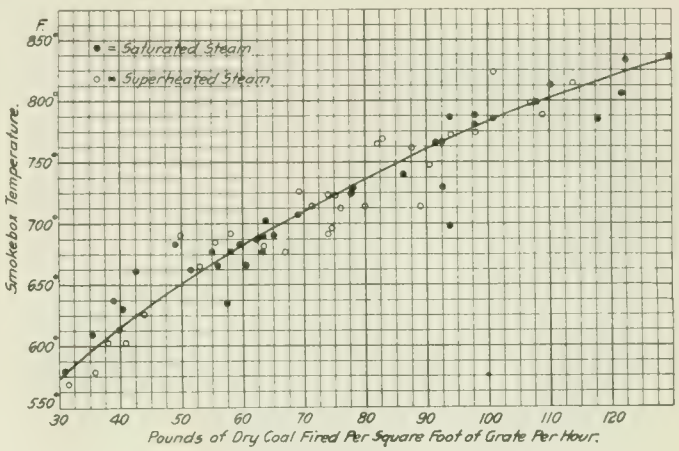


Fig. 4—Smoke-box Temperature for Different Rates of Combustion.

amount of heat carried out of the boiler by the smoke-box gases. Take a particular case and suppose that for every pound of coal burned 16 lbs. of gases escape at 700 deg. F. Then, if the air admitted to the furnace has a temperature of 70 deg. F., the loss of heat in the dry gases, since their specific heat at smokebox temperature is about 0.24, will be $0.24 \times 16 \times (700\text{-}70) = 2{,}420$ B. t. u.. If the water vapor produced by combustion carries another 480 B. t. u., the total loss in the smoke-box gases will be $2{,}420 + 480 = 2{,}900$ B. t. u. per pound of coal burned, and if the coal contains 14,500 B. t. u. per pound, this is 20 per cent. of its heating value.

That is to say, under the conditions assumed, each pound of coal actually burned in the firebox produces 14,500 B. t. u., and of this heat 2,900 B. t. u., or 20 per cent., is carried off by the smoke-box gases. The remaining 80 per cent. of the heat produced must be taken up by the boiler heating surface. This 80 per cent. measures the efficiency of the heating surface, or the efficiency of absorption of the heat produced. It is not identical with the boiler efficiency, because some of the coal fired escapes unburned, and hence the heat produced by the coal actually burned is less than the heat in the coal fired.

We cannot measure directly the amount of heat produced, but the author's method of calculation gives a simple method of determining this, and consequently the efficiency of combustion, by measuring the heat in the coal fired and the amount of heat absorbed by the boiler, the latter including the heat used in evaporation and that lost by external radiation. If, in the case under consideration, we find a boiler efficiency of 65 per cent., that is, that 65 per cent. of the heat in the coal fired is used in producing steam, about 3.0 per cent. additional will be lost by external radiation, so that 68 per cent. of the heat in the coal fired is absorbed by the boiler. But it has been seen that the heat absorbed is 80 per cent. of the heat produced, hence 68 per cent. of the heat of the coal fired is equal to 80 per cent. of the heat produced, from which we find that the heat produced is 85 per cent. of the heat in the coal fired.

It should be noted that the simple and direct calculation described above enables a heat balance to be established without it being necessary to measure the coal lost as sparks and cinders. In the foregoing example 85 per cent. of the heat in the coal fired is produced in the firebox, so that the remaining 15 per cent. is lost by incomplete combustion. The heat balance will then run

Heat used in producing steam	65 per cent.
Heat lost by external radiation	3 per cent.
Heat lost by temperature of smoke-box gases (20 per cent. of 85)	17 per cent.
Heat lost by incomplete combustion	15 per cent.
Total heat in coal fired	100 per cent.

The losses by incomplete combustion calculated by this method

from the data of the Purdue tests agree closely with the losses as actually determined in the tests by measurement of the sparks, cinders, etc.

To apply this to the elucidation of the meaning of the Purdue

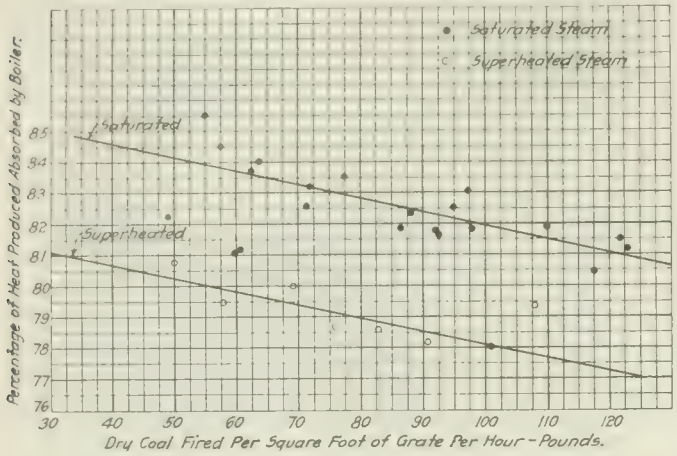


Fig. 5—Efficiency of Heat Absorption.

tests, Fig. 5, was plotted to show the efficiency of absorption of the boilers. That is, the percentage of the heat produced which is taken up by the boiler is shown in relation to the rate of working of the boiler. From the efficiencies of absorption heat balances have been calculated and are represented in Fig. 6. The

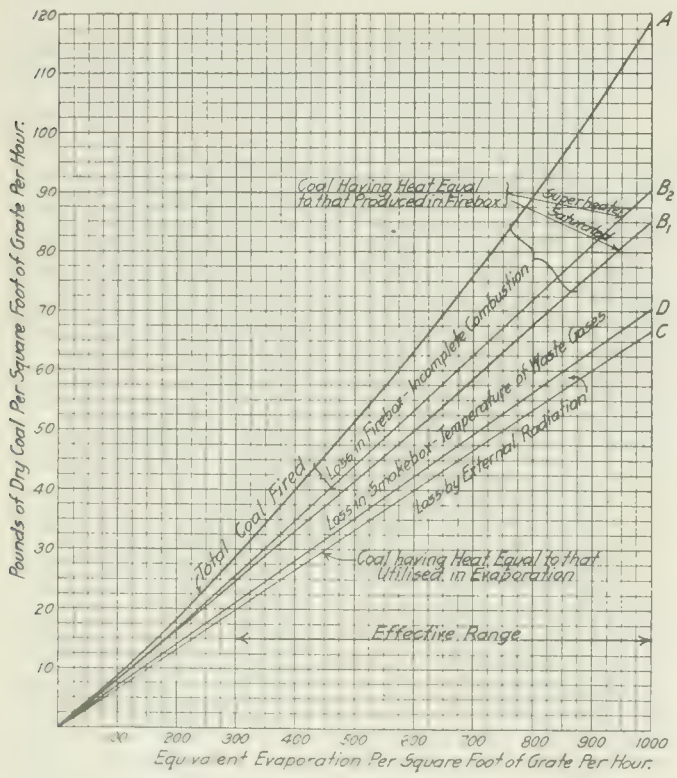


Fig. 6—Diagram Showing the Distribution of the Heat from the Coal Fired.

horizontal scale in this diagram indicates the output of the boiler in terms of the rate of equivalent evaporation, that is, in pounds of water from and at 212 deg. F. per hour per square foot of grate area. The vertical scale measures heating value in terms of pounds of coal, each pound having a heating value of 14,500 B. t. u. The upper curve *A* shows the total amount of coal fired per square foot of grate per hour. Since both boilers have the same efficiency, the same amount of coal must be fired in either boiler to produce a given evaporation. A single curve *A* serves therefore, for both boilers. The lowest line *C* shows, by its distance above the horizontal base line, the amount of coal having a heating value equal to the amount of heat employed in producing the steam. As each pound of water evaporated from and at 212 deg. F. requires 966 B. t. u., and as each pound of coal contains 14,500 B. t. u., the heat of one pound of coal will be equivalent to the evaporation of 15 lbs. of water, and consequently *C* is a straight line rising one unit (one pound of coal) on the vertical scale for each 15 units (pounds of water) advance along the horizontal. The line *D* is drawn 5 per cent. higher than *C*, the distance between them representing the amount of heat lost by external radiation and leakage. Then the distance of *D* from the horizontal base line measures the total heat taken up by the boiler. The lines in Fig. 5 show what percentage this is of the heat actually produced in the firebox, and it is therefore a simple matter to determine the position of the curves B_1 and B_2, which, by their distance from the horizontal, mark respectively for the saturated and for the superheated steam boilers, the amount of heat actually produced in the firebox. Then obviously the distance between *B* and *A* on any vertical must measure for that rate of evaporation, the amount of coal the heating value of which is lost unburned from the firebox, and similarly the distance between *B* and *D* must measure the amount of coal, the heating value of which is equal to the loss in the smokebox by reason of the temperature of the smoke-box gases.

Now it is clear from Fig. 3 that at any given rate of evaporation the boiler with the superheater takes more air through the fire and it is in consequence of this that, as shown in Fig. 6, the combustion is more efficient than in the saturated steam boiler. The same amount of coal is fired, but the larger air supply enables more coal to be effectively burned, and thus more heat is produced.

This heat is, however, less efficiently absorbed, owing to the smaller heating surface of the superheater boiler, and though more heat is produced, only the same quantity is absorbed and utilized in the steam production. It is probably merely by chance that the gain in efficiency of combustion so nearly offsets the loss in the efficiency of absorption. Further, and most important, if the smokebox arrangement of the saturated steam boiler could have been improved so as to take as much air for a given rate of evaporation as the superheater boiler did, the efficiency of combustion would have been improved and the over-all boiler efficiency would have been higher than that of the boiler with the superheater.

Herein lies the value of the flue gas analyses. They enable the boiler efficiency to be divided into its component parts—efficiency of combustion, and efficiency of heat absorption. It will in general be found that the efficiency of absorption varies only slightly; in the present case it is between about 81 and 85 per cent. in the saturated steam boiler and between 78 and 81 per cent. in the superheater boilers throughout the range of tests. On the other hand the efficiency of combustion shows considerable variations, decreasing rapidly as the output of the boiler is increased. It is desirable when testing a locomotive to see whether abnormalities in the action of the boiler are due to defects in the efficiency of combustion or in the efficiency of absorption. The former is the more sensitive and usually offers opportunities for improvement. Information on this point can only be obtained by knowing the amount of air passing through the fire, and for this flue gas analyses are necessary.

The projected line from Beira, South Africa, to the Zambesi river, which is known as the Sena railway, has been in contemplation for a number of years, and the construction may be begun this year. This line, which will eventually link up with the railway in Nyasaland, would be of great benefit to the port of Beira, as well as to the territory of the Mozambique Company. Such a railway would open up the rich country between the Buzi river and the Zambesi river, besides affording Nyasaland an easy communication with an excellent harbor.

FUNDAMENTAL PRINCIPLES OF RAILWAY STOREKEEPING.

An Argument for departmental organization; the Storehouse a "Storage Battery Floating on the Power Line."

BY GEORGE G. YEOMANS.

There are in reality only two ways in which the materials belonging to a railway can be handled and accounted for with any degree of success.

First, where each department has exclusive jurisdiction and control of the material which it requires for its own use.

Second, where one department has absolute and complete control of all material belonging to the company that is not in actual use—whatever its nature or wherever it is located.

Any attempted modification or commingling of these two methods is at best a makeshift, and like all half-way measures, is always ineffective and uneconomical.

The first of these two methods is the one originally adopted by the railways, and was in reality a natural consequence of existing conditions. Instead of being the result of any well-defined plan, it "just growed." It answered all purposes when the railways were small and compact properties, whose entire operations could easily be supervised in detail by a few individuals, and when their investment in material could be designated in thousands, instead of millions.

More than thirty years ago, as the railways began to expand more rapidly, they recognized the defects of this system as applied to the purchasing of the material which they used, and they began to concentrate the function of buying in the hands of one individual. The advantages of this arrangement have gradually made themselves so apparent that more and more authority has continued to be placed in the hands of the purchasing agent, and on many of the larger railroads he has become an officer of considerable importance.

Just why the railway executives should recognize the importance of this principle as applied to the mere buying of material and then fail to apply the same principle to the more important features of caring for and disbursing the material after it belongs to them, is difficult to understand, although one explanation may be found in the fact that the duty of looking after material was originally conceived to be the duty of a servant. Neither physical nor mental qualifications were thought to be required in a man who only "looked after material." If he was fit for efficient work in the office or on the road, at the bench or on the track, that was where he belonged; not in the storehouse.

To this fact also is due the idea, which is still prevalent to a large extent, that the work of caring for and disbursing material can be properly performed by low-priced labor, and that less ability is needed for work of that character than is required in the successful management of the other departments.

In turn, this idea has reacted on the service, and is largely responsible for the unsatisfactory results which a majority of railroad executives are conscious of but seem to be at a loss to correct.

It requires as much brains and ability properly to provide, care for and disburse material on a division as it does to properly perform the duties of chief clerk to a division superintendent or master mechanic, and this fact must be recognized and accepted if increased efficiency is to be obtained in the handling of supplies.

This same idea has also led to a very general misconception, on the theory that those in actual charge of any work involving the use of material can best determine the kind, quality and amount of material necessary, as well as when and how it can best be used. This theory is absolutely correct, but it does not follow that they can also determine how it can best be procured or most advantageously supplied. As a matter of fact, they can not do this so well as the man whose time and attention is given to that one duty. It is this misconception, however, that has led many to the conclusion that the head of each department must *control* the material pertaining to his particular work, either independently or through the medium of a powerless storekeeper, and it is this conclusion that has been largely responsible for the indifferent accounting, excessive stocks and waste of material of which executive officers so frequently and justly complain.

In this way "storekeeping" came to be a despised occupation. It is not greatly to the credit of railway executives that the storekeeper has remained a neglected nonentity for so many years. The need for improvement in respect to all matters pertaining to material has been vaguely felt for a long time, but owing to the low type of intellect that had been employed in the practical work of handling material, there has been no one to offer any valuable suggestions from that important standpoint. On the other hand, there has been no lack of officials, who had never done a day's work in a storehouse or who perhaps had never seen one, but who were ready with theories and advice as to how material should be handled and accounted for.

The demand for improvement became so urgent that frequently the most ridiculous ideas were eagerly seized upon and put into effect, abandoned, and some other equally unpractical methods substituted, and still the hoped-for improvement failed to materialize.

Finally, the fact that there had been a great improvement in the purchasing of material began to dawn on the railway managers. With strange perversity, they ascribed this improvement to the man, and not to the method. They reasoned that he ought to know something about the distribuion and use of material, because he knew what it cost, and, therefore, decided that the way to get the results they were after was to put the purchasing agent in charge of the custody and disbursement of the material.

The purchasing of material is an important detail in the procuring and handling of supplies on a large railway, but it is only a detail. It does not even involve "procuring" material in its broadest sense.

The most important matter in connection with anything is not the *getting* of it, but the care taken of it and the use made of it after it is acquired. In an efficient organization, therefore, the chief supply officer should have the purchasing agent as a member of his staff, to assist in providing the material which he must procure.

"Procuring" material, in its proper sense, involves the originating of the requisitions on which the purchasing agent acts, as well as the control of internal sources of supply maintained and operated by the company, either directly or through the agency of officials of the other departments.

A second member of his staff should be an officer in general charge of the custody and disbursement of material, and this branch of the organization should be developed in the manner best suited to meet the local requirements of the service.

The authority of the chief supply officer should be absolute with respect to the procuring, custody and disbursement of all material used by the company, and his responsibility should be co-extensive with his authority. His jurisdiction and that of his staff should extend to all material of whatever nature, or wherever located, that is not in actual use.

A properly organized supply department must of necessity be departmental in character in order to obtain the greatest efficiency. It is the only branch of the operating service which is not susceptible of divisional organization without serious impairment of its effectiveness. This is because the department has really only one function—the economical handling of supplies, embracing the providing, distributing and conserving of material.

The activities of all of the other operating departments may properly have a beginning and an ending on the operating division with the exception, perhaps, of some of their minor func-

tions; such, for instance, as the function of the mechanical and maintenance of way departments of establishing and maintaining standards on all divisions, which is a departmental and not a divisional function. Such, also, is that important function of the transportation department which deals with the distribution of equipment.

The efficiency of the railway as a means of transportation would be at least partly destroyed if the authority of the superintendent of transportation was confined to the limits of an operating division with respect to the distribution of equipment. So it is with the distribution of material, which is, perhaps, the main function of the supply department, and certainly the most important one with respect to the efficiency of the railway as an operating entity. It is only by means of such an organization that the chief supply officer can intelligently control and regulate the amount of material carried in stock, and on this regulation depends his success or failure.

The cost to the company of delays to the normal progress of any work through lack of the proper material with which to carry it forward without interruption, or the necessity of employing makeshifts, or of temporarily transferring its forces to some other location, can not be calculated. On the other hand, the effect of an excessive stock of material on operating expenses can not be reckoned in terms of interest on the investment. In addition, there are the costs of transporting the unnecessary material over longer or shorter distances; the labor of handling it at the storage points; the loss through depreciation, and obsolescence of unused material; taxes; insurance; and, finally, the more fasteful use of material because of its abundance.

The amount and kind of material that must necessarily be carried in stock depends solely upon the amount and kind of material that is actually used in any given period, and it can depend on nothing else. It, therefore, becomes a prime necessity to the chief supply officer to have an accurate knowledge of the current consumption of material, and to that end the accounting methods must be as correct, simple and concise as possible. The exact facts must be set forth. There must be no self-deception through any effort to show efficient performance on paper, or to make an individual record at the expense of the company; conditions which may be said to exist on many railways today.

A properly classified stock account is indispensable as a foundation for such accounting, and in the interests of uniformity in such matters among different companies, the general form recommended by the Railway Storekeepers' Association, modified in details to suit individual preferences, so long as the underlying principle is maintained, may be used to advantage.

The actual consumption of each class of material should be closely studied each month, and upon the information so obtained, in connection with constant consultation with the heads of departments in regard to work in contemplation or proposed changes in current operations, the chief supply officer can so regulate his stock of material as to meet the requirements of the service without an excessive reserve.

A prevailing misconception of the true function of a stock of material in its relation to current operations is that the storehouse acts as a reservoir into which the material is poured and from which it is drawn off as needed for use, or that, like a storage battery, it is charged during a certain period in order to be discharged later at a point remote from the source of current. It is this misconception which is at the bottom of the unnecessarily large accumulation of material found on so many railways, and which forms a source of so much expense to the company and so much anxiety to the managing officials.

As a matter of fact, on every railway large amounts of material are being received each day, and with a well organized supply department it is coming in as nearly as possible in conformity to the requirements of the work, and moving forward to the place where it is needed.

In any sufficiently long period—a year, for instance—there is as much material received as is used. It cannot be otherwise. More may be received than is used; but never less.

The ideal condition would be to receive each month just the kind and quantity of material required for that month and pass it directly to the spot where it is needed, without delay. In such a condition, no stock of material would be required. Because such a condition is impossible, a stock becomes necessary, to provide against contingencies which may arise, and prevent delays to the work through the temporary failure of material to arrive when it is expected.

It is evident, therefore, that instead of acting as a reservoir, the storehouse is in reality a standpipe, taking up inequalities, regulating the pressure on the flow of material from the factories and mills to the work, and keeping the stream constant and effective; or, to revert to the other simile, it is a storage battery floating on the power line, receiving a portion of the current in times of minimum stress in order to help carry the peak load when it develops. The necessity, therefore, for a stock of material sufficient in itself to supply the entire requirements for any given period, is problematical, to say the least.

The assertion that the supply department of a given road is being operated on one month's, two months', or three months' supply, is frequently heard; but beyond forming a basis for computation or comparison, it means nothing with respect to efficiency.

When this true relation of the stock of material to current operations is once clearly understood by all concerned, the fear that the railway may have to suspend operations unless it has in reserve a sufficient amount of all kinds of material to run it for two, four, or six months, will be dispelled, and to this fear on the part of both managers and subordinates is due a much larger investment in material than is at all necessary.

The principles involved in the successful handling of railway material may, then, be summed up as follows:

1. The concentration of all authority and all responsibility with reference to all material of every description that is not in actual use, in the hands of a single department which should have no other duties to perform, and whose only interest should lie in properly providing for the wants of the other departments, and in carefully guarding and accounting for the material entrusted to it.

2. The employment generally of higher grade and more capable men in charge of division storehouses than are ordinarily found in such positions at present.

3. The simplification of accounting methods and the retention of all material in the stock account until it is actually used, in order to remove the temptation of making a record for the department at the expense of the company; to avoid duplication of work, and minimize the chance for error. The adoption of a classified stock report in the interest of accuracy and uniformity and as a basis for determining the amount of stock that is necessary to carry on hand.

4. The intelligent regulation of the stock of material on the basis of actual consumption, instead of on the estimates of various officials as to the amount which they consider necessary or on any theory as to the quantity that should be carried in reserve.

The supreme test of the efficiency of such a department is its ability to procure and deliver to those engaged in the manifold operations of the railway, all of the necessary material as, and when, it is required for use, so that there shall be no delay to the normal progress of the work through lack of the proper material with which to carry it on; and the most successful supply officer is the one who, by close and intelligent supervision, so regulates his stock of material as to meet this test with the lowest percentage of fixed investment and the smallest operating costs per unit of material handled.

The construction work on the Transcaucasian Railway, Russia, will be begun immediately, and will be pushed forward rapidly at the expense of the government. This railway will shorten the journey between Tiflis and central Russia by 576 miles. It will also simplify communication between Persia and Turkish Asia.

COMMERCE, THE COMMISSION AND THE COURTS.*

BY LOGAN G. M'PHERSON,
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When the railways came into existence they were as a matter of course subject to the existing law. A most important part of the common law is that which relates to property, the rights to property, the conditions under which property may be held and transferred. The right to the use and enjoyment of property lawfully held is one of the fundamental rights guaranteed to the American citizen by the Constitution of the United States and the law of the land. The railways in the United States are private property and as such those who hold title to them are entitled to their use as property and are entitled to be protected in that use by the law and the government.

It is also true that the railways are "affected with a public use." It is because of the public nature of their services that the railways were accorded the power of eminent domain which almost continuously has been referred to as the reason that they should be subject to public regulation. It ought to be recognized, however, that the real basis for this regulation is the economic power of the railways, which was not foreseen when the original charters were granted. The distinction between the private rights and the public obligations of a railway have not even yet been definitely and finally determined.

So recently as October, 1876, the Supreme Court of the United States in Lake Superior & Mississippi Railroad Company vs. United States; and Atchison, Topeka & Santa Fe Railroad Company vs. United States (United States Reports, Supreme Court, Volume 93, p. 442), held that the act of Congress providing that a railway shall be "a public highway for the use of the nation of the United States, free from all toll or other charges, for the transportation of any property or troops of the United States," decrees to the government the free use of the road only and not of the rolling stock or other personal property of the company. Still later—October 2, 1883—it is declared in a Pennsylvania case (Pierce vs. Commonwealth, 104 Pa., 150, 155, 13 Am. & Eng. Cas., 74, 79, per Gordon, J.,) citing Presbyterian Society vs. Auburn & Rochester Railroad Company, 3 Hill (N. Y.) that

> "A railway company is not public, nor does it stand in the place of the public; it is but a private corporation over whose rails the public may travel if it chooses to ride in its cars. Indeed, we regard it as a misnomer to attach even the name 'quasi-public corporation' to a railway company, for it has none of the features of such corporations, if we except its qualified right of eminent domain, and this is because of the right reserved in the public to use its way for travel and transportation. Its officers are not public officers, and its business transactions are as private as those of a banking house. Its road may be called a quasi-public highway, but the company itself is a private corporation and nothing more."

The railways of the United States were regarded as private property subject to the law of the common carrier, and they were so administered as private property. In the sale of transportation they resorted to practices that are still common among those engaged in other branches of commerce. They adjusted rates to market, to competition, to the pressure of shrewd and effective buyers just as the manufacturer or the wholesale merchant still adjusts his prices to markets, to competition, to the pressure of shrewd and effective buyers. The railways gave rebates and cut rates as manufacturers and merchants still give rebates and cut prices. They charged less to and from places where there was effective competition just as manufacturers and merchants still charge less for their goods where there is effective competition than where such competition does not exist.

As producers and distributors strove to extend the area of their markets and competition reduced their margins of profit the railway rate, especially that applied to the coarser and heavier staples of commerce, became more and more a factor in determining what markets the various producers and distributors could enter. As industry and commerce developed, complaints increased of discrimination made by the railways between persons, between localities, and between commodities. These complaints in various cases were more or less well founded, but the truth is that they arose in the main from that process of adjustment entailed by the extension and ramifications of the channels of trade, an adjustment which is still in process. There was discomfiture because of the loss of large amounts that had been invested in railway construction, and there was bitterness of feeling, frequently justified, against promoters, speculators, and manipulators. The agitation led to the enactment of the Interstate Commerce Act in 1887, the first measure of federal regulation, and which was based on that clause of the constitution authorizing congress to regulate commerce among the states. The intent of that act was simply to apply by federal statute to interstate commerce the principles of the common law which applied in the separate states, and which there applied to both interstate and intrastate commerce; to abolish rebates, secretly cut rates, and other stealthy devices for securing traffic; to prohibit unjust discrimination between persons, places and commodities.

The Interstate Commerce Commission has stated that it could not undertake to equalize the natural disadvantages of shippers and of communities. However, a member of the commission once said that it had been established to protect the people against the railways. Although it is coming more and more to recognize that its duty is that of an arbiter between the shippers and the railways, there is hardly any doubt that the vast majority of the people regard it as an institution created primarily to curb the railways. It is sometimes claimed that the railways are monopolies and as such that their rates should be controlled by a body acting on behalf of the public. That the railways should be prevented by public authority from charging excessive and extortionate rates is not to be denied. To but a partial extent, however, are they a monopoly, and the phase of monopoly seldom enters into the complaints that are brought before the commission. Nearly all of these complaints, especially those of importance, are of rates originally made by the railways and usually under stress of competition, but which do not satisfy all of the shippers.

CONFLICT BETWEEN COMMISSION AND COURTS.

Under the constitution and the law of this land, the ultimate determination of a question involving a property right rests with the courts.

When the Interstate Commerce Commission was established there began the so-called conflict between the commission and the courts. Many of the early decisions of the Interstate Commerce Commission were resisted by the railways and many of these decisions were overruled by the United States Supreme Court. As an advocate of the people it was not unnatural for the commission to fall into errors in the capacity of an arbiter between the people and the railways, even to make mistakes in the law; not because of any lack of ability or honesty on the part of the commission, but because the inability on the part of an advocate to see both sides of the question is a trait of human nature. The railway managers, not without sanction from the courts, as evidenced by the decisions which have been quoted, had a conception of their rights upon which the Interstate Commerce Commission seemed to encroach. Although the railways obeyed 90 per cent. of the formal orders made by the commission, they steadily resisted its encroachments, while the members of the commission, not satisfied with the measure of their authority, as steadily pressed for an increase of power. The commission's zeal in advocacy and the natural human resentment of interference led it to be exceedingly unfriendly to judicial control. The early annual reports of the commission contained numerous criticisms of the courts, even of the supreme court and many of them most severe. This use by the commission of its annual report as an organ of public criticism of the courts has continued

*A lecture delivered under the auspices of the College of Arts and Sciences at Cornell University, May 13, 1912.

to the present although the courts by the nature of their functions are prohibited from making reply to such criticism or engaging in public discussion of the cases that come before them.

Public sentiment, almost invariably against the railways, led to the enactment of the further federal legislation which has given the Interstate Commerce Commission enlarged power over the interstate railways of the country. It has prescribed the system of accounts to be used by the railways, the standard of safety appliances, rules for demurrage, for this, that and the other thing. The railways unquestionably have been forced to do things that they ought to have done of their own volition, but which were not done sometimes for lack of funds, sometimes for lack of foresight, and sometimes because of lack of accord between the administrators of various roads. The drastic features of some enactments would have been avoided had railway managers always exercised the spirit of forbearance and compromise.

In accordance with their importance, cases in the ordinary course of litigation may be appealed from a lower to a higher court, and most cases of federal concern may be appealed ultimately to the Supreme Court of the United States.

The expression "appeal" is used when a case is taken from a lower court to a higher court. The Interstate Commerce Commission is not a court, but none the less its decisions affect the rights of property, and therefore a party thereto cannot be debarred from having such a decision passed upon ultimately by the courts. The constitution provides, however, that except in a few classes of cases of peculiar nature a cause cannot be heard first in the Supreme Court. It must come to it on appeal from a lower court.

As the Interstate Commerce Commission is not a court, the taking of one of its decisions into a court is not designated as an appeal; the case is taken from the commission to the court for "review" by the court. It was originally provided in the interstate commerce law that the decisions of the commission should be subject to review by the United States circuit courts. Appeal would lie from the United States circuit court to the United States Supreme Court.

There have been those who would deny to the courts the right to review the decisions of the commission. Although this right of review was discussed in congress during the debate on the Hepburn bill, it is obvious that it cannot be denied.

It has been enacted that the courts have no jurisdiction to review the wisdom or expediency of the views or action of the commission within the limits of its administrative function. However, the Supreme Court has said:

> [illegible] sion shall be sustained or set aside, we must consider (a) All relevant questions of constitutional power or right; (b) All pertinent questions as to whether the administrative order is within the scope of the delegated authority, under which it purports to have been made; and (c) A proposition which we state independently, although in its essence it may be contained in the previous ones, viz., whether even although the order be in form within the delegated power, nevertheless it must be treated as not embraced therein, because the exertion of authority which is questioned has been manifested in such an unreasonable manner as to cause it in truth to be within the elementary rule that the substance, and not the shadow determines the validity of the exercise of the power."

To expedite the trial of cases brought into the United States circuit court after decision by the Interstate Commerce Commission; in order that such cases might have the consideration of a court that should gain increasing experience with the problems of traffic and in the application of the law as related to them, the congress established the Commerce Court to review cases brought from the Interstate Commerce Commission.

THE COMMISSION AND THE COMMERCE COURT.

As the Commerce Court which has no powers other than those formerly possessed by the United States circuit court, and whose judges rank as did the judges of the United States circuit court, has been made the court in which reviews of the decisions of the Interstate Commerce Commission are concentrated, it follows that the long continued conflict between the Interstate Commerce Commission and the courts has now become primarily a conflict between the Interstate Commerce Commission and the Commerce Court.

The Commerce Court has probably rendered no greater proportion of decisions adverse to the commission than have the circuit courts or the supreme court if there be taken the entire record from the organization of the commission. It must be borne in mind that ordinarily the orders of the commission are complied with. It is only when the counsel for the railway companies feel satisfied that they can clearly demonstrate error on the part of the commission that they take a case to court. Therefore, it may not be a cause of surprise that in a considerable number of these cases, which involve but a very small proportion of the orders of the commission, the court should find that the commission had committed errors that invalidated its orders. This is only to be expected because of that human fallibility from which members of the interstate commission are not exempt.

The crucial point is whether the court can determine no more than that the decisions of the commission have been or have not been within the statutes which specify its authority and therefore is prohibited from examining the questions of fact on which the commission has based its decisions; or whether the court to ascertain whether the authority of the commission has been manifested in a reasonable manner is entitled to make its own examination of the facts. The decision of the United States Supreme Court upon this point is now being awaited.

Certain differences in the point of view of the Interstate Commerce Commission and that of the Commerce Court may be brought out by a brief survey of a few of the decisions of the commission which have not been sustained by the court.

It is the practice of the railways to build or to permit to be built from their tracks to a large commercial or industrial plant what is known as an industrial track, or sometimes colloquially as a private siding. Over such a track freight cars are moved by the railway to the industrial or commercial plant into whose receptacles their contents are directly unloaded, the time and expense of conveyance from the railway station by dray or truck thereby being saved. In the more densely settled east it has become customary by reason of competition and other causes that in most of the larger cities the railway hauls the cars over the private siding to the plant of the consignee, and takes cars from the plant of the consignee to its own track without charging for this service other than the rate that applies to and from the railway terminal on a shipment over a considerable distance In the state of California whose population all told is about the same as that of the city of Chicago the railways serving San Francisco and Los Angeles have made a charge of $2.50 per car for haulage over the private siding between the railway track and the industrial plant. This charge for many years has been a cause of contention. The Interstate Commerce Commission held that such service was part of the terminal service which should be performed by the railways without extra charge and it ruled that they should desist from exacting the charge of $2.50 per car when such carload freight is moving in interstate commerce incidentally to a system line haul. The railways took the case to the Commerce Court, which held that the railways are bound only to carry freight to the station to which freight may be consigned or from which it may be shipped, that upon the facts presented it comes to a conclusion different from that reached by the commission; that the real question is whether the railway is lawfully entitled to make the charge for the service in question. The court held that "if the carrier is not bound by law to deliver freight at the industrial plant, and it cannot be successfully contended that it is, then it follows as a necessary consequence that this industrial track service is a special service and is not a service which the carrier is bound to perform for the general tariff charge for the transportation of freight destined to Los Angeles."

In another case the Interstate Commerce Commission set aside the rate of $1.05 per 100 lbs. for the transportation of less-than-carload shipments of boots and shoes from Boston and New

York to Atlanta, Ga., ruling that a rate exceeding 95 cents per 100 lbs. was unreasonable, unjust and unduly discriminatory. The Commerce Court said:

"By the plain language of the law the power of the commission to prescribe a rate for the future cannot be exercised unless after full hearing on complaint made it shall be of the opinion that any of the rates or charges whatsoever demanded, charged, or collected by any common carrier or carriers subject to the provisions of the act . . . are unjust or unreasonable, or unjustly discriminatory, or unduly preferential or prejudicial, or otherwise in violation of the provisions of the act.

"The word 'opinion' must be interpreted with reference to the connection in which it is used in the law. It is only after full hearing upon complaint made that the law gives any weight or significance to the opinion of the commission; that is, it is only when the opinion results from a full hearing that it can be used as the basis of further action by the commission. It is true that in making up the opinion of the commission its members may and it is their duty to call to their aid their knowledge and experience, but if congress had intended that the commission could make up its opinion from the knowledge and experience of its members independent of the evidence in the particular case, then it was idle to provide for a full hearing, as an opinion of the commission could be formed as well without as with the full hearing. A full hearing not only means an opportunity to be heard by the carrier, but an investigation by the commission itself of the lawfulness of the rate in question.

The court holds the allegation that there was no such evidence offered, heard or introduced, to be an allegation of fact; that is that no evidence was offered to the commission to sustain the finding of the commission.

In another case, the commission had ordered a reduction in rates from New Orleans to Mobile, Pensacola and Montgomery The Commerce Court, referring to a recent decision of the United States Supreme Court in a case of the same general class said, "Tested by the principles laid down in that decision, we are of opinion that the order here drawn in question must be held invalid, as exceeding the delegated powers of the commission, because there was no substantial evidence to sustain it. . . . having regard to the undisputed evidence adduced at the hearing, the existing rates were not shown to be unjust or unreasonable and there was therefore no valid basis for the commission's conclusion."

In another case, in which the commission ordered a reduction in the rates on lemons from California to the east, the court said that the commission dealt "entirely with matters tending to show the need in this industry of a high-protective tariff against Sicily and, not on tariff considerations, but to compensate for the tariff insufficiencies, ordered a low transportation rate especially to eastern territory"; and that as in the judgment of the court "the order is based primarily on the assumed authority to protect their industry against foreign competition, it must be held void as beyond the powers delegated to the commission."

What perhaps is the most important decision of the Interstate Commerce Commission that has been taken up to the Commerce Court is that affecting the rates on transcontinental traffic. The commission divided the country into zones, and specified in percentages the relation that the rates from each zone should bear to the through rate from the Atlantic to the Pacific. That is, it did not prescribe exactly what should be the rates from the respective zones but ordered that they should bear a certain relation to a through rate no matter what that rate might be. The court said, "In so far as the commission attempts thus to determine the relation of the long-and-short haul rates, irrespective of absolute rates, it goes beyond any authority that has been vested in it, for it is not in the power of the commission to say that 100 per cent., 107 per cent., or any given percentage of an unknown less than reasonable rate to the coast is necessarily a maximum reasonable and a non-discriminatory rate."

These decisions are examples of the jurisdiction exercised by the Commerce Court to control the action of the Interstate Commerce Commission when the commission has erroneously taken action adverse to the railways. The Commerce Court has also indicated that it has jurisdiction to control the action of the commission should it erroneously be adverse to the public interest.

PLACE OF THE COMMISSION IN THE GOVERNMENT.

Whatever be the outcome of the controversy over the relation that the Interstate Commerce Commission bears to the courts, it must be recognized that from whatever viewpoint it be considered the commission is, under our scheme of government, an anomalous institution. Under that clause of the constitution which gives the congress the power to regulate commerce between the states, and which was intended to keep one state from taking advantage of another, the congress has been considered to have the power to fix the rates of the railways applying to interstate traffic. The delegation of this power to the commission, while not considered by the courts as a delegation of legislative power, unquestionably is closely related to the legislative power. The power accorded the commission to determine whether an existing rate is reasonable makes it a judicial body. Its mandate to see that the interstate commerce act is enforced makes it an executive body. Therefore the commission does not fit into our scheme of government under which it is ordained that the legislative, executive and judicial functions shall be separate. This is not to say that the commission may not be a useful institution. It has done many useful things and has the opportunity to do more. This is not to say that although an anomaly at present it may not become adjusted to our scheme of government, or that our scheme of government may not become adjusted to include the commission. Indeed, as repeated decisions of the Supreme Court of the United States have recognized the validity of orders issued by the commission, it must be admitted that the constitutionality of the commission has been virtually even if not expressly established. As it stands, it is engrafted upon the government and receives nourishment from the same source that vitalizes the three original co-ordinate departments, to no one of which can it in truth be said to belong. Thus engrafted upon the government, the Interstate Commerce Commission exercises a greater measure of power than any other agency of the government, not only over the railways of the United States, but through its power over railway rates over the entire industry and commerce of the United States.

As we have seen, the popular and legal conception of the relations of the railways to the government has undergone marked changes and, as we all know, there is a possibility of still more radical change. The era of corporate amalagamation marks a transition in the industrial and commercial status which has found effect in modifications of the laws. As the problems developed by this period of transition are not as yet thoroughly understood, the laws to which they have given rise are as yet incoherent.

Inasmuch as the railways of this country have been constructed and maintained by private capital that capital must be protected in the rights inherent in property. To do otherwise would impede their operation, impair their maintenance, and obstruct their development. There is but one way in which the obligation of the government to the railways as private property can be removed, and that is through their purchase by the government. The experience of other countries in the ownership and administration of the railways is sufficient to give the people of the United States a long pause before taking this step.

That private property must be used for public good applies with redoubled force to the railways. This does not mean, however, that their public relations may be considered a basis for their oppression by the public any more than their status as private property can be made the basis for oppression of the public by them.

The project for constructing a railway to the summit of Table mountain, Cape Town, South Africa, is once more being revived. The scheme was opposed by mountain enthusiasts, but the opposition has been largely overcome, and it is stated that plans are under way for its immediate construction.

STATEMENT OF MR. FAY ON SAN ANTONIO BOILER EXPLOSION.

A Searching Analysis of the Evidence, Circumstantial and Other, Brought Out by the Railway Company's Inquiry.

Thornwell Fay, president of the Harriman Lines in Texas and Louisiana, has issued a comprehensive statement regarding the causes of the disastrous boiler explosion at San Antonio, Tex., on March 18, which was described and illustrated in the *Railway Age Gazette* of April 5, page 806. The report of John F. Ensign, chief inspector of locomotive boilers for the Interstate Commerce Commission, was published in our issue of May 17, page 1128. Mr. Fay says:

The officials of the Galveston, Harrisburg & San Antonio have heretofore refrained from making any public statement with respect to the causes of explosion of locomotive 704 at San Antonio, March 18, 1912, awaiting the report to be made by the inspectors of the Interstate Commerce Commission. The report of the commission has now been received, and, in order that the public may know the facts as developed by a board of inquiry composed of disinterested outsiders, and the investigation by the officials, the following statement is made:

The conclusion of the interstate inspectors in giving their report is as follows: "It is our conclusion that this explosion was due to excessive steam pressure, which was caused by an employee of the Galveston, Harrisburg & San Antonio Railway tightening the adjusting screws of the safety valves, resulting in an accumulation of steam pressure beyond the endurance of the boiler."

For several years the Galveston, Harrisburg & San Antonio in every accident of any consequence that has occurred, has selected a board of inquiry composed of operating officers and citizens to investigate and make unbiased reports on such accidents. This practice was followed in this case, and a board consisting of the following gentlemen, most of whom are experts, was convened:

Col. Chas. H. Clark, ordnance department, U. S. Army.
Capt. Geo. A. Schreiner, U. S. Army.
Lieut. R. C. Burleson, U. S. Army, expert on high explosives.
J. H. Holmgreen, president Alamo Iron Works, San Antonio.
G. W. Taylor, superintendent motive power, S. A. & A. P. Ry.
W. B. Tuttle, manager San Antonio Street Railway.
Daniel Cleary, locomotive boiler inspector, S. A. & A. P. Ry.
A. M. Fischer, druggist, San Antonio.
F. McCardle, road foreman of engines, S. A. & A. P. Ry.
T. H. Mooney, former master mechanic G. H. & S. A. Ry.

In addition to this board of inquiry, the explosion was carefully investigated by W. H. Logan, boiler inspector for the Maryland Casualty Company, Baltimore, Md., one of the large insurers of steam boilers, and Capt. Carlton, assistant to Col. B. W. Dunn, chief inspector of the Bureau for the Safe Transportation of Explosives, New York City, and an expert on high explosives.

The expert men on this board of inquiry are fully as competent, both from experience and service, as any of the experts of the Interstate Commerce Commission, and while the enterstate inspectors are unanimous and positive in their opinions, this board of disinterested experts were very much divided in their opinions, which were made in writing, as to the cause of this explosion.

Four of the board, two of whom are not experts on steam boilers, think the explosion was due to excessive steam pressure.

One does not give any definite cause of the explosion, but states that the boiler was in most excellent condition; that no evidence of low water was found, and that there was no evidence of anything being wrong with the steam gage.

Two of the boiler experts state the explosion was due to low water, which left part of the crown sheet exposed, and when cold water was pumped on this metal the explosion took place.

One of the army officers, an expert on high explosives, states, "It is evident that the explosion was caused by some unusual and extraordinary cause." This gentleman found that the mud ring was broken in two parts on the left hand side of the locomotive, and that the bolts in this part of the mud ring showed that wrapper sheet and firebox sheet were separated from the mud ring at the same instant. This was not noted in any other part of the boiler, indicating that a local explosion of some character took place at this point. He states that a close examination of all the parts fails to disclose evidence of high explosive action, but that a small charge of dynamite, if suspended in the water, not in contact with any portion of the boiler coverings, would not have left much, if any, trace of its detonations, and at the same time would be sufficient to cause the damage to the mud ring at the point indicated, and to force the plates from it at this point.

One member, a boiler expert, thinks the steam gage became defective after the pressure reached 190 lbs.

Another member of the board thinks that the fact that the boiler was heated some time before the explosion occurred argues against the application of nitroglycerine or dynamite, but does not preclude the use of some other explosive, such as a derivative of picric acid.

Every member of this board practically agrees, and particularly the boiler experts on the board, that the boiler was of the very best construction, and in good condition, which should absolutely refute the statements made by the Interstate Commerce Commission inspectors, in which they charge the railroad company as being at fault "in keeping a boiler in service for which the factor of safety, as shown by test, was below the recognized standard."

Outside of the reports of this board of inquiry, the report of the boiler inspector for the Maryland Casualty Company says, "I made a thorough investigation of all parts. Internally, all sheets, bracing, heads and seams in first class condition, and the boiler free from mud, dirt and scale. Boiler entirely safe for working pressure of 214 lbs., and would require a pressure of about 956 lbs. to explode it. Examined two pop safety valves (the only ones found after the explosion); found one adjusting screw and lock nut set up tight on casing and threads did not show signs of having been moved recently. As neither pop valve spring was found it was not possible to state at just what pressure the safety pops were set, or how much pressure showed on the boiler at time of explosion, but from evidence gathered do not think there was sufficient steam pressure to have caused all sheets and plates to have been torn asunder as they were. Entertain grave doubts that so complete destruction of this boiler was caused alone by steam pressure."

The inspector of the Bureau for the Safe Transportation of Explosives found: "Appearance indicates boiler probably gave way in the vicinity of its left leg. Mud ring broken into several parts. While did not find any shattered pieces of metal indicating use of high explosives, it was not impossible for one to have been used, either inside or outside the boiler. Plenty of places below boiler near driving wheels where explosives could have been located, which would have driven hole in the boiler, and that part of the boiler may have been the part that was never recovered. There was ample opportunity for persons to have placed an explosive in the boiler. Pressure in the boiler was about 200 lbs., which would give temperature of the steam 388 deg., and probably down at the first end of the leg of the boiler temperature would be not over 360 deg., which is about the exploding point of dynamite or nitroglycerine."

All these experts, both on the board of inquiry and off, practically agree that the boiler was in first class condition, thus refuting absolutely the statement of the Interstate Commerce Commission inspectors, that it was not.

Investigation by myself and other company officials, promptly after the accident, developed the following facts:

The locomotive, which was comparatively new, having been less than four years in service, had been in the San Antonio shops for several weeks and overhauled. After completion of work upon it, the boiler was tested with the usual hydraulic test and found to be in good condition.

This engine after being fired up in the roundhouse was brought out of the roundhouse by Hostler Lewis, a very intelligent negro of many years' experience in this line of work. Lewis stated that he brought the engine out of the roundhouse, took it to the water tank where water was put into the engine tank, and also oil for fuel, and turned the engine over after this was done to the engineer who was to take it out on the run. At the time he turned the locomotive over to the engineer, the steam gage registered 190 lbs., injectors were working, and the engineer tested the water cocks, looked at the steam gage and saw that the injectors were working; then took his oil can and got down on the ground to oil up.

The master mechanic, Mr. McLean, was on the engine 15 or 20 minutes before the explosion, and stated that at that time everything was in good shape, and that the steam gage registered 145 lbs. A man named Gorman was on the boiler at the time the engine exploded setting the pop valves and waiting for the steam to reach 200 lbs., so as to set the valves to blow off at that pressure. The inspectors of the Interstate Commerce Commission state as their final conclusion that the explosion was due to excessive steam pressure, caused by an employee of the company tightening the adjusting screws of the safety valves, resulting in an accumulation of steam pressure beyond the endurance of the boiler; and then go on to state that the company was at fault in allowing such responsible work as setting safety valves to be performed by an employee of whose experience and judgment the testimony shows its officers knew practically nothing.

I am at a loss to know the basis for this statement. Gorman was a victim of the explosion, and, therefore, cannot for himself answer the reflections cast upon him by this report. As a matter of fact, the records of the company show that Gorman was employed early in October, 1911, and his application showed that he had had ten years' experience as a machinist, and had been in the service of several American railways. He had been engaged in this character of work since November, 1911, and had properly and satisfactorily adjusted the safety valves on 27 locomotives prior to the 704, several of which were locomotives of the Missouri, Kansas & Texas. Roundhouse Foreman Cavanaugh, an old and experienced employee of many years in the service, states that when he put Gorman on this work he watched him until he saw that he was O. K.; that his work was satisfactory, and that he was a sober and industrious man.

Mr. McCardle, a member of the board of inquiry, a practical man of wide experience in the handling of men as well as locomotives, in his report which was made shortly after the explosion, referring to Gorman, says, "I think the man who was setting the pop valves was entirely competent; that the work of adjusting the pops was being properly performed."

Gorman began his career as an apprentice in the shops of Robert Thompson & Sons in Great Britain, and served there five years. He was afterwards engineer on British steamers Foyle, Abeokuta and Bessborough, and his ability and conduct are reported "very good" by the commanders of these vessels.

Gorman also worked as a machinist for the Carnegie Steel Company at Youngstown, Ohio, and the foreman of those works states he was a good workman and competent

As is well known, a great many of the shop employees of this company voluntarily left its service in September last, and in order to faithfully discharge its duties to the public as well as to its stockholders, it was compelled to employ, and did employ, new men to take their places. If the inference is to be drawn from the report of the Interstate Commerce inspectors that a railway is negligent in entrusting such work as Gorman was performing at the time the accident occurred to anyone other than employees old in *its* service, then we must plead guilty to such negligence; but I am not prepared to believe that either the government or the general public will censure the railway for employing experienced and competent men wherever they can be found, to take the place of employees who voluntarily quit its service.

The exploded boiler was designed to carry a working pressure of 200 lbs. per square inch, with a safety factor of 5, which means that it would have required a pressure of 1,000 lbs. to the square inch to have made the boiler give way in its weakest part. Mr. Logan, who inspected the boiler thoroughly after the explosion and looked at every piece of it, announced it exceptionally well built, and of the very best material and construction, and states positively that as the boiler stood at the time it exploded, it would have required a steam pressure of about 956 lbs. per square inch to have made it give way. Proof that no such pressure was in the boiler is shown by the fact that at the time of the explosion the injectors were working and putting water into the boiler. The Nathan Manufacturing Company, who made the injectors used, state that these injectors will put water into a boiler at as low a pressure as 40 lbs., and at as high a pressure as 240 lbs—240 being about the maximum at which injectors of this type would have worked. All engineers and mechanical men are well aware of this fact, and yet it is shown conclusively in the statement of the hostler, and would also no doubt be shown by the engineer if he were alive, that the injectors were working. The engineer, Walter Jordan, was one of the best and most experienced engineers in the service of the company. He had been running an engine for about 25 years, and was always a very careful man. It is entirely beyond the bounds of possibility that if any such pressure as claimed was in this boiler at the time he took charge of the engine he would not have known it and have at once applied the correction.

It is suggested that possibly the steam gage did not record correctly. This gage was tested before it was put on the locomotive by a weight gage testing machine, and was found to be accurate. The man who made the connection to the boiler stated that he cleaned out the syphon pipes and saw that they were perfectly clear before the connection was made. Even admitting that the steam gage might have registered inaccurately, the fact that the injectors were putting water into this boiler at the time of the explosion would seem to prove beyond all doubt that the pressure did not exceed 240 lbs. to the square inch.

One of the most important features in connection with the damage done by this explosion would seem to have been overlooked, at least no mention is made of same by the government inspectors, and that is, that one of the driving axles, a solid piece of steel 9½ in. in diameter, was broken short off underneath this engine by the force of the explosion. It is possible to conceive that a solid steel cylinder 9½ in. in diameter could be confined in such a way that steam pressure sufficient might be brought against it to break it, but it is hardly possible to conceive that steam pressure sufficient to break a cylinder of this kind could be exerted upon it in the open air. The destructive force of a high explosive placed on or near a steel cylinder would, no doubt, shatter it, but it is not believable that any steam pressure in the open air could do this. Many of the employees around the shop at the time of this accident stated positively they heard two separate and distinct explosions. Such testimony as this should be considered.

It is quite apparent from the above that the true cause of

the explosion of this locomotive boiler has not been determined. The inspectors of the Interstate Commerce Commisison find unanimously that the explosion was due to excessive steam pressure. The board of inquiry, which was composed of several experts entirely disinterested and fully as experienced and as competent as the Interstate Commerce Commission inspectors, are badly divided in their opinions as to the cause, but all agree that the boiler was in first class shape, contrary to the opinion of the interstate inspectors. While some members of the board of inquiry believe the cause to have been excessive pressure, others equally competent and experienced claim low water the cause, and still other members intimate, at least their belief, that high explosives were used to rend the boiler.

The record of the steam gage, the fact that the injectors were working, the fact that the explosion broke up the boiler and parts of the machinery into many pieces, and threw them in every direction, and the further fact that a massive, solid steel cylinder (the axle) 9½ in. in diameter, was broken like a pipe stem, in the open air, are all circumstances that cannot be lightly brushed aside in any unbiased investigation of this disaster.

Under such circumstances, it is but natural to go further and to consider the circumstantial evidence in this case.

Since the shop employees of the company left its service on September 30, 1911, many acts of vandalism have been committed against its property, and, in addition, two guards and one workman were killed at Houston, while many employees have been assaulted and beaten at many points on the line. Locomotives just out of shop, after running a few miles, have knocked out cylinder heads, and investigation has developed that small nuts or other pieces of metal have been placed in the pipes which worked down into cylinders, doing this damage. Bolts have been placed on guides, which did similar damage. Wooden plugs have been found in steam gage pipes. Innumerable cases have been found where emery dust has been put in bearings; water has been doctored, and many similar acts of vandalism have been perpetrated.

Much evidence exists pointing strongly to the conclusion that this work has been done by men who sought employment in the shops for the very purpose of doing damage to property. It does not require much imagination to believe that some of the men who did such dastardly acts would also, where opportunity offered, apply explosives, such as may have occurred at San Anontio.

Indeed, this view will not be considered extravagant after reading the following quotation from Strike Bulletin No. 100, quoted below:

"Office 608 Hibernia Bldg.,
"San Francisco, January 30, 1912.
"Strike Bulletin No. 100.

"Brothers, Greetings:

"We find the following very able article by Shotwell in today's stock quotations relative to the cause of the big slump in earnings of the Harriman System Lines, and we sincerely hope that the explanation will be satisfactory to the stockholders:

"'Earnings of the Harriman Lines for December are expected tomorrow or Wednesday, and they probably will show a material loss compared with the same month in the previous year. In some quarters the Union Pacific's loss is estimated at a million net. This has been an unusually bad winter in the Harriman territory, and the strike has interfered seriously with operation. The strike is practically over, but train movements are interfered with by bars of soap that get into the engine boilers accidentlly and emery dust that somehow gets on the axles.'

"He forgot to mention the dynamite or sugar that caused so many boiler explosions. *Next.*"

The question is, whether San Antonio was *"Next."*

The Cordoba Central Buenos Ayres Extension Railway, Argentina, was opened for passenger traffic May 15.

TRAIN ACCIDENTS IN MAY.[1]

Following is a list of the most notable train accidents that occurred on railways of the United States in the month of May, 1912:

Collisions.

Date.	Road.	Place.	Kind of Accident.	Kind of Train	Kil'd.	Inj'd.
*14.	Louisv. & N.	Calhoun, Ala.	bc.	F. & F.	2	1
16.	Lake Shore & M. S.	Cleveland.	xc.	F.	1	0

Derailments.

Date.	Road.	Place.	Cause of Derailm't	Kind of Train	Kil'd.	Inj'd.
5.	Chicago & Alton	Cockrell, Ill.	unx.	P.	1	0
5.	Southern	Hortense, Ga.	derail.	P.	0	4
*6.	N. Orleans & N. E.	Hattiesburg.	unx.	P.	9	57
7.	Southern	Columbia.	axle.	P.	0	21
7.	Atch., T. & S. F.	Caddoa, Col	axle.	P.	..	11
8.	Western & Atl.	Gilmore.	.....	F.	..	..
12.	Missouri Pac.	New Haven.	d. track.	P.	1	45
12.	Norfolk So.	Hickory.	.....	P.	..	..
14.	Lake Shore & M. S.	Archbold, O.	eq.	F.	2	1
15.	Southern	Connelly Spgs.	d. switch.	P.	2	4
20.	Chi., Mil. & St. P.	Winona.	d. track.	P.	0	1
20.	Louisv. & N.	Blue Ridge.	unx.	P.	1	0
20.	Mobile & O.	Coalfire.	unx.	F.	1	1
23.	Penn.	Bradford, O.	.....	P.	1	1
23.	Atlantic C. L.	Tampa.	malice.	P.	0	2
30.	Balt. & Ohio	Philadelphia.	.....	F.	1	4

The trains in collision near Calhoun, Ala., on the 14th, were a freight train and a work train, and the engineman and fireman of the freight were killed. One trainman injured. Both engines and ten cars were knocked off the track and the wreck took fire, and was mostly burnt up. It is said that the work train was on the main track on the time of the freight and that its flagman neglected to flag the freight.

The collision at Cleveland, on the 16th, was due to a string of ten freight cars becoming uncontrollable on a descending grade. These cars ran at high speed for about three miles through the western part of the city and struck a locomotive near the union station. The engineman on this locomotive was fatally injured.

The train derailed near Cockrell, Ill., on the 5th, was an eastbound through passenger. A trespasser, stealing a ride, was killed. The cause of the derailment was not discovered.

The train derailed at Hortense, Ga., on the 5th, was southbound passenger train No. 13, and the engine, three baggage cars and two passenger cars were overturned. Two employees and two postal clerks were injured. The derailment was at a derailing switch which was carelessly thrown, immediately in front of the train.

In the derailment near Hattiesburg, Miss., on the 6th, 7 passengers and 2 trainmen were killed and 57 passengers were injured. The engine and first five cars were derailed, the engine and baggage car being overturned. The train was running on a straight line at about 30 miles an hour. The cause has not been determined.

The train derailed at Columbia, S. C., on the 7th, was southbound express No. 31, and two sleeping cars were overturned. Seven employees, 24 passengers and 3 other persons were injured. The derailment was due to the breaking of an axle of a driving wheel.

The train derailed at Caddoa, Colo., on the 7th, ran some distance on the ties and roadbed after the wheels jumped the track, and 3 of the 4 passenger cars were partly overturned. Only 11 persons (passengers) were injured, and those not

[1]Abbreviations and marks used in Accident List:
rc, Rear collision——bc, Butting collision——xc, Other collisions——b, Broken——d, Defective——unf, Unforeseen obstruction——unx, Unexplained——derail, Open derailing switch——ms, Misplaced switch——acc. obst., Accidental obstruction——malice, Malicious obstruction of track, etc.——boiler, Explosion of locomotive on road——fire, Cars burned while running——P. or Pass., Passenger train——F. or Ft., Freight train (including empty engines, work trains, etc.)——Asterisk, Wreck wholly or partly destroyed by fire——Dagger, One or more passengers killed.

seriously. The derailment was due to the breaking of the crank axle of the engine.

The train derailed at Gilmore, Ga., on the 8th, about 7 p. m., was a wrecking train returning from a wreck some distance north of Gilmore, and three of the cars were overturned. One trainmen and one car repairer were killed and 9 others were injured.

The train derailed on the Missouri Pacific, near New Haven, Mo., on the 12th, was westbound passenger No. 1, and the engine and first two cars were overturned. Three passenger cars were ditched but fell against a bluff and were not overturned. The engineman was killed, and 5 employees, 4 mail clerks and 36 passengers were injured, all but three of the passengers' injuries being classed as slight. The derailment was due to heavy rain and "soft" track, some repair work done the previous day having been imperfectly finished.

The train derailed at Hickory, Va., on the 12th, was northbound passenger No. 2, and the first car to leave the track was the mail car. The three rear passenger cars were overturned. Eighteen passengers and one trainman were injured.

The derailment on the 14th, near Archbold, Ohio, was caused by a drawbar which fell on the track, following the parting of the train, because of a coupler coming open. The car next behind the one that failed was an empty stock car and, in consequence of the sudden stopping of the cars by the automatic application of the air brakes, this car was crushed by loaded cars behind it; and six cars, altogether, were wrecked. Two trespassers were killed and a third was injured.

The train derailed at Connelly Springs, N. C., on the 15th, was southbound passenger No. 11, and the engine and first two cars fell against a train standing on a side track, causing fatal injury to the engineman of the standing train. One passenger in No. 11 was killed, and two trainmen and two passengers were injured. The derailment was caused by the loosening of a switch, due to a bolt working out.

The train derailed near Winona, Minn., on the 20th, was the first section of the westbound Pioneer Limited, and the baggage car, one smoking car and two sleeping cars fell down a bank, lodging partly in the Mississippi river. The train was running slowly, having been warned of the possibility of washouts, and the track had been examined a few minutes previous to the passage of the train. The bank slid out after the engine had passed the spot, the surface of the roadbed appearing to the engineman to be in perfect condition. Only one person, a passenger, was seriously injured.

The train derailed near Blue Ridge, Ga., on the 20th, was northbound passenger No. 4, and the engineman was killed. The cause of the derailment could not be determined.

The derailment near Coalfire, Ala., on the 20th, was that of a light engine running backward. Both tender and engine fell down a bank and a student fireman was killed. The regular fireman was seriously scalded.

The train derailed near Bradford, Ohio, at 4 o'clock on the morning of the 23rd, was westbound passenger No. 25. It was running about 50 miles an hour, and the entire train, except the last two cars, was derailed. The fireman was killed and a mail clerk was injured. It is said that no passengers were seriously hurt. The cause of the derailment has not been determined.

The train derailed at Tampa, Fla., on the 23rd, was southbound passenger No. 83, and the engine and tender were overturned in the ditch. An express messenger and the fireman were slightly injured. The derailment was due to a partly open switch, opened maliciously or by a crazy person.

The train derailed at Philadelphia, on the 30th, was a southbound freight, and the cause of the derailment was sand which had been washed on to the tracks at a road crossing, in a heavy rain. The engine was overturned, and the conductor was crushed beneath it and killed; the engineman and three other trainmen were badly injured.

Electric Accidents.—Of the eight electric accidents to electric cars reported as occurring in the United States in the month of May, one, a collision near Kokomo, Ind., on the 10th, is reported as having resulted fatally; one person killed, 34 injured. The collision was between a car of the Indiana Union Traction Company and one of the Fort Wayne and Wabash Valley. Both cars were badly wrecked, but most of the passengers were in the rear ends of the cars.

SUPREME COURT DECISIONS IN COMMERCE COURT CASES.

As reported in last week's issue of the *Railway Age Gazette*, the Supreme Court of the United States on June 7 handed down three decisions overruling the Commerce Court in cases that had come up from the Interstate Commerce Commission. Two cases were remanded with directions to dismiss for want of jurisdiction; in the third it was held that the Commerce Court possessed jurisdiction but its decision was reversed. On June 10 the Supreme Court also rendered another decision in a case instituted by the Federal Sugar Refining Company, involving lighterage charges in the New York harbor, in which a preliminary injunction issued by the Commerce Court was affirmed and the case was remanded for hearing on the merits. In the Proctor & Gamble case the decision turned on the extent of the Commerce Court's jurisdiction. Chief Justice White delivered the opinion of the court, of which an abstract follows:

The Procter & Gamble Company, dissatisfied with the regulations concerning demurrage, in so far as they imposed in certain respects charges upon its tank cars, filed a complaint with the Interstate Commerce Commission charging the rules to be repugnant to the act to regulate commerce because unjust and oppressive and because to enforce them would create preferences and discriminations forbidden by the act. After hearing, the commission made a report declaring that the rules complained of were in no sense in conflict with the act to regulate commerce, and on the contrary conformed to that act and tended to prevent and repress unlawful preferences and discriminations. An award of relief was therefore denied. In February, 1911, the Procter & Gamble Company filed a petition in the Commerce Court of the United States making defendants the United States, the Interstate Commerce Commission and the railways who had been complained of in the proceeding before the commission. In disposing of the case, the court considered it in a two-fold aspect—first, as to its jurisdiction; and, second, as to the merits of the case. On the first subject it held, *a*, that it had jurisdiction of the cause, and that the refusal of the Interstate Commerce Commission to afford relief to the Procter & Gamble Company was, for the purposes of jurisdiction of the court, the exact equivalent of an order of the commission granting affirmative relief, and *b*, as a corollary of this power it was further decided that there was jurisdiction to award pecuniary relief for demurrage if any was illegally exacted. On the merits, however, it was decided that the Interstate Commerce Commission had rightfully refused to grant relief and that there was no foundation for the contention that the property of the company in its private tank cars was taken without due process of law by the demurrage regulations. On this subject it was declared that as the company had accepted the provisions of the published tariffs concerning the use of the tank cars, therefore those cars were submitted to the regulations which the carriers had lawfully established.

The case was then brought here by the appeal of the Procter & Gamble Company. That company insists that the court below erred in not awarding the relief which was asked and in dismissing the petition. On the other hand the Interstate Commerce Commission and the railways insist that the court was right in refusing relief and dismissing the bill. Before we can come, if at all, to consider the merits, however, it is necessary to dispose of the question concerning the jurisdiction of the court below to entertain the petition, because the United States insists at bar, as it did in the lower court, that the court erred in overruling

the demurrer to the jurisdiction and refusing to dismiss the cause for want of jurisdiction.

The question to be decided is this: Does the authority with which the Commerce Court is clothed in virtue of these provisions invest that body with jurisdiction to redress complaints based exclusively upon the conception that the Interstate Commerce Commission, in a matter submitted to its judgment and within its competency to consider, has mistakenly refused, upon the ground that no right to the relief claimed was given by the act to regulate commerce, to award the relief which was claimed at its hands? In other words, the important question is, Is the authority of the Commerce Court confined to enforcing or restraining, as the case may require, affirmative orders of the commission, or has it the power to exert its own judgment by originally interpreting the administrative features of the act to regulate commerce and upon that assumption treat a refusal of the commission to grant relief as an affirmative order and accordingly pass on its correctness?

Turning for the elucidation of the question to the jurisdictional provisions (of the act creating the Commerce Court), the solution of the question must intrinsically be found in a correct interpretation of the second subdivision. The words of this second subdivision are: "Second. Cases brought to enjoin, set aside, annul, or suspend in whole or in part any order of the Interstate Commerce Commission."

Giving to these words their natural significance we think it follows that they confer jurisdiction only to entertain complaints as to affirmative orders of the commission; that is, they give the court the right to take cognizance when properly made of complaints concerning the legality of orders rendered by the commission and confer power to relief parties in whole or in part from the duty of obedience to orders which are found to be illegal. No resort to exposition can add to the cogency with which the conclusion stated is compelled by the plain meaning of the words themselves. But if it be conceded for the sake of argument that the language of the provision is ambiguous a consideration of the context of the act will at once clarify the subject. Thus, the first subdivision provides for the enforcement of orders, that is, the compelling of the doing or abstaining from doing of acts embraced by a previous affirmative command of the commission, and the second (the one with which we are concerned) dealing with the same subject from a reverse point of view, provides for the contingency of a complaint made to the court by one seeking to prevent the enforcement of orders of the commission such as are contemplated by the first paragraph. In other words, by the co-operation of the two paragraphs, authority is given on the one hand, to enforce compliance with the orders of the commission if lawful, and, on the other hand, power is conferred to stay the enforcement of an illegal order. The other provisions of the act are equally convincing.

We might well be content to rest our conclusion upon the considerations just stated. In view, however, of the importance of the subject we do not do so, but shall consider the matter in a broader aspect for the purpose of demonstrating that to give to the statute a meaning contrary to that which we have found results from its text, and therefore to recognize the existence in the court below of the power which it deemed it possessed would result in frustrating the legislative public policy which led to the adoption of the act to regulate commerce, would render impossible a resort to the remedies which the statute was enacted to afford, would multiply the evils which the act to regulate commerce was adopted to prevent, and thus bring about disaster by creating confusion and conflict where clearness and unity of action was contemplated. It cannot be disputed that the act creating the Commerce Court was intended to be but a part of the existing system for the regulation of interstate commerce. That in adopting the provision concerning the Commerce Court and making it part of the system, it was not intended to destroy the existing machinery or method of regulation, but to cause it to be more efficient by affording a more harmonious means for securing the judical enforcement of the act to regulate commerce is certain. The first six sections, which called into being the Commerce Court and defined its powers, all demonstrate the purpose as above stated, that is, to adjust the powers and duties of the newly created court in such manner as to cause them to accord with the system of regulation provided by the act to regulate commerce as it then existed.

By that act as originally enacted many regulations and consequent duties were imposed upon carriers in the interest of the public and of shippers which did not theretofore exist, and various administrative safeguards were formulated, all of which, in their very essence, required, first, for their compulsory enforcement the exercise of official functions of an administrative nature, and, second, for their harmonious development an official unity of action which could only be brought about by a single administrative initiative and primary control. To that end the act (sec. 11) created an administrative body endowed with what may be in some respects qualified as *quasi* judical attributes, to whom was confided the enforcement of those provisions of the act which essentially exacted unity in order that they might beneficially operate. The statute, therefore, necessarily, while it created new rights in favor of shippers, in order to make those rights fruitful as to the subjects with which the statute dealt coming within the scope of the administrative unity which we have mentioned primarily made the judgment of the administrative body to whom the statute confided the enforcement of the act in the respects stated a prerequisite to a resort to the courts.

In the long interval which intervened between 1887 when the act to regulate commerce was enacted and June 18, 1910, when the Commerce Court act was passed we have learned of no instance where it was held or even seriously asserted, that as to subjects which in their nature were administrative and within the competency of the commission to decide, there was power in a court, by an exercise of original action, to enforce its conceptions as to the meaning of the act to regulate commerce by dealing directly with the subject irrespective of any prior affirmative command or action by the Interstate Commerce Commission. On the contrary, by a long line of decisions, it appears by the reasoning indulged in that it was never considered that there was power in the courts as an original question without previous affirmative action by the commission to deal with what might be termed in a broad sense the administrative features of the act to regulate commerce by determining as an original question that there had been a compliance or non-compliance with the provisions of the act.

Originally the duty of the courts to determine whether an order of the commission should or not be enforced carried with it the obligation to consider both the facts and the law. But it had come to pass prior to the passage of the act creating the Commerce Court that in considering the subject of orders of the commission, for the purpose of enforcing or restraining their enforcement, the courts were confined by statutory operation to determining whether there had been violations of the constitution, a want of conformity to statutory authority, or of ascertaining whether power had been so arbitrarily exercised as virtually to transcend the authority conferred although it may be not technically doing so.

In view of the provisions of the act to regulate commerce just referred to as originally enacted, of the legislative evolution of that act, its uniform practical enforcement and the constant judical interpretation which we have thus briefly indicated, it is impossible, we think, in reason, to give to the act creating the Commerce Court the meaning affixed to it by the court below, since to do so would be virtually to overthrow the entire system which had arisen from the adoption and enforcement of the act to regulate commerce. First, because as the previous ascertainment by the commission on complaint made to it as to whether violations of the act had been committed, with reference to the subjects as to which previous action was required, was an essential prerequisite to a right to complain in a court, the interpretation given below would, by destroying the necessity for the prerequisite, action of the commission, operate to create a vast

body of rights which had no existence at the time the Commerce Court act was passed. Second, because the recognition of a right in a court to assert the power now claimed would of necessity amount to a substitution of the court for the commission or at all events would be to create a divided authority on a matter where from the beginning primary singleness of action and unity was deemed to be imperative. Third, because the result of the interpretation would be to bring about the contradiction and the confusion which it had been the inflexible purpose of the lawmaker from the beginning to guard against, an interpretation which would seemingly create rights hitherto non-existent and yet at once proceed to destroy such rights by bringing about a conclusion which would render the rights which the act creates practically valueless. Indeed, these inevitable results of the interpretation given by the court below to the act would necessarily amount to declaring that Congress in seeking to unify and perfect the administrative machinery of the act to regulate commerce and to make more beneficial its operation had overthrown the whole fabric of the system as previously existing.

The demonstration of the error of the construction adopted below is so additionally made manifest by a consideration of the general structure and the text of the act creating the Commerce Court, that we advert to that point of view: A. The first section of the act makes clear that the purpose was not to create a court with new and strange powers but only to give to the new court the special jurisdiction then possessed by the courts of the United States for the enforcement of orders made by the commission, and thus to unify the exertion of judical power with reference to the enforcement of the orders of the commission. The opening words of the section which make this result clear are as follows: It (the Commerce Court) shall "have the jurisdiction now possessed by circuit courts of the United States and the judges thereof over all cases of the following kinds: . . ." B. Because the enumeration as to the subject matters of jurisdiction conferred which follows the words just quoted, conforms to the existing law and evidently assumes its continued operation. C. Because the sedulous effort of Congress while creating the new machinery not to destroy the existing system finds expression in a two-fold way: (1) by the declaration that nothing in the fact that the existing power of the circuit courts as to the subjects of jurisdiction transferred to the new court should be deemed as an enlarging of those powers, and (2) by the provision that nothing in the transfer of the enumerated powers to the Commerce Court should be considered as limiting or abridging the existing jurisdiction possessed by the circuit courts as to things and subject matters not embraced in the powers transferred. D. Because the act which created the court contained in its latter sections provisions amending sections of the act to regulate commerce which when rightly interpreted were manifestly adopted to make that act more consistent with the new situation resulting from the creation of the new court and utterly inconsistent with the conception that that court had power not previously possessed by any court and the existence of which would serve to set at naught the whole system of interstate commerce regulation.

The general considerations which we have stated establish the error committed by the court below in holding that it had jurisdiction over the claim of the Procter & Gamble Company to recover on a money demand based on the illegality of the demurrage charges alleged to have been wrongfully exacted by the railway companies. Through abundance of precaution, we, however, say that wholly irrespective of the general considerations stated we think the conclusion of the court as to its possession of jurisdiction over the subject referred to was clearly repugnant in other respects to the express terms of the act.

As it follows from what we have said that the court below erred in taking jurisdiction of the petition, it results that our duty is to remand the cause to the court below with directions to dismiss the petition for want of jurisdiction.

* * *

In the case known as the Southeastern Rate Case, which had been appealed by the Cincinnati Receivers' & Shippers' Association and the Eagle White Lead Company from a decision of the Interstate Commerce Commission, Chief Justice White also delivered the opinion, which followed that in the Procter & Gamble case.

The appellants in these cases originally applied to the Interstate Commerce Commission for reduction of the maximum rates between Cincinnati and Chattanooga from the 76c. schedule to 60c. schedule. The commission refused to make the full extent of this reduction. Thereupon the respective parties filed bills in the Commerce Court demanding that the commission's order be "suspended, set aside, annulled, and declared void and of no effect," and that the individual defendants and the commission be required by mandatory injunction to set aside and annul the said order, that the case be reopened, and the complainants given further relief. The two bills were consolidated. The individual defendants, the commission, and the railway company all demurred to the bill on the merits. The United States moved to dismiss on the ground that the court had no jurisdiction. The court took jurisdiction, but dismissed on the merits. These appeals were then prosecuted. The cases are, in all respects, controlled by the opinion announced and ruling made in the Procter & Gamble case, this day decided, and for the reasons in that case stated, these cases must be and are remanded, with directions to dismiss for want of jurisdiction.

The third case is that of the Interstate Commerce Commission and the United States versus the Baltimore & Ohio, the Pennsylvania and other roads, known as the "restricted rate case."

The question in the case is whether railway companies may charge a different rate for the transportation of coal to a given point to railways than to other shippers, the coal being intended for the use of the railways as fuel.

The Interstate Commerce Commission held that a charge of a different rate was an unlawful discrimination against other shippers and made an order requiring a cessation of such charge. The execution of the order was enjoined by the Commerce Court.

The facts are certainly undisputed, or, to put it differently, the circumstances and conditions which determined the order are certainly not in controversy; and while certain general inferences are disputed which may be called inferences of fact, yet we think "power to make the order, and not the mere expediency of having made it, is the question" presented. In other words, that the question presented by the petition is that the order of the commission was not merely administrative, but proceeded from a construction of sections 2 and 3 as applicable to the conditions which affected the traffic in the different kinds of coal and that the different charges for transportation constituted violations of those sections. The Commerce Court, therefore, had jurisdiction of the petition and jurisdiction to enjoin the order of the commission if the court considered that the order would cause irreparable injury.

It is asserted that there are disparities between the traffics and qualifying circumstances which the commission disregarded and, in error, held that traffic in fuel coal could not be distinguished from the traffic in commercial coal.

The commission, it is contended, while it found a similarity in the traffics, did not consider or discuss the two most important features of difference—"the two features" which make the traffics unlike, that is, that railway-fuel coal "does not come into competition with the commercial coal, and is in competition with coals coming on the railway's line at other points." But such features do not affect the carriage, qualify or alter the essential service, which is to get an article from one place to another. The greater or less inducement to seek the service is not the service. Such competition, therefore, is as extraneous to the transportation as the instances in the cases cited. And equally so in the other "feature" that the fuel coal may be destined for consumption beyond the junction point. The circumstances do not alter the fact that it and commercial coal go to the same point, and are delivered at the same point. There is, it is true, a difference in the manner of delivery, depending

upon the difference in the facilities possessed by the railways and other consignees.

The commission especially disclaimed holding that the rate to the junction point must be paid on shipments going beyond that point, and insisted that it only held that the charges to that point should be the same to all shippers, and rates through that point should also be the same to all shippers. And the commission said that the testimony established that the service as to the coals was alike when they go beyond the junction point. The commission, therefore, considered alone the service, disregarding circumstances and conditions which were mere accidents of it and had relation only to the respective shippers.

There are other contentions or rather phases of those that we have considered and which seek to further emphasize the strength of competition as a circumstance or condition differentiating the traffic. For instance, it is urged that the shipment of the fuel coal to a particular railway "for the use of that railway" makes special the traffic. And, further, that "a railway is not a person" but is "rather in the nature of a geographical division and extends through long distances." Pushing the argument or illustrations farther, it is urged that a railway company may be distinguished from the physical thing, the railway itself, and may be a locality where a commodity is used, like "a river, a county or a city," and be entitled to preferential rates to accommodate competitive conditions. The *Import Rate Case,* 162 U. S., 197, is invoked as analogous. We cannot accept the likeness nor the distinctions which are said to establish it. The railway company cannot be put out of view as a favored shipper, and we see many differences between such a shipper receiving coal for use in its locomotives and a nation as the destination of goods from other nations for distribution throughout its expanse on through rates from points of origin.

The decree of the Commerce Court is reversed and the case remanded with directions to dismiss the petition.

The Federal Sugar Refining Company case is a suit instituted in the Commerce Court to enjoin the enforcement of an order by the Interstate Commerce Commission. The order which it was the purpose of the suit to enjoin was made in a proceeding commenced before the commission on behalf of the Federal Sugar Refining Company, to compel the railways to desist and abstain from paying to Arbuckle Brothers, claimed to be operating what is known as the Jay street terminal, certain so-called allowances for floatage, lighterage and terminal services rendered by them to the complainants in connection with sugar transported by them in New York harbor to and for the complainants, while at the same time paying no such allowances to the said Federal Refining Company on its sugar.

There was clearly a right in the court below to entertain jurisdiction of the petition and to determine whether the affirmative order of the commission was entitled to be enforced. There was clearly also power in the court to allow a preliminary injunction, since that authority is conferred in express terms by section 3 (208) of the act. And the right to appeal from such an order is also in express terms conferred by section 2 of the act.

It is not disputable that although the right to appeal to this court from an order like the one here in question is conferred, yet obviously the purpose which must have caused the creation of the Commerce Court must have been the desire to interpose between the action of the commission and this court an intermediate tribunal, having the powers which the statute delegates to it. Our duty is to give that purpose effect and to uphold the lawful authority of the court, without deviation and yet without hesitancy where there has been an abuse of discretion to correct it in the completest way. But as this case manifests no such abuse, our duty is not to reverse the action of the court but to remand the case so that there may be an opportunity to dispose of it on the merits in the forum selected by Congress for that purpose. Of course, in saying this, we must not be understood as deciding or in any way implying that the duty would not exist to examine the merits of a preliminary order of the general character of the one before us in a case where it plainly in our judgment appeared that the granting of the preliminary order was in effect a decision by the court of the whole controversy on the merits or where it was demonstrable that grave detriment to the public interest would result from not considering and finally disposing of the controversy without remanding to enable the court below to do so.

REPORT ON HOOSAC TUNNEL COLLISION.

An abstract of the report of the Massachusetts Railway Commission on the rear collision which occurred in the Hoosac tunnel, of the Boston & Maine, last February, was given in the *Railway Age Gazette* of June 7. The following additional facts are brought out in the report of Professor William L. Puffer, who made an examination of the electrical conditions at the tunnel.*

The power house is 2.4 miles from the west portal of the tunnel, and a 25-cycle, single-phase current at 11,000 volts is transmitted to the tunnel over a wire line on poles. The current is distributed to separate sections of the over-head trolley wire by six feeders. Each trolley wire in the tunnel is made of three separate wires fastened together at 10 ft. intervals. The insulators, 100 ft. apart, are suitable for 300,000 volts. The return current from the motors passes over the rails to the west portal, where it is collected by a special return wire.

In the event of an accidental or abnormal increase in the current sent out from the generator, an automatic device immediately switches a large resistance into the circuit and limits the rise of current, and if this excess is of more than momentary duration, another switch disconnects the generators from the wires and leaves everything dead. On the switchboard of the power house is an automatic instrument which draws a line on a continuously moving wide paper ribbon indicating the momentary fluctuations of the total demand for power of the various electric locomotives. The fluctuation of this line records the moment of starting of every motor and the cutting off of power, and from it can be made a very fair study of the movements of individual motors or engineers.

Professor Puffer made tests showing that there was room for the engineman to put his head out of the cab window. Throughout the tunnel there was at least 4½ in. space from the side of the cab of the steam engine that was in the collision, and at the place where the engineman says he looked forward and saw the signal there was a space of 18 in. He had to project his head not over 2 in. in order to see the signals in the manner described. It is possible, however, that he may have seen the signal lights some distance ahead, while at the same time the men looking out of the front windows of the motor car (at a different angle) may have been unable to see the lights on account of smoke, and that their first view was of the "double green." Attention is called to the possibility that a red and a yellow may change to green at the same time not only on the closing of a switch in the block section, but also when a signal is put in order after having been out of order because of a broken wire or other defect.

Professor Puffer's search for conditions which would make possible a false clear signal was "long, difficult and discouraging." The signals seemed able to meet every line of attack by showing a stop signal at the slightest attempt to tamper with them.

The signal current in the rails is alternating, 60-cycle. The energy for the signal circuits is taken from an electric light company, over special wires and special transformers. Accidental injury to the signal circuits from either high potential

*The plan of the wiring for the signals in the tunnel is the same as that described in the report presented by Committee No. 10 to the Railway Signal Association last October (*Proceedings*, Vol. 8, pages 415, 424 and inset following 424).

currents or lightning is prevented by several sets of arresters and unusually elaborate double transformation.

The rails in the tunnel are 45 ft. long, laid with even joints. Each block section is divided into two track circuits, and each track circuit is fed, in the middle of its length, at a pressure not exceeding 30 volts. There are three kinds of relays; the most important one is called the galvanometer relay. One of its two electrical windings is permanently supplied with current from the transformer near it; the other receives current from another source over the signal (wire) circuit from the transformer at the beginning of the next block to the east. According to whether this latter current flows one way called "normal," or the other way called "reversed," or does not flow at all, the moving part of this relay rocks (revolves) to the one side or the other, or remains in the middle position.

The rocking element carries four sets of contact points so arranged that when in the middle position, current is cut out of two simple relays; these being open, one turns on a red light and the other a yellow light, as their armatures fall against the back stops.

When rocked in a normal direction by the normal current in the signal line, contacts are closed and current is sent through both light relays, attracting their armatures and thereby turning on two green lights.

When the current in the signal line is reversed, the galvanometer relay rocks in the opposite direction, sending current to the first relay, thereby turning on a green light, but sending no current to the other relay, which maintains a yellow light, because its armature is down.

The galvanometer relay has other contact points controlling a pole changing relay, through whose contacts a current derived from the near signal transformer is delivered in the normal direction to a set of signal wires going to the next signal in the rear. The pole changing relay reverses the current only at such times as it is not supplied with current from the contacts of the galvanometer relay; this occurs when there is no current in the moving element, and it is in the central position; and the lights show red and yellow.

There is a track relay at each end of each track circuit. As each block is a "cut section" the wire circuit controlling the signal extending the length of the block must be closed at four points in order to clear the signal. With any one of the four track relays demagnetized, the galvanometer relay on the signal wire rests in a neutral position. A current of one polarity passing through it holds the home signal at clear and one of the opposite polarity holds both home and distant clear.

Professor Puffer experimented with trains and engines to see if the propulsion currents could interfere with the signals. Describing these trials he says:

I find from a study of the automatic record at the power house upon which each engineer has unknowingly written more or less clearly his movements just previous to the accident, and from the train sheets of the day, that there were four motors in use. No. 5002 had just brought a freight train out of the west end of the tunnel and was using no power at the moment, but had been using a little at the yard; No. 5003 was drifting out light at the west end under no power; No. 5001 was on the eastbound freight and was slowing down just outside of the east end of the tunnel, and was using little, if any, power, but had been using power to accelerate its train and get out of the tunnel; No. 5004 was drawing the passenger train and probably coasting with no power on, but I am certain was not using power for three-quarters of a minute before the accident, during which time it would have gone 1,320 ft. if traveling at 20 miles per hour.

If any 25-cycle propulsion current did affect the signal H 1376, it must have come from the motor of the eastbound freight train; and with this in mind, I placed some cars at about the place where the freight must have been, and had a motor with brakes set run back and forth over the impedance bonds at the east end of the tunnel. Simultaneously an engine was caused to stop with its front wheels part of the time on the one side, and part of the time on the other side of the track insulation at the setting point. I stood on the track watching the lights of the signal and saw that it operated perfectly with no hesitation and indicated clearly the progress of the motor through the tunnel and into the yard, giving the double green as the track was cleared, and then the green yellow and red yellow as the motor backed the cars into the tunnel and went to seesawing over the insulation at the end of the block. Nothing abnormal happened and the signal went through the proper changes as the cars were removed and the motor came back to get my engine.

Professor Puffer also tested the track relays to make sure that they did not respond to the propulsion current of 25 cycles. "The design is extremely ingenious and contains so many precautions against a false clear signal that it seems almost impossible that such a thing could occur." Yet relays have been known to stick and refuse to move. The provision of two relays in each section is claimed to guard against danger from such a failure.

The inspector, or his assistant, visits every signal and relay in the electric zone once a week, at least.

Professor Puffer found that very small whiffs of smoke emitted by steam locomotives and subsequently whirled about by trains would completely or partially obscure the signal lights. Such whiffs were seen to obscure one of two lights at the same signal, but not the other. The tail lights of a receding train were noticed to disappear in a very few seconds.

Concerning possible derangement of signals, the reports says:

I have found two theoretical abnormal conditions which will explain the showing of two green lights when a train is in the block provided certain unlikely, yet possible derangements were to happen. I have found no evidence of such a condition, nor has it been artificially produced.

First Condition.—Assume the rear of the freight train somewhat east of the track transformer of the first track circuit section east of H 1376. Assume the passenger train approaching the signal H 1376 at any point. Assume that through some fault, derangement, or leakage of current the signal line as it approaches the track relay at the beginning of the block receives a suitable amount of current in the normal direction from any of the many wires connected to the transformer at this point. Assume that this leakage is in the normal direction and sufficient in quantity to hold the galvanometer relay in the position corresponding to double green. The freight train will short circuit the track transformer, thus opening the contacts of the first relay in the block, causing the signal to show red-yellow. As the rear of the freight passes on, sufficient current from the track transformer will again pass through this track relay, closing its contacts and allowing the leakage current to change the galvanometer relay into its position to show a double green. When the motor of the passenger train passes the setting point and into the block, it will open the track relay and by cutting off this leakage current, cause the signal to show red-yellow. The above explanation would produce conditions which tally exactly with those stated by the steam engineman, and would require a train in a position in which the freight train could well have been. Such an accidental condition of affairs would probably never be reported as the lights operate properly under the conditions produced by trains in exactly these positions, and even then the signals would only stop a train. However, it must be said that had an observer been standing and watching H 1376 as single trains went by, he would have noticed that the combination of green-yellow might never be seen as the reversed current might not be strong enough to overpower the leakage current.

Second Condition.—Assume that the rear of the freight train was about to pass over the impedance bond in the middle of the block (at the cut section), and that the track relay on the

east of this insulation was either out of adjustment or that its contact points were sufficiently burned or roughened as to never interrupt the circuit through them under any position the relay might take. With the freight train here, the relay west of the insulation at this point would interrupt the signal circuit, causing H 1376 to show a red and a yellow. Instantly upon the passage of rear wheels beyond the impedance bond the signal line would be completed, and the signals would change to double green, and so remain until the forward wheels of the motor of the passenger train passed into the block, or the movement of the freight took the current from the track transformer. This combination produces the effect as described by the steam engineman, and assumes that a freight train about 1,500 ft. long would not immediately take sufficient current from the track transformer of the eastern section of this block to cause the track relay at its eastern end to lose its magnetization and open the signal circuit.

In conclusion, the report says: . . . The complete electrical installation shows the highest degree of skill available, and there has been no use of any but the best of materials and apparatus.

An examination of the interior of the tunnel from end to end with the aid of a powerful search light to note the methods used in the installation of trolley wires, cables and signals, shows that the construction is first class in every way and very creditable to those who worked under such adverse conditions.

The automatic, electric signals of the electrified zone are as reliable and trustworthy as any which are available, but signal H 1376 could have changed and may have changed from red-yellow to double-green due to a combination of events, which, while improbable, is not impossible. . . .

The high voltage propulsion power was immediately automatically cut off at the power house when the trolley wires were either jammed against the wall of the tunnel or against the iron parts of either the electric motor or the locomotive. This contact was so complete that almost no flash or light was produced by it in the tunnel, and the two subsequent tests with power made no light and could not have started the fire because of the completeness of the short circuit.

Neither the electrification of the Hoosac tunnel nor the use of the rails for returning the propulsion current to the power house is in any way responsible for the accident, for the fire following the accident, or for the failure of any signal to indicate danger.

I am of the opinion that the enginemen of the electric motor No. 5004 may not have seen the red-yellow lights before the double green of signal H 1376, nor the tail lights of the freight train as they approached it, because of the smoke made by the westbound and the eastbound freights; and at the moment of the collision they were coasting and looking for the telltale signal at the 1,000 ft. mark.

The country between Port San Antonio, Argentina, and Valdivia, Chili, has been surveyed, and a favorable report has been made on the proposal to build a transandine railway connecting these ports. The railway under construction from San Antonio to Nahuel Huapi would be used for about 300 miles of that section; 200 miles have already been completed. The line would then run for about 60 miles up the valley, where the mountains are much lower than they are in the section further north.

The Caledonian Railway, Scotland, awards annually a prize of ten dollars for the best essay on a stated ambulance subject sent in by any employee of the company. This year the essay was "Unconsciousness, Its Principal Causes and Treatment," and in all 26 papers were submitted. The prize was awarded to William Tavendale, ticket collector, Perth. Mr. Tavendale has won this prize on two previous occasions, 1905 and 1906.

RAILWAY SIGNAL ASSOCIATION.

On the second day of the New York meeting, which was in session as we went to press last week, C. J. Kelloway, signal engineer of the Atlantic Coast Lines, presented on behalf of Committee No. 2, Mechanical Interlocking, seven drawings of interlocking station leadouts, which were approved after a short discussion.

Following this the discussion of the rules submitted by Committee No. 5 was completed. It was moved that the proposed changes in rules 334 and 365, concerning manual block, and 434 and 465, concerning controlled manual block, are unnecessary. Several revisions were made in the proposed rules 629, 630, 631 and 667, included under the operation of interlocking plants. These rules were referred back to the committee for further consideration.

The additional rules for signal maintainers at interlocking plants were discussed at considerable length, and it was suggested that the rules avoid specifying practice and confine their instructions to employees of the signal department as in the case, for instance, where one of the proposed rules specifies that fiber insulation in pipe lines, insulated joints or insulated switch rods must be renewed by track forces in ample time to prevent failures. It was pointed out that the signal department has no right to specify the duties of track men and that the words "by track forces" should be eliminated. The discussion brought out the fact that if the rules referring to the care of lamps were separated it would materially add to the convenience in distributing the rules to employees. It was decided to refer back the proposed rules to the committee for revision.

R. C. Johnson, assistant signal engineer of the New York Central Electric Zone, and chairman of sub-committee "E" of Committee No. 3, presented an outline of specifications for the protection of drawbridges by electro-pneumatic power interlocking. C. E. Denney (L. S. & M. S.) suggested that the R. S. A. ought to co-operate with bridge engineers in preparing specifications for drawbridge interlocking, and a motion to the effect that the secretary be instructed to communicate with the American Railway Bridge and Building Association was carried.

The specifications for oil-cooled transformers and core type impedance bonds for use with direct current propulsion, submitted by H. S. Balliet, chairman of the Commitee on Electric Railway and Alternating Current Signaling, were approved.

The report of Committee No. 9 on Wires and Cables was presented by W. H. Elliott. It is possible for a compound of comparatively low specific gravity to meet the present insulation requirements and still contain too little rubber per foot of insulation to give the best results. From the standpoint of the user the unit of volume would be a more reasonable standard on which to base the requirement as to the amount of rubber. A number of additions and changes in the specifications were presented. The principal ones consisted in increasing the minimum specific gravity to 1.85, increasing the minimum tensile strength to 1,200 lbs. per sq. in., materially reducing the test voltage and changing somewhat the allowable ingredients and the required method of vulcanizing.

It was suggested that tests be made in conjunction with the manufacturers to determine whether some wires that do not pretend to meet the R. S. A. specifications and do not depend on rubber alone for the preservative qualities are not in reality better. Mr. Elliott replied that the manufacturers have shown the committee their full process; and the committee lacks only the co-operation of signal engineers to carry on tests to find out how long wire of various kinds and makes will last. The committee believes that the new specifications will raise the requirements sufficiently by calling for a certain volume as well as a certain weight. Replying to questions, Mr. Elliott said that the specifications as now offered are the result of a study of eleven formulae given to him by the manufacturers. The motion originally made by Mr. Elliott to adopt the recommendations of the

committee was amended so as to exclude the paragraph (4) concerning the ingredients to be used in the mixture; and was then adopted.

The report of the Special Committee on Storage Battery was presented by R. B. Ellsworth (N. Y. C.), chairman, and consisted of a set of specifications for lead type storage batteries for power stations. In the discussion of the specifications the paragraph on separators, specifying that they shall be either of specially treated wood, hard rubber or a combination of both, was revised to allow wood only. The paragraph in the section on elements, stating that positive and negative plates shall be preferably of the pasted type, was referred back to the committee, and the remainder of the specification was approved with a few slight revisions.

Committee No. 4, on Automatic Block, through A. G. Shaver, chairman, reported that a change has been proposed in the specifications for caustic soda primary battery, to include barrel-shaped jars, and that it would be advisable to prepare specifications for galvanizing. The committee was instructed to prepare these specifications for the October meeting, and to make the necessary revisions in the specifications for caustic soda cells.

On Thursday afternoon, W. K. Howe, of the General Railway Signal Company, gave a short talk on the subject of voltage ranges, which had been discussed on the previous day.

Committee No. 7, on Definitions, was the last to make its report. A. G. Stradling, signal engineer of the Chicago, Indianapolis & Louisville, presented about 200 definitions which the committee had prepared. A number of revisions were suggested, and the committee was given a number of new words to define.

The meeting adjourned at four o'clock, after running practically on schedule throughout the entire four sessions. The total attendance was about 200.

PIPE LINES HELD TO BE COMMON CARRIERS.

The Interstate Commerce Commission in an opinion prepared by Commissioner Lane, has held that pipe lines are subject to the Act to Regulate Commerce as common carriers; and this notwithstanding various objections presented by the proprietors of lines. The substance of the opinion follows:

This is a proceeding instituted by the commission on its own initiative. The hearings held in various parts of the country developed certain facts which made it advisable that before continuing to a conclusion of the investigation certain questions of law should be argued before the commission. Accordingly, on the record made, seven questions were formulated and presented to the pipe-line companies, into whose operations the investigation had been made. These questions go to the power of the commission to regulate the rates, rules, and practices of these pipe lines as common carriers. These questions may be summarized into the one interrogatory: Have these pipe lines been placed under the jurisdiction of this commission as common carriers? We shall proceed to a consideration of the questions propounded.

QUESTION NO. 1.

Does the act to regulate commerce impress the obligations of a common carrier upon a pipe line engaged in the transportation of oil in interstate commerce, even though such pipe line was built over its privately acquired right of way, and (by pursuing a policy of refusing to receive oil into its pipes except as the purchaser of such oil) transports only its own oil?

Section 1 of the act to regulate commerce was amended in 1906 so that it applies to corporations or persons engaged in the interstate transportation of oil or other commodity, except water and except natural or artificial gas, by means of pipe lines and partly by pipe lines and partly by railway, or partly by pipe lines and partly by water.

The record discloses that the Prairie Oil & Gas Company, the Ohio Oil Company, and other of the pipe line respondents, have never held themselves out to the world as common carriers, but have made it their business to buy oil at the producing well and transport it by means of their own pipe lines across the state lines and sell it within the other states. They claim to be dealers in oil who use their pipe lines solely to convey their own property from state to state.

Upon these facts the question is raised as to whether the provisions of the section of the act above quoted are applicable to such carriage. It is urged that Congress does not possess the power to require that pipe lines shall not engage in interstate transportation of oil excepting as common carriers. A safe construction, accordingly would be one which made the act to read as if written, "All pipe lines transporting oil between the states as common carriers shall become subject to the provisions of the act to regulate commerce." In short the claim is that Congress did not intend to bring under the jurisdiction of the act any pipe lines other than those which hold themselves out as common carriers.

We shall not consider the constitutional question here involved. If there were doubt in our minds as to the purpose of Congress, it would be proper to resolve that doubt upon the side of constitutional safety, but it seems quite manifest to us, from the history of this amendment to the act and from its language, that Congress intended to convert the interstate oil pipe lines of the country into common carriers. Whether Congress could lawfully so act is a matter for the courts judicially to decide. The Interstate Commerce Commission is an administrative body which may not presume to annul by interpretation an act of the federal legislature. So far as we are informed, the Supreme Court of the United States has never been called upon to pass upon a question of this character, and while it may be conceded that Congress could not impose upon a private pipe line the duties and responsibilities of a common carrier, it is not clear but that the provisions of this act could be upheld upon the ground that Congress was establishing a condition to which any pipe line company must conform which transported oil across a state border.

This seems to be the plain meaning of the act, that all pipe lines carrying oil from one state to another state, no matter what their previous status, should be thenceforward considered and deemed to be common carriers.

Pipe lines as facilities of interstate commerce were not included in the bill introduced in the Fifty-ninth Congress. On May 4, 1906, Senator Lodge, of Massachusetts, offered an amendment whereby pipe lines . . . were included in the act. During the discussion following the introduction of the amendment, it was suggested that it be limited by placing therein words which would make it applicable only to such pipe lines as "carry for the public." This was objected to by Senators Lodge and Nelson, who stated that the adoption of such language would practically nullify the provision, "because every one of these pipe lines can say, 'We refuse to do business for the public.'" There then followed considerable debate, and some further modifications, and the amendment passed the Senate, making the law applicable as above stated.

Throughout the discussion there is abundant evidence that Congress passed this act for the purpose of subjecting all interstate pipe lines carrying oil to federal regulation, and took this action consciously, in the presence of the very constitutional question now raised as to its power.

The answer to Question No. 1 will be in the affirmative.

QUESTION NO. 2.

Assuming Question No. 1 to be answered affirmatively, is such traffic divested of its interstate character by placing the ownership of the pipe line in a different corporation in each state through which the transportation passes, and by transferring title to the oil to each of such corporations contemporaneously with the entrance of the oil into the pipes of that corporation at the state line?

Discussing the case of the Oklahoma Pipe Line Company the

commission says: It is not denied that the oil when it leaves the Oklahoma points is at that time destined for storage in Louisiana and for ultimate delivery at Baton Rouge, La. At McCurtain, on the Oklahoma-Arkansas state line, possession passes from a common carrier to the owner's so-called private carrier. It also appears that title passes to the Standard Oil Company of Louisiana at the point called Ida within the state of Louisiana, and the transportation beyond to Baton Rouge is by that company as the owner of the oil through its private pipe line. . . . The change of title, breakage of bulk, stoppage in transit, or whatever it may be that happens at these state-line points, is not made in good faith for some necessary purpose. Therefore, when it is claimed that such an operation is not interstate in character, this claim is made in violation of the letter and spirit of section 7 of the act. The Supreme Court of the United States in a recent decision, *Dozier v. Alabama,* 218 U. S., 124 says:

What is commerce among the states is a question depending upon broader considerations than the existence of a technically binding contract, or the time and place where the title passed. It may be added that this state-to-state arrangement does not meet the Supreme Court test of state traffic. For after arrival of the oil at the state line, the owner does not "there and then for the first time and independently of any existing arrangement" with the pipe lines that had transported the oil thither, arrange for the transportation beyond. This is the test in the Social Circle case. 162 U. S., 184, 192.

But this state-to-state operation from Oklahoma to Baton Rouge, La., is supposedly accomplished by the location of pumping stations, or relay stations *upon the state lines.* Consider a line in its geometrical capacity, possessing only length, but neither breadth nor thickness, and contemplate the absurdity of such a line being the location of a pumping station, with its equipment of engines, boilers, tanks and accessories. Moreover, the record shows that these locations on the state lines exist only in the intent of the pipe-line companies—in fact, they are generally several hundred feet away from the line.

Our conclusion is that the traffic referred to is not divested of its interstate character by the devices shown in the record.

QUESTION NO. 3.

If a pipe line for the transportation of crude oil is built upon its privately acquired right of way, by a private corporation holding a charter subject to amendment or repeal, and the state wherein it was incorporated and wherein its pipe line is laid, later passes legislation declaring all such pipe lines to be common carriers, does such a pipe line, built before the enactment of such legislation, thereby become impressed with the obligations of a common carrier?

The Prairie Oil & Gas Company was incorporated under the laws of the state of Kansas in 1900. . . . In 1905 the Kansas legislature passed a law declaring all pipe lines common carriers. . . . No necessity exists for the consideration of the effect of this Kansas statute. The federal jurisdiction depends upon federal acts.

QUESTION NO. 4.

Does the utilization by a pipe line of the right of way of a common-carrier railway impress upon that pipe line the obligations of a common carrier?

The pipe line of the Prairie Oil & Gas Company is built for some 300 miles upon the right of way of common-carrier railways, among them the Missouri Pacific and the Atchison, Topeka & Santa Fe, the right so to build having been obtained from the railways.

While some doubt may exist as to the right by which pipe lines build on railway right of way, the mere fact that they are so built does not impress them with common-carrier obligations. This is so because the question whether a facility is a public facility does not depend upon whether it exercises the rigth of eminent domain. Furthermore, in this question of federal regulation the nature of the title to right of way is not controlling.

This question must be answered negatively.

QUESTION NO. 5.

Does the utilization by a pipe line of a highway acquired for or dedicated to the public use impress on that pipe line the obligations of a common carrier?

In building pipe lines along public highways it has been the usual policy to deal with the owner of the abutting property in acquiring such highway rights on the theory that such abutting owners own also the fee in the highway. . . . We are of the opinion that a pipe line is not impressed with the obligations of a common carrier merely because, by arrangement with the abutting owner, it uses a public highway for right of way purposes.

QUESTION NO. 6.

Assume that throughout a series of years prior to November 1, 1905, the pipe lines of the New York Transit Company in the state of New Jersey, and the pipe lines of the National Transit Company in the states of New Jersey and Maryland, engaged in the transportation of crude oil for the Standard Oil Company of New Jersey, the Seep Agency and others, and that the New York Transit Company was a common carrier by pipe line incorporated under the laws of the state of New York, and that the National Transit Company was a common carrier by pipe line incorporated under the laws of the state of Pennsylvania; was such transportation by these lines in New Jersey and in Maryland transportation by them as common carriers?

It is clear that these lines entered New Jersey and Maryland in their corporate capacities and equally clear that their operations in these two states were part and parcel of their New York and Pennsylvania operations. The "delivery stations" at the state lines were not then in existence. Certainly the operations in New York and Pennsylvania were then, as they are now, common-carrier operations. These conditions sufficed to make them common carriers in New Jersey and in Maryland. It is immaterial that the patrons of the lines were few in number. The fact remains that these corporations held themselves out to carry through to their Bayonne, Bayway, and Baltimore destinations, and in fact did so carry for such as offered goods for transportation. They were, therefore, common carriers in New Jersey and Maryland within the usually accepted definition of "one who undertakes for hire to transport the goods of such as choose to employ him, from place to place."

Nor does the fact that these lines in New Jersey and Maryland did not exercise the right of eminent domain take them out of the common-carrier class. It is not the rule that because they exercise the right of eminent domain they shall be held to be common carriers, but rather that because they are common carriers they may be granted the right of eminent domain.

We hold that the transportation by the New York Transit Company in New Jersey and by the National Transit Company in New Jersey and Maryland, prior to November 1, 1905, was transportation by these corporations as common carriers.

QUESTION NO. 7.

Does the transfer by a common-carrier pipe line to a private corporation of a portion of its property theretofore used in its common-carrier operations, but not located in the state wherein it was incorporated as a common carrier, release that property from the obligations of a common carrier?

On November 1, 1905, the Standard Oil Company of New Jersey purchased from the New York Transit Company all the latter corporation's pipe-line property in New Jersey, and likewise purchased from the National Transit Company all of

that corporation's pipe-line property in New Jersey and Maryland. Discussing these transfers the commission says:

There is a line of authorities which permits a common carrier to abandon operations which cannot be profitably conducted, but no element of abandonment exists in this question. These New Jersey and Maryland lines, after November 1, 1905, handled the same flow of interstate commerce which had passed through them before that date.

The facts in the case show rather an arrangement whereby a common carrier divested itself of its terminals and turned them over to its principal patron for that patron's sole use. And the entire and complete failure of the government and of this commission to obtain any reason for this transfer of property on November 1, 1905, fairly warrants the inference that it was done in anticipation of legislation which was enacted in June, 1906, and which was foreshadowed by a governmental investigation.

The seventh question must be answered negatively.

In accordance with these conclusions, an order will be entered against the Oklahoma Pipe Line Company, the Prairie Oil & Gas Company, Standard Oil Company of Louisiana, the Ohio Oil Company, Standard Oil Company of New Jersey, the Tidewater Pipe Company, Limited, Producers & Refiners Oil Company, Limited, United States Pipe Line Company, Pure Oil Company, Pure Oil Pipe Line Company, the National Pipe Line Company, the Uncle Sam Oil Company, and the Uncle Sam Oil Company of Kansas, that they file with this commission on or before September 1, 1912, schedules of their rates and charges for the transportation of oil, in compliance with the provisions of the act to regulate commerce. (24 I. C. C., 1.)

TIE-TREATING PLANT AT GAINESVILLE.

The Atlantic Coast Line Railroad Company is erecting at Gainesville, Fla., a two-cylinder plant for the creosoting of its pine cross ties and such piling and structural timber as may be required.

The location is a level tract of land 180 ft. above sea-level adjoining its main line between Jacksonville and St. Petersburg, Fla. The storage yard, which is about 3,100 ft. long, has five tracks parallel to the main line. The plant proper is at the south end of the yard, the storage tracks leading from a ladder track which springs from the main line at the north end. All the track paralleling storage space is laid with a third rail for the handling of the 24 in. gage tie and piling cars.

The railway company is putting in the concrete foundations for the tanks and main building, and the retaining walls for the loading platform, while the Allis-Chalmers Company of Milwaukee, Wis., has the contract for furnishing and erecting all steel work, machinery and piping. These comprise two 150,000 gal. creosote storage tanks; one 45,000 gal. water tank and tower; an underground tank for receiving creosote from tank cars and for the quick handling of creosote in the impregnating operations; two overhead working tanks; a drain tank; two sap drums; two 150 h. p. internal furnace tubular boilers; one American ingot iron self-supporting stack, and other necessary standard steam plant equipment; an air receiver; two 138 ft. 7½ in. x 6 ft. 2 in. x ¾ in. cylinders, with specially designed doors at each end; two pressure pumps; one general service pump; an air compressor; a vacuum pump; a fire pump; a 30 k. w. generator; an experimental plant, complete with tank, cylinder and pump; all piping, thermometers, gage and miscellaneous fittings; a steel-frame building with corrugated iron roofing and sides; a narrow-gage track scale; a fire line with hose and hydrants, and the necessary tie and piling cars.

The railway company previously owned at its export terminal docks, Jacksonville, three 250,000 gal. tanks. The Allis-Chalmers Company has equipped these with heating coils and other necessary fittings, and has put up in addition one 500,000 gal. tank, giving at this point a total storage capacity of 1,250,000 gal. The same company has furnished and placed the pipe line from the tanks to the dock, and installed a small pumping station. Creosote oil will be received from tank steamers, and stored at this point, and transferred in A. C. L. tank cars to the Gainesville plant as required.

In the center of the creosoting yard, on a line with the cylinders is a 300 ft. loading platform, or dock, carrying three narrow gage tracks and flanked on each side by a depressed standard gage spur; for the transferring of treated material, timber and ties, from the cylinder cars to standard gage cars for shipment.

The tie and piling cars will be moved in the yard by a 19 ton narrow gage switching locomotive, and a locomotive crane will be used in moving piling and timber. Space has been provided in the main building, adjacent to the pump and cylinder rooms, for a machine shop, equipment for which is to be installed later.

Ties are to be air seasoned before treatment, and the full-cell process of impregnation followed. The majority of the ties now being bought carry only 10 to 15 per cent. of sapwood, being practically heart ties, and with the protection thus afforded are expected to last 18 years. The plant is designed throughout, however, so that the Rueping process may be used to the best advantage without change in equipment, if at any future time the adoption of that process and the treatment of sap ties shall become advisable. The yard has storage capacity for 500,000 ties, besides miscellaneous timber, and the plant will be able to treat about 1,250,000 ties annually.

The plant was designed by the Allis-Chalmers Company, and is expected to be in operation by September 1.

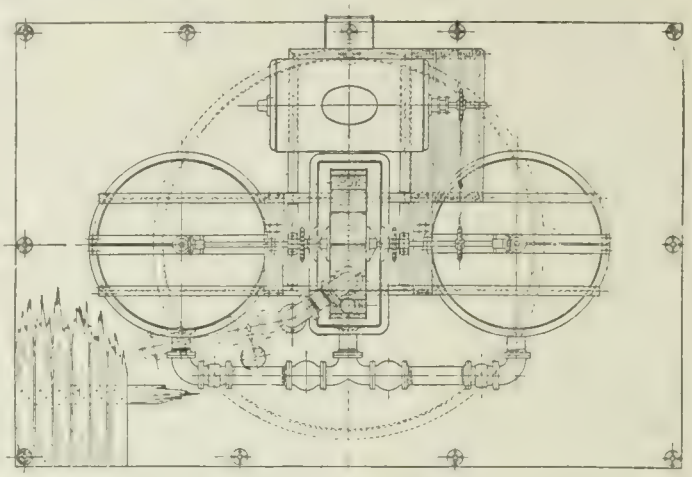
There has been considerable progress for the past year in construction of the Bagdad railway, Asiatic Turkey. This line, which commences at Konia, the terminus of the Anatolian railway, is to run to Bagdad, and when completed there will be through rail communication from Constantinople, Turkey, to Bagdad. In 1911 a new section of 25 miles from Ouloukishlou to Eregli was opened to traffic and about 50 miles of roadbed across the Adana plain was constructed which will soon be in use. The work of tunneling the Taurus and Anti-Taurus mountains was begun, and in a few years the railway will be open to Aleppo. This railway is a German concession and the construction material is principally from Germany. The company which has this concession is also furthering the irrigation of the country adjacent to its line and has already executed a plan for the irrigation of the district of Konia. Its engineers are now studying the feasibility of irrigating the plain of Adana to make it more productive. An aerial railway for the handling of cargo at the port of Mersine was also built by the Bagdad company which, however, seems to have abandoned its original intention of constructing harbor works at Mersine and is preferring the port of Alexandretta as its terminus for Syrian and Mesopotamian traffic.

Extensive plans for the electrification of the London suburban railway lines are under serious contemplation. These involve the substitution of electricity for steam on some hundreds of miles of railways in the London district. The advantages of electrical operation for handling such traffic have been so completely demonstrated that the question has largely passed out of the technical into the financial phase. In some cases the terms on which the necessary capital for conversion could be raised are such as to induce railway boards to postpone the work of electrification until the latest possible date, and in no instance is the provision of the large funds for converting to electric working a large mileage quite a simple problem. The railways which are considering the subject of the electrification of portions of their lines are the Great Eastern, the Midland, the Great Northern, and the Lancashire & Yorkshire.

LORD WATER SOFTENER.

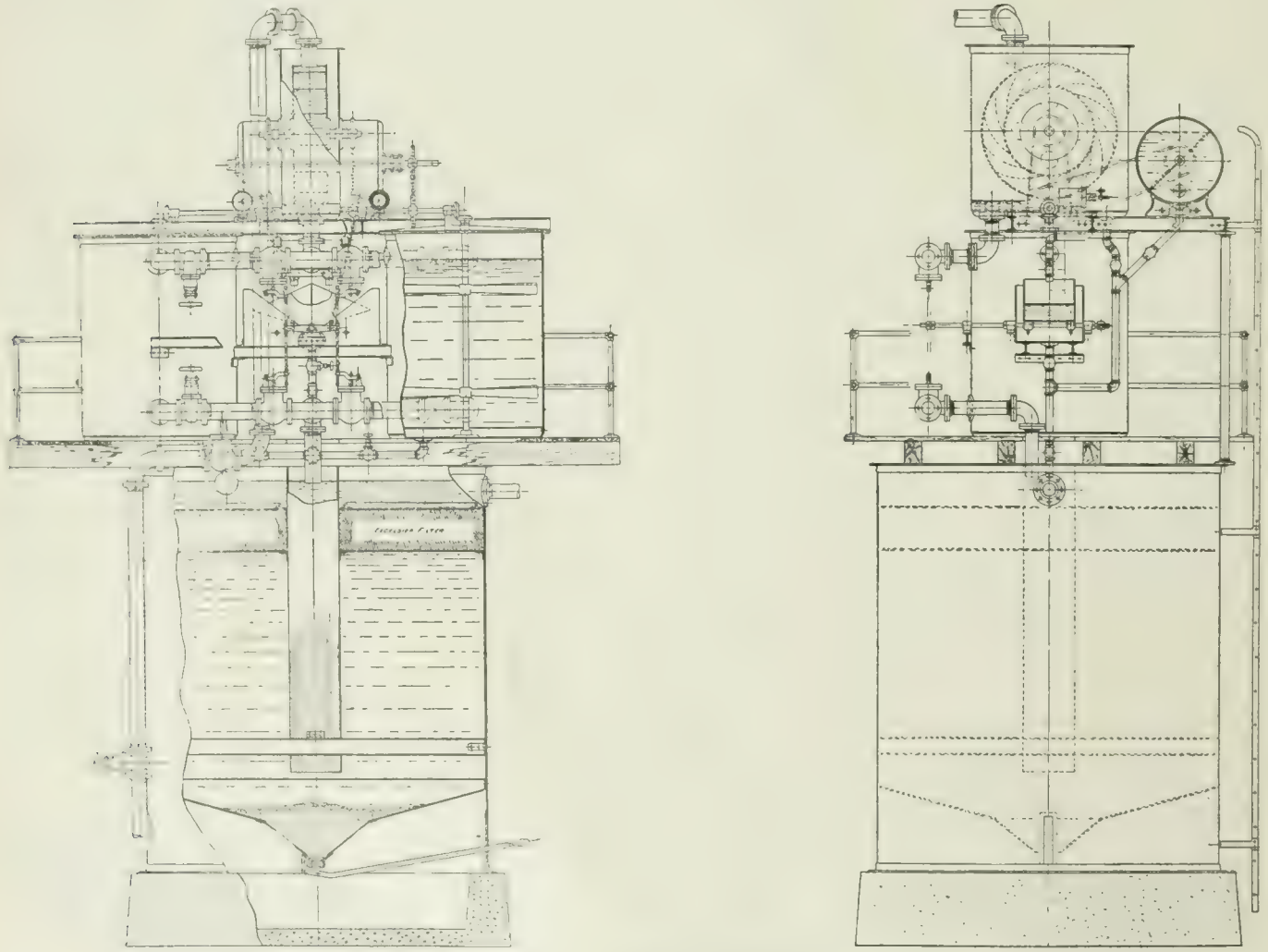
An automatic water softener or purifier, known as the Lord Model A, is shown in the accompanying illustrations. The water enters through the inlet pipe and passes over a water wheel, which furnishes the power for the operation of the filter. The shaft supporting this wheel is connected by a chain drive with a horizontal shaft above the two mixing tanks, which in turn is connected by miter gears with two vertical shafts, equipped with paddles for agitating the water in the mixing tanks, thus aiding the precipitation of the injurious solids. This water wheel also drives paddles in a chemical storage tank, which continually agitates the solution of chemicals so as to keep them of a uniform consistency and strength. These purifiers are also equipped with chemical measuring valves to regulate the amount of chemicals used from time to time. The dumping bucket also operates a series of lower valves, by opening and closing them at proper intervals, thus giving complete automatic action.

After the water leaves the water wheel, it enters the upper line of pipe and flows first to the right and then to the left. The flow is regulated by the lever valves referred to above, which are connected with the inflow and outflow pipes. For example, the water first passes through the pipe leading into the right hand mixing tank until this tank is completely filled. After this a sufficient amount of water overflows through a pipe in the upper part of the tank into the dumping bucket, which tilts and closes one upper valve and opens the lower valve directly underneath, thus allowing the water to flow from the mixing tank and enter the main filter tank of the purifier. This action is then repeated in the left hand tank and goes on indefinitely until the storage tank is filled. After the agitation is completed, the water next flows through a center partition or cylinder into the main filter tank, which separates the raw water from the treated water after it flows upward through the filters and overflows into the storage tank at the side, or directly into the boilers.



Plan View of Lord Water Softener and Purifier.

The precipitates in the meantime settle into the funnel-shaped base of the filter tank. Some of these may be carried up a slight distance, but being of a heavy nature the tendency is to settle, and on the downward flow they naturally come in contact with other particles rising and unite with them, causing them to fall to the base of the purifier where they are re-



Lord Water Softener and Purifier.

moved through a sludge valve into the sewer. The filters remove any remaining trace of precipitates.

The drawing shows the chemical measuring valve which holds a definite amount of the reagents furnished for precipitating the injurious solids. This valve is equipped with an inner measuring cup and a brass sleeve on the outside cover, which the cup slides back and forth. The cup itself has an opening at the bottom, and a small opening or air vent at the top, which allows the air to pass in and out at proper intervals. The valve is operated by a dumping bucket as it tilts back and forth, which causes the opening in the inner cup to rotate back and forth, so as to come directly in contact with the two ports on the right and left, one of which is connected with the chemical storage tank, and the other with the mixing tank. This allows the measuring valve to be filled and emptied at regular intervals, making the action an entirely automatic one. In this way a definite amount of chemical solution is fed into the mixing tank at regular intervals, the amount being so regulated as to be of sufficient strength to precipitate all the injurious solids in a tank of a given size. The float valve connected to the inlet pipe is operated in connection with the storage tank, and controls the entire system. This water softener is made by the George W. Lord Company, Philadelphia, Pa.

JOURNAL TURNING LATHE.

It is often necessary to refinish the journals on car axles when the wheels are not to be removed from the axles. With the more general introduction of the steel wheel in freight service this operation is becoming continually more frequent. A machine suitable for this purpose must of necessity be constructed to turn out accurate work since the cuts taken will be light and perfect roundness is desirable. If the axle is carried on the centers only, as is generally necessary where an old machine is adapted for this purpose, there is bound to be more or less springing of the axle on account of the heavy wheels. This will cause some lost motion at the centers that will be reflected in the quality of the work.

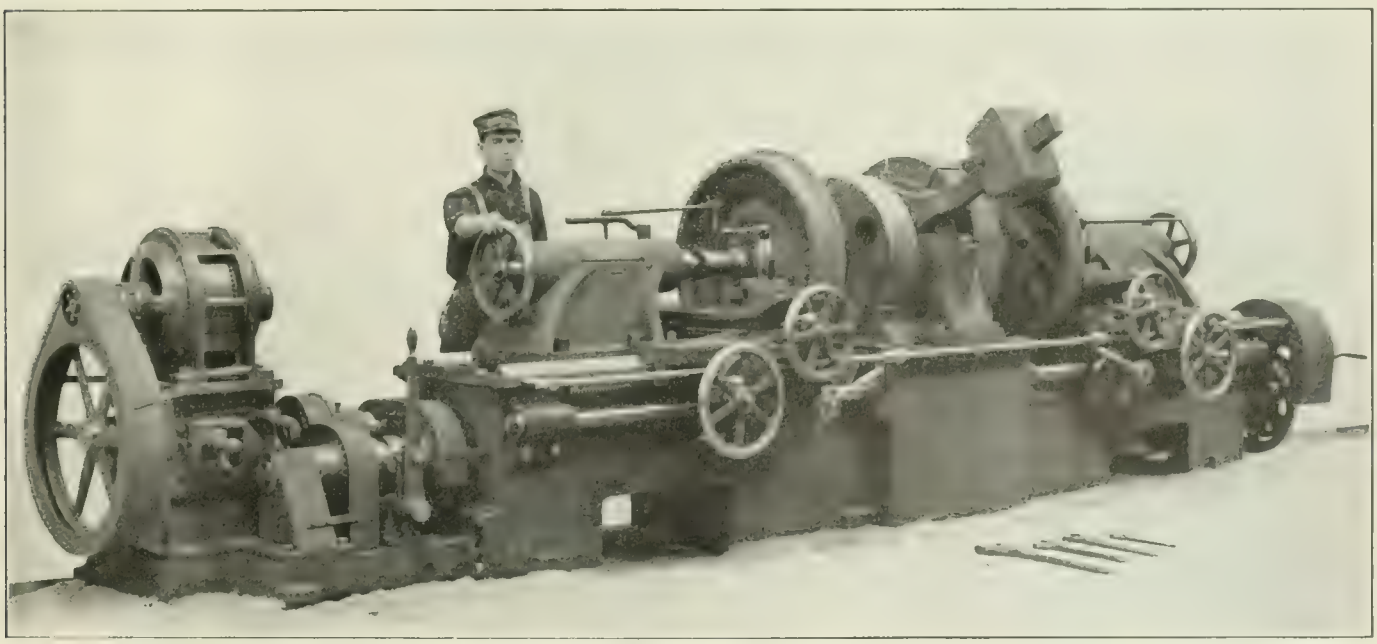
While some of the older designs of car wheel lathes were arranged and fairly well suited for journal turning, these machines are generally pretty well crowded with the work for which they are best adapted and, in fact, the more modern tools of high capacity are not even arranged to permit journal turning. Recognizing that a demand already exists which will become more insistant, the Niles-Bement-Pond Company has designed a machine especially for this purpose. It is arranged for center drive with a gap in the center head for putting in and taking out the axles, and is provided with suitable speeds and feeds for rapid, accurate turning and rolling of the journals. It has a capacity for axles carrying wheels up to 42 in. diameter on the tread. Both journals can be finished at the same time.

While the journal turning will not require much power, the machine is designed throughout and is well suited for axle turning, if a somewhat larger motor is provided. Arranged for both kinds of work, this machine could probably be kept busy in practically any shop where it would not be advisable to install it for journals alone.

The driving mechanism consists of two driving pinions so arranged that when one is opposite the gap the other is in mesh and performs the work alone. The top bearing at the center is hinged at the front of the machine and is provided with a counterweight. It is opened by simply loosening one nut on the clamping bolt, which is then swung out and frees the bearing, permitting the pair of wheels to be quickly handled. The driving dog is carried on an automatic adjustable driver plate and is so constructed that it may be quickly applied, and has a powerful grip. The arrangement is such that the axle does not spring under the strain of the cut. The feed gears are supplied with a quick change arrangement, using a sliding key, and they give all the necessary feeds for turning and burnishing.

The machine shown in the illustration is fitted with an alternating current, constant speed, motor which makes necessary the group of gears shown between the motor and the bed of the machine. Where a variable speed, direct current, motor can be used, this gearing will not be required. A 10 h. p. motor is suitable for journal work only, but if the machine is also to be used for axle turning, a 25 h. p. motor should be used.

Some new types of invalid cars have been built for the Austrian state railways. The first-class cars are equipped with a cooling apparatus for use in summer. The second and third-class cars are so made as to be easily converted into ordinary passenger cars, and after being used by an invalid for a journey they can accommodate the normal number of passengers for the return trip. This has resulted in the reduction of the charges for second and third-class invalid transportation.



Motor Driven Journal Turning Lathe.

MAINTENANCE OF WAY SECTION

THE past month has been marked by unusual floods in many parts of the country, the most serious results having occurred along the Platte and the lower Ohio and Mississippi rivers. Although high water was generally feared, after the heavy rains of the early winter, followed by the unusually heavy snows, the floods have exceeded all expectations, and have washed out large amounts of railway track. These conditions have created emergencies requiring not only the greatest ingenuity possessed by the bridge supervisors, but also the most continuous watchfulness and work on their part. Such emergencies are fully as serious to the bridge and track departments as were those caused by the cold weather and heavy snows of the past winter. The trouble will not be ended when traffic is fully resumed, for both bridges and track will need careful attention until settlement has been completed, which will require a considerable time.

CONTRIBUTIONS to the contest on Bridge Kinks should be sent in promptly in order that they may be received before June 25, on which date they will be turned over to the judges. The limits of the contest have been made sufficiently broad to include any kink coming within the field of bridge work. Those applying more directly to concrete work, which were excluded from the Construction Kink Contest last winter, are eligible at this time, as are also those relating to the construction, repair or renewal of bridges of steel, timber or other material. The field is very large and the opportunity for the development of these kinks is great. The conditions under which bridge work must be done, such as stage of water, traffic, time of completion, etc., frequently make necessary the adoption of special methods which are, however, many times capable of wide adoption, at least in general outline. Prizes of $25 and $15 will be awarded for the two best contributions, while others accepted and published will be paid for at our regular space rates. All contributions should be in the hands of the Civil Engineering Editor of the *Railway Age Gazette,* 417 South Dearborn street, Chicago, by June 25.

THE next contest in this section will be on the subject of "Tools," and will include descriptions of tools which can be employed to advantage in any branch of maintenance of way work and which are not now in common use. Within these limits will come the many devices which have been worked out to meet certain needs locally, and which may be capable of wider application, but which have not been patented and placed on general sale. Descriptions of these devices should be clear and explicit, and should, if possible, be accompanied by sketches or photographs that their construction may be well understood. The descriptions should include statements of the relative advantages of the tools described over those more commonly used, as the awards will be based largely on the importance of the improvement made. This contest will include many more or less simple track tools, such as improved tamping bars, or shovels, and similar devices in the bridge, water service and other branches of maintenance work, as well as the more complicated machines for doing heavier work, such as small derricks, etc. Nearly every supervisor of bridge, track or water service has made special tools for his own use. Many of these are available for wide use if brought to light. A number have already been received in the different bridge and track kink contests which have been published. One such kink published in these columns, describing a device which it cost less than $5 to make in the company shops, saved over $250 per month on one division of one road last year. The field for the development of such devices is large and the number of them is rapidly increasing. Prizes of $25 and $15 will be paid for the first and second best contributions, and we will pay our regular space rates for all others accepted and published. All contributions must be in the hands of the Civil Engineering Editor of the *Railway Age Gazette,* 417 South Dearborn street, Chicago, by August 25.

THE need of keeping the entrances to all culverts and bridges free from brush and other obstructions is well known, and yet it is not uncommon to see the channel leading to a bridge remain partially blocked for some time and to learn of washouts and other troubles resulting from these conditions. Master carpenters and bridge supervisors should be continually on the watch for such conditions and should also see that the bridge and track foremen are instructed regarding the necessity for keeping all channels clear. At this time of year, when bridge repair and renewal work is under way the foremen will occasionally leave refuse lumber or piling lying in the stream, which is likely to cause trouble at the first freshet. The damages arising from blocking a waterway are not confined to those from washouts, although these are probably the most serious, but damage claims following the backing up of water on to adjacent property can very frequently be traced to the same cause. Much ballast is also damaged or destroyed by water flowing over the track and depositing mud on it which cannot be entirely removed. From this time on through the summer freshets may be expected any day without warning, so that it is necessary constantly to be prepared for them. The time and care spent in carefully studying the drainage area and the local conditions in order to provide a suitable waterway are wasted unless equal care is exercised by the maintenance forces to keep the channel open. As an illustration of the results of blocking the channel the experience of a large road last year may be instructive. When heavy engines were introduced on one division a bridge across a small stream which was subject to quick floods was found to require strengthening. As a temporary expedient piling was driven as additional support. Following a heavy thunderstorm the creek rose one night very suddenly and deposited a large amount of debris against this piling. The water was forced over the track, washing a large opening in the line as well as in that of an adjoining road, and putting the main lines of both roads out of service for several hours. The cost of properly strengthening the bridge in a permanent manner may have justified taking the chance on such a flood occurring, but the results were disastrous and the damages amounted to far more than the cost of doing the work properly in the first place.

WE publish elsewhere in this issue three discussions of the hobo as a track laborer, prepared by men who have handled this class of labor extensively; and we hope to follow these in succeeding months with similar discussions of the Italian, Mexican, negro, Japanese and other nationalities employed extensively in track work in various parts of the country. While the local supply of labor is usually such that only one or two classes of labor are employed to any extent in one locality, the limits between the portions of the country in which the different nationalties predominate are rapidly changing. The hobo has practically disappeared from the eastern states and is now only found to any extent in the central states, where he is fast diminishing in numbers. The Italian and Greek predominate in the eastern states and are rapidly moving westward. The Mexican, who, a few years ago was found only in the southwest, has now moved as far east as Chicago, and is found in large numbers in Missouri, Kansas and adjoining states. The Hindu is increasing in numbers on the Pacific coast. Therefore, the man who is handling a certain class of labor today may be called upon to work men of an-

other nationality and of different characteristics and ability tomorrow. It is our purpose in presenting these discussions to give the experience of men who have handled successfully the kinds of labor mentioned, for the information of those who may be called upon to handle them. No two classes of labor can be handled in the same way. Many supervisors and foremen who meet with success with one kind of men are less successful with others through their failure to understand them and to adapt methods to their peculiarities. For instance, the severe methods of handling the southern negro would drive the more sensitive Japanese from the work. Likewise, the provision that must be made for feeding and housing the men vary with the different nationalties, as does their ability to handle different kinds of work. The average supervisor at the present time does not have the opportunity to learn these different characteristics of more than three or four nationalities at most, and when new men are sent to him, with whom he is unfamiliar, he is forced to do more or less experimenting before he comes to understand them and to get the best results. It is to be expected that differences in opinion regarding the relative value of the different classes of labor will appear in these discussions, based upon the varying individual experiences of the writers, and it is for this reason that we plan to present the ideas of three or four men, that the reader may be better able to get the information that will best meet his requirements.

THE method of tie distribution and renewal on the Rock Island which is described elsewhere in this issue, indicates the thoroughness with which this feature of maintenance work is studied on this road. While some other roads, perhaps, give the same amount of attention to this subject, this is not the case in many instances. The importance of a careful study of the subject is not always realized, and can best be emphasized by noting the report of the Interstate Commerce Commission for the year ending June 30, 1910, which shows that while .922 per cent. of all operating expenses was for rail, 3.099 per cent., or over three times as much, was expended for ties. This latter amount was over one-seventh of all expenditures for maintenance of way and structures. In the method described not only are the estimates of ties needed for the year carefully prepared by the roadmasters after close personal inspection of the track, but they are closely studied in the general offices, in the light of expenditures made in previous years and on other subdivisions maintained under the same general conditions. Likewise, the program of tie distribution is carefully planned with reference to the source of supply as well as to the importance of the tracks in which the ties are to go. Hauling ties back and forth is restricted as much as possible by following this definite program in making shipments. This in itself is a feature which is sometimes overlooked and the amount of needless hauling back and forth is not realized until statistics are collected. Very frequently the idea prevails that because the company is moving its own material it costs nothing to haul it, but whether or not this cost is charged directly against the material, it is present. Likewise, with the rapidly increasing cost of ties, the necessity is becoming more apparent for classifying them according to the service they give under the various densities of traffic and distributing them accordingly. Following this plan, a certain stretch of line over which the same amount of traffic passes, will be laid throughout with the same kind of ties. It is not a great step in advance of this to further distribute the ties according to the roadbed conditions, and place the strongest ties where the roadbed is weakest and the load upon the ties therefore the heaviest. For instance, ties on an unstable, wet roadbed require more strength and heavier preservative treatment than do those in a dry, rocky cut, and the roadmaster can well take these conditions into consideration when distributing his ties. Economy in tie renewals begins first with a careful inspection of the ties to see that none is removed which is fit for further service in the track consistent with the proper maintenance standards, and continues through the selection of the tie to replace it, its treatment, its transportation to the place of renewal and its installation in the track.

THE AMERICAN RAILWAY ENGINEERING ASSOCIATION.

THE practical value of the work being carried on by the American Railway Engineering Association is best indicated by the proceedings of the thirteenth annual convention, copies of which are now being distributed among the members. Although the proceedings this year are bound in one volume, they contain over 1,200 pages, and include reports of nineteen standing committees, and several special committees.

The history of this association is unique, for few, if any, similar associations have attained so great prominence and have been recognized as the authority in their field in so short a time. It has now reached such a stage that with proper guidance its future is secure, as it has passed through the critical period of rapid growth, and has now settled down to a more steady, but nevertheless continual development.

Because of its position the association has a great field for activities before it, and fills a place which it was not possible for any other organization to fill. Being free from any official backing by the railways, its members express their views as individuals and work out the problems which are of common interest to them as engineers in responsible charge of work on American railways. Through such an organization data from many roads can be compiled and studied, and results secured which are much more accurate than it would be possible to gather from any one road, because of the influence of local conditions. This has been especially true in the study of rail failures, where the reports from eighty-three railway companies were collected and tabulated last year.

Another advantage which is possible is the undertaking of investigations of important subjects of interest to all roads which the individual roads cannot undertake because of the expense or lack of facilities. The association can serve as a common agent to prosecute such studies, and the results are available for all, eliminating in this way needless duplication and confusion. As these investigations are carried on directly by committee members or by trained investigators working under the direction of the committees, it is possible to secure data in a shape capable of direct application to the problems of the railways. Work of this kind will doubtless be taken up by the association more and more as it assumes its proper position as the common agent of the railways to investigate all problems of an engineering nature.

The rail investigation is a conspicuous example of the kind of study possible only by such a society. The committee last year consisted of 23 men, most of whom were chief engineers or consulting engineers in direct charge of rail investigations on their respective lines. The study of this subject, probably the most important one which has been undertaken by the association, has been carried on continuously since its organization. As a result of this, specifications for the manufacture of rails were presented by the committee and adopted at the last meeting, under which rails are now being rolled. It is expected that these rails will show a marked improvement in service over rails which have been rolled during recent years. Studies of such specifications properly come within the scope of this organization. Although the earlier investigation of the rail question was conducted by the American Society of Civil Engineers, only a portion of whose members were directly interested in railway operation, it was very properly relinquished to the new organization.

An important feature of the work of the association is the preparation of standard plans and specifications for various materials, in this way promoting uniformity among the different roads. Most roads now have their individual standards, which are the result of the combination of the ideas of different men on those roads. The association is trying to still

further combine the standards so that they will be suitable for all the roads, or at least for those which are operating under similar conditions of traffic and climate. The standardization of material is of direct economy in making purchases, to the roads that adopt the standards, and to other roads as providing standards of good practice for guidance.

The value of the association's investigations to the individual railways cannot be overestimated, and its field of usefulness is rapidly broadening as the operation of the railways is tending more and more along scientific lines. The future will demand more and more studies of this nature, and the work of the association must of necessity be greatly increased to enable it to maintain the important position it now holds.

With the growth in the work of the organization, a natural increase in expenses is to be expected. The association derives no financial assistance directly from the railways, this assistance being confined to encouraging their men to maintain membership in it and to offer facilities for special study and experimental work. The strength of the association is very largely due to its representative membership, especially among the higher engineering officers, combined with the fact that these men have given freely of their time and energy to further its work. This membership, however, is far from complete, especially among the younger men, many of whom hesitate to join or do not realize the value of membership. It is among these younger men that large increases in the membership are possible. Membership in the association has come to denote progress, and to stand as a distinct credit to a man. The reports and bulletins are of much value, and are coming to be sought more and more as books of reference by those outside its membership.

From the standpoint of the association a larger membership is desirable in order to increase the funds available for more work. Large economies have been effected in the conduct of its affairs during the past year, but the limit in this direction has been closely approached, and it will be regretted very much if its work shall be held back in any way because of lack of funds.

From its inception the association has refrained from soliciting any aid from the manufacturers and sellers of railway supplies, not because of any hostility to them, for its attitude towards the Railway Appliances Exhibition, held in connection with its annual convention has been that of most hearty support; but rather because of the desire to be free from the criticism sometimes directed at other associations. For this reason it is to be regretted that the association has considered it necessary to solicit advertising to secure sufficient funds to meet its current expenses. That the board of directors does not like this course, and adopted it only as a temporary expedient, is evidenced by the statement of the retiring president, W. C. Cushing, who said in his annual address last March that "the members of the board are opposed to this principle and would not restort to it except in case of emergency." It is to be hoped that the railway men who enjoy the benefits of the association, but have not allied themselves will do so, not only that the association may maintain the high standards which it originally set for itself, but that because of the additional support the work of the association may continue to advance and the members receive even greater privileges and advantages than now.

NEW BOOKS.

[illegible] By Gilbert H. Gilbert, Lucius I. Wightman and W. I. Saunders. Bound in cloth, 6 in. x 9 in. [illegible] pages. Illustrated. John Wiley & Sons, New York. Price, $4.

The authors state in the preface that the aggregate cost of the tunnels of New York has probably been as great as that of the Panama Canal. The obstacles encountered have been stupendous in magnitude and difficulty and have called for engineering skill of a very high order. The tunnel and subway system which is the result of traffic conditions entirely without parallel in any other city includes a complete subway system connecting the three boroughs, eight subaqueous tunnels under the East river, six subaqueous tunnels under the Hudson river to the mainland, two subaqueous tunnels under the Harlem river to the Bronx, the Belt Line tunnels and New York subway of the Hudson & Manhattan system and the Bergen Hill and crosstown tunnels of the Pennsylvania Railroad. The construction details of these undertakings are completely covered, cost data, plant layouts and methods of operation being particularly emphasized. A great deal of historical data and a number of appendices on methods and devices used in the construction of the tunnels are included. The authors pay a high tribute to the three men who have been most instrumental in the building of the various tunnels. Delos E. Haskin was the man who first proved the practicability of tunneling through the silt under the Hudson river. Charles M. Jacobs built the first tunnel under the rivers about New York, namely the East River gas tunnel. He combined the genius and enthusiasm of Haskin with the ability of the engineer. William G. McAdoo planned and executed the Hudson & Manhattan System and has added to the qualifications of the other two that of the business man.

Concrete Costs. By Frederick W. Taylor and Sanford E. Thompson. 5 in. x 8 in. 709 pages. 75 illustrations. 166 tables. Cloth binding. John Wiley & Sons, New York. Price, $5.

Although prepared especially for the use of architects, engineers and contractors engaged in building construction, "Concrete Costs" contains a great deal of information for railway engineers. The knowledge of detailed costs on railway work, particularly on large work handled by company forces, is often very limited with a resulting lack of efficiency. Some of the costs given in the tables printed in this book will not apply to the conditions under which railway work is done, but no claims are made for a universal application of the tables, and the authors have been very careful to indicate the proper use of all data furnished and to outline carefully the conditions under which it can properly be applied. The figures given for the cost of transporting concrete materials, mixing both by hand and machine, building forms, finishing concrete surfaces and a great many of the details of plant layout and form construction, are of direct application in planning and carrying out the work of building abutments and piers, retaining walls, foundations, subways and other concrete structures for railways. One of the distinct features of the book is the fact that most of the information contained in its tables was secured by observations on workmen regularly employed, which makes the data of more value than that which is usually prepared by keeping records of time and work accomplished on complete pieces of work. The authors state that in the preparation of the book the work was divided into three sections: (1) An analysis of all the work connected with concrete construction, separating efficient from inefficient movements of the workmen and then studying with the stop watch the proper time for making each elementary movement; (2) a grouping of these series of movements to obtain the proper time allowance for each class of work, and the classification and tabulation of this data so as to place it in a simple and convenient form for practical use; and (3) the testing of the value of the data by computing from the tables the time necessary to build a structure and then comparing the "book time and cost," with the "actual time and cost." As pointed out by the authors, cost data is of comparatively little value without a knowledge of the proper way to use it. In the introduction of scientific management the first essential is the introduction of standard methods. To assist in the application of the data presented considerable material has been included in the book which will be found very useful in deciding on such standard methods and in training workmen to use them.

THE ERIE TRACK INSPECTION CAR.

Apparatus Designed to Detect Inequalities in Line and Surface of Track and to Make Record on Paper and on the Track.

BY E. G. CHENOWETH,
Mechanical Engineer, Erie, Meadville, Pa.

In order to ascertain the condition of the track with reference to the gage on tangents and curves, the elevation of the outer rail on curves, low joints and other irregularities in rail or road bed which in any way endanger the safety of high speed trains, and to make comparisons with established track standards, an inspection car containing track testing and registering apparatus has been designed and is now being operated by the Erie.

The track inspection car is built on the general plan of a business car, a passenger car being reconstructed in the company

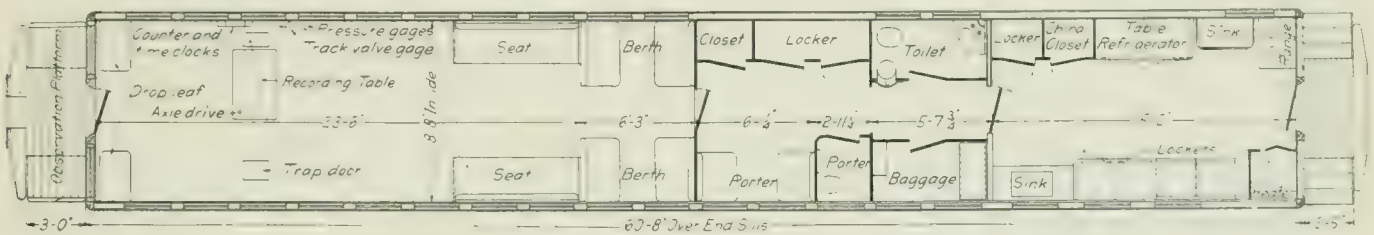


Fig. 1—Erie Track Inspection Car, Floor Plan.

car shops for this purpose. The length of the car is 66 ft. 1 in. It is provided with a 3 ft. rear observation platform and a 2 ft. 5 in. front platform. The observation room in the rear is 23 ft. 6 in. long and 8 ft. 8 in. wide, and is provided with the largest window space available in the rear so that an extensive view of the track is obtained. In front of each rear observation window is a drop leaf table 18 in. x 30 in. The recording table is placed nearly 7 ft. from the rear door on the left side of the car. On the right of the recording table is a trap door 12 in. x 16 in., while on the left is another one 9 in. x 16 in. which permit taking care of the machinery and keeping it oiled. To the left of the recording table, where they can be conveniently seen by the operator, are five counter clocks in a glass case, as shown in Fig. 6. The operator sits at the recording table facing the rear of the car. At his right hand is the three way air valve for raising and lowering the track gauge. Near the counter clock case is a pressure gage showing the air pressure available. Toward the front of the observation room are lounge seats on each side of the car with lockers below. In front of the observation room there are berths for sleeping purposes, lavatories, kitchen, etc.

The car is lighted throughout with 32 volt Tungsten car lights, operated by a standard, axle driven, belted, car lighting generator in connection with a battery of 16 storage cells. The electric lights are supplemented with standard Pintsch gas fixtures.

RECORDING APPARATUS.

The apparatus for the detection of track irregularities is designed to automatically indicate to the track man by the ejection of colored liquids upon the road bed, imperfections of track alinement and to make autographic records for office use and for reference of irregularities of track surface, variation in gage, cross level and car swings, lurches, speed and distance traveled and time in five-second intervals.

The fluctuations in track condition are recorded upon a strip of moving poper, by means of stylographic pens. These pens are arranged in two sets, one of which being stationary, establishes a series of horizontal datum lines, while the other pens have a motion at right angles to the datum, this motion being controlled by the various track imperfection detecting mechanisms and being limited by the extent of these imperfections. As the paper moves under the pens at a rate directly proportional to the car speed, the indications of track irregularities appear in their true relation and can be located at any time as may be necessary.



Fig. 2.

THE TRACK SURFACE DEVICE.

The purpose of this apparatus is to provide means for the detection of low joints and unsatisfactory conditions of track surface. Vertical movements of the central axle of a six wheel

truck relative to the outer axles, are utilized to indicate the existence and extent of imperfect surface alinement. The mechanism consists of 6-in. I beams mounted over the side sills of the truck and supported at the ends by stanchions, which are fastened to the front and back journal boxes, as shown in Fig. 3. Two plates are bolted on the middle journal box outside and inside of the pedestal. These plates are free to move vertically in yokes attached to the I beam, and their movement in a vertical direction relative to the beam is transmitted to the recording apparatus, by means of a suitable phosphor bronze wire carried on brass sheaves. This mechanism is applied to each side of the truck and indicates the defects of both rail surfaces simultaneously.

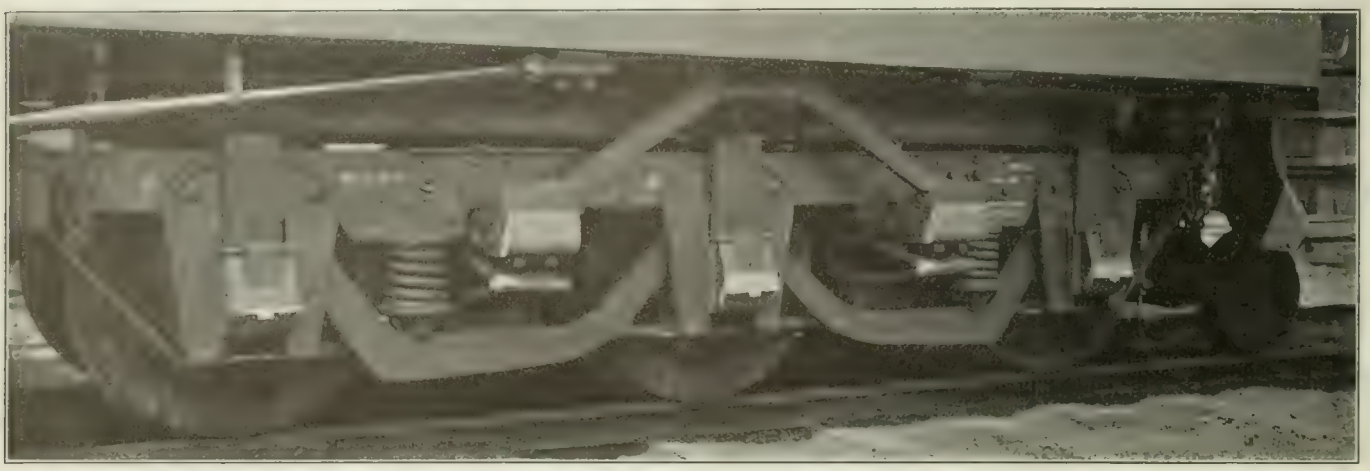


Fig. 3—Arrangement of Apparatus for Detection of Low Joints; Erie Track Inspection Car.

Two sets of adjustable electric contact points are provided on each of the outside plates, fastened to and moving with the middle journal boxes. These points are arranged to make connection with corresponding contacts carried on the I beams. Whenever a variation of track surface amounting to ⅜ in. or over is encountered, one set of points makes an electrical contact and the condition is automatically registered by means of a counting mechanism. In a similar manner, all irregularities of ⅝ in. or more are registered by the other set of contact points, suitably connected in series with the car storage batteries and counting apparatus. It is further provided that when either a ⅜ in. or ⅝ in. variation in surface alinement is registered, an electro pneumatic spotting valve simultaneously opens and ejects a colored liquid upon the road bed, thereby marking the location of the defects.

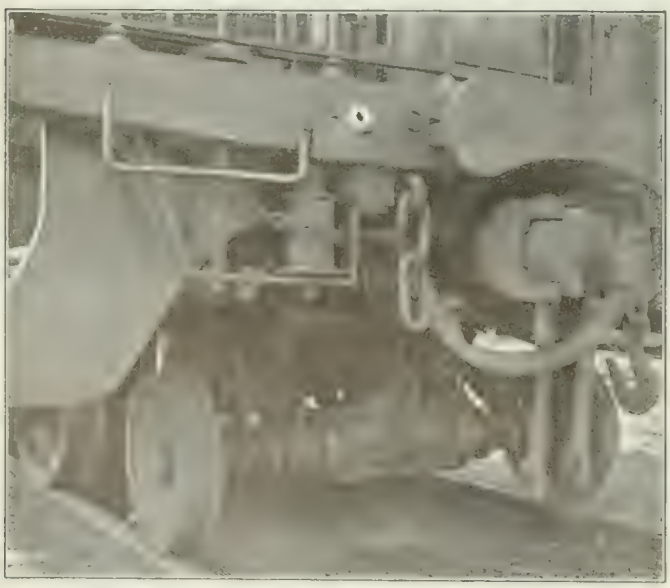


Fig. 4—Apparatus for Detection of Variations in Track Gage.

THE GAGE VARIATION DETECTOR.

The rear six-wheel truck has a two-wheel trailer attached, with its wheels arranged to slide on the axle, as shown in Fig. 4. A system of springs compel the wheels to follow all gage fluctuations, and by means of a phosphor bronze wire these variations are transmitted to the stylographic pen, through suitable brass sheaves and levers.

In order to prevent unnecessary operation, the trailer is flexibly connected and may be raised to clear the track, when so desired. While being raised a spiral clutch automatically grips the wheels and draws them inward until they register 4 ft. 8 in. in gage, so that when lowered the trailer wheels will fall correctly inside a 4 ft. 8½ in. standard gage track. The raising and lowering operations are pneumatically performed, and are controlled by means of a three-way air valve, conveniently located in the car observation room.

THE CROSS LEVEL INDICATOR.

Objectionable car swings owing to imperfect cross level conditions are indicated, and their extent recorded by the motions of a heavy pendulum, swinging in a plane at right angles to the center line of the track. To avoid disturbing effect of sudden lurches and minor vibrations, this pendulum is immersed in oil, which effectually dampens its action and prevents the recording of conditions other than those for which the device is intended. The action of centrifugal force upon the pendulum



Fig. 5—Interior of Car, Looking Towards the Rear.

when rounding curves is compensated for by an adjustment in the recording arm connection. The effect at various speeds is thus controlled so that a true record of cross level conditions is registered by the stylographic pen.

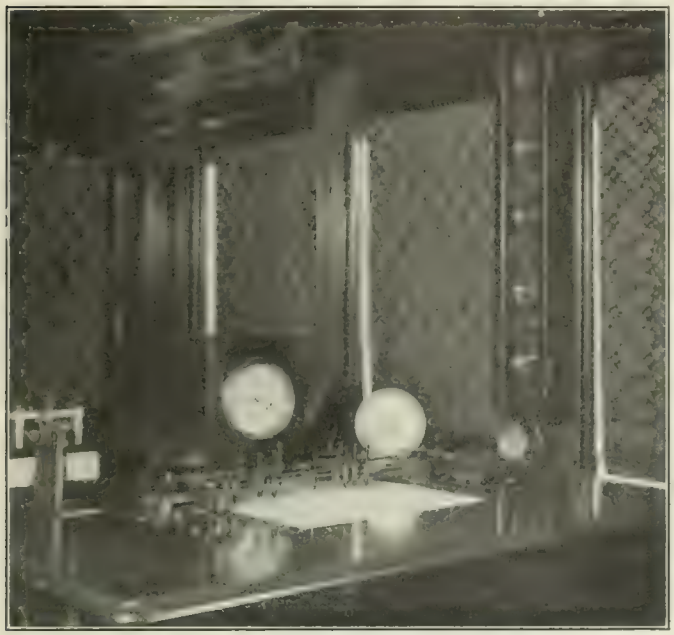


Fig. 6—Operator's Table, Recording Apparatus and Counter Clocks; Erie Track Inspection Car.

THE LURCH RECORDING DEVICE.

This apparatus is a more sensitive mechanism than the previously described cross level indicator. Its purpose is the detection of minor vibrations and sudden car lurches caused by various imperfect track conditions. The device consists of a pendulum which swings in a plane at right angles to the center line of the track and carries two copper balls, each secured to the end of a light band steel spring, which in turn is fastened at one end to the pendulum blade by an adjustable screw clamp. The copper balls are thus free to vibrate at the end of steel springs held in a vertical position and parallel with the pendulum. A sudden car lurch produces a corresponding motion of the pendulum. This motion, transmitted to the copper balls through the flexible steel springs, causes one of them to fly out and make electrical connection with suitable contacts. The pen registering car lurches is electro-magnetically operated, and when the copper ball makes a contact the otherwise continuous car lurch line is notched, which notch constitutes a record of an objectionable track condition causing the lurch.

An electric counting mechanism and electro-pneumatic spotting valves are also wired in series with the above recording apparatus; thereby each individual defect is automatically counted and the track simultaneously marked with a colored liquid.

SPEED, TIME AND DISTANCE INDICATORS.

An electric contact time clock is connected in circuit with the datum line pens and arranged so that each five-second interval is registered by a notch. As the movement of the record paper is proportional to the distance traveled, these notches in the datum line serve as a means to determine the train speed. The location of mile-posts, stations, bridges, etc., are also recorded

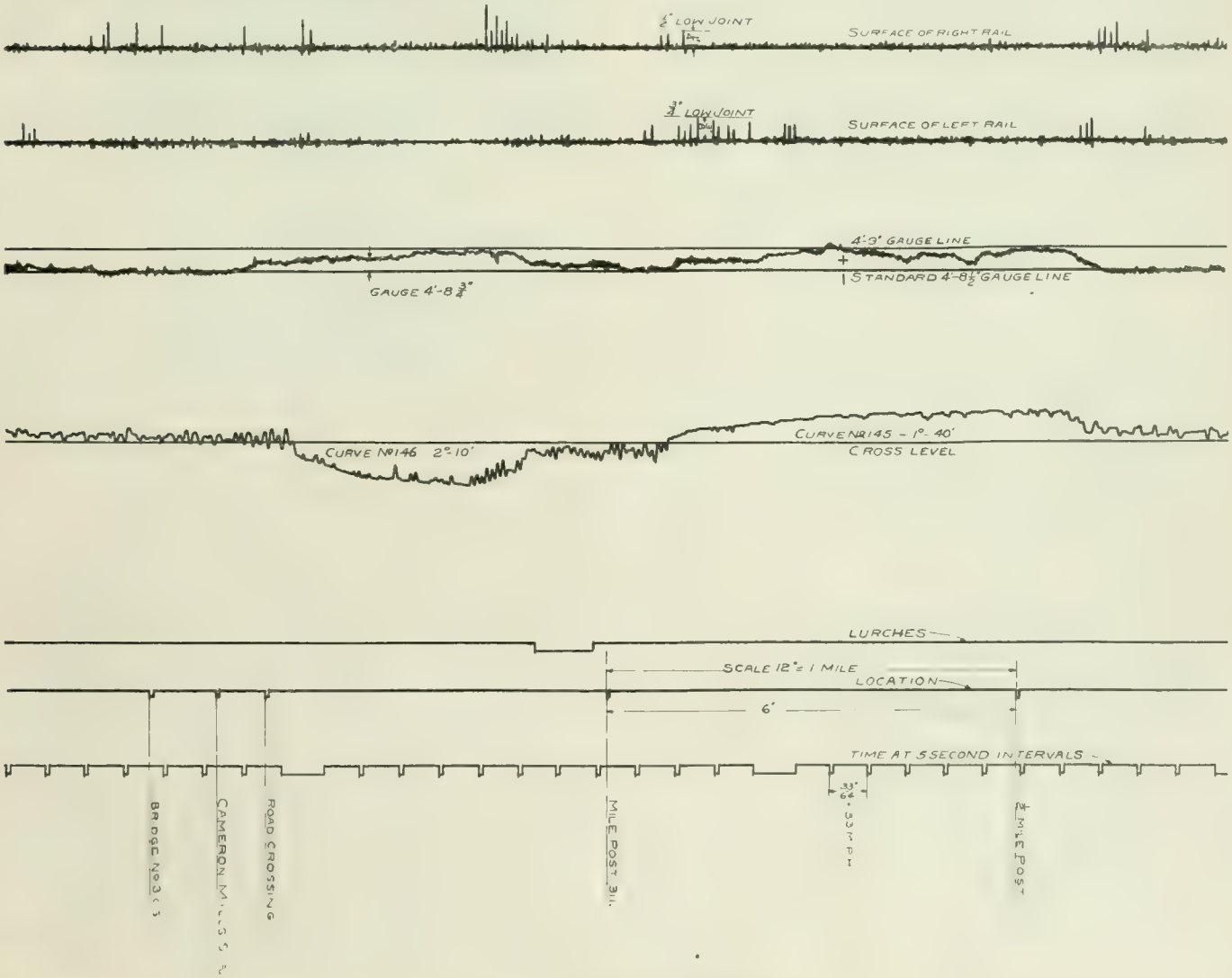


Fig. 7—Part of a Record Diagram.

electrically by an observer, who presses a key as the car passes such points. These indications constitute an accurate method whereby the position of track imperfections can be located, and provide a check upon the operation of the track-spotting device.

Before placing this car in service, the various detecting and recording mechanisms were carefully calibrated, upon a section of specially prepared track. As all the devices are provided, where necessary, with suitable adjustment facilities, it is anticipated that future track inspection work can be performed and accurate records obtained covering a wide range of conditions.

The car and apparatus were completed and put into service in July, 1911, and immediately following that date a complete test of all track on the system was made. A similar inspection was again made in the fall of the year.

In making tests the car is run on the rear of a special train at a regular rate of 35 miles per hour. On the usual run about 350 miles of track is tested in a day. The charts made by the car are blueprinted and copies of their respective sections furnished to the track foreman. Prints are also furnished to the division engineers, and a complete set to the chief engineer of maintenance of way. At the same time reports showing the total and average number of 3/8 in. and 5/8 in. or over low joints and carswings per mile for each section and division are made up.

The maintenance of way officials are present on these tests and inspect the general conditions of the track, the division engineers, superintendents and supervisors accompanying them over their respective territories. Following the fall inspection and test, reports are made up and the charts and records are compared with those taken in July.

A system of prizes for the best sections has been established. The track charts, the records of spring and fall inspections, the physical conditions surrounding the work and the expense of maintenance from the basis of making awards.

In the operation of the car it has been found reliable in taking tests from 30 to 40 miles per hour, according to track conditions, but that when a faster rate of speed is reached the cross level and lurch devices are affected by the movement of the car and the centrifugal force when rounding curves so as to give inaccurate results. Therefore, care is taken to calibrate the car for 35 miles per hour and to run as near as possible to that speed.

THE FOREMAN PROBLEM.*

BY P. J. M. WOSLYNG,

Roadmaster, Alberta Railway & Irrigation Co., Lethbridge, Alta.

I would advise the following measures to improve the situation facing us regarding the scarcity of good section foremen:

1. Give the section men a fair and square deal. Let them understand that they are just as important as any other class of railway employes and show them that it is recognized that their service is important.

2. Pay all regular laborers the highest local laborers' wages, so that they will be encouraged to remain and work steady on the track.

3. The foreman should show his men how to do different kinds of work, and explain whenever convenient why it should be done in such a way. When a laborer is far enough advanced, give him a show to do different kinds of track work under the foreman's supervision, and if he does wrong, the foreman should be prompt to rectify him. Before he gets any promotion, move him to some section, in a yard, or extra gang, where some heavy work is going on under a good practical foreman; and let him work long enough to get familiar with heavier work than he would be able to practice on an ordinary section.

4. When the road master calls a meeting of his foremen to discuss track work, the men that are nearest in line for promotion should, if possible, be present and be encouraged to take an active part.

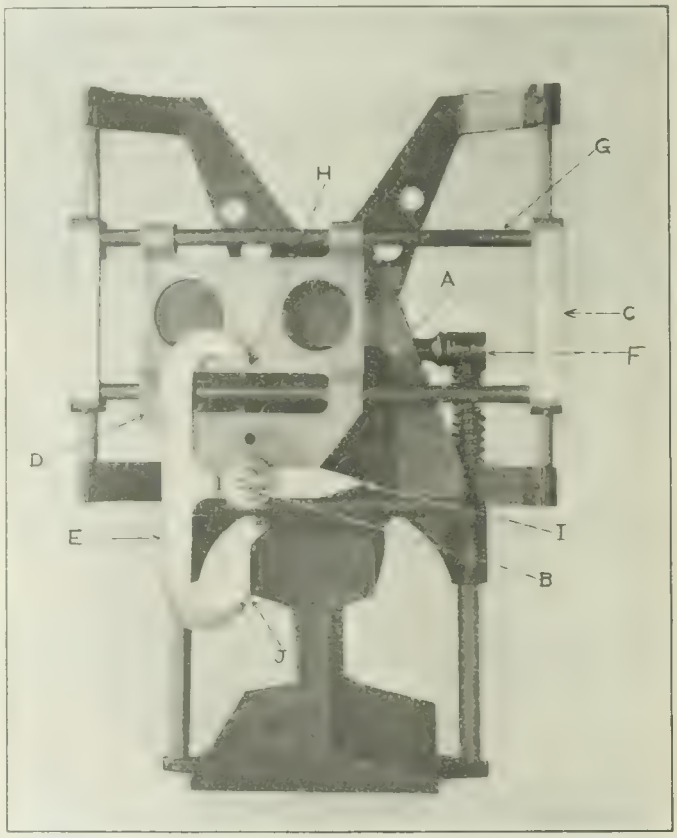
*Read before the [illegible] Section Foremen Problem, which closed March 25, 1912.

RAIL TRACING MACHINE.

BY F. H. K. SHANNAHAN, JR.

It is of importance to both the railways and the manufacturers to have a quick, accurate method of determining the wear of rails in service, especially on stretches of track where the service is known to be severe. This enables the railway company to make accurate comparisons of the wearing qualities of the rails furnished by the various manufacturers, and it also serves as guide to the manufacturers themselves.

The Maryland Steel Company has had in use for several years a machine which is simple in design, accurate in execution and easily operated. By moving steel tracer points over the surfaces of the head, a facsimile section of the rail is traced simultaneously on a glass plate coated with lampblack ground



Type A Rail Tracer Used by Maryland Steel Company.

in oil. The mechanical arrangement is such that absolute accuracy is guaranteed.

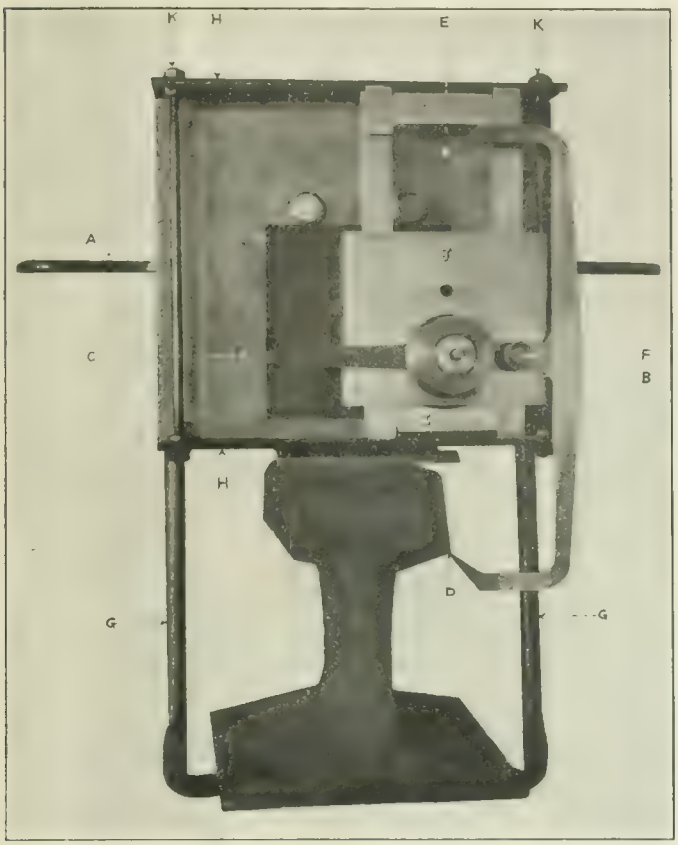
If it is desired, a pencil and pad may be substituted for the steel point and the glass plate, but the latter is preferable, as a blue print may be made from it direct, thus giving the actual section from the original tracing.

If the rail is of a standard section, a templet can be placed over the tracing and the original section laid out, showing the actual amount of wear. By making readings from the same rail at regular intervals, the wear per month or per week may be easily computed in pounds.

Two machines are in use by the steel company. The type "A," shown in the cut, is used for work where especial care is desired. This machine weighs 7 lbs. in working order. The glass plate is shown at "A" and a portion of the section already traced is clearly seen. The tracer "E" has three points, the central one "I" being used for tracing the top and the side prongs "H" and "J" for the under and side furnaces on their respective sides. Irrespective of which of the tracers may be in use, the pencil "B" always follows the outline of the section.

The bearings are all case-hardened and ground and of such length as to make the head "D" rigid, yet its movement along the runway "G" is perfectly smooth.

The type "B" machine operates in precisely the same manner, but is of different and much lighter construction. This



Type B Rail Tracer Used by Maryland Steel Company.

is a distinct advantage when a large number of tracings are to be made over an extended territory, as is frequently the case. This machine weighs about 4½ lbs. in working order and 7 lbs. in its leather case, which is 11½ in. x 9½ in x 4 in. With a supply of 40 plates in the case the whole outfit weighs but 12½ lbs.

CARING FOR EXTRA GANGS.*

BY G. W. ROBERTS,
Roadmaster, Central of Georgia, Columbus, Ga.

In my experience in the last twenty years in handling extra gangs the best results have been secured by furnishing good living cars, feeding them fairly well and furnishing them beds to sleep on.

I think that the best track foremen should be put in charge of the extra gangs; that is, foremen with smooth temper and fair intelligence, who realize the fact that all of the men he employs are not thoroughly competent to handle the work themselves and need smooth handling to make them valuable in the service.

I have had very little experience with foreign laborers. I have worked colored laborers as a rule, but any laborers handled under the above system should be successful.

We pay colored labor $1.10 and $1.25 per day on extra gangs, which is the general practice through this section of the country. The laborers we are able to get for $1.10 are very inferior. As a rule the laborers that we get for $1.25 prove very good and make much better time and are a great deal more to be depended on.

*Received in the contest on The Organization of the Extra Gang, which closed April 25, 1912.

TRAINING THE FOREMAN.*

BY C. C. COOK,
Division Engineer, Baltimore & Ohio, Philadelphia, Pa.

The development for men for positions wherein they will be responsible for direction of others and the accomplishment of desirable results must consider two factors; viz., the personality of the man, and the work to be accomplished. In the case of the section foreman, the incompetency of many of those now holding their positions introduces another factor.

The present sources of supply of track laborers and foremen are very diverse, and will continue to be so. Owing to the fact that many of the skilled trades offer opportunities for greater remuneration to men who have ability to develop into excellent section foremen, trackmen are usually drawn from the natives of each particular locality, who are willing to sacrifice more desirable positions in order to remain at home, or from a less intelligent class, usually the negro of the foreigner, whose ability would not command a greater wage than is offered to track laborers.

The solution of the problem of the future supply of track foremen is education. This does not mean simply the education secured by varied experience as a track laborer; but that which is given through proper direction by the officers in charge.

Practically all labor of maintenance may be classified into distinct items, and into individual actions. Most of such items may be measured by standards of time consumed and method pursued. Preliminary investigations for establishment of such standards, and continual study to determine necessary revision thereof in order to meet changing conditions are necessary. The standards relating to time reduce each item of work accomplished to a unit of distance or quantity per man per hour; those relating to method cover organization of force and manner of pursuing each item of work. Such methods as have proven to be most economical are established as standards, printed as instructions, and must be followed exclusively.

The foremen are thus placed in possession of the most desirable practice, and directed to follow it. The trackmen on all sections use the same methods. The laborer who is most apt in acquiring knowledge of the standard methods, and gives evidence of possessing executive ability is designated assistant foreman or leading laborer, and is paid a rate approximately 20 per cent. higher than is given to the other laborers. This increased pay is an inducement to acquire all the knowledge of the details of track work necessary to fit him for the position of foreman, and the constant drill in approved standard practice results in the development of a desirable occupant of that position.

This plan requires that ample and competent supervision be constantly exercised. A supervisor and an assistant supervisor should be in immediate charge of a territory not too extended to prevent them from being in continual touch with the foremen and their work. The assistant supervisors make the studies of standard time and method, confer with their respective supervisors, and, in conjunction with maintenance of way officers on each division, determine upon established standards.

This plan is essentially a study of men and their accomplishment. The importance of having a competent foreman is accentuated; and the method of developing them is progressive, educational, and direct. His maturity is inevitable.

The question is an economic one; a more intelligent class of men might be attracted to the maintenance forces if a general increase in wages were authorized; but the problem of development of section foremen would not be solved. Instruction would still be necessary. It is then only by methodical direction of available labor through the standards above outlined that a desirable supply of foremen will be developed for the future.

*Submitted in the contest on The Section Foreman Problem, which closed April 25, 1912.

THE HOBO AS A TRACK LABORER.

The First of a Series of Discussions of the Various Types of Men Employed in Railway Maintenance Work.

CHARACTERISTICS OF THE HOBO.

BY F. KELLOGH,

Roadmaster, Chicago, Burlington & Quincy, Aurora, Ill.

The class of laborer known as the American hobo is used quite extensively on the heavier maintenance work, such as rail renewals, ballasting, etc., at the present time, especially on the middle western roads. This type differs widely from any other and must be thoroughly understood if the best results are to be secured. It is necessary to provide sleeping quarters, commissary and meals for them. This is usually taken care of by boarding contractors who handle it along with depot eating houses, etc., while the railways provide outfit cars, coal, water and ice.

The efficiency of this class of labor depends on the demand for laborers, the quality of the board furnished, the location and nature of the work and the supervision. In the early spring there is no trouble in securing first-class men, provided there is "free shipment" from the labor center. The best men do not have money to pay for jobs, otherwise they would not be ready for work. With free shipment these good men known as "old-timers" can be readily picked up and no trouble need be expected about their ability to do the work. In the early part of the season they can be called on to do almost any sort of work with good results.

Good substantial food is a big item in holding men, but this also is governed largely by supply and demand. Most railway boarding contractors provide about the same quality of food, and, considering the present prices of provisions, do as well as can be expected. The greatest trouble experienced is when the camp helpers begin drinking or stealing and the camp is allowed to run down before a change is made. Sometimes a dishonest clerk will "peddle" goods and shorten up on the tables. This, however, is being checked closer now than ever before and the amount of stealing is rapidly decreasing.

The location of the work has much to do with this class of laborers. A small percentage of the men move north and south with the seasons, but probably 90 per cent. of the real hobos work in certain definite districts. Genuine hobos do not move about the country as a rule. They are poor travelers, and are usually known as Chicago, Kansas City, or St. Paul men. Many of them can be found at each season in the same section of the country. A small proportion of the early shipments drift along to new work at track laying. These are usually the best men and are attracted by the higher scales of wages paid by contractors, where spikers, tong men, etc., are generally paid more than those engaged in less strenuous work. Stone ballast work is invariably shunned by this class of men. They also avoid work in swamps, handling coal and cinders, and other more or less disagreeable employment.

On account of the vast experience that men gain by going from one job to another, many of them are liable to have a better knowledge of track work than the foreman in charge. This is especially true of the details of new kinds of switches, tie plates, rail anchors, etc. Unless a foreman has had previous experience with hobos he will get no benefit from their knowledge, but will be left entirely alone to figure out his problems, and a foreman is soon well known by these men; in fact, long before he has a chance to know them. If he is familiar with this class of labor he can usually pick out the "right man" for different kinds of work by inspection. Foremen frequently make the mistake of asking for a certain number of spikers, tong men, etc., instead of pointing out the men they want. In hot weather especially there will be no volunteers for the hardest jobs, although the men will take hold if asked individually.

The foremen are classed by the hobos in three groups: The good foreman will be one who understands thoroughly every phase of the work and who handles his men in a systematic manner. The foreman known as a "bawler" is a man who understands his work very well, but does an unnecessary amount of loud talking. This class of foremen have trouble holding good men when labor gets a little scarce. Another type of foreman is known to the hobo as the "scissor bill." This class of foremen is wholly inexperienced in handling hobo labor. As a rule, such a foreman is looked down on by the men, although they are apt to pick his gang out for a "summer home" during the hot weather, in order to "get by" easy until cooler weather when they can get along with any foreman. Such foremen often use extra precautions to keep on the good side of the men, and it is here that they make a mistake. No genuine hobo wants to be addressed "Come boys," which is the general expression used when working native or local labor. Experienced foremen call the hobos "men," and, while they are not necessarily rough, they do not pick their language nor use extra precautions to get along with the men, as do the inexperienced ones.

While wages enter largely in the handling of this class of men, this is by no means the most important factor. The majority do not intend to make over $10 on a job, and, therefore, it is an advantage not to have the wages too high, as with lower wages it will take the men longer to make their stake. Hobos generally are known to each other as "long" or "short stake" men, the long stake ones being termed "stockholders." When men are ready to leave a gang they invariably have a good excuse prepared if the foreman should ask for it. An experienced foreman, however, will not ask for it, but will have their time made up promptly; in fact, hobo time checks should be expedited in order to get the men away without delay. They will go back to work again as soon as they are "broke," but generally to some other gang.

In summing up, the chief advantage of this class of labor is the knowledge of the English language, familiarity with the various kinds of work, fewer delays from conversation in the gang, less trouble than with foreigners in suburban districts as they are perfectly harmless and stay close to the cars while the foreigners are usually trading, stealing and causing trouble. There is also less liability of graft or stealing by foremen, timekeepers and others as is so often the case with foreigners. The chief disadvantages with the hobos are their irregularity of service, the necessity for housing and boarding the men, their refusal to work in stone ballast or other work not to their liking, and their refusal to work Sundays or overtime unless paid an extra rate, in which case invariably they lay off on Monday.

To successfully handle hobo work the men should be provided with the best outfit cars and good, substantial board; time checks should be issued and paid promptly, and good, experienced foremen should be provided.

THE ABILITY OF THE HOBO.

BY E. R. LEWIS,

Division Engineer, Michigan Central, Bay City, Mich.

As an extra gang laborer in American railway service the hobo's capabilities are indisputable. His inclination to work is more uncertain. That he requires strict discipline has been repeatedly proved, for there is little of the childlike simplicity of a foreign laborer about the hobo. He is a man of the world and is furthermore a traveled personage, schooled in all the tricks of living on his wits.

A foreman who attempts to manage a hobo gang must be thoroughly experienced and when occasion demands must be able to use aggressive tactics. Absolute justice, fearlessness, and faultless judgment are necessary to the foreman, for he is dealing with men who know men, and whose appreciation of mastership is quick and keen.

The hobo has little to learn about track work. He is familiar with all branches of a railway, from the train service to the detective department. Moreover he is well used to doing various kinds of work, being a jack of all trades in a vagrant way. There is a self reliance, a "cammaraderie," a reckless independence, and a cheerful acceptance of circumstances about a gang of hobos that appeals to the experienced railroad man, and that warms the heart of a first class foreman, who knows hobo ways. It likewise often chills the blood of the tenderfoot. There is a rough loyalty about these tramping railway laborers which is remarkable. There is a pride among them in their work, similar to that of every free born American citizen. European laborers are usually "quitters" in emergencies. Not so with the hobo. Emergencies are his delight. A car off the track, a washout, or a track torn up furnish a zest to the work and an incentive to extraordinary effort. There is life and reserve energy in a gang of hobos that it is difficult to detect among other classes of railway laborers.

While the hobo has his preferences, as evidenced by certain chalk marks on gates of fences surrounding the houses which shelter the best and most generous cooks of the towns he frequents—he is also inured to hardships and disappointment. He will cheerfully accept such food as is furnished him till he can do better. But to hold a hobo gang, clean, plain food must be furnished in abundance. Box cars fitted with board bunks serve well as lodgings.

Definite organization is the greatest money saver with a hobo gang. Pick a man for certain work. Keep him at it. If possible work him against a comrade, or work one gang against another at similar tasks. The friendly rivalry created is a pleasure to the men and a profit to all concerned. The rivalry one can create between two gangs of European laborers is usually tamer than a chicken fight.

Payday is the hobo's Waterloo. Too often the hard earned monthly wage, minus the board and van account, is spent in one glorious week-end spree, while the foreman waits or struggles on with a few weaklings or new men, but without the old hands whom he has worked so carefully to organize into a quickly responding human machine. In two or three days a large percentage of the men may return. If a nucleus can be retained the matter is not so serious. The hobo seldom strikes. If he does not get what he considers his rights, he leaves; usually without comment.

Complaints are always heard from foremen used to handling hobos when they are put in charge of gangs of foreign laborers. There are often interpreters who are trouble breeders. There is a mutual distrust between the foreman and men—largely due, as are most misunderstandings, to ignorance on both sides. Many of the men never have seen railway tools or materials, nor will they spread out and work singly as hobos will. There is continual trouble to avoid bunching, and jabbering to the detriment of the work in hand.

The hobo will often soldier if he can, as will every other laborer at times. But the hobo can be reasoned with. He is an intelligent, independent working unit. Each man is a real American man, full of comprehension, guile and a certain amount of energy. He will work when he is supposed to, if reasonably supervised. The European laborer, however, endures idleness better than the hobo. He is content to cook his food and idle about in his bunk cars while the rain pours down and the work is shut down. A stranger in a strange land, he is naturally clannish, staying with his comrades who come from his own old country district, who speak his dialect and understand his ways and modes of living.

The hobo idles as he works, independently. Idleness in a railway camp is far from his notion of happiness. He overeats, fights, drinks if possible, and becomes generally demoralized in spite of discipline. I have seen a first class track laying gang utterly routed after a week's enforced idleness. While he works the hobo is unsurpassed as a trackman. Well handled, he is good for say five months' work a year. The steam shovel has partly put him out of the railway business, but gangs are still to be found and where they can be secured they are still more in favor with railway employers than any other class of labor.

GOOD BOARD ESSENTIAL IN HOBO CAMPS.

BY F. E. CRABBS,

Roadmaster, Chicago & North Western, Chicago, Ill.

Hobos will not accept work as regular track laborers. They are much better when used in extra gangs laying rail and track, but are a very unreliable class of men, their length of service averaging from three days to six weeks, depending largely upon the time of the month they go to work and the interval intervening since pay-day. With a gang of 50 or more one can figure on from one-half to two-thirds leaving at pay-day, unless he maintains an exceptionally good boarding camp and the wages are standard when he can expect the larger part of the gang to remain. The railways are, however, depending less and less upon this class of labor owing to their uncertainty in service and are giving the preference to the foreign class.

My experience as an extra gang foreman has been that the foreman who allows the commissary company to provide him with good board and who never takes the interest to make a personal inspection of the board that is being furnished his men will not be able to hold them. I made it a rule to inspect each table at least twice a week to satisfy myself that the board was all they could expect. I also made it a rule never to accept any kicks on board on the work but only at the table and always took the clerk of the camp with me. In doing this I always was able to maintain a first class camp and was able to hold the men most of the season. The fact that poor board has been furnished is what has driven the hobo away to a great extent and the reason that the poor board has been furnished has been due largely to lack of competition in this line. The railways are now getting competition and it will improve the length of the service of the so-called hobo laborer.

For relaying rail, track laying or putting in switches the hobo is preferred owing to his intelligence, but the foreigner is more preferable for ballasting, ditching or other work owing to his staying qualities. Outside of camp conditions the staying qualities of the hobo depend largely upon the organization of a gang. If a foreman does not know how to organize a gang he will not be able to hold the men. There are no laborers who will detect a foreman's organizing ability more quickly than the hobo, who will not stay with a poor foreman but will go on to the next gang, advertising the fact.

A foreman should never try to drive his men but to study their physical conditions and know what each man should accomplish. If there are any men in the gang who are not physically able to do a day's work get rid of them. The foreman should let the men know that he is boss but should never abuse a laborer. If he gets the good will of the men they will need no driving, but will drive themselves when he is in a pinch.

FROM WATERBOY TO FOREMAN.*

BY D. F. HARVEY

Supervisor, Pittsburgh & Lake Erie, Beaver Falls, Pa.

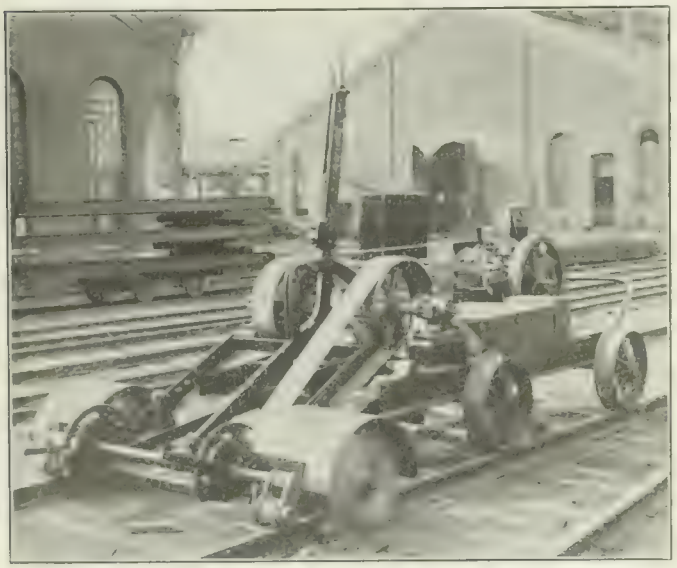
Each spring I usually receive applications from a number of school boys, 16 to 18 years old, who want to work during the summer vacation. From these applications, we select as many boys of good character and habits as we need for water-boys for the extra gangs. After carrying water for one or two seasons, they have a fair idea of the duties of a foreman, and the ones who wish to follow track work are assigned to work as sub-foremen, under the best foremen we have. In this way we have each year a number of sub-foremen who can take charge of extra gangs at any time. At present I have eight extra gangs, and with five of these gangs I have young American sub-foremen

*Received in the contest on The Section Foreman Problem, which closed March 25, 1912.

who are capable of taking charge of extra gangs at any time. Some of these sub-foremen are graduates of local high schools. My motto is, "Make your own foremen."

A NEW TIE SCARFING MACHINE.

The accompanying view shows a new device for scoring ties which has recently been developed and is now being used on the Illinois district of the Chicago, Burlington & Quincy. It consists essentially of four 18 in. circular saws mounted on a frame which is pivoted to the front end of a push car, on which is placed a 20 h. p. gasolene engine. The saws are placed one on each side of each rail and are spaced as desired by means of suitable filler washers on the saw arbor. The depth to which the saws cut is regulated as desired by raising and lowering this arbor, while their lateral position with reference to the rail is maintained fixed by small flanged guide wheels placed in advance of the saws. The driving is belt connected to the engine, which furnishes power exclusively for the saws, as the car itself is not self-propelling. The framework supporting the saws is pivoted to the front end of the car and can be raised clear of the track when not in service. The push car is very similar to the ordinary car, except that it is built somewhat heavier and has a projection on the front end. When sawing, the car is pushed along the tracks by two or three men, while



Tie Scarfing Machine.

one man is required on the car to operate the engine. While the car is balanced so that it can be taken off the track readily at road crossings, it cannot be lifted bodily from the track by the four men, and must be protected by flagmen when working. When operating, the car is pushed along the track, sawing the ties to the required depth, the saws being spaced 11½ in. center to center over each rail, at the time these observations were taken. Because of the interference of the ballast with the saws it has been found advisable to clean the ballast away for about an inch below the base of the rail in advance of the car. The best speed made so far has been one mile of ties sawed in three hours, although this will probably be exceeded as the operator becomes more experienced. Three sets of saws are required per mile, although this depends somewhat on the kind of ballast in the track. It requires about five minutes to replace a set of saws. About three gallons of gasoline and one-half of a gallon of valve oil are required per mile of ties sawed.

By sawing the ties even with the base of rail, as is done here, the scoring of the ties in advance of the rail gang is eliminated and the amount of adzing necessary after the old rail is thrown out is decreased, so that it is found that four men working with the rail gang can do the adzing necessary. This compares with from eight to twelve men adzing with the ordinary rail gang, laying perhaps one-half mile of track daily. However, this saving in labor is not as important as saving in ties and the securing of more uniform adzing. With this machine the ties are sawed only to the base of the rail and the adzers have this guide to follow instead of adzing practically the same amount for each tie as is generally done. Furthermore, this sawing furnishes a more uniform bearing for the rail, not only by insuring that the tie is adzed level, but also that all are adzed to the same height. This car was designed and developed under the personal direction of A. W. Newton, inspector of permanent way and structures of the Chicago, Burlington & Quincy, and was built in the Aurora shops of the Burlington.

SOUTHERN PACIFIC MEDALS FOR TRACK MAINTENANCE.

The practice of the Southern Pacific in awarding medals to roadmasters, section foremen, station agents, pumpers and power plant engineers, on the results of an annual inspection is similar to that in use on the Union Pacific, which was mentioned in an article on Prize Systems in Track Work in the *Railway Age Gazette* of February 16. The last inspection on the Pacific system of the Southern Pacific was made between November 21, 1911, and January 6, 1912, a complete report of which has recently been issued in pamphlet form. The inspection of track on each section is based on a grade of 100 for perfect, 25 points being allowed for alinement, surface and gage; 25 for spiking, ties, lining and spacing, switches and frogs; 20 for drainage and ballast; 10 for material, condition of grass and weeds, and right of way; 10 for section houses and grounds; 5 for sidings, and 5 for fences, road crossings and run-offs. The foreman of the section having the highest percentage on the system is awarded a gold medal, and the roadmaster of the district on which the average of the percentages for all sections is the highest also receives a gold medal. At the last inspection these medals were awarded to M. Lahey, roadmaster on the Salinas district of the Coast division, and J. J. Silva, foreman of section No. 17 on the Salinas district. A silver medal is awarded to all foremen having the highest average for their respective roadmasters' districts. The inspection also covers the stations, pump houses, fuel oil plants and power plants, these buildings being graded on a basis of 10 as perfect. Silver medals are awarded all station agents, pumpers and engineers in charge of buildings receiving a perfect grade. Out of 637 stations on the system, 27 were perfect. There were also 21 perfect pump houses, 3 per fect fuel oil plants and 6 perfect power plants. The inspection was made under the direction of J. Q. Barlow, assistant chief engineer, the other members of the party consisting of district engineers, division engineers and assistant division superintendents, these men inspecting lines over which they had no jurisdiction. The inspection train covered a mileage of 9,655 miles, the inspection being made on 6,481 miles.

In 1900, 4,406 yellow pine ties which had not been tapped for turpentine were installed with 660 oak ties in the westbound passenger track on the Barree tangent east of Tyrone, Pa., on the main line of the Pennsylvania Railroad. Eleven per cent. of the pine ties were removed in 1908, 15 per cent. in 1910, and 21 per cent. in 1911, or 47 per cent. in all up to February, 1912, while all but 2 per cent. of the oak ties had been removed by 1908. This would indicate the great advantage for tie purposes of not tapping the pine for turpentine, and shows a greatly increased life of the yellow pine tie which has not been tapped over one which has been tapped, or over the oak.

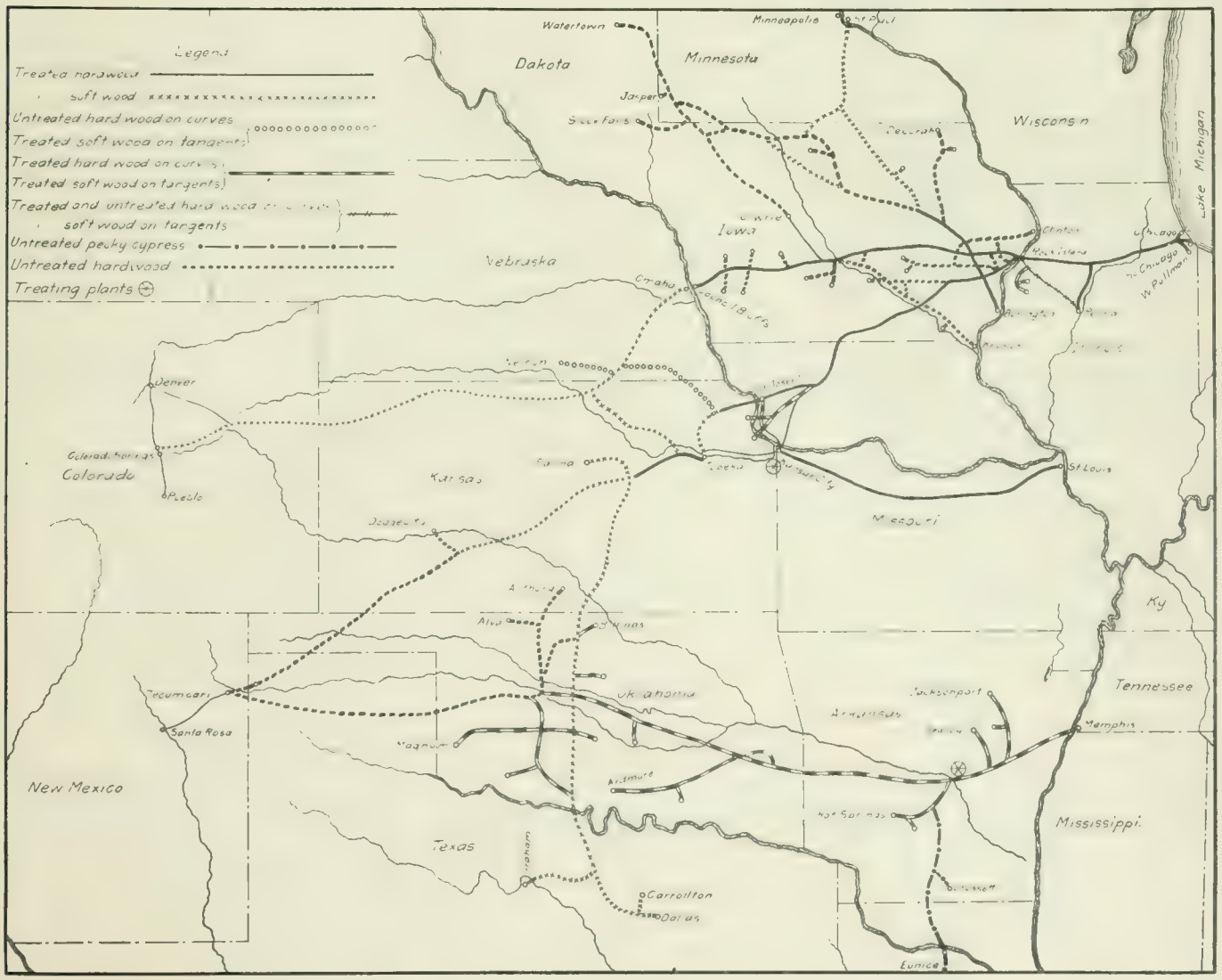
TIE DISTRIBUTION AND RENEWAL RECORDS.

Description of the Methods Used on the Rock Island in Making Allotments for the Season's Requirements, with Forms Used.

The distribution of the various grades of ties—hard wood and soft wood, treated and untreated—over a large railway system so that each grade will give the most economical service, and the keeping of accurate and complete tie renewal records to eliminate waste and double haul on ties supplied in excess of requirements, can be made to effect a considerable saving in this branch of maintenance. The engineering department of the Rock Island has made a careful study of this problem and has in operation a very satisfactory program of distribution and system of records.

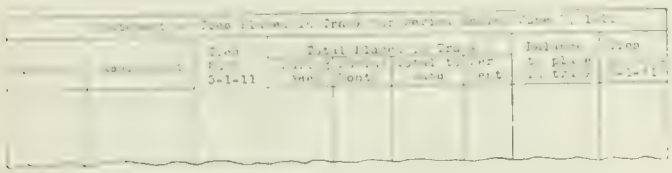
The decision to use a given class on a given division should depend on the climate, the traffic, the weight of rail, depth and kind of ballast, the use of tie-plates and fastenings and the location of the line with reference to the tie supply. These factors have all been considered in deciding on the standard distribution indicated on the accompanying map, which is changed as variations in one or more of the above conditions make it necessary. This company's tie supply is derived almost entirely from the Missouri and Arkansas timber district and the treated ties are treated at the American Creosoting Company's plant at Kansas City, Mo., and the Ayer & Lord Tie Company's plant at Argenta, Ark. As indicated on the map, treated hard wood ties with tie-plates are used on the main lines of heaviest traffic in Illinois, Iowa, Missouri and Kansas and treated soft wood ties with tie plates are used extensively over the whole system for lines of moderate traffic. The available supply of untreated hard wood, oak and cypress, is used on lines where experience shows that this wood will give the maximum service, but it is likely that the use of treated pines and other soft woods will soon have to be further extended on divisions now receiving untreated white oak on account of the increasing scarcity of that timber. A considerable mileage in the southern states which is subject to a heavy traffic uses treated hard wood on curves and treated soft wood on tangents. The use of untreated pecky cypress on one branch line in the South has been found to be very satisfactory, and owing to the fact that a supply of that wood was available in the territory reached by that line, such ties are more economical than treated ties.

The assignment of ties is based on estimates made by roadmasters which are classified in the general office by superintendents' divisions. Each roadmaster is furnished a book of printed forms for making detailed estimates, which he retains as a guide in assigning ties to the foremen. It also shows the number of each size of switch tie required with the name of the siding where they are needed. The roadmasters are required to personally inspect and mark all switch ties to be removed and no renewals are made except on the roadmaster's order. The road-



Map of Rock Island System, Showing Class of Cross Ties Used.

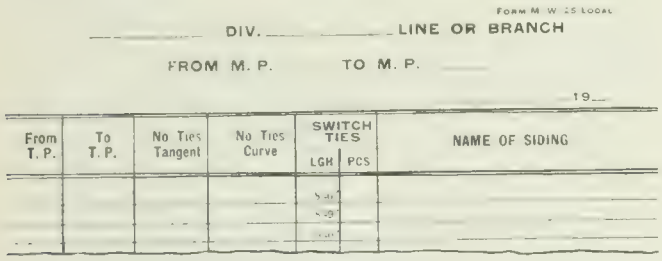
master copies the estimate for track ties from this book to a standard form showing ties required on main and side tracks by miles and sections. These estimates are checked over when received in the office of the supervisor of the tie and timber department, and all unusually high estimates are made the subject of special investigations. The roadmaster's estimate of switch ties is sent in on a blank which classifies all pieces of each of the standard sizes showing the station where they will be used. The track tie estimates totaled by superintendents' divisions are entered in a large form which also shows the mileage of main and



Weekly Tie Report.

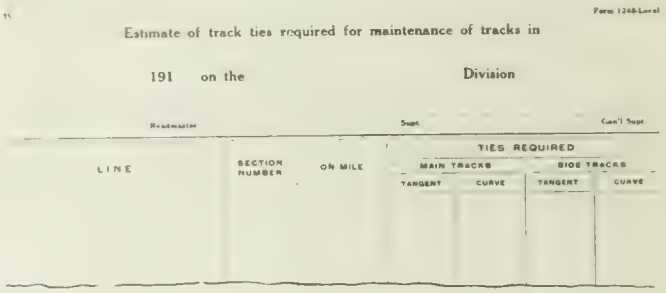
side tracks and the number of ties used previous years on each division. By comparing these figures and allowing for the local conditions which are known to affect the problem, an assignment can be made in the general office which will come very close to the actual requirements of the track.

It has been the policy of the company for some years to have at least 50 per cent. of the ties required for the season on hand by January 1 and to begin distributing them as opportunity offers so that the assignment may be on the ground by June 1. Shipments are made from the treating plants whenever cars and engines can be furnished, as an immediate shipment eliminates



Tie Estimate Form Filled in by Roadmaster.

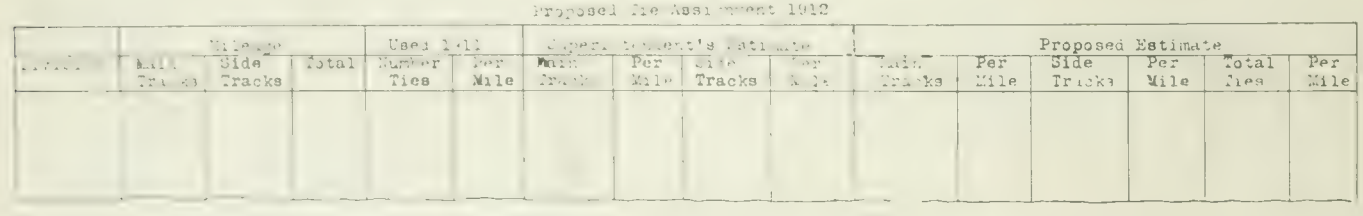
handling into and out of storage piles, reduces the space necessary for such storage piles and the risk incident to keeping a large number of ties in one place. There is a great advantage in supplying the ties to foremen before the spring work starts as the men can then space them along the track approximately as they will be needed without interfering with other work and thereby save themselves considerable time when the renewals are being made. Every foreman reports four times a month to the superintendent the number of ties, treated and untreated, which have been placed in main and side tracks since the last report, and this information for each division is reported by the superintendents to the tie and timber department at the same intervals. These reports are made by wire and a letter code is used to indicate whether ties are treated or untreated and whether they are placed in main or side tracks. Monthly reports are mailed in to the general office by roadmasters showing the number of ties received to date on the assignment and the number of each kind used for renewals and new tracks. From these weekly and monthly reports statements covering the whole system are prepared. The weekly statement shows the assignment, number of ties furnished and number placed in track that week, that month, and total to date; also the balance on hand and the number yet to place. The monthly statement divides the information to show separately the treated and untreated ties and number used in main and side tracks, and the number of each kind used for new tracks. The monthly report is cumulative so that at the end of the year the annual statement is ready without additional work. Summarized statements covering a term of years are also



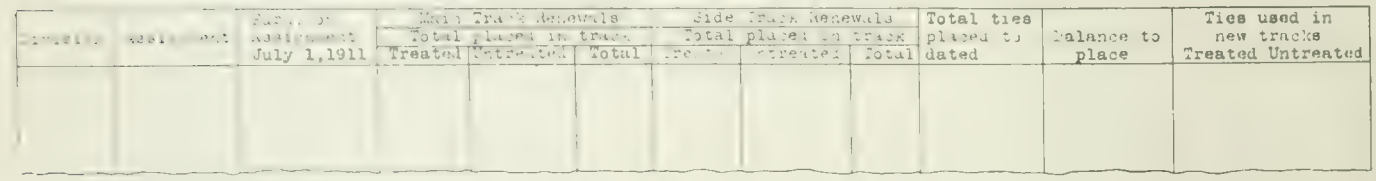
Form for Reporting Tie Estimate to General Office.

kept up—one showing all treated ties used, divided between main and side tracks, with the mileage and total number of ties in track; and another, the total number of all ties, both treated and untreated, placed in the track each year. These statements show a number of interesting things about the company's policy in the use of ties. In the four years ending in 1911 treated ties were placed in the main track of every division on the road, the percentage of treated ties to the total ties in the track varying from 6 to 53 with an average for the whole system of 29. Treated ties have also been used in side tracks on every division but one, the percentage of such ties reaching a maximum of 55 on one division and an average of 21 for the system. The total renewals per mile for the last five years is shown as follows: 1907, 201; 1908, 286; 1909, 275; 1910, 245; 1911, 255.

This system of tie records has been worked out under the direction of J. B. Berry, chief engineer, and C. F. Ford, supervisor of timber and tie department, to whom we are indebted for assistance in securing the above information.



Form for Preparing Tie Assignment.



Monthly Tie Report.

THE FUTURE SUPPLY OF SECTION FOREMEN.*

BY C. J. MCANDREWS,
Roadmaster, Chicago & North Western, Belle Plaine, Iowa.

An essential part of successful railway management is to secure the greatest possible efficiency from the expenditure for track material and labor, hence the importance of proper supervision of the labor employed, as well as of the use of material. As track foremen are in most immediate charge of track maintenance, and it is necessary to recruit supervisors and roadmasters from the foremen, it is important that these men be high grade, intellectually and physically. Up to the present few companies have anticipated the scarcity of foremen or made provision to guard against such a condition, the matter being left largely in the hands of the roadmasters.

The decline in the quality of foremen is not entirely the result of wages paid to laborers, although no doubt that is a contributing cause. In agricultural districts the farmers, contractors and municipalities control a large percentage of the local labor, and a higher rate of wages will always be paid by such employers, than by the railways, resulting in the latter being compelled to employ the inferior local labor and such foreign laborers as may be secured from the commercial centers. Were the railways in the agricultural districts to increase the rate paid unskilled labor, their competitors for the local labor would immediately outbid them and the situation would remain unchanged. The situation is a natural consequence of the rapid development of the western part of our country and not the result of mismanagement.

It is apparent, therefore, that the solution of the problem must be sought elsewhere than through a raise in wages paid to laborers. In the opinion of the writer this may be brought about by an evolution in the organization of track forces, such as a combining of duties now assigned to track foremen, signal maintainers, etc., a possible extension of the average length of sections and other economies that will enable the companies to pay a higher rate to the foreman without increasing the charge for track maintenance.

We have recently been shown through the *Railway Age Gazette* that considerable saving has been made by adopting the motor car for section use on some lines. If a portion of such saving were applied in an increased wage to the foremen remaining, it would serve as an inducement for desirable men to take up track work and fit themselves for the position of foreman. It has been demonstrated that a combination of track and signal maintenance duties can be taken care of by one individual, so that in automatic signal districts the work of the foreman can be made more attractive than formerly, which will aid in securing men.

Through the agricultural districts it is now a rare occurrence to find young, active and intelligent Americans engaged as track laborers. We are therefore compelled to seek the future foreman among the foreign laborers. This task is not an impossible one, however, as there are at present a large number of very good foreign track foremen who have been educated to their work. Our plan is to observe the laborers, and when a man is noticed who takes an interest in the work, we endeavor to furnish him employment throughout the year and by gradually extending his responsibilities we learn whether he is suitable timber for a foreman. Such a student must be able to read and write the English language, and of course speak it well enough to be readily understood. After a period as laborer, we appoint him assistant foreman with some experienced man, who we know will take an interest in teaching him the best methods of accomplishing various kinds of work, and as soon as opportunity offers we give the student a small crew of men, usually of his own nationality, and move him about on the different sections to assist where required in surfacing, ditching, laying small amounts of rail or putting in switches, thus giving our student a varied experience on the work as well as with different foremen. We have found that the student will pattern after the foreman who has the best and quickest methods. While the student is in charge of this small floating gang, he is required to work under the direction of the section foreman with whom he may be, but is required to do as much of the actual work of foreman as his experience may fit him for. He should not be confined during his experience to yard work, but must be kept for a while on the outlying sections as well.

The period as a student can only be determined by the aptness and natural ability of the individual, but should be extended enough to give him an opportunity to spend some time at the various kinds of work. On divisions where there are branches or side lines we prefer to give our student his first real trial as foreman on the line where the work is the least important, and if he shows fitness, he is then advanced to a more important section with the usual slight increase in salary over the branch line rate. During the period they are employed as student foremen they may be taught how the various reports are made out, and under the supervision of the section foremen ought to be allowed to make up their own time books and distribution of labor while with the floating gangs.

*Received in the contest on The Section Foreman Problem, which closed March 25, 1912.

A CORRECTION.

The paper which was awarded first prize in the contest on The Organization of the Extra Gang, and which was printed on page 1103 of the issue of the *Railway Age Gazette* of May 17, should have been credited to A. Palm, roadmaster of the Western Pacific Railway, instead of A. Palmer.

EFFICIENT OPERATION OF AN EXTRA GANG.*

BY P. H. HAMILTON,
St. Louis & San Francisco, Pittsburg, Kan.

Proper organization, a good foreman, a good class of labor, and plenty of good tools are the four main factors in securing efficiency in an extra gang.

The aim of the average extra gang foreman is simply to keep the men moving, and as long as they are busy he considers it an efficient gang. The foreman should organize the work and should have a definite understanding with each man as to what he expects of him. He should be able to keep his men "strung out" so that each can do a full day's work. Foreigners, especially, are inclined to bunch up and turn the day's work into a "talkfest." The men should each have a certain work to perform each day and should be developed along that line. For instance, the men in a rail gang are not all good spikers. The foreman should pick the best spikers and keep them busy. To keep a good bunch of spikers the foreman should be allowed to pay them 10 or 15 cents per day more than the other laborers, this being the most trying work on a rail-laying job. He should have certain men assigned to the tongs, etc.

I do not believe in large gangs for any kind of track work unless it is common pick and shovel work where the foreman has only to walk up and down his line of men to keep them busy. I have noticed that the larger the gang under one man's supervision the less the amount of work per man. No extra gang should exceed 35 men, as this is all that one foreman and an assistant foreman can handle profitably. Two surfacing gangs of 35 men, each with a foreman, assistant foreman and timekeeper, will do work much cheaper per track foot than a gang of 70 men with one foreman, two assistant foremen and a timekeeper.

There are three chances to increase the efficiency of a gang—the timekeeper and the two flagmen. The timekeeper should be a young man who wishes to learn track work and who will try to act as assistant foreman. The flagmen generally have a

*Received in the contest on The Organization of the Extra Gang, which closed April 25, 1912.

monotonous job which on a warm day is very conducive to drowsiness. On a rail gang the front flagmen can do good work putting the joints on rails, with two bolts in place, ready for "heeling in"; or he can score ties for adzing. The rear flagman can find plenty of work tightening bolts. On a surfacing gang the head flagman can make jack holes, etc., and the rear flagman can make himself useful dressing up track. This work keeps them wide awake and they are always on the alert for approaching trains.

The roadmaster and foreman should decide how each man should do his part of the work and should instruct him to do it that way. While instructing the men the progress will probably be a little slower; but in a short time the foreman will have the men working in unison and doing the work according to his system, which means the highest efficiency obtainable.

A green section foreman rarely makes a good extra gang foreman at first, but by giving him an assistant foremanship under a good extra gang foreman, and giving him personal instruction, the roadmaster can usually develop him into a good foreman. On this road outsiders are never hired for extra gang foremanships unless in emergency. Foremen are taken from the sections and developed; when their gangs are laid off they are again given charge of their regular sections, enabling the roadmaster to keep extra gang foremen at hand who understand the working conditions on the division.

On this road we work five classes: American whites, American negroes, Greeks, Italians and Mexicans. For all classes of work the Americans are the best, but a full gang is hard to obtain at current wages. For steel gangs I consider negroes far superior to any other laborers. They are active, strong and intelligent; and will work in unity. The "unison man" is ever present and is a strong factor in speeding the work and in keeping down the number of minor injuries to the men. In handling heavy material foreigners are not prone to move together, and this results in numerous personal injuries which could be prevented. The "unison man" should be present in every gang where there is danger of pinched fingers, mashed toes, etc. Of the foreign labor I consider Italians far superior for rail gangs. The Italians, Greeks and Mexicans stand about on a par for surfacing work. The Mexican is far superior when it comes to dressing track.

The Greek and Italian can always be depended upon in time of need, and the foreman can always figure on a full gang, as they hardly ever lose a day unless compelled to. But with the Mexican it is different. As long as he has a dollar he does not care whether he works or not, and the foreman is generally short handed for several days after pay day. One foreman who was an adept at card playing used to keep the Mexicans' finances in bad condition, and in this way he kept a full gang. The strong point in favor of the Mexican for extra gang labor is that they are not as clannish as the Greeks and Italians. Any time that a foreman wishes to weed out his gang he can do so without fear of losing the men that he wishes to keep. It has been my experience with Greeks and Italians that when the foreman discharges a drone he can also figure on losing every relative of this man.

Good tools should always be at hand. Where the supply of tools is limited the foreman should carry a forge and anvil for repair work. Poor tools, such as chipped spike mauls, worn-out shovels, dull adzes and dull track chisels are time losers. The foreman should see that the men take proper care of the tools. In large gangs the men are apt to leave tools scattered along the track, and it is sometimes expedient to have a "tool man" to look after these, put handles in mauls, grind adzes, sharpen track chisels and repair other tools.

On one division where shovels were continually being lost and broken, and the extra gang foremen were ordering large numbers of shovels without being able to turn in the old ones, the roadmaster issued an order that each man should have his own shovel, and any time that he appeared on the work without it he would be sent to the bunk cars until he showed up with one. This soon did away with the scarcity of shovels.

CHICAGO, MILWAUKEE & ST. PAUL RAIL MILL.

The Chicago, Milwaukee & St. Paul operates a rail mill and storage yard at Savanna, Ill., to which all rail and fastenings removed from track are sent when released and from which second-hand rail and fastenings are shipped to various portions of the system as required. For several years previous to 1890 a portable rail saw was located at Watertown, Wis., but on this date a permanent plant was established at Savanna. As this mill was operated it was found that work could be done here more economically than at Watertown and in 1894 the latter plant was closed. Since that time all rails have been sent to Savanna not only from the St. Paul lines proper, but since the construction of the Chicago, Milwaukee & Puget Sound, from this line as well. A variety of work has been undertaken at this mill in addition to the straightening and sawing of rail until at the present time all tracks fastenings, including tie plates and angle bars are sent here to be reclaimed and surplus rail from the system is stored here until needed. This plant has developed to keep pace with the work until it is one of the largest mills in the country operated by a railway company for the recovery and storage of second-hand track material.

Most rail is commonly removed from track because of the



Chicago, Milwaukee & St. Paul Rail Yard, at Savanna, Ill.; Rail Mill in Background.

wearing away of the head on curves and the battering of the ends. By sawing off and redrilling these battered ends, much of this rail is suitable for further service in main lines, or at least in heavy freight or side tracks. All rails and fastenings are shipped to Savanna as soon as released from the track and are there sorted and worked over. If suitable only for scrap the material is placed on stock piles awaiting orders for shipment. If suitable for further use, it is passed through the rail mill, where it is sawed, straightened and redrilled and sent out to be used in the track again.

As this rail comes in it is unloaded directly on to skids leading to the saws. Before reaching these saws it is passed through a hydraulic gag press or straightening machine, where kinks and bends are removed. It then passes directly to the saws, of which there are two. These saws are circular and are spaced 31 ft. between faces so that one foot can be removed from each end of a standard 33-ft. rail at one operation. On rails of other lengths or where more than this amount is cut off, only one end can be sawed at a time. Before the rail is sawed the sawyers examine it and classify it as to quality, marking the rail accordingly. They also examine carefully the freshly sawed ends for flaws in the metal. After leaving the saws the burrs at the ends of the

rail resulting from the sawing are chipped off with chisels. The rail then passes to the drilling machines, four of which are provided, and two or three holes are drilled in each end for the fastenings at one operation of the machine. The rail passes directly from the drilling machines on to lines of rollers leading along stock piles. When the pile is reached corresponding to the number designated by the sawyer the rail is slid on to skids and then lifted on to the storage pile with an air hoist awaiting shipment out on the line again.

After passing through the mill the usable rail is divided into three classifications according to condition. The rail in the first class is suitable for important branch lines where smooth riding track is important. The second quality rail is used for less important branch lines and for heavy traffic freight tracks, while the third class is used for yard and side tracks. This year the first class has been further divided into two qualities, the second of which is used on important freight tracks.

The C. M. & St. P. has for a number of years sent large quantities of rails of heavy sections to Joliet, Ill., where they are rerolled by the McKenna process. These rails are sorted on their arrival at Savanna and those fit for rerolling are shipped to Joliet while the others are disposed of as outlined above. Short sections of second-hand rails of good quality are cut to the proper length for frogs and switches and are sent to the company frog and switch shops at Tomah, Wis., for use in making frogs and switches.

All lifting of usable rail in unloading from cars, handling on the stock piles and loading from the piles on to cars, is done by means of vertical air cylinders, to the lower ends of which rail tongs are connected. These cylinders move on overhead tracks which are carried on the timber framework shown in the accompanying view. With this arrangement one man can pick up three rails at one time, one inverted between two upright, as shown in the piles in the foreground, and transport them to any portion of the pile desired. In this way the cost of loading rails from stock piles on to the cars has been reduced to five cents per ton, while two men can unload 200 tons of rails from the cars on to stock piles in one day where no sorting is necessary.

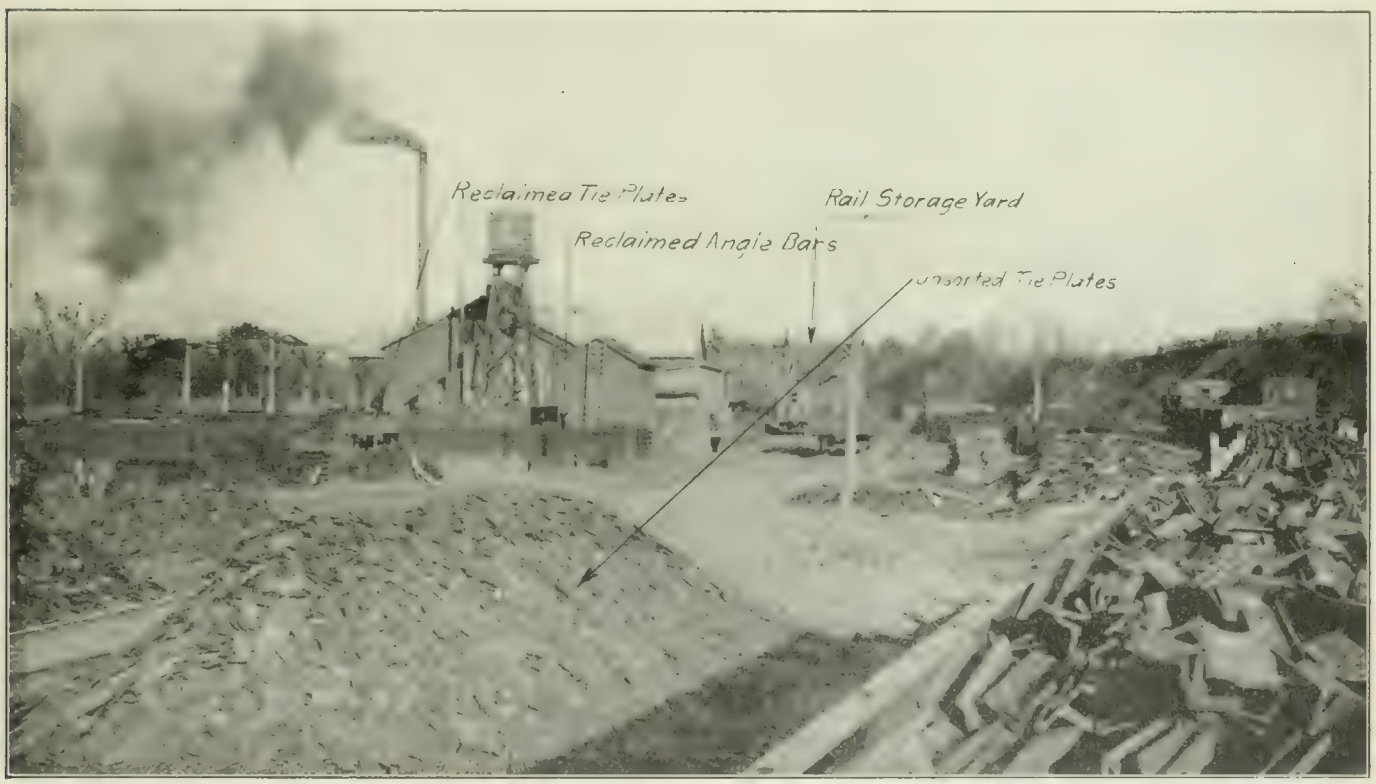
The average capacity of the mill is about 500 sawed, straightened and drilled rails per day of 10 hours, while the maximum number ever put through the mill in one day was 800 60-lb. rails. Two men unload the rails from the cars on to skids leading into the mills, three men work on the straightener, three on the saws, two chip the burrs from the rail and four are on the drill presses. From two to four men are employed on the stock piles, varying with the amount of material which is being handled. The cost of handling the rail, including the unloading, straightening, sawing, chipping, drilling and placing on the stock piles, averages about 50 cents per ton.

RECLAIMING TRACK FASTENINGS.

A very important part of the work done at this yard is the reclaiming of tie plates, angle bars, joints, etc. This material is sent in with the rail, frequently being loaded on the same cars.

A large proportion of the tie plates which are released are reclaimed here for further service. As the plates are received most of them have considerable wood and gravel adhering to the undersides between the flanges. To remove this the plates are piled and kerosene is poured over them and fired, burning out the larger portion of the wood. That which remains is removed by boys using hammers, chisels and small hooks made for that purpose. These boys also sort the plates into piles according to the kind of plate and also divide them between those suitable for main line, those suitable for side tracks, those requiring straightening, and scrap. The plates sorted out for main track are practically as good as new, while those for side tracks are inferior in that they are worn, corroded or slightly cracked. By using them in this way it is possible to tie-plate many side tracks at a very small expense with plates which would otherwise go in the scrap pile. The straightening is done with a 300-lb. air drop hammer falling about three ft. on to the plate. The plates are carefully stacked according to their kind and condition awaiting shipment, as shown in one of the accompanying views.

A large number of tie plates are repunched each year for sections of rail other than those for which they were originally intended. Last year about 200,000 plates, both malleable iron and steel, were handled in this manner at an approximate cost of $238.18, or $1.19 per thousand. With the increasing use of rail



Reclaimed Track Fastenings; Chicago, Milwaukee & St. Paul Yard, Savanna, Ill.

joints in place of angle bars a large number of joint tie plates are accumulating which are too long for use as intermediate plates. These plates are sheared to the proper length and repunched, the shearing costing about 50 cents per thousand plates.

Last year 107,487 new tie plates were shipped from this yard at a cost for handling of $75, and 495,000 second-hand steel and malleable iron tie plates were furnished from here at a cost of $1,371.56. Including the cost of punching the 200,000 tie plates referred to, the total cost of handling these 495,000 second-hand tie plates and putting them back into service was $1,609.74, or $3.25 per thousand plates, which included the cost of unloading, sorting, removing wood, straightening, piling in storage, and reloading. In addition to this, 224 tons, or about 20 per cent. of the total output of tie plates, were disposed of as scrap.

Many of the angle bars and joints received with the rail have to be worked over before being returned to the track. Large numbers of the 6-hole 40-in. angle bars which were commonly used several years ago are now being released. Many of these are badly worn at the top on the center directly under the end of the rail, especially if they come from double track. Because of this wear they cannot be returned to main track in their present condition. A 12-in. piece is therefore cut from one end changing the center of the bearing 6 in. and offering a new support for the head of the rail. The angle bar is repunched for larger bolts and for new spacing and is reslotted for spikes when it is again suitable for main line track. In reclaiming the angle bars three men are able to handle 1,000 bars daily. The cost of reclaiming these angle bars in this way is 0.8 cents per bar. A considerable number of Weber joints have recently been removed from the track after 10 years' service and these are also being repunched for larger bolts and returned to main lines.

A small excess and emergency stock of new rails is maintained here, although most new rail is shipped directly from the rolling mills to the point of laying. Sufficient track bolts and nutlocks are kept here to supply all rail shipped from this mill, but all track spikes are furnished direct by the store department.

Very careful records of the entire cost of operation is kept of the mill and of the material handled. A report is made four times a month to the inspector of rail at Chicago, showing the amount of new and second-hand rail on hand of the different weights and qualities, together with the amount of rail on hand to be sawed and straightened, and the amount of scrap. Similar information is shown regarding tie plates and angle bars. From this report the inspector determines the distribution of rail on the various requisitions and instructs the mill regarding loading.

Including those previously mentioned in the rail mill, about 45 men are employed, the larger part of whom are foreign. The labor expense of operation of the entire plant last year was $18,943, while the material expense, including fuel and storekeeper's charges, was $3,245. The amount of usable steel rail received was 20,676 tons, while 20,338 tons were shipped; 4,420 tons of new steel rails were received and 3,789 tons shipped; 12,428 tons of scrap steel rails were received and 12,560 tons of scrap rails disposed of; 1,761 tons of iron rails were received and 2,087 tons sold; 1,141 tons of new fastenings, including tie plates, were received and 1,876 tons forwarded, while 3,393 tons of old fastenings were received and 2,183 tons were shipped out. While considerably under the figures of some previous years, this tonnage represents about an average year's work.

This mill is operated under the supervision of J. G. Woodworth, inspector of rail, and John Reinehr, superintendent of the rail mill, to whom we are indebted for assistance in securing this information.

In an address given before the last annual convention of the American Wood Preservers' Association, Harold F. Weiss called attention to some experiments being conducted at the Forest Products Laboratory at Madison, Wis., and exhibited a piece of red oak which had been "conditioned" in a treating cylinder, with the result that its strength was more than doubled. In other words, by a manipulation in the cylinder this piece of oak was made twice as hard as it originally was. If it should be possible to develop this commercially there would be a great field for the treating of soft wood ties, such as loblolly pine, to secure a much harder and more durable tie.

THE TRACK FOREMEN OF THE FUTURE.*

BY WILLIAM J. POTTER,
University of Pennsylvania.

At the present rate of pay we cannot get a man of the required caliber to take the position of track foreman. We have two alternatives; either attract good foremen by compensating them for their ability and finding your return in the increased work of the less skilled laborers, or take the men you now have, and by the expenditure of much money train them to fill the positions with at least a fair degree of efficiency. The former of these two methods has proved to be applicable, with profits both by increased efficiency and by decreased costs. Is it not a mistake for railway managers to allow the question of immediate returns to blind them while the more important question, permanence of supply, is allowed to take care of itself? In the quest for immediate gain do they not in the long run suffer loss? The skilled men have been driven out of the business by the low wages paid. Our large and progressive roads are facing this problem, knowing that it must be solved, and the sooner the better. The Union Pacific has installed a series of lessons for trackmen, nine in number, reaching from the minor duties of caring for tools to the more technical training necessary to install a switch and grade curves.

I believe that by raising the wages of the foremen the standard of efficiency of the men, and the amount of work performed could be increased to make the investment a profitable one. Last summer I saw what a foreman can do if he has a proper incentive. This young foreman was the son of a farmer who lived adjacent to the roadbed. He had grown up on the section and loved the outdoor life too well to look for better opportunities elsewhere. Evidently he had been reading the new doctrines of efficiency and being of a practical turn of mind had begun to apply them to the work in hand. When lining track, he had all the men of one nationality working together, and he had previously picked out the fastest workers in each group. The roadbed had four tracks, so he divided his workers into groups of four, all within reach of his voice. After the track had been lined up properly and the men were about to start tamping, he would set the fast men on the right-hand track, and make the others keep pace with them. He established a certain amount of work to be completed each day, and when the men had completed their day's allotment they were allowed to go home. The men all accepted this idea and often worked hard during the noon hour in order to get the work finished on time. The men themselves prevented any individual soldiering. In direct contrast is the next section below, which is in charge of a foreigner, who is the despair of the road master. His tools are continually being stolen and broken by the men, his curves are so poorly watched that engineers from the main office are often out there checking; and he has no real control over the men under him.

The pay that is given section foremen, $60 for the road sections and $65 to $75 for the yards and terminals, is not enough to tempt men of ability to apply their best efforts in the interest of the company. Pay the best men high wages and see that they repay it by increasing the output of work. The work on the track is sufficiently standardized to permit the assignment of tasks., making the men perform the task set, and paying them a certain proportion of the increased value of the work. Select foremen who are well qualified to set tasks for the men, give them high wages to see that the men perform the work as planned, and pay men proportionate increases for their extra effort. By investing in the high-priced men you can get a

*Received in the contest on The Section Foreman Problem, which closed March 25, 1912.

type qualified to handle the additional clerical work; by being square with the men, you avoid labor troubles and build up a loyal feeling among the workers toward the road.

THE SECTION FOREMAN PROBLEM.*

BY EX-TRACK INSPECTOR.

After considering the track foreman problem for 20 years I have evolved no better plan than the one used by a railway builder and manager, away back in 1884-90. Like all good, workable plans it was perfectly simple. On each section he had his regular foreman, and each foreman picked out the best man in the gang and put him down as "second hand" at ten cents a day more than the other men. This man was to be the foreman of the future. He knew it, and did all he could to be ready when his time came. The ten cents a day paid him in part, at least, for the extra work and study necessary while he was waiting. This plan appealed to all that was worth while in the men. The foreman looked forward to handling the extra gang. The second hand looked forward to taking his foreman's place, or getting a section for himself, while each man in the gang looked forward to being second hand, and some day foreman.

I watched the working of this plan for years, and know that it was good. I saw it discarded under new management, and watched good men drift away when the prize, or reward for extra effort, was withdrawn; and ambition died in those who remained. Of all the plans I have seen tried I have seen none that worked so well as this one.

THE FOREMAN PROBLEM.*

BY M. GAUTEY,

Roadmaster, Atchison, Topeka & Santa Fe, Argentine, Kan.

In districts where there are not many large towns or cities close by and the young white men are working on sections, the roadmaster has an opportunity to get some material for foremen, but there are not many of these districts left now, and in most places all labor on the sections is foreign.

I have tried to pick out foreigners who would make good foremen after a couple of years' training, and when I had brought them up to a point where the foreman and myself both thought we had a fair man, and have brought them into the office and told them what I intended to do, they would go back to work and in less than a week would be endeavoring to run the gang of the foreman they were working for. All the good I had accomplished in a year or two of training would be lost in 15 or 20 minutes conversation. I have tried to place them between reliable white foremen so I could depend on the white men for any critical or important work.

I have resorted from time to time to the various methods of getting foremen and educating them, but have found nothing that I can work out with the facilities afforded roadmasters, which will give more than temporary relief. Monthly meetings of section foremen have brought good results; and assistant foremen in extra gangs have helped relieve the distress, but I am a firm believer that the following method would work out well.

Subdivide the territory under a general roadmaster among three to five roadmasters, and install on each general roadmaster's territory a student gang of white men, receiving a prescribed daily wage the first year, an increase the second year, and a stated monthly salary the third year. The gang should contain not less than 30 nor more than 40 men. Pick out a competent track man for a foreman, having all reports from this gang rendered both to the general roadmaster's office and to the roadmaster on whose territory the gang was working. See that a strict personal record of every man in the gang is kept. The general roadmaster could move this gang from one division to another, to the different roadmasters for different work, so that the gang will have to do every kind of work that will possibly come up in the track department.

The gang should be divided in three bunches, ten men on the first year, ten on the second year and ten on the third year. The men on the third year should be used as foremen to be sent out to relieve foremen that are lying off. This would also give the roadmaster a chance to call on his general roadmaster for a foreman to relieve other foremen who had been working for the company a long time to permit them to have a vacation once a year. This is something that is not afforded section foremen and which men on a monthly salary in most other departments get. No relative of the general roadmaster or the roadmaster in charge should be permitted to work in the gang. Permit the men to have a boarding car on a co-operative plan. There should be an instructor, similar to the one furnished machinist apprentices, and all of the third-year men should be educated on the technical points that come up in track work. They should receive four or six lessons a month and they should have a study car which should be supplied with literature that pertains to track work.

*Received in the contest on The Section Foreman Problem, which closed March 25, 1912.

THE FOREMAN PROBLEM.*

BY J. L. TAYLOR

Assistant Division Engineer, Grand Rapids & Indiana, Fort Wayne, Ind.

Neglect has caused the present scarcity of good section men. While the wages of other railway employes have increased considerably in the last twelve years, the wages of the section man have lagged far behind in proportion. The present foreman is often an old railroader, bent and gray after many years of faithful and hard service; between him and the average track laborer there is a wide gap which may well cause uneasiness when the supply for the future is considered.

There are still many localities where Americans are available for section foremen. In order to keep this class of labor against outside demands, the railways should make the job of foreman an attractive one. Better pay than at present, with perhaps additional duties such as maintaining signals, etc., steady work and prospects of retiring on a pension will always attract a good class of men. At the same time the laborers should be receiving better wages. To provide a supply of American foremen for the future, each subdivision should carry a fixed number of laborers who may be styled Assistant Foremen and who should receive a higher rate of pay than the ordinary laborer.

At many places Americans are not available and section gangs are composed of foreigners bossed by American foremen. The foreigners are usually "any old thing" that can be supplied by a labor agent, and consequently the job of bossing is most distasteful, and each year finds it harder to get competent men who are willing to take the job of foreman at present wages. If the railway companies would spend as much in proportion to obtain $100,000 worth of labor as they do to buy $300 worth of, say, ornamental iron railing, then the class of laborers employed would be better suited to the requirements. Foreign laborers should be carefully chosen and some attempt made to get men who would be willing to stay in the service, so that the present "floater" could be eliminated. By carefully composing gangs of foreigners willing to work and to learn the trade of section man, a class of men available for foreign foreman would surely develop. The railways of Europe are kept up by native laborers, so why could not the same laborers keep up the railways of this country? They can, and they will, but first they must be taught our methods. A "boss" supplied by a labor agent is usually a good politician, but a very poor foreman. American foremen of the required temperament can teach foreign laborers a good deal in a few weeks. Foreigners chosen for their skill, adaptability, willingness to learn and knowledge of reading and writing could be put under a competent and patient foreman whose duty it would be to teach the men the art of track work; and in time they would become competent to act as foremen, and would make good foremen, too.

METHODS OF BRIDGE NUMBERING.

The practice of designating railway bridges by number is practically universal and its advantages are generally recognized. The correspondence and records referring to any structure are very much simplified and the making of reports concerning accidents and necessary repairs, and the issuing of slow orders to trainmen are greatly facilitated by such designation. Whatever the system adopted a complete record should be kept in the general office of the bridge department showing the number, type and location of all structures; convenient records should be supplied to the bridge and track department and to despatchers' offices; and the number should be displayed as prominently as possible on the bridge itself.

The methods used to display numbers at the bridge site vary on different roads and for different types of bridges. For through trusses it is quite common to stencil the number on the cover plate of the righthand end post, and for through girder bridges it can be similarly shown on the girder. For deck structures a number board or casting may be attached to the ties outside the guard rail, either resting on the tie or extending out beyond the end of the tie; a number post may be set at each end of the structure, or the number may be cast in the concrete of the abutments. The principal requirement of such signs is that they be permanent and conspicuous. Trainmen or officers riding trains often desire to refer to a bridge in their report and should be able to take the number as the train passes. In case of accidents it may save trouble in reporting the matter if the number is plainly visible to witnesses who may not be familiar with the bridge numbering system.

In general, all numbering systems can be divided into two classes; those which give bridges consecutive numbers without reference to location and those which base the numbers on some unit of measure of the distance from an arbitrary point so that the number represents a definite location on the profile. The letters submitted in response to a request by a committee of the American Railway Bridge and Building Association, and published in the 1911 Proceedings of that association, show that the following roads, representing a mileage of 36,299 out of a total of 111,425 reporting, use the consecutive system exclusively: the Boston & Albany; the Chicago, Milwaukee & St. Paul; the Grand Trunk; the Great Northern; the Intercolonial; the Missouri Pacific; the New York Central & Hudson River; the Norfolk & Western and the Pennsylvania Lines West. The following roads representing a mileage of 62,873 use the mileage system exclusively: the Atchison, Topeka & Santa Fe; the Canadian Pacific; the Central of Georgia; the Chesapeake & Ohio; the Chicago, Burlington & Quincy; the Chicago Great Western; the Chicago, Rock Island & Pacific, the Delaware, Lackawanna & Western; the Denver & Rio Grande; the Erie; the Illinois Central; the Lehigh Valley; the Michigan Central; the New York, New Haven & Hartford, and the Southern. Three roads, the Baltimore & Ohio, the Lake Shore & Michigan Southern and the Northern Pacific, with a combined mileage of 12,253, report that both systems are in use.

The details of either system as worked out on the various roads may differ considerably. With the consecutive system it is customary to separate the structures into several series which may or may not be distinguished by letter prefixes or suffixes. The Baltimore & Ohio numbers the bridges on each division independently, the lower numbers being used for the main line of the division and a series in a separate hundred for each branch. On the Chicago, Milwaukee & St. Paul all bridges on a division are included in one series which is distinguished from other divisions by a letter prefix. All bridges on this road have even numbers, the odd numbers being reserved for culverts. The Great Northern has a separate series for each branch, no distinguishing marks being used, so that there are several bridges on the line whose numbers are duplicates, and in referring to a bridge by the number the location is always indicated. The bridges on the Intercolonial are numbered consecutively, westward from each station. Milepost records are also kept in the bridge inspection books to locate the structures. The keeping of such milepost records is very common, and many roads have small blue print plans prepared for the use of track and bridge men and despatchers' offices. With the consecutive system it is necessary to use fractional numbers or letter suffixes to designate bridges added after the numbers are assigned to obviate the necessity of renumbering the remainder of the series. Three roads, the Baltimore & Ohio, the Chicago, Milwaukee & St. Paul and the Lake Shore & Michigan Southern, report that they use fractions for this purpose, and two roads, the Grand Trunk and the Norfolk & Western, mention the use of letters.

The systems of numbering based on the location of the structures usually refer to the mileage from some terminal, the distance beyond the nearest milepost being commonly expressed in tenths or hundredths of a mile. For example, bridge number 42.61 would be .61 miles beyond the milepost 42. Three of the reporting roads, however, use letter suffixes to designate the bridges between consecutive mileposts, as 42A, 42B and 42C for three consecutive bridges, between mileposts 42 and 43. These roads are the Atchison, Topeka & Santa Fe, the Denver & Rio Grande and the Lehigh Valley. The Northern Pacific has used a decimal to indicate the number of bridges beyond the last milepost, in which case the three bridges referred to would become 42.1, 42.2 and 42.3. Mr. Stevens of the Northern Pacific, and Mr. Bland of the Pennsylvania Lines West, both express their preference for the use of multiples of 100 ft. to indicate the fractions of a mile. Under this system a bridge located 2,840 ft. beyond milepost 42 would be numbered 42.28. In the mileage system, as in the consecutive, letters may or may not be used in connection with the number to indicate the division or branch on which a bridge is located. The Missouri Pacific has used a system based on telegraph poles instead of mileposts on some divisions where mileposts are not set along the line. The nearest telegraph pole to each mile is painted white for about 10 ft. of its length and the mile number painted on it. The bridge cannot well be numbered by any other mileage system, as confusion would arise. This has some obvious disadvantages, however, as the spacing of telegraph poles may be frequently changed and is usually not the same over the road.

A consideration that complicates any system of bridge numbering is the necessity for providing a record for the culverts and other small openings. Some roads do not assign numbers to anything but important bridges. The Rock Island does not number any culverts; the Chesapeake & Ohio does not number any opening under 10 ft.; and the New York Central & Hudson River does not assign numbers for openings less than 4 ft. On the Northern Pacific culverts take the number of the nearest bridge in the direction from which the series is numbered with the addition of the letter suffix. A similar system is used on the Lehigh Valley, except that a cipher precedes the number as an indication that the structure is a culvert. As mentioned above, the Chicago, Milwaukee & St. Paul reserves all odd numbers for culverts. The Spokane, Portland & Seattle is considering the plan of numbering bridges to tenths and culverts to hundredths of a mile to distinguish the type of structure. It is argued in favor of this system that bridges are usually long enough to avoid any confusion which might arise from using only tenths for their location. The roads that do not differentiate between bridges and culverts argue that the frequent change of bridges to culverts makes it desirable to show only location by the bridge number.

In comparing the advantages and disadvantages of the consecutive mileage systems, several arguments are advanced by the respective advocates of the two methods. The consecutive system has been more generally applied on the old lines, and the fact that many roads have kept all their records on that basis for many years is in itself an argument against changing the system. It is considered by many men a serious matter to

change all bridge numbers on a road, as a great deal of confusion and misunderstanding may result. The consecutive system gives an indication of the total number of bridges on each section which is not furnished by the mileage system. On the other hand, it gives no indication of the location of the structure and the numbering is complicated when new bridges are built or old ones filled. The disadvantage of using either fractions or letters for additional bridges is a serious one when there are numerous additions, as for example, when tracks are elevated through a city and a number of new street subways are built. The use of the consecutive system in which all series begin with one means certain duplication of numbers, which often results in misunderstanding, especially when the number is used in telegrams and the designation of the division or branch may be altered or omitted.

The numbering of structures by location makes the assignment of numbers automatic and indicates to every one familiar with the road at least the approximate location of the bridges. Such a system greatly simplifies reference to structures as it is possible to locate any given bridge by number from a time card. New bridges can be inserted or old ones filled without affecting the numbers of the other structures. A number of the bridge engineers who report the use of the consecutive system on their roads express their personal preference for the mileage system. On the other hand, there are several disadvantages which are urged against this method of numbering. The numbers frequently involve five figures, making them difficult to remember. In case a number board is lost from the bridge and the number is forgotten, it cannot be supplied by reference to the nearest bridge, as can be done in the consecutive system. In case of line revisions which change the distance of the structures from the terminal, all numbers must be changed to agree with the new mileage.

The following comments have been abstracted from the letters submitted to the Bridge and Building Association, as mentioned above, and from which considerable data for the preceding article has been taken:

J. C. Bland (Engineer Bridges, Pennsylvania Lines West): I think the numbering of bridges is an arbitrary matter which we become accustomed to, and when once learned it is pretty hard to replace. The merits of the decimal system of numbering are many, but in reality I think are largely theoretical. If the matter were left entirely in my hands I would adhere to the consecutive numbering system.

G. W. Rear (Bridge Inspector, Southern Pacific): I recommend that structures be numbered with the mile number and a letter to designate the order in which openings come beyond the mile board. The numbers should include all openings through the embankment which terminate on the company's property, also overhead structures which are maintained by the railway. This method eliminates sewers, water pipes, etc., which are continuous, and overhead structures for which the company is not responsible. I would not number surface or slat cattle guards, but would number pit guards, pipe culverts, etc.

W. F. Steffens (Engineer Structures, Boston & Albany): My personal preference has always been for a consecutive system coupled with milepost records in the office.

C. H. Cartlidge (Bridge Engineer, Chicago, Burlington & Quincy): It is my firm conviction that the double decimal system of numbering is the best.

A. W. Carpenter (Engineer of Structures, New York Central & Hudson River): We tried at one time to adopt the mileage system of numbering bridges, but found it unsatisfactory for the following reasons: First, it made great confusion in our records, the bridges having been numbered consecutively and no changes having been made for many years. Second, the mileage system was found to be changeable, varying with any change in the length of line caused by change in alinement.

I believe personally in the consecutive system of numbering as the most satisfactory. All pipes, box culverts, small arches and other openings under 4 ft. are scheduled, showing their relative position and milepost location, but they are not given a number.

H. E. Stevens (Bridge Engineer, Northern Pacific): In my opinion bridges should be numbered with reference to the easterly milepost plus the number of hundreds of feet they lie west of said milepost. The numbers should be written in a circle with the milepost number on the upper half, and the number of hundreds of feet on the lower half, with a horizontal line between.

L. D. Hadwen (Engineer Masonry Construction, Chicago, Milwaukee & St. Paul): Personally, I consider a system of number which designates the location of a bridge with reference to its actual position on the profile as most desirable, especially if used with a letter prefix for each division. It is increasingly difficult to separate openings under track into bridges and culverts, for many structures might be considered as belonging to either class. Moreover, bridges are continually being replaced with culverts. This fact makes it desirable to have the openings numbered without reference to their character and entirely by their location.

Howard G. Kelly (Vice-President, formerly Chief Engineer, Grand Trunk): I believe the best method of numbering bridges is by mileage and tenths, without necessarily complicating the reading on the number board by the insertion of any letter or other designation for the division or district in which it occurs. Ordinarily, on a large system no man can carry in his mind all of the letters which designate the divisions, nor can he remember the various bridges by number except the most important ones.

PIECEWORK WAGES IN A TIMBER TREATING PLANT.

In a discussion on the operation of tie plants at the last annual convention of the American Wood Preservers' Association, Secretary F. J. Angier, superintendent of timber preservation of the Baltimore & Ohio, gave the following information concerning the establishing of piecework rates at a timber-treating plant on the Burlington in South Dakota. At the time this system was installed they were handling ties on a day basis, paying 17½ cents per hour. A gang of ten Swedes was secured and they were placed under a good foreman, who was instructed to see that the men worked steadily and gave a good day's work. The record of the number of ties handled was carefully kept for a week and this number divided into their total wages gave the cost per ties on a day basis. This gang of Swedes was then placed on a piecework basis with a rate a trifle less than had been paid on the day basis. The result was that they very quickly increased their monthly wages until they made from $75 to $90 a month where they had previously made about $45. The company did not decrease the rate, as with the increased output the cost of the work to the company was lessened, because of the reduction in the cost of the foreman's supervision and overhead charges.

The new Hungarian passenger tariff, taking the place of the famous zone tariff, goes into effect July 1 of this year. Generally speaking, it is a mileage tariff in which the miles are 6.2 miles long. On express trains the rates are the same for all places within 18.6 miles, namely 30, 48 and 72 cents respectively for the three classes. But by passenger and mixed trains within this distance, which may be called the suburban zone, the rates vary according to distance, as: Third class, 4 cents for 3 miles, 4.8 for 6 miles, 7.2 for 9 miles, 10 cents for 12.4 miles, 14 cents for 17 miles, and 20 cents for 18.6 miles, one-half to two-thirds for second class, and 2½ to three times as much for first class.

General News Section.

Mr. Kruttschnitt announces that safety committees are to be organized throughout the Harriman lines on the first of July.

Suits were filed in the United States district court at Salt Lake City on June 13 against the Denver & Rio Grande for 20 alleged violations of the hours of service law.

At Malmslaett, Sweden, June 15, according to a press despatch, there was a collision between a passenger train and a freight in which 18 persons were killed and 16 injured.

The Pennsylvania Railroad System in the past 25 years has paid in wages $2,220,034,753, or double the amount of the national debt. The system has 11,503 miles of line, 25,236 miles of track, and about 185,000 employees.

It is announced that the National Packing Company, a $15,000,000 corporation, said to be owned jointly by the Armour, Swift and Morris interests, and which has been unsuccessfully prosecuted as the "beef trust," has informed the attorney-general that a plan of dissolution will be submitted to the government by August 1.

The Pacific Railway of Nicaragua (Ferrocarril del Pacifico de Nicaragua) has been incorporated in Maine, to construct and manage public utilities and other enterprises. The authorized capital stock is $3,300,000. The temporary officers are: President, Clarence E. Eaton; treasurer, T. L. Croteau; clerk, James E. Manter.

Officers of the Oregon Short Line have recently completed a second annual "get acquainted" tour, during which all the lines of the company south and east of Pocatello, Idaho, were covered—more than 1,000 miles of road. Stops were made at 60 stations on the main line and branches and meetings and conferences were held with the citizens of the towns.

"Strength Tests of Cross-arms" is the subject of a report by Thomas R. C. Wilson, assistant engineer in forest products for the United States Department of Agriculture, printed in circular No. 204 recently issued by the Forest Service bureau. Mr. Wilson, in a pamphlet of 15 pages, gives the results of tests made by him at the University of Wisconsin, on 84 cross-arms.

Suits were filed in the United States district court at Chicago last week against the Baltimore & Ohio and Chicago, Milwaukee & St. Paul, to recover $8,000 in penalties for violations of the federal hours-of-service law. The Chicago & North Western was fined $100 in the district court of Chicago on June 14 for a violation of the 28-hour law in the transportation of live stock.

A committee of the Chicago city council which has been trying to settle the Chicago freight handlers' strike held a meeting with representatives of the strikers on June 17 and later called on W. A. Garrett, chairman of the Chicago General Managers' Association, who informed them that no formal settlement of the strike was possible, as some of the roads had filled all positions left vacant and that the men would have to apply individually to be taken back.

About 250 members of the Traffic Club of Chicago took advantage of the opportunity afforded them on June 11 by the Chicago & Western Indiana and Belt Railways to inspect the network of the Chicago terminals in a special train. The party spent nearly the whole day in making the trip over the lines of the company, which connect with practically every road entering the city, crossing some 38 roads, and viewing some of the principal industries of the city.

On the Lehigh Valley one day this week a freight train which was run from Buffalo, N. Y., to Sayre, 177 miles, was loaded wholly with iron ore, and the weight of the cars and lading was 6,663 tons. The number of cars was 95, and there were two engines. At Sayre five other cars were added, making a train of 100 cars from Sayre to Coxton. Last week a train of 100 cars, weighing 6,200 tons, was run through solid from Buffalo to Coxton, 260 miles.

The Pennsylvania Lines west of Pittsburgh carried, during the calendar year ending on the 31st of last December, 32,558,337 passengers, who traveled 1,138,329,577 miles; and not one was killed in any train accident. The Vandalia Railroad, which is a part of this system, has maintained a record like this for five years, and during that time has recorded only 46 passengers injured in train accidents, this number including every case requiring medical or surgical attention, however trivial. The Grand Rapids & Indiana reports a similar freedom from fatal accidents to passengers for five years.

Reports printed in the daily papers last week to the effect that the Canadian Pacific has ordered many thousands of new cars were denied by officers of the road as entirely without foundation. This week despatches from Ottawa, reporting a hearing before the Canadian railway commission, quote an officer of the road, J. W. Leonard, as saying that the directors of the company have authorized an expenditure of $19,000,000 for cars, but that it has been impossible to find car builders to take the contracts. All the shops are behind in their orders. This statement appears to have been made in connection with a general inquiry which is being made by the Canadian commission based on alleged complaints that there is a shortage of freight cars throughout Canada.

The Grand Trunk Pacific has opened its line from Prince Rupert on the Pacific coast eastward to the Skeena river crossing, and trains will be run three times a week each way. A gap of only about 400 miles now remains between the Pacific end and the Winnipeg end of the Grand Trunk Pacific. Contractors' trains are now running and carrying passengers and freight on the National Transcontinental for 130 miles west of Cochrane three times a week, and also for 150 miles east of Cochrane twice a week. Cochrane is a short distance west of the Quebec-Ontario boundary, almost directly north from Sault Ste. Marie, and 524 miles east of Superior Junction, which is now known as Graham. It is estimated that there are now 5,000 settlers along the line of this road between Graham and the Manitoba boundary.

The Common Pleas court at Philadelphia refused last week to make permanent the temporary injunction which had been granted forbidding three employees' brotherhoods to act together in their attempt to secure increased wages or improvements in service from the Pennsylvania Railroad Company. The separate committees, however, had taken action independently and the leaders now say that they expect to be able to announce next Monday that their constituents have given them the desired authority to use their judgment as to calling strikes. Press despatches say that walking delegates are active all over the lines east of Pittsburgh. The ballot on which the men are asked to vote fills four pages, and it is said that many employees vote to support their leaders without reading the ballot. One well-informed employee estimates that half of the men voting on this proposition are over 45 years old.

Electrification of the B. A. & P.

The electrification of the Butte, Anaconda & Pacific is of exceptional interest, because it represents one of the largest installations of electrical equipment for steam railway service and the first in this country where 2,400 volt direct current locomotives will be employed. The work necessary to change from steam to electricity is now going on, and it is hoped that the electric operation will be begun early next year.

The section of the road to be equipped is that between Butte and Anaconda, Mont., comprising about 30 miles of main line, single track, and a total track mileage including the sidings and smelter tracks, of 114 miles. The remaining 24 miles of the road, embracing the mine tracks on Butte Hill, minor sidings, etc., will continue to be operated by steam; although it is probable that the entire system will be electrified at an early date.

The 2,400 volt direct current system was adopted by this road after a careful study of local conditions. In comparison with other existing systems, it was found best suited for the heavy trains run over its tracks. The main line trains of the Chicago, Milwaukee & Puget Sound run over the Butte, Anaconda & Pacific for a distance of 16 miles, and this calls for trunk

line freight and passenger service in addition to the heavy local freight traffic. The freight consists principally of copper ore from the Butte mines to the smelters at Anaconda, and with mine supplies, lumber, etc., moving in both directions, amounts to approximately 5,000,000 tons of freight yearly. Complete trains, weighing 3,400 tons and made up of 50 loaded steel ore cars, will be hauled by two locomotives up a ruling grade of 0.3 per cent. Single locomotives will be used for making up trains in the yards.

The entire electrical equipment for this installation is being furnished by the General Electric Company. Seventeen 2,400 volt direct-current locomotives of the articulated truck type, each weighing 75 tons, have been ordered. Each locomotive will be equipped with four GE-229, 1,200 volt, commutating pole, twin geared railway motors insulated for operation, two in series on 2,400 volts. The motors will be ventilated by a forced circulation of air, in addition to the ventilation secured by the fan in the armature. Sprague General Electric Type M control equipments, will be used, a dynamotor being used to furnish 600 volts for the operation of the contactors, lights and air compressor. The cabs will be heated by special heaters, using 2,400 volt direct current direct from the trolley circuit.

Two of the locomotives are designed for passenger service. There are four passenger trains a day, each way, the average train having three passenger cars. When hauling a train of three coaches, the passenger motors will be capable of running 45 miles an hour on level track. Current for lighting the cars will be taken from the 600 volt circuit of the dynamotor, and for heating the coaches will be tapped from the 2,400 volt trolley circuit on the locomotive.

Two 2,400 volt substations are being installed, one at Butte, and the other at Anaconda, 26 miles apart. The equipments will each consist of two 1,000 k. w. synchronous motor-generator sets. Power for operating the motor-generator sets will be supplied from the 2,300 volt, 60 cycle, three-phase buses in the substation of the Great Falls Power Company, to which power is transmitted at 50,000 volts from the hydraulic power stations of the company.

A TA regulator will be installed in each substation to maintain constant voltage automatically at the terminals of the synchronous motors. Through this method of operation the possibility of the sets dropping out of step on extreme overloads will be eliminated.

Current for operating the locomotives will be taken from overhead conductors. A special flexible catenary trolley suspension will be used over the larger part of the line, with direct suspension over some of the difficult sidings. Side brackets and cross span construction will be employed where local conditions demand. Numerous yards are to be electrified, and at one point it will be necessary to span 12 tracks, which will be accomplished by cross span construction, using a third pole between the eight and ninth tracks.

Railway Financial Science.

The Boston Elevated Street Railway Company is maintaining practically normal service on most of the lines, but on others cars are infrequent. The strike will be a week old tomorrow morning and there are no indications of a settlement. The company has begun to weed out the dishonest conductors, many having been discharged yesterday and today (June 14). The thieving by some of the new men has been so open that it has become a public scandal. The money order department at the post office has been doing a big business with conductors, who have been sending from $50 to $100 each to New York and Philadelphia, making payment in dimes and nickels which were manifestly the proceeds of their "knocking down."—*Press Despatch*

Legislation in Massachusetts.

The legislature of Massachusetts adjourned without day on June 13. The law to authorize the consolidation of the three principal street railway companies in the western part of the state was vetoed by the governor, so that the only thing accomplished in that matter was the appointment of a committee to consider the question between now and the meeting of the next legislature in January, 1913. This committee consists of Mr. Coolidge and two other senators, and Mr. Hardy and three other members of the lower house. All of the proposed measures for changing the status of the New Haven road and the Boston & Maine, and for the construction of a tunnel across the city of Boston failed, together with the proposals of the governor (which were modified several times) to change the status of the State Railway Commission or to establish some other body in place of it.

The Central of Georgia's "Higher" Educational Class.

Under the auspices of the Educational Bureau recently established by the Central of Georgia Railway, a class has been formed for the purpose of discussing modern railway problems and other topics of timely interest, to meet once a week. This class is composed of the heads of the several departments at Savannah, including chief clerks and those having similar duties.

The executive force of the organization consists of the assistant chief of the Educational Bureau, D. C. Boy, who performs the duties of chairman, and two committees; a program committee and a membership committee. This organization may well be termed an advanced educational class, as we have suggested in our title. The personnel of the committees is as follows:

Program Committee—

W. B. McKinstry, Freight Claim Agent (Chairman);
C. F. Groves, Car Accountant;
J. M. Fagan, Freight Agent;
A. R. Lawton, Jr., Chief Clerk, Law Department;
W. McN. Knapp, Chief Clerk to Freight Traffic Manager;
H. L. Fell, Chief Clerk, Passenger Department;
J. R. Koerper, Chief Clerk, Mechanical Department.

Membership Committee—

M. B. Nichols, Auditor of Traffic (Chairman);
G. F. Smith, Land and Tax Agent;
J. L. Bennett, General Storekeeper;
W. J. Robider, Master Car Builder;
H. V. Jenkins, Cashier;
J. B. Maddock, Bridge and Building Engineer;
W. B. Clements, City Ticket and Passenger Agent.

It is the duty of the program committee to formulate a list of subjects for discussion and also to make suggestions as to the most suitable person to discuss each topic. The speaker and his subject are selected two or three weeks in advance of the meeting at which the topic is to be discussed so that necessary preparation can be made. Meetings are held on Tuesday evening of each week.

So far the class has had four regular meetings, and lectures have been given by F. F. Gaines, superintendent of motive power, on fuel oil-burning engines; J. T. Johnson, general superintendent on telephone train despatching; W. D. Beymer, comptroller, on the manibill, and F. J. Robinson, A. G. P. A. on handling large crowds.

Such topics as the Long and Short Haul Clause; Yard and Terminal Work; Time Freight; Local Freight Trains; Industrial Development; Agricultural Development; Freight and Personal Injury Claims; Prevention of Loss and Damage to Freight, etc., will be taken up at future meetings.

There are other excellent features augmenting the value and importance of this class work; not the least of these being the "get-to-gether" spirit. This will undoubtedly result in increased co-operation among the heads of the several departments.

Practically every officer in the general offices is a regular member and is taking an active part toward making the class a success.

Argument Against a 45-Cent Per Diem Rate.

W. A. Worthington, assistant director of maintenance and operation of the Union Pacific and the Southern Pacific, has issued a circular urging all railways to vote against the proposition, which was sent to letter ballot by the American Railway Association at its meeting in May, to increase the charge for interchanged freight cars from 30 and 35 cents a day to 45 cents. He declares that the proposed large increase is uncalled for and is not in any way essential to increased car efficiency. The present plan of making the rate during the seven busiest months of the year five cents a day higher than in the months of lighter business, which was adopted in January, 1910, has not proved unsatisfactory or unwise, and there is no reason for abandoning

[illegible] principle. The per diem rate should represent as nearly as possible the cost of owning the car. A higher rate is unjust to borrowers, while yet it would not increase car efficiency; that is to say, it would not increase the movement of loaded cars. On the other hand, it would increase empty haul because it would increase the motive to send cars home. The high rate (50 cents) which was in force in 1907 and 1908 caused an undue stimulation of empty car movement; a 45 cent rate would have a similar effect when cars are plentiful. The committee, in recommending the 45 cent rate expressed the belief that it would stimulate the acquisition of cars; but at present many roads are unable to afford additional cars, and it is questionable whether it is necessary or desirable to increase the car equipment by allowing an unreasonably high return. Since January, 1908, there has always been a net car surplus; if a high rate had been in force and the number of cars had thereby been increased, we should simply have had an increased investment in freight cars and a decreased performance per car per day. The average mileage per car per day has been quite as good under the present rates as it was under the 50 cent rate. Supporting the statement that there is a surplus of cars, and explaining the fact, Mr. Worthington shows that since 1902 the total ton mileage of freight has increased but 64 per cent. while the aggregate carrying capacity of freight cars has increased 91 per cent., as shown by the reports of the Interstate Commerce Commission.

The special commission on the interchange of freight cars, reporting for 1907, found that the average cost of owning a freight car was 35.58 cents a day. Since then there has been a decrease, and for 1910 Mr. Worthington finds this cost to be 34.79 cents a day. This sum is made up as follows: Repairs, 17.99 cents; replacements, 5.06 cents; taxes, 1.06 cents; interest at 5 per cent. per annum on $780, 10.68 cents; total, 34.79 cents. For a car away from home, Mr. Worthington would make this cost 2½ cents less, that being the estimated cost of repairs paid for by the road using the car. Excluding also the interest, the cost per day is 21.61 cents. Calculating the average per diem rate at present as 32.9 cents throughout the year, this leaves the owner a profit of 11.3 cents a day, or $41.25 a year for interest on his investment. This amounts to 5.3 per cent.; whereas if the per diem rate were 45 cents, he would receive nearly 11 per cent. interest on the cost of the average car.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.

American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass.

American Association of General Passenger and Ticket Agents.—W. C. Hope, New York; next convention, September 12, Seattle, Wash.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Detroit, Mich.

American Association of Railroad Superintendends.—W. C. Cooder, Carew building, Cincinnati, Ohio; 3d Friday of March and September.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York. Convention, October 7-11, Chicago.

American Electrical Railway Manufacturers' Assoc.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

American Railway Association.—W. F. Allen, 75 Church St., New York; annual, November 20, 1912, Chicago.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago.

American Railway Master Mechanics' Assoc.—J. W. Taylor, Old Colony building, Chicago.

American Railway Tool Foremen's Association.—M. H. Bray, N. Y. N. H. & H., New Haven, Conn. Convention, July 9, Chicago.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

American Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, October 21-25, Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York. Convention, June 25-26, Bluff Point, N. Y.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.

International Railway Fuel Association.—C. G. Hall, 922 McCormick building, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York. Convention, May, 1913, Chicago.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago.

Master Car and Locomotive Painters' Assoc. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass. Convention, September 10-13, Denver, Col.

National Railway Appliances Assoc.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railroad Club.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Business Association.—Frank W. Noxon, 2 Rector St., New York; annual, November 20, 1912, New York.

Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

Railway Gardening Association.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.

Railway Industrial Association.—G. L. Stewart, St. L., S. W. Ry., St. Louis, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa. Convention, Oct. 8-11, Quebec.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio.

Railway Supply Manufacturers' Assoc.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

Railway Tel. & Tel. Appliance Assoc.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling, Ill. September 10-13, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

Society of Railway Financial Officers.—C. Niquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; annual, Aug. 27-30, Chicago.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The railways in Oregon, Washington and Idaho, with the exception of the Oregon Short Line, have entered into an agreement for the issuance of interchangeable 2,000-mile mileage books.

The street railway company in Cleveland which carries passengers for 3 cents each, reports for the month of May a surplus of $32,000, which is said to be an unexpectedly favorable showing.

At a meeting of the Illinois Grain Dealers' Association at Peoria on June 12, a resolution was passed advocating that all public grain elevators in Chicago be owned and operated by the railways.

It is reported that up to June 13 the Great Northern ore docks at Allouez have handled 3,156,383 tons of ore this season as compared with 2,126,487 to the same date last year. Total receipts in 1911 were 9,773,061, and it is estimated that the total for this year will be about 13,000,000 tons.

C. W. Young & Company, of Philadelphia, have loaded an automobile truck with three tons of freight which they say they are going to send to Petaluma, Cal. The truck is to be exhibited along the road and it is planned to have it follow a route 4,436 miles long. The time schedule as laid out takes 45 days.

The Northern transcontinental railways have filed with the Interstate Commerce Commission westbound tariffs naming commodity rates from eastern shipping points to Oregon, Idaho, Washington, Montana and Wyoming, in accordance with the compromise agreement recently reached by the shippers of Spokane and the railways, which the commission allowed to become effective without giving its approval.

The American Hawaiian Steamship Company announces that five large new freight steamers are to be built, with a view to establishing a line from New York to San Francisco and Puget Sound through the Panama Canal. It is the intention of the company also to build two fast passenger steamers for this route. W. R. Grace & Company, of New York, will also have five new steamers built by the time the canal is opened.

W. L. Sargent, industrial and immigration agent for the Gould lines, has rendered a report that during the year ended June 1 over $20,000,000 has been paid by immigrants for land along the line of the Texas & Pacific between Texarkana and El Paso, and that 22,745 people had moved into that territory. There were 758,790 acres of land sold at an average price per acre of $26.30. One thousand eighty-five new immigrant cars and 3,446 cars of live stock and machinery were shipped into the territory during the year.

Car Surpluses and Shortages.

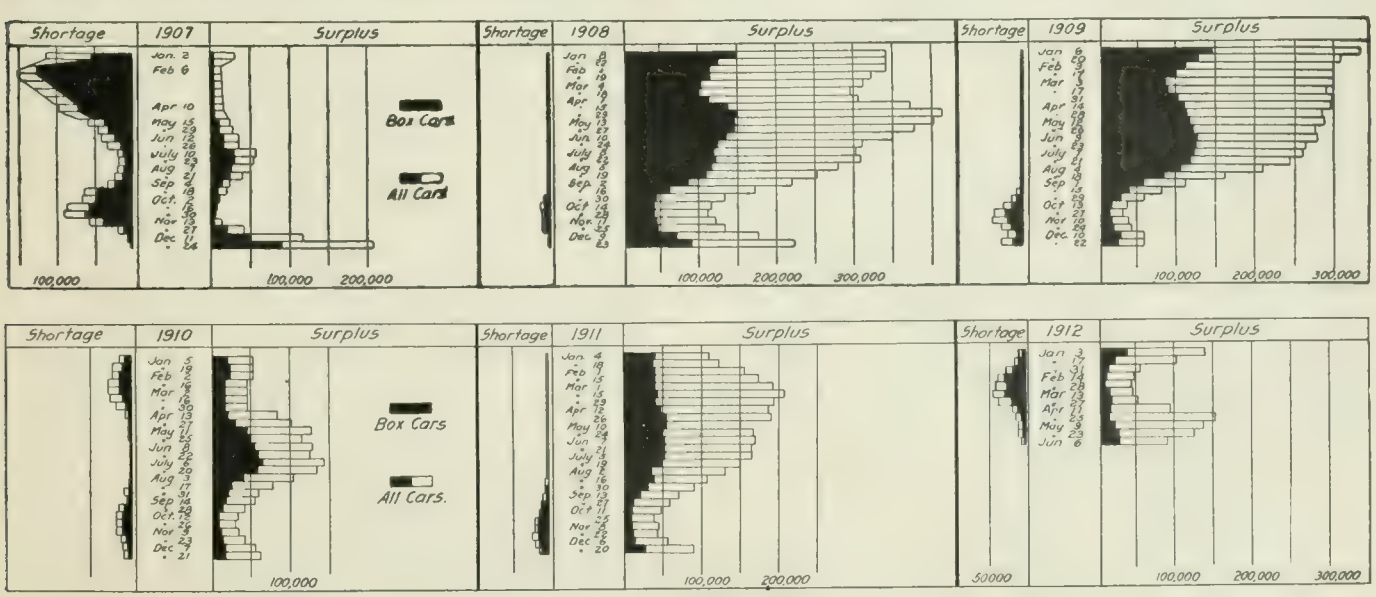
Arthur Hale, chairman of the committee on relations between railways, of the American Railway Association, in presenting statistical bulletin No. 121, giving a summary of car surpluses and shortages by groups from February 1, 1911, to June 6, 1912, says:

"The total of surpluses of cars on June 6, 1912, was 89,208; on May 23, 1912, it was 123,683 cars, and on June 7, 1911, it was 169,006 cars. Compared with the preceding period there is a decrease in the total surplus of 34,475 cars. The decrease in surplus coal cars is general throughout the country, except in Groups 4 (The Virginias and Carolinas), 9 (Texas, Louisiana and New Mexico), and 11 (Canadian Lines), where a slight increase is shown. The net decrease in this class of equipment is 35,283 cars. The box car surplus remains practically the same as shown for the previous period, there being a net increase of

CAR SURPLUSES AND SHORTAGES.

Date.	No. of roads.	Surpluses—Box.	Flat.	Coal gondola and hopper.	Other kinds.	Total.	Shortages—Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1.—June 6, 1912	7	65	135	1,431	116	1,747	123	65	200	0	388
" 2.— " 6, 1912	25	2,537	116	15,057	1,110	18,820	1	2	0	3	6
" 3.— " 6, 1912	25	4,819	197	8,344	3,078	16,438	10	85	84	57	236
" 4.— " 6, 1912	9	1,701	29	888	1,398	4,016	296	402	0	0	698
" 5.— " 6, 1912	18	1,978	1	890	1,394	4,164	25	131	275	0	431
" 6.— " 6, 1912	24	2,804	467	2,086	5,057	10,414	103	27	63	35	228
" 7.— " 6, 1912	4	65	73	135	392	665	50	0	10	0	60
" 8.— " 6, 1912	18	3,412	347	4,535	2,706	11,000	0	100	0	0	100
" 9.— " 6, 1912	11	1,330	85	438	1,728	3,581	100	0	0	0	100
" 10.— " 6, 1912	23	4,846	2,023	1,970	8,565	17,404	84	2	10	57	153
" 11.— " 6, 1912	6	448	34	11	466	959	150	253	3	16	422
Total	170	23,906	3,507	35,785	26,010	89,208	942	1,067	645	168	2,822

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages in 1907 to 1912.

only 608 cars. A slight increase is also shown in surplus miscellaneous cars.

"The total shortage on June 6, 1912, was 2,822 cars, on May 23, 1912, it was 7,482 cars, and on June 7, 1911, it was 2,204 cars. Compared with the preceding period there is a decrease in the total shortage of 4,660 cars, of which 1,976 is in box, 551 in flat, 2,004 in coal and 129 in miscellaneous cars. The decrease in box car shortage is chiefly in Groups 4 and 11, and the decrease in coal car shortage is principally in Groups 2 (New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania) and 4.

"Compared with the same date of 1911 there is a decrease in the total surplus of 79,798 cars, of which 28,745 is in box, 3,285 in flat, 37,677 in coal and 10,091 in miscellaneous cars."

The accompanying table gives car surplus and shortage figures by groups for the last period covered in the report, and the diagram shows total bi-weekly surpluses and shortages from 1907 to 1912.

INTERSTATE COMMERCE COMMISSION.

The commission holds that a railway company and a telegraph company may exchange services with respect to strictly company matters on the basis of their private agreement.

The commission has postponed from July 1, 1912, to October 1, 1912, the effective date of the shipping-container specification No. 6, of its regulations for the transportation of explosives.

The commission in conference holds that in awarding reparation it will make no award except to a consignor or consignee as shown by the transportation records; that it will recognize an assignment from a consignor to a consignee, or from a consignee to a consignor, but will recognize no assignment to a third party.

The commission announces that it will make a general and exhaustive inquiry into the rates for the transportation of anthracite coal from the coal regions to all points east of the Mississippi and north of the Ohio and Potomac rivers, attention being given also to the question whether the railways own the mines or are interested in the production of the coal.

The commission, on June 19, ordered the Chicago & Northwestern, the Chicago, St. Paul, Minneapolis & Omaha and the Great Northern to establish by August 1 certain reduced freight rates between Sioux City, Iowa, and certain points in Minnesota. These rates were suggested by the commission some time ago, but the suggestion was ignored by the roads. The rates are said to be about 10 per cent. lower than those now in effect.

Rulings 98 and 337 do not apply where the consignment is to, or in care of, the carrier itself for the purpose of being forwarded by that carrier over its own line and connections according to routing instructions from the point of receipt at the regular rate, and where no lawful through rate is defeated and no discrimination or other violation of the act results. In no case must the same person act as the agent of the carrier and the shipper.

A consignor delivered a shipment to a carrier under a bill of lading on which the name and street address of the consignee at destination was entered. The carrier failed to transmit to its connection such street address. Upon arrival of shipment the delivering carrier sent notice of arrival to the general post office in a large city, which never reached the one addressed. The goods were warehoused and drayage and storage charges accrued thereon. It is held that where a definite address of the consignee is entered on a bill of lading, it is the duty of the initial carrier to transmit that address to its connections, and of each succeeding carrier to transmit it to its connection, and of the delivering carrier to send notice of arrival to that address, failing in which the carrier at fault will be held liable for demurrage or storage charges accruing as a result of failure of notice to reach consignee.

Boston Denied Differential.

In re Import cases. Opinion by Commissioner Clark:

Following the Chamber of Commerce case (abstracted herewith) Philadelphia and Baltimore are allowed a differential over New York on import traffic; but Boston must maintain the same import rates as New York.

No Relief Under Long and Short Haul Clause.

In re Application of Southern Pacific for Relief Under the Fourth Section. Opinion by Commissioner Lane:

A previous report in this matter, 22 I. C. C., 366, concluded as follows:

In view of the condition here presented, we must find that the carrier has not justified the rate situation presented in its tariff in these respects:

(1) The application of the same rates from other points upon San Francisco bay and points inland to Portland as are extended from San Francisco.

(2) The application of higher rates southbound from Portland to points inland than to San Francisco.

(3) The application of higher rates to points on the Willamette river on traffic northbound from San Francisco than are applied on traffic southbound from Portland to points on the Sacramento river.

(4) The application of rates from San Francisco that are higher to points between San Francisco and Portland than the combination of locals on Portland.

(5) The application of unreasonably higher rates at intermediate points.

Instead, however, of denying the application of the carrier, we shall give permission for it to make a further showing under its application in accordance with the views herein expressed as to the requirements of the law.

The further hearing has been had in which all parties have been fully heard, and after full consideration of the record the commission is of the following opinion:

The carrier has not justified the application of the same rates from other points upon San Francisco bay and points inland to Portland as are extended from San Francisco to Portland.

The carrier claims that it instituted this policy in 1906 to increase its loaded-car movement northward. The carrier was asked to submit a statement showing the empty-car movement northbound for a period of years prior to 1906 and subsequent thereto. It has submitted a statement of the empty-car movement northbound and southbound for the years subsequent to 1906, but has submitted no record for the years prior thereto. This statement shows that of all of the cars moving northbound between June 25 and December 31, 1906, 22 per cent. went empty, while for the same period but 3 per cent. of the cars moving southward were empty. During 1907, 40 per cent. of the cars northbound were empties and 5 per cent. of the cars moving southbound were empties. In 1908 approximately 31 per cent. of the cars moving northbound were empty and 9 per cent. of the cars moving southbound were empty. In 1909 the percentage was 34 per cent. northbound and 10 per cent. southbound. In 1910, 30 per cent. northbound, 9 per cent. southbound. In 1911, 20 per cent. northbound, 13 per cent. southbound. The great volume of lumber moving southbound during 1907, 1908, 1909 and 1910 accounts for the small percentage of empties southbound and the large percentage of empties northbound. There is nothing in the statement as to the number of empties moving northbound prior to 1906, when the rates were put in, ostensibly to give northbound lading. This showing is insufficient to satisfy us that some points intermediate between San Francisco and Portland should be given the water competitive rate that San Francisco enjoys unless the carrier is willing to extend this policy to all intermediate points.

The carrier has justified the application of higher rates southbound from Portland to points inland than to San Francisco.

In this connection the following colloquy is pertinent. The witness on the stand was the traffic manager for the Southern Pacific, and the questions were put by an examiner:

Traffic Manager—The reason we do not apply southbound to the inland points the same rates that we apply to San Francisco, while we make them the same northbound, is because there is no empty movement of cars southbound to any extent.

Examiner—Then, what you want the commission to understand is this, with respect to 1 and 2, that you make your rates from Portland to San Francisco and to Lathrop and all these other points what you can get?

Traffic Manager—Yes, sir.

Examiner—And that you are able to get these arbitraries above the San Francisco rate southbound, but that experience has demonstrated that while it would appear that you could get the same rate northbound, your northbound empty-car move-

ment was so large that it was to your interest to make those rates even more attractive than the conditions would apparently warrant, and that you have made those rates more attractive in order to get more of your business to fill up your empty cars?

Traffic Manager—That is it exactly.

The carrier has not justified the application of higher rates to points on the Willamette river on traffic northbound from San Francisco than are applied on traffic southbound from Portland to points on the Sacramento river.

The explanation of this situation given by the carrier through its traffic manager is as follows:

The rates northbound from San Francisco to points on the Willamette valley are made by combining on Portland. The rate so made to each point in the Willamette valley is different one from the other, according to the local rate in effect from Portland to points south, being a higher rate as you recede from Portland. And that applies, naturally, a higher rate to Willamette valley points northbound from San Francisco to some of the points, and from points near Portland they would be less than the Sacramento rate. Generally speaking, I would state that to be correct.

The reason the Portland and Sacramento river points rates are lower is because the rate is made by combining, if you please, on San Francisco as far as Sacramento, and that is made by taking the ocean rate of 45 cents, first class, and adding to that the old Sacramento river rate of 15 cents, making a through rate of 60 cents, and that was the maximum at all points on the Sacramento river, and therefore was not a graduated rate or a full combination of what we might call the rail rates, but of the Sacramento river rates, and therefore made to Sacramento and made to points along the peninsula, Port Costa, and those points a 60-cent rate, which I considered generally lower than most of the points have on traffic going from San Francisco northbound to Willamette valley points, because of the local rate increasing as we recede from Portland.

There has been no showing made, other than this, as to why the same policy should not be pursued by the carrier as to Willamette valley points that is pursued by the carrier as to Sacramento river points. If Portland is not entitled to any lower rates to intermediate points on the Sacramento river, then San Francisco is not entitled to any lower rates to intermediate points on the Willamette river.

The carrier has not justified the application of rates from San Francisco that are higher to points between San Francisco and Portland than the combination of locals on Portland. This matter was treated of in the previous report, and nothing was added by this record, excepting the statement that the carrier cannot defend this situation excepting as a temporary matter. The rates which have been established by the Oregon commission as local rates from Portland south are effective at present, but the order of the commission is being resisted by the carrier and the case is now in the Supreme Court. When this litigation is concluded, the carrier says, if the Oregon commission scale is upheld, the rates to intermediate points will be made on the combination of the rate to Portland plus the Oregon commission scale south.

The carrier has not justified the reasonableness of the higher rates existing at points intermediate between San Francisco and Portland or the extent to which it now discriminates against intermediate points. (24 I. C. C., 35.)

Complaint Dismissed.

Alan Wood Iron & Steel Co. v. Pennsylvania Railroad et al. Opinion by Commissioner Clark:

Complaint attacks certain features of the uniform demurrage code. Carriers have voluntarily eliminated the provision for separating cars under the average agreement into (*a*) box cars including refrigerator cars, and (*b*) freight cars of all other descriptions. That being the only change which, under this complaint, we would order, complaint dismissed. (24 I. C. C., 27.)

Escanaba Business Men's Association et al. v Ann Arbor et al. Opinion by Commissioner Clark:

Escanaba, Mich., is not reached by break-bulk boats or by car ferry. Complaint is that rates to Escanaba from trunk line and central freight association territories are unreasonable and discriminatory. The evidence does not warrant finding the rates unreasonable, and the absence of water service to Escanaba produces circumstances and conditions dissimilar from those which obtain at points so served. Although on the water Escanaba has the same conditions of transportation as a town inland. (24 I. C. C., 11.)

Differentials to Atlantic Seaboard Fixed.

Chamber of Commerce of the State of New York et al. v. New York Central & Hudson et al. Opinion by Commissioner Clark:

Differentials under New York on all-rail and lake-and-rail export shipments from differential territory to Baltimore should not exceed 3 cents per 100 lbs., and to Philadelphia should not exceed 2 cents per 100 lbs. on the classes and on commodities other than grain. On all-rail and lake-and-rail export shipments of grain the differentials under New York should not exceed 1.5 cents per 100 lbs. to Baltimore, and 1 cent per 100 lbs. to Philadelphia.

As to all this traffic the export rates to Boston should not be lower than to New York.

The differentials under New York from Buffalo, N. Y., Erie, Pa., and West Fairport, Ohio, to Baltimore and Philadelphia, on ex-lake grain from differential territory for export, should not to exceed two-tenths of 1 cent per bushel on barley and oats, and three-tenths of 1 cent per bushel on wheat, corn and rye.

Differentials under New York on import traffic, all-rail and lake-and-rail, from Philadelphia and Baltimore to differential territory should be no greater than those which existed in the latter part of 1908.

Import rates from Boston should not be lower than from New York. (24 I. C. C., 55.)

Discrimination Against Wichita.

Transportation Bureau of Wichita, Kans. v. St. Louis & San Francisco et al. Opinion by Chairman Prouty:

Present rates for transportation of dried and evaporated fruits in carloads from northwestern Arkansas points on the St. Louis & San Francisco Railroad to Wichita, Kans., found unduly discriminatory as compared with rates on same commodities from same points of origin to Hutchinson, Kans. (23 I. C. C., 682.)

Present rates on canned vegetables from points in Missouri and Arkansas to Wichita, Kans., not found unreasonable in themselves, but found unduly discriminatory as compared with rates on same commodities from same points of origin to Hutchinson, Kans. (23 I. C. C., 679.)

STATE COMMISSIONS.

The Washington public service commission has announced that a hearing will be held at Seattle on August 15 for the purpose of investigating the express rate situation. Express companies have been ordered to be represented at the hearing and to furnish the commission with the necessary tariffs and records.

COURT NEWS.

Representatives of the minority stockholders of the Wheeling & Lake Erie filed suit in the federal district court at Cleveland on June 15, asking permission to intervene in the receivership proceeding, and an order restraining the Wabash-Pittsburgh Terminal interests from voting their majority stock at any annual meeting.

The law of Indiana, requiring freight cabooses to be 24 ft. long and to have two four-wheel trucks, has been sustained in the lower court, at Indianapolis, which has fined the Pittsburgh, Cincinnati, Chicago & St. Louis $100 for disobedience. The use of cabooses, as defined by the law, is not compulsory until 1914, but the company disobeyed a provision of the act in failing to make the proper changes in a caboose which was sent to the shops for general repairs. The Indiana law requiring railway officers to give "service letters" to employees who resign or are dismissed has been declared unconstitutional by the local court at Peru, in the case of the state against J. C. Sullivan, superintendent of the Wabash.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF MARCH, 1912.

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses: Maintenance						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total. inc. misc.	Way and structures.	Of equipment.	Traffic.	Trans-portation.	General.	Total.					
Baltimore & Ohio Chicago Terminal	77	.....	$1,938	$139,222	$13,328	$20,059	$934	$62,719	$3,911	$100,951	$38,271	$970	$18,206	$21,035	$17,913
Bessemer & Lake Erie	204[1]	$382,282	21,226	413,082	44,938	117,863	8,103	171,232	9,896	352,032	61,050	.....	9,000	52,050	36,105
Chicago Great Western	1,496	769,135	198,719	1,051,713	94,043	179,342	46,544	537,382	34,411	891,722	159,991	—328	35,090	124,573	—126,913
Cincinnati, New Orleans & Texas Pacific	337	621,280	139,065	806,721	66,604	207,034	20,685	250,835	20,744	565,902	240,819	609	21,800	219,628	194,847
Duluth, South Shore & Atlantic	624[2]	172,412	58,846	243,032	31,852	31,786	7,775	98,122	13,356	182,891	60,141	—2,445	18,000	39,696	17,847
Louisiana Ry. & Navigation	351	124,247	18,398	153,070	28,223	15,315	6,365	65,297	5,641	120,841	32,229	.....	5,000	27,229	568
New Orleans, Mobile & Chicago	547[3]	138,214	26,203	171,605	27,700	21,301	3,536	80,992	8,800	142,329	29,276	—82	4,154	25,040	—35,942
San Pedro, Los Angeles & Salt Lakes	1,116[4]	451,043	248,210	742,566	86,609	189,212	31,310	288,224	17,477	612,832	129,734	—2,848	24,122	102,764	87,417
Richmond, Fredericksburg & Potomac	83	101,426	97,117	221,236	30,262	28,490	3,129	89,970	5,686	157,537	63,699	.....	1,094	62,605	—22,066

NINE MONTHS OF FISCAL YEAR, 1912.

Baltimore & Ohio Chicago Terminal	77	.....	$20,561	$1,163,232	$216,128	$160,308	$8,042	$539,024	$44,148	$967,650	$195,582	$7,647	$163,857	$39,372	$25,894
Bessemer & Lake Erie	204[1]	$5,460,536	262,166	5,810,473	584,397	1,171,913	74,612	1,555,380	92,430	3,478,732	2,331,741	.....	94,474	2,237,267	472,956
Chicago Great Western	1,496	6,730,005	2,190,795	9,676,372	1,069,725	1,466,130	423,406	4,183,939	314,087	7,457,287	2,219,085	—696	299,838	1,918,551	—255,422
Cincinnati, New Orleans & Texas Pacific	337	5,483,074	1,356,152	7,206,185	709,483	1,589,648	180,551	2,095,236	169,490	4,744,408	2,461,777	—5,417	196,200	2,260,160	12,589
Duluth, South Shore & Atlantic	624[2]	1,502,589	702,246	2,326,109	354,797	267,020	84,272	914,259	86,484	1,706,832	619,277	4,002	159,666	463,613	—65,185
Louisiana Ry. & Navigation	351	1,114,177	208,918	1,427,061	221,335	131,214	55,049	561,209	60,006	1,028,813	398,248	.....	43,200	355,048	114,080
New Orleans, Mobile & Chicago	547[3]	1,113,459	268,310	1,464,267	226,823	160,695	26,047	473,443	72,288	959,296	504,971	—472	40,046	464,453	—80,615
San Pedro, Los Angeles & Salt Lakes	1,116[4]	3,923,029	2,208,336	6,557,876	1,037,998	1,526,192	285,887	2,545,474	153,558	5,549,109	1,008,767	34,185	221,762	752,820	156,344
Richmond, Fredericksburg & Potomac	83	878,787	709,803	1,812,406	191,405	228,549	25,767	688,726	53,036	1,187,483	624,923	.....	9,847	615,076	16,665

Operated in previous period—[1] 205; [2] 611; [3] 404; [4] 1,105. — Indicates Deficits, Losses and Decreases.

MONTH OF APRIL, 1912.

Butte, Anaconda & Pacific	46	$86,868	$7,992	$100,967	$15,812	$20,297	$914	$46,925	$3,198	$87,146	$13,821	.....	$2,000	$11,821	$2,749
Georgia, Southern & Florida	395	111,717	57,855	199,093	22,558	48,898	8,161	88,221	8,413	176,251	22,842	.....	9,819	13,023	—23,174
Great Northern	7,345[1]	3,636,744	1,042,149	5,068,454	879,341	703,777	89,812	1,459,255	212,242	3,344,427	1,724,027	—$811	296,097	1,427,119	352,620
Lehigh & Hudson River	97	109,155	3,535	114,345	15,468	19,139	1,281	46,843	4,342	87,073	27,272	.....	5,000	22,272	—23,843
Lehigh Valley	1,449[2]	1,462,764	357,746	1,924,229	287,947	396,287	72,243	900,614	65,631	1,722,722	201,507	—30,195	131,000	40,312	—1,224,774
Louisiana Western	208[3]	102,762	52,005	164,277	20,082	22,002	7,813	57,819	6,144	113,860	50,417	483	6,534	44,366	—11,702
Louisville & Nashville	4,728[4]	3,461,520	963,313	4,729,591	794,664	892,430	89,945	1,623,115	95,569	3,495,723	1,233,868	2,138	150,617	1,085,389	304,706
Morgan's La. & Tex. R. R. & S. S. Co.	404[5]	238,577	101,496	370,938	63,484	56,308	13,920	164,243	11,368	309,323	61,615	—2,214	17,762	41,639	—39,365
New Orleans & North Eastern	196	250,970	48,978	322,546	38,643	63,649	9,955	122,645	13,243	248,135	74,411	46	8,250	66,207	—9,557
New Orleans Great Northern	282	88,082	24,303	122,822	14,834	19,811	2,147	39,642	7,031	83,465	39,357	—91	1,750	37,516	—8,376
New Orleans, Mobile & Chicago	547[6]	127,961	21,523	159,534	36,458	21,291	3,255	79,036	7,276	147,316	12,218	—74	4,154	7,990	—37,426
Spokane, Portland & Seattle	556[7]	218,168	129,010	371,172	47,991	58,949	7,848	92,100	12,009	218,897	151,275	890	53,400	98,765	—107,647

TEN MONTHS OF FISCAL YEAR, 1912.

Butte, Anaconda & Pacific	46	$802,428	$85,678	$947,704	$104,647	$179,790	$7,232	$431,170	$29,456	$752,295	$195,409	.....	$21,764	$173,645	$29,148
Georgia, Southern & Florida	395	1,090,546	700,470	2,074,497	210,881	407,176	73,511	809,536	92,040	1,593,144	481,353	.....	102,256	379,097	—24,971
Great Northern	7,345[1]	39,535,213	11,254,956	54,662,378	6,129,507	6,509,737	904,896	15,194,333	1,105,846	29,844,319	24,818,059	87,202	2,794,474	22,110,787	4,611,570
Lehigh & Hudson River	97	1,299,445	40,245	1,356,935	148,720	190,243	12,430	472,159	48,464	872,016	484,919	.....	36,500	448,419	32,858
Lehigh Valley	1,449[2]	25,996,834	3,889,414	30,956,031	3,511,757	5,466,342	799,271	10,754,622	681,176	21,213,170	9,742,861	—253,788	1,194,700	8,294,373	—1,498,143
Louisiana Western	208[3]	1,001,339	541,445	1,629,310	194,747	281,176	77,544	550,094	65,175	1,168,736	460,574	2,491	70,875	392,190	—173,073
Louisville & Nashville	4,728[4]	34,212,351	10,203,038	47,214,648	7,217,577	8,332,533	972,198	15,306,874	910,388	32,739,570	14,475,078	—23,690	1,494,500	12,956,888	970,167
Morgan's La. & Tex. R. R. & S. S. Co.	404[5]	2,904,643	1,050,864	4,215,239	550,722	558,309	137,061	1,712,638	122,643	3,081,373	1,133,866	—19,565	185,062	929,239	—309,291
New Orleans & North Eastern	196	2,399,065	528,603	3,147,765	303,559	593,668	92,064	1,187,373	118,656	2,295,320	852,445	—7,752	86,671	758,022	—118,660
New Orleans Great Northern	282	962,627	282,540	1,344,310	202,462	181,508	25,521	433,208	73,174	915,873	428,437	—734	17,923	409,780	—84,334
New Orleans, Mobile & Chicago	547[6]	1,241,420	289,833	1,623,802	263,281	181,986	29,303	552,479	79,564	1,106,613	517,189	—546	44,200	472,443	—118,041
Spokane, Portland & Seattle	556[7]	2,328,340	1,435,802	4,016,196	424,938	401,311	71,198	1,026,931	114,114	2,038,492	1,977,704	11,419	420,605	1,568,518	—57,970

Operated in previous period—[1] 7,329; [2] 1,431; [3] 207; [4] 4,591; [5] 405; [6] 404; [7] 551. — Indicates Deficits, Losses and Decreases.

REVENUES AND EXPENSES OF EXPRESS COMPANIES AS REPORTED TO THE INTERSTATE COMMERCE COMMISSION.

MONTH OF NOVEMBER, 1911.

	Miles of line covered.			Gross receipts from operation.	Less express privileges. Dr.	Total operating revenues.	Operating expenses.				Net operating revenue (or deficit —).	Taxes.	Operating income (or loss —).	Increase or decr. (—) comp. with last year.
	Steam roads.	Other lines.	Express revenue.				Maintenance.	Traffic.	Trans-portation.	General.	Total.			
Adams Express Co.	32,946[1]	4,843	$3,012,814	$3,048,955	$1,584,896	$1,464,059	$74,720	$7,364	$1,110,986	$76,503	$1,269,573	$194,486	$19,730	$174,756	$58,594
American Express Co.	54,688[2]	1,910	3,741,467	3,884,527	1,727,351	2,157,176	45,516	31,072	1,501,136	123,293	1,701,017	456,159	34,014	422,145	150,684
Canadian Express Co.	6,123[3]	830	244,824	250,426	119,297	131,129	6,620	790	95,386	7,865	110,661	20,468	2,250	18,218	—7,988
Canadian Northern Express Co.	3,551[4]	22	55,545	57,779	22,218	35,561	169	457	15,228	1,251	17,105	18,456	215	18,241	5,477
Globe Express Co.	2,904[5]	....	61,635	62,267	31,604	30,663	1,011	1,607	24,612	3,954	31,184	—521	800	1,321	5,902
Great Northern Express Co.	8,497[6]	399	252,646	253,885	153,626	100,259	1,468	1,400	69,604	3,782	76,254	24,005	2,819	21,186	—7,201
National Express Co.	1,422	218	105,826	106,394	40,650	65,744	895	.....	50,277	3,135	54,307	11,437	485	10,952	5,232
Northern Express Co.	7,310[7]	315	242,402	246,000	125,661	120,339	1,409	3,928	81,162	5,625	92,174	28,165	4,500	23,665	—17,441
Pacific Express Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Southern Express Co.	31,936[8]	821	1,370,585	1,406,584	665,712	740,872	28,915	8,342	445,468	58,959	541,684	199,188	14,937	184,251	—29,862
United States Express Co.	28,965[9]	3,954	1,841,886	1,869,549	827,566	1,041,983	30,414	14,352	828,099	48,186	921,051	120,932	11,781	109,151	114,600
Wells, Fargo & Co.	63,675[10]	17,339	2,756,106	2,809,818	1,352,840	1,456,978	53,524	21,633	1,044,125	107,405	1,226,687	230,291	24,744	205,547	82,623
Western Express Co.	4,892[11]	4	102,156	103,834	52,135	51,699	1,097	2,845	36,228	4,153	44,323	7,376	783	6,593	3,680
						FIVE MONTHS OF FISCAL YEAR, 1912.									
Adams Express Co.	32,946[1]	4,843	$13,879,482	$14,046,195	$7,152,279	$6,893,916	$359,953	$37,096	$5,352,865	$415,615	$6,166,429	$727,487	$98,392	$629,095	—$104,887
American Express Co.	54,688[2]	1,910	17,683,860	18,426,107	8,586,043	9,840,064	257,600	146,167	7,307,292	607,239	8,318,288	1,521,776	157,833	1,363,943	66,553
Canadian Express Co.	6,123[3]	830	1,261,193	1,287,866	608,023	679,843	30,366	5,006	475,086	34,209	544,667	135,176	11,250	123,926	16,370
Canadian Northern Express Co.	3,551[4]	22	353,624	341,067	93,619	147,448	1,074	2,052	70,045	6,884	80,055	67,393	814	66,579	10,256
Globe Express Co.	2,904[5]	....	361,297	364,345	181,593	182,752	3,510	8,214	125,692	19,580	156,996	25,756	4,000	21,756	21,425
Great Northern Express Co.	8,497[6]	399	1,269,053	1,275,126	768,199	506,927	8,789	6,994	343,105	19,139	378,027	128,900	16,865	112,035	22,246
National Express Co.	1,422	218	555,890	558,164	213,067	345,097	4,599	7	247,368	15,256	267,230	77,867	2,425	75,443	2,582
Northern Express Co.	7,310[7]	315	1,319,032	1,336,008	679,278	656,730	7,232	16,739	400,584	29,503	454,058	202,672	22,500	180,172	142,860
Pacific Express Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Southern Express Co.	31,936[8]	821	5,774,905	5,888,305	2,800,045	3,088,260	103,411	47,361	2,044,398	280,523	2,475,693	612,567	74,291	538,276	28,409
United States Express Co.	28,965[9]	3,954	8,830,486	8,968,441	4,082,216	4,886,225	165,474	81,750	4,063,300	233,185	4,543,709	342,516	53,155	289,361	91,062
Wells, Fargo & Co.	63,675[10]	17,339	12,898,829	13,137,807	6,227,919	6,909,888	253,708	123,011	4,969,370	418,297	5,784,386	1,125,502	124,796	1,001,706	23,339
Western Express Co.	4,892[11]	4	488,237	491,439	252,331	239,108	5,446	14,634	176,112	18,007	214,199	24,909	3,787	21,122	22,368

[1] Operations ceased July 31, 1911. Business disbanded.
Operated in previous period: Steam Roads—[2] 32,659; [3] 55,042; [4] 6,964; [5] 13,369; [6] 2,844; [7] 7,839; [8] 6,601; [9] 31,631; [10] 28,807; [11] 46,252; [12] 3,506. Other Lines—[1] 3,727; [2] 2,408; [3] 381; [4] 261; [5] 816; [6] 3,762; [7] 4,594.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Fred A. Miller, formerly president of the Laramie, Hahns Peak & Pacific, has resigned as president, and has been appointed receiver of the road.

George K. Saunders has been appointed assistant claim agent of the International & Great Northern at Palestine, Tex., succeeding J. M. Sellers, deceased.

T. J. Guilfoil has been appointed auditor of the Clinton & Oklahoma Western, with office at Clinton, Okla., succeeding W. J. Aycock, who has been made general freight and passenger agent.

M. Donaldson, superintendent of the Grand Trunk, at Ottawa, Ont., has been appointed vice-president and general manager of the Grand Trunk Pacific in charge of the lines West of Fort William, Ont., with headquarters at Winnipeg, Man.

The officers of the Eagles Mere Railroad are now as follows: H. Laussat Geyelin, president; William K. DeVictor, vice-president; S. S. Garwood, secretary, and E. S. Chase, treasurer, with headquarters at Eagles Mere, Pa.

Joseph M. Bryson, who was recently appointed general counsel of the Missouri, Kansas & Texas, as has been announced in these columns, has been appointed also general counsel of the Texas Central, the Wichita Falls & Northwestern, the Wichita Falls & Northwestern of Texas, and the Wichita Falls & Southern, with office at St. Louis, Mo.

J. S. Pyeatt, vice-president and general superintendent of the St. Louis, San Francisco & Texas and the Fort Worth & Rio Grande at Fort Worth, Tex., has been appointed vice-president and general manager of the New Orleans, Texas & Mexico, the Beaumont, Sour Lake & Western, the Orange & Northwestern and the St. Louis, Brownsville & Mexico, with office at Houston, Tex., succeeding J. H. Elliot, who has been transferred to Fort Worth, in place of Mr. Pyeatt.

Operating Officers.

J. F. Goodrich has been appointed assistant superintendent of the Phoenix and Hayden divisions of the Arizona Eastern, with office at Phoenix, Ariz.

G. B. Moore has been appointed general manager of the Washington Western, with headquarters at Three Lakes, Wash., succeeding C. W. Hole, resigned.

J. P. Freeman, assistant trainmaster of the Lake Shore & Michigan Southern at Collinwood, Ohio, has been appointed trainmaster, with office at Cleveland, Ohio.

P. G. Walton has been appointed assistant superintendent of the Ozark division of the St. Louis & San Francisco, with office at Thayer, Mo., succeeding B. F. Hunter, deceased.

Osgood F. Barnes, division engineer of the Erie Railroad at Susquehanna, Pa., has been appointed also trainmaster of the Delaware and Jefferson divisions, with headquarters at Susquehanna.

H. H. Baker, assistant superintendent of dining cars and restaurants of the Pennsylvania, has been appointed superintendent of dining cars and restaurants, with headquarters at New York, succeeding John F. Trout, deceased.

E. J. Parrish has been appointed joint superintendent of telegraph of the New York, Chicago & St. Louis and the Western Union Telegraph Company, with office at Cleveland, Ohio, succeeding G. C. Todd, whose appointment as superintendent of the Cleveland division of the N. Y. C. & St. L. has been announced in these columns.

The Lake Superior division of the Canadian Pacific will in future be operated in three districts, as follows: The First district includes Temiskaming, Kipawa, Webbwood, Algoma, Sudbury, North Bay and Cartier subdivisions, also all terminals connected therewith except Cartier and Muskoka; the Second district includes Chapleau and White River subdivisions, and Cartier terminal, and the Third district includes Schreiber and Nipigon subdivisions, and White River terminal.

George Spencer, superintendent at Sudbury, Ont., is in charge of the First district. T. Collins, assistant superintendent at Smith Falls, Ont., has been appointed superintendent, with headquarters at Chapleau, Ont., in charge of the Second district, and J. H. Hughes, superintendent at White River, Ont., is now in charge of the Third district, with headquarters at Schreiber.

Traffic Officers.

W. C. Quillian has been appointed soliciting agent of the Central of Georgia, with office at Albany, Ga., succeeding J. E. Thayer, resigned.

E. R. Leis has been appointed general agent of the Atchison, Topeka & Santa Fe, with office at Salt Lake City, Utah, succeeding C. F. Warren, deceased.

J. F. McMahon has been appointed contracting freight agent of the Illinois Central, with headquarters at Dubuque, Iowa, succeeding E. W. Stafford, promoted.

Hal S. Ray, assistant general passenger agent of the First district of the Rock Island Lines at Chicago, will have his office removed to Des Moines, Iowa, effective July 1.

A. G. Busch, commercial agent of the Louisiana & Arkansas at Shreveport, La., has been appointed general agent, with office at Shreveport, and his former title has been abolished.

C. Hartigan, general passenger agent of the Rutland Railroad at Rutland, Vt., has been appointed assistant general passenger agent of the Lake Shore & Michigan Southern, with office at Chicago.

F. P. Sutherland has been appointed traffic manager of the Clinton & Oklahoma Western, with office at Clinton, Okla., succeeding C. J. Turpin; and W. J. Aycock, auditor, has been appointed general freight and passenger agent.

J. R. Keefer, assistant general passenger agent of the Pacific Coast Steamship Company, with office at San Francisco, Cal., has been assigned to special duties under the direction of the passenger traffic manager, and his former position has been abolished.

Fred H. Behring, assistant general freight agent of the Southern Railway, at Louisville, Ky., has been transferred, as assistant general freight agent, to St. Louis, Mo., succeeding C. D. Morris, deceased, and E. R. Oliver succeeds Mr. Behring, with office at Louisville.

W. R. Wyatt, freight soliciting agent of the Southern Railway, at Mobile, Ala., has been appointed traveling freight agent, with office at Montgomery, succeeding J. A. McWilliams, transferred. C. S. Shawhan succeeds Mr. Wyatt, with office at Mobile, and J. O. Smith has been appointed freight soliciting agent, with office at Knoxville, Tenn.

H. W. Steinhoff, Michigan passenger agent of the Chicago, Milwaukee & St. Paul at Detroit, Mich., has been appointed district passenger agent, with office at Detroit. A. L. Eidemiller, traveling passenger agent at St. Paul, Minn., has been appointed traveling passenger agent, with office at Indianapolis, Ind., and Leslie M. Jones succeeds Mr. Eidemiller.

B. H. Hartley, commercial agent of the Seaboard Air Line, at Atlanta, Ga., is now in charge of the soliciting freight traffic in the Atlanta territory, and W. H. L. Nelms, commercial agent at Atlanta, has been appointed contracting freight agent, both with offices at Atlanta. G. C. Poole, traveling freight agent at Raleigh, N. C., has been appointed commercial agent, with office at Greenville, S. C., succeeding C. S. Allen, resigned to go to another company, and Andrew Syme succeeds Mr. Poole, with office at Raleigh.

Engineering and Rolling Stock Officers.

Frank Rusch, district master mechanic of the Chicago, Milwaukee & Puget Sound at Tacoma, Wash., has been appointed acting general master mechanic, with office at Tacoma, succeeding N. M. Maine, deceased.

M. A. Box, general roadmaster of the Southern division of the Kansas City Southern and of the Texarkana & Fort Smith at Texarkana, Tex., has been appointed general roadmaster of the Kansas City Terminal and Northern divisions of the Kansas City Southern and of the Arkansas Western, with office at Pittsburg, Kan., succeeding Patrick Gratton, resigned. R. H. Gaines, division engineer of the Kansas City Southern and chief engineer of the Texarkana & Fort Smith at Texarkana, has assumed the duties of Mr. Box.

Samuel Garver Thomson, whose appointment as superintendent of motive power and rolling equipment, of the Philadelphia & Reading, with headquarters at Reading, Pa., has been announced in these columns, was born on November 19, 1875, at Cumberland, Md., and was graduated from the Lawrenceville school in 1894, and from Princeton University in 1898. In October of the same year he began railway work with the Pennsylvania Railroad as special apprentice at the Altoona, Pa., shops, and he completed his apprenticeship in 1902. The following year he was general foreman of the Bedford shops at State Line, and in November, 1904, he was assistant master mechanic of the Harrisburg shops. Mr. Thomson was appointed assistant engineer of motive power of the Buffalo & Allegheny Valley division, now the Northern division, with headquarters at Buffalo, in February, 1906, and in April, 1908, was transferred in the same capacity to the office of the assistant to general manager at Philadelphia, Pa., of the same road. He went to the Philadelphia & Reading as assistant engineer of motive power on November 15, 1909, and in January, 1912, was made acting superintendent of motive power and rolling equipment of the same company, which position he held at the time of his recent appointment as superintendent of motive power and rolling equipment, as above noted.



S. G. Thomson.

T. J. Burns, whose appointment as assistant superintendent of motive power of the Michigan Central, with office at Detroit, Mich., has been announced in these columns, was born July 24, 1869, at Hillsdale, Mich. He is a graduate of the Bay City, Mich., high school and of Assumption College at Sandwich, Ont., and he took a postgraduate course at Grand Seminaire, Montreal, Que. He began railway work with the Michigan Central at Bay City, Mich., and after working one year in the track department he entered the locomotive and car department. In 1902 he was made chief clerk of the locomotive department at Jackson, Mich., and three years later was transferred to Detroit as chief clerk of the locomotive and car department. He was appointed assistant to the superintendent of motive power in 1909, which title he held until his recent promotion to assistant superintendent of motive power.



T. J. Burns.

James F. Walsh, general superintendent of motive power of the Chesapeake & Ohio, with office at Richmond, Va., is to retire from the active duties of that office on July 1. He may continue with the road in a consulting capacity. Mr. Walsh was born in March, 1857, at Cleveland, Ohio, and began railway work in 1871, on the Cleveland, Columbus, Cincinnati & Indianapolis, now a part of the Cleveland, Cincinnati, Chicago & St. Louis. From 1871 to 1892 he was consecutively apprentice, locomotive fireman, locomotive engineman, and shop foreman. Mr. Walsh left railway work in 1892 to become mechanical expert for the Galena Oil Company, but returned to the railway service ten years later as superintendent of motive power on the Chesapeake & Ohio. He held the position until May, 1910, when he was promoted to general superintendent of motive power.



J. F. Walsh.

OBITUARY.

David B. Hunt, formerly auditor of the Mexican Central and the Union Pacific railways, and recently in the auditing department of the Standard Oil Company, died at Northampton, Mass., on June 18.

John H. Wicks, special agent of the New York Central & Hudson River, died on June 18, at his home at Tarrytown, N. Y., at the age of 61. Mr. Wicks has been in the service of the New York Central for 41 years, having entered the service as a brakeman. He held various positions until he was appointed assistant superintendent of the Hudson division. Some time ago he was made special agent in charge of examinations on the rules.

Major Eli H. Janney, inventor of the Janney car coupler, died at his home in Alexandria, Va., on Monday last, in his eightieth year. Major Janney was a field quartermaster on the staff of General Robert E. Lee in the civil war. The contour lines of the Janney coupler were adopted by the Master Car Builders' Association, and thus are now the well known "M. C. B. standard," used everywhere throughout the United States.

Charles E. Satterlee, secretary and treasurer of the Texas & Pacific, with office at New York, and president of the Opelousas, Gulf & Northeastern, died on June 17, at his summer home, Atlantic Highlands, N. J. Mr. Satterlee was born in New York 80 years ago, and has been in railway service since 1871. He was first accountant on the Texas & Pacific, and in 1875 was appointed secretary. Since 1881 he has been secretary and treasurer and a director of the road.

The government of Malay States has voted $300,000 for railway construction during the present year. The most important line to be built is that from Pahang to Kelantan, which is ultimately intended to connect with the Siamese system. This line will be of great importance to the state of Kelantan. Another projected line will enter Kedah.

The opening of the Arica & La Paz railway, which runs from Chili to Bolivia will, in all probability, take place on August 6 next, this being the anniversary of the declaration of the constitution of Bolivia. It had been suggested that the railway should be opened on the anniversary of the independence of Chili, but the Chilian government, with a desire to pay tribute to Bolivia, proposed August 6 as the date.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

THE CENTRAL OF GEORGIA is in the market for 15 mikado locomotives.

THE GRAND TRUNK has ordered 19 Pacific type locomotives from the Baldwin Locomotive Works.

THE CENTRAL OF NEW JERSEY has ordered 5 ten-wheel locomotives from the Baldwin Locomotive Works.

THE GEORGIA SOUTHERN & FLORIDA is in the market for 6 consolidation freight locomotives and 4 switching locomotives.

THE CENTRAL IRON & COAL COMPANY has ordered 1 six-coupled double-ender locomotive from the Baldwin Locomotive Works.

THE HOUSTON BELT & TERMINAL COMPANY has ordered 2 six-wheel switching locomotives from the Baldwin Locomotive Works.

THE ILLINOIS CENTRAL is in the market for 50 mikado locomotives, 20 Pacific type locomotives and 18 switching locomotives.

THE PENNSYLVANIA RAILROAD has ordered 21 freight locomotives and 10 switching locomotives from the company's shops at Altoona, Pa.

THE SOUTHERN RAILWAY is in the market for 30 mikado locomotives, and 10 Pacific type locomotives. All these locomotives will be equipped with superheaters.

THE VULCAN IRON WORKS, Wilkesbarre, Pa., has received orders for locomotives as follows: 6 locomotives, Pinkerton Construction Company, Philadelphia, Pa.; 1 saddle-tank switching locomotive, Baltimore & Ohio; 2 four-wheel saddle-tank locomotives, Chattanooga Iron & Coal Company, Chattanooga, Tenn.; 1 locomotive, Lathrop & Shea, Buffalo, N. Y.; 1 four-wheel switching locomotive, Indianapolis Sand & Gravel Company.

CAR BUILDING.

THE KANAWHA & MICHIGAN is in the market for 3 passenger cars.

THE PENNSYLVANIA RAILROAD has ordered 875 refrigerator cars from the company's shops at Altoona, Pa.

THE METROPOLITAN WEST SIDE ELEVATED RAILWAY COMPANY, Chicago, is in the market for 50 steel passenger cars.

THE GEORGIA SOUTHERN & FLORIDA is in the market for 2 steel-underframe mail cars, 5 steel-frame coaches, 4 steel-underframe express cars and 240 freight cars.

THE CENTRAL OF NEW JERSEY has ordered 1,500 freight cars as follows: 500 from the Cambria Steel Company; 500 from the American Car & Foundry Company, and 500 from the Standard Steel Car Company.

THE SOUTHERN RAILWAY is in the market for 20 first class steel-frame passenger coaches, 5 steel-underframe combination baggage and express cars, 5 steel-underframe combination baggage and mail cars, 2 dining cars, 200 steel-underframe ventilated box cars, 150 steel-underframe automobile cars, and 100 steel flat cars. This is in addition to 4 dining cars recently ordered.

IRON AND STEEL.

THE BOSTON & MAINE has given an order to the Pennsylvania Steel Company for 300 tons of bridge material.

THE SOUTHERN RAILWAY is in the market for 26,200 tons of rails. These will be bought largely in the Birmingham district.

SIGNALING.

New Installations of Block Signals, Interlocking, Telephones for Train Despatching, Etc.

The Southern Pacific has appropriated $125,000 for installing automatic block signals on the Lucin cut-off across the Great Salt Lake. Alternating current apparatus will be used; and the plan covers a distance of 20 miles across the fills on the east side and approximately 24 miles on the west side of the trestle.

Supply Trade News.

Edgar Lewis has resigned as representative of the P. & M. Company of Chicago on account of illness.

The Western Electric Company has opened a branch office and a large warehouse at Houston, Tex. The sales agent is H. P. Hess.

J. E. Chisholm has opened an office at 355 Old Colony building, Chicago, and will handle railway specialties. Mr. Chisholm has been sales manager of the Chicago Steel Car Company for the past three years, and was formerly mechanical superintendent of the Chicago Great Western.

J. R. Flynn, Jr., who has been on the Panama Canal since 1905, has resigned as mechanical engineer for the Isthmian Canal Commission, and has been elected president of Lines, Flynn & Company, Incorp., dealers in railway and contractors' equipment, with office at 50 Church street, New York.

John S. Quist, formerly in the locomotive department of the Union Pacific, has become associated with the M. M. Rogers Company, of Chicago, maker of the Rogers improved indestructible journal packing. Mr. Quist will have charge both of the manufacturing and sales departments, and his office will be at the factory, 6422 Stony Island avenue.

The American Mason Safety Tread Company, Boston, Mass., has purchased from the Quincy, Manchester, Sargent Company, Chicago, all patents, machinery, selling rights, etc., connected with the Stanwood steel car steps and treads. The Stanwood step has been used by street, elevated and steam railways for a number of years. It is composed of a number of thin strips of steel, crimped so as to form corrugations which, when the strips are assembled, produce a series of hexagonal openings.

Officers of the Roadmasters' & Maintenance of Way Association are expecting a very large attendance at the convention, to be held at Hotel Statler, Buffalo, September 10. The number of exhibits is likely to be correspondingly large, and Mr. Preston, secretary of the Track Supply Association (637 Exchange Building, Chicago), asks all prospective applicants to make their wishes known without delay. He has only 5,000 square feet of space at his disposal. There will be a meeting July 10 to allot space.

H. M. Estabrook, whose election as president of the Barney & Smith Car Company, has been announced in these columns, was born in Cambridge City, Ind., in 1864, and received his education in the public schools, graduating from the Terre Haute High School in the class of 1883. He then went to Oswego, N. Y., to study stenography, and soon after became stenographer in the motive power department of the New York, West Shore & Buffalo, now the West Shore, under R. H. Soule and James M. Boone. In August, 1885, he went to Dayton, Ohio, as stenographer for the Barney & Smith Car Company. After filling various positions he was made general assistant to the superintendent, and was appointed assistant superintendent in December, 1897. In January, 1900, he was appointed superintendent, and in June 1906, he was elected a member of the board of directors and was also elected second vice-president and general superintendent. On November 10, 1908, he was elected vice-president and general superintendent, and now becomes president of the company. Arthur J. Stevens, whose election as first vice-president and general manager of the Barney & Smith Car Company was announced last week, has been in charge of the lumber department of that company for the last four years, having been appointed manager April 1, 1908. On October 21, 1909, Mr. Stevens was appointed manager of purchases and transportation, which included the purchase of all materials and lumber and transportation, including all inbound and outbound shipments; and in June of the following year he was elected to the board of directors and also second vice-president. At the recent annual meeting of the company he was elected vice-president and general manager. Mr. Stevens was born on May 23, 1871, at Dayton, Ohio. He received his early education in the public schools and at Cooper Seminary in Dayton, which was founded about the year 1834 by Eliam E. Barney, the founder of the Barney & Smith Car Company. After finishing his course at the seminary he took a college course at Denison University, at Granville, Ohio, and after leaving college he entered the lumber business. He entered the service of the Barney & Smith Car Company as assistant lumber buyer on December 26, 1897, later when he was appointed manager he succeeded his father, James H. Stevens, who retired after a continuous service with the car company of over 46 years. In March, 1905, the company having bought large timber interests, including a saw-mill and railway in southern Georgia, there was organized the Milltown Lumber Company, Milltown, Ga., and the Milltown Air Line Railroad, of both of which companies Mr. Stevens was elected president, which offices he now holds. Mr. Stevens was a grandson of Ansel E. Stevens, who was with the car company in its earliest years, having entered its service in 1852. He was associated with the elder Mr. Barney in the early days of the company, and continued in its service until 1882. Mr. Stevens' grandmother, Mrs. Ansel E. Stevens, was a sister of E. E. Barney, founder of the car company and his father, J. H. Stevens, and his grandfather, A. E. Stevens, have given to the car company an aggregate service of over 90 years, having had complete charge of its very extensive lumber interests since the founding of the company. Under the direction of Mr. Stevens, the car company has become an importer direct of fancy woods from all corners of the globe.



H. M. Estabrook.



A. J. Stevens.

TRADE PUBLICATIONS.

Water Tube Boilers.—Egbert R. Morrison, Sharon, Pa., has published an article on Morrison Water Tube Boilers, containing diagrams, brief descriptions, and reasons why these boilers are safe, economical and efficient.

Turbines.—The Kerr Turbine Company, Wellsville, N. Y., has published bulletin No. 24 on the Economy steam turbine for belt drive. This bulletin shows installations, describes the construction of these turbines and points out their advantages.

Digging Machinery.—The Hayward Company, New York, has issued a small pamphlet describing its buckets and digging machinery and giving many illustrations showing their use in actual service on particularly difficult jobs, together with data describing the character of the work.

Track Tools.—Fairbanks, Morse & Company has issued a new catalog covering its line of railway supplies, including the Chisholm & Moore chain hoists, the Duff-Barrett jacks and similar lines handled exclusively for the railway trade by Fairbanks, Morse & Company, Samson and Badger car movers, a complete line of oilers and oil cans, the Sheffield track drill, shovels, track tools, rail benders, etc.

Railway Construction.

New Incorporations, Surveys, Etc.

Atchison, Topeka & Santa Fe; Coast Lines.—An officer writes that a contract has been given to the Sharp-Fellows Contracting Company, Los Angeles, Cal., for building the first six miles of second track between Keenbrook, Cal., and San Bernardino. All other work will be taken care of by the company's forces. No change of line will be made, as the second track will parallel the present main line. G. W. Harris, chief engineer. Los Angeles, Cal.

Atlanta & Macon (Electric).—This company has asked permission to mortgage its property, the proceeds to be used to build a line from Atlanta, Ga., southeast to Macon, about 80 miles. The company was recently incorporated with $100,000 capital. G. Cowan, Chicago; H. M. Scott and R. S. Parker, Atlanta, are interested. (April 19, p. 940.)

Canadian Pacific.—On the Raymond section, the Coutts' sub-division has been opened for business from Montana, Alta, south via Stirling to Coutts, about 65 miles, and the Cardston sub-division has been opened for business from Stirling southwest to Cardston, 47 miles. On the Ontario division, the Coldwater sub-division, formerly in operation between Coldwater Junction, Ont., and Coldwater, has been extended from Coldwater to Port McNicoll, Victoria Harbor, 12 miles, and the eastern terminal port of the Great Lakes steamship service has been changed from Owen Sound to Port McNicoll.

Cincinnati, New Orleans & Texas Pacific.—On account of the increased traffic over this road in connection with the Southern Railway and the Alabama Great Southern, double-tracking work is to be carried out between Erlanger, Ky., and Williamstown, 29½ miles. This will give the company about 37 miles of double-track south from the Ohio river. To facilitate the movement of trains into and out of Chattanooga, Tenn., the line from Boyce to Citico is to be double-tracked, and in addition the freight yard at Oakdale, just north of Harriman Junction, is to be enlarged to give it an additional capacity of 135 cars. C. Dougherty, chief engineer, Cincinnati, Ohio. (June 14, p. 1364.)

Columbus, Chattahoochee Valley & Atlanta.—Incorporated in Georgia with $500,000 capital, by residents of Columbus, Ga. The plans call for building from Columbus, south to a point on the Gulf of Mexico. An extension will probably be built to Atlanta.

Eastern Illinois & Peoria.—Incorporated in Illinois to build from Peoria, Ill., south to St. Elmo. The incorporators include: F. R. Austin, Evansville, Ind.; R. A. Dennis, F. S. Nicholson, K. L. Richmond, and F. W. Krohn, all of Chicago.

Fredericton & Grand Lake Coal & Railway Company.—A. E. Trites & Son, Gibson, N. B., who have the general contract to build between Fredericton, N. B., and Minto, have sublet contracts for clearing as follows: To Luther Taylor, to H. Burns, to J. W. Steeves, and to Barnes & Nichols. For grading work: to John Mavor, to Patterson Brothers, to Mavor Brothers, to J. E. Armstrong, to McPhail & Baird to Cooke, Kitchen & Company, to McLeod & McNeill, to William Rockford, and to Sutton & McLane. Some of the grading will be carried out by the general contractors, and additional contracts are yet to be let. Contracts for the masonry work on bridges have been let for the Nashwaak and Little River bridges, and for concrete culverts and a number of stations to D. C. Burpee & Son, to McLaggan & McVain, and for Bailey brook arch, and for five other arches, and culverts to J. Maxwell. H. W. D. Armstrong, chief engineer, Fredericton. (May 17, p. 1139.)

Great Northern.—A new branch has been opened for business on the Minot division from Stanley, N. D., northwest to Wildrose, 52 miles.

The Midland of Manitoba, which provides the Great Northern with an entrance into Winnipeg, Man., has been opened for business.

Knoxville, Sevierville & Eastern.—According to press reports, work is to be started soon on an extension from Sevierville, Tenn., to the east side of Sevier county. W. A. Seymour, chief engineer, Knoxville, Tenn.

Louisville & Nashville.—A new branch has been opened for business on the Cumberland Valley division from Ponza, Ky., to Colmar, about 6 miles.

Maine Central.—The extension from Mainstream, Me., west to Harmony will be opened in July, or in August. It is reported that a further extension is contemplated from Harmony north to Greenville, 36 miles. Surveys were made for such an extension by the Sebasticook & Moosehead, before it was taken over by the Maine Central. T. L. Dunn, chief engineer, Portland, Me. (February 2, p. 221.)

Meridian & Memphis.—According to press reports, a contract has been given to the Morey-Faulhauber Company, St. Louis, Mo., to build from Meridian, Miss., northeast to Union, about 30 miles. S. A. Neville, president, Meridian. (April 19, p. 941.)

Midland of Manitoba.—See Great Northern.

Missouri, Oklahoma & Gulf.—The Railroad Commission of Texas has approved an issue of bonds to cover the cost of building 10 miles from Denison, Tex., north to the Oklahoma state line. Work on the proposed extension southeast from Denison will be started soon. J. J. Harrison, chief engineer, Muskogee, Okla.

Northwestern Pacific.—The Northern division has been extended from Shively, Cal., to South Fork, for a distance of eight miles.

Sebasticook & Moosehead.—See Maine Central.

Southern Pacific.—On the Portland division a new line has been opened for business from Natron, Ore., east to Oak Ridge, 33½ miles.

Southern Railway.—This company expects to place about 28 miles of second-track in service at once. This is part of the section of 36 miles of double-tracking work now being carried out on the main line north of Atlanta, Ga., between Crosskeys and Gainesville. The freight yard at North Birmingham, Ala., is to be further developed. W. H. Wells, chief engineer construction, Washington, D. C.

St. Louis, Brownsville & Mexico.—The Port O'Connor branch has been extended from Bloomington, Tex., north to Victoria, 13½ miles. (January 5, p. 37.)

Union Pacific.—On the Nebraska division, the Kearney branch has been extended from Callaway, Neb., west to Stapleton, about 37 miles.

Washington Western.—This road has been opened for business from Machias, Wash., south via Harnett to Woodruff, 12 miles. There is also a branch from Harnett east to Williams Mill. C. W. Hole, general manager, Three Lakes, Wash. (May 24, p. 1181.)

RAILWAY STRUCTURES.

Bainbridge, Ga.—According to press reports, the Atlantic Coast Line will build a concrete bridge over Flint river at Bainbridge, and will also build a long concrete trestle.

Columbus, Ga.—The Southern Railway will build a new brick freight house, 40 ft. x 400 ft., at Columbus.

Indianapolis, Ind.—It is reported that the Cleveland, Cincinnati, Chicago & St. Louis will enlarge its Indianapolis yards and expend $175,000 in erecting additional shop buildings at Beech Grove.

Ottawa, Ont.—The National Transcontinental (Grand Trunk Pacific) has received bids for building 25 stations and two terminal stations on the line between Cochrane, Ont., and Superior Junction. The cost of the improvements will be between $250,000 and $300,000.

Construction work on the line from Kalgoorlie, Australia, to Port Augusta will be begun immediately. Pending the arrival of the rails, the grading work will be pushed forward, and when the track-laying machinery is ready, and the rails are on the spot, it is expected that track will be laid at the rate of at least two miles a day.

Railway Financial News.

Boston & Albany.—The New York Public Service Commission, Second district, has authorized this company to issue $1,000,000 twenty-five-year 4½ per cent. improvement bonds to be sold at not less than par, and to be guaranteed by the New York Central & Hudson River. The Massachusetts railway commission has already authorized this issue.

Kidder, Peabody & Company; R. L. Day & Company, and Estabrook & Company, all of Boston, have bought these bonds, and are selling them at 105.

Boston & Maine.—See Connecticut River.

Bridgton & Saco River.—See New York, New Haven & Hartford.

Brooklyn Rapid Transit.—The bankers who are to underwrite the financing of the B. R. T. subways and elevated lines which have been approved by the New York Public Service Commission are Kuhn, Loeb & Company and the Central Trust Company, both of New York, and Kidder, Peabody & Company, Boston.

It is understood that the plan to place a mortgage for $100,000,000 on the property of a subsidiary company which is to be formed has the unofficial approval of the New York Public Service Commission. It is expected that the bonds secured by this mortgage will be collateral for short-term notes which will be sold to the public.

Canada Southern.—Stockholders have authorized the $40,000,000 consolidated mortgage bonds which stockholders of the Michigan Central, as previously announced in these columns, agreed to have guaranteed by the Michigan Central.

Carolina, Clinchfield & Ohio.—A certificate of increase of stock has been filed in Virginia. There is now authorized $15,000,000 preferred stock, of which $10,000,000 is outstanding; and $15,000,000 common stock, of which the entire amount is outstanding. The increase in stock is $10,000,000 common, of which $5,000,000 has been issued, bringing the total amount of outstanding common stock up to $20,000,000.

Connecticut River Railroad.—Gov. Foss of Massachusetts has signed the bill authorizing this company to take over the Vermont Valley Railroad and the Sullivan County Railroad.

Cuba Railroad.—A dividend of 3 per cent. has been declared on the $10,000,000 6 per cent. non-cumulative preferred stock, payable August first. This compares with 2½ per cent. declared in February, 1912, and 2½ per cent. declared a year ago at this time, and with 2 per cent. declared in February, 1911.

Denver, Laramie & Northwestern.—On application of F. E. Bridge, a bondholder, and until recently a vice-president, a receiver has been appointed. The Denver *Republican* says that on February 16 the company owed to the Northwestern Land & Iron Company, $1,207,496; to the Denver-Laramie Realty Company, $200,000; to the Colorado-Wyoming Coal Company, $75,000; besides being indebted for $392,000 on pay rolls, etc.

Detroit, Toledo & Ironton.—The Central Trust Company, New York, has brought suit as trustee for the Detroit Southern and Ohio Southern, first mortgage 4 per cent. bonds to foreclose this mortgage.

Eagles Mere Railroad.—The interests which bought this property in September, 1911, have organized under the name of the Eagles Mere Railroad Company, and have elected the following directors: H. L. Geyelin, William Emery, E. S. Chase, W. K. DeVictor, W. S. Kirk.

Illinois Central.—Kuhn, Loeb & Company, New York, have bought from the company $15,000,000 two-year 4½ per cent. secured notes, which the bankers have resold to the public. The notes are secured by $14,000,000 Central of Georgia income bonds and $5,000,000 Central of Georgia stock.

Laramie, Hahn's Peak & Pacific.—In the federal court at Cheyenne, Wyo., June 10, F. A. Miller, president of this road, was appointed receiver. Mr. Miller, who has resigned the presidency, says that the receivership had been applied for the purpose of straightening out some financial difficulties, the nature or magnitude of which he did not explain; but he expects that the receivership will be of short duration and that the road will meet all obligations. The road is 110 miles long, extending southwesterly from Laramie, Wyo., to Coalmont, Colo., and it has six locomotives, two passenger cars and 41 freight cars. The funded debt is $3,750,000, and the stock outstanding $9,100,000. The secretary of the company is Arthur S. Howe, of Boston, and the American Trust Company, of Boston, is trustee under the first mortgage. The Guaranty Trust Company, of New York, is trustee under the refunding mortgage bonds.

Maine Central.—The $5,000,000 new stock recently authorized is being offered to stockholders at par.

Mexico Northwestern.—The stockholders are offered the privilege of subscribing at 85 for £750,000 ($3,750,000) 6 per cent. cumulative convertible income bonds. The company has 512 miles of line built and is now building 29 miles of what is known as the Chuichupa branch.

New England Investment & Security Company.—Gov. Foss of Massachusetts has vetoed the bill to permit the incorporation of the Worcester, Springfield & Berkshire Street Railway, whose common stock was to be sold to the New York, New Haven & Hartford. The senate failed to give the necessary two-thirds vote to pass the bill over the veto, although the house had passed it by more than a two-thirds majority. In his message to the legislature Gov. Foss says:

"It is our right to demand proper additions and improvements, and it is time to put the seal of the disapproval of this commonwealth on the continuous proposals of the N. Y., N. H. & H. to do its duty by this commonwealth only in exchange for some desired piece of legislation.

"I also recommend that the state conduct through a special commission an investigation of the whole problem of more adequate railway facilities for the western section, particularly the hill towns of the state, and to report to the general court. If private capital is unable to supply this service without surrendering it to the domination of the New Haven road, I believe it is the duty of the state to supply that service directly by a state-owned system of electric roads."

New York, New Haven & Hartford.—Stockholders of the Bridgton & Saco River have voted to accept an offer to sell their stock at par. The purchasers are said to represent the New York, New Haven & Hartford. (See also the New England Investment & Security Company.)

New York, Philadelphia & Norfolk.—The Public Service Commission of Maryland has followed the advice of its counsel—already noted in these columns—and has refused to permit the issue of $1,250,000 additional stock as a 50 per cent. dividend.

Pere Marquette.—The Farmers' Loan & Trust Company, New York, has filed objections to the issuance of $3,500,000 receivers' certificates recently approved by the Michigan railway commission.

Philadelphia & Baltimore Central.—This company has asked the Public Service Commission of Maryland for authority to make a mortgage to secure $10,000,000 bonds and to issue $2,200,000 of these bonds at once.

St. Louis Southwestern Railway.—A semi-annual dividend of 2½ per cent. has been declared on the outstanding $19,893,650 5 per cent. non-cumulative preferred stock, payable June 15. In January, 1912, 2 per cent. was declared, and, in 1911 the annual rate was 4 per cent.

Seaboard Air Line.—The 90,000 shares of preferred stock and 120,000 shares of common stock, bought from the Cumberland corporation by S. Davies Warfield and associates, was paid for at a price estimated to be about $55 per share for the preferred and $25 for the common. At the end of last week the common stock sold on the New York Stock Exchange at 24¾, and 54⅛ was bid for the preferred stock.

Texas & Pacific.—It is said that a new company, the Texas & Pacific Terminal Company, will be formed to finance the building of new freight and passenger terminals at New Orleans, to cost about $5,000,000.

Verde Valley Railroad.—This company has made a mortgage securing $1,500,000 4 per cent. bonds of May 12, 1912-1962.

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THE bursting tests of locomotive boilers, outlined in another column, are notable in a number of their features. It is many years since a deliberate and scientific attempt has been made in this country to explode a boiler, and probably never before have such careful arrangements been made to watch every stage of the process from a condition of safety to rupture, as in this case. At the end, the unexpected and expected occurred. Certainly no one thought, or, if they did, they failed to give utterance to the thought, that the Jacobs-Shupert boiler would come through the ordeal practically unscathed. No one expected an extended coming down of the crown-sheet, but everyone did look for at least a split section that would put the boiler out of commission. On the other hand, the collapsed crown-sheet of the radial stay boiler was quite in accordance with expectations. It is evident, therefore, that we have here a type of construction that must receive earnest consideration on the basis of safety. It is well known that these tests at Coatesville are the climax of a long series, extending over six months, that have been conducted under the direction of Dr. Goss. In the work that has gone before, the details of which have not yet been made public, it is understood that the new type of firebox has shown itself to be equal or superior to the old in such items as rate and economy of evaporation, and circulation—matters that will appear in due time in Dr. Goss' report. Apparently durability and performance in road service are the points that still remain to be cleared. At any rate the work of the past winter, and especially the results of the tests of last week, present important facts for the consideration of railway officers.

IT is notable that the republican national convention did not adopt any plank dealing specifically with the question of regulation of railways. The platform adopted refers to the fact that republican congresses enacted the act to regulate commerce and the measures supplementary thereto, and favors the creation of a federal trade commission, but it does not mention any further measures exclusively affecting railways as being needed. For a long period the railway question was prominently before the public, and was specifically dealt with in every party platform, state or national. The silence of this year's national republican platform seems to indicate that those who framed and adopted it think that the laws already on the statute books are sufficient for the present. It looks almost like a confession that regulation has been overdone, and it certainly must signify that the republican party believes that under existing conditions the imposition of further restrictions and burdens on the railways is inexpedient. Silence probably was maintained both because it was not desired to say anything that would sound like advocacy of a backward step, and because it was felt that to say anything that would sound otherwise would be considered as implying that the convention favored a more radical policy than that now being followed. Undoubtedly the petitions for conservatism presented by the Railway Business Association had a good influence. It should be borne in mind that while Mr. Taft was nominated by a faction, a large number of the delegates who were opposed to him voted for the platform adopted. While he received only 561 votes, the number by which the platform was adopted was 666, or nearly two-thirds of all the delegates, and there is no reason to doubt that the action—or non-action—taken reflected the sentiments of practically all of them. There seems reason to hope that the railway question will take a back seat and keep it throughout the national political campaign on which we are now entering.

IT is seldom that a shipper, or any one else, deliberately draws a check in favor of a railway for anything except his direct obligation. It is, therefore, refreshing to call attention to a unique case which recently occurred on a certain railway operating in the middle states. A grain shipper, with headquarters at Chicago, bought a carload of wheat to be shipped from western fields, consigned to himself at St. Louis. Through error on the part of the railway, the car was sent to Chicago, and the consignee was notified. The car was refused there, and it was consequently sent to St. Louis, where correct delivery was made. The railway had but one course to follow, for the expense of the extra haul was the fault of its own employees, and, naturally, it could not collect freight charges for a movement of this kind. Owing, however, to the unusual delay in making delivery of the wheat, the shipper found himself with an extra profit of some two cents a bushel, caused by an advance in the market price, and he mailed a check to an officer of the railway for the amount of this increase. The

officers of the road have not recovered yet from the shock the receipt of the check gave them. To find a shipper whose desire was to treat the railway as he would his most favored customer was as novel as it was gratifying. Now, to consider the equities of the case, suppose that, by reason of the delayed movement of this car of grain, the market price had receded, and the shipper had been obliged to pocket a loss on his sale. The railway would at once have accepted and paid, without protest, any clear, properly substantiated claim that might have been presented; for the difference between the price that the grain would have brought had the movement been without delay and what it actually sold for would have been a proper and legal basis for a claim. On the same principle ought not the railway to benefit by the profit that it made the shipper? But the shadow of "I. C. C." beclouds this weary land and the question arises: Can the railway in the case mentioned legally accept payment from the shipper in consideration of increased price received for the grain, when its contract consisted only of an agreement to haul the car of grain from A to B for a certain fixed charge, as provided for in duly published tariffs? It is true that, if the conditions were reversed, the railway would have paid the shipper's loss, but can the shipper pay the loss sustained by the railway because of the circuitous haul? At any rate, this little incident may indicate a significant change during the last few years in business morals and in the attitude of some shippers toward the railways.

DESPATCHERS ON STANDARD CODE REVISION.

THE report which the Train Despatchers' Association has made to the American Railway Association, suggesting changes in the Standard Code of train rules, is the most business-like and illuminating document on that subject which has appeared for many a day. We report the train despatchers' convention in this issue, but the discussion on these train rules was so long and so full that we have not the space for it. Every railway officer interested in perfecting the standard code should get the full report. The suggestions are based on actual experience and it is clear that they come from despatchers who see straight and who aim to waste no time on non-essentials. The *Railway Age Gazette* advocates the block system, and looks forward to the time when that shall be so perfected everywhere that the hair-splitting discussions which now constitute the life of train despatchers' meetings shall be done away with; but so long as "31" and "19," either or both, continue a vital part of our everyday life, the duty remains to perfect the system to the fullest practicable extent. And in this the despatchers, especially when—as in this case—they maintain a thoroughly intimate acquaintance with every feature of the freight conductor's work, must be considered a valuable, perhaps the most valuable, source of sound ideas.

As an example of the intelligent way in which the rules have been dealt with in this report we quote the following substitute for Rule 93, which is offered by the committee:

> Yard limits will be designated by ..... Within yard limits the main track may be used, clearing the time of ..... class trains as prescribed by rule. Other than ..... class trains must move within yard limits prepared to stop within half the distance the main track is seen or known to be clear.
>
> *Argument.*—The present rule is subject to confusion. In our judgment, no train should be permitted to protect against a first-class train, except in emergency, but not by rule provision. If such a train is late, they [switching trains] should be given time as per Form E. This suggested rule permits the use of main track upon the time of all except first-class trains without protection of flagman. Without such a provision, a yard limit affords no relief to trains having work to do.
>
> The provision in regard to half the distance the main track is seen or known to be clear seems necessary, in view of the possibility of two opposing trains or yard engines each moving "under control" (as defined) being unable to stop before colliding, while entirely able to do so within the "under control" distance.

A similar clarifying suggestion is made at the very beginning of the report where the committee offers a definition of the term "under control," and points out the inadequacy of the term "proceed with caution." Another definition proposed, which becomes necessary by reason of the general use of telephones, is "train order station." Discussing rule 14, it is suggested that the duration of a whistle sound should not be made variable. In connection with rule 27, it is suggested that red is an improper color for switch lights. With this color in use, trains at meeting points are constantly passing red signals. For rule 86 two forms are proposed; and the committee observes that in this rule a passenger extra, running on a telegraphic schedule, should be cleared by inferior trains the same as they would clear a regular passenger train. It is suggested that rule 91 should keep passenger trains ten minutes apart; and the unanswerable argument in favor of it is embodied in three lines—a five-minute interval is not sufficient to permit a flagman to get out the proper distance. We might go on at length quoting equally interesting paragraphs, especially concerning rules 207-212; but, as we have said, the subject can only be properly dealt with by reference to the full report of the committee. This report appears to have been made up mainly by Messrs. J. F. Mackie, R. C. Norton and J. E. Scott.

A PLAIN TALE OF NEWSPAPER MISREPRESENTATION.

A LETTER from a newspaper manager, published in our issue of May 24, page 1147, together with comment that it elicited from other newspaper writers, has given the *Railway Age Gazette* occasion recently to discuss the relations between the newspapers and the railways. We have remarked that while some railway men are not always as frank and veracious with the press as they might be, it is also true that some newspapers and newspaper writers deliberately misrepresent the railways. The purpose of this editorial is to tell a plain tale of a flagrant instance of this kind of newspaper misrepresentation.

The Railway Business Association is an organization composed exclusively of concerns engaged in the making and sale of railway supplies. Its membership includes many of the largest manufacturing concerns in America. Its members are, of course, all shippers. Therefore, whatever affects railways or shippers, or both, affects them. It was because they occupied a middle ground, which they felt afforded them a peculiar opportunity to bring about better relations between the carriers and the shippers, and to influence wisely the course of government regulation, that the supply concerns four years ago organized the Railway Business Association. Since that time the association has published and circulated eleven bulletins dealing with railway conditions and railway regulation. The eleventh was entitled, "Duty of Political Parties to the Shippers," and was an appeal to the republican and democratic national conventions to adopt planks in their platforms which, while countenancing no backward step in respect to public regulation, would advocate a policy that would tend to enable the railways to earn enough money to attract the capital which will be necessary to provide adequate facilities to handle the business of the shipping public. The bulletin contained quotations from 21 newspapers and magazines advocating the same policy for which the Railway Business Association appealed. It had a blank space in which shippers could sign a petition to the national conventions. It also gave a complete list of the names of its members.

This bulletin was sent broadcast to shippers, newspapers and commercial organizations throughout the United States. No effort was spared to secure the widest publicity for it. It was furnished to all of the newspapers in Chicago, including the *Chicago Tribune*, and it was received by the *Tribune* at the same time as by the other Chicago newspapers. On June 7 the *Chicago Evening Post* under large headlines printed extracts from the bulletin. On the morning of June 8 the *Chicago Record-Herald* gave it about a third of a column of space. The *Tribune* at that time did not mention it, but on June 17, on the eve of the republican convention, it published references to it under the following headlines: "Railway Lobbies in Conventions. Powerful Influences Seek Insertion of Planks in the Party Platforms. 'Secret Bulletin No. 11.' It Asks Aid of Shippers in Wielding

Influence Affecting Resolutions." Quotations from the bulletin were introduced as follows:

"New York, June 16.—(Special). The active operations of a powerful lobby to influence the framing of planks favorable to the railways in the national platforms of the democratic and republican parties has been revealed here in secret 'Bulletin No. 11' of the Railway Business Association. The railways propose to operate by bringing to bear the influence of the shippers, and to this end the bulletin, which has been sent out to boards of trade and commercial organizations all over the country, contains a blank form to be signed by the executive of shippers and receiving concerns."

Farther down, the article said:

"Lest the shipper should fail to realize that it is to his interest to sign and forward the petition, the bulletin contains this significant paragraph with an implied threat: 'Whether the shippers of our country shall have adequate railway facilities depends entirely upon how wisely the delegates to the national conventions perform their duty in making their declaration of policy with reference to railways.'"

Who made this alleged "threat?" The quotation in which it appears is from an introductory statement in the bulletin signed by George A. Post, president of the Railway Business Association. Did the writer in the *Tribune* mean to imply that Mr. Post, himself a shipper and the president of an organization of shippers, and having no connection whatever with the railways, "threatened" himself and other shippers with a lack of sufficient facilities for transportation unless the conventions did what the shippers asked them to do? On the contrary, the obvious intent was to convey the impression that the alleged "threat" came from the railways.

First, then, the *Tribune's* article conveyed the impression that the alleged lobbies were composed of railway men, when, in fact, they were composed of railway supply men who are also shippers; second, it implied that the bulletin was issued by railway men, when, as a matter of fact, it was issued by railway supply men who are also shippers; third, it specifically asserted that the bulletin was secret, when it had been scattered broadcast over the country ten days before, and a copy had been sent to the *Tribune* itself *for publication;* fourth, it implied that the bulletin contained a "threat" made by the railways that the shippers would not be given adequate facilities unless the conventions adopted planks favorable to the railways, when, as a matter of fact, the language quoted was a plea by the shippers for action which would tend to enable the railways to furnish to the shippers adequate facilities.

In view of the facts which we have stated, it clearly was absolutely impossible that the writer of the article in question could have had any other purpose than that of deliberately misrepresenting the facts with the intent of placing the railways of the country in a false light before the public and thereby doing them injury; and the only effect of his action, so far as it had any effect, must have been to accomplish the only purpose which can be attributed to him. A few days after the article referred to was published the *Chicago Tribune* quoted at the head of several pages of one of its issues the commandment, "Thou shalt not steal." It had reference to the alleged theft of delegates by the Taft forces in the republican national convention. There are other commandments in the decalogue. One of them relates to the bearing of false witness. Is a thief so much worse than a liar?

The newspapers of the United States during recent years have been holding railway managers up to very high standards of public duty. The *Chicago Tribune,* a great newspaper in most ways, has been foremost in the denunciation of abuses in the transportation business. We raise once more the question of whether the furnishing of transportation to the public is of more importance than the furnishing of the information on which the public may base its decisions regarding the most important public questions. Can newspapers and newspaper writers justify themselves in insisting that railways shall not unfairly discriminate, shall not work their employees excessive hours, shall not issue watered securities, shall not earn excessive profits, and then turn around and deliberately and wilfully so distort the facts regarding them as to put them in a wholly false light before the public? Is not the railway situation serious enough now without newspapers resorting to falsifications that render it more serious? It is the fear of intelligent and thoughtful students of railway affairs that the nation is drifting toward government ownership of railways. To solve the railway problem in such a way as to escape that calamity is going to be hard enough at best; and no man but a fool or a knave will add to the complexity and difficulty of the situation by misrepresenting the roads to a public whose mind already is prejudiced and hostile.

NEW BOOKS.

Catalogue of Books on Railway Economics. Compiled by the Bureau of Railway Economics, Washington, D. C. Published by the University of Chicago Press, Chicago. Cloth. 7 in. x 10 in. 450 pages. Price, $3.28.

In this work the Bureau of Railway Economics has undertaken to list the works relating to the economics of railway transportation that are cataloged in 13 of the principal libraries of the country, together with those in its own collection. Except for material existing in these libraries, but not cataloged, and for the literature to be found in periodicals and collections of miscellaneous papers and general works containing railway material, and in some of the less important state and federal documents, the work can fairly lay claim to being a representative bibliography in the field of railway economics. The table of contents is very comprehensive and makes easy an almost instant reference to any subject or class of works that may be desired. The value of the work as a book of reference is also enhanced by a 25-page index of the names of all authors. The list of libraries containing the material recorded in the catalog is as follows: Bureau of Railway Economics, Columbia University, Hopkins Railway Library (Leland Stanford, Jr., University), Harvard University, Interstate Commerce Commission, John Crerar, Library of Congress, New York Public Library, University of Chicago, University of Illinois, University of Michigan, University of Pennsylvania, University of Wisconsin and Yale University.

Letters from an Old Railway Official, Series II: "To His Son, a General Manager." By Charles De Lano Hine. 232 pages, 5 in. x 7 in. McGraw-Hill Book Company, New York. Price, $2.00 net, postpaid.

Those who are fascinated and instructed by Major Hine's first series of letters—"Letters from an Old Railway Official to His Son, a Division Superintendent"—which were published some years ago, will expect to be both entertained and edified by this second series. Nor will they be disappointed. Written after their author has had a longer and more varied experience in railway service, and after he has given years of study and work, as special representative of the director of maintenance and operation, to the reorganization of the Harriman Lines upon the unit basis, it is an advance over the former series in point of vigorous, stimulating discussion of many of the serious problems confronting railway managers, and at the same time is brightened by the same flashes of wit and permeated by the same racy philosophy that makes its predecessor such good reading. A man who knows nothing about the railway business can read it with pleasure for its flavor, just as one who is not an expert wine taster can like good wine merely because he likes it. And those familiar with railway affairs may read it with even more pleasure and profit, both because of its flavor and because it is a valuable discussion of many railway questions by a railway expert. The problem of organization occupies the largest place in the book, but the discussions of it deal not merely with organization as such, but with organization in its bearing on all the internal workings and the external relations of the railway, and, therefore, bring into view the questions of the operating efficiency, of rates, of financial return, of wages and conditions of employment of labor, of labor unionism, of accounting and of public regulation. And there is no phase of the railway problem which is touched without being illuminated.

Letters to the Editor.

EQUIPPING OF OLD EQUIPMENT WITH SAFETY APPLIANCES.

Chicago, June 17, 1912.

To the Editor of the Railway Age Gazette:

In your daily edition of June 13, 1912, in the first editorial, page 1297, I note the following: "And, further, it is required that all cars passing through the shops for general repairs, whether of home or foreign roads, must be equipped with safety appliances."

The order of the Interstate Commerce Commission, dated March 13, 1911, extending the time within which equipment existing July 1, 1911, must be made to comply with the United States safety appliance standards, is not, I think, open to this construction. The order of the commission is clear and explicit as to the character of the work to be done upon the cars before it is absolutely essential to replace existing appliances with those called for under the standards.

I call this to your particular attention, inasmuch as a proposition was made at the time the extension of time was under consideration to incorporate the expression "general repairs" as indicating when the appliances should be placed upon the cars, and the expression was absolutely avoided when the commission formulated its order, for reasons which must be manifest. It is my thought that a wholly wrong impression may be given and an objectionable situation created if this particular idea is read into the order of the commission.

GEORGE HODGES,
Secretary, Special Committee on Relations of Railway Operation to Legislation.

PAVEMENTS FOR TEAM TRACKS.

New York, May 28, 1912.

To the Editor of the Railway Age Gazette:

Your editorial in the issue of May 24, on the above subject is timely, interesting and, in the main, sound. The matter is one to which railway officers do not seem to give the attention it merits, doubtless because they have so many other more important things pressing for consideration, and because the members of the engineering staff on railways are not usually specialists on street paving. In the majority of cases the proper pavement of team tracks and freight house driveways is inadequately or improperly provided for, while sometimes the opposite is true and a needless amount of money is spent to accomplish the purpose.

The conditions to be met are somewhat different from those of ordinary city streets. The travel is practically all slow; there is an unusual proportion of heavy loads, and stopping and starting of these heavy loads is very frequent. The teams stand for considerable periods in the same spot while loading and unloading and, in fly-time particularly, the stamping of the horses' feet is very severe on some pavements. The requirements at the different stations vary within wide limits from the simplest driveway along a side-track at a small country station to the receiving and delivery yards in the large cities, where an enormous tonnage is concentrated. The problem is to select for each situation the pavement that will best serve the purpose at the lowest cost for construction and maintenance.

The plain, old-fashioned macadam or gravel road, while low in first cost, as you say, unsuited for heavy work, and comparatively expensive to maintain. In well-drained railway yards it is particularly liable to the kind of distintegration called "raveling." Still, at many country and town stations it is, on the whole, the most satisfactory, particularly as its construction requires only ordinary care and skill.

You do not mention bituminous macadam (or bituminous concrete, pavements, and they seem to be very little used by the railways. Such a pavement, if properly built, using a standard asphaltic cement for binding material, ought to prove very satisfactory. It is comparatively low in first cost, furnishes good foothold for horses, its tractive resistance is low, and under anything but very heavy travel it should prove durable and easily maintained. It merits a more extensive trial. Nor do you mention sheet asphalt pavement, doubtless because for out-of-door yards, where it is exposed to the direct summer sun, its use is not advisable. It may become so soft and malleable that the standing horses and wheels of vehicles sink into and badly deform the surface. Under some conditions it may also be slippery. But for driveways under roof, where it is kept clean and dry and shielded from the direct rays of the sun, nothing is more satisfactory, and it is not expensive to construct or maintain.

Brick pavements for freight yards are to be advised with caution, principally because of the variability in the quality of the brick available. In the eastern and the central western states high-quality paving brick are not produced, and the long transportation of the recognized superior brands makes the pavement so expensive that the railways are tempted to use local brick, which often give very disappointing results. But in the central Mississippi valley where first-class paving brick are available at reasonable cost, a properly constructed brick pavement will, except under the heaviest and severest travel, give excellent service, and may be strongly recommended, especially as the first cost and the cost of maintenance are both comparatively low.

For use under the severe conditions usually found in the congested yards of large cities stone block pavement is the only kind that can be safely recommended. Within the region where it is considerably less expensive than granite, Medina sandstone pavement of first-rate quality has much in its favor. It gives a better foothold than granite, wears down to a smoother surface, costs less to construct, and is no more expensive to maintain. On the whole, however, granite-block pavement will doubtless continue to be the standard for the heaviest class of service.

Wood-block pavement has a number of strong points in its favor, but as ordinarily constructed it is much more slippery than any other variety in common use. It also costs more than brick pavement and has not shown itself to be more durable.

Hydraulic concrete pavements have not been sufficiently tried in freight yards to be safely recommended. The constant stamping of sharp-shod standing horses might rapidly disintegrate the material.

Whatever the kind of pavement chosen, good construction is as important as the material. A good foundation for the wearing surface is very essential. For all kinds except the ordinary macadam, a hydraulic concrete foundation is best, and, in the end, cheapest. But the thickness and quality of the concrete may be varied according to the solidity of the sub-foundation and the severity of the expected service. For city yards it should not be less than 6 in. thick, but where the travel is not especially heavy and the sub-foundation is good, a thickness of 4 in. will be ample. It is seldom necessary to use a rich concrete such as that considered standard for culverts, piers and retaining walls. A well made 1:4:9 concrete will often be good enough. Six inches of such concrete will give more bearing strength on a road than 12 in. of broken stone, and will prove to be considerably cheaper.

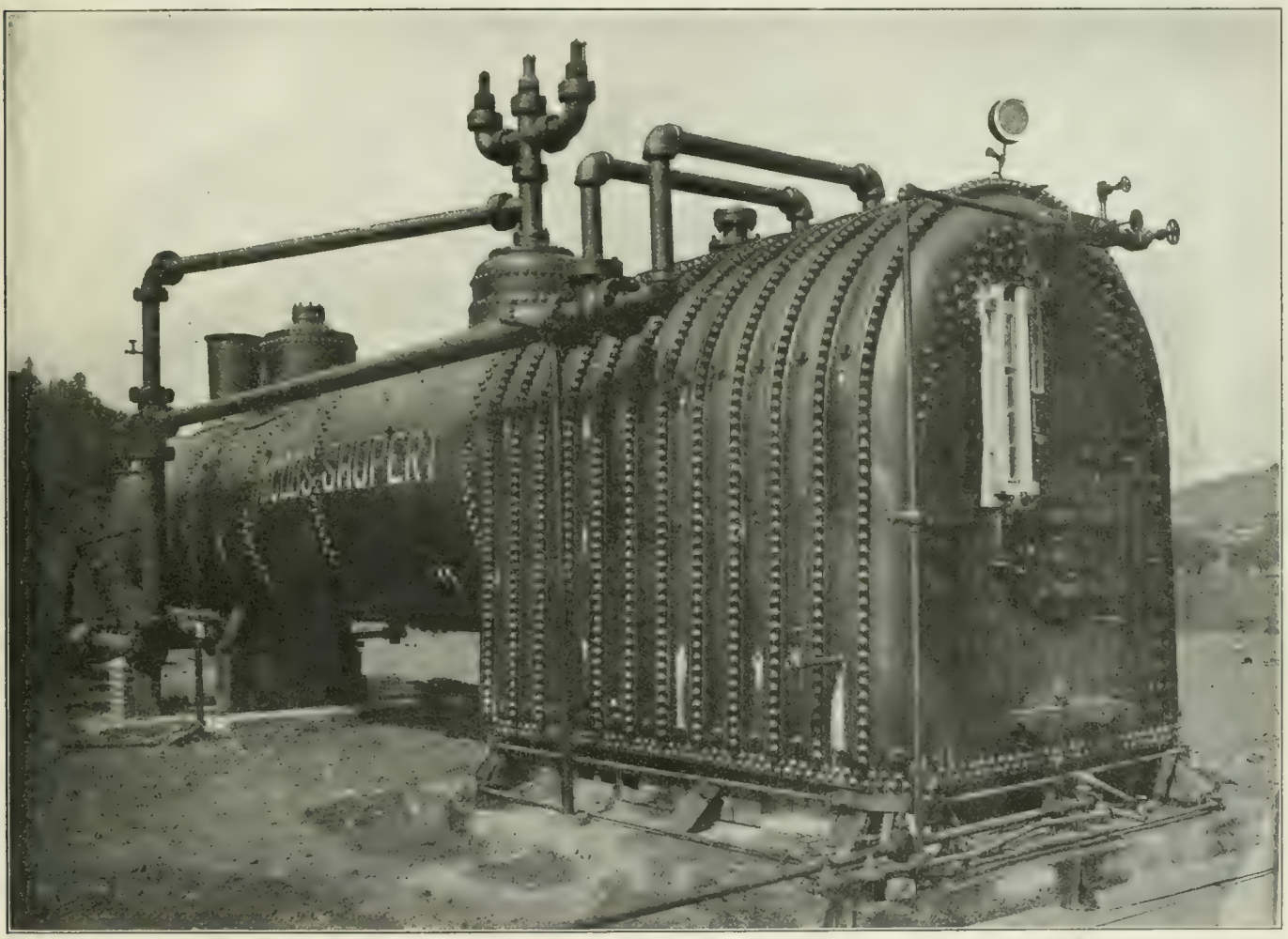
The joints between the blocks of brick or stone pavements should preferably be filled with Portland cement grout, made of one cement to two and a half sand. This is not only cheaper than pitch or other bituminous filling, but it makes a stronger and smoother pavement, without materially decreasing the foothold for horses.

S. WHINERY,
Consulting Engineer.

LOW WATER LOCOMOTIVE BOILER TESTS.

Radial Stay Type Fails; the Jacobs-Shupert Is Not Affected Except for the Overheating of the Firebox Sheets.

The long series of competitive tests between boilers of the Jacobs-Shupert and the radial stay types, which have been conducted at Coatesville, Pa., under the direction of Dr. W. F. M. Goss, of the University of Illinois, were concluded on the afternoon of Friday, June 20, in the collapse of the radial stay firebox. The regular series of evaporation and other tests had been conducted in a temporary shed near the buildings and on the property of the Lukens Iron & Steel Company, and, these concluded, the boilers were moved to a cinder dump about a half mile west of the works. Here they were carefully set up on concrete foundations and fully fitted with all of the necessary steam gages, safety valves and blow-off cocks, but without the usual boiler lagging. They were arranged for oil burning, and for two weeks had been subjected to a constant series of preliminary runs, in order to make sure that there should be no hitch on the final day.



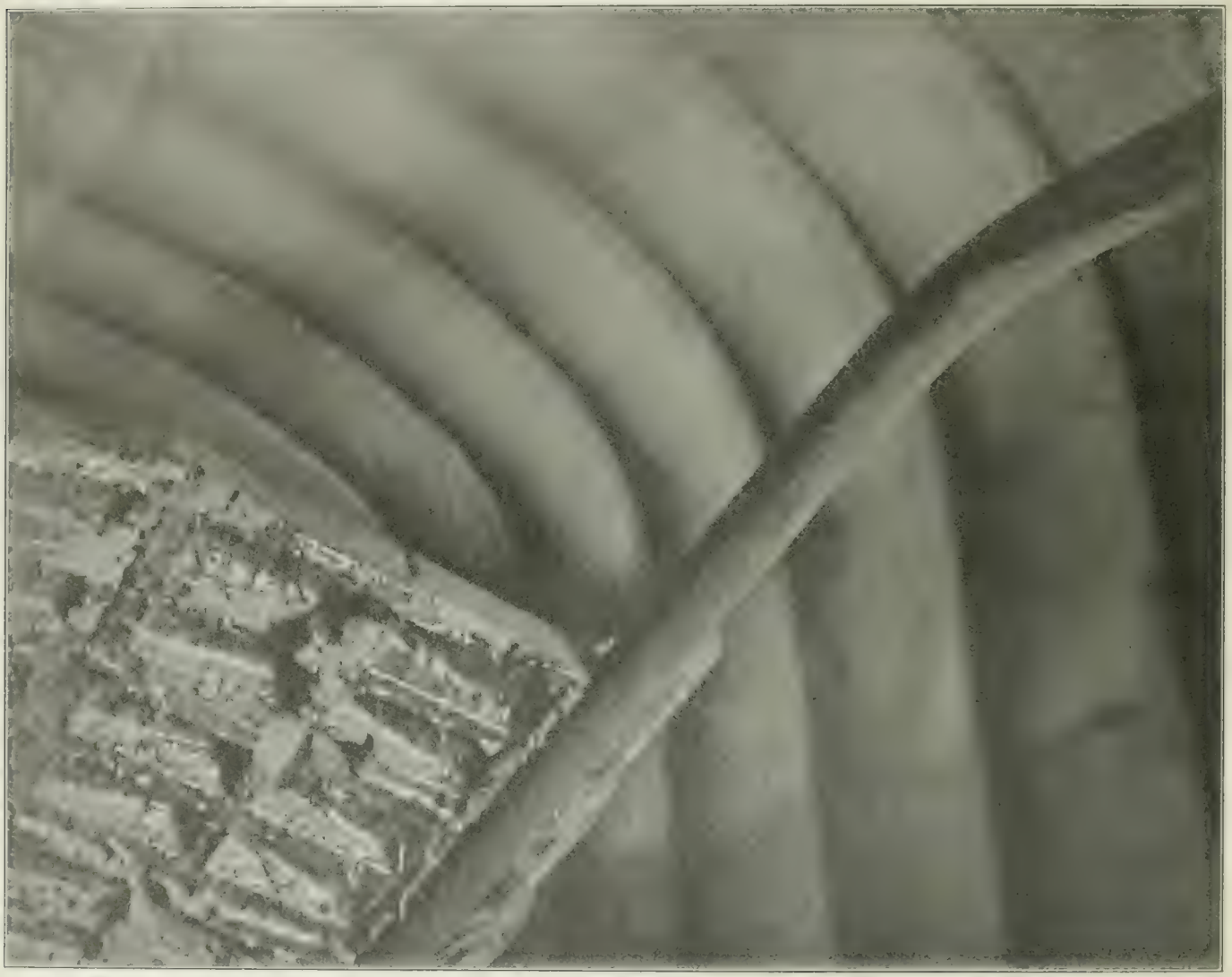
Jacobs-Shupert Boiler After the Test at Coatesville, Pa.

The tests simply consisted of starting the fire with the water at the proper height above the crown-sheet and then allowing the water to fall until something happened—that something being expected to be the failure of the crown-sheet.

The site chosen for the work was ideal. The cinder dump extends as a long and high fill along one side of the valley with no buildings of any kind within a quarter of a mile, and it runs in a general easterly and westerly direction. A stream supplying water for Coatesville flows along the foot of the northerly slope of the dump, while on the north the hills are wooded and rise with a gentle slope to a height of a few hundred feet above it. At the point selected for the tests the dump is leveled to a plateau about two hundred feet wide, while to the southeast of it is an open field rising with a gentle slope. In the southeast corner of this field a grand stand was erected, from every seat of which a clear view could be obtained of both boilers and of the bomb-proof, or fort, for the official observers and directors of the test. Somewhat to the west and about 200 ft. nearer the seat of action was a small platform and shelter on which one of the Pathé Frères photographers was stationed for the purpose of taking moving pictures of the scene below. The grand stand had a seating capacity of about 300, and was filled with men and women, while from 150 to 200 more were scattered over the slope in the neighborhood; if anyone failed to have a perfect view of the whole proceedings the fault lay in themselves and not in the arrangements and surroundings. The whole area of what was considered the danger zone was guarded by a cordon of police, and back of and outside of it the hills were dotted in every direction with interested spectators. The field occupied by the grand stand was reserved for the invited guests of the Jacobs-Shupert Firebox Company.

The day was an ideal one for the work. The temperature was in the seventies, there was a pleasant breeze blowing from

the west and there were just enough of clouds in the sky to make it a typical day of June. Dr. Goss and his assistants were on the ground early in the morning, and the guests began to arrive at about noon, some coming from Parkesburg, where they had visited the mills in the morning, and the others from Philadelphia. The last contingent reached Coatesville at 12.48 p. m., and were met at the station by carriages and automobiles in which they were carried to the gates of the Lukens works. From this point they were taken to the observation stand on the ingot cars of the steel company; these had been fitted with flooring and seats for the occasion, the hauling being done by the works' locomotives over the narrow gage industrial railway. On arrival the guests were served with luncheon in a tent erected next to the observation stand; while eating they had full opportunity to overlook and familiarize themselves with the field of operations below. Among the guests were representatives of railways from all sections of the country.



Flash Light Taken from the Lower Left Corner of the Door Sheet of the Jacobs-Shupert Firebox, Showing the Brick Arch Intact and the Discoloration of the Sheets Due to Overheating.

ARRANGEMENT OF BOILERS AND APPARATUS.

Both boilers were under steam, the safety valves of the Jacobs-Shupert blowing vigorously. The boilers were set facing the southwest and at a slight angle with each other. This put their firebox ends at an angle of about 45 degs. with the line of vision of the observers on the grand stand. This was so that in case of a violent failure and a throwing of the mass, due to the collapse of the firebox, the movement would be away from the spectators. The boilers were about 800 ft. from the guests who, with the exception of the official observers, were the nearest to the scene of action.

The official observers were stationed in a bomb-proof or fort erected directly back of the boilers and about 250 ft. away. It was formed of a Jacobs-Shupert firebox laid upon its side with the roof sheet turned towards the boilers and protected on that side by a cribbing of ties with a cinder filling. Immediately back of this was a platform on which the observers could stand and look over the top of the bomb proof towards the boilers. On top of it were two telescopes which were used for reading the steam gages and water glasses. Of the latter each boiler was fitted with two of such a length that the combination made it possible to read the water level from a height of about 6 in. above the crown-sheet to 25 in. below it. Leading to the boiler were the pipes for conveying the oil to the firebox and two wires for manipulating the blower valve for regulating the amount of steam admitted to the stack for maintaining the draft. There were three safety valves on the boiler, the first set to open at 220 lbs., and the other two at three and five pounds above it. The boiler feed water was delivered by a pump supplied with steam by a donkey boiler, both of which were placed on the bank of the stream at the foot of the dump.

Back of the platform of the official observers was a cribwork of ties on which the feed tank for the oil burners was located.

It is fed the oil to the burners by gravity, and the amount delivered could be regulated by the observers. This tank was itself fed by a pump taking its supply from a small tank car set still farther back.

To the rear of the platform and in front of the tank were two indicators that were manipulated by the official observers. The lower one was a large white board on which was drawn a sectional outline of the inner and outer sheets of the firebox. Below the the crown-sheet line were figures indicating various distances below its highest point, at 2-in. intervals up to 36 in. Across the face of the indicator a horizontal black rod was placed to be moved downward with the fall of the water level in the boilers. Above this was a circular indicator provided with a single hand that could be turned to indicate the boiler pressure, which was indicated by figures near the outer edge and which ran from 150 to 240 lbs.

To complete the arrangements telephonic communication was established between the bomb-proof and the grand stand, with an assistant at the latter point who stood throughout the whole test with the receiver at his ear and with a megaphone in his hand, through which he announced the readings of the observers as to pressure and water level as they were sent to him. Incidentally, it is interesting to note that though this assistant had a good, loud, well-carrying voice, the roar of steam at the safety valves and at the stack was such that he could not be heard at the farther end of the stand.



Radial Stay Boiler Shortly After the Failure of the Crown Sheet.

THE JACOBS-SHUPERT TEST.

As already stated, the boilers were under steam and the safety valves were blowing vigorously when the last guests arrived, and shortly after half-past one the attendants retired from the neighborhood of the boilers, the fire beneath the radial stay boiler was put out and its valves ceased to blow, while those of the other were in full blast. At 1:48 the announcement was made that the test of the Jacobs-Shupert boiler had begun. At that moment the steam pressure was 225 lbs. and the water stood at about 6 in. above the crown-sheet. Slowly the water level rod was lowered, and in about ten minutes it was announced that the top of the crown-sheet was bare. Then came the speculation as to when the collapse would occur, with an average consensus of opinion that about 8 in. would be the place. The steam pressure held with some variations, rising and falling between 220 and 225 with the continued dropping of the water level. The safety valves were blowing, sometimes one, usually two, occasionally three, and the long, white swift column of steam rose nearly straight in the air and was in a strong contrast with the green of the hills beyond.

Down came the level of the rod, 10, 11, 12, 13 in., and then the white mist began to fade; there were intervals with nothing immediately above the safety valves and only a white cloud above. Evidently superheating of the steam had set in. Then the pressure lagged, one valve blowing became the rule, and slowly the column of escaping steam disappeared, and finally it was gone, though the roar of the superheated steam through the valve was still clear and distinct. Then the decreasing heating surface showed its effect on the pressure and it began to fall. The pop valves closed and there was nothing but the noise of the exhaust and the increasing volume of black smoke from the stack to mark the progress of the test. This did not occur, however, until the water was well below the crown-sheet.

But down came the rod through the teens until the safety valves closed somewhere about 20 in. Then the pressure fell rapidly, and when it was announced that the water had disappeared from the gage glass at 25 in. below the crown-sheet and that no further readings could be made the pressure was at 190. Then there was nothing to do but wait. The full stream of oil was still flowing to the boiler, but with the rapidly falling pressure and the weakening blast, combustion was becoming more and more incomplete and black smoke of increasing volumes was pouring from the stack. Down came the pressure until it finally reached 50 lbs. per sq. in., when the faint blast stopped, the smoke cleared away and the precentor at the megaphone announced from Dr. Goss that the test was discontinued because the small amount of water remaining did not evaporate sufficiently fast to supply the draft necessary to maintain the fire. This was at 2:43, or 55 minutes after the test was started.

Aside from the overheating the injury to the Jacobs-Shupert box was slight and consisted of comparatively insignificant distortion of the inner sheets, the details of which will be made public with Dr. Goss' official report. The brick arch and the arch tubes were not disturbed, although the rear ends of the arch tubes were a considerable distance above the water level at the close of the test.

TEST OF RADIAL STAY BOILER.

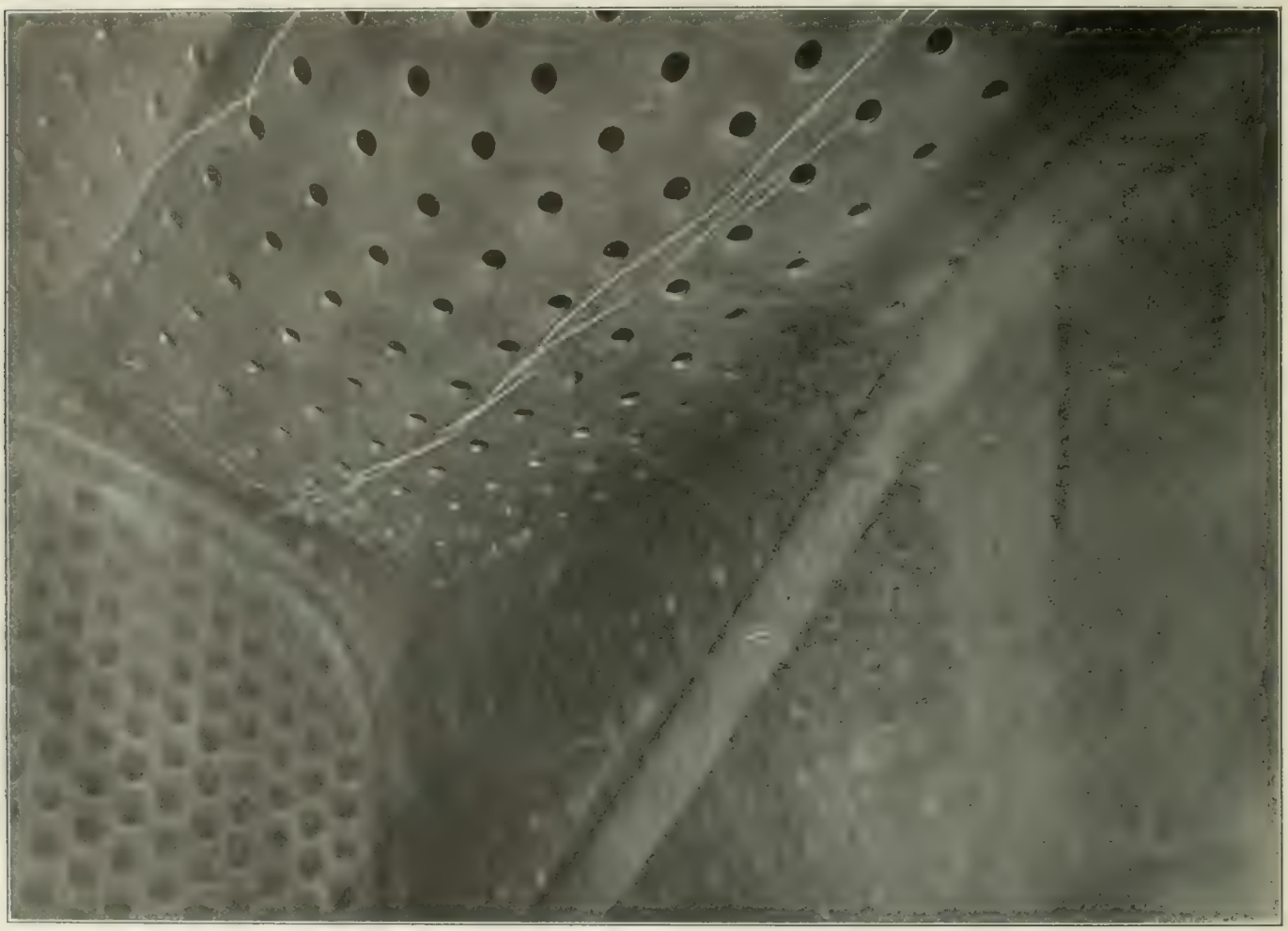
At once the fires were started under the radial stay boiler. The pressure which had fallen was quickly raised, and at 3:35 p. m., with all three valves blowing under a pressure of 225 lbs. and with 5 in. of water over the crown-sheet, the test of

the radial stay boiler was announced to have started. Again it took about ten minutes to bare the crown-sheet, and again the maximum steam pressure was held, rising from 225 to 230 lbs. per sq. in. The water level fell minute by minute and inch by inch until at about 3:50, with the water at 6 in. below the crown-sheet, there were signs of distress at the staybolts in the outer sheet. Streams of steam were seen issuing from a number of them. Then the girth seam between the throat sheet and the shell developed a leak, and as the water level fell the staybolt leakages came down with it. They were small, and not more than may often be seen. Still down came the level, with no change at the safety valves, through 10, 11, 12, 12½, 13 in. below the crown-sheet, until just as the percentor had announced 14¼ in. at 3:58 there was a puff of black smoke out from the right hand side of the foundation that curled around back of the firebox, to be followed by a blast of black smoke from the left, a dull roar, a cloud of smoke and flying debris and the disappearance of the boiler and all of that part of the field while the cloud swept out to the left and right for about 150 ft. and up for a similar distance. Evidently something had happened this time.

In a minute the smoke and steam cleared away and there stood the boiler. It had been lifted from its foundation and moved ahead and to one side about 18 in. The brickwork of the foundation and the arch was scattered hot and glowing for 50 ft. in all directions.

Examination showed that the crown-sheet had come down in a sag for a distance of about 18 in., but had not split or cracked. The staybolts had merely either pulled out of the sheet or had been broken off at the head. There were 72 radial hammer-headed staybolts pulled; 81 button-headed stays and 21 T-bar bolts. The main damage was on the right side, beginning at about the second row of T-bars and running back 14 rows. Apparently one of the hammered head stays was the first to yield; this allowed the sheet to drop and the heads of the other bolts were simply jerked off.

As for the method of conducting the test, the rate of evaporation of the two boilers was apparently about the same throughout, and started at about 12 lbs. per sq. ft. of heating surface per hour. The boilers had been carefully calibrated as to capacity so that accurate records of what was done could be kept and will be available later.



Flash Light Taken from the Lower Left Corner of the Door Sheet of the Radial Stay Boiler After the Failure of the Crown Sheet.

The main line from Lourenco Marques, Portuguese East Africa, to the Transvaal border is only 55 miles long; nevertheless, it has an enormous traffic, both passenger and freight. To Johannesburg alone imports to the value of over $30,000,000 pass over this route. Lourenco Marques is not only a direct gateway to the Transvaal, but is also the chief center from which laborers are drawn for the gold fields.

The latest railway to be inaugurated in Chile is a line between Curico and Hualane, 39 miles. This line, which is of the 3-ft. 1-in. gage, has two large bridges. The Teno bridge is 310 yds. long and the Rauco bridge is 130 yds. long. There are several smaller bridges and a viaduct 50 yds. long and 30 ft. high. The contractors completed the line six months before the date arranged and earned a government bonus of $50,000.

REASONABLE REGULATION OF RAILWAY RATES.*

Commerce Built Up by Rate-Making on Business Principles—Danger of Tendency to Base Tariffs on Cost.

BY MORRELL W. GAINES.

Federal supervision of rates, in its present period of enforcement, began gently and has grown, step by step, more searching and more stringent. Rate laws, advancing from the salutary to the questionable, are typical of the wider movement towards regulation, in which the states have gone farther than the federal government. On all sides local commissions have been established with sweeping powers over capitalization, operation, and, more fundamentally, the rates of railways.

For the struggle to preserve their freedom the railways were desperately handicapped. In the main they were honestly managed. But their former offenses against fair play, in the practice of personal rebates and in certain conspicuous instances of over-capitalization, were dragged into public view. They could not enter the contest with clean hands, and they have accordingly bent, perforce, before a storm of attacks which they should, by rights, have resisted to the utmost. Innumerable enactments invest commissions with powers stripped from railways. The steps of the latter have been hedged about, their freedom of initiative curtailed, their rights infringed, their revenues diminished, and their taxes and expenses increased. Their future is clouded with dispute.

Now the courts are busied with the task of sorting from this feverish legislation the things that are Cæsar's and the things that are not. Some of this legislation has been swept away, and from the very nature of its origin much more will be. Decision and enactment will finally determine the legal metes and bounds of regulation. In the end a new state of equilibrium will result under which railways can certainly exist, but as certainly under altered conditions of growth and earning power.

Traffic, in the old use of the word, signifies exchange of goods with a view to gain. As applied to railways, traffic has acquired a narrower meaning, the movement of goods without exchange. So railway traffic has come to be thought of as a thing apart from trade. Indeed, the general concept of freight rates is that they are a burden on commerce, a charge on the profit of merchant and manufacturer. Nevertheless, even in the narrower interpretation, railway traffic remains of the very essence of the exchanges of commerce. All of it, without exception, moves from seller to purchaser or, if the conditions are more complex, then from the seller towards the purchaser. The force behind each shipment is profit in exchange. Railways live by serving trade, and their deeper interests are the same as those of the commerce they haul.

Community of interest between railways and railway-borne commerce is dependent on simple and well-known relations of financial factors. Railways and trade complement each other in their activities, so that under free play of natural and selfish forces each is the stimulus and support of the other. This is the argument for securing to the railways freedom of rate-making. It is as valid and of as deep influence on the public welfare as the wise reasoning that has left trade itself between the states free and untrammelled.

Railways and industries alike are operated for profit. But they must seek profit by different paths. The railway sells its one commodity, transportation, at a thousand prices. Rates for coal, lumber, hay, grain, cattle, cotton, hardware, and the numberless manufactures differ according to the article transported. Rates for the same article transported the same distance are unlike in different places. Increase of distance brings no equal advance of rate, even where there is no competition of intersecting routes. Where there is such competition a longer haul frequently carries a lower rate. If there be a cost basis for rates, it is clear that it has been ignored throughout the rate structure. The reason is that, for profits railways must consult tonnage rather than costs. Traffic that may be carried only by making special rates lower than the originally established tariff, is offered for transportation. If it will yield a margin above its direct cost of haul, that margin is profit. So railway tariffs have been differentiated by long process of evolution from the simple tariff of 1801, of the Surrey Iron Railway, cited by Acworth, which named but four rates, and was itself an evolution from a single rate canal-toll tariff. The complexity of present tariffs is the result of 80 years of adapting rates to the multifarious requirements of trade, in order to secure tonnage and profits that would otherwise be unobtainable. Costs, within wide limits, have been ignored, save when rates touch closely the lower barrier of direct costs. The aim of the railways has been to keep the average of all rates high enough to cover the whole of the three divisions of their outgo, and to adjust the individual rate at any point above the direct costs which will secure a maximum tonnage from the traffic to which the rate applies.

Industries have a thousand commodities to sell; but, within narrow limits, must offer each commodity at a fixed price. To make profits, their prime need is for a market wide enough to absorb their product at whatever price will more than cover the cost. The wider the market the faster and surer their growth. Railways have brought markets within reach and are responsible for the growth of trade and manufacture. But the railway rate that stands between a rigid cost on the one side and a rigid price on the other must itself be flexible. Trade arises and traffic moves only when the railway rate plus the cost of production is less than the price at the market by a margin of profit sufficient to sustain and develop the business. The railway rate designed to produce tonnage is the rate that satisfies the need of trade to be market-free. Each locality, at once producing center and market, has its own scale of cost for its products and of prices that it can pay for what it buys. Hence arises the need of commerce for infinitely various, profoundly sympathetic schedules of rates and classifications that will "move the business" between localities. Hitherto, in this country, railways have been constructed to carry commerce, and their rates have been established to create it.

Rates must put a profit into the pocket of the shipper in order that traffic may move. They must leave a profit in the hands of the railway in order that the railway may live. Up to the present there has been a system of rates based on mutual profits, and not on costs, distances, or any other extra-commercial factor pertaining to the railway alone. The chief service of this system to the general growth of wealth lies in its promotion of what is known as market competition. This is a competition of traffic and not of routes. Wares from two or more producing points, unequally distant, are, through adjustment of rates, laid side by side in the same market. Except where hauls are too costly, all producers are placed in a position to compete. Equal opportunity the railways cannot create, but in the desire for tonnage, they create everywhere such opportunity as they can. The effect is to raise prices to the more outlying producer by increasing his demand, and to lower them to the common market by increasing supply. Area of production and volume of trade are increased. The average railway rate is lowered. The

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average rate of profit is also lowered. The consumer pays less. The net result is altogether in the spirit of modern industry, which develops wealth by augmenting volume of business and reducing margins of profit.

Market competition exists everywhere. It is characteristic of every form of trade except monopoly. The rates for market competition are set by the railway's cutting into its own margin of profit until it meets the margin of profit of the producer. They need no regulation except that furnished by the desire for tonnage. Natural resources have been developed by rates named to meet market competition. The granary of the western prairies was thrown open to commerce not so much by the extension of lines as by the low rates that put wheat into Chicago, New York and Liverpool on the basis of maintaining a livelihood for the farmers. On the basis of giving a profit to the West Virginia operator, West Virginia coal, with its long haul to tidewater, was opened up by rates that would place it in New England furnaces in competition with the nearer coals of Pennsylvania and Maryland. Lumber of Washington and Oregon is hauled a thousand miles farther across the continent than is the lumber of the south with which it competes; the rates named are such as to start the mills and keep them going. Fruit from California meets in New York on equal footing the product of Florida and the Mediterranean. The rates named have turned the desert into a garden. New England factories, market-towns of the west and south, manufacturing cities of trunk-line territory, the export tonnage of the great seaports—all are sustained and nourished by special rates based on market competition.

Next to market competition in point of service comes the competition with other routes. Clipper ships, whose extinction the Interstate Commerce Commission has lately mourned, would still bear the attenuated commerce of California and the Orient around the Horn, if it were not for the flexibility of rates, by means of which railways give the traffic their fostering care. So the low rates and the quick facilities in any competition of routes promote the exchanges of trade. Where there is neither competition of route nor competition of traffic the railways are still of service. There is here the slower but no less potent competition of standards of living. Population must be attracted and territory developed if tonnage is to result. Rates may be higher than against the sharper, more direct competition, but they must still be based on the necessity of bringing a profit to the producer.

If instead of the inequalities of the profit-making system of rates we had had hitherto a leveled-down system, based on cost of service, fair return on capital, distance, or any other equalizing factor, we should have had, in the first place, a much smaller development of railway traffic, and in the second, a much smaller development of railways. Had they been debarred from seeking any and all obtainable tonnage, the lines built would have been perhaps half of the existing mileage, and would have comprised only the most advantageously situated routes. Traffic carried would have been less than half the present volume, because all those activities that have been called into life by favoring rates would be lying dormant. The trade and the wealth of the country would be immeasurably less than they have grown to be. This is the justification of the irregular and unregulated rate system which has evolved and been evolved by the railways and their traffic.

The law does not direct the Interstate Commerce Commission to seek and apply rates which will promote commerce. The law is aimed, first, against discriminatory rates, and, second, against unreasonable rates. To that end it instructs the commission to decide what is a reasonable rate, in the cases that come before it, but omits to prescribe the standard by which reasonableness is to be established. There is, and can be, no such standard. Rates are simply committed to the judgment of the commission. That body has used from time to time, as aids to judgment, but not as standards, cost of service, value of service, distance, natural advantages of localities, consideration of local interests, competitive conditions, and fair return on capital. Except that competition sometimes determines a rate definitely, none of these factors can be of exact application. Furthermore, they often conflict. The commission has used now one and now another as the preponderating influence in its deliberations. At first it emphasized value of service, until it became evident that the term, whatever else it might be, was not a unit of measure. More recently it has given prominence to cost, and to fair return, taking the latter in the sense of including moderate capital charges in cost. However, no matter what the factors taken, the decision can be no more than an arbitrary ruling as to what constitutes a reasonable rate. Reasonableness cannot be deduced from the factors, singly or together.

Rates imposed by authority on other than commercial considerations could hardly be expected, at best, to give automatic obedience to commercial needs. Moreover, the actual determination of rates is poorly handled, sometimes with impracticable results. There are no traffic men on the commission. The ground to be covered is so vast that labors must be simplified by the adoption of short cuts, such as that furnished by comparison of rates. Furthermore, the commission wishes to suppress market competition as a basis for rates, and to establish instead "some system of rates which on the whole seems just and reasonable. . . . Different communities should be permitted to do whatever business they can under that rate system." It declares that market competition is but a euphemism for railway policy. To quote from the last annual report: "It will be found that this thing called market competition rests in all cases in the mind of the traffic manager. It is the expression of a desire to obtain business which otherwise would not be obtainable." Market competition will be considered, but not as market competition. It will be allowed where compelled by other railways, but not where railways create it for the benefit of their own shippers, and in either event it is not a matter to be left to their own discretion. "The commission has never yet decided that this form of competition alone would justify a departure from the fourth section" (the long-and-short-haul clause). So the rates of the commission are both arbitrary and hasty, and based on faulty principle. It is by chance only that any of them may promote, and not destroy, the growth of wealth.

A wide application of the principle of comparison of unrelated rates, with concomitant destruction of market competition, is to be found in the Spokane and intermountain decisions. These are among the most important of the recent rate decrees of the Interstate Commerce Commission. In them the commission attempts to arrogate to itself the power to fix rates absolutely, a very different matter from the power to name a maximum permissive rate conferred on it in the terms of the law. These decisions, handed down June 22, 1911, have served as text for a general order prohibiting departures from the long-and-short haul clause, and prescribing rectification, until such time as the commission may be able to hold hearings and issue permits for reasonable departures. Furthermore, they have been enjoined by the Commerce Court and the injunction is under appeal by the commission to the Supreme Court. The rate-making power, particularly with reference to market competition, is in issue and the case will have bearing on the whole future course of regulation.

The question was one of commerce and not of rates. Yet it had to be argued, considered, and decided on the barren basis of "reasonableness" and discrimination. The complaint arose because the most westerly of the interior cities, Spokane, Reno, Phoenix, Salt Lake, and other points, desired to take away from the coast cities, Seattle, Portland, and San Francisco, the local distributing trade in manufactured products brought from the east. The interior towns wish to become wholesaling centers for a larger tributary territory. The coast cities want

to hold the trade of the interior to the extent that they have always had it. One group asks for lower rates from the east; the other has retaliated by asking lower rates from the west. The quarrel over trade privileges is of long standing. It has been urged for more than twenty years.

No considerations of tonnage or of competition dictated the rates to intermediate points in the west, this side of the Sierras and the Cascades. The small communities of that region had neither choice of routes nor, at that time, an appreciable volume of traffic. The fact that through rates were low was all the more reason for keeping these rates full, so that the average rate on all traffic might cover all three classes of railway expense. Low rates everywhere would bankrupt the railways, barely covering movement expenses and maintenance. Full rates everywhere would also bankrupt them, shutting off the through tonnage that they wrest from the sea, which carries a share of their burden of operation. To live they must have a dual system of high and low rates; and they are still under the necessity of keeping their intermediate business untouched by the forced level of water competition. The high rates are not, however, a burden on intermountain traffic for the benefit of through traffic. The intermountain cities, on the contrary, are the chief beneficiaries of both high rates and low rates. The coast would always have had low rates by sea, without the transcontinentals. But the interior, if rates had been leveled, would still have nothing but the wagon haul of the pre-railway era.

The rate system followed has been to carry the full charge on intermediate traffic as far west as possible, and then to protect it against back haul at a lower cost by making extremely high rates from the coast inland. Thus the rate plateau rises slowly from its eastern origin until near the Pacific, where it breaks away to the low level of tide water. The system is eminently rational, in spite of the incidental waste of train-miles in back haul where the plateau breaks. The rates are, nevertheless, hardly "reasonable" in the regulatory sense. The impact of Interstate Commerce Commission ideas upon this situation could not fail to work havoc.

The opinion of the commission on these rate cases contains, first, a discursive discussion, and, last, an announcement of the rate order. There is no necessary or apparent connection between the two. The order itself is not supported by reasoning, nor is it a logical deduction from the facts presented. Either the commission conceives of its regulatory power as absolute, needing only an arbitrary enunciation, or it perceives that to support a decreed rate by the inferential and loose arguments of "reasonableness" would only expose it to successful attack in the courts. Each of its three orders on this rate situation lays down a different set of "reasonable" rates. Each order is arbitrary, and each is arbitrarily different from the other two.

Costs are mentioned as among the considerations to which thought has been given, but the reduction of rates finally arrived at is explicitly not based on costs alone. Detailed cost figures, quoted in an appendix, purport to prove that the Southern Pacific had made exorbitant and discriminatory profits on its Reno traffic. The figures so quoted in prejudice of the case for the railways do not apply. They are for the average traffic, which consists largely of long-haul freight moving in full trainloads with the utmost economy both of road and of terminal expenses. The westbound transcontinental traffic set off at Reno averages about two cars per day. To leave these cars, through trains must be broken up, or, at greater expense, the cars must be hauled in by lightly-loaded way trains. Car loading with such small traffic is certain to be light, and return loading is irregular. The agent's salary and other local expenses mount high when levied on so few cars. Reno traffic is necessarily expensive, and not fairly to be compared as to costs with through freight.

The exorbitant profits are not proven. A rate of three cents per ton-mile is high as railway rates go, and if matched against the average cost the resultant net earnings appear excessive. But this rate is not, in and of itself, high for the haul of special tonnage of this volume across the Nevada desert. Independent lines in that region charge more. In January of this year, the Interstate Commerce Commission itself decided that the Nevada-California-Oregon Railway, leading north from Reno, was entitled to charge four cents and upwards on a volume of business several times as large.

The financial position of the carriers was considered in a one-sided fashion. A test of reduced rates had been carried out under the last preceding order of the commission, and it was found that while losses resulted the railways could carry them. Therefore it appeared that there was no confiscation of property. The commission fortified this position by declaring the general profits of the transcontinentals to have been excessive. The thirty years of struggle and the approaching contest with the Panama canal were forgotten in view of the present period of substantial earnings. Shortly after the decision was made, the St. Paul, a powerful system whose stock has been a standard investment, was obliged to cut its dividend, and the Denver & Rio Grande, borne down by the burden of the Western Pacific, which is earning nothing against its charges, passed its dividend completely. The dividend rate of three other lines out of the seven has been called in question in the markets of the last eight months. There is no question but that the transcontinentals are, as a class, fairly prosperous, but they need their prosperity as reserve strength for the immediate future. There is here no good reason for saddling them with an instant loss estimated from $6,000,000 to $12,000,000 a year on all the traffic affected by the order.

The losses proposed were not confined to the railways most directly concerned. The mantle of sacrifice would fall on eastern lines as well. More than that, commerce, for whose benefit the rate reductions were ordered, would be disturbed and confronted with loss. The final decision, now under injunction, is in substance as follows: the railways are permitted to charge as much to intermountain points as to the coast on commodities originating at St. Paul, Kansas City, Omaha, and Missouri river cities; 107 per cent. as much from Chicago; 115 per cent. from Buffalo and Pittsburgh; and 125 per cent from New York and the Atlantic seaboard. These rates are relative and not specific. They lean on the through rate. They represent the permissive maxima; any railway may go lower at its option. The intent was not only to reduce the intermountain rates but to create distance differentials that would destroy in this territory market competition between the cities of the east.

The Commerce Court did not pass adverse judgment on the general rate-making powers of the Interstate Commerce Commission. It holds authority under the same general law. Its injunction was issued on entirely different grounds: first, that railways have the right to make low through rates against water competition without reference to their intermediate rates; second, that percentages of such through rates (which may themselves be raised or lowered) are not rates at all, and particularly not the "reasonable" rates which the commission is empowered to impose. Any change in through rates would destroy the reasonableness of the intermediate rates. Moreover, the relations set up between the eastern cities are untenable and impracticable. The percentages established would be self-nugatory before they were ever put into effect. "The practical effect of the order is either to compel a blanket rate from the entire east to the entire west, or to prevent the carriers from getting all the business which they now secure without loss by making rates which enable merchants to meet market competition." The court illustrates this conclusion by showing that roads leading from New York would have to reduce their permissive 125 per cent. Spokane rates to the 100 per cent. established from St. Paul, Minn., or abandon the

traffic. Desiring their proper share of tonnage, all railways would reduce to the 100 per cent. from all points east of the Mississippi to all points in the west.

The court might well have gone further and barred the percentages on the ground that they involved in principle the fixing of rates absolutely, a power as yet withheld from the commission by its enabling law. For if the commission can say that the rate from New York to Spokane shall be no more than 125 per cent. of the rate from New York to Seattle, it can with equal right go on to say that the rate from New York to Seattle shall be no more than 80 per cent. of the rate from New York to Spokane. Furthermore, in order to carry into effect the percentages of its decision and abate the market competition of the eastern cities, it will have to do just that and add to its present order the converse percentages from each locality. Thereafter the intermountain and the through rates will be interlocked so that none can change unless all change. Practically speaking, these rates would then be immovable, fixed by order of the commission. Thus the right to establish percentages puts the entire rate structure within the iron grasp of regulation. An important element of the vast power conferred by percentages is that the method is so facile, so adapted to broad strokes, that the commission could multiply its decisions and divide its labors, quickly overrunning the rate complexities of the whole country.

The decision aims to reverse the currents of traffic. It favors the interior at the expense of the coasts. Intermountain towns are to buy from the east direct what they have previously received from the Pacific ports. Shipments from the east are expected to proceed from the nearer cities instead of from the more distant, whose rates are made higher. Existing trade will be stopped and new trade established instead. Such a decision would be questionable under any circumstances, but it is demonstrably unprofitable to trade as well as to railways when made in the face of the opening of the Panama canal. As matters stand, the decision can hardly go into effect more than a few months before the canal is in operation. It would, if of immediate acceptance, have had a bare two years to run. Through rates will be fixed by the canal at a level to be estimated at perhaps half of the present low rail charges. The force of this competition will necessarily avail to give the two coasts the advantage over the interior. Spokane and Reno must then be served from the west and not from the east, and the flow of traffic set up by the commission will again be reversed. San Francisco and Seattle will not only take back the jobibng business now wrested from them, but will extend their domination farther inland. It is an ephemeral trade that the commission confers on the intermediate towns. New capital cannot be employed in it safely or profitably. If employed, it will have to cover itself as best it may by exorbitant charges to the consumer. Existing capital in the established trade of the coast points faces temporary idleness and loss. As a practical matter reversal of trade currents would hardly be entered on for so short a period. The commission's order, if enforced, will be self-nugatory with respect to trade as well as to percentages, and its net effect will be temporary sacrifice by merchants of the coast, and heavy loss to the railways.

The railways never had greater need of their dual standard of high and low rates than now as they stand facing new water competition. The canal will contend directly with the seven transcontinentals for traffic that yields, on a conservative estimate, at least ten per cent. of their combined gross earnings. If their intermediate rates also are to bear a percentage relation to the rates they must make against this competition, their total of losses will be greater than they can endure. The present order of the commission, or any future order of the same aim, will force the transcontinentals to abandon their through business altogether, turn it over to the sea, and give not only the intermountain territory but all the region as far east as Denver a haul to and from the Pacific. The decision of the commission is directly against the logic of events. It is not illumined by the light of reason.

The universal indictment against commissions is that they are lacking in that trained understanding of traffic matters by which alone they could fix beneficial rates. The indictment against the whole regulatory system is that it imposes an impossible task upon human intelligence in committing so vast a supervision to so few men; that it also makes the labors of rate determination destructive and misspent by framing the instrument in hostility to what exists. It is a question whether, under any circumstances, bodies of combined legislative, administrative, and judicial powers can take that moderate view of their own functions which will lead them to develop and not reverse the orderly and fruitful progress of rate evolution.

Regulatory commissions are created as a guard against selfishness. The money-selfishness against which they are aimed is at least guided by fructifying self-interest. The power-selfishness with which commissions are steeped leads to no end but futility and self-aggrandizement. Reasonable regulation should be confined to extension of the police function of the government. It should guarantee safety and stability, and guard against dishonesty, whether in promotion, in accounting, or in favoritism. It should leave the administration of railways alone.

Surveys have been completed for the railway from Yunnan, China, to Szechwan. This line will be built by the Chinese to connect the French railways in the province of Yunnan with the Yangtze valley system at Chungking, about 500 miles.

Arrangements are being made to finance a line from Arica, Chile, to La Paz, Bolivia, via Yungas. A good deal of difficulty has been experienced owing to the opposition of some interests which have received a concession to build to Yungas, although no particular route was specified. It is expected that the new line will prove very profitable financially, and the Bolivian government, which has granted the concession notwithstanding the opposition, is doing everything to bring about its construction.

The Peruvian congress has passed a bill for construction of the Ucayali Railroad, which will connect the most easterly railway head in Peru with Amazon river navigation. The line will extend 270 miles from Goyllarisquisca, terminus of the Cerro de Pasco Railroad, to the port of Pucalpa, on the Ucayali river. The route will follow the Huallaga river, crossing the mountains which separate it from the Ucayali river, and will cross the extensive Sacramento pampa. It is planned to run 2,000-ton steamers from Pucalpa to Iquitos, where connection will be made with ocean-going vessels. Steamboats are now operating from Pucalpa 300 miles south on the Ucayali river. By the concession, which needs only the signature of the president to become effective, the Peruvian government will issue $10,000,000 in bonds, payable in instalments with the completion of each 25 miles of the road, to the Amazon & Pacific Railway Company, a corporation organized in New Jersey. The bonds will bear 6 per cent. interest with 1 per cent. for a sinking fund, and are to be secured by the tobacco tax. The concession includes the right to extend the railway 190 miles from Cerro de Pasco to the Pacific coast, and upon its completion a further payment of $2,500,000 in Peruvian bonds is to be made. Five years are allowed for construction of both branches, which are to become government property after the concessionaire has operated them for 25 years. In addition to the bonds mentioned Peru is to convey 5,000,000 acres of land, the title to which becomes accomplished when the president approves the bill, the concessionaire, A. W. McCune, having already deposited $150,000 as security for the execution of the contract. The Sacramento pampa contains 80,000 square miles. The engineers who surveyed the road were the first of the white race known to have crossed the plain, which they found inhabited by about 250,000 people.

THE LITTLE SALMON RIVER BRIDGE.*

Interesting Features of Design and Erection of a 4,000-Foot Viaduct on the National Transcontinental Railway.

BY R. F. UNIACKE,
Bridge Engineer, National Transcontinental.

The Eastern division of the National Transcontinental Railway from Moncton through the central part of the province of New Brunswick and through the province of Quebec to the city of Quebec is built with a ruling of 0.4 per cent. compensated grade, and a maximum curvature of 6 deg., requiring some advanced bridge and high viaduct construction. The valley of the Little Salmon river, 185 miles from Moncton, presented one of the obstacles to be overcome, as the grade development showed a crossing over 4,000 ft. long, with a height of 200 ft. above the water line.

The line approaches the west end of the structure on a 6 deg. curve through a rock cutting and crosses on a tangent bearing N. 10 deg. 27 min. W., the grade rising 0.40 ft. per hundred. There are 24 towers, 58 ft. 9 in. centers and 25 intermediate spans, 100 ft. 3 in. center to center, the end spans being 100 ft. 10½ in. center of bent to outer end of steel. All the tower spans are alike, and also the intermediate spans, except that the masonry ends are extended to give the required bearing. The towers and bracing are made alike as much as possible, necessitating only one set of templates for the spans and tower parts which duplicate each other. A through girder construction was adopted, the girders being spaced 17 ft. 6 in. center to center, while the floor beams with gussets were spaced 14 ft. center to center along the plate girders. The east end span is on a spiral to a 6 deg. curve, and in consequence the girders are deflected at this abument 1 ft. 3 in. off the tangent.



Little Salmon River Viaduct.

There were several reasons which led to the adoption of through girders. In high trestle construction where the use of falsework is out of the question, the most economical layout is that of an intermediate span as long as can be handled with a well-designed traveler working from grade, so as to reduce the number of high towers, their pedestals and foundations. Spans of 60 ft. with 40 ft. towers are generally employed where deck girders are used, spaced 9 ft. center to center, and bridge ties resting on the top flanges. As the through girders are spaced 17 ft. 6 in. center to center, intermediate spans of 100 ft. could be handled, the bearings of the traveler resting on the flanges, thus giving a wider base for the traveler in handling loads. The stability of the erection outfit is amply provided for so that in this case girders weighing 30 tons were placed. It certainly gives a feeling of safety to see from the car window the flanges of a heavy steel girder, and that this is not altogether sentiment is shown by the fact that instances of derailment are recorded, in which the car held to the roadway by the lateral resisting power of these girders.

*From a paper read before the Canadian Society of Civil Engineers.

SUBSTRUCTURE.

To avoid building the steel work on a curve at the east end and also to utilize the material in the rock approach cut without waste, an abutment of reinforced concrete placed on top of the rock fill was decided on. A buried pier built from the original surface at this point would have been over 100 ft. high, difficult to design and build, and very costly. The concrete was reinforced to prevent danger from cracks due to settlement in the bank, and in order to give time for the bank to settle the ends of the girders were temporarily supported by a crib-work of square timber.



Erection Derrick.

In the design of the pedestals and west abutment, borings and test pits were first made to determine the character of the soil. This proved to be of compact sand, gravel and hard pan, so that no piling was required, the footings being designed to distribute the load at a pressure of from 2.5 to 4 tons per sq. ft. The four pedestals near the water line at the banks of the river were built with curved cutwaters, the axis of piers being parallel to the direction of the current, forming suitable ice breakers. The anchor bolts for pedestals consisted of two rods, 2 in. in diameter, the lengths varying according to the uplift to be resisted. These rods were anchored at the bottom by spacers of 10 in. channels and washers, the concrete being built around them. In order to give room for a little variation in their position, conical forms were set around each bolt, a lip being left at the top extending beyond the base plate of column through which these

joints were reamed with grout after the steel was erected. The west abutment or buried pier was about 40 ft. in height above the footing course, and in order to reduce the pressure on the soil and allow the embankment to run through and surround it, an arched void was left in a longitudinal direction. No difficulty was experienced in building to this design.

In laying out the work no triangulation was required and an ordinary steel tape was used. As provision is made in the girders for expansion, a slight variation in the position of the anchor bolts is permissible, providing the expansion slots are made longer than the theoretical length requires. The chief difficulty consists in maintaining the anchors in a vertical position and protecting them from rough usage from swinging buckets of concrete and other causes.

DESIGN.

The Dominion government specifications were strictly adhered to in the proportioning of the members. The compression members were figured for the pin ended formula of these specifications. In the tension members of the towers a limiting length of 200 $\frac{l}{r}$ was used to avoid sagging of members, to make them capable of resisting compression and to give initial stiffness. Bulb angles are used in the sway bracing of towers, which make a very stiff and economical section and avoid breakages in shipment, the great fault in box-laced sections of light angles. Traction and wind were figured as called for in the specifications.

The posts have a relatively small radius of gyration when compared with a built up channel section; but the saving in weight of details and simplicity in shop work fully compensates for the extra main material. The metal is used mostly in directly resisting the primary stresses, as very little is required for secondary purposes (viz., lattice tie plates, etc.), and in this way a stronger column is obtained. The section used has also the advantage of continuous webs in each direction, which are greatly superior to the easily bent lattice bars, and moreover the interior of the column is much more accessible to the paint brush for shop and



Erecting Engine on Derrick.

field coats. The section is symmetrical on both axes, having therefore its center of gravity in the center of the section, and no eccentric loading is induced from the girders. The small amount of redundant metal means uniformity of stress in the columns, and simplicity in the make up will decrease the cost of maintenance.

In calling for tenders for the steel work the company's usual practice was followed, the bridge companies being furnished a general design and details of girders and towers, with a printed form of tender in which was filled in the estimated weights of steel, and number of feet B. M. of timber in the floor. All bridge companies bid on the same basis, and were not required to make a single drawing to submit with tenders, but merely to fill in the unit prices for steel and timber erected in place, and to carry out the amounts on the estimated quantities furnished, viz., steel 14,000,000 lbs., timber 520,300 ft. B. M. After the tender was awarded the bridge company submitted stress sheets and details for approval before ordering the material from the mills.

The rails are directly supported by 8 in. x 12 in. x 14 ft. bridge ties resting on the steel stringers, every fourth tie being 16 ft. long to support the plank footway placed outside the guard timber for the convenience and safety of the section men. An outside guard timber 8 in. x 9 in. is dapped 1 in. over the ties, which are spaced 4 in. apart in the clear. The ties are secured to the stringers by ¾ in. hook bolts, and the guard timbers bolted through the tie with one ¾ in. bolt in every fourth tie. A steel



Riveting Bridges in Use on Tower.

guard rail 60 lbs. to the yard will be placed inside the gage line, and 8 in. therefrom in the clear, these guard rails coming together at the center of the track one rail length beyond the end of the bridge and being protected by a cast steel point fitting the rail section and spiked to the track ties.

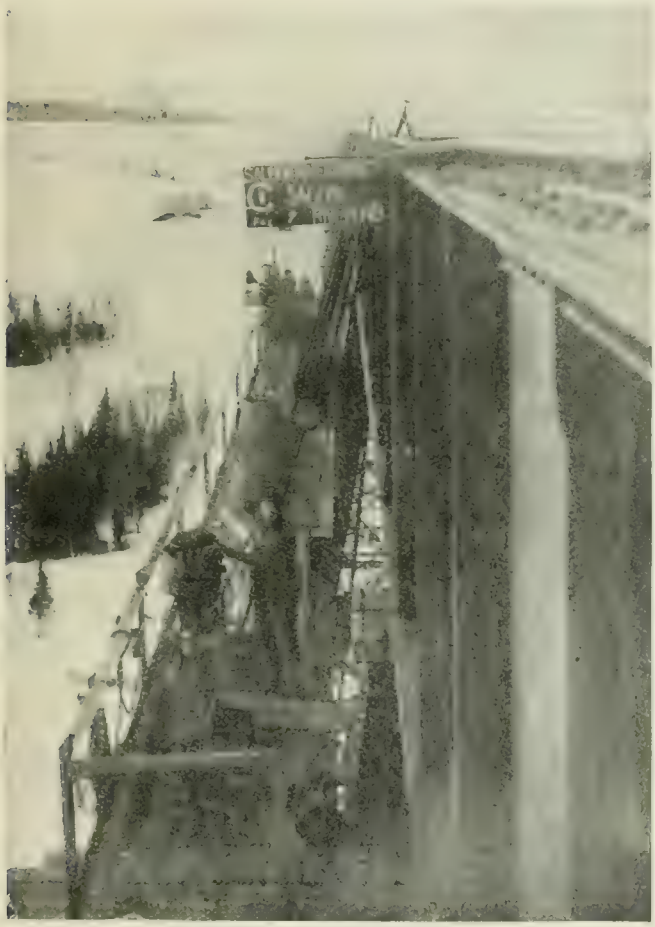
ERECTION.

Actual erection began July 27, 1910; the steel was all assembled and last span swung February 8, 1911, and all riveting and painting fully completed August 19, 1911. Material was unloaded at a siding at the west end and handled by a two-boom derrick car in the storing yard. A light standard gage locomotive with lorry cars handled the material from the storage yard to end of steel. The main feature of the erection outfit was the 30-ton two-boom erection derrick, traveling on the top flanges of the girders, the trucks of the traveler running on 115 lb. crane rails, the base of which rested on timber temporarily secured to the girder flanges. This derrick was self-propelling by means of a chain and sprocket connecting the trucks with the erecting engine, which had two 10 in. x 12 in. cylinders. The 115 ft. booms were box sections composed of four 36 in. x ¼ in. web plates at the center of the boom and tapering at the ends, connected by four 3½ in. x 3½ in. x ⅜ in. angles. This section was found to weigh less than a latticed section and the combined unit stresses from compression and bending were very much reduced. The writer was told that the men working on the traveler were very enthusiastic over the ease with which the big machine handled its work. The wind at the deck of the trestle was very strong, and was generally blowing at right angles to the bridge, but the work was practically never held up on this account. The use of the erection struts is shown in the photograph. After a tower and its girders were assembled the erection struts were removed and used again to stiffen the first bent of the next tower until it too was connected and self-sustaining. Hook bolts temporarily connected the ends of these struts with the columns and proved very efficient.

Another important feature was the use of riveting bridges for convenience and safety of the men in assembling, riveting, and

painting. They were carried along the top of the trestle by the two-boom yard derrick car, and after being secured to the top girder flanges by hooks, the cages were lowered or raised by hand, as required, the free end of the tackles being on the platform, so that the riveters could slack away.

The erection staff varied from 60 to 80 men, of which but six were employed on the big traveler. One sub-foreman and 14 men were used to assemble the steel work, and the rest formed from two to six gangs of riveters, the crew for derrick car used for unloading material in the yard, and the driver for the light locomotive. The riveting gangs averaged 302 rivets per gang per day of 10 hours, a rate which would probably have been reduced by 50 per cent. if ordinary staging had been used, instead of the riveting cages. The erection was accomplished in rather remarkable time, considering the force employed. A pair of 100-ft. girders were swung and bolted in their final position



Riveting Bridge.

in 37 minutes, and floor beams and stringers assembled in half a day.

One coat of Sherwin-Williams black Metalastic paint was used in the shop, with a coat on each contact surface before assembling. Two field coats were applied, the first Metalastic brown, and the final coat Acheson Graphite. Rivet heads and shop marks were touched up before applying the field coats. The use of a different shade for the first field coat was a great help to the inspector, to enable him to see that the several coverings were properly applied.

The inspection covered mill, shop, and erection inspection, all in accordance with the Dominion government specifications of 1908. The bridge company furnished the inspection company with copies of all mill orders. An inspector was present at the rolling of the material furnished on these orders, making complete surface inspection of every piece. Specimens were selected from the material so inspected, and these test pieces were forwarded to the machine shop to be machined on both edges and straightened true. The test pieces so prepared were sent to the testing laboratory at the mills, where they were measured and broken in the testing machine, in the presence of the inspector. The inspection company also secured from the rolling mills a certificate of the chemical analysis of the steel so tested. Frequently the inspector required drillings to be taken from the test pieces at the mills, to check up the accuracy of the reports presented by the rolling mill company. Test pieces and material which they represent were identified by melt numbers.

The inspector at the mill also undertakes to see that the material is properly loaded in the cars ready for shipment to the bridge works. Full descriptive reports are then made out by the inspection company, showing the number of pieces and the size and length of each piece so shipped from the steel works, together with the results of tests, and these reports are sent to the bridge engineer.

The representative of the inspection company is present at the bridge works to watch each operation and check up material. Full detail reports are made out showing what material has been constructed during each week, also what material is under course of construction, and what material has been shipped, commenting on any errors that may have been discovered and how they have been remedied, with a report in addition as to what future progress would be expected.

Inasmuch as the material was purchased on a pound price, the inspection company had special representatives at each of the bridge plants estimating the weights of all material entering into the bridge members, so as to check up against the actual weights furnished by the bridge company. If the actual weights were in excess of 2 per cent., as allowed by the Dominion government specifications, such weight was cut down to the estimated weight.

A representative of the inspection company supervised the erection of the entire structure, taking at least three photographs each week, showing progress and keeping an account of the labor. To show that the photographs are taken weekly, a special sign is furnished by the inspection company, on which the name of the structure appears, together with the date on which the photograph is taken, and this sign is embodied in the photograph. Weekly reports are furnished by the inspector, and the bridge engineer is kept advised as to all movement or delays that may occur. On completion of the bridge, the inspection company reports that the work has been carried on to the satisfaction of their inspector, and the bridge engineer, or his representative, then makes final inspection, after which payments for the completed work are made.

Throughout the construction a private stamp is used, bearing the trade-mark of the inspection company, together with a number representing the inspector who has used this particular stamp. This serves as a means of identification, so that the inspector at the shop, and also in the field may see that the material has been inspected and accepted. If any faulty or defective workmanship shows up the inspector who passed this particular piece of work can be easily located by the number of his stamp.

In the final estimates the actual amounts and cost under the several items are:

Substructure:

[illegible]	[illegible]	@	$15.00
[illegible]	[illegible]	@	11.00
[illegible]	excavation	@	1.00
[illegible]	"	@	2.50

Superstructure:

Steel	13,991,310 lbs.	@	4.68 cts.=$654,793.31
Timber .	518,041 ft. B.M.	@	4.60 cts.= 23,829.89
			$678,623.20

Progress estimates were paid monthly on the superstructure according to the following basis:

	Rate.
Steel	$4.68 per 100 lbs.
Timber [illegible]	[illegible] per 1000 ft. B.M.

Schedule for monthly estimates.

	Rate.		
Steel provided	$2.00	per	100 lbs
manufactured	1.00	"	"
delivered at site	.49	"	"
assembled	.98	"	"
riveted	.15	"	"
painted and fully equipped	.15	"	"
	$4.68	"	"
Lumber delivered	$40.00	per	1000 ft. B.M.
framed and placed	6.00	"	"
	$46.00	"	"

This basis of payment was considered a fair and equitable distribution of cost throughout the different stages of manufacture. It is the result of experience on many bridges previously built by this and other bridge companies on the described method of working and specifications, and the writer believes may fairly be used in other similar cases.

The work was carried out under the general direction of the writer. The Dominion Bridge Company, Limited, Montreal, were the contractors for the steel.

TRAIN DESPATCHERS' ASSOCIATION.

The twenty-fifth annual convention of the Train Despatchers' Association of America was held at Louisville, Ky., June 18, 19 and 20. It was opened Wednesday morning in the Henry Watterson Hotel, C. H. Mullinix, chairman of the local committee of arrangements, in the chair. Mayor Head welcomed the convention to the city and Lieut-Gov. O'Donnell welcomed it to the State of Kentucky.

President Ford on taking the chair appointed a credentials committee, who reported 62 members present. The president, in his annual address, told of a greatly improved outlook for the association, owing to the efforts of the "boosting committee" and the increased interest taken in it by railway officers. Eighty-eight members were elected or reinstated, in addition to 187 elected during the year just closed. The report of the executive committee showed that there had been a net increase in the membership during the year of 12 members, aside from those elected and reinstated at the present meeting. Owing to abnormal expenses the financial result of the year was a net shortage of $105. Discussion of the treasurer's report resulted in the continuance of the boosting committee for another year, but under the direction of the secretary instead of the vice-president; and the secretary's salary was increased owing to his impending retirement from active railway service, which would enable him to devote his entire time to the association.

The principal report was that of the train rules committee. This was in the form of a memorial to the American Railway Association, suggesting or recommending certain changes in the standard code of train rules. The report was made the order of the day for Wednesday. On Tuesday evening there was a reception at which Secretary-Treasurer-Editor J. F. Mackie was the recipient of a beautiful loving cup suitably inscribed on one side and bearing on the other the representation of a railway train and below it a train despatcher seated at a table engaged in his duties. Light refreshments were served and there was dancing by the younger members.

The discussion of the train rule report lasted throughout Wednesday and Thursday. The report was discussed by paragraph and, with slight exceptions, was approved.

There was a vigorous discussion on the exclusive use of the "19" form of order, which was strongly advocated by J. P. Finan, to whom numerous questions were addressed with a view to making clear his assertion that the "19" form of order was actually superior in safety to the "31" form. Numerous members also testified to their use of the "19" form, both with and without block system; and the feeling of the convention was very largely in favor of its use.

A resolution offered by S. K. Buchanan (San Antonio & Aransas Pass) that it was the sense of the convention that the use of the "19" form of order, when surrounded by the safeguards in delivery provided in the report of the train rules committee, was safe and desirable, was unanimously adopted.

There was some informal discussion on the use of the telephone for train despatching, the sentiment of the despatchers present who had used it being largely in its favor. The argument that station operators could not keep so closely in touch with train movements as with the telegraph was considered a very minor objection, as appliances were now being introduced whereby sound was magnified and the operator able to hear almost as well as when listening to the click of the Morse sounder. And even where such appliances are not used, it is not necessary in most cases that operators should hear O. S. reports, as they can always obtain information from despatchers. The discussion lasted well into the evening session of Thursday. The latter session was prolonged until midnight by the annual election, which resulted as follows:

President—T. W. Kane (Northern Pacific), Livingston, Mont. Vice-President—J. P. Finan (A. T. & S. F.), Needles, Cal. Secretary-Treasurer (two years)—J. F. Mackie (C. R. I. & P.), Chicago; Editor—J. F. Mackie. The new president has appointed the following as members of the train rules committee: J. E. Scott (G. C. & S. F.), Geo. W. Greenert (C. & O.), F. B. Hubbart (C. B. & Q.), E. W. Westen (N. P.).

The association elected as honorary members, G. E. Evans, E. W. Grice and R. H. Tuttle. The date of the next convention was fixed for June 17, 1913, and the place Los Angeles.

Attention being called to the introduction in Congress by Representative Martin of Colorado of H. R. bill 25040 amending Section 2 of the present hours of labor law, the convention passed a resolution directing the president of the association to appoint a special committee of three members to wait on the committee on Interstate and Foreign Commerce of the House of Representatives at Washington, and protest on behalf of the Train Despatchers' Association against such legislation, which would seriously hamper railway operation, without in any manner increasing the safety of employees or the general public. The proposed amendment would prohibit the service beyond eight consecutive hours in each 24, of conductors receiving orders for their own train or carrying orders to other conductors or enginemen at intermediate sidings, or of operators at stations receiving, transmitting or delivering train orders; whereas the present law permits a 16 hours service in the case of trainmen and 13 hours' service in the case of station men where but one man is employed.

During the session of Thursday forenoon, Gen. Young, president of the Society of Confederate Veterans and a leading attorney of Louisville, addressed the convention on the Federal hours of labor law as affecting train despatchers and train employees.

On Wednesday evening the members visited one of the parks near Louisville, overlooking the Ohio river, saw a vaudeville show, and had a banquet, each member being furnished with coupons admitting to all the attractions of the park. Friday was devoted to a trip to Mammoth Cave in a special train furnished by the courtesy of the Louisville & Nashville. The members, their wives, daughters and visitors numbered 240.

The convention was the most successful in point of attendance, interest and importance of any held in 20 years. There was much enthusiasm over the improved prospects, and each member returned to his home with a new purpose to advocate the claims of the association upon all train despatchers.

The financial position of the Salvador Railway, Salvador, has shown such improvements recently that it is expected that the company will be able to get along easily without the annual government subsidy of $120,000, which expires in about five years. It is not certain that the government will decline to renew the subsidy, or at least a portion of it.

B. A. WORTHINGTON.

B. A. Worthington has resigned as receiver of the Wheeling & Lake Erie and its subsidiary companies, and on June 24 was elected president of the Chicago & Alton, succeeding Theodore P. Shonts, who resigned in order to devote his entire time to the New York traction interests, with which he has long been identified as president of the Interborough-Metropolitan Company. Mr. Worthington will assume the duties of his new office on July 1, and will have headquarters in Chicago. He was also elected a director and a member of the executive committee, succeeding J. S. Mackie, resigned.

Mr. Worthington's election marks the beginning of a new régime under which the Harriman interests will again exert a potent influence in the affairs of the Alton. The Union Pacific now holds a little over $10,000,000 of its preferred stock, and is understood to have recently taken, through Kuhn, Loeb & Company, $4,500,000 of the general mortgage 6 per cent. bonds. This is part of a proposed issue of $20,000,000 which is to be ratified by the stockholders at a special meeting on August 19, and which will be sold from time to time for much needed improvements which the present condition of the Alton and the requirements of its traffic demand. The Alton enjoys excellent earnings—at the rate of about $15,000 per mile—but has been handicapped by heavy fixed charges and by the need of enlarged terminal facilities in all of the three large cities it enters—Chicago, St. Louis and Kansas City—as well as additional yard facilities at its lesser terminals, a large amount of additional equipment and double-tracking, especially on the Missouri lines. It is understood that the new arrangement with the Union Pacific will make these improvements possible, and that the Harriman interests will secure a larger representation on the Alton's board. As president of the Alton, Mr. Worthington, therefore will be charged with the heavy task of building the road up to the condition which its traffic and its location warrant, and his experience and ability are of a character to render him eminently fitted for his responsibilities. He began his railway work on the Central Pacific, and all of his railway career until he was made first vice-president of the Wabash eastern lines on June 1, 1905, was passed in the service of the Harriman lines. Consequently, he is well versed in the Harriman methods and policies. He is an exceptionally hard worker, and his experience has given him a thorough training in the various branches of the operating department, as well as in an executive capacity. Whereas Mr. Shonts has for several years had his office in New York and has devoted most of his attention to other interests. Mr. Worthington will maintain his headquarters on the road in Chicago, and will devote his entire energies to the railway.



B. A. Worthington.

Like most railway executives, Mr. Worthington has risen from the ranks. He was born November 20, 1861, at Sacramento, Cal., and after receiving a common school education entered railway service on July 1, 1874, as telegraph messenger for the Central Pacific at Sacramento, soon becoming a telegraph operator. For five years from 1877 he was commercial operator for the Western Union Telegraph Company. Returning to the railway service in 1882, he was for six years chief clerk to the general master mechanic of the Southern Pacific at Sacramento, then for seven years chief clerk and secretary to the vice-president and general manager at San Francisco, and from July, 1895 to 1898 chief clerk and secretary to the assistant to the president. He was placed in charge of the tonnage rating of locomotives in 1898, and was superintendent from July, 1901, to August, 1903, first of the Tucson, and later of the Coast division. On August 20, 1903, he was made assistant to Julius Kruttschnitt, general manager at San Francisco, and was assistant director of maintenance and operation of the Southern Pacific Company and the Union Pacific system at Chicago from April 1, 1904, to February 9, 1905, when he went with the Oregon Railroad & Navigation Company as vice-president and general manager. He left the Harriman Lines on June 1, 1905, to become first vice-president of the Wheeling & Lake Erie, the Wabash-Pittsburgh Terminal and the West Side Belt, comprising the Wabash lines east of Toledo, Ohio, and in September of the same year he was made general manager also of those lines. On June 8, 1908, he was made receiver of the Wheeling & Lake Erie, with office at Cleveland, Ohio.

During his connection with the Harriman Lines Mr. Worthington devoted much of his time to statistical work, and developed to a remarkable degree the faculty of analyzing operating results. He is said to have originated on the Southern Pacific the plan of making surprise tests which was at first widely criticized, but which has since been adopted as standard practice on many large systems. He is a man of pleasing personality, a good executive, and, while known as a rather hard taskmaster, has always set the example of unremitting energy himself, and bears a reputation for fair dealing with his subordinates.

W. M. Duncan, who has been Mr. Worthington's legal adviser on matters pertaining to the Wheeling & Lake Erie receivership, has been appointed to succeed him as receiver.

The election of a new president, and the closer affiliation with the Harriman interests, mean much to the Alton, which for several years has not had adequate facilities for handling the traffic offered. With the addition of a strong friendly connection, which it has heretofore lacked, and with a strong management, the necessary expenditures for improvements should place it in an unusually favorable situation.

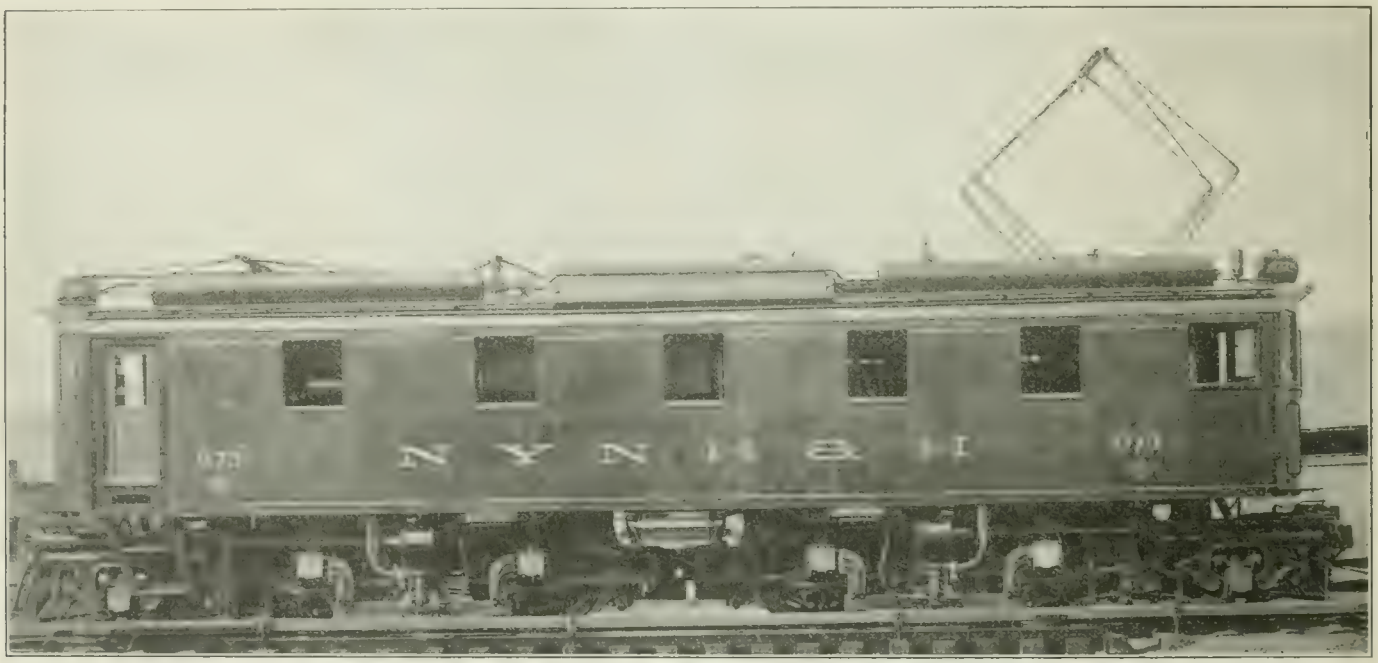
EIGHT-MOTOR ARTICULATED ELECTRIC LOCOMOTIVE.

New Engines for the New Haven, Most of Them Being Designed to Haul 1,500-Ton Freight Trains at 35 Miles an Hour.

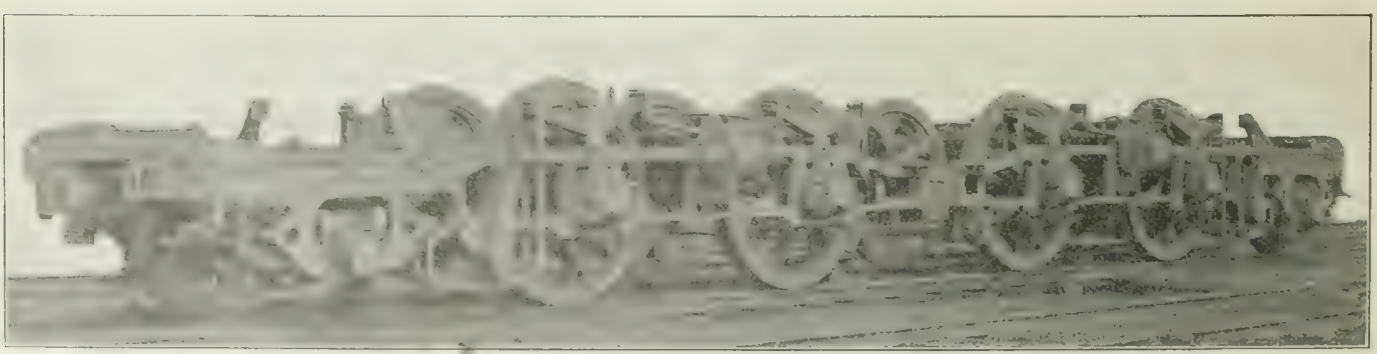
The New York, New Haven & Hartford will shortly receive 39 heavy service electric locomotives, to be used between New York and New Haven, which are being built by the Baldwin Locomotive Works and the Westinghouse Electric & Manufacturing Company. The design varies considerably from that of previous electric locomotives, and 36 of the engines are arranged for single-phase service only. There are no decidedly new features involved, as all of the methods used have been heretofore employed, but never in the same combination.

Each engine is driven by four twin-motor units—eight motors in all—with one twin motor unit mounted over each driving axle. This arrangement has shown itself to be a very desirable one for the following reasons: Peripheral speed is a limiting feature in railway motor design. With two small motors it is possible to use a rotative speed approximately twice that with one large motor. Each motor has therefore one-half the number of poles of practically the same size as would be required by one equivalent large motor. Therefore two of the small motors have practically the same number of parts, such as field coils, armature coils, and brush holders, as would be required by one large motor. Each of the small motors has a diameter practically half of that of one equivalent large motor, hence a saving in weight and space. A further saving in weight results, because each small motor exerts but one-half the torque that must be exerted by one equivalent large motor; therefore a single gear, meshing with the pinion of each motor, can be used in place of two gears. The use of a single gear is possible, and the motor can be made longer, which permits of a more economical design. The motor armatures are interchangeable with those used on the New York, New Haven & Hartford and the New York, Westchester & Boston motor cars. Finally, eight motors actually cost less than do four having the same aggregate output.

The articulated running gear is similar to that used on a previous order of locomotives, and has shown itself to be easy running as far as shock to the equipment in the locomotive cab is concerned, which is one of the reasons why it has been used. The cab rides on semi-elliptic and helical springs in series. This arrangement resembles, in general principal at least, that which is employed for and makes riding easy in passenger cars. In general design and arrangement all of the locomotives are the same, but the three bearing the road numbers 073 to 075 are for both alternating and direct-current operation in fast freight and heavy passenger service, and are



Eight-Motor Articulated Electric Locomotive for Fast Freight and Heavy Passenger Service on the New Haven.



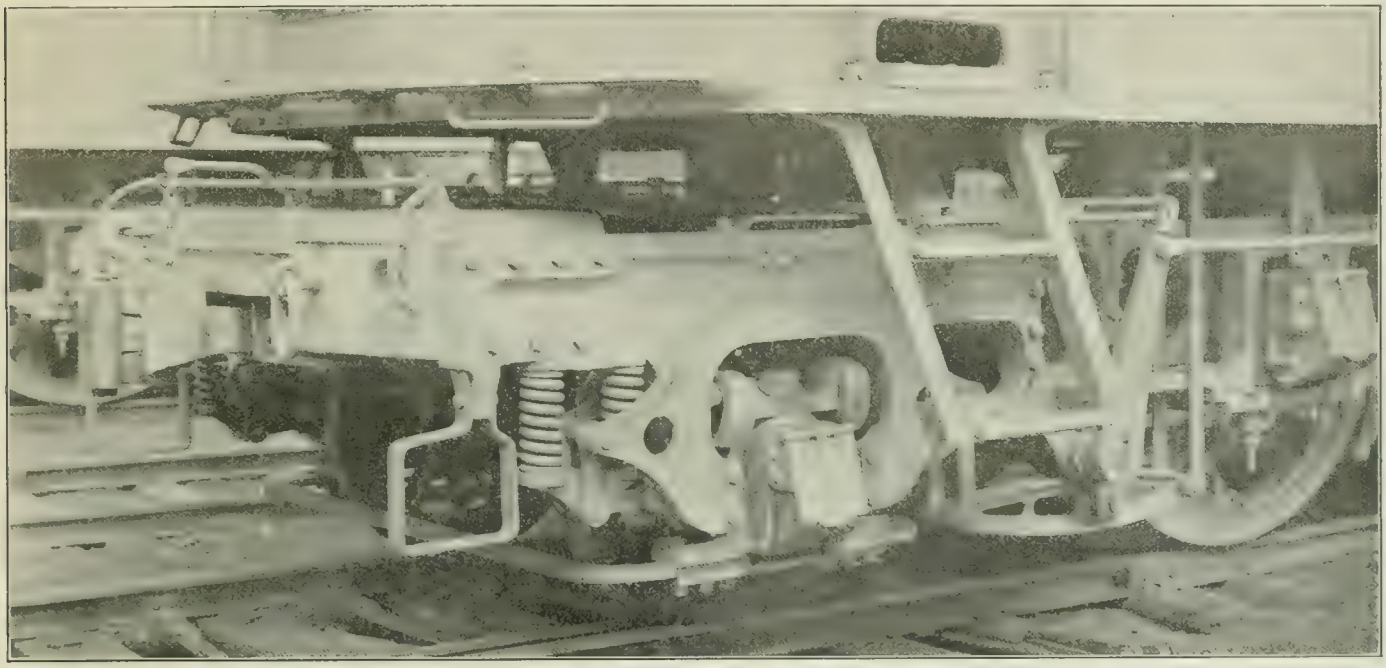
Arrangement of Trucks and Running Gear on New Haven Electric Locomotive.

designed to handle a trailing load of 800 tons at a maximum speed of 45 miles an hour. When operating on single-phase alternating current they take energy at 11,000 volts and 25 cycles, and on direct current, at 650 volts.

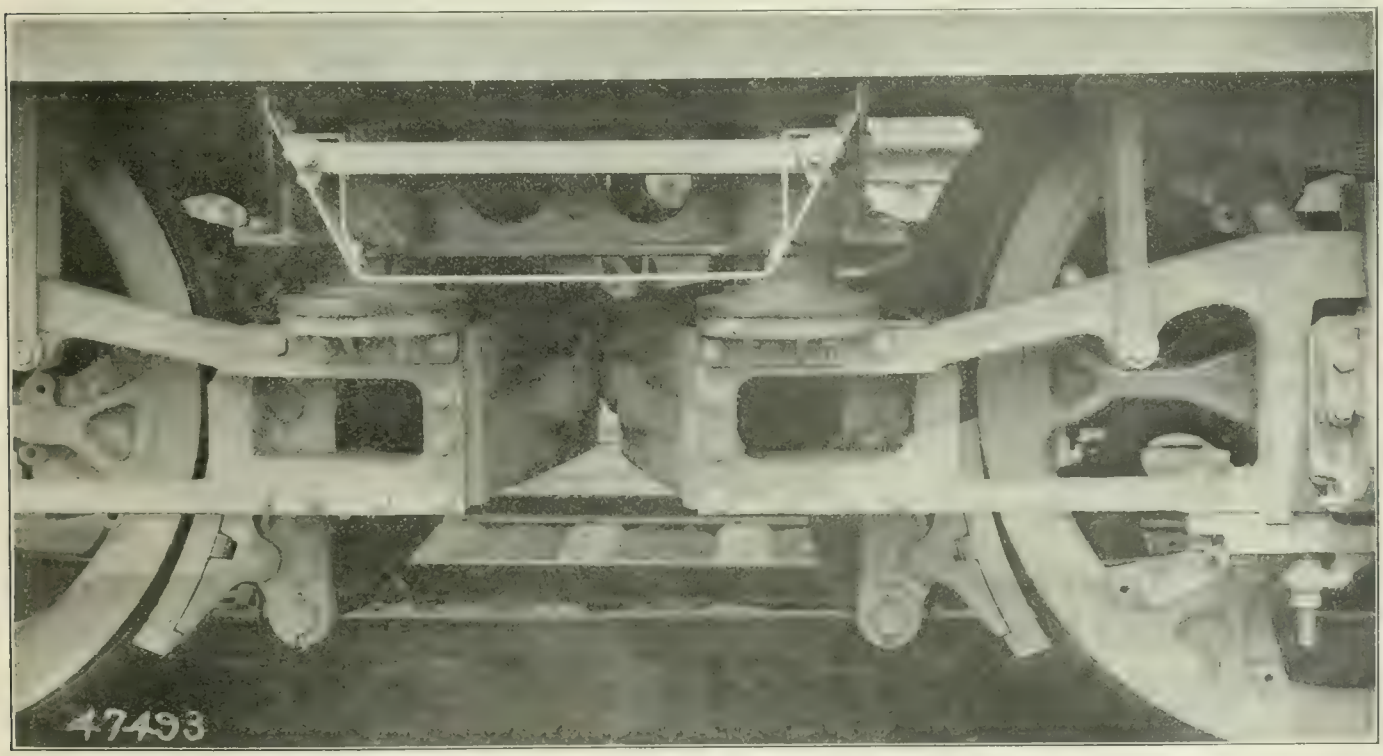
The remaining 36 locomotives, which bear the road numbers 076 to 0111, are equipped for 11,000 volt, 25 cycle, alternating current operation only, and are primarily for fast freight service, but will also sometimes haul passenger trains; they are designed to handle a trailing load of 1,500 tons at a maximum speed of 35 miles an hour, and exert a maximum tractive effort of 40,000 lbs.

The four pairs of driving wheels and the two pairs of small leading wheels are arranged in two groups, each group having outside frames of the bar type. These cast steel frames are 4 in. wide and are similar to those used in steam locomotive practice. The pulling and buffing strains are transmitted entirely through the truck frames which are braced transversely at the ends of the trucks and between the driving axles. The inside faces of the driving pedestals are finished to a taper and are fitted with adjustable wedges. The pedestal binders are cast steel.

The drawbar pull is transmitted from truck to truck by a drawbar which is adjusted to leave a ½ in. maximum clearance between the end ties of the trucks when all the slack is pulled out. The truck crossties or bumper girders which are located on the trucks at the mid-length of the locomotive, are



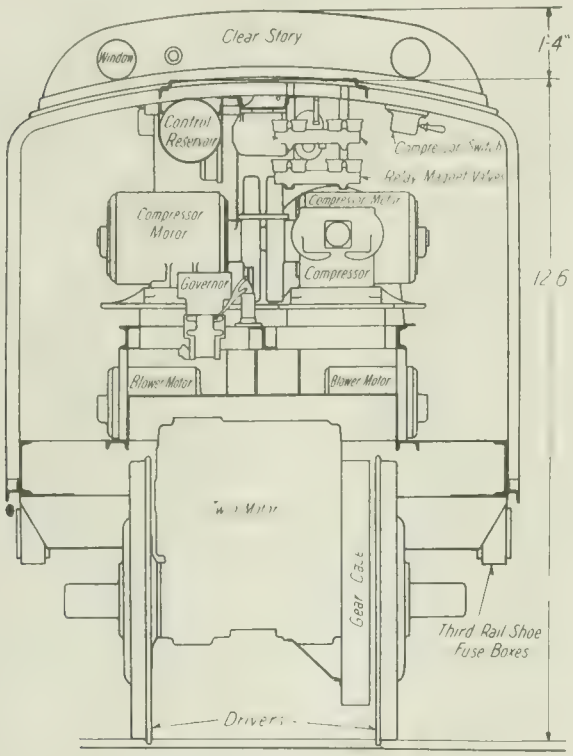
Rushton Truck as Applied to New Haven Electric Locomotive.



Spring Buffers and Bumper Girders on New Haven Electric Locomotive.

equipped with spring buffers which assist in transmitting the buffing shocks from truck to truck. The drawbar has a slotted hole in one end. With this arrangement all pulling strains are transmitted through the drawbar and pushing and buffing shocks through the spring buffers.

Midway between the driving wheels the bar frame of each truck is braced transversely by a built-up structure on which the truck center pin is mounted. This pin carries no weight, its only function being to push the cab underframe and to hold

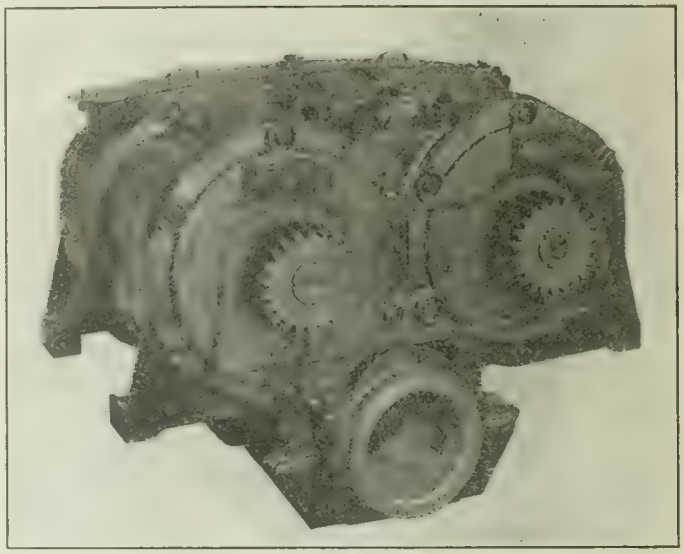


Transverse Section Through New Haven Electric Locomotive.

the truck in alinement with the cab. The center-pin of one truck is allowed a limited longitudinal movement with reference to the cab underframe to relieve the cab frame from pulling and buffing strains.

A two-wheel truck of the Rushton type with outside journals is arranged under each end of the locomotive and carries the small guide wheels. The Rushton truck is of the radial type, its frame being connected to the main truck crosstie by two links which are so arranged in relation to one another that the intersection of their center lines, if they were extended, would be on the center line of the locomotive at the correct point for the truck radius-bar pin. This construction was adopted because the motors are so located that it is impossible to place the radius pin at its normal position on the center line. A radial type drawbar, arranged to receive a housing for a Westinghouse friction draft gear, is mounted on each end of the engine. Thrust springs are provided to limit the lateral movement of the drawbar. The coupler shank is supported by a carrier iron which is bolted to the end bumper casting.

Each group of two pairs of driving wheels and a pair of truck wheels is equalized on each side of the locomotive. The springs are of the usual semi-elliptic form and are mounted directly over their respective boxes. Helical springs support



The Twin Motors Assembled.

the truck frames at their outer ends. The equalizing beams are of cast steel.

An underframe, composed of two 12 in. steel channel side sills and two trussed center sills, supports the cab and equipment. The cab covers the whole locomotive and is built of No. 14 steel plate on a Z-bar frame. The cab underframe is supported at four points on each unit, two at the inner ends of the truck with the centers 84 in. apart transversely, and two between the truck wheels and the adjacent driving wheels, with centers 34 in. apart transversely. As this arrangement is duplicated on both units, there are four points of support at mid-length placed wide apart transversely and two points near each end, placed comparatively close together. The weight of the cab is transferred to the truck frames through coil springs, and the spring pocket plungers slide on the frame crossties when the engine is traversing curves. Thus the cab floats

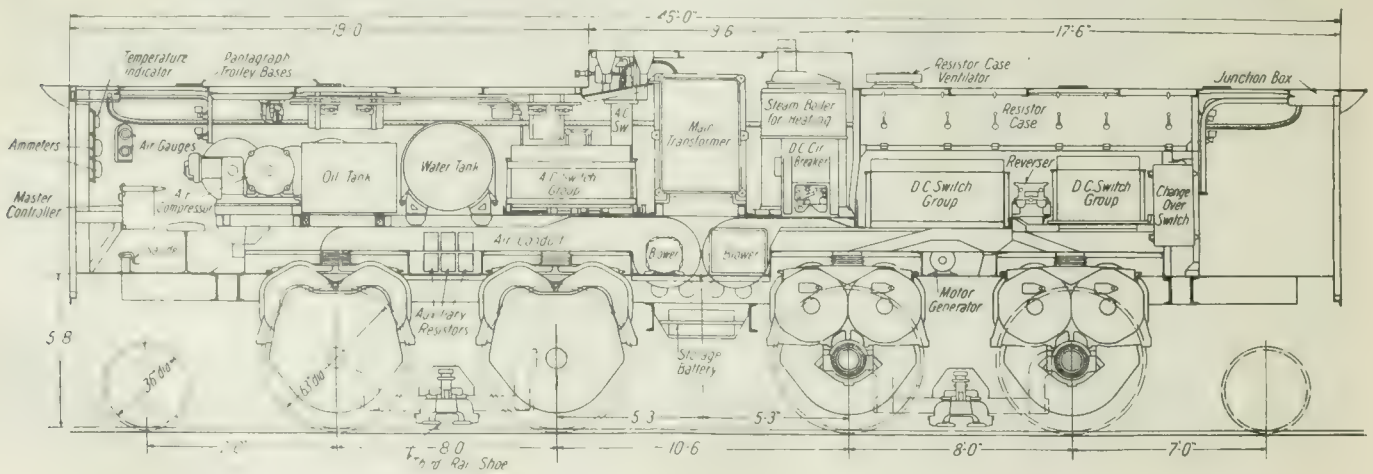


Diagram Showing Arrangement of Apparatus on Articulated Electric Locomotive for the New Haven.

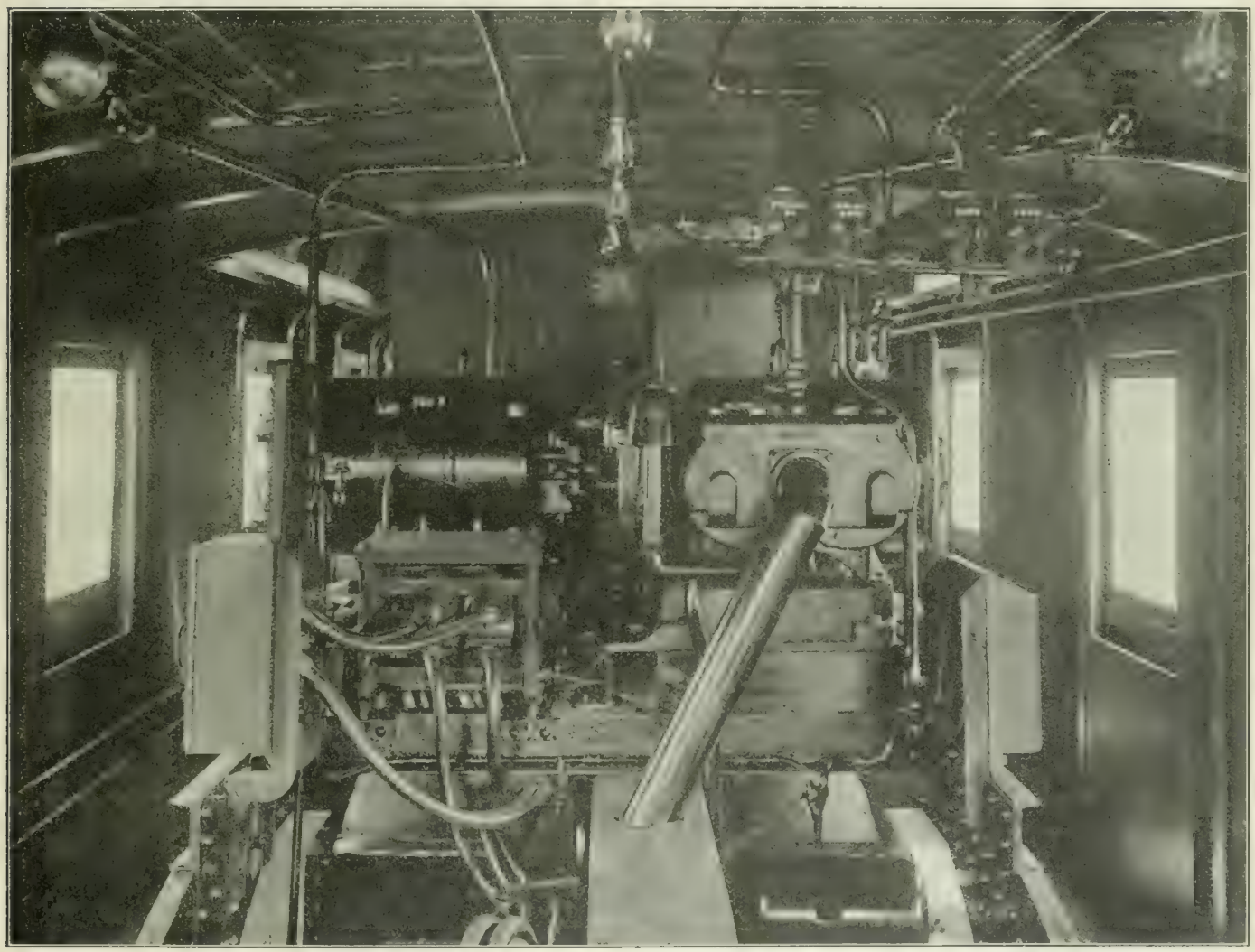
on the trucks and is held in proper alinement with them by the center pins.

The principal dimensions of the locomotives are as follows:

Length between coupler faces	50 ft.
Width over all	10 ft. 3 in.
Height to top of cab	12 ft. 6 in.
Height to top of clear story	13 ft. 10 in.
Wheel base, rigid	8 ft.
Wheel base, total	40 ft. 6 in.
Driving wheels, outside, diameter	63 in.
Driving wheel centers, diameter	56 in.
Driving journals	7 in. x 13 in.
Truck wheels, diameter	36 in.
Truck journals	6 in. x 12 in.
Weight on driving wheels, for a. c.—d. c. engines	182,000 lbs.
Weight, total locomotive, for a. c.—d. c. engines	240,000 lbs.

quill and driving wheel axle so that the drivers are free to follow irregularities in the tracks. This method of mounting relieves the axles of the dead weight of the motors and insures the operation of the locomotive being easier on the track. The tops of the motors extend into the cab about 6 in. above the floor line. A low deck is built over each pair of motors and doors are provided in the decks in such positions that free access to the commutators and armature bearings is afforded. Flexible leads of ample length to accommodate all movement of the motors relative to the cab extend through insulating bushings in the floor and electrically connect the motors with the control apparatus.

Of the 39 locomotives three are arranged for operation on



Interior of Cab Showing Air Compressor and Motor-Generator Set for Charging Storage Batteries.

Eight No. 409-C. single phase, commutator type, series motors, each having a capacity of 170 h. p. on a one hour rating, drive each locomotive. The motors are grouped together in pairs. The two motors of each pair—a right-hand and a left-hand motor—are bolted together to form a unit. One pair of motors is mounted rigidly on the truck frame over each of the four driving axles. Each pair of motors is provided with two axle bearings which carry a quill which is concentric with and surrounds the axle. A single gear is secured on one end of the quill and into this gear mesh the two pinions keyed on the motor armature shafts. Mechanical connection between the quills and the driving wheels is effected through helical springs which are mounted between the driver spokes and the projecting arms provided on each end of the quill. A radial clearance of 1½ in. is provided between the inside of the

either alternating current or direct current, and these are provided with control equipment that can be used in either service. Therefore the pneumatically operated control switches work in combination with a transformer and preventive coils when the locomotive is receiving alternating current energy and in combination with grid resistors when it is receiving direct current. Each pair of motors is connected permanently in series. In alternating-current operation the four pairs are connected in multiple and on direct current they may be connected two pairs in series or all four pairs in parallel.

When operating on alternating current from the line at 11,000 volts, the energy passes through an oil circuit breaker to the primary of a main transformer and thence to the ground. A number of taps are provided on the secondary winding of this main transformer and are connected to the motor cir-

cuits through preventive coils, by means of the pneumatically operated switches. There are 12 voltage steps on the transformer winding, nine of which are for running points.

The pneumatic switches used for operation on alternating current are assembled in one group which is located close to the transformer. Reversal of the direction of rotation of the motors is effected with two pneumatically operated drum type reverses. Each reverser is so connected as to control two pairs of motors. When the locomotives are on direct current the control of the motors is accomplished with two other groups of pneumatically operated switches which connect the pairs of motors in series and in parallel in combination with the resistors. The switches and resistors used for operation on direct current are supported at the center of one end of the locomotive. The switches are arranged in one straight line with the resistors directly above them so that the connecting leads between the switches and resistors are of minimum length. Two master controllers are provided, one located in each end of the cab. With these the operation of the pneumatically operated switches and reverser, and hence the motors, can be regulated when the locomotive is running either on alternating current or direct current.

Two Sirocco type blowers for handling cooling air, each

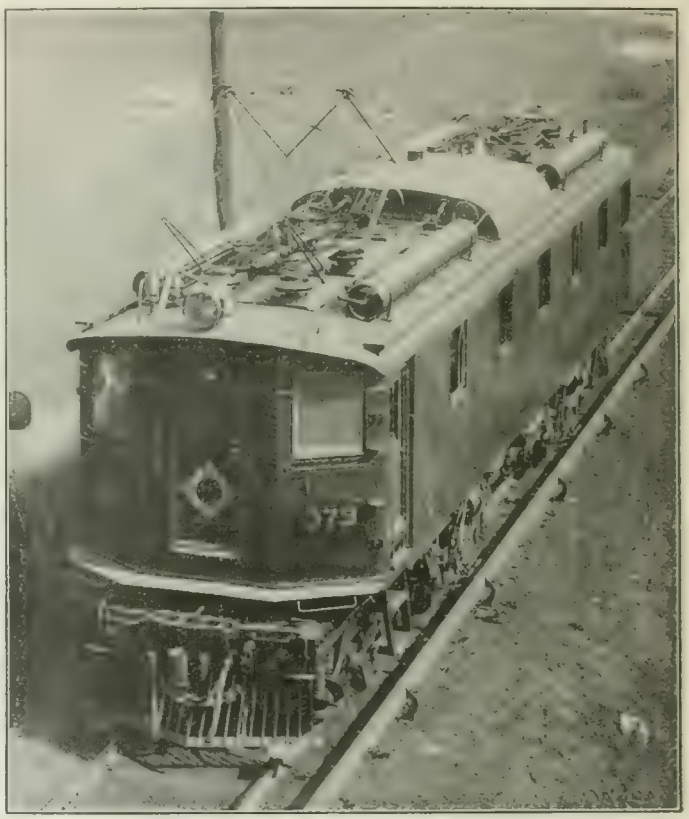


Interior of Cab Showing Engineman's Seat, Master Controller, Brake Valve, Air Compressor Gages, Temperature Indicator, Ammeters, and Pedals for Sanders.

[illegible] are located in the center of the cab directly under the main transformer. These blowers draw the air from outside of the locomotive and discharge it through the main transformer, motors and resistors. The equipment is thereby maintained at a moderate temperature, even when operating under severe overloads.

A double E. T. air brake equipment is provided on each locomotive. Two compressors, each having a capacity of 50 cu. ft. of free air per minute, are mounted within the cab to supply air for the brake and control apparatus. Brake shoes are applied to all of the driving wheels and separate air brake cylinders are provided for each group of wheels. The brakes can be applied to one group with a hand wheel located in the cab. An oil-burning steam heater plant, capable of supplying 800 lbs. of steam per hour, is installed in the three alternating-direct—current locomotives for the heating of passenger trains.

There are two pneumatically operated pantagraph trolleys



Looking Down on A. C.—D. C. Electric Locomotive for the New Haven.

for use with an overhead wire, and four pneumatically operated third rail shoes for use in the direct-current zone. There is also a small overhead direct current shoe-type collector for use at cross-overs. All of the collector devices are arranged so that they are under the control of the engineer at all times from either of the control positions in the locomotive cab.

The northern sections of the Shantung-Yangtze system, China, have been completed and put in operation as follows: The Tietsin-Tsinan lines have been in operation since November, 1910; the track to the south is complete to Hsuchowin, but at present the Yellow river is crossed only by a ferry. Work on the difficult enterprise of bridging this stream is proceeding steadily, but it will be one year before trains can be run across the bridge. In the construction of this road there have been and are yet to be met many engineering difficulties, the most serious being those relating to the handling of flood waters from the river and canal systems crossed by the line. These flood waters in recent years have caused hundreds of thousands of deaths in the flat country the road traverses. Excepting the Yellow river bridge, the entire line will be completed shortly, thus giving the Yangtze valley connections with the sea at Tsingtau and opening up a great territory between the Peking-Hankow line and the sea. The completion of this railway will have a marked influence in preventing or at least in modifying the great famines caused by the floods in this portion of China.

THE IMPACT OF FLAT WHEELS UPON RAILS.

BY C. H. BENJAMIN,
Dean of the School of Engineering, Purdue University.

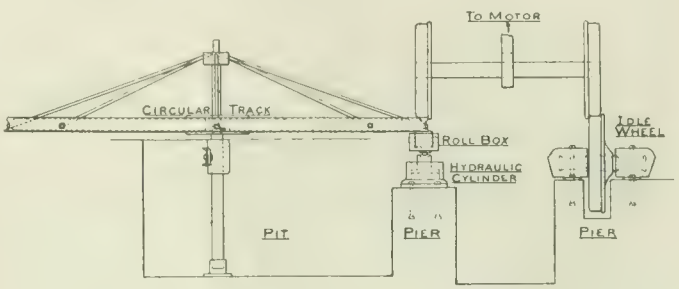
The numerous and somewhat unusual failures of steel rails during the past winter have led to a more careful investigation of the character of the rails themselves and the nature of the stresses to which they are subjected in practice. That the rail situation is at present a critical one is generally admitted by railway men when they are not talking for publication. The fact that the failures of rails in service, especially on the more northern railways, have amounted to hundreds and even thousands, is a sufficient indication that everything is not as it should be. It is true that most of these failures have been discovered in time and that the number of derailments and of casualties has been small compared with the number of rails failing, but this is due more to the greater care exercised by road foremen and inspectors than to any improvement in the rail itself.

While it is admitted that continued cold weather, which renders the road bed more rigid, the track more constrained, and the metal less ductile, is a prime cause of these accidents, this is no reason for passing over the matter lightly. When rails break in such numbers as they did during the past winter, it is apparent to anyone that the margin of safety is not as large as it should be and that something must be done either to increase the toughness of the rail or to diminish the stresses which come upon it.

There is no lack of direct evidence to prove that the blows produced by flat wheels, by eccentric wheels, and by improperly balanced wheels, are frequent causes of rail breakage. The experience of one road where 650 rails were broken by one flat wheel is evidence enough to show the need of more attention being paid to this subject. Whether the greater number of breakages are due to imperfections in the rail which exist when it leaves the steel mill, or whether they are due to a deterioration of the metal under the numerous blows and shocks to which it is subjected under heavy cars and in high speed service, is a question which has not yet been definitely solved. There is some evidence in the appearance of numerous broken rails which tends to show a local hardening effect produced by severe external punishment. There is also some evidence that rails have failed because of unusual strains induced by the processes of cold straightening. There are undoubtedly other rails which have failed because of segregation of various elements in the steel during the process of cooling, and there is also a strong presumption that many rails have been overheated during the process of manufacture. All these things being admitted, it is none the less important to know the magnitude of wheel blows as delivered in practice and the effect of these upon the metal in the rail. The subject of the energy of impact due to flat spots has already been treated at some length in your columns. In an article in your issue of November 27, 1908, I described briefly a proposed apparatus for making tests on flat wheels. During the discussion of this article and the paper which gave rise to it, several mathematical theories were advanced to account for the amount of energy developed. The discussion written by the late Professor Hancock is now generally admitted to be incomplete and to a certain extent erroneous. That of L. S. Spilsbury, of the Canadian Pacific, presented by H. H. Vaughan,* is probably as correct as any that could be written in the absence of experimental data. I have asked Professor R. G. Dukes, head of the department of Applied Mechanics of Purdue University, to review Mr. Vaughan's article and check the calculations therein contained, and he reports that he considers the reasoning and the analysis sound and justifiable. This latter discussion shows the possible effect of blows from flat wheels to be much less severe than was indicated in Professor Hancock's discussion. Nevertheless, the well-known fact that flat wheels sometimes do break rails which are sound and of good material shows the desirability of some experimentation in this field.

American Engineer and Railroad Journal, December, 1908.

Some of the leading officials of the New York Central Lines have become interested in this matter and have made it possible to build such an apparatus at Purdue University. The machine will be available for a series of experiments after the opening of the university next fall. As finally built, the machine contains the essential elements of the one described in the issue of the *Railway Age Gazette* before referred to. It consists in the main of a circular track made of an 80-lb. steel rail supported by spokes of channel steel and by adjustable tie rods connecting with a vertical shaft. The shaft rotates freely in bearings allowing the circular rail to travel indefinitely. One wheel of a truck is supported on this rail and the other rests on an idle wheel so that the axle can turn freely, driving the rail by means of the wheel in contact with it. The rail is supported underneath the test wheel by a substantial roll box containing two large conical rolls. The box rests on a hydraulic plunger, a steel ball being interposed between the two. The plunger rests on oil contained in a large steel cylinder and pipe connections are made with indicators and gages. The axle carrying the test wheel is rotated at different rates of speed by a variable speed motor belted to a split pulley on the axle. A spur track runs directly to the machine and is so arranged that a car may be



Machine for Measuring Blows of Flat Wheels.

pushed into such a position that its forward wheels rest upon the proper part of the machine. The car can then be loaded with different weights and the axle can be driven at different speeds. For determining the laws of impact under different conditions, the test wheel will be ground true and spots of different widths accurately ground upon the tread. In this way, the relations can be determined between the energy of impact and the three principal elements, namely, width of spot, speed and load. This will enable us to formulate some law for the effect produced, in terms of the elements mentioned.

In order to calibrate the apparatus and determine the relations between the actual blow and the diagram given by the gage or indicator, a drop machine will be erected directly over the circular rail and a comparison made between the effect of known weights falling certain distances and the diagram produced by the recording apparatus. The rail will be turned by independent means at the speed desired while a wheel or roll on the lower edge of the drop rolls in contact with the rail. The drop will then be raised and released, striking the rail in a manner analogous to that of the test wheel. By such calibration, the errors due to the inertia and gyroscopic action of the various parts will be eliminated.

It is apparent that the usefulness of the machine is not limited to experiments on flat wheels, but that eccentric and unbalanced wheels may be readily tested in a similar manner. It is to be expected that some difficulties will present themselves and that the experiments at first will be more or less unsatisfactory. It is believed, however, that, in the main, the machine will justify itself and will throw considerable blight on a problem which has been so far more or less neglected. As the apparatus is somewhat novel and the field of experiment equally so, any suggestions for betterment of the apparatus or for conduct of the experiment will be gladly received and weighed by the writer.

RAILWAY WAGES AND COST OF LIVING.

The Bureau of Railway Economics will soon issue Bulletin 34, being the second of its comparative studies of railway conditions in the United States and the principal countries of Europe. It relates to the wages paid railway employees and the cost of living, and is based on the latest years for which comparative data are available. A summary follows:

The average daily compensation of railway employees of all classes for the year 1910 was in the United States, $2.23; in the United Kingdom, $1.05; excluding supplementary allowances negligibly affecting the average, it was in Prussia-Hesse 81 cents, and in Austria 89 cents. The lowest paid railway employee in the United States, the ordinary trackman, receives a greater compensation than many of the railway employees of France, even those of higher grades and with responsible duties. The compensation of railway employees is from two to three times as high in the United States as in Italy.

A recent report of the English Board of Trade on railway wages shows that the average weekly pay of enginemen in the United Kingdom in 1907 was $11.17; of firemen, $6.67. In the same year enginemen on American railways received an average weekly compensation of $25.80, counting six days to the week, and firemen $15.24. Recent returns make it clear that in 1912 enginemen and firemen in the United States are compensated at rates of pay for specific runs that are two, three and four times as high as the corresponding rates on representative English railways. The annual compensation of enginemen in the United States, as reported by two representative railway companies, now ranges from $1,100 in switching service to over $2,800 in passenger service, and of firemen from $700 in switching service to over $1,700 in passenger service.

For Continental Europe, official returns in requisite detail are not available for a later year than 1908. The salaries and allowances of the typical engineman in Germany amounted for that year to $646.88, in Austria to $870.80; of a fireman in Germany to $424.59, in Austria to $532.03. The annual compensation of enginemen on two of the principal railways of France ranged in 1908 from $505.66 to $906.91, and of firemen from $324.24 to $595.98. In Italy enginemen received in 1908, salary and allowances included, from $581.10 to $812.70 a year; firemen, from $330.30 to $475.05 a year.

The average annual compensation of enginemen in the United States in 1908, on an estimated basis of 300 days' service, was $1,335; of firemen, $792.

In Belgium, enginemen received in 1907 from $23.16 to $38.60 a month; firemen, from $17.37 to $23.16 a month; conductors and station employees, from 46 cents to 96 cents a day. In the United States, in the same year, 1907, enginemen averaged, on the basis of 25 days' service, $107.50 a month; firemen, $63.50 a month; conductors, $3.69 a day; station employees, from $1.78 to $2.05 a day.

The rental of a three or four room house or flat is almost as high in Berlin, Paris, or London as throughout the United States, but in England and on the Continent it generally runs from $30 to $90 a year less. The quantity of food and fuel estimated by the Board of Trade of England as the standard consumption of a typical workingman's family costs in the United States 17.8 per cent. more than in France or in Germany; 35.3 per cent. more than in Belgium, and 38 per cent. more than in the United Kingdom.

It is well within the truth to estimate in a broad and general way that while the cost of living of a railway employee in the United States is less than fifty per cent. higher than that of a corresponding employee in the United Kingdom or on the Continent, his compensation averages over twice as great.

The completion of the Swaziland Railway, South Africa, will shorten the present route to Johannesburg, Transvaal, by nine hours and will eliminate the present expensive cartage charges.

MAKING RAILWAY ADVERTISING EFFECTIVE.

BY LOUIS BRENTNALL.

Quite a number of railways are doing more newspaper and magazine advertising today than in past years. The advertisements of many of these roads are well-written and effectively illustrated. Sometimes a special trip is advertised, or an excursion, and a free booklet given to those who answer the advertisement. A few railways have a regular advertising department. As considerable creative ability is required there are two features which help retain the services of a good advertising man: making his position authoritative and paying him a reasonably good salary. Generally, a railway advertising man who is used as a clerk or who is required to sit in the office most of the time, gleaning necessary information for advertising copy from such officers as he can get hold of, is not likely to attain the best results; for he is advertising things which perhaps he has never seen or had the privilege of testing personally. Some of the officers tell him about it and that is deemed sufficient. He selects a few fancy phrases and advertises the road's fine service as he understands it. Yet advertising copy which looks promising in the newspaper and which may make a strong appeal to the public may prove detrimental in its future effect, because deceptive. Usually, there is something "behind the scenes."

The X. Y. Q. road had been advertising for some time and as a result its trains were being well filled. As the passenger officers rode over the line they would sit in the observation car and talk over the successful excursions which had been conducted, as well as congratulate themselves on the larger traffic which was being handled by regular passenger trains.

However, a Mr. Smith, a passenger, was rather displeased with his trip, and, speaking to a representative of the road about the service, claimed that his train was very late, at one time had left the track, and that the crowded condition of the train made traveling uncomfortable; while the meals were not up to standard, etc. He was told, of course, that he was unfortunate in having been involved in these adverse conditions and that similar circumstances might have prevailed had he traveled over another line. But Mr. Smith was not to be pacified and his provocation grew into anger as he thought of what good things the advertising had promised him and how little of them he actually got.

A short time later this representative of the railway made a trip, determined to look into the service by considering himself as a regular passenger and observing the conditions as they were. At the sleeping car office he bought a berth ticket and proceeded to the train, reflecting that as soon as he entered he would take his favorite seat on the observation end and view the crowd of travelers which the advertising was bringing.

"Next car ahead, sir," said the polite sleeping car conductor; and the representative lugged his well-packed grips ahead.

"Nex' car ahead, sah," directed the porter at the second car.

The third car, however, proved to be a tourist car. Retracing his steps with his fifty-pound grips the representative informed the porter of his mistake.

"Wal, ah declar, boss, I don't just know whar your car is; you'll hav' to see the conductor."

Having completed his circuit by walking to the end of the train, the representative again appealed to the sleeping car conductor, who became meditative and examined his route book carefully. Finally he said, "Excuse me, sir, but your car is on the second section."

The representative reflected. He had come out to the train half an hour before its leaving time so as to obtain a seat on the observation end. He remembered that the advertisement had much to say about the observation car. It contained not a word about those who, for one reason or another, could not sit in it. No doubt some of the other passengers were thinking of the same thing. Before him were a hundred or more sleeping car passengers who found that they, like himself, were slated for the second section.

"I'd have taken the 'D. Z. route' had I known about this," said a man who was becoming tired holding two small children.

"You can't get back to the station through this crowd," remarked another man. "All this sleeping car company cares about is selling berths."

A traveling man bit his cigar savagely and said: "I never had any luck with the 'X. Y. Q.,' anyway. Here we have to stand for half an hour, jostled by these first-section passengers, while we bought tickets expecting some comforts."

"That's not all," complained a man who was accompanied by his wife and four children. "This second section is only going to run during the night and will then consolidate with the first section, when we shall have to ride in the coaches. I wanted sleeping car accommodations all the way, but failed to get them. What's the occasion for all this travel?"

"Why, the X. Y. Q. has advertised an excursion and is carrying the excursionists in with the regular traffic. You can see how it works; no more X. Y. Q. for me."

The jam of the people boarding the first section was terrific. The trainmen were doing all they could by working doubly fast in loading them on, but the people would push, all anxious to get a seat in the packed cars.

Finally, as the first section departed, the second section was in readiness and the tired travelers hastened to the restful seats. The sleeping car conductor on the second section was of an authoritative, "you-do-as-I-tell-you" kind—decidedly different from the one on the first section. "This is not your seat," he said gruffly to a lady, as he examined her ticket. "I think it is," she replied. "Then you say I don't know," he said emphatically. "I said nothing of the kind," replied the lady, becoming irritated; "the porter placed my things here and said this was my seat." Perhaps this porter was a new man, but this was no excuse for the conductor's impoliteness.

In the morning the passengers of the second section were ready to transfer to the first section.

"When I bought my berth ticket I was told I could pass from the sleeper into the coach in the morning," said the man who had the four children and had to accept sleeping car accommodation half of the way.

"You could do that," replied the conductor, "if this car had been on the first section, but as it is, the trains will be side by side and you must transfer to the other."

By this time the railway representative was making notes. These conditions would never do. They were occurring right along. The employees were doing their best, generally, considering that double service was oftentimes required. The sleeping car man, of course, needed training. Numerous trifling conditions were noted on this single trip which needed remedying, they ought to be remedied or else the advertising should be changed. If the service really didn't "stand up" as pictured, some patronage, at least, would be lost. Some of the traveling men were already avoiding the X. Y. Q., while some of the regular passengers had vowed that one trip over that road was enough.

It is one thing for a passenger man to solicit a large passenger traffic, it is another thing for an advertising man to advertise it advantageously, and back of the whole should be a careful analysis of what the service really is and what the passengers think of it after they have tried it.

The section of the line of the International Railways of Central America, Guatemala, between La Union, on the Pacific coast of southwestern Salvador, and San Miguel, 42 miles, has been almost completed. It is expected that this will be open to traffic within the next two or three months. When the system of the International Railways of Central America has been completed it will be connected with the existing Salvador Railway and in addition will afford an excellent opportunity for the commercial development of the lesser known countries in Central America.

ROLLING STOCK, STATIONS AND DWELLINGS.

The freight car which is converted into real estate by being used as a passenger station or a dwelling house is a feature in many railway landscapes, and usually it is anything but a pleasing feature. More than once this feature of "economy" has been questioned or condemned in these columns. This being so, it is a pleasure to call attention to an example of economy of this kind which is suggested by the accompanying illustration, made from a photograph received from a Baltimore correspondent. The picture shows the summer residence of H. B. Anderson, assistant trainmaster of the Maryland, Delaware & Virginia, at Love Point, Md. This dwelling has two bedrooms, a dining room and a kitchen. For so modest a house, the underpinning seems rather costly; that is to say, the trucks appear to be all there, together with the air brake equipment. This, however, is a mere detail.

In speaking unfavorably concerning the use of freight cars as fixed structures we have perhaps slighted many commendable efforts to make the best of poor facilities. If so we hasten to express regret. We have a feeling of sorrow—or something stronger—for the superintendent who is obliged to use a partly decayed box car body for a station, or even for a temporary watchman's shanty; but the occupant of the improvised habitation certainly deserves friendly consideration. Often he deserves commendation. A lace curtain filling a rectangular hole 18 in. x 24 in., sawed out of the side of a boarding car, cannot be treated as other than evidence of taste—or at least of tasteful inclinations. If the side of the car is composed in part of boards, including scraps of letters and numbers, which display a half dozen colors, including the natural wood, that condition may be excused on the ground that the occupant of the car was long on lace but short of paint. One very modest box car body, flat down in the dirt and serving as the only shelter at a stopping place on a poor road in Michigan—a stopping place where the said poor road is crossed by another which is poorer—is so destitute of all appearance of comfort that it arouses in the approaching visitor a feeling of commiseration. But some cheerful minded person in the neighborhood has a disposition to put the best possible face on things; and, on nearer approach, one sees, in letters as neat and symmetrical as ever were seen on a dining car menu:



A Trainmaster's Summer Residence.

UNION STATION.

What could excite pleasanter emotions?

Even a dreary place can have a pretty name. *The Frisco Man* in a picture printed in its last issue, "gives away" the Frisco as having a station building which is poorer even than an old freight car! It is an old locomotive cab; open, of course, at one end. But the name of the place is "Fern." Moreover, the picture is published for the purpose of showing a wedding party disembarking from a train. A Frisco employee appears to have found his bride there. And this serves as a reminder that station buildings are secondary matters, after all.

General News Section.

A full crew bill was passed by the senate of Louisiana on June 19 by vote of 26 to 8. The bill has not yet passed the house.

The Union Pacific grain elevator at Armourdale, Kan., and a portion of the Union Pacific shops at that point were destroyed by fire on June 21.

At the twenty-third annual convention of the Travelers' Protective Association, held at Peoria last week, resolutions were passed in opposition to a parcels post.

The Chicago Transportation Association has announced the formal opening on June 27 of its new club rooms, the old quarters of the Hamilton Club, at the northwest corner of Clark and Monroe streets, Chicago.

Suits against the Grand Rapids & Indiana charging six violations of the federal hours of service law were filed in the United States district court at Indianapolis on June 22, and two suits against the Chesapeake & Ohio of Indiana charging violations of the safety appliances law.

The striking Chicago freight handlers at a mass meeting on Monday voted to reject an offer made by the railways at the intercession of E. U. Kimbark, president of the Chicago Association of Commerce, to take back 1,800 of the strikers individually before July 1, provided the strike should be called off at once.

In the county court at Hollidaysburg, Pa., June 20, W. F. Gitzman, a police officer of the Pennsylvania Railroad, was convicted of murder in the second degree. Gitzman, in pursuing a party of trespassers, fired his revolver for the purpose, it is said, of frightening the runaways, and his third shot killed one of the men.

The executive committee of the Federation of Federations, a recently formed organization of nine mechanical crafts on the railways west of Chicago, began a meeting at St. Louis on June 24 to count the ballots cast on the question of calling a general strike in sympathy with those on the Illinois Central and the Harriman Lines. It is stated that the results of the vote will not be announced for the present.

The Chicago, Milwaukee & St. Paul, and two of its employees have been indicted in connection with the collision at Odessa, Minn., last winter. The railway company and L. Gillic, conductor of the passenger train, which was struck by the following section, were indicted on charge of manslaughter in the second degree. Robert Law, the flagman, was indicted for violation of the company's rules.

The three brotherhoods (conductors, trainmen and firemen) who have been negotiating with General Manager Long of the Pennsylvania, have laid before him the results of their strike votes. They are understood to be nearly unanimous in favor of a strike. The principal grievances not yet adjusted, are the conditions of employment on electrified lines and the wages of trainmen in the Pittsburgh district.

The Pennsylvania has a dining car seating 36 persons. By omitting platforms and vestibules space has been provided for two additional tables seating six persons. On a demonstration to determine the capacity of the car, we are told that 108 persons were served in three hours with no rush or crowding. The new car is 83 ft. long over all; it is of steel, weighing 147,500 lbs. The kitchen is 19 ft. 6 in. long, and the pantry 7 ft. long.

On Sunday, June 23, the Chicago & North Western put in service a new train between Chicago and St. Paul-Minneapolis, by way of Milwaukee and the new line of the Milwaukee, Sparta & Northwestern, to be known as the North Western Special. The train leaves Chicago at 10 a. m., arriving at St. Paul, 10 p. m., and Minneapolis 10:25 p. m. It will include an observation parlor car, dining car, chair car and coaches, and will give the North Western six through trains each way daily between Chicago and the Twin Cities.

The judiciary committee of the lower House of Congress has voted to recommend to the House that Judge Archbald, of the Commerce Court, whose conduct has been under investigation for several weeks, shall be impeached. No formal announcement has been made, and no further elucidation has been given of the testimony which was taken at the hearings, but it is understood that the specifications will allege that the judge exercised influence with railways in connection with purchases of culm, and that he personally profited by the transactions.

The board of arbitration chosen to consider the demands of the enginemen of the eastern roads expects to hold its first hearing on July 15. The board will meet this week to organize. B. A. Worthington, who has taken a chief part in the preparation of the case of the railways, has been elected president of the Chicago & Alton, but it is not believed that this will prevent him from appearing for the roads before the committee and presenting their case. The committee of managers of the eastern railways will meet representatives of their firemen on Monday, July 1.

H. J. Slifer, general manager of the Chicago Great Western, has issued a circular to enginemen, maintenance of way men and station employees, asking their co-operation to prevent the killing of animals on the right-of-way. Last year, he says, the Great Western spent an average of $49 a day in settlement of claims for livestock killed on the right-of-way, or a total of $18,028.84, which was absolutely wasted. The circular points out that enginemen may do much to reduce the amount of such payments by the exercise of care; maintenance of way men by seeing that cattle guards, fences and gates are kept in good condition, and station employees by notifying farmers or section foremen of any carelessness on their part.

Illinois Central "Graft" Cases Non-Suited.

The suits against four former officers of the Illinois Central, Frank B. Harriman, Charles L. Ewing, John M. Taylor and Joseph E. Buker, charged with conspiracy to defraud the road out of about $1,500,000 in the famous car repair graft case, were non-suited in the criminal court at Chicago on June 24, on the motion of Assistant State's Attorney John E. Northup, because of inability to secure the presence of three indispensable witnesses. A motion that the cases be stricken off the record with leave to reinstate had been denied by the court on June 22. The cases have been pending for over nineteen months during which time civil suits to collect damages were settled out of court.

Don'ts for Local Freight Conductors.

Don't try to unload merchandise onto platform from two or three peddler cars at the same time when there is only one man to check it.

Don't carry small shipments by small stations with the intention of returning them the following day; it may be important to the consignee and might be overlooked the following day.

Don't run by pickup loads at the small stations because the agent doesn't raise a howl about it; he knows he is in the minority.

Don't tell the agent that he is having unnecessary work done when he gives you a switch list; remember he is the general manager at his station and is held responsible for securing business and taking care of patrons.

Don't fail to see that merchandise is properly broken down in peddler cars where cars break bulk, and at each subsequent unloading point; claims and losses to the company result from neglect of this.

Remember co-operation means harmony; courtesy means increased business; additional business means greater revenues. Let's all pull together.—*Rock Island Employees' Magazine.*

An Incident of State Railway Operation.

The Assembly of Notables in Saxony has lately had to tackle the question of prices of beer in the railway restaurants. In 1909 these were fixed at 3.6 cents for 0.35 of a liter (a liter is a little less than a quart), and 2.4 cents for one-fifth of a liter —this for beer brewed in Saxony, and called "Pilsen" beer; the genuine Pilsen beer coming from Bohemia. Now the Saxon

brewers asked that these prices be raised to 4.8 cents for two-fifths of a liter (say a schooner), and 3.6 cents for a quarter of a liter. They complain of glaring injustice, because the restaurants are permitted to charge such prices for genuine Bohemian beer that they make $2.38 cents more on a keg than when they sell Saxon beer. The official answer to this request is that the restaurants ought to make more on Bohemian beer, because they have to pay more for it. Suppose a carload of it spoils on their hands; they lose 65 per cent. more than if it had been Saxon beer. And they don't sell so much Bohemian as Saxon, because the Bohemian is dearer. The railway restaurants took 6,843 kegs of "echt Bömisch" in 1910, and 14,616 kegs of the cheaper Saxon. Moreover, should the railway restaurants raise their prices for Saxon beer, what would be the result? The thirsty would just step across the street and quench their thirst at a lower price, or worse, they would avoid Saxon beer entirely and drink genuine Bohemian, which then would be but little dearer. The request of the petitioners was therefore refused, only once vote being in its favor.

Respectfully referred to the Interstate Commerce Commission.

President Finley Urges Compulsory Arbitration.

In my opinion, the time has now arrived for the adoption of a well-devised system of arbitration in labor controversies, not only because of the public interest in the avoidance of strikes and the interruption of transportation service, but also because, as indicated by Judge Prouty, we are face to face with a situation which may bring the relation of the wages of railway employees and charges for transportation service before governmental tribunals.

If arbitration is to be a sure and effective means of preventing strikes and the interruption of service resort to it must be compulsory. If it is to do substantial justice to both sides and is to be the method of satisfying governmental tribunals that, as Judge Prouty says, the wages are necessarily and properly paid, provision should be made for the creation of a board of arbitrators composed of men who would become experts in their duties and who would base their decisions upon the economic considerations involved.

The desirability of the inauguration of such a system is illustrated by a wage controversy now pending in which a class of employees on certain railways asked for substantial increases in wages. The companies affected declined to accede to the demand, one of the reasons assigned being that the revenues of the roads were not sufficient to justify the payment of the increased wages. That the matter will be intelligently and comprehensively determined is indicated by the means adopted for arriving at a conclusion.

The adoption of a policy of settling labor disputes by a well-devised system of arbitration is but a logical outgrowth of our present system of railway regulation, for a railway, just as any other business enterprise, must be managed in accordance with sound business principles. If it is to be permanently successful and if it is to be able adequately to perform its function of transportation, its earnings from operation must be sufficient to pay all operating costs and yield a return to its owners at approximately the rate that may be earned on other investments of the same grade. If, as a result of compliance with the requirements of legislative regulation or of any other causes not under the control of the management, operating expenses should be so increased as to bear an uneconomic relation to earnings, not only the railway, but its employees and the public would suffer.—*From an address by W. W. Finley, president Southern Railway, to the graduating class of Wofford College, Spartanburg, S. C., June 10.*

Improvements at North Philadelphia.

The Pennsylvania Railroad has let contracts for the work of making extensive changes at North Philadelphia by which four passenger trains, two eastbound and two westbound, can receive or discharge passengers there at the same time, while the industrial freight tracks east and west of the station will be made continuous, thus converting this section into an eight-track railway. The improvements will cost about $1,000,000.

There will be two eastbound and two westbound passenger tracks, with island platforms between. Three new tracks will be built north of the present tracks and one on the south. This last will occupy the place now used as the eastbound passenger platform. The passenger house (on the south side) stands well back, and will not have to be moved. The two center tracks of the eight will be for through freight. Outside of the passenger tracks will be two industrials tracks, one on the north and one on the south side. This part of the New York division is lined with an almost continuous industrial track for several miles, on one side or the other, and much of the way on both sides.

Looking west, the arrangement of the tracks will be as indicated by the letters (F for freight and P for passenger) in the subjoined sketch. The horizontal rules between the two pairs of passenger tracks represent the island platforms. These will have sheds with flat roofs.

F P ——— P F F P ——— P F

There will be two new waiting rooms 10 ft. x 60 ft. in the eastbound island platform, and one 10 ft. x 80 ft. on the westbound island platform. Each platform will accommodate a 12-car train on each side.

In the station the ticket office and retiring rooms for men and women will be enlarged, while much more space for baggage will be provided by moving the baggage room to the basement. Leading from the station under the tracks will be a passenger tunnel from which there will be two sets of stairways to each platform. This tunnel will extend out to the driveway on the north side of the tracks, which is about 12 ft. below track level, where there will be an ornamental carriage and automobile entrance. Work on this driveway has already begun.

Broad street crosses beneath the tracks just east of the station. There will be walks on each side of the railway, the station leading from Broad street direct to the passenger tunnel so that passengers not having to buy tickets need not pass through the station building. There will be a separate tunnel with elevators, for baggage. Over Broad street a new eight-track steel and concrete bridge will be built. The three rows of pillars under the present bridge will be done away with, and a single row substituted in the middle of the street. It is expected that the improvements will be completed in about a year.

Per Cent. of Expenses: 92.5.

There having been charges that the Chinese Eastern Railway—that is, the extension of the Siberian railway across Manchuria to Vladivostok, with the branch towards Port Arthur—was being robbed by its officers and employees, a Russian journal defends it, and in the course of the defence cites the earnings and expenses for three years, as follows:

	1908.	1909.	1910.
Gross earnings	$7,585,000	$7,895,000	$8,927,000
Working expenses	9,494,000	8,359,000	8,256,000
Net earnings	.....	.....	$671,000
Deficit	$1,909,000	$464,000	.....

The gross earnings are surprisingly large for 1,088 miles of railway, but the expenses are not such as one would expect to be cited as proof of economical management. To spend $26,109,000 in order to earn $24,407,000 in the course of three years is not the way to boom Chinese Eastern stock, and in the late "profitable" year, the expenses were still 92½ per cent. of the receipts, and the net was but $617 per mile.

The amount of freight going to Dairen (formerly Dalny) is about twice as great as that going to Vladivostok, which seems natural, as Vladivostok is far north of the great populations served by the railway. The quantities in 1910, when they were much greater than ever before, were 1,357,620 tons to Dairen and 784,080 to Vladivostok. There are important coal mines on the Japanese part of the Chinese Eastern, the product of which must go largely to Dairen.

North Western Organizes Smoke Department.

The Chicago & North Western has announced the appointment of a central smoke inspection organization which will make a determined fight to eliminate the smoke nuisance in the Chicago district. The department will work in conjunction with the smoke inspection department of the city and will have no other duty than to see that locomotives and shops are

operated with the maximum efficiency of fuel and the minimum of smoke. C. W. Corning has been placed at the head of the new department, with the title of chief smoke inspector, in charge of all territory within the limits of Chicago, and by division of territory special attention will be given to every part of the company's lines in the Chicago district. J. J. O'Connor is appointed smoke inspector, with jurisdiction over the Chicago shops and the Fortieth street yards; T. Thomas, smoke inspector in charge of the Galena division from California avenue to the Chicago passenger terminal; J. H. Oliver, day smoke inspector at the Chicago terminal station, and C. E. Robbins, night smoke inspector, with the same jurisdiction. W. B. Sievers has been appointed smoke inspector at the Wood street roundhouse and yard, and J. Ellis, smoke inspector for the Wisconsin division. The duties of these men will be to ride on locomotives instructing enginemen and firemen in their duties, and by education and discipline, when necessary, do everything possible to reduce the smoke nuisance to a minimum.

A Car Record for Shippers and Consignees.

That a merchant or manufacturer, receiving (or sending) large quantities of freight in carloads, ought to keep an accurate record of the movements of the cars, especially where such cars are unloaded on his private tracks, would seem to be an elementary proposition in the interest of good business; for the demurrage on such cars, when they are not promptly unloaded, is likely to amount to a considerable sum, and disagreements with the railways concerning the accuracy or justice of demurrage bills often hinge on differences of testimony or of opinion as to the date and hour on which a given car was received or was made empty. Appreciating these considerations, and seeing the desirability of a systematic record, J. E. Challenger, of Philadelphia, formerly and for about 20 years manager of the Philadelphia Car Demurrage Bureau, has prepared a "car demurrage record book," which he is selling to shippers and consignees, and for which he has already received orders from many large business establishments. He makes books of 50 pages each, with room for records of 25 cars on a page, and also provides loose sheets, to be put into binders, for establishments where the number of cars is so great that a 50-page book would be quickly used up. The book has 11 headings, besides the file number and the column for remarks, and these headings are subdivided so as to make 37 columns, as follows:

Shipped from—
Station.
Railway.
Date
Car
Initial.
Number
Kind.
Weights, Rates, Route of
Contents
Notice Received—
Arrival, date.
Arrival, hour.
Placing, date.
Date.
Hour.

Placed—
Constructively, date.
Constructively, hour.
Actually, date.
Actually, hour.
Released
Date.
Hour.
Number of days debited—
Up to 7 days inclusive, box cars.
——— other cars.
In excess of 7 days, box cars.
——— other cars.
Total, box cars.
——— other cars.
Number of days credited—
Box cars.
Other cars.

The book also contains a page on which to record the weather, for a year or more, there being 31 columns on a page, one for each day of the month. Each book also contains the uniform code of demurrage rules, supplemented by numerous explanations and interpretations, edited by Mr. Challenger, for the benefit of shippers and consignees. Mr. Challenger says that he has no intention of establishing anything like a claim agency; but he promises the buyers of his books that he will keep them promptly advised of all changes in the demurrage rules, and also will freely give advice on any obscure questions which may arise and which they may present to him.

Safety Committees for the Western Indiana.

The Chicago & Western Indiana and the Belt Railway of Chicago have recently organized safety committees, following the plan that has been put into effect on many other roads, but with a slightly different method of organization. The safety committee plan was explained at a mass meeting of the employees by officers of the company and the members of the central safety committee were nominated and elected directly by the employees. The central safety committee consists of the following: C. G. Austin, general attorney, chairman; E. H. Lee, chief engineer; R. W. Stevens, superintendent; F. E. Jacob, signal engineer; E. L. Pollock, purchasing agent; G. M. Grimes, claim agent, and L. M. Betts, car accountant, who is secretary of the committee. The plan also includes five district committees, also elected directly by the employees, except that the chairmen were appointed by the central committee, and they comprise a division committee. The lines of the Western Indiana and of the Belt were divided into five districts, and the district committees were elected by ballot by members of the various crafts, according to a plan which insured that the different crafts would be properly represented on the committees. The district and the division committees will hold meetings once a month and make recommendations to the central committee which will also meet once a month following the meetings of the other committees. An attractive button is being prepared to be worn by members of the committee. It will be in the form of the company's trade mark, and will contain the motto "Safety Always First."

Express Train Speeds in Germany.

German trains usually run on schedule time. The new summer time table for the state railways shows some advances in speed in through trains. The fastest train in Germany is the so-called "D-Zug 20" between Berlin and Hamburg, which maintains an average speed of 55.2 miles an hour. This throws into second place the express from Munich to Nuremberg (leaving Munich at 8:15 a. m.), which heretofore has been the fastest train in Germany, with an average speed of 55 miles an hour. In the third place is an express train from Berlin to Halle, with an average speed of 54.9 miles an hour, and the fourth place is held by the express from Freiburg to Appenweier, in Baden, with an average speed of 52.9 miles an hour.

For covering long distances without stop the record is held by the Munich-Berlin express for the run between Nuremberg and Halle, a distance of 195.11 miles, which is covered without stop at an average speed of 43.19 miles an hour, in spite of the heavy grades in crossing the Thuringian Mountains. Other long runs without stop are Berlin to Hamburg, 178 miles, at an average speed of 55.18 miles an hour; Munich to Wurzburg, 172.12 miles, at 50.33 miles an hour; Berlin to Hanover, 157.83 miles, at 50.39 miles an hour; Schneidemuehl to Berlin, 153.48 miles, at 50.46 miles an hour; and Breslau to Frankfort on the Oder, 154.10 miles, at 50.77 miles an hour.

The Berlin-Hanover-Dortmund express covers 292.04 miles with but three stops, at an average speed of 50.52 miles an hour; the Oderberg-Breslau-Berlin express, 316.90 miles, with four stops, at 50.14 miles an hour; the Berlin-Konigsberg express, 366.61 miles with three stops, at 49.70 miles an hour; the Munich-Berlin express, 419.42 miles with two stops, at 48.78 miles an hour, the Berlin-Frankfort-on-the-Main express, 334.92 miles with five stops, at 48.50 miles an hour; the Munich-Wurzburg-Frankfort-on-the-Main express, 256 miles with four stops, at 47.04 miles an hour; the Berlin-Hof-Munich express, 407 miles with four stops, at 44.93 miles an hour.—*Consular Reports.*

Treatment of Immigrants.

The Passenger Index, a publication of the passenger department of the Illinois Central, recently contained the following appeal to employees on the treatment of immigrants:

"Just a word in connection with the care of the immigrant. In round numbers, 1,040,000 were admitted into the United States through our various ports during the year ending June 30, 1910. As their first impressions of this country and its methods are likely to be lasting ones, and as on landing most of them come in immediate contact with the railway fraternity, in journeying to their new-found homes, square treatment and a kindly interest, as agents in molding a reciprocal regard for our rights, may return to us a hundred fold at some future time when the employees of now shall have then become the officers.

"Then too, looking further ahead, most of these immigrants, as naturalized citizens, will one day raise a voice in our governmental affairs, and as representatives, seated in our legislative halls, will assist in shaping measures from their view-

points based, perhaps, on these same first impressions. They will contribute to our art, science and literature, and aid in and even promote our commercial enterprises, as useful and influential citizens.

"It behooves us, therefore, thinking ahead to treat them right."

Another View of the Car Shortage Problem.

The Texas railways are taking great care not to underestimate the peach and tomato crop this season. They know that the crop will be an enormous one and are bending every effort to provide cars enough to handle it. It is well known that if there is a car shortage the producers will take advantage of it to collect claims from the companies. It is said to be an old trick in farming districts to have the railways underestimate the crops. This makes it possible to ship only a limited amount, and thus the prices are kept high, while if the entire yield is shipped the prices are likely to be low. Therefore by causing the railways to underestimate the crops they are able to keep prices up on what is shipped and to collect damages from the transportation companies on what is not shipped, alleging the railways failed to furnish the cars. The roads have fallen a victim of this game in the past, and now great precaution is being taken to get a correct estimate of the yield.—*From the Houston Post.*

The President of a Weak Railway.

He comes to his Wall Street office in an absent state of mind, thinking of $7,500,000 5 per cent. three-year notes coming due on the 15th, and his office is full of men from down the line. They expect to be called by their right names. They are not smoking; they expect that to be noticed. The president passes out his worst cigars, which are better than his visitors ever smoke outside of his office, and asks them "How?" . . . They are a delegation from a stub-end of the line. Two or three dozen peach trees have been planted twenty miles back in the country, and they want the president to come up there with his railway.

He has to seem pleased. He is thinking of $7,500,000 notes, which must be paid off to keep the road in a condition of tentative solvency, but he has been going to and fro among these people, promising them new mileage if they would stop legislating against railways, his particularly, and it is necessary to propitiate them.

"Money's pretty tight," he ventures.

"Can't tell us anything new," says the head of the delegation. "Ain't money always tight? Them speculators down here can git all they want. We want that piece of road. Going to have an election next fall. Some of your old friends want to git into office again. They'll make it hot for you if they do."

He promises them the road. He will have a man go right to work on it, estimating the cost, the probable revenue, etc., and send a surveyor.

"We know what that means," says the head of the delegation. "We ain't come fifteen hundred miles for promises. We want that road. Now, when?"

If necessary, the president would promise it a week from Tuesday, all nickel plated and equipped. He does promise it to be done by the end of the year, and before the delegation can tie it any tighter he takes it on its weak human side.

"You didn't come fifteen hundred miles only for that," he says. "You must have wanted to see the town."

He presses the button; one of the most useful men on the railway's pay roll is summoned. "Take these friends and show them New York," he says. "Show it to them right."

In a few minutes he is rid of them. As he sits down to solve the $7,500,000 note problem his desk telephone rings, and his secretary outside says: "There's a man here from one of the news bureaus. Wants to know what makes our stock so weak, and if we are going to pay off those notes?" . . . —*New York Evening Post.*

American Road Congress.

At the American Road Congress to be held next fall the United States Department of Agriculture will present an interesting exhibit under the charge of Director Logan Waller Page, of the office of public roads, showing the government's work on the public roads of the country, and how unimproved roads injure the farmer and how improved roads benefit not only the farmer but also the consumer. The American Road Builders' Association, the American Association for Highway Improvement, the American Automobile Association and the National Association of Road Material & Machinery Manufacturers will consolidate to make this congress a success.

American Reporters for International Railway Congress.

The permanent commission of the International Railway Congress, which will hold its next meeting at Berlin in 1915, has, on the recommendation of the American members of the commission, designated the following as the American reporters on the subjects mentioned:

	Subjects.	Reporters.
	First Section.	
I.	Method of construction of roadbed and track, etc.	H. U. Mudge, President, Rock Island Lines.
II.	Study of maintenance and supervision of track.	Epes Randolph, President, Southern Pacific in Mexico.
III.	Special Steels.	W. C. Cushing, C. E. M. of W., Pennsylvania Lines.
IV.	Reinforced Concrete.	C. H. Cartlidge, Bridge Engr., C. B. & Q. R. R.
	Second Section.	
VII.	Passenger Equipment.	B. F. Bush, President, Missouri Pacific Ry.
VIII.	Electric Traction.	Horace G. Burt, Chief Engr., Chicago Committee of Investigation on Electrification of Railway Terminals.
	Third Section.	
IX.	Passenger Terminals.	F. A. Delano, Receiver, Wabash Railroad.
X.	Freight Terminals.	W. S. Kinnear, President, Kansas City Terminal Co.
	Fourth Section.	
XIII.	The relation of cost of service to rates.	Fairfax Harrison, President, C. I. & L. Ry.
XV.	Interchange of equipment and demurrage charges.	Arthur Hale, General Agent, American Railway Association.
XVI.	Workmen's Dwellings.	A. F. Banks, President, E. J. & E. Ry.
	Fifth Section.	
XIX.	Special types of traction units for branch lines.	H. B. Spencer, Vice President, Southern Ry.

The American members of the permanent commission made an especial effort to get the higher officers of the railways of this country to take assignments as reporters, and it will be noted from the above list that they were very successful. The papers of the reporters will be prepared in 1914.

The American members of the permanent commission of the Congress are the following:

W. F. Allen, general secretary, American Railway Association; E. P. Ripley, president, A. T. & S. F.; Theodore N. Ely, Bryn Mawr, Pa.; Fairfax Harrison, president, C. I. & L.; Charles M. Hays (deceased), president, Grand Trunk; Franklin K. Lane, Interstate Commerce Commission; L. F. Loree, president, Delaware & Hudson; G. W. Stevens, president, C. & O.; Stuyvesant Fish, 52 Wall street; W. W. Finley, president, Southern Railway.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass. Convention, May, 1913, St. Louis, Mo.

American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass.

American Association of General Passenger and Ticket Agents.—W. C. Hope, New York; next convention, September 12, Seattle, Wash.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.

American Association of Railroad Superintendents.—W. C. Cooder, Carew building, Cincinnati, Ohio; 3d Friday of March and September.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York. Convention, October 7-11, Chicago.

American Electrical Railway Manufacturers' Assoc.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

American Railway Association.—W. F. Allen, 75 Church St., New York; annual, November 20, 1912, Chicago.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

American Railway Engineering Association.—E. H. Fritch, 1011 S. Michigan Ave., Chicago. Convention, March 18-20, 1913, Chicago.

American Railway Master Mechanics' Assoc.—J. W. Taylor, Old Colony building, Chicago.

American Railway Tool Foremen's Association.—M. H. Bray, N. Y. N. H. & H., New Haven, Conn. Convention, July 9, Chicago.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.; annual, June, 1913.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

American Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, October 21-25, Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 112 West Adams St., Chicago; annual, May 20, 1913, St. Louis, Mo.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.

International Railway Fuel Association.—C. G. Hall, 922 McCormick building, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Convention, August 20, Chicago.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York. Convention, May, 1913, Chicago.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago.

Master Car and Locomotive Painters' Assoc. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass. Convention, September 10-13, Denver, Col.

National Railway Appliances Assoc.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railroad Club.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Business Association.—Frank W. Noxon, 2 Rector St., New York; annual, November 20, 1912, New York.

Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

Railway Gardening Association.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.

Railway Development Association.—W. Nicholson, Kansas City Southern, Kansas City, Mo. Next meeting, Nov. 17, 1912, Cincinnati, Ohio.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa. Convention, Oct. 8-11, Quebec.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio.

Railway Supply Manufacturers' Assoc.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

Railway Tel. & Tel. Appliance Assoc.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling, Ill. September 10-13, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

Society of Railway Financial Officers.—C. Niquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.; annual, Oct. 17, Atlanta, Ga.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; annual, Aug. 27-30, Chicago.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The Munson Steamship Line announces that, beginning September 11, steamers will sail regularly from Mobile, every four weeks, to Montevideo, Buenos Ayres and other South American ports.

Passenger officers of the principal western railways have called a meeting, to be held in the Transportation building, Chicago, on June 28, with a view to forming a permanent organization of a "See America First" campaign.

Representatives of local shippers' traffic bureaus in various cities of the Southwest have formed an organization to be known as the Four-State Traffic League, to discuss traffic questions affecting the states of Texas, Louisiana, Arkansas and Oklahoma.

The Richelieu & Ontario Navigation Company has absorbed the Niagara Navigation Company, the Thousand Island Steamboat Company and the St. Lawrence River Steamboat Company; and the authority of Thomas Henry, traffic manager, Montreal, has been extended over these lines.

Thomas Marshall, hitherto chairman of the Canadian Freight Association, has resigned to become the head of the newly established traffic department of the Toronto Board of Trade. Mr. Marshall has been connected with Canadian railways for many years, and for seven years, until recently, was secretary of the Canadian Freight Association.

The freight department of the Lehigh & New England announces that the extension of the road to Tamaqua, Pa., 33 miles westward from Danielsville, will be opened for business July 8; and at the same time the company will begin running trains through to Lansford, Hauto and Summit Hill, on the line of the Lehigh Coal & Navigation Company, having made a contract for running rights over the L. C. & N. tracks.

At a conference of traffic officials of the southern and southwestern lines at St. Louis last week, it was decided to reestablish through rates on lumber with the 41 tap lines named by the Interstate Commerce Commission as entitled to allowances for divisions, effective about July 1. All through rates with the tap lines were canceled on April 30, following the announcement of the commission's original decision.

New passenger schedules between Chicago, Denver and the Pacific coast have been arranged by the Union Pacific, the Chicago & North Western and the Chicago, Milwaukee & St. Paul, to become effective about June 30. For several years some of the trains on the Union Pacific west of Omaha have been made up from trains on the North Western and the St. Paul, due to arrive at Omaha from the east at the same time and consolidated at that point into one westbound train. Likewise a single eastbound train on the Union Pacific has been split up at Omaha and divided between the North Western and the St. Paul for Chicago. This occasionally resulted in inconvenience and delay to passengers, because whenever a train on either line was late the passengers on the other road had to wait at Omaha for the connection. Under the new arrangement both the St. Paul and the North Western will have their own exclusive through trains in each direction. A statement issued by the North Western says: "This announcement of definite service disposes of the gossip which has been exploited from time to time that there was dissension existing between the North Western and the Union Pacific. On the contrary, it will be seen that this arrangement really ties the two companies closer together, and will permit of exclusive North Western trains with exclusive North Western equipment in both directions between Chicago, Denver, San Francisco, Los Angeles and Portland." The North Western will retain for its service the present Overland Limited, the Los Angeles and Portland Limited and the Denver Special, in addition to its two fast mail trains in connection with the Union Pacific and an exclusive fast express (parcels) train. The St. Paul will put in service on June 30 a Denver-Portland train, leaving Chicago at 10 a. m., arriving at Denver at 1:15 p. m. the next day and at Portland at 12:45 p. m. the third day. Later it will put in service a through train for San Francisco and Los Angeles to be known as the Pacific Limited, leaving Chicago at 10:45 a. m.

Cost of Travel in Europe.

I should like to correct an impression which I find prevails in regard to the cheapness of traveling in Europe.

I have been traveling with two others for over three months this year in Italy, Austria, Germany and France. My experience is that traveling first class on the railways and stopping at the best hotels in the countries named is quite as expensive as in the United States, and in fact is not as comfortable at the same price as in the United States.—*Correspondent N. Y. Evening Post.*

INTERSTATE COMMERCE COMMISSION.

The commission has suspended until October 29 a tariff showing increases in rates for the transportation of pig iron from Duluth and other points to Omaha, Kansas City and other points in that region.

The commission has suspended until December 28 tariffs filed by the southwestern railways making an increase of about 10 per cent. in the freight charges on cotton seed products from points in Oklahoma to places in Texas and other states.

The commission has further suspended from June 25 to December 25, 1912, the advances in the rates on empty barrels, in carloads, from sixth to fifth class, and in less than carloads, from fourth to third class, in Southern classification territory.

The Beaumont (Tex.) Chamber of Commerce has filed a complaint with the Interstate Commerce Commission attacking the regulations of the Texas & Pacific and International & Great Northern governing the milling-in-transit rate on rice as discriminatory against all mills not located on the lines of the defendants.

The commission has vacated its suspension of the transcontinental class tariffs to Pacific coast terminals. The new tariffs, therefore, became effective June 15, or at the same time as the Spokane compromise rates. The new transcontinental tariffs change the $3 blanket scale to $3.70 from New York pier, $3.60 from New England, $3.50 from New York, $3.40 from Chicago, $3.30 from the Mississippi river, $3 from the Missouri river, and $2.60 from Colorado points on first class.

Rates on Cement Reasonable.

Ashgrove Lime & Portland Cement Co. et al. v. Atchison, Topeka & Santa Fe et al. Opinion by Commisisoner Clements:

Defendants give the same rates to all points in the so-called "gas belt" south to Dewey, Okla., on northbound traffic in cement and north to Kansas City on shipments to Texas. Certain cement mills at Iola, Kans., and immediate vicinity complain that their rates on cement to Kansas City and to various points in the states of Missouri, Iowa, Nebraska, Colorado, South Dakota, Montana, Oklahoma, and Texas are unreasonable and unjustly discriminatory. While on a strict per-ton-mile basis, computed from these particular mills, certain of these rates may seem rather high, considering the record as a whole, the complaints should be dismissed except as to Oklahoma, where certain reductions are made to place Oklahoma on a substantial parity with other cement rates in this general territory allowed to stand. (23 I. C. C., 519.)

Complaint Dismissed.

John W. Boileau et al v. Pittsburgh & Lake Erie. Opinion by Commissioner Meyer:

The decision in 22 I. C. C., 640, ordered a reduction from 88 cents per ton to 78 cents per ton in the lake-coal rate from the Pittsburgh district to Ashtabula, Ohio. The complainant now seeks a further reduction in the same rate. The evidence is not conclusive and the complaint is dismissed. (24 I. C. C., 129.)

Businessmen's League of Alberta Lea, Minn. v. Baltimore & Ohio et al. Opinion by Commissioner McChord:

The complainant seeks to have applied to Albert Lea the Minneapolis-St. Paul class rates, all-rail, from the Atlantic seaboard. Traffic to Albert Lea from points east of Buffalo and Pittsburgh now takes differentials over Minneapolis and St. Paul, both all-rail and rail-lake-and-rail. The commission found that the Twin City rates are a result of competition by Canadian roads, and that none of the conditions affecting the Twin City rates obtains at Albert Lea. The complaint was dismissed. (24 I. C. C., 125.)

Coal Rates to Nassau, Ill., Reduced.

Crescent Coal & Mining Co. v. Chicago & Eastern Illinois et al. Opinion by the commission:

The complainant charges that on shipments of coal from points in Indiana to Nassau, Ill., it was charged the local rate to Depue, Ill., when it should have been charged the proportional rate to Depue, as Nassau is beyond that point. The commission found that the proportional rate to Depue should have been charged by the defendant, as that rate was the lawfully effective rate applicable to the shipments to Nassau. Reparation will be awarded upon proof of the amount due on interstate shipments. (24 I. C. C., 149.)

Not a Tap Line.

McCloud River Lumber Co. v. Southern Pacific et al. Opinion by Commissioner Clark:

The McCloud River Railroad, although owned by complainant is a common carrier and a member of the American Railway Association.

Complainant is entitled to through routes and joint rates on lumber in carloads from McCloud, Cal., to the eastern destinations to which the coast group rates apply, but such rates should not exceed the coast group rates by more than 1½ cents per 100 lbs. (24 I. C. C., 89.)

New Roads, La., Discriminated Against.

New Roads Oil Mill & Manufacturing Co., Ltd., v. St. Louis, Iron Mountain & Southern et al. Opinion by Commissioner Clements:

The complainant alleges that there are no joint rates between the carriers on cotton seed from Arkansas points of production on the defendant's line to New Roads, La., and that the combination of rates now in effect results in an aggregate charge which is unreasonable, and results in a discrimination against New Roads in favor of St. Louis, East St. Louis and certain other points. The commission found that these rates were unreasonable and unjustly discriminatory and prescribed certain rates for the future. Reparation was denied. (24 I. C. C., 167.)

Glucose Rates Reduced.

State of Iowa et al v. Atlantic Coast Line et al. Opinion by Commissioner Harlan:

The complainant charges that the export and domestic rates of 22½ cents and 25 cents per 100 lbs., respectively, on glucose from Chicago to New York are excessive. The commission found that the present rate adjustment enabled certain glucose manufacturers to place their product on certain markets at a certain lower cost than was possible to other manufacturers. This resulted from the lower rate on corn from which glucose is made. The manufacturer who had his plants near the markets and transported the corn to those plants had a decided advantage over the manufacturer who had to ship the glucose from his plant to a distant market. To overcome this advantage to certain manufacturers the commission reduced the export rate from Chicago to New York to 18 cents per 100 lbs., and the domestic rate to 20 cents. The complainant sought to have the same rates applied to glucose as were applied to corn, but the commission found that a manufactured product is not entitled as a matter of right to the rate on the raw material from which it is made. Attention was called to certain irregularities and unlawful practices of certain manufacturers of glucose and syrup in the use of milling-in-transit privileges. (24 I. C. C., 134.)

Through Routes and Joint Rates on Lumber Restored.

Beaumont & Great Northern v. Atchison, Topeka & Santa Fe et al. Opinion by Commissioner Harlan:

The complainant seeks the restoration of the through routes and joint rates on lumber and other forest products from points

on its lines which were canceled by the Atchison, Topeka & Santa Fe. The commission found that the defendant must be required to join with the complainant in tariffs establishing through routes and naming joint rates from points on the defendant's line to interstate destinations. (24 I. C. C., 161.)

Omaha, Neb., Discriminated Against.

Omaha Grain Exchange v. Chicago, Milwaukee & St. Paul. Opinion by Commissioner Clark:

The commission found that the present rate adjustment from the stations on the defendant's line, between Canton, S. D., and Elk Point, S. D., to Omaha and Minneapolis was unjustly discriminatory against Omaha in favor of Minneapolis, and that the differential on coarse grain in favor of Omaha as against Minneapolis from the stations between Canton and Elk Point should not be less than that now in effect at Canton, which is 1½ cents per 100 lbs. The rates themselves were not found to be unreasonable. (24 I. C. C., 122.)

Santa Rosa, Cal., Discriminated Against.

Santa Rosa Traffic Association v. Southern Pacific et al. Opinion by Commissioner McChord:

The complainant asks to be given terminal rates on westbound transcontinental traffic. Present rates based on rates to the nearest terminal, plus the local rate from the terminal to Santa Rosa, are alleged to be unreasonable and unduly prejudicial to Santa Rosa in favor of San Jose, Santa Clara and other California points now given the benefit of terminal rates, although not strictly terminal points. The commission found that Santa Rosa was more fairly entitled to the terminal rate than some of the cities which now enjoyed that rate. It was argued that Santa Rosa was not in competition with the other towns which are given the terminal rate, and was not so important commercially. The commission found that Santa Rosa would increase in commercial importance and would be in a better position to compete with the other towns if given the terminal rate. It therefore ordered that Santa Rosa should be given the terminal rates as long as those rates were applied to San Jose and Santa Clara. (24 I. C. C., 46.)

Barrel Stave Rates Reduced.

Holland Blow Stave Co. v. Atlantic Coast Line et al. Opinion by Commissioner Meyer:

The complainant attacks carload rates on barrel staves and headings from Decatur, Ala., to all markets, and alleges that the present adjustment discriminates against Decatur, Ala., in favor of Memphis, Tenn. The commission found that the reductions proposed by the Louisville & Nashville would make the rates to the southeastern markets reasonable. The defendant will be given 60 days to make these reductions. To the western markets the present adjustment is found unduly discriminatory to the extent that the Decatur rates exceed by more than four cents the rates from Memphis. In regard to the central markets, the rates were not found to be unreasonable or unduly discriminatory to Decatur. To the Gulf markets it was found that the rate of 15 cents from Decatur appeared to be too high by comparison with the charges received by the Louisville & Nashville on the Memphis traffic for the transportation from Memphis and Birmingham. This, however, related to the reasonableness of the rate, and as the reasonableness was not questioned in the complaint, no conclusion could be reached in regard to it. (24 I. C. C., 81.)

Apple Rates Increased.

In re suspension of advances in rates by carriers for transportation of apples in carloads. Opinion by Commissioner McChord:

Upon complaint of Minneapolis and St. Paul apple dealers the proposed changes in apple rates from southwestern Missouri points to St. Paul, Minneapolis, and other points in that territory from a commodity rate to the fifth class rate were suspended. These changes would have resulted in an increase of about seven cents per 100 lbs. The commission found that apples, with few exceptions, took the fifth class rate, and that in this case the proposed increased rates were not unreasonable and that the application of increased rates would remove certain discriminations now existing. The order suspending the increased rates will be vacated. (24 I. C. C., 38.)

Boston, Ga., Discriminated Against.

Mayor and Council of Boston, Ga., v. Atlantic Coast Line et al. Opinion by Commissioner McChord:

The complainant alleges that Boston is unduly discriminated against in favor of Thomasville, Ga., Valdosta and Quitman by the higher rates charged to Boston on all traffic from New York and other points. The commission found that the dissimilarity of conditions at the points mentioned was not such as to warrant a differential at Boston over the other towns, and ordered that this differential be removed. The financial inability of the defendants to extend to Boston the Thomasville-Quitman rates, even if this could be established as a fact, is no answer to the charge of undue discrimination. (24 I. C. C., 50.)

Coal Rates Reduced.

Marian Coal Co. v. Delaware, Lackawanna & Western. Opinion by Commissioner Meyer:

The complainant charges that the defendant's rates, local and proportional, on anthracite coal from Taylor, Pa., to all points on the defendant's line are unreasonable. The commission found that the defendant's rates per long ton on anthracite coal in carloads from Taylor, Pa., to Hoboken, N. J., or New York Lighterage Station, N. J. (f. o. b. vessel) of $1.58 on prepared sizes, $1.43 on pea and $1.28 on buckwheat, are excessive and unreasonable to the extent that they exceed $1.33 on prepared sizes, $1.24 on pea and $1.09 on buckwheat, and that for the future the latter rates must not be exceeded. Reparation will be awarded upon the basis of the rates found reasonable on such shipments as were delivered within two years prior to the date of filing the complaint. (24 I. C. C., 140.)

Grain Rates Equalized.

Superior Commercial Club of Superior, Wis., v. Great Northern et al. Chamber of Commerce of the City of Milwaukee v. Chicago, Milwaukee & St. Paul et al. Duluth Board of Trade v. Great Northern et al. Opinion by Commissioner Clark:

The complainants allege that the rates on grain from points in North and South Dakota, southern Minnesota and northern Iowa to Superior, Wis., and Milwaukee, and to Duluth, Minn., are unreasonable as compared with the rates from that territory to Lake Michigan ports, Minneapolis and other markets; and that rates on grain products from Superior, Wis., via lake and rail to the Atlantic seaboard points are unjustly discriminatory as compared with the similar rates from Chicago. The commission found that the evidence of unjust discrimination in lake and rail rates on grain products was not conclusive, and that in regard to the grain traffic in that territory, the circumstances and conditions of transportation were so substantially similar that distance must be the controlling factor. Rates from South Dakota, Minnesota and Iowa to Duluth and Superior should not exceed the rates to Milwaukee or Chicago for equal distances. Rates to Milwaukee from points in South Dakota, Minnesota and Iowa should not exceed the rates to Duluth and Superior for equal distances. Distances are to be measured by the short line of the originating system having lines to Duluth and Superior, and to Milwaukee or Chicago, the Chicago & North Western and the Chicago, St. Paul, Minneapolis & Omaha being considered as one system and the Chicago, Milwaukee & St. Paul as having its own rails to Duluth. The Great Northern's differential to Willmar as between Minneapolis and Duluth and Superior should not exceed three cents, and that differential should not be exceeded from any point on the Great Northern beyond Willmar to and including Sioux City, Yankton and Huron. Where because of difference in distance the rates are different from a junction point of a carrier's main line or branches, the differential should not be higher from points beyond which traffic moves through that junction than at such junction point. Through rates via the Soo line, the North Western-Omaha system or the Chicago, Milwaukee & St. Paul to Duluth and Superior via Minneapolis should in no case exceed the rates from the same points to Minneapolis by more than four cents. Where distances are not equal, the differentials should fairly reflect the differences in distance, and

except from points where rates are held down by actual competition, the rates should grade up gradually by distance. The request for the establishment of through routes and joint rates to Duluth and Superior via the Great Northern crossings was denied. (24 I. C. C., 96.)

Increased Coal Rates Held Unreasonable.

In re suspension of advances in rates by carriers for the transportation of soft coal. Opinion by Commissioner McChord:

Rates on soft coal from Springfield and southern Illinois mines to stations on the Missouri Pacific in Kansas and Nebraska were increased by the cancellation of joint rates and the application of combinations of intermediate rates. The complaint was filed by coal operators on the tracks of the Chicago, Burlington & Quincy at Christopher, Ill. Christopher, which is also reached by the Illinois Central, is 82 miles east of East St. Louis over the tracks of that line. The traffic originating on the tracks of the Chicago, Burlington & Quincy at Christopher does not move through East St. Louis, but is shipped over the Chicago, Burlington & Quincy to the Missouri river, where for a number of years it has been delivered to the Missouri Pacific for transportation to local points on that line at a joint rate made by the addition of 40 cents over the East St. Louis rate. The local rate from Christopher to East St. Louis over the Illinois Central tracks is 40 cents. The Chicago, Burlington & Quincy makes no rate to that point, to reach which it would have to haul the traffic via Concord, a distance of 257 miles. In September, 1911, the Missouri Pacific withdrew the application of the joint rates and substituted combination rates which resulted in some instances in an increase of from 20 cents to 88.4 cents a ton. This schedule was suspended by the commission. A few days later the Missouri Pacific restricted the application of the joint rates to East St. Louis in connection with the Missouri Pacific, thereby forcing the Chicago, Burlington & Quincy to transport coal to East St. Louis, a distance of 257 miles, for 40 cents a ton. The Chicago, Burlington & Quincy insisted that the former joint rates were reasonable and that the controversy was due to the selfish desire of the Missouri Pacific not only to deprive it of a haul to which it was jointly entitled, but also to compel it to make delivery to the Missouri Pacific at East St. Louis at a ridiculously low division of the joint rate. The shipper is not interested in the division but in the route. It was testified that traffic via the route dictated by the Missouri Pacific would be subjected to a delay of more than a week over the former route. The commission found that the route via East St. Louis was impracticable and that the proposed increases in rates had not been shown to be reasonable. The commission ordered that the rates heretofore in effect be restored, that is, a joint rate be published applicable from complainant's mines at Christopher via the Chicago, Burlington & Quincy, the Missouri river and the Missouri Pacific to points of destination on the Missouri Pacific in Kansas and Nebraska which will not exceed 40 cents a ton above the current East St. Louis rate. (24 I. C. C., 43.)

STATE COMMISSIONS.

The Wisconsin commission has issued an order stating that it cannot compel common carriers to reimburse passengers who miss connections at junction points.

The Louisiana commission has announced that the hearing called to consider the adoption of a rule relative to wire screens in the windows of passenger cars is postponed until a later session at the request of the state board of health, in view of the fact that the Southern Medical Association intends taking some action regarding railway sanitation at its annual meeting in the fall.

The establishment of a division of transportation by the New York State Public Service Commission, Second district, was noticed in our issue of June 14, page 1355. The vacant inspectorship has been filled by the appointment of H. K. Eggleston, heretofore general roadmaster of the New York, Westchester & Boston. Mr. Eggleston has had twenty years' experience in railway work, having begun as a water boy on the New York Central. For a time he was supervisor of track, bridges and buildings, on the Central New England.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

O. G. Parsley, traffic manager of the Missouri, Oklahoma & Gulf at Kansas City, Mo., has been elected vice-president of the Missouri, Oklahoma & Gulf of Texas.

Erle C. Cowgill, assistant to the president of the Illinois Central, with office at Chicago, has resigned, effective July 1, to become secretary and treasurer of the M-C-B Company, Chicago.

E. R. Lewis, division engineer of the Michigan Central at Bay City, Mich., has been appointed assistant to the vice-president of the Duluth, South Shore & Atlantic, with office at Duluth, Minn.

C. W. Veitch, formerly assistant secretary and assistant treasurer of the Texas & Pacific, has been appointed secretary and treasurer, with office at New York, succeeding C. E. Satterlee, deceased.

B. A. Worthington, receiver of the Wheeling & Lake Erie at Cleveland, Ohio, has been elected president of the Chicago & Alton, with office at Chicago, succeeding Theodore P. Shonts, resigned to devote his time to the New York traction interests. (See an article on a preceding page.)

W. M. Duncan, who has been acting as legal adviser to the receiver of the Wheeling & Lake Erie, has been appointed receiver of that road and subsidiary companies, effective June 20, by the United States district court of the northern district of Ohio, with office at Cleveland, Ohio, succeeding B. A. Worthington, resigned to become president of the Chicago & Alton.

The Continental Trust Company and Marshall B. Smith, having been appointed receivers of the railway and business of the Denver, Laramie & Northwestern, the office of general attorney has been abolished, and W. H. Bryant and W. W. Garwood have been appointed attorneys for the receivers. A. F. Dodd, general auditor, has been appointed auditor for the receivers, with office at Denver, Colo.

The practice of designating the several vice-presidents of the Grand Trunk Pacific by numbers has been discontinued. Wm. Wainwright, first vice-president, is now vice-president; M. M. Reynolds, second vice-president, is now vice-president in charge of financial and accounting departments; M. Donaldson, superintendent of the Grand Trunk at Ottawa, Ont., has been appointed vice-president and general manager of the Grand Trunk Pacific lines west of Fort William, in charge of construction, transportation and maintenance departments, and J. E. Dalrymple, fourth vice-president, is now vice-president in charge of traffic.

Theodore Perry Shonts, who has resigned as president of the Chicago & Alton to devote his time to his traction interests as president of the Interborough-Metropolitan Company in New York City, was born in Crawford county, Pennsylvania, on May 5, 1856. He graduated from Monmouth College (Illinois) in 1876 with the degree of A. B., and the M. A. degree was conferred on him by the same college three years later. After graduation he became an accountant and also studied and practiced law for a time at Centerville, Iowa. He began railway work in July, 1881, as superintendent of the Iowa Construction Company. He had charge of the construction of the Iowa Central, the Missouri, Iowa & Nebraska and the Indiana, Illinois & Iowa, and was general superintendent of the latter road, now the Chicago, Indiana & Southern, for four years from May, 1882. He was made general manager in 1886, and from June 16, 1898, to January, 1902, he was president and general manager. Since January, 1904, he has been president of the Toledo, St. Louis & Western, part of the time having been general manager also. He was made president of the Chicago & Alton in the latter part of 1907. From 1905 to February, 1907, he was chairman of the Isthmian Canal Commission, formulating plans for that work. He was elected president of the Interborough Rapid Transit Company in New York City in February, 1907, in charge of the subway and elevated systems,

and he is also president of the Interborough-Metropolitan Company.

Operating Officers.

R. L. Stairs has been appointed chief despatcher of the Chesapeake & Ohio of Indiana, with office at Peru, Ind., succeeding J. M. Martin, transferred.

C. W. Cool has been appointed assistant superintendent of the Northern division of the Chicago Great Western, with office at St. Paul, Minn., succeeding S. R. Bunch, resigned.

John D. Purtell, chief despatcher of the Erie, at Dunmore, Pa., has been appointed trainmaster, and Daniel P. McCoy, despatcher at Dunmore, succeeds Mr. Purtell, both with offices at Dunmore.

W. M. Whitenton, general manager of the First district of the Rock Island Lines at Des Moines, Iowa, has been appointed general manager also of the St. Paul & Kansas City Short Line, effective July 1.

F. S. James, superintendent of the Missouri, Kansas & Texas of Texas, at Hillsboro, Tex., has been appointed general superintendent of the Texas Central, with office at Waco, Tex., succeeding W. A. Webb. general manager, promoted.

L. G. Coleman, assistant superintendent of the Grand Trunk, at Belleville, Ont., has been appointed superintendent of the Ottawa division, with office at Ottawa, Ont., succeeding M. Donaldson, whose appointment as vice-president and general manager of the Grand Trunk Pacific has been announced in these columns.

Receivers having been appointed for the Denver, Laramie & Northwestern (see item under Executive, Financial and Legal Officers), J. L. Terry, assistant to the vice-president and general manager and purchasing agent, has been appointed superintendent for the receivers, and the office of general superintendent and chief engineer has been abolished. C. R. Himes has been appointed chief despatcher and trainmaster for the receivers, with office at Denver, Colo.

Thomas Collins, whose appointment as superintendent of the Canadian Pacific, with headquarters at Chapleau, Ont., has been announced in these columns, was born at Toronto, Ont., and was educated at St. Helen's School, Toronto, and at Guelph Business College. Mr. Collins began railway work as a brakeman, in September, 1885, with the Canadian Pacific, and has been in the service of that company ever since. In March, 1887, he was promoted to conductor, and from August, 1906, to June, 1909, was trainmaster. He was appointed assistant superintendent in June, 1909, which position he held at the time of his recent appointment as superintendent of the same company, as above noted.

H. F. Coyle, assistant superintendent of the Fourth district of the Grand Trunk, in charge of the Montreal terminal, with headquarters at Montreal, Que., has been appointed assistant superintendent of the Sixth and Seventh districts, with headquarters at Belleville, Ont., succeeding L. G. Coleman, promoted. J. J. Connolly, trainmaster at Island Pond, Vt., succeeds Mr. Coyle, with headquarters at Montreal, and the jurisdiction of J. W. Farrell, trainmaster at Island Pond, has been extended to include the Second district, with headquarters at Island Pond. J. W. Canatsy has been appointed general yardmaster of the Montreal, Que., terminals, succeeding X. J. Schatzle.

William L. Blair, whose appointment as assistant to general manager of the New York, Chicago & St. Louis, with office at Cleveland, Ohio, has been announced in these columns, was born December 27, 1858, at Hamilton, Ohio. He received a high school education and began railway work as a telegraph operator with the Cincinnati, Hamilton & Dayton in 1872, and remained with that road until 1881, having been operator, train despatcher and clerk in the general manager's office. In September, 1881, he went with the New York, Chicago & St. Louis as chief clerk to the general manager, and he has been with that road ever since. He was superintendent of the Eastern division from Sptember, 1893, to March, 1901, and again from October, 1905, to October, 1906, having been superintendent of telegraph from 1901 to 1905. He was made superintendent of transportation in October, 1906, which position he held until June 15, 1912, the date of his appointment as assistant to general manager as above noted.

Fred M. Hawley, whose appointment as superintendent of the Allegheny and Bradford divisions of the Erie Railroad, with office at Salamanca, N. Y., has been announced in these columns, began railway work in June, 1879, as an operator on the Western division of the New York, Lake Erie & Western, now the Allegheny division of the Erie Railroad, at Andover, N. Y., and in December, 1882, he was appointed train despatcher of the Bradford division, at Bradford, Pa. In April, 1889, he was made chief despatcher of the same division. From March, 1901, to November of the same year, he was passenger trainmaster on the Allegheny, the Susquehanna and the Delaware divisions, and from November, 1901, to June, 1906, he was chief despatcher of the Bradford division. He was then chief despatcher of the Allegheny division until January, 1907, when he became trainmaster of that division, and since October, 1907, he was trainmaster of the Delaware and Susquehanna divisions until his recent appointment as superintendent of the Allegheny and Bradford divisions of the same road.

Traffic Officers.

C. F. Verlander has been appointed soliciting freight agent of the Missouri Pacific, with office at New Orleans, La.

S. A. Stemmons has been appointed traveling passenger agent of the Trinity & Brazos Valley, with office at Dallas, Tex.

N. C. Osborne has been appointed contracting freight agent of the Seaboard Air Line, with office at New York, succeeding C. J. Kruger, resigned.

E. E. Ellis, district passenger agent of the Southern Pacific and the Oregon-Washington Railroad & Navigation Company at Seattle, Wash., has resigned, effective July 10, to engage in other work.

C. A. Rose has been appointed commercial agent of the Lake Shore & Michigan Southern, with headquarters at Toledo, Ohio, succeeding R. P. Hurley, resigned to accept service with another company.

J. M. Tyler, chief clerk in the passenger department of the Texas & Pacific, has been appointed traveling passenger agent of that road, with office at Birmingham, Ala., succeeding P. A. Baer, assigned to other duties.

W. E. Whitmore, commercial agent of the Seaboard Air Line, with office at Pittsburgh, Pa., is now in charge of the freight traffic moving to and from the Pittsburgh territory via all fast freight lines operated over the Seaboard Air Line.

Receivers having been appointed for the Denver, Laramie & Northwestern (see item under Executive, Financial and Legal Officers), S. K. Martin, general freight and passenger agent, has been appointed traffic manager for the receivers, with office at Denver, Colo.

F. A. McCormick, rate clerk of the Boston & Maine, has been appointed assistant general passenger agent, with office at Boston, Mass., succeeding F. T. Grant, resigned to go to another company. C. P. Kimball, assistant rate clerk, succeeds Mr. McCormick.

F. D. Claggett has been appointed assistant general freight agent of the Cincinnati, New Orleans & Texas Pacific, in charge of freight tariffs and rates, and J. B. Ford has been appointed assistant general freight agent in charge of the solicitation department, both with offices at Cincinnati, Ohio.

The general Southern agency of the Wabash having been removed from Atlanta, Ga., to Birmingham, Ala., E. H. Blair, traveling freight and passenger agent at Atlanta, has been appointed general agent, with office at Birmingham. Oscar Plunkett has been appointed traveling freight agent, and G. B. Harris has been appointed traveling passenger agent. George L. Word, general Southern agent at Atlanta, has resigned to engage in other business. Effective July 1.

Engineering and Rolling Stock Officers.

Henry W. Jacobs, assistant superintendent of motive power of the Atchison, Topeka & Santa Fe system, with office at Topeka, Kan., has resigned, effective July 1, to devote his time to private affairs.

D. R. Morris, general construction foreman in the signal department of the Illinois Central, has been appointed signal engineer of the El Paso & Southwestern, with office at El Paso, Tex., succeeding E. E. Backus, resigned, effective August 1.

W. R. Coln, roadmaster of the Rock Island Lines at El Dorado, Ark., has had his territory extended to mile post 107, including El Dorado yard. R. I. Gollehon has been appointed roadmaster of the territory from mile post 107 to Eunice, La., succeeding T. A. Palmer, resigned.

F. B. Marble, division engineer of the Michigan Central, at Detroit, Mich., has been appointed assistant chief engineer, succeeding R. D. Starbuck, resigned. G. H. Harris, division engineer, at St. Thomas, Ont., succeeds Mr. Marble, and W. O. Houston succeeds Mr. Harris.

E. J. Langford, principal assistant to the engineer, of the New York, Westchester & Boston, at New York, has been appointed acting chief engineer, succeeding J. L. Crider, resigned to become a construction superintendent of J. G. White & Company, engineers, New York City, in charge of the extension of the Oakland & Antioch, being built in California under the name of the Oakland, Antioch & Eastern, with headquarters for the present at Oakland, Cal.

J. R. Gould, superintendent motive power of the Virginia general division of the Chesapeake & Ohio and the Chesapeake & Ohio of Indiana, with office at Richmond, Va., has been appointed general superintendent of motive power, succeeding J. F. Walsh, who, upon his own request, has been relieved of the duties of general superintendent of motive power, as has already been announced in these columns. Mr. Walsh will remain in the service of the company in an advisory capacity.

Walter H. Flynn, who has been appointed superintendent of motive power of the Michigan Central, with office at Detroit, Mich., as has been announced in these columns, was born June 24, 1877, at Buffalo, N. Y., and he graduated from the mechanical engineering department of the Michigan Agricultural College in 1899. In September of the same year he began railway work with the Cleveland, Lorain & Wheeling, now part of the Baltimore & Ohio. From September, 1900, to March 1, 1902, he was a draftsman on the Michigan Central, and was subsequently assistant general foreman and general foreman of the same road at Jackson, Mich. He was appointed master mechanic, with office at St. Thomas, Ont., on September 1, 1907, from which position he was recently promoted to superintendent of motive power.

OBITUARY.

James E. Howard, secretary and treasurer of the Pere Marquette, with office at Detroit, Mich., died at Detroit on June 23.

W. K. High, formerly master mechanic of the Cleveland, Cincinnati, Chicago & St. Louis, with office at Mattoon, Ill., died at Mattoon on June 22. Mr. High was placed on the pension roll of the company last November.

W. Butler Duncan, chairman of the board of directors of the Mobile & Ohio, died on June 20, at his home in New York City. Mr. Duncan was born on March 17, 1830, at Edinburgh, Scotland, and attended school in Edinburgh and later graduated from Brown University, Providence, R. I., in the class of 1860. Five years after his graduation he became head of the banking firm of Duncan, Sherman & Company, and in 1874 was elected president of the Mobile & Ohio. Since 1888 he has been chairman of the board of directors of that company.

The Dutch have appropriated $15,000,000 for building a railway across the island of Sumatra. Forces for building it will be brought from Java, and the work is to be completed in six years.

Work is steadily progressing on the Anglo-Argentine Tramway, the new underground line in Buenos Aires, Argentina. About 1,000 men are employed on the excavations. Between the terminal points there will be 11 stations, all on the same plan, with two platforms in each. The terminal stations will be larger and contain three platforms.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

THE CHESAPEAKE & OHIO has ordered 25 mikado locomotives from the American Locomotive Company.

THE HUNAN-YUEH-HAN, China, has ordered 3 mogul locomotives from the Baldwin Locomotive Works.

THE CENTRAL RAILWAY OF BRAZIL has ordered 6 consolidation locomotives from the Baldwin Locomotive Works.

THE LOUISVILLE, HENDERSON & ST. LOUIS has ordered 3 ten-wheel locomotives from the Baldwin Locomotive Works.

THE DENVER & RIO GRANDE will place orders at once for 16 Mallet locomotives, 14 mikado locomotives and 6 passenger locomotives.

THE VULCAN IRON WORKS, Wilkesbarre, Pa., has received orders for locomotives as follows: Winston Brothers Company, Minneapolis, Minn., 1 locomotive; Kentucky Portland Cement & Sand Company, 1 locomotive.

THE PENNSYLVANIA LINES WEST have ordered 32 consolidation locomotives and 5 Pacific type locomotives from the company's shops at Altoona, Pa., and 13 switching locomotives from the Lima Locomotive & Machine Company.

THE MONTPELIER & WELLS RIVER has ordered 2 eight-wheel locomotives from the American Locomotive Company. The dimensions of the cylinders will be 18 in. x 24 in., the diameter of the driving wheels will be 69 in., and the total weight in working order will be 128,000 lbs.

MITSUI & COMPANY, New York, have ordered 1 six-wheel switching locomotive from the American Locomotive Company. The dimensions of the cylinders will be 13 in. x 18 in., the diameter of the driving wheels will be 36 in., and the total weight in working order will be 62,000 lbs.

THE CENTRAL OF NEW JERSEY has ordered 2 eight-wheel switching locomotives from the American Locomotive Company. The dimensions of the cylinders will be 23½ in. x 30 in., the diameter of the driving wheels will be 55 in., and the total weight in working order will be 227,000 lbs.

THE CARNEGIE STEEL COMPANY, Pittsburgh, Pa., has ordered 2 six-wheel switching locomotives from the American Locomotive Company. The dimensions of the cylinders will be 20 in. x 26 in., the diameter of the driving wheels will be 51 in., and the total weight of the locomotives in working order will be 151,000 lbs.

THE GRAND TRUNK has ordered 41 Pacific type locomotives from the Montreal Locomotive Works. All these locomotives will be equipped with superheaters, will have 23 in. x 28 in. cylinders, and in working order will weigh 223,000 lbs.; 31 locomotives will have 69 in. driving wheels, and 10 locomotives will have 73 in. driving wheels.

CAR BUILDING.

THE SOUTHERN RAILWAY has ordered 4 dining cars from the Barney & Smith Car Company.

THE LEHIGH VALLEY is in the market for three 70-ft. combination baggage and express cars.

THE DENVER & RIO GRANDE will place orders at once for 1,200 cars, including 700 box cars, 350 coal cars, 100 stock cars and 50 cabooses.

THE ST. LOUIS ROCKY MOUNTAIN & PACIFIC is said to be in the market for 500 steel underframes. This item has not been confirmed.

THE PHILADELPHIA & READING has ordered 500 gondola cars from the Cambria Steel Company. These cars were mentioned in the *Railway Age Gazette* of June 21 as having been bought by the Central of New Jersey.

Supply Trade News.

A bill asking the foreclosure of the property of the Allis-Chalmers Company, Milwaukee, Wis., in Chicago, has been filed in the United States district court, by the Continental & Commercial National Bank.

W. A. Austin, for a number of years in the enginering department of the Baldwin Locomotive Works, Philadelphia, Pa., with office in that city, has resigned that position to go to the Lima Locomotive & Machine Company, Lima, Ohio, as chief mechanical engineer, with office at Lima.

The Collins Metallic Packing Company, Philadelphia, Pa., has received orders for Collins wheel flange lubricators for the 22 locomotives ordered by the Delaware, Lackawanna & Western from the American Locomotive Company, New York, which were mentioned in the *Railway Age Gazette* of March 15.

The Track Supply Association will hold an exhibit in connection with the thirtieth annual convention of the Roadmasters' and Maintenance of Way Association at the Hotel Statler, Buffalo, N. Y., September 9 to 13. The association is anxious to obtain at once the names of all desiring to exhibit. Particulars may be had by addressing F. A. Preston, secretary and treasurer, P. & M. Company, Chicago.

The McKeen Motor Car Company, Omaha, Neb., has recently shipped two all-steel gasolene motor cars to the Victorian State Railways, Australia, where they were placed in operation for cross-country and branch line service. The interior finish is polished mahogany, and the walls are insulated to retain an even temperature. The cars are divided into six compartments, a semi-circular rear end forming an observation car.

Edward Henry Keating, formerly city engineer of Toronto, Ont., and later general manager of the Toronto Railway, died at his home in Toronto on June 17 at the age of 68. He had been failing in health for some time. Mr. Keating obtained his technical training under George Whiteman, provincial engineer for Nova Scotia, and under Sir Sanford Fleming. In 1892 he was made city engineer of Toronto, in which capacity he distinguished himself. In 1898 he resigned that position to become general manager of the Toronto Railway, which position he held until 1904. He then was made manager and engineer for the Mackenzie and Mann syndicate in Mexico. Since 1905 Mr. Keating has been identified with Keating & Breithaupt, Toronto, consulting engineers.

The M-C-B Company, Chicago, recently incorporated under the laws of Illinois, will have the following officers and stockholders: President, Walter E. Marvel; secretary and treasurer, Erle C. Cowgill; vice-president, Frank A. Buckley. Mr. Marvel was for several years manager of the St. Louis branch of the Buda Company, Chicago, and later western sales manager of the Detroit Seamless Steel Tubes Company, Detroit, Mich. Mr. Cowgill is assistant to President Markham of the Illinois Central, and will sever his connection with that road July 1. Mr. Buckley is western representative of the Armspear Company, New York, and the Central Railway Signal Company of Pittsburgh. The new company derives its name from the first letters of the surnames of its officers and stockholders. The Chicago offices will be located in the McCormick building. The M-C-B Company, in addition to making several of its own patented devices, has secured the exclusive sole rights in western territory from some of the foremost manufacturers of the following lines: Miscellaneous cars for traction lines; snow plows, flangers, sweepers and ice diggers for steam and electric lines; pneumatic tools for railway shop work; track and bonding drills, tool grinders, cattle guards, jacks, handmade chains, locomotive water gages, track tools, anti-rail creepers, portable kerosene lights, etc.

TRADE PUBLICATIONS.

Brake Beams.—The Damascus Brake Beam Company, Cleveland, Ohio, has issued a 78-page excellently printed and illustrated catalogue including drawings and photographs of, and descriptive data and specifications regarding, the "Waycott Special," "Anglrod" and "Damascus" brake beams, the "Brascott" freight car ladder and miscellaneous appliances.

Railway Construction.

New Incorporations, Surveys, Etc.

Astoria Southern.—This company has begun condemnation proceedings, it is said, to secure a right of way in the Klaskanine river district, Ore. The plans call for building about six miles towards Nehalem valley. The company was incorporated to build to the Nehalem valley and eventually to Tillamook. The original incorporators included: L. W. Humphreys, W. E. Thomas and O. J. Kraemer, all of Portland, Ore. The Western Cooperage Company is said to be back of the project.

Canadian Northern.—This company is offering stock, the proceeds of which are required for the acquisition, construction or extension and equipment by the Canadian Northern System Terminals, Ltd., of certain terminal and hotel facilities at important central points on the system, to be used by the Canadian Northern under permanent lease or agreement. (See an item under Railway Financial News.)

An officer is quoted as saying that the new construction to be started this year will include 500 miles of extensions in Alberta, and probably 1,300 miles of new track on a branch to Thief River Landing.

Canadian Northern System Terminals, Ltd.—See Canadian Northern.

Canadian Pacific.—Bids are being asked for clearing an extension from Gimli, Man., north to Riverton on the Icelandic river. The Canadian government has granted a subsidy of from $3,200 to $6,400 a mile for building this extension, not to exceed 35 miles, in place of the subsidy granted in 1906.

A grading contract has been given to Dutton & Timson, Winnipeg, Man., for work between Kerrobert, Sask., and Reford. The Canadian board of railway commissioners has approved the location plans for the first 20 miles. J. G. Sullivan, chief engineer, Western lines, Winnipeg, Man. (December 8, p. 1188.)

The Canadian government has entered into an agreement with the Southampton Railway to build from a point on the Gibson branch of the Canadian Pacific near Millville, N. B., to a point on the St. John river near Pokiok bridge, 13 miles. The New Brunswick government will guarantee the bonds to the extent of $10,000 a mile on condition that the line will be leased to the Canadian Pacific. H. H. McNally is president, and D. Brown, chief engineer, of the Southampton Railway. (May 3, p. 1027.)

A contract has been given to Deeks & Hinds, Toronto, Ont., for the grading and bridge work on 60 miles of double-tracking work between Port Arthur, Ont., and Sudbury. The work is to be finished before the coming winter.

Chicago, Milwaukee & Puget Sound.—An officer writes that contracts have been given to Winston Brothers, Minneapolis, Minn., and to Twohy Brothers, Portland, Ore., to build from Lewiston, Mont., to Great Falls, 137 miles. The work will be fairly heavy. E. O. Reeder, chief engineer, Seattle, Wash. (June 14, p. 1364.)

Dominion Atlantic.—A subsidy agreement has been entered into with the Canadian government to build a one-mile branch to the government pier at Canning, N. S. P. Gifkins, general manager, Kentville.

Hudson Bay Railway.—Bids are wanted on August 1, by L. W. Jones, secretary of the Department of Railway and Canals, Ottawa, Ont., to build a section of about 68 miles from Thicket Portage to Split Lake Junction. Plans are on file at the office of the chief engineer of the Department of Railways and Canals, Ottawa, and at the office of John Armstrong, chief engineer of the Hudson Bay Railway, Winnipeg, Man. According to press reports F. D. Hazen, a Dominion government engineer, is now on his way to Port Nelson, Keewatin, to commence work on the railway terminal at that place. (June 7, p. 1262.)

Joliette & Lake Manuan Colonization.—The Canadian government has granted a subsidy of from $3,200 to $6,400 a mile, to build from Joliette, Que., to Lake Manuan, 60 miles. The Enterprise Construction Company of New York and Ottawa is building the line. J. N. Patton, chief engineer, St. Felix de Valoix, Que. (May 3, p. 1027.)

Kansas City, Mexico & Orient.—According to press reports, construction work is to be resumed on the extension

from Granada, Tex., to Fort Stockton, 32 miles. The contract and receiver's certificates, providing for the extension, have been approved by the court. It is understood that as soon as this section is finished, construction work will be carried out on the section southwest to Alpine, 62 miles. (June 7, p. 1262.)

LEHIGH & NEW ENGLAND.—This company will open for business on July 8 the extension from Danielsville, Pa., west to Tamaqua, 33 miles. Trackage rights have been secured over the Lehigh Coal & Navigation Company's line between Tamaqua and Hauto, also on a branch between Lansford and Summit Hill. F. W. Gilcreast, chief engineer, Mauch Chunk. (June 7, p. 1262.)

LOUISVILLE & NASHVILLE.—According to press reports, surveys are being made for a branch from Irvington, Ala., to Alabama Port, Ala. W. H. Courtenay, chief engineer, Louisville, Ky.

NEBRASKA & NORTHWESTERN.—This company expects to start survey work soon on a line from Bassett, Neb., northwest to Springview, about 25 miles. The plans call for building a bridge over the Niobrara river in Keyapaha and Rock counties. C. E. Leahr, Springview, is interested. (See Nebraska Roads, February 23, p. 360.)

NEW ORLEANS & WESTERN (Electric).—Incorporated in Louisiana, with $1,500,000 capital, to build from Gretna, La., west to Waggaman, about 10 miles. C. D. Warren, president, and F. Howard McCabe, secretary.

NORTH RAILWAY.—This company, which was incorporated in Quebec under the name of the Northeastern Railway, to build from Montreal, Que., northwest to James Bay, about 500 miles, is making preliminary surveys, and it is expected that contracts for building the line will be let this year. The Canadian government has granted a subsidy for building from a point near Montreal to the National Transcontinental, thence northerly and northwesterly 300 miles; the Quebec government has also granted a subsidy. F. H. Clergue, president, Montreal.

NORTHEASTERN RAILWAY.—See North Railway.

OREGON ROADS.—Surveys are being made for a line from Metolius, Ore., southeast to Prineville, about 25 miles. It is expected that the work will be started early in August. Stanger & Company, St. Louis, Mo., are back of the project.

SOUTHAMPTON RAILWAY.—See Canadian Pacific.

SOUTHERN PACIFIC.—According to press reports, this company will start work at once laying 90 miles of second-track through Tehachapi Pass, Cal. One-half of the cost of the work is to be paid for by the Santa Fe, which will also use the new track.

STANTON & CAVE BLUFF.—Incorporated in Missouri, with $100,000 capital, to build a narrow-gage line from Stanton, Mo., to a point on the Meramec river, 4½ miles. W. H. Bauman, J. P. Boland and J. P. Burleigh, St. Louis, Mo.; P. Dunn, Stanton; and L. J. Mattock, St. James, are interested.

SUGARLAND RAILROAD.—The Railroad Commission of Texas has approved an issue of bonds on the 38 miles of line completed between Ramsey, Tex., and Harlem State Farms, and to pay for the extension from Cabell Station to Rogers. W. T. Eldridge, president and general manager, Sugerland. (See an item under Railway Financial News.)

VIRGINIA-CAROLINA.—An officer is quoted as saying that plans have been made to build an extension from Konnarock, Va., southeast through ore lands in a mountainous section of Virginia and North Carolina to Wilkesboro, N. C., about 40 miles.

YAMPA VALLEY.—Under this name, residents of Craig, Colo., and Denver, are planning to build from a connection with the Denver, Northwestern & Pacific at Steamboat Springs, Colo., west to Craig, about 40 miles. J. J. Argo is said to be back of the project.

RAILWAY STRUCTURES.

ALLENTOWN, PA.—A contract has been given to McArthur Brothers, New York, for the construction of the Eighth street bridge in Allentown. The bridge to be built by the Allentown Bridge Company, a subsidiary of the Lehigh Valley Transit Company, with a view to inaugurate a fast service between Allentown and Philadelphia. The contract is said to be worth $300,000. (January 5, p. 37.)

BOONE, IA.—The Fort Dodge, Des Moines & Southern will erect a steel trestle to replace the present wooden bridge over the Des Moines river at an estimated cost of $60,000.

BROCKWAYVILLE, PA.—See East Salamanca, N. Y.

DALLAS, TEX.—Tentative plans have been agreed on for the construction of a new union passenger station at this point for the use of ten railways. The erection of the station has been ordered by the state railway commission.

EAST SALAMANCA, N. Y.—The Buffalo, Rochester & Pittsburgh has given contracts for improvement work as follows: Brick passenger station and office building at East Salamanca, contract let to George B. Elwell, Wellsville, N. Y.; brick passenger station at Warsaw, contract let to Porter & Nicholson, Warsaw; brick passenger station at Brockwayville, Pa., contract let to G. F. Miller & Son, Salamanca; for lining the Indiana tunnel with masonry at Indiana, Pa., contract let to P. G. McGovern, Indiana.

EL PASO, TEX.—The El Paso & Southwestern has awarded a contract to W. L. Pearson & Company, of Houston, for the construction of a new freight station and warehouse and a roundhouse.

GOWANDA, N. Y.—The New York Public Service Commission, Second district, has ordered the elimination of the grade crossing over the Erie Railroad in Gowanda. The highway is to be carried under the tracks by means of a subway, with a clear headroom of 13 ft. The order was made following an application by the state commission of highways, and the state's proportion of this elimination will be paid from the good roads fund.

GREEN BAY, WIS.—It is reported that the Chicago & North Western will build a 60-stall roundhouse and machine shop.

INDIANA, PA.—See East Salamanca, N. Y.

KALAMAZOO, MICH.—The Michigan Central is to begin work at once on the construction of a large roundhouse and machine shop.

KANSAS CITY, MO.—The Kansas City Terminal Railway has awarded a contract to the Concrete Foundation Company of Kansas City for concrete work on the South Broadway viaduct in connection with the new terminal station, involving an expenditure of approximately $50,000.

MILWAUKEE, WIS.—The Chicago & North Western will begin work at once on an addition to its freight house facilities to cost about $150,000, and will elevate its tracks from National avenue to the Kinnickinnic river and along Milwaukee river, at a cost of about $1,000,000.

NEWPORT NEWS, VA.—The Chesapeake & Ohio has decided to build a new steel and concrete pier at Newport News, to cost about $1,500,000.

NEW YORK, N. Y.—A contract has been given to the North Eastern Construction Company, New York, to begin work on the new station of the Brooklyn Bridge in the borough of Manhattan. The contract is for excavation and masonry work and includes connecting the tracks of the subway under the new Municipal building with the Brooklyn Rapid Transit tracks. The contract for the super-structure has not yet been let.

NORFOLK, VA.—The union passenger station of the Norfolk Terminal Railway, at Norfolk, was opened for business on June 1.

PHILADELPHIA, PA.—Plans are made for putting up a new pier between Fitzwater and Catharine streets for the Philadelphia & Reading. The improvements will cost about $300,000.

PORT NELSON, KEEWATIN.—See Hudson Bay Railway under Railway Construction.

SASKATOON, SASK.—The Canadian Pacific has asked for bids for a four-story office building.

TUCSON, ARIZ.—Work has been started on the erection of machine shops for the Southern Pacific, to cost $20,000, and it is estimated that $20,000 additional will be expended for new machinery.

WARSAW, N. Y.—See East Salamanca, N. Y.

Railway Financial News.

Argentine Central.—This 16-mile road was sold for $5,000 on June 15 to William Rogers, of Georgetown, Col. It is 3 ft. gage.

Atlanta, Birmingham & Atlantic.—The receivers have asked permission of the court to issue $5,000,000 receivers' certificates for improvements. The new securities have been taken by Clark, Dodge & Company, and White, Weld & Company, New York. There are $3,250,000 5 per cent. receivers' certificates due July 1.

Canadian Northern.—There was recently offered in London £1,438,356 ($7,191,780) 4 per cent. perpetual consolidated debenture stock at 95. The following is taken from a statement issued by the railway company:

The proceeds of the present issue are required in anticipation of a great increase in business on the opening of the through tfanscontinental service, for the initial acquisition, construction or extension and equipment by the Canadian Northern System Terminals, Ltd., of certain terminal and hotel facilities at important central points on the system, including Quebec, Montreal, Ottawa, Toronto, Hamilton, Sudbury, Port Arthur, Winnipeg, Brandon, Regina and Calgary. These terminal and hotel properties are, or as acquired will be, vested in the Canadian Northern System Terminals, Ltd., but will be used by the Canadian Northern system under permanent lease or agreement. The Canadian Northern System Terminals, Ltd., has created first mortgage securities to the extent of $7,000,000, which it has sold to the Canadian Northern and which have been deposited with the trustees for the debenture stock. The present issue of £1,438,356 ($7,191,780) of debenture stock is being made against these securities. It is expected that through trains will be running from Quebec to Vancouver early in the spring of 1914.

Chicago & Alton.—Stockholders are to vote on August 19 on the question of authorizing $20,000,000 new 6 per cent. general mortgage bonds of July 1, 1912-1932. The bonds are to be issued at the discretion of the directors either for refunding purposes or for extensions or new acquisitions.

Erie.—The New York Public Service Commission, Second district (up state), has approved the issue of $450,000 5 per cent. notes of June 1, 1912, maturing $90,000 annually from June 1, 1913, to 1917 inclusive. The proceeds are to be used for ore unloading and handling machines at Cuyahoga river, Ohio, and Randall.

Galveston, Harrisburg & San Antonio.—The Texas railway commission has approved the issue of $1,518,000 Galveston-Victoria division 6 per cent. bonds to retire and cancel $1,518,000 New York, Texas & Mexico bonds. The Southern Pacific owns all of the $9,022,000 now outstanding (including the newly authorized) Galveston-Victoria bonds.

Great Northern.—W. H. Dunwoody, vice-president of the Washburn-Crosby (flour) Company, and President Carl H. Gray, of the Great Northern, have been elected directors of the Great Northern, succeeding R. I. Farrington and Edward Sawyer, resigned.

Hocking Valley.—A semi-annual dividend of 4 per cent. has been declared on the stock, nearly all of which is owned by the Chesapeake & Ohio. This makes 7 per cent. paid in the 1912 fiscal year ended June 30. Previous to the declaration of a 3 per cent. semi-annual dividend in November, 1911, the company had paid 4 per cent. dividends annually.

Kanawha & Michigan.—White, Weld & Company, New York, have bought, subject to completion of legal details, $1,200,000 equipment trust 4½ per cent. bonds of July 1, 1912, maturing $60,000 semi-annually from January 1, 1913, to July 1, 1922. These bonds are secured on new equipment costing $1,333,400, the company having paid in cash 10 per cent. of the cost of new equipment. The Chesapeake & Ohio and the Lake Shore & Michigan Southern own more than 95 per cent. of the stock of the Kanawha & Michigan.

Lake Erie & Eastern.—This company and the Lake Erie, Youngstown & Southern, both of which are controlled jointly by the Pittsburgh & Lake Erie and the Mahoning Coal Railroad, have merged.

New York Central & Hudson River.—This company has announced that, having purchased a large majority of the outstanding stock of the New York & Harlem, the Rome, Watertown & Ogdensburg and the Utica & Black River, it will, on June 30, withdraw its offer to pay $175 per $50 share for New York & Harlem, $128 per $100 share for Rome, Watertown & Ogdensburg, and $180 per $100 share for Utica & Black River.

Pere Marquette.—Judge Sessions has refused to consider the objections of the Farmers Loan & Trust Co., and has given permission to the receivers of the Pere Marquette to issue $3,500,000 receivers' certificates.

Pittsburgh & Lake Erie.—See Lake Erie & Eastern.

Sugarland Railroad.—The Texas railway commission has approved the issue of $493,837 bonds secured on the 38 miles of road completed between Ramsey and Harlem State Farms. The commission has also approved $296,834 "construction bonds" to pay for the 24-mile extension from Cabell station to Rogers.

Southern Pacific.—See Galveston, Harrisburg & San Antonio.

Tampa & Gulf Coast.—The Florida *Times Union* quotes President Charles H. Brown as saying that the Tampa & Gulf Coast has bought the Port Richey Railroad. The Port Richey runs from Tarpon Springs, Fla., to Port Richey, eight miles.

Wabash Railroad.—The *Wall Street Journal* says it is now planned, in the reorganization of the Wabash, to retire the present outstanding first refunding and extension 4 per cent. bonds by the payment of 50 per cent. in cash and 50 per cent. in new 4 per cent. preferred stock. The *Wall Street Journal* also says that the cash necessary to carry out this plan will be raised through the assessment of $40 per share on all outstanding stock.

Wabash-Pittsburgh Terminal.—See West Side Belt.

West Side Belt.—Judge Charles P. Orr in the United States district court handed down an order on June 26 directing the receivers to sell the property on the application of the Pittsburgh Construction Company, which holds a judgment note against the railway for $432,000. Louis Marshall, of Untermyer & Marshall, New York, appearing for the reorganization committee of the Wabash-Pittsburgh Terminal, argued against the sale. He said that to compel the disposal of the railway would utterly defeat the plans of the committee, which would soon be able to borrow $11,000,000 and reorganize both the Wabash-Pittsburgh Terminal and the West Side Belt. Judge Orr's order directed the receivers to sell the property to raise money with which to pay the company's indebtedness.

During 1910 the French railway to Yunnan, China, was completed. This line, known as the Yunnan-Anam Railway, extends from Laokai, on the China-Tonkin frontier, to Yunnan, the capital of the province, a distance of about 310 miles. It was opened to traffic in April, 1910. The natives have been quick to realize what the railway means to them, and are projecting a number of branch lines, among them being a line from Mengtsze-Pichichai to the Kochiu tin mines, a distance of about 30 miles. This line will have an abundance of traffic and will probably be profitable at once. Of the projected lines, the most interesting are the lines planned to connect the Chinese north and south system and the French and British lines to the south. The connection with the French lines to the south at Yunnan is not only practicable, but would be realized in a very short time if the Chinese would grant concessions to the French interests involved. This proposed line of development runs both to the north from Yunnan to Luchow, with the plan of connecting with the Chinese east and west lines along the Yangtze river and thus with the northern system, and also to the northeast to connect the French lines with the Kwangtung system, and thence to the systems of the north. When completed this line will be of great importance to the provinces through which it will run.

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